

INTEGRALE RICOSTRUZIONE PARCHI EOLICI "Vulturino-Volturara"

**ADEGUAMENTO TECNICO IMPIANTO EOLICO MEDIANTE INTERVENTO DI REPOWERING
DELLE TORRI ESISTENTI E RIDUZIONE NUMERICA DEGLI AEROGENERATORI**



Edison Rinnovabili Spa
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Opera	A Progetto di Integrale Ricostruzione di n. 1 impianto eolico composto da 6 aerogeneratori da 6,6 MW per una potenza complessiva di 39,6 MW nei Comuni di Vulturino, Volturara Appula ed opere di connessione nel comune di Alberona alle località "Piano dei Galli - Passo del Lupo" con smantellamento di n. 20 aerogeneratori di potenza in esercizio pari a 13,08 MW.				
Oggetto	Nome Elaborato: VIA_03_PNXF3G0-SHFCK_Shadow flickering		Folder: VIA_03_Relazioni Specialistiche		
	Descrizione Elaborato: Shadow flickering				
00	Novembre 2023	Emissione per progetto definitivo	VEGA	Arch. A. Demaio	Edison Rinnovabili SpA
Rev.	Data	Oggetto della revisione	Elaborazione	Verifica	Approvazione
Scala:	----	A) Integrale Ricostruzione Vulturino - Volturara			
Formato:		Codice progetto AU PNXF3G0			

Integrale Ricostruzione Parco Eolico “Volturino-Volturara”.
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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 Spa** intende realizzare nei comuni Volturara Appula e Volturino (FG), nello specifico la proposta progettuale prevede la dismissione dell’impianto esistente costituito da n. 20 aerogeneratori nel comune di Volturino (n. 18 WTG modello Vestas V47, diametro 47m, hub 55m e potenza unitaria 660 kW/WTG + n. 2 WTG modello Enercon E40, diametro 44m, hub 46m e potenza unitaria 600 kW/WTG) per una potenza complessiva di 13,08 MW, e la realizzazione di un nuovo impianto costituito da n. 6 aerogeneratori di diametro rotore 155m, altezza al mozzo 102,5 m, per una potenza nominale di 6,6 MW e complessiva 39,6 MW)

Nome WTG	WGS 84 UTM33	
	Est	Nord
1	507540	4591960
2	507893	4591208
3	508305	4590479
4	508699	4591514
5	509003	4591136
6	509104	4590484

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

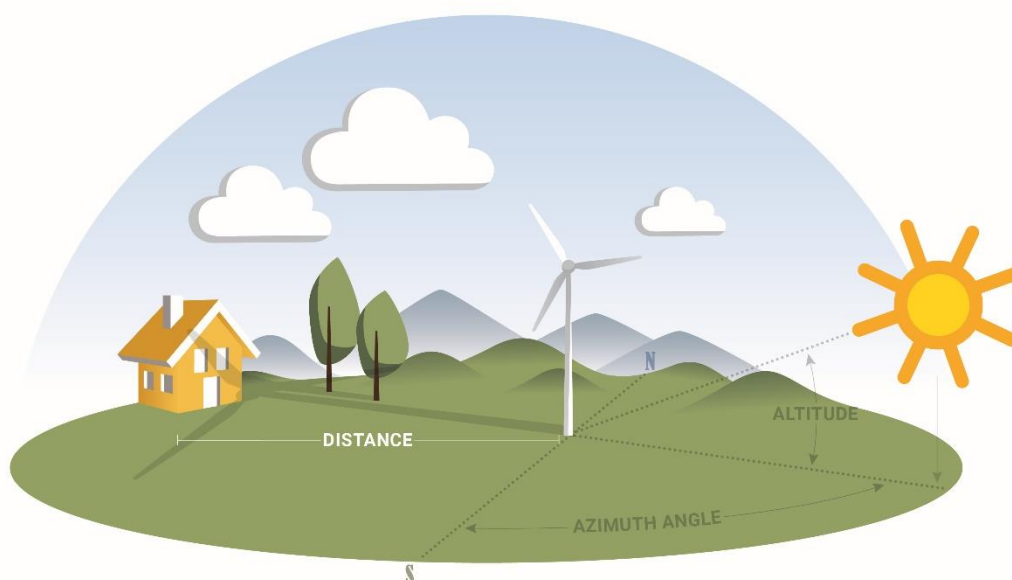
Per lo studio dello Shadow Flicker è stata presa in considerazione una SIEMENS-GAMESA SG155 che ha le medesime caratteristiche dimensionali dell’aerogeneratore di progetto avente un’altezza al mozzo pari a 102,5 metri ed un diametro del rotore pari a 155 metri.

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

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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*
- *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

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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.

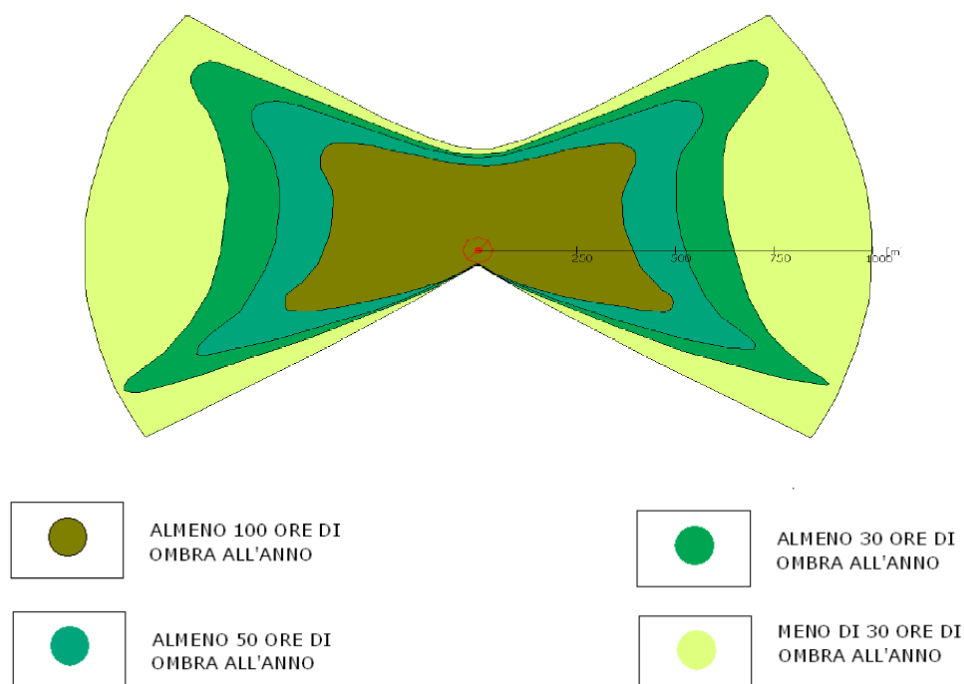


Figura 2: Evoluzione annuale tipo dell'ombra di una pala

Considerati i pochi precedenti esistenti (Germania) e le ipotesi così penalizzanti con cui è stata 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 questo come limite da non superarsi.**

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 12 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:

- 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.
- Posizioni geografiche di recettori con dettaglio dimensionale delle aree più esposte.** Sono i ricettori 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.

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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.

Ricettore	Name WindPro		Coordinate		Ore di ombra x anno	Giorni di ombra x anno	Max ore ombra x giorno
	ID	Name	E	N			
R36	1	A	508389	4592061	82:08	100	0:56
R84	2	B	508637	4590754	147:26	162	1:27
R93	3	C	509465	4590850	96:13	110	1:14
R94	4	D	509404	4590807	116:16	103	1:27
R95	5	E	509420	4590783	141:36	120	1:28
R96	6	F	509380	4590759	167:05	133	1:38
R97	7	G	509347	4590754	170:37	127	1:46
R101	8	H	509609	4590872	155:50	187	1:00
R105	9	I	509503	4591014	0:00	0	0:00
R108	10	J	509527	4591045	0:00	0	0:00
R109	11	K	509572	4591091	0:00	0	0:00
R110	12	L	509548	4591066	0:00	0	0:00

Tab. 1 – Coordinate ricettori UTM-WGS84

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 recettori evidenziati, 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”:

NESSUN RICETTORE DI CATEGORIA CATASTALE “A” E’ INTERESSATO DAL FENOMENO

6. CONCLUSIONI E RACCOMANDAZIONI

In conclusione, si può affermare che i risultati ottenuti dell’elaborazione evidenziano, pur considerando le condizioni più sfavorevoli, che le turbine di progetto generano effetti di shadow flickering i cui impatti

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risultano essere nulli per la maggior parte dei recettori individuati, e piuttosto modesti per gli altri e che comunque quelli che interessano ore superiori a 30 ore annui NON APPARTENGONO ALLA CATEGORIA CATASTALE DI TIPO A.

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.

6. 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. Calendar per WTG, graphical: grafico dell’analisi giornaliera dell’effetto “flickering” indotto da ogni aerogeneratore sui recettori;
6. Map: mappa delle aree soggette ad ombreggiamento.

SHADOW - Main Result

Calculation: VV

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_VolturinoVolturaraMotta

Obstacles used in calculation

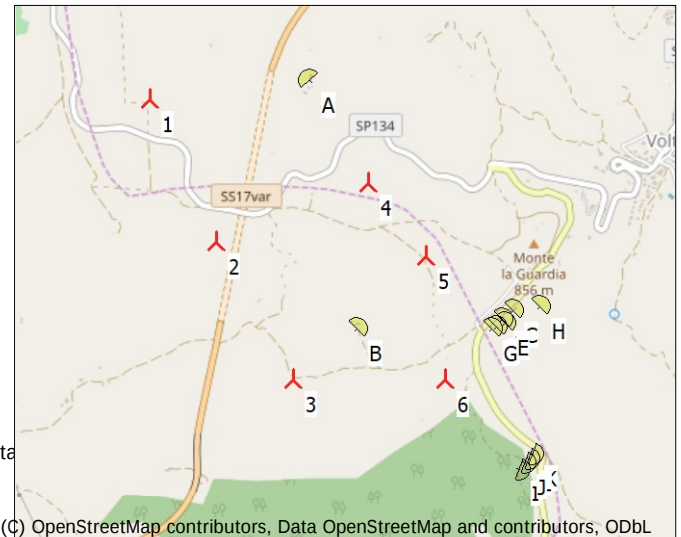
Receptor grid resolution: 1,0 m

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	507.539	4.591.959	727,7	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	102,5	2.042	8,8
2	507.892	4.591.207	721,9	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	102,5	2.042	8,8
3	508.305	4.590.478	720,1	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	102,5	2.042	8,8
4	508.698	4.591.514	843,4	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	102,5	2.042	8,8
5	509.002	4.591.135	841,8	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	102,5	2.042	8,8
6	509.104	4.590.484	814,8	Siemens Gamesa SG 6.6-...	Yes	Siemens Gamesa	SG 6.6-155-6.600	6.600	155,0	102,5	2.042	8,8



Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation	Degrees from	Slope of	Direction mode	Eye height
			[m]	[m]	[m]	a.g.l.	south cw	window		(ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
A	508.389	4.592.061	685,2	1,0	1,0	1,0	-40,0	90,0	Fixed direction	2,0
B	508.637	4.590.754	756,4	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
C	509.465	4.590.850	834,0	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
D	509.404	4.590.807	834,3	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
E	509.420	4.590.783	832,7	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
F	509.380	4.590.759	831,9	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
G	509.347	4.590.754	835,0	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
H	509.609	4.590.872	825,5	1,0	1,0	1,0	45,0	90,0	Fixed direction	2,0
I	509.503	4.590.014	839,6	1,0	1,0	1,0	110,0	90,0	Fixed direction	2,0
J	509.527	4.590.045	840,1	1,0	1,0	1,0	110,0	90,0	Fixed direction	2,0
K	509.572	4.590.091	840,8	1,0	1,0	1,0	110,0	90,0	Fixed direction	2,0
L	509.548	4.590.066	840,7	1,0	1,0	1,0	110,0	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	82:08	100	0:56
B	147:26	162	1:27
C	96:13	110	1:14
D	116:16	103	1:27
E	141:36	120	1:28
F	167:05	133	1:38

To be continued on next page...

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas
Via delli Carri, 48
IT-71100 Foggia
+39 0881 756251
VEGA / info@studiovega.org
Calculated:
18/10/2023 09:25/3.5.584

SHADOW - Main Result

Calculation: VV

...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]
G	170:37	127	1:46
H	155:50	187	1:00
I	0:00	0	0:00
J	0:00	0	0:00
K	0:00	0	0:00
L	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: 102,5 m (TOT: 180,0 m) (17)	0:00
2	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (18)	8:30
3	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (19)	139:20
4	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (20)	82:08
5	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (21)	69:45
6	Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (22)	214:45

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.

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

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IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar

Calculation: VVShadow receptor: A - Shadow Receptor: 1,0 × 1,0 Azimuth: -40,0° Slope: 90,0° (22)

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	07:27 16:40	52	09:40 (4) 10:32 (4)	07:13 17:15	44	09:53 (4) 10:37 (4)	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:31	55	09:25 (4) 10:20 (4)	
2	07:27 16:41	53	09:40 (4) 10:33 (4)	07:12 17:16	43	09:54 (4) 10:37 (4)	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:28	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	09:37 (4) 09:51 (4)	07:07 16:31	54	09:26 (4) 10:20 (4)
3	07:27 16:42	52	09:41 (4) 10:33 (4)	07:11 17:18	40	09:55 (4) 10:35 (4)	06:33 17:52	06:42 19:27	05:56 19:59	05:28 20:28	05:31 20:38	05:56 20:16	06:27 19:32	06:58 18:40	06:33 16:54	09:33 (4) 09:55 (4)	07:08 16:31	55	09:26 (4) 10:21 (4)
4	07:27 16:43	53	09:41 (4) 10:34 (4)	07:10 17:19	38	09:56 (4) 10:34 (4)	06:32 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	09:30 (4) 09:58 (4)	07:09 16:31	54	09:27 (4) 10:21 (4)
5	07:27 16:44	54	09:41 (4) 10:35 (4)	07:09 17:20	35	09:58 (4) 10:33 (4)	06:30 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	09:29 (4) 10:01 (4)	07:10 16:31	57	09:27 (4) 10:21 (4)
6	07:27 16:45	53	09:42 (4) 10:35 (4)	07:08 17:21	31	10:00 (4) 10:31 (4)	06:28 17:55	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:27	07:01 18:35	06:37 16:50	09:27 (4) 10:03 (4)	07:11 16:30	53	09:28 (4) 10:21 (4)
7	07:27 16:46	54	09:42 (4) 10:36 (4)	07:06 17:23	26	10:01 (4) 10:27 (4)	06:27 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:37	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	09:26 (4) 10:04 (4)	07:12 16:30	54	09:28 (4) 10:22 (4)
8	07:27 16:47	54	09:43 (4) 10:37 (4)	07:05 17:24	20	10:04 (4) 10:44 (4)	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	09:24 (4) 10:05 (4)	07:13 16:30	53	09:29 (4) 10:22 (4)
9	07:26 16:48	55	09:42 (4) 10:37 (4)	07:04 17:25	12	10:08 (4) 10:20 (4)	06:24 17:59	06:32 19:33	05:49 20:05	05:26 20:32	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	09:24 (4) 10:08 (4)	07:14 16:30	52	09:30 (4) 10:22 (4)
10	07:26 16:49	54	09:43 (4) 10:37 (4)	07:03 17:26			06:22 18:00	06:30 19:34	05:47 20:06	05:26 20:33	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29	06:42 16:46	09:23 (4) 10:08 (4)	07:15 16:30	53	09:30 (4) 10:23 (4)
11	07:26 16:50	55	09:43 (4) 10:38 (4)	07:02 17:28			06:20 18:01	06:28 19:35	05:46 20:07	05:26 20:33	05:36 20:35	06:04 20:06	06:35 19:18	07:07 18:27	06:43 16:45	09:22 (4) 10:09 (4)	07:16 16:30	52	09:31 (4) 10:23 (4)
12	07:26 16:51	55	09:43 (4) 10:38 (4)	07:00 17:29			06:19 18:02	06:27 19:36	05:45 20:08	05:26 20:34	05:36 20:35	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	09:23 (4) 10:11 (4)	07:16 16:30	52	09:31 (4) 10:23 (4)
13	07:25 16:52	56	09:43 (4) 10:39 (4)	06:59 17:30			06:17 18:03	06:25 19:37	05:44 20:09	05:26 20:34	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	09:22 (4) 10:12 (4)	07:17 16:31	51	09:32 (4) 10:23 (4)
14	07:25 16:53	56	09:44 (4) 10:40 (4)	06:58 17:31			06:15 18:05	06:24 19:38	05:43 20:10	05:26 20:35	05:38 20:34	06:07 20:02	06:38 19:13	07:10 18:22	06:46 16:42	09:21 (4) 10:12 (4)	07:18 16:31	51	09:33 (4) 10:24 (4)
15	07:25 16:54	56	09:44 (4) 10:40 (4)	06:57 17:33			06:14 18:06	06:22 19:40	05:42 20:11	05:26 20:35	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	06:48 16:41	09:22 (4) 10:14 (4)	07:19 16:31	51	09:33 (4) 10:24 (4)
16	07:24 16:55	55	09:45 (4) 10:41 (4)	06:55 17:34			06:12 18:07	06:20 19:41	05:41 20:12	05:26 20:36	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	06:49 16:40	09:21 (4) 10:14 (4)	07:19 16:31	51	09:34 (4) 10:24 (4)
17	07:24 16:57	55	09:45 (4) 10:40 (4)	06:54 17:35			06:10 18:08	06:19 19:42	05:40 20:13	05:26 20:36	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:18	06:50 16:39	09:21 (4) 10:15 (4)	07:20 16:31	51	09:34 (4) 10:25 (4)
18	07:23 16:58	56	09:45 (4) 10:41 (4)	06:53 17:36			06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	06:51 16:39	09:21 (4) 10:15 (4)	07:21 16:32	51	09:35 (4) 10:26 (4)
19	07:23 16:59	56	09:45 (4) 10:41 (4)	06:51 17:38			06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14	06:52 16:38	09:22 (4) 10:16 (4)	07:21 16:32	50	09:35 (4) 10:25 (4)
20	07:22 17:00	56	09:45 (4) 10:41 (4)	06:50 17:39			06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37	05:43 20:30	06:13 19:54	06:44 19:03	07:17 18:13	06:54 16:37	09:21 (4) 10:16 (4)	07:22 16:33	50	09:36 (4) 10:26 (4)
21	07:22 17:01	56	09:46 (4) 10:42 (4)	06:48 17:40			06:04 18:12	06:13 19:46	05:37 20:17	05:26 20:37	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11	06:55 16:36	09:21 (4) 10:17 (4)	07:23 16:33	50	09:36 (4) 10:26 (4)
22	07:21 17:03	55	09:46 (4) 10:41 (4)	06:47 17:41			06:02 18:13	06:11 19:47	05:36 20:18	05:26 20:37	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10	06:56 16:36	09:21 (4) 10:17 (4)	07:23 16:33	50	09:37 (4) 10:27 (4)
23	07:20 17:04	54	09:47 (4) 10:41 (4)	06:45 17:42			06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:38	05:45 20:27	06:16 19:49	06:48 18:57	07:20 18:09	06:57 16:35	09:22 (4) 10:18 (4)	07:24 16:34	50	09:37 (4) 10:27 (4)
24	07:20 17:05	54	09:47 (4) 10:41 (4)	06:44 17:44			05:58 18:16	06:08 19:49	05:34 20:20	05:27 20:38	05:46 20:26	06:17 19:48	06:49 18:56	07:21 18:07	06:58 16:35	09:22 (4) 10:18 (4)	07:24 16:35	50	09:38 (4) 10:28 (4)
25	07:19 17:06	54	09:48 (4) 10:42 (4)	06:42 17:45			05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38	05:47 20:25	06:18 19:46	06:50 18:54	07:22 17:06	06:59 16:34	09:23 (4) 10:18 (4)	07:25 16:35	50	09:38 (4) 10:28 (4)
26	07:18 17:07	52	09:49 (4) 10:41 (4)	06:41 17:46			05:55 18:18	06:05 19:51	05:33 20:22	05:28 20:38	05:48 20:25	06:19 19:44	06:51 18:52	07:01 17:04	06:56 16:34	09:24 (4) 10:18 (4)	07:26 16:36	51	09:38 (4) 10:29 (4)
27	07:17 17:09	52	09:49 (4) 10:41 (4)	06:39 17:47			05:53 18:19	06:04 19:53	05:32 20:23	05:28 20:38	05:49 20:24	06:20 19:43	06:52 18:50	07:02 17:03	06:57 16:33	09:25 (4) 10:19 (4)	07:27 16:36	51	09:38 (4) 10:29 (4)
28	07:16 17:10	51	09:49 (4) 10:40 (4)	06:38 17:48			05:52 18:20	06:03 19:54	05:31 20:24	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	07:03 17:02	06:58 16:33	09:26 (4) 10:20 (4)	07:26 16:37	51	09:39 (4) 10:30 (4)
29	07:16 17:11	50	09:50 (4) 10:40 (4)				05:50 19:21	06:01 19:55	05:31 20:24	05:29 20:38	05:51 20:22	06:22 19:40	06:54 18:47	07:04 17:00	06:59 16:32	09:27 (4) 10:20 (4)	07:26 16:38	51	09:40 (4) 10:31 (4)
30	07:15 17:12	48	09:51 (4) 10:39 (4)				06:48 19:22	06:00 19:56	05:30 20:25	05:29 20:38	05:52 20:21	06:23 19:38	06:55 18:45	07:05 16:59	06:58 16:32	09:25 (4) 10:20 (4)	07:26 16:39	51	09:40 (4) 10:31 (4)
31	07:14 17:14	46	09:52 (4) 10:38 (4)				06:47 19:23	06:00 19:23	05:30 20:26	05:29 20:26	05:53 20:20	06:24 19:36	06:56 18:58	07:06 17:01	06:59 16:58	09:26 (4) 16:39	07:26 16:39	51	09:40 (4) 10:31 (4)
Potential sun hours	296		296				369	399	449	454	460	429	375	345	297		286		
Total, worst case		1662		289											1374				1603

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: VVShadow receptor: B - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (23)

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	07:27		14:58 (3)	07:13	15:17 (3)	06:36	06:45	05:59	05:29	19:57 (2)
	16:40	76	16:14 (3)	17:15	16:32 (3)	17:50	19:24	19:57	20:27	5 20:02 (2)
2	07:27		14:59 (3)	07:12	15:18 (3)	06:35	06:43	05:57	05:29	19:56 (2)
	16:41	76	16:15 (3)	17:16	16:31 (3)	17:51	19:25	19:58	20:28	6 20:02 (2)
3	07:27		14:59 (3)	07:11	15:19 (3)	06:33	06:42	05:56	05:28	19:56 (2)
	16:42	77	16:16 (3)	17:18	16:30 (3)	17:52	19:27	19:59	20:28	7 20:03 (2)
4	07:27		15:00 (3)	07:10	15:20 (3)	06:32	06:40	05:55	05:28	19:56 (2)
	16:43	77	16:17 (3)	17:19	16:30 (3)	17:53	19:28	20:00	20:29	8 20:04 (2)
5	07:27		15:00 (3)	07:09	15:21 (3)	06:30	06:38	05:53	05:28	19:55 (2)
	16:44	78	16:18 (3)	17:20	16:29 (3)	17:54	19:29	20:01	20:30	9 20:04 (2)
6	07:27		15:01 (3)	07:08	15:23 (3)	06:28	06:37	05:52	05:27	19:55 (2)
	16:45	78	16:19 (3)	17:21	16:28 (3)	17:55	19:30	20:02	20:30	10 20:05 (2)
7	07:27		15:01 (3)	07:06	15:23 (3)	06:27	06:35	05:51	05:27	19:55 (2)
	16:46	79	16:20 (3)	17:23	16:26 (3)	17:57	19:31	20:03	20:31	11 20:06 (2)
8	07:27		15:02 (3)	07:05	15:25 (3)	06:25	06:33	05:50	05:27	19:55 (2)
	16:47	79	16:21 (3)	17:24	16:26 (3)	17:58	19:32	20:04	20:32	11 20:06 (2)
9	07:26		15:02 (3)	07:04	15:27 (3)	06:24	06:32	05:49	05:26	19:55 (2)
	16:48	80	16:22 (3)	17:25	16:25 (3)	17:59	19:33	20:05	20:32	12 20:07 (2)
10	07:26		15:02 (3)	07:03	15:29 (3)	06:22	06:30	05:47	05:26	19:54 (2)
	16:49	81	16:23 (3)	17:26	16:23 (3)	18:00	19:34	20:06	20:33	13 20:07 (2)
11	07:26		15:03 (3)	07:02	15:30 (3)	06:20	06:28	05:46	05:26	19:54 (2)
	16:50	81	16:24 (3)	17:28	16:21 (3)	18:01	19:35	20:07	20:33	14 20:08 (2)
12	07:26		15:03 (3)	07:00	15:32 (3)	06:19	06:27	05:45	05:26	19:54 (2)
	16:51	82	16:25 (3)	17:29	16:20 (3)	18:02	19:36	20:08	20:34	14 20:08 (2)
13	07:25		15:04 (3)	06:59	15:35 (3)	06:17	06:25	05:44	05:26	19:54 (2)
	16:52	82	16:26 (3)	17:30	16:18 (3)	18:03	19:37	20:09	20:34	15 20:09 (2)
14	07:25		15:05 (3)	06:58	15:37 (3)	06:15	06:24	05:43	05:26	19:54 (2)
	16:53	83	16:28 (3)	17:31	16:15 (3)	18:05	19:38	20:10	20:35	15 20:09 (2)
15	07:25		15:05 (3)	06:57	15:41 (3)	06:14	06:22	05:42	05:26	19:55 (2)
	16:54	84	16:29 (3)	17:33	16:12 (3)	18:06	19:39	20:11	20:35	14 20:09 (2)
16	07:24		15:06 (3)	06:55	15:45 (3)	06:12	06:20	05:41	05:26	19:55 (2)
	16:55	84	16:30 (3)	17:34	16:08 (3)	18:07	19:41	20:12	20:36	15 20:10 (2)
17	07:24		15:06 (3)	06:54	15:52 (3)	06:10	06:19	05:40	05:26	19:55 (2)
	16:57	85	16:31 (3)	17:35	16:01 (3)	18:08	19:42	20:13	20:36	15 20:10 (2)
18	07:23		15:07 (3)	06:53		06:09	06:17	05:39	05:26	19:55 (2)
	16:58	86	16:33 (3)	17:36		18:09	19:43	20:14	20:36	15 20:10 (2)
19	07:23		15:07 (3)	06:51		06:07	06:16	05:38	05:26	19:55 (2)
	16:59	87	16:34 (3)	17:38		18:10	19:44	20:15	20:37	15 20:10 (2)
20	07:22		15:07 (3)	06:50		06:05	06:14	05:37	05:26	19:56 (2)
	17:00	86	16:33 (3)	17:39		18:11	19:45	20:16	20:37	16 20:12 (2)
21	07:22		15:09 (3)	06:48		06:04	06:13	05:37	05:26	19:56 (2)
	17:01	85	16:34 (3)	17:40		18:12	19:46	20:17	20:37	16 20:12 (2)
22	07:21		15:09 (3)	06:47		06:02	06:11	05:36	05:26	19:56 (2)
	17:03	85	16:34 (3)	17:41		18:13	19:47	20:18	20:37	16 20:12 (2)
23	07:20		15:09 (3)	06:45		06:00	06:10	05:35	05:27	19:56 (2)
	17:04	85	16:34 (3)	17:42		18:15	19:48	20:19	20:38	15 20:11 (2)
24	07:20		15:10 (3)	06:44		05:58	06:08	05:34	05:27	19:57 (2)
	17:05	83	16:33 (3)	17:44		18:16	19:49	20:20	20:38	15 20:12 (2)
25	07:19		15:11 (3)	06:42		05:57	06:07	05:33	05:27	19:57 (2)
	17:06	83	16:34 (3)	17:45		18:17	19:50	20:21	20:38	15 20:12 (2)
26	07:18		15:12 (3)	06:41		05:55	06:05	05:33	05:28	19:57 (2)
	17:07	82	16:34 (3)	17:46		18:18	19:51	20:22	20:38	15 20:12 (2)
27	07:17		15:12 (3)	06:39		05:53	06:04	05:32	05:28	19:58 (2)
	17:09	82	16:34 (3)	17:47		18:19	19:52	20:23	20:38	15 20:13 (2)
28	07:16		15:13 (3)	06:38		05:52	06:03	05:31	05:28	19:57 (2)
	17:10	80	16:33 (3)	17:48		18:20	19:54	20:24	20:38	15 20:12 (2)
29	07:16		15:14 (3)			06:50	06:01	05:31	05:29	19:57 (2)
	17:11	79	16:33 (3)			19:21	19:55	20:24	20:38	15 20:12 (2)
30	07:15		15:15 (3)			06:48	06:00	05:30	19:59 (2)	19:58 (2)
	17:12	77	16:32 (3)			19:22	19:56	20:25	1 20:00 (2)	20:38 14 20:12 (2)
31	07:14		15:16 (3)			06:47		05:30	19:58 (2)	
	17:14	76	16:32 (3)			19:23		20:26	3 20:01 (2)	
Potential sun hours	296		297		369	399	449		454	391
Total, worst case	2518		901					4		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

SHADOW - Calendar

Calculation: VVShadow receptor: B - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (23)

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	05:30		19:58 (2)	05:54	06:25	06:56		06:31	14:57 (3)	07:06	14:45 (3)							
	20:38	14	20:12 (2)	20:18	19:35	18:44		16:56	55	15:52 (3)	16:31	81	16:06 (3)					
2	05:30		19:59 (2)	05:55	06:26	06:57		06:32		14:56 (3)	07:07	14:46 (3)						
	20:38	13	20:12 (2)	20:17	19:33	18:42		16:55	59	15:55 (3)	16:31	80	16:06 (3)					
3	05:31		19:59 (2)	05:56	06:27	06:58		06:33		14:55 (3)	07:08	14:46 (3)						
	20:38	13	20:12 (2)	20:16	19:31	18:40		16:54	61	15:56 (3)	16:31	80	16:06 (3)					
4	05:31		20:00 (2)	05:57	06:28	06:59		06:34		14:53 (3)	07:09	14:46 (3)						
	20:37	12	20:12 (2)	20:15	19:30	18:39		16:53	63	15:56 (3)	16:31	79	16:05 (3)					
5	05:32		20:01 (2)	05:58	06:29	07:00		06:35		14:52 (3)	07:10	14:46 (3)						
	20:37	11	20:12 (2)	20:14	19:28	18:37		16:51	66	15:58 (3)	16:31	79	16:05 (3)					
6	05:32		20:01 (2)	05:59	06:30	07:01		06:37		14:51 (3)	07:11	14:47 (3)						
	20:37	10	20:11 (2)	20:13	19:26	18:35		16:50	68	15:59 (3)	16:30	78	16:05 (3)					
7	05:33		20:02 (2)	06:00	06:31	07:02		06:38		14:50 (3)	07:12	14:47 (3)						
	20:37	9	20:11 (2)	20:11	19:25	18:34		16:49	70	16:00 (3)	16:30	78	16:05 (3)					
8	05:34		20:02 (2)	06:01	06:32	07:03		06:39		14:48 (3)	07:13	14:48 (3)						
	20:36	8	20:10 (2)	20:10	19:23	18:32		16:48	72	16:00 (3)	16:30	77	16:05 (3)					
9	05:34		20:03 (2)	06:02	06:33	07:04		06:40		14:48 (3)	07:14	14:48 (3)						
	20:36	7	20:10 (2)	20:09	19:21	18:30		16:47	74	16:02 (3)	16:30	77	16:05 (3)					
10	05:35		20:04 (2)	06:03	06:34	07:05		06:42		14:47 (3)	07:15	14:49 (3)						
	20:35	6	20:10 (2)	20:08	19:20	18:29		16:46	75	16:02 (3)	16:30	76	16:05 (3)					
11	05:36		20:04 (2)	06:04	06:35	07:07		06:43		14:46 (3)	07:16	14:48 (3)						
	20:35	5	20:09 (2)	20:06	19:18	18:27		16:45	77	16:03 (3)	16:30	76	16:04 (3)					
12	05:36		20:05 (2)	06:05	06:36	07:08		06:44		14:47 (3)	07:16	14:49 (3)						
	20:35	4	20:09 (2)	20:05	19:16	18:25		16:44	77	16:04 (3)	16:30	75	16:04 (3)					
13	05:37		20:07 (2)	06:06	06:37	07:09		06:45		14:46 (3)	07:17	14:50 (3)						
	20:34	2	20:09 (2)	20:04	19:15	18:24		16:43	79	16:05 (3)	16:31	75	16:05 (3)					
14	05:38		20:08 (2)	06:07	06:38	07:10		06:46		14:45 (3)	07:18	14:50 (3)						
	20:33	1	20:09 (2)	20:02	19:13	18:22		16:42	80	16:05 (3)	16:31	75	16:05 (3)					
15	05:39		06:08	06:39	07:11	18:21		06:48		14:44 (3)	07:19	14:51 (3)						
	20:33		20:01	19:11	18:21		16:41	81	16:05 (3)	16:31	74	16:05 (3)						
16	05:39		06:09	06:40	07:12	18:19		06:49		14:45 (3)	07:19	14:51 (3)						
	20:32		19:59	19:09	18:19		16:40	82	16:07 (3)	16:31	74	16:05 (3)						
17	05:40		06:10	06:41	07:13	18:18		06:50		14:44 (3)	07:20	14:52 (3)						
	20:32		19:58	19:08	18:18		16:39	83	16:07 (3)	16:31	74	16:06 (3)						
18	05:41		06:11	06:42	07:14	18:16		06:51		14:44 (3)	07:21	14:53 (3)						
	20:31		19:57	19:06	18:16		16:39	83	16:07 (3)	16:32	73	16:06 (3)						
19	05:42		06:12	06:43	07:15	18:14		06:52		14:44 (3)	07:21	14:52 (3)						
	20:30		19:55	19:04	18:14		16:38	85	16:09 (3)	16:32	74	16:06 (3)						
20	05:43		06:13	06:44	07:17	18:13		06:54		14:44 (3)	07:22	14:53 (3)						
	20:30		19:54	19:03	18:13		16:37	85	16:09 (3)	16:33	74	16:07 (3)						
21	05:44		06:14	06:45	07:18	18:11		06:55		14:44 (3)	07:23	14:53 (3)						
	20:29		19:52	19:01	18:11		16:36	85	16:09 (3)	16:33	74	16:07 (3)						
22	05:44		06:15	06:46	07:19	18:10		06:56		14:43 (3)	07:23	14:54 (3)						
	20:28		19:51	18:59	18:10		16:36	86	16:09 (3)	16:34	74	16:08 (3)						
23	05:45		06:16	06:47	07:20	18:09		06:57		14:44 (3)	07:24	14:54 (3)						
	20:27		19:49	18:57	18:09		16:35	87	16:11 (3)	16:34	74	16:08 (3)						
24	05:46		06:17	06:49	07:21	18:07		06:58		14:44 (3)	07:24	14:54 (3)						
	20:26		19:48	18:56	18:07		16:35	86	16:10 (3)	16:35	74	16:08 (3)						
25	05:47		06:18	06:50	06:22	15:20 (3)	06:59		14:44 (3)	07:24	14:56 (3)							
	20:25		19:46	18:54	17:06	15:34 (3)	16:34	85	16:09 (3)	16:35	73	16:09 (3)						
26	05:48		06:19	06:51	06:23	15:14 (3)	07:00		14:44 (3)	07:25	14:56 (3)							
	20:25		19:44	18:52	17:04	15:39 (3)	16:34	84	16:08 (3)	16:36	73	16:09 (3)						
27	05:49		06:20	06:52	06:25	15:09 (3)	07:02		14:44 (3)	07:25	14:56 (3)							
	20:24		19:43	18:50	17:03	15:42 (3)	16:33	84	16:08 (3)	16:36	74	16:10 (3)						
28	05:50		06:21	06:53	06:26	15:06 (3)	07:03		14:44 (3)	07:26	14:57 (3)							
	20:23		19:41	18:49	17:02	15:45 (3)	16:33	83	16:07 (3)	16:37	74	16:11 (3)						
29	05:51		06:22	06:54	06:27	15:04 (3)	07:04		14:45 (3)	07:26	14:57 (3)							
	20:22		19:40	18:47	17:00	15:48 (3)	16:32	82	16:07 (3)	16:38	75	16:12 (3)						
30	05:52		06:23	06:55	06:28	15:02 (3)	07:05		14:45 (3)	07:26	14:58 (3)							
	20:21		19:38	18:45	16:59	15:50 (3)	16:32	82	16:07 (3)	16:39	74	16:12 (3)						
31	05:53		06:24		06:29	14:59 (3)				07:26	14:58 (3)							
	20:20		19:36		16:58	15:51 (3)				16:39	75	16:13 (3)						
Potential sun hours	460		429		375	345		297		286								
Total, worst case		115				255		2319			2343							

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: VVShadow receptor: C - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (24)

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	07:26		14:46 (6)	07:13		15:21 (6)	06:36	06:45	05:59	05:29	
	16:40	73	15:59 (6)	17:15	26	15:47 (6)	17:50	19:24	19:57	20:27	
2	07:27		14:46 (6)	07:12		15:25 (6)	06:35	06:43	05:57	05:29	
	16:41	73	15:59 (6)	17:16	19	15:44 (6)	17:51	19:25	19:58	20:27	
3	07:27		14:47 (6)	07:11			06:33	06:42	05:56	05:28	
	16:42	72	15:59 (6)	17:18			17:52	19:26	19:59	20:28	
4	07:27		14:47 (6)	07:10			06:32	06:40	05:55	05:28	
	16:43	73	16:00 (6)	17:19			17:53	19:28	20:00	20:29	
5	07:27		14:48 (6)	07:09			06:30	06:38	05:53	05:27	
	16:44	72	16:00 (6)	17:20			17:54	19:29	20:01	20:30	
6	07:27		14:49 (6)	07:08			06:28	06:37	05:52	05:27	
	16:45	71	16:00 (6)	17:21			17:55	19:30	20:02	20:30	
7	07:27		14:50 (6)	07:06			06:27	06:35	05:51	05:27	
	16:46	71	16:01 (6)	17:23			17:57	19:31	20:03	20:31	
8	07:27		14:50 (6)	07:05			06:25	06:33	05:50	05:27	
	16:47	71	16:01 (6)	17:24			17:58	19:32	20:04	20:32	
9	07:26		14:50 (6)	07:04			06:24	06:32	05:49	05:26	
	16:48	71	16:01 (6)	17:25			17:59	19:33	20:05	20:32	
10	07:26		14:51 (6)	07:03			06:22	06:30	05:47	05:26	19:48 (5)
	16:49	70	16:01 (6)	17:26			18:00	19:34	20:06	20:33	4
11	07:26		14:52 (6)	07:02			06:20	06:28	05:46	05:26	19:45 (5)
	16:50	69	16:01 (6)	17:28			18:01	19:35	20:07	20:33	11
12	07:26		14:53 (6)	07:00			06:19	06:27	05:45	05:26	19:44 (5)
	16:51	68	16:01 (6)	17:29			18:02	19:36	20:08	20:34	14
13	07:25		14:54 (6)	06:59			06:17	06:25	05:44	05:26	19:43 (5)
	16:52	67	16:01 (6)	17:30			18:03	19:37	20:09	20:34	16
14	07:25		14:55 (6)	06:58			06:15	06:24	05:43	05:26	19:42 (5)
	16:53	67	16:02 (6)	17:31			18:05	19:38	20:10	20:35	18
15	07:25		14:55 (6)	06:57			06:14	06:22	05:42	05:26	19:41 (5)
	16:54	66	16:01 (6)	17:33			18:06	19:39	20:11	20:35	20
16	07:24		14:57 (6)	06:55			06:12	06:20	05:41	05:26	19:41 (5)
	16:55	65	16:02 (6)	17:34			18:07	19:41	20:12	20:36	21
17	07:24		14:57 (6)	06:54			06:10	06:19	05:40	05:26	19:41 (5)
	16:57	64	16:01 (6)	17:35			18:08	19:42	20:13	20:36	22
18	07:23		14:58 (6)	06:52			06:09	06:17	05:39	05:26	19:40 (5)
	16:58	62	16:00 (6)	17:36			18:09	19:43	20:14	20:36	23
19	07:23		14:59 (6)	06:51			06:07	06:16	05:38	05:26	19:40 (5)
	16:59	62	16:01 (6)	17:38			18:10	19:44	20:15	20:37	24
20	07:22		15:00 (6)	06:50			06:05	06:14	05:37	05:26	19:41 (5)
	17:00	60	16:00 (6)	17:39			18:11	19:45	20:16	20:37	24
21	07:22		15:02 (6)	06:48			06:03	06:13	05:36	05:26	19:41 (5)
	17:01	58	16:00 (6)	17:40			18:12	19:46	20:17	20:37	24
22	07:21		15:03 (6)	06:47			06:02	06:11	05:36	05:26	19:41 (5)
	17:03	57	16:00 (6)	17:41			18:13	19:47	20:18	20:37	24
23	07:20		15:03 (6)	06:45			06:00	06:10	05:35	05:27	19:41 (5)
	17:04	56	15:59 (6)	17:42			18:15	19:48	20:19	20:38	24
24	07:20		15:05 (6)	06:44			05:58	06:08	05:34	05:27	19:42 (5)
	17:05	53	15:58 (6)	17:44			18:16	19:49	20:20	20:38	23
25	07:19		15:06 (6)	06:42			05:57	06:07	05:33	05:27	19:43 (5)
	17:06	51	15:57 (6)	17:45			18:17	19:50	20:21	20:38	22
26	07:18		15:08 (6)	06:41			05:55	06:05	05:33	05:27	19:43 (5)
	17:07	49	15:57 (6)	17:46			18:18	19:51	20:22	20:38	21
27	07:17		15:10 (6)	06:39			05:53	06:04	05:32	05:28	19:44 (5)
	17:09	46	15:56 (6)	17:47			18:19	19:52	20:23	20:38	21
28	07:16		15:11 (6)	06:38			05:52	06:03	05:31	05:28	19:45 (5)
	17:10	44	15:55 (6)	17:48			18:20	19:54	20:23	20:38	19
29	07:16		15:13 (6)				06:50	06:01	05:31	05:29	19:45 (5)
	17:11	40	15:53 (6)				19:21	19:55	20:24	20:38	18
30	07:15		15:15 (6)				06:48	06:00	05:30	05:29	19:47 (5)
	17:12	36	15:51 (6)				19:22	19:56	20:25	20:38	15
31	07:14		15:18 (6)				06:47		05:30		
	17:14	31	15:49 (6)				19:23		20:26		
Potential sun hours	296			297			369	399	449	454	
Total, worst case		1888			45						408

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

SHADOW - Calendar

Calculation: VVShadow receptor: C - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (24)

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	05:30		19:48 (5)	05:54	06:25	06:56	06:31				07:06	14:35 (6)
	20:38	13	20:01 (5)	20:18	19:35	18:44	16:56				16:31	68 15:43 (6)
2	05:30		19:51 (5)	05:55	06:26	06:57	06:32				07:07	14:34 (6)
	20:38	8	19:59 (5)	20:17	19:33	18:42	16:55				16:31	70 15:44 (6)
3	05:31			05:56	06:27	06:58	06:33				07:08	14:34 (6)
	20:37			20:16	19:31	18:40	16:54				16:31	71 15:45 (6)
4	05:31			05:57	06:28	06:59	06:34				07:09	14:35 (6)
	20:37			20:15	19:30	18:39	16:53				16:31	70 15:45 (6)
5	05:32			05:58	06:29	07:00	06:35				07:10	14:35 (6)
	20:37			20:14	19:28	18:37	16:51				16:31	71 15:46 (6)
6	05:32			05:59	06:30	07:01	06:37				07:11	14:35 (6)
	20:37			20:13	19:26	18:35	16:50				16:30	71 15:46 (6)
7	05:33			06:00	06:31	07:02	06:38				07:12	14:35 (6)
	20:36			20:11	19:25	18:34	16:49				16:30	72 15:47 (6)
8	05:34			06:01	06:32	07:03	06:39		15:02 (6)		07:13	14:35 (6)
	20:36			20:10	19:23	18:32	16:48	5	15:07 (6)		16:30	73 15:48 (6)
9	05:34			06:02	06:33	07:04	06:40		14:56 (6)		07:14	14:36 (6)
	20:36			20:09	19:21	18:30	16:47	19	15:15 (6)		16:30	72 15:48 (6)
10	05:35			06:03	06:34	07:05	06:41		14:52 (6)		07:15	14:36 (6)
	20:35			20:08	19:20	18:29	16:46	26	15:18 (6)		16:30	73 15:49 (6)
11	05:36			06:04	06:35	07:06	06:43		14:49 (6)		07:16	14:36 (6)
	20:35			20:06	19:18	18:27	16:45	32	15:21 (6)		16:30	73 15:49 (6)
12	05:36			06:05	06:36	07:08	06:44		14:47 (6)		07:16	14:36 (6)
	20:34			20:05	19:16	18:25	16:44	37	15:24 (6)		16:30	73 15:49 (6)
13	05:37			06:06	06:37	07:09	06:45		14:45 (6)		07:17	14:37 (6)
	20:34			20:04	19:15	18:24	16:43	40	15:25 (6)		16:31	73 15:50 (6)
14	05:38			06:07	06:38	07:10	06:46		14:43 (6)		07:18	14:37 (6)
	20:33			20:02	19:13	18:22	16:42	44	15:27 (6)		16:31	74 15:51 (6)
15	05:39			06:08	06:39	07:11	06:48		14:42 (6)		07:19	14:38 (6)
	20:33			20:01	19:11	18:21	16:41	46	15:28 (6)		16:31	74 15:52 (6)
16	05:39			06:09	06:40	07:12	06:49		14:41 (6)		07:19	14:38 (6)
	20:32			19:59	19:09	18:19	16:40	49	15:30 (6)		16:31	73 15:51 (6)
17	05:40			06:10	06:41	07:13	06:50		14:40 (6)		07:20	14:38 (6)
	20:32			19:58	19:08	18:17	16:39	51	15:31 (6)		16:31	74 15:52 (6)
18	05:41			06:11	06:42	07:14	06:51		14:39 (6)		07:21	14:38 (6)
	20:31			19:57	19:06	18:16	16:39	53	15:32 (6)		16:32	74 15:52 (6)
19	05:42			06:12	06:43	07:15	06:52		14:38 (6)		07:21	14:39 (6)
	20:30			19:55	19:04	18:14	16:38	56	15:34 (6)		16:32	74 15:53 (6)
20	05:43			06:13	06:44	07:17	06:54		14:38 (6)		07:22	14:40 (6)
	20:30			19:54	19:02	18:13	16:37	57	15:35 (6)		16:33	74 15:54 (6)
21	05:44			06:14	06:45	07:18	06:55		14:37 (6)		07:23	14:40 (6)
	20:29			19:52	19:01	18:11	16:36	58	15:35 (6)		16:33	74 15:54 (6)
22	05:44			06:15	06:46	07:19	06:56		14:36 (6)		07:23	14:41 (6)
	20:28			19:51	18:59	18:10	16:36	60	15:36 (6)		16:33	74 15:55 (6)
23	05:45			06:16	06:47	07:20	06:57		14:36 (6)		07:24	14:41 (6)
	20:27			19:49	18:57	18:09	16:35	62	15:38 (6)		16:34	74 15:55 (6)
24	05:46			06:17	06:48	07:21	06:58		14:36 (6)		07:24	14:41 (6)
	20:26			19:48	18:56	18:07	16:35	62	15:38 (6)		16:35	74 15:55 (6)
25	05:47			06:18	06:50	06:22	06:59		14:35 (6)		07:24	14:42 (6)
	20:25			19:46	18:54	17:06	16:34	64	15:39 (6)		16:35	74 15:56 (6)
26	05:48			06:19	06:51	06:23	07:00		14:35 (6)		07:25	14:42 (6)
	20:24			19:44	18:52	17:04	16:33	65	15:40 (6)		16:36	74 15:56 (6)
27	05:49			06:20	06:52	06:25	07:02		14:34 (6)		07:25	14:43 (6)
	20:24			19:43	18:50	17:03	16:33	66	15:40 (6)		16:36	73 15:56 (6)
28	05:50			06:21	06:53	06:26	07:03		14:34 (6)		07:26	14:44 (6)
	20:23			19:41	18:49	17:02	16:33	67	15:41 (6)		16:37	73 15:57 (6)
29	05:51			06:22	06:54	06:27	07:04		14:35 (6)		07:26	14:44 (6)
	20:22			19:40	18:47	17:00	16:32	67	15:42 (6)		16:38	74 15:58 (6)
30	05:52			06:23	06:55	06:28	07:05		14:35 (6)		07:26	14:45 (6)
	20:21			19:38	18:45	16:59	16:32	68	15:43 (6)		16:39	73 15:58 (6)
31	05:53			06:24		06:29					07:26	14:45 (6)
	20:19			19:36		16:58					16:39	73 15:58 (6)
Potential sun hours	460			429		375		345		297		286
Total, worst case		21							1154			2257

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar

Calculation: VVShadow receptor: D - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (25)

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	07:26 16:40	14:30 (6) 07:13 15:55 (6) 17:15	14:59 (6) 06:36 15:50 (6) 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	07:06 15:40 (6)
2	07:27 16:41	14:30 (6) 07:12 15:56 (6) 17:16	15:01 (6) 06:35 15:49 (6) 17:51	06:43 19:25	05:57 19:58	05:29 20:27	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	07:07 15:41 (6)
3	07:27 16:42	14:31 (6) 07:11 15:56 (6) 17:18	15:03 (6) 06:33 15:47 (6) 17:52	06:42 19:26	05:56 19:59	05:28 20:28	05:31 20:37	05:56 20:16	06:27 19:31	06:58 18:40	06:33 16:54	07:08 15:41 (6)
4	07:27 16:43	14:31 (6) 07:10 15:56 (6) 17:19	15:06 (6) 06:32 15:45 (6) 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	07:09 15:42 (6)
5	07:27 16:44	14:32 (6) 07:09 15:57 (6) 17:20	15:09 (6) 06:30 15:43 (6) 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	07:10 15:43 (6)
6	07:27 16:45	14:33 (6) 07:08 15:57 (6) 17:21	15:11 (6) 06:28 15:39 (6) 17:55	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35	06:37 16:50	07:11 15:43 (6)
7	07:27 16:46	14:33 (6) 07:06 15:58 (6) 17:23	15:16 (6) 06:27 15:36 (6) 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:36	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	07:12 15:44 (6)
8	07:27 16:47	14:34 (6) 07:05 15:58 (6) 17:24	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	07:13 15:44 (6)
9	07:26 16:48	14:34 (6) 07:04 15:57 (6) 17:25	06:24 17:59	06:32 19:33	05:49 20:05	05:26 20:32	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	07:14 15:45 (6)
10	07:26 16:49	14:35 (6) 07:03 15:58 (6) 17:26	06:22 18:00	06:30 19:34	05:47 20:06	05:26 20:33	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29	06:41 16:46	07:15 15:46 (6)
11	07:26 16:50	14:36 (6) 07:02 15:58 (6) 17:28	06:20 18:01	06:28 19:35	05:46 20:07	05:26 20:33	05:36 20:35	06:04 20:06	06:35 19:18	07:06 18:27	06:43 16:45	07:16 15:47 (6)
12	07:26 16:51	14:36 (6) 07:00 15:58 (6) 17:29	06:19 18:02	06:27 19:36	05:45 20:08	05:26 20:34	05:36 20:34	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	07:16 15:48 (6)
13	07:25 16:52	14:37 (6) 06:59 15:58 (6) 17:30	06:17 18:03	06:25 19:37	05:44 20:09	05:26 20:34	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	07:17 15:49 (6)
14	07:25 16:53	14:38 (6) 06:58 15:59 (6) 17:31	06:15 18:05	06:24 19:38	05:43 20:10	05:26 20:35	05:38 20:33	06:07 20:02	06:38 19:13	07:10 18:22	06:46 16:42	07:18 15:50 (6)
15	07:25 16:54	14:39 (6) 06:57 15:58 (6) 17:33	06:14 18:06	06:22 19:39	05:42 20:11	05:26 20:35	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	06:48 16:41	07:19 15:51 (6)
16	07:24 16:55	14:40 (6) 06:55 15:59 (6) 17:34	06:12 18:07	06:20 19:41	05:41 20:12	05:26 20:36	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	06:49 16:40	07:20 15:52 (6)
17	07:24 16:57	14:40 (6) 06:54 15:58 (6) 17:35	06:10 18:08	06:19 19:42	05:40 20:13	05:26 20:36	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:17	06:50 16:39	07:21 15:53 (6)
18	07:23 16:58	14:41 (6) 06:52 15:58 (6) 17:36	06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	06:51 16:39	07:22 15:54 (6)
19	07:23 16:59	14:42 (6) 06:51 15:58 (6) 17:38	06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14	06:52 16:38	07:23 15:55 (6)
20	07:22 17:00	14:43 (6) 06:50 15:58 (6) 17:39	06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37	05:43 20:30	06:13 19:54	06:44 19:02	07:17 18:13	06:54 16:37	07:24 15:56 (6)
21	07:22 17:01	14:44 (6) 06:48 15:58 (6) 17:40	06:03 18:12	06:13 19:46	05:36 20:17	05:26 20:37	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11	06:55 16:36	07:25 15:57 (6)
22	07:21 17:03	14:45 (6) 06:47 15:58 (6) 17:41	06:02 18:13	06:11 19:47	05:36 20:18	05:26 20:37	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10	06:56 16:36	07:26 15:58 (6)
23	07:20 17:04	14:46 (6) 06:45 15:57 (6) 17:42	06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:38	05:45 20:27	06:16 19:49	06:47 18:57	07:20 18:09	06:57 16:35	07:27 15:59 (6)
24	07:20 17:05	14:47 (6) 06:44 15:56 (6) 17:44	05:58 18:16	06:08 19:49	05:34 20:20	05:27 20:38	05:46 20:26	06:17 19:48	06:48 18:56	07:21 18:07	06:58 16:35	07:28 15:59 (6)
25	07:19 17:06	14:48 (6) 06:42 15:56 (6) 17:45	05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38	05:47 20:25	06:18 19:46	06:50 18:54	07:22 18:06	06:59 16:34	07:29 15:59 (6)
26	07:18 17:07	14:50 (6) 06:41 15:56 (6) 17:46	05:55 18:18	06:05 19:51	05:33 20:22	05:27 20:38	05:48 20:24	06:19 19:44	06:51 18:52	07:23 18:04	07:00 16:33	07:30 15:59 (6)
27	07:17 17:09	14:51 (6) 06:39 15:55 (6) 17:47	05:53 18:19	06:04 19:52	05:32 20:23	05:28 20:38	05:49 20:24	06:20 19:43	06:52 18:50	07:24 18:03	07:02 16:33	07:31 15:59 (6)
28	07:16 17:10	14:52 (6) 06:38 15:54 (6) 17:48	05:52 18:20	06:03 19:54	05:31 20:23	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	07:25 18:02	07:03 16:33	07:32 15:59 (6)
29	07:16 17:11	14:54 (6) 06:37 15:54 (6) 17:49	05:50 18:21	06:01 19:55	05:31 20:24	05:29 20:38	05:51 20:22	06:22 19:40	06:54 18:47	07:26 18:00	07:04 16:32	07:33 15:59 (6)
30	07:15 17:12	14:55 (6) 06:36 15:53 (6) 17:50	05:48 18:22	06:00 19:56	05:30 20:25	05:29 20:38	05:52 20:21	06:23 19:38	06:55 18:45	07:27 18:00	07:05 16:32	07:34 15:59 (6)
31	07:14 17:14	14:57 (6) 06:35 15:51 (6) 17:51	05:47 18:23	06:00 20:26	05:30 20:26	05:29 20:38	05:53 20:20	06:24 19:36	06:29 18:58	07:28 18:00	07:06 16:32	07:35 15:59 (6)
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
Total, worst case	2354	267	369	399	449	454	460	429	375	345	297	286

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar

Calculation: VVShadow receptor: E - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (26)

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	07:26 16:40	14:40 (6) 07:13 16:08 (6) 17:15	15:00 (6) 06:36 16:11 (6) 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	14:43 (6) 07:06 15:31 (6) 16:31
2	07:27 16:41	14:41 (6) 07:12 16:09 (6) 17:16	15:01 (6) 06:35 16:11 (6) 17:51	06:43 19:25	05:57 19:58	05:29 20:27	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	14:42 (6) 07:07 15:34 (6) 16:31
3	07:27 16:42	14:41 (6) 07:11 16:09 (6) 17:18	15:03 (6) 06:33 16:10 (6) 17:52	06:42 19:26	05:56 19:59	05:28 20:28	05:31 20:37	05:56 20:16	06:27 19:31	06:58 18:40	06:33 16:54	14:39 (6) 07:08 15:35 (6) 16:31
4	07:27 16:43	14:42 (6) 07:10 16:09 (6) 17:19	15:04 (6) 06:32 16:09 (6) 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	14:38 (6) 07:09 15:36 (6) 16:31
5	07:27 16:44	14:42 (6) 07:09 16:10 (6) 17:20	15:06 (6) 06:30 16:09 (6) 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	14:36 (6) 07:10 15:37 (6) 16:31
6	07:27 16:45	14:43 (6) 07:08 16:10 (6) 17:21	15:06 (6) 06:28 16:07 (6) 17:55	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35	06:37 16:50	14:35 (6) 07:11 15:39 (6) 16:30
7	07:27 16:46	14:44 (6) 07:06 16:11 (6) 17:23	15:08 (6) 06:27 16:06 (6) 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:36	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	14:34 (6) 07:12 15:39 (6) 16:30
8	07:27 16:47	14:44 (6) 07:05 16:12 (6) 17:24	15:10 (6) 06:25 16:05 (6) 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	14:32 (6) 07:13 15:40 (6) 16:30
9	07:26 16:48	14:44 (6) 07:04 16:11 (6) 17:25	15:12 (6) 06:24 16:03 (6) 17:59	06:32 19:33	05:49 20:05	05:26 20:32	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	14:32 (6) 07:14 15:42 (6) 16:30
10	07:26 16:49	14:45 (6) 07:03 16:12 (6) 17:26	15:14 (6) 06:22 16:02 (6) 18:00	06:30 19:34	05:47 20:06	05:26 20:33	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29	06:41 16:46	14:31 (6) 07:15 15:43 (6) 16:30
11	07:26 16:50	14:46 (6) 07:02 16:13 (6) 17:28	15:16 (6) 06:20 15:59 (6) 18:01	06:28 19:35	05:46 20:07	05:26 20:33	05:36 20:35	06:04 20:06	06:35 19:18	07:06 18:27	06:43 16:45	14:30 (6) 07:16 15:43 (6) 16:30
12	07:26 16:51	14:45 (6) 07:00 16:12 (6) 17:29	15:19 (6) 06:19 15:57 (6) 18:02	06:27 19:36	05:45 20:08	05:26 20:34	05:36 20:34	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	14:30 (6) 07:16 15:44 (6) 16:30
13	07:25 16:52	14:46 (6) 06:59 16:13 (6) 17:30	15:22 (6) 06:17 15:55 (6) 18:03	06:25 19:37	05:44 20:09	05:26 20:34	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	14:29 (6) 07:17 15:45 (6) 16:31
14	07:25 16:53	14:47 (6) 06:58 16:14 (6) 17:31	15:25 (6) 06:15 15:51 (6) 18:05	06:24 19:38	05:43 20:10	05:26 20:35	05:38 20:33	06:07 20:02	06:38 19:13	07:10 18:22	06:46 16:42	14:28 (6) 07:18 15:46 (6) 16:31
15	07:25 16:54	14:47 (6) 06:57 16:13 (6) 17:33	15:32 (6) 06:14 15:46 (6) 18:06	06:22 19:39	05:42 20:11	05:26 20:35	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	17:56 (3) 06:48 17:57 (3) 16:41	14:28 (6) 07:19 15:46 (6) 16:31
16	07:24 16:55	14:48 (6) 06:55 16:14 (6) 17:34	06:12 18:07	06:20 19:41	05:41 20:12	05:26 20:36	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	17:55 (3) 06:49 17:56 (3) 16:40	14:28 (6) 07:19 15:47 (6) 16:31
17	07:24 16:56	14:48 (6) 06:54 16:14 (6) 17:35	06:10 18:08	06:19 19:42	05:40 20:13	05:26 20:36	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:17	17:53 (3) 06:50 17:54 (3) 16:39	14:27 (6) 07:20 15:47 (6) 16:31
18	07:23 16:57	14:49 (6) 06:52 16:13 (6) 17:36	06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	17:52 (3) 06:51 17:53 (3) 16:39	14:27 (6) 07:21 15:48 (6) 16:32
19	07:23 16:58	14:50 (6) 06:51 16:14 (6) 17:38	06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14	17:53 (3) 06:52 17:54 (6) 16:33	14:27 (6) 07:21 15:49 (6) 16:32
20	07:22 17:00	14:50 (6) 06:50 16:14 (6) 17:39	06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37	05:43 20:30	06:13 19:54	06:44 19:02	07:17 18:13	17:54 (6) 06:53 17:55 (6) 16:33	14:27 (6) 07:22 15:50 (6) 16:33
21	07:22 17:01	14:51 (6) 06:48 16:15 (6) 17:40	06:03 18:12	06:13 19:46	05:36 20:17	05:26 20:37	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11	17:56 (6) 06:54 17:56 (6) 16:33	14:26 (6) 07:23 15:51 (6) 16:33
22	07:21 17:03	14:52 (6) 06:47 16:14 (6) 17:41	06:02 18:13	06:11 19:47	05:36 20:18	05:26 20:37	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10	17:57 (6) 06:55 17:57 (6) 16:33	14:26 (6) 07:23 15:52 (6) 16:33
23	07:20 17:04	14:52 (6) 06:45 16:14 (6) 17:42	06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:38	05:45 20:27	06:16 19:49	06:47 18:57	07:20 18:09	17:58 (6) 06:56 17:58 (6) 16:34	14:26 (6) 07:24 15:53 (6) 16:34
24	07:20 17:05	14:53 (6) 06:44 16:14 (6) 17:44	06:08 18:16	06:08 19:49	05:34 20:20	05:27 20:38	05:46 20:26	06:17 19:48	06:48 18:56	07:21 18:07	17:59 (6) 06:57 17:59 (6) 16:35	14:26 (6) 07:24 15:54 (6) 16:35
25	07:19 17:06	14:53 (6) 06:42 16:13 (6) 17:45	06:07 18:17	06:07 19:50	05:33 20:21	05:27 20:38	05:47 20:25	06:18 19:46	06:50 18:54	06:22 17:06	18:00 (6) 06:58 18:00 (6) 16:36	14:26 (6) 07:24 15:55 (6) 16:35
26	07:18 17:07	14:55 (6) 06:41 16:14 (6) 17:46	06:05 18:18	06:05 19:51	05:33 20:22	05:27 20:38	05:48 20:24	06:19 19:44	06:51 18:52	06:23 17:04	18:01 (6) 06:59 18:01 (6) 16:37	14:26 (6) 07:25 15:56 (6) 16:36
27	07:17 17:09	14:56 (6) 06:39 16:14 (6) 17:47	06:04 18:19	06:04 19:52	05:32 20:23	05:28 20:38	05:49 20:24	06:20 19:43	06:52 18:50	06:25 17:03	18:02 (6) 07:02 18:02 (6) 16:38	14:26 (6) 07:25 15:57 (6) 16:36
28	07:16 17:10	14:56 (6) 06:38 16:13 (6) 17:48	06:03 18:20	06:03 19:54	05:31 20:23	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	06:26 17:02	18:03 (6) 07:03 18:03 (6) 16:39	14:26 (6) 07:26 15:58 (6) 16:37
29	07:16 17:11	14:57 (6) 06:37 16:13 (6) 17:49	06:02 18:21	06:01 19:55	05:31 20:24	05:29 20:38	05:51 20:22	06:22 19:40	06:54 18:47	06:27 17:00	18:04 (6) 07:04 18:04 (6) 16:40	14:27 (6) 07:26 15:59 (6) 16:38
30	07:15 17:12	14:58 (6) 06:36 16:12 (6) 17:50	06:01 18:22	06:00 19:56	05:30 20:25	05:29 20:38	05:52 20:21	06:23 19:38	06:55 18:45	06:28 17:01	18:05 (6) 07:05 18:05 (6) 16:41	14:28 (6) 07:26 16:00 (6) 16:39
31	07:14 17:14	14:59 (6) 06:35 16:12 (6) 17:51	06:00 18:23	05:59 19:57	05:29 20:26	05:28 20:39	05:53 20:19	06:24 19:36	06:56 18:46	06:29 17:02	18:06 (6) 07:06 18:06 (6) 16:42	14:29 (6) 07:26 16:01 (6) 16:40
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	2714
Total, worst case	2598	767	369	399	449	454	460	429	375	345	297	2714

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

SHADOW - Calendar

Calculation: VVShadow receptor: F - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (27)

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	07:26		14:27 (6)	07:13		14:46 (6)	06:36		17:27 (3)	06:45		05:59		05:29	
	16:40	97	16:04 (6)	17:15	83	16:09 (6)	17:50	1	17:28 (3)	19:24		19:57		20:27	
2	07:27		14:28 (6)	07:12		14:47 (6)	06:35			06:43		05:57		05:29	
	16:41	97	16:05 (6)	17:16	82	16:09 (6)	17:51			19:25		19:58		20:27	
3	07:27		14:28 (6)	07:11		14:48 (6)	06:33			06:42		05:56		05:28	
	16:42	97	16:05 (6)	17:18	80	16:08 (6)	17:52			19:26		19:59		20:28	
4	07:27		14:29 (6)	07:10		14:49 (6)	06:32			06:40		05:55		05:28	
	16:43	97	16:06 (6)	17:19	79	16:08 (6)	17:53			19:28		20:00		20:29	
5	07:27		14:29 (6)	07:09		14:51 (6)	06:30			06:38		05:53		05:28	
	16:44	97	16:06 (6)	17:20	76	16:07 (6)	17:54			19:29		20:01		20:30	
6	07:27		14:30 (6)	07:08		14:51 (6)	06:28			06:37		05:52		05:27	
	16:45	97	16:07 (6)	17:21	74	16:05 (6)	17:55			19:30		20:02		20:30	
7	07:27		14:30 (6)	07:06		14:53 (6)	06:27			06:35		05:51		05:27	
	16:46	97	16:07 (6)	17:23	72	16:05 (6)	17:57			19:31		20:03		20:31	
8	07:27		14:31 (6)	07:05		14:54 (6)	06:25			06:33		05:50		05:27	
	16:47	97	16:08 (6)	17:24	70	16:04 (6)	17:58			19:32		20:04		20:32	
9	07:26		14:31 (6)	07:04		14:56 (6)	06:24			06:32		05:49		05:26	
	16:48	97	16:08 (6)	17:25	67	16:03 (6)	17:59			19:33		20:05		20:32	
10	07:26		14:31 (6)	07:03		14:58 (6)	06:22			06:30		05:47		05:26	
	16:49	97	16:08 (6)	17:26	64	16:02 (6)	18:00			19:34		20:06		20:33	
11	07:26		14:32 (6)	07:02		14:59 (6)	06:20			06:28		05:46		05:26	
	16:50	97	16:09 (6)	17:28	61	16:00 (6)	18:01			19:35		20:07		20:33	
12	07:26		14:32 (6)	07:00		15:01 (6)	06:19			06:27		05:45		05:26	
	16:51	97	16:09 (6)	17:29	58	15:59 (6)	18:02			19:36		20:08		20:34	
13	07:25		14:33 (6)	06:59		15:04 (6)	06:17			06:25		05:44		05:26	
	16:52	96	16:09 (6)	17:30	53	15:57 (6)	18:03			19:37		20:09		20:34	
14	07:25		14:34 (6)	06:58		15:06 (6)	06:15			06:24		05:43		05:26	
	16:53	96	16:10 (6)	17:31	49	15:55 (6)	18:05			19:38		20:10		20:35	
15	07:25		14:34 (6)	06:57		15:08 (6)	06:14			06:22		05:42		05:26	
	16:54	96	16:10 (6)	17:33	45	15:53 (6)	18:06			19:39		20:11		20:35	
16	07:24		14:35 (6)	06:55		15:12 (6)	06:12			06:20		05:41		05:26	
	16:55	96	16:11 (6)	17:34	38	15:50 (6)	18:07			19:41		20:12		20:36	
17	07:24		14:35 (6)	06:54		15:15 (6)	06:10			06:19		05:40		05:26	
	16:57	95	16:10 (6)	17:35	32	15:47 (6)	18:08			19:42		20:13		20:36	
18	07:23		14:35 (6)	06:52		15:20 (6)	06:09			06:17		05:39		05:26	
	16:58	95	16:10 (6)	17:36	23	15:43 (6)	18:09			19:43		20:14		20:36	
19	07:23		14:36 (6)	06:51		15:31 (6)	06:07			06:16		05:38		05:26	
	16:59	95	16:11 (6)	17:38	2	15:33 (6)	18:10			19:44		20:15		20:37	
20	07:22		14:37 (6)	06:50			06:05			06:14		05:37		05:26	
	17:00	94	16:11 (6)	17:39			18:11			19:45		20:16		20:37	
21	07:22		14:38 (6)	06:48			06:03			06:13		05:36		05:26	
	17:01	93	16:11 (6)	17:40			18:12			19:46		20:17		20:37	
22	07:21		14:38 (6)	06:47			06:02			06:11		05:36		05:26	
	17:03	93	16:11 (6)	17:41			18:13			19:47		20:18		20:37	
23	07:20		14:39 (6)	06:45		17:20 (3)	06:00			06:10		05:35		05:27	
	17:04	92	16:11 (6)	17:42	1	17:21 (3)	18:15			19:48		20:19		20:38	
24	07:20		14:39 (6)	06:44		17:20 (3)	05:58			06:08		05:34		05:27	
	17:05	92	16:11 (6)	17:44	2	17:22 (3)	18:16			19:49		20:20		20:38	
25	07:19		14:40 (6)	06:42		17:22 (3)	05:57			06:07		05:33		05:27	
	17:06	90	16:10 (6)	17:45	1	17:23 (3)	18:17			19:50		20:21		20:38	
26	07:18		14:41 (6)	06:41		17:22 (3)	05:55			06:05		05:33		05:27	
	17:07	90	16:11 (6)	17:46	2	17:24 (3)	18:18			19:51		20:22		20:38	
27	07:17		14:42 (6)	06:39		17:24 (3)	05:53			06:04		05:32		05:28	
	17:09	89	16:11 (6)	17:47	2	17:26 (3)	18:19			19:52		20:23		20:38	
28	07:16		14:43 (6)	06:38		17:25 (3)	05:52			06:03		05:31		05:28	
	17:10	88	16:11 (6)	17:48	2	17:27 (3)	18:20			19:54		20:23		20:38	
29	07:16		14:43 (6)				06:50			06:01		05:31		05:29	
	17:11	87	16:10 (6)				19:21			19:55		20:24		20:38	
30	07:15		14:44 (6)				06:48			06:00		05:30		05:29	
	17:12	86	16:10 (6)				19:22			19:56		20:25		20:38	
31	07:14		14:45 (6)				06:47					05:30			
	17:14	85	16:10 (6)				19:23					20:26			
Potential sun hours	296			297		369				399		449		454	
Total, worst case		2912		1118			1								

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: VVShadow receptor: F - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (27)

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	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44		06:31 16:56	64	14:27 (6) 15:31 (6)	07:06 16:31	14:14 (6) 15:51 (6)
2	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42		06:32 16:55	67	14:26 (6) 15:33 (6)	07:07 16:31	14:15 (6) 15:51 (6)
3	05:31 20:37	05:56 20:16	06:27 19:31	06:58 18:40		06:33 16:54	70	14:24 (6) 15:34 (6)	07:08 16:31	14:15 (6) 15:52 (6)
4	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39		06:34 16:53	73	14:22 (6) 15:35 (6)	07:09 16:31	14:15 (6) 15:52 (6)
5	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37		06:35 16:51	74	14:21 (6) 15:35 (6)	07:10 16:31	14:15 (6) 15:53 (6)
6	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35		06:37 16:50	76	14:21 (6) 15:37 (6)	07:11 16:30	14:16 (6) 15:53 (6)
7	05:33 20:36	06:00 20:11	06:31 19:25	07:02 18:34		06:38 16:49	79	14:19 (6) 15:38 (6)	07:12 16:30	14:16 (6) 15:53 (6)
8	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32		06:39 16:48	80	14:18 (6) 15:38 (6)	07:13 16:30	14:17 (6) 15:54 (6)
9	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30		06:40 16:47	82	14:18 (6) 15:40 (6)	07:14 16:30	14:17 (6) 15:54 (6)
10	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29		06:41 16:46	83	14:17 (6) 15:40 (6)	07:15 16:30	14:18 (6) 15:55 (6)
11	05:36 20:35	06:04 20:06	06:35 19:18	07:06 18:27		06:43 16:45	84	14:16 (6) 15:40 (6)	07:16 16:30	14:17 (6) 15:55 (6)
12	05:36 20:34	06:05 20:05	06:36 19:16	07:08 18:25		06:44 16:44	86	14:16 (6) 15:42 (6)	07:16 16:30	14:18 (6) 15:55 (6)
13	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	1	17:59 (3) 18:00 (3)	87	06:45 15:42 (6)	07:17 16:31	14:19 (6) 15:56 (6)
14	05:38 20:33	06:07 20:02	06:38 19:13	07:10 18:22	2	17:57 (3) 17:59 (3)	89	06:46 15:43 (6)	07:18 16:31	14:19 (6) 15:56 (6)
15	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	2	17:55 (3) 17:57 (3)	89	06:48 15:43 (6)	07:19 16:31	14:20 (6) 15:57 (6)
16	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	2	17:54 (3) 17:56 (3)	90	06:49 15:44 (6)	07:19 16:31	14:20 (6) 15:57 (6)
17	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:17	1	17:53 (3) 17:54 (3)	90	06:50 15:44 (6)	07:20 16:31	14:21 (6) 15:58 (6)
18	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	1	17:52 (3) 17:53 (3)	92	06:51 15:45 (6)	07:21 16:32	14:20 (6) 15:58 (6)
19	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14		06:52 16:38	92	14:14 (6) 15:46 (6)	07:21 16:32	14:21 (6) 15:58 (6)
20	05:43 20:30	06:13 19:54	06:44 19:02	07:17 18:13		06:54 16:37	93	14:13 (6) 15:46 (6)	07:22 16:33	14:22 (6) 15:59 (6)
21	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11		06:55 16:36	93	14:13 (6) 15:46 (6)	07:23 16:33	14:22 (6) 15:59 (6)
22	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10		06:56 16:36	94	14:13 (6) 15:47 (6)	07:23 16:33	14:23 (6) 16:00 (6)
23	05:45 20:27	06:16 19:49	06:47 18:57	07:20 18:09	13	15:55 (6) 16:08 (6)	95	06:57 15:48 (6)	07:24 16:34	14:23 (6) 16:00 (6)
24	05:46 20:26	06:17 19:48	06:48 18:56	07:21 18:07	26	15:48 (6) 16:14 (6)	95	06:58 15:48 (6)	07:24 16:35	14:23 (6) 16:00 (6)
25	05:47 20:25	06:18 19:46	06:50 18:54	07:22 17:06	34	14:43 (6) 15:17 (6)	95	06:59 15:48 (6)	07:24 16:35	14:24 (6) 16:01 (6)
26	05:48 20:24	06:19 19:44	06:51 18:52	07:23 17:04	40	14:41 (6) 15:21 (6)	96	07:00 15:49 (6)	07:25 16:36	14:24 (6) 16:02 (6)
27	05:49 20:24	06:20 19:43	06:52 18:50	07:25 17:03	45	14:38 (6) 15:23 (6)	96	07:02 15:49 (6)	07:25 16:36	14:25 (6) 16:02 (6)
28	05:50 20:23	06:21 19:41	06:53 18:49	07:26 17:02	50	14:35 (6) 15:25 (6)	96	07:03 15:49 (6)	07:26 16:37	14:26 (6) 16:03 (6)
29	05:51 20:22	06:22 19:40	06:54 18:47	07:27 17:00	54	14:33 (6) 15:27 (6)	96	07:04 15:50 (6)	07:26 16:38	14:26 (6) 16:03 (6)
30	05:52 20:21	06:23 19:38	06:55 18:45	07:28 16:59	58	14:31 (6) 15:29 (6)	97	07:05 15:51 (6)	07:26 16:39	14:26 (6) 16:04 (6)
31	05:53 20:20	06:24 19:36		06:29 16:58	61	14:29 (6) 15:30 (6)			07:26 16:39	14:27 (6) 16:04 (6)
Potential sun hours	460	429	375	345	390	297	2593	286	3011	
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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Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar

Calculation: VVShadow receptor: G - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (28)

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	07:26 16:40	14:12 (6) 07:13 15:56 (6) 17:15	14:34 (6) 06:36 15:58 (6) 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	14:18 (6) 07:06 15:18 (6) 16:31
2	07:27 16:41	14:12 (6) 07:12 15:57 (6) 17:16	14:36 (6) 06:35 15:57 (6) 17:51	06:43 19:25	05:57 19:58	05:29 20:27	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	14:16 (6) 07:07 15:20 (6) 16:31
3	07:27 16:42	14:13 (6) 07:11 15:57 (6) 17:18	14:37 (6) 06:33 15:57 (6) 17:52	06:42 19:26	05:56 19:59	05:28 20:28	05:31 20:37	05:56 20:16	06:27 19:31	06:58 18:40	06:33 16:54	14:14 (6) 07:08 15:21 (6) 16:31
4	07:27 16:43	14:13 (6) 07:10 15:58 (6) 17:19	14:39 (6) 06:32 15:56 (6) 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	14:12 (6) 07:09 15:22 (6) 16:31
5	07:27 16:44	14:14 (6) 07:09 15:58 (6) 17:20	14:40 (6) 06:30 15:55 (6) 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	14:11 (6) 07:10 15:23 (6) 16:31
6	07:27 16:45	14:15 (6) 07:08 15:59 (6) 17:21	14:41 (6) 06:28 15:53 (6) 17:55	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35	06:37 16:50	14:10 (6) 07:11 15:25 (6) 16:30
7	07:27 16:46	14:15 (6) 07:06 15:59 (6) 17:23	14:43 (6) 06:27 15:52 (6) 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:37	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	14:08 (6) 07:12 15:26 (6) 16:30
8	07:27 16:47	14:16 (6) 07:05 16:00 (6) 17:24	14:45 (6) 06:25 15:51 (6) 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	14:07 (6) 07:13 15:27 (6) 16:30
9	07:26 16:48	14:16 (6) 07:04 15:59 (6) 17:25	14:47 (6) 06:24 15:50 (6) 17:59	06:32 19:33	05:49 20:05	05:26 20:32	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	14:07 (6) 07:14 15:28 (6) 16:30
10	07:26 16:49	14:17 (6) 07:03 16:00 (6) 17:26	14:49 (6) 06:22 15:49 (6) 18:00	06:30 19:34	05:47 20:06	05:26 20:33	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29	06:41 16:46	14:05 (6) 07:15 15:29 (6) 16:30
11	07:26 16:50	14:18 (6) 07:02 16:00 (6) 17:28	14:51 (6) 06:20 15:47 (6) 18:01	06:28 19:35	05:46 20:07	05:26 20:33	05:36 20:35	06:04 20:06	06:35 19:18	07:06 18:27	06:43 16:45	14:04 (6) 07:16 15:30 (6) 16:30
12	07:26 16:51	14:17 (6) 07:00 16:00 (6) 17:29	14:53 (6) 06:19 15:45 (6) 18:02	06:27 19:36	05:45 20:08	05:26 20:34	05:36 20:34	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	14:03 (6) 07:16 15:31 (6) 16:30
13	07:25 16:52	14:18 (6) 06:59 16:01 (6) 17:30	14:57 (6) 06:17 15:43 (6) 18:03	06:25 19:37	05:44 20:09	05:26 20:34	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	14:03 (6) 07:17 15:32 (6) 16:31
14	07:25 16:53	14:20 (6) 06:58 16:01 (6) 17:31	14:59 (6) 06:15 15:40 (6) 18:05	06:24 19:38	05:43 20:10	05:26 20:35	05:38 20:33	06:07 20:02	06:38 19:13	07:10 18:22	06:46 17:59 (3)	14:02 (6) 07:18 15:33 (6) 16:31
15	07:25 16:54	14:21 (6) 06:57 16:01 (6) 17:33	15:03 (6) 06:14 15:37 (6) 18:06	06:22 19:39	05:42 20:11	05:26 20:35	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	06:48 17:57 (3)	14:01 (6) 07:19 15:34 (6) 16:31
16	07:24 16:55	14:21 (6) 06:55 16:02 (6) 17:34	15:08 (6) 06:12 15:33 (6) 18:07	06:20 19:41	05:41 20:12	05:26 20:36	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	06:49 17:56 (3)	14:01 (6) 07:19 15:34 (6) 16:31
17	07:24 16:56	14:21 (6) 06:54 16:01 (6) 17:35	15:16 (6) 06:10 15:24 (6) 18:08	06:19 19:42	05:40 20:13	05:26 20:36	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:17	06:50 17:54 (3)	14:01 (6) 07:20 15:34 (6) 16:31
18	07:23 16:57	14:21 (6) 06:52 16:01 (6) 17:36	15:24 (6) 06:09 15:09 (6) 18:09	06:17 19:43	05:39 20:14	05:26 20:36	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	06:51 17:52 (3)	14:00 (6) 07:21 15:35 (6) 16:32
19	07:23 16:58	14:23 (6) 06:51 16:02 (6) 17:38	15:24 (6) 06:08 15:10 (6) 18:10	06:16 19:44	05:38 20:15	05:26 20:37	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14	06:52 16:38	14:00 (6) 07:21 15:36 (6) 16:32
20	07:22 17:00	14:23 (6) 06:50 16:01 (6) 17:39	15:25 (6) 06:07 15:11 (6) 18:11	06:14 19:45	05:37 20:16	05:26 20:37	05:43 20:30	06:13 19:54	06:44 19:02	07:17 18:13	06:54 16:37	14:00 (6) 07:22 15:37 (6) 16:33
21	07:22 17:01	14:24 (6) 06:48 16:02 (6) 17:40	15:26 (6) 06:06 15:12 (6) 18:12	06:13 19:46	05:36 20:17	05:26 20:37	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11	06:55 16:36	14:00 (6) 07:22 15:38 (6) 16:33
22	07:21 17:03	14:25 (6) 06:47 16:02 (6) 17:41	15:27 (6) 06:05 15:13 (6) 18:13	06:12 19:47	05:35 20:18	05:26 20:37	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10	06:56 16:36	14:00 (6) 07:23 15:39 (6) 16:33
23	07:20 17:04	14:25 (6) 06:45 16:01 (6) 17:42	15:28 (6) 06:04 15:14 (6) 18:14	06:11 19:48	05:34 20:19	05:27 20:38	05:45 20:27	06:16 19:49	06:47 18:57	07:20 18:09	06:57 16:35	14:00 (6) 07:24 15:40 (6) 16:34
24	07:20 17:05	14:26 (6) 06:44 16:01 (6) 17:44	15:29 (6) 06:03 15:15 (6) 18:15	06:10 19:49	05:33 20:20	05:27 20:38	05:46 20:26	06:17 19:48	06:48 18:56	07:21 18:07	06:58 16:35	14:00 (6) 07:24 15:41 (6) 16:35
25	07:19 17:06	14:27 (6) 06:42 16:00 (6) 17:45	15:30 (6) 06:02 15:16 (6) 18:16	06:09 19:50	05:32 20:21	05:27 20:38	05:47 20:25	06:18 19:46	06:50 18:54	06:22 17:06	06:59 14:43 (6)	14:00 (6) 07:24 15:42 (6) 16:35
26	07:18 17:07	14:28 (6) 06:41 16:01 (6) 17:46	15:31 (6) 06:01 15:17 (6) 18:17	06:08 19:51	05:31 20:22	05:27 20:38	05:48 20:24	06:19 19:44	06:51 18:52	06:23 17:04	06:59 14:44 (6)	14:00 (6) 07:25 15:43 (6) 16:35
27	07:17 17:09	14:29 (6) 06:39 16:01 (6) 17:47	15:32 (6) 06:00 15:18 (6) 18:18	06:07 19:52	05:30 20:23	05:28 20:38	05:49 20:24	06:20 19:43	06:52 18:50	06:25 17:03	06:59 14:45 (6)	14:00 (6) 07:25 15:44 (6) 16:35
28	07:16 17:10	14:30 (6) 06:38 16:00 (6) 17:48	15:33 (6) 05:59 15:19 (6) 18:19	06:06 19:53	05:29 20:24	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	06:26 17:02	06:59 14:46 (6)	14:00 (6) 07:26 15:45 (6) 16:35
29	07:16 17:11	14:31 (6) 06:37 16:00 (6) 17:49	15:34 (6) 05:58 15:20 (6) 18:20	06:05 19:54	05:28 20:25	05:28 20:38	05:51 20:23	06:22 19:41	06:54 18:47	06:27 17:00	06:59 14:47 (6)	14:00 (6) 07:26 15:46 (6) 16:35
30	07:15 17:12	14:32 (6) 06:36 16:00 (6) 17:50	15:35 (6) 05:57 15:21 (6) 18:21	06:04 19:55	05:27 20:26	05:28 20:38	05:52 20:23	06:23 19:40	06:55 18:45	06:28 17:00	06:59 14:48 (6)	14:00 (6) 07:26 15:47 (6) 16:35
31	07:14 17:14	14:33 (6) 06:35 16:00 (6) 17:51	15:36 (6) 05:56 15:22 (6) 18:22	06:03 19:56	05:26 20:27	05:28 20:38	05:53 20:23	06:24 19:38	06:29 18:45	06:29 17:00	06:59 14:49 (6)	14:00 (6) 07:26 15:48 (6) 16:35
Potential sun hours	296	297	297	297	297	297	297	297	297	297	297	297
Total, worst case	3064	3064	3064	3064	3064	3064	3064	3064	3064	3064	3064	3064

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

SHADOW - Calendar

Calculation: VVShadow receptor: H - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (29)

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	07:26	15:22 (6)	07:13	15:38 (6)	06:36	06:45	05:58	05:29	19:02 (5)
	16:40	52	16:14 (6)	17:15	48	16:26 (6)	17:50	19:24	05:57
2	07:27	15:23 (6)	07:12	15:39 (6)	06:35	06:43	05:57	05:29	19:01 (5)
	16:41	52	16:15 (6)	17:16	46	16:25 (6)	17:51	19:25	19:58
3	07:27	15:23 (6)	07:11	15:41 (6)	06:33	06:42	05:56	05:28	19:02 (5)
	16:42	53	16:16 (6)	17:18	44	16:25 (6)	17:52	19:26	19:59
4	07:27	15:23 (6)	07:10	15:42 (6)	06:32	06:40	05:55	05:28	19:02 (5)
	16:43	54	16:17 (6)	17:19	42	16:24 (6)	17:53	19:28	20:00
5	07:27	15:24 (6)	07:09	15:44 (6)	06:30	06:38	05:53	05:27	19:01 (5)
	16:44	54	16:18 (6)	17:20	39	16:23 (6)	17:54	19:29	20:01
6	07:27	15:24 (6)	07:08	15:45 (6)	06:28	06:37	05:52	05:27	19:57 (5)
	16:45	55	16:19 (6)	17:21	35	16:20 (6)	17:55	19:30	20:02
7	07:27	15:25 (6)	07:06	15:47 (6)	06:27	06:35	05:51	05:27	19:02 (5)
	16:46	55	16:20 (6)	17:23	32	16:19 (6)	17:57	19:31	20:03
8	07:27	15:25 (6)	07:05	15:49 (6)	06:25	06:33	05:50	05:27	19:02 (5)
	16:47	56	16:21 (6)	17:24	28	16:17 (6)	17:58	19:32	20:04
9	07:26	15:25 (6)	07:04	15:52 (6)	06:24	06:32	05:49	05:26	19:02 (5)
	16:48	57	16:22 (6)	17:25	23	16:15 (6)	17:59	19:33	20:05
10	07:26	15:25 (6)	07:03	15:56 (6)	06:22	06:30	05:47	19:23 (5)	05:26
	16:49	58	16:23 (6)	17:26	15	16:11 (6)	18:00	19:34	20:06
11	07:26	15:26 (6)	07:02		06:20	06:28	05:46	19:19 (5)	05:26
	16:50	58	16:24 (6)	17:28		18:01	19:35	20:07	17
12	07:26	15:26 (6)	07:00		06:19	06:27	05:45	19:16 (5)	05:26
	16:51	59	16:25 (6)	17:29		18:02	19:36	20:08	23
13	07:25	15:27 (6)	06:59		06:17	06:25	05:44	19:14 (5)	05:26
	16:52	59	16:26 (6)	17:30		18:03	19:37	20:09	27
14	07:25	15:27 (6)	06:58		06:15	06:24	05:43	19:12 (5)	05:26
	16:53	60	16:27 (6)	17:31		18:05	19:38	20:10	31
15	07:25	15:27 (6)	06:57		06:14	06:22	05:42	19:10 (5)	05:26
	16:54	60	16:27 (6)	17:33		18:06	19:39	20:11	34
16	07:24	15:28 (6)	06:55		06:12	06:20	05:41	19:09 (5)	05:26
	16:55	60	16:28 (6)	17:34		18:07	19:41	20:12	37
17	07:24	15:28 (6)	06:54		06:10	06:19	05:40	19:09 (5)	05:26
	16:57	59	16:27 (6)	17:35		18:08	19:42	20:13	39
18	07:23	15:28 (6)	06:52		06:09	06:17	05:39	19:08 (5)	05:26
	16:58	59	16:27 (6)	17:36		18:09	19:43	20:14	41
19	07:23	15:29 (6)	06:51		06:07	06:16	05:38	19:07 (5)	05:26
	16:59	59	16:28 (6)	17:38		18:10	19:44	20:15	42
20	07:22	15:29 (6)	06:50		06:05	06:14	05:37	19:06 (5)	05:26
	17:00	59	16:28 (6)	17:39		18:11	19:45	20:16	44
21	07:22	15:30 (6)	06:48		06:03	06:13	05:36	19:05 (5)	05:26
	17:01	59	16:29 (6)	17:40		18:12	19:46	20:17	45
22	07:21	15:31 (6)	06:47		06:02	06:11	05:36	19:05 (5)	05:26
	17:03	58	16:29 (6)	17:41		18:13	19:47	20:18	47
23	07:20	15:31 (6)	06:45		06:00	06:10	05:35	19:04 (5)	05:27
	17:04	57	16:28 (6)	17:42		18:15	19:48	20:19	48
24	07:20	15:31 (6)	06:44		05:58	06:08	05:34	19:03 (5)	05:27
	17:05	57	16:28 (6)	17:44		18:16	19:49	20:20	50
25	07:19	15:32 (6)	06:42		05:57	06:07	05:33	19:03 (5)	05:27
	17:06	56	16:28 (6)	17:45		18:17	19:50	20:21	50
26	07:18	15:33 (6)	06:41		05:55	06:05	05:33	19:03 (5)	05:27
	17:07	56	16:29 (6)	17:46		18:18	19:51	20:22	51
27	07:17	15:34 (6)	06:39		05:53	06:04	05:32	19:02 (5)	05:28
	17:09	54	16:28 (6)	17:47		18:19	19:52	20:23	52
28	07:16	15:34 (6)	06:38		05:52	06:03	05:31	19:03 (5)	05:28
	17:10	54	16:28 (6)	17:48		18:20	19:54	20:23	52
29	07:16	15:35 (6)			06:50	06:01	05:31	19:02 (5)	05:29
	17:11	53	16:28 (6)		19:21	19:55	20:24	19:55 (5)	20:38
30	07:15	15:36 (6)			06:48	06:00	05:30	19:02 (5)	05:29
	17:12	51	16:27 (6)		19:22	19:56	20:25	19:56 (5)	20:38
31	07:14	15:37 (6)			06:47		05:30	19:02 (5)	
	17:14	50	16:27 (6)		19:23		20:26	19:56 (5)	
Potential sun hours	296		297		369	399	449	454	1708
Total, worst case	1743		352				899		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

SHADOW - Calendar

Calculation: VVShadow receptor: H - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (29)

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	05:30	19:06 (5)	05:54	19:27 (5)	06:25	06:56	06:31	15:24 (6)	07:06	15:08 (6)	
	20:38	20:03 (5)	20:18	19:49 (5)	19:35	18:44	16:56	15:41 (6)	16:31	16:06 (6)	
2	05:30	19:07 (5)	05:55	19:31 (5)	06:26	06:57	06:32	15:21 (6)	07:07	15:08 (6)	
	20:38	20:04 (5)	20:17	19:45 (5)	19:33	18:42	16:55	15:45 (6)	16:31	16:06 (6)	
3	05:31	19:07 (5)	05:56		06:27	06:58	06:33	15:19 (6)	07:08	15:09 (6)	
	20:37	20:04 (5)	20:16		19:31	18:40	16:54	15:47 (6)	16:31	16:06 (6)	
4	05:31	19:08 (5)	05:57		06:28	06:59	06:34	15:16 (6)	07:09	15:09 (6)	
	20:37	20:04 (5)	20:15		19:30	18:39	16:53	15:49 (6)	16:31	16:05 (6)	
5	05:32	19:07 (5)	05:58		06:29	07:00	06:35	15:14 (6)	07:10	15:10 (6)	
	20:37	20:04 (5)	20:14		19:28	18:37	16:51	15:51 (6)	16:31	16:05 (6)	
6	05:32	19:08 (5)	05:59		06:30	07:01	06:37	15:13 (6)	07:11	15:10 (6)	
	20:37	20:04 (5)	20:13		19:26	18:35	16:50	15:53 (6)	16:30	16:05 (6)	
7	05:33	19:09 (5)	06:00		06:31	07:02	06:38	15:12 (6)	07:12	15:11 (6)	
	20:36	20:05 (5)	20:11		19:25	18:34	16:49	15:54 (6)	16:30	16:05 (6)	
8	05:34	19:08 (5)	06:01		06:32	07:03	06:39	15:10 (6)	07:13	15:11 (6)	
	20:36	20:04 (5)	20:10		19:23	18:32	16:48	15:55 (6)	16:30	16:05 (6)	
9	05:34	19:09 (5)	06:02		06:33	07:04	06:40	15:10 (6)	07:14	15:12 (6)	
	20:36	20:04 (5)	20:09		19:21	18:30	16:47	15:56 (6)	16:30	16:05 (6)	
10	05:35	19:10 (5)	06:03		06:34	07:05	06:41	15:09 (6)	07:15	15:13 (6)	
	20:35	20:05 (5)	20:08		19:20	18:29	16:46	15:57 (6)	16:30	16:05 (6)	
11	05:36	19:09 (5)	06:04		06:35	07:06	06:43	15:08 (6)	07:16	15:12 (6)	
	20:35	20:04 (5)	20:06		19:18	18:27	16:45	15:58 (6)	16:30	16:04 (6)	
12	05:36	19:10 (5)	06:05		06:36	07:08	06:44	15:08 (6)	07:16	15:13 (6)	
	20:34	20:04 (5)	20:05		19:16	18:25	16:44	15:59 (6)	16:30	16:04 (6)	
13	05:37	19:10 (5)	06:06		06:37	07:09	06:45	15:07 (6)	07:17	15:14 (6)	
	20:34	20:04 (5)	20:04		19:15	18:24	16:43	16:00 (6)	16:30	16:05 (6)	
14	05:38	19:11 (5)	06:07		06:38	07:10	06:46	15:06 (6)	07:18	15:15 (6)	
	20:33	20:05 (5)	20:02		19:13	18:22	16:42	16:00 (6)	16:31	16:05 (6)	
15	05:39	19:11 (5)	06:08		06:39	07:11	06:48	15:06 (6)	07:19	15:15 (6)	
	20:33	20:04 (5)	20:01		19:11	18:21	16:41	16:00 (6)	16:31	16:05 (6)	
16	05:39	19:11 (5)	06:09		06:40	07:12	06:49	15:06 (6)	07:19	15:15 (6)	
	20:32	20:04 (5)	19:59		19:09	18:19	16:40	16:02 (6)	16:31	16:05 (6)	
17	05:40	19:12 (5)	06:10		06:41	07:13	06:50	15:06 (6)	07:20	15:16 (6)	
	20:32	20:04 (5)	19:58		19:08	18:17	16:39	16:02 (6)	16:31	16:06 (6)	
18	05:41	19:13 (5)	06:11		06:42	07:14	06:51	15:05 (6)	07:21	15:16 (6)	
	20:31	20:03 (5)	19:57		19:06	18:16	16:39	16:02 (6)	16:32	16:05 (6)	
19	05:42	19:12 (5)	06:12		06:43	07:15	06:52	15:06 (6)	07:21	15:17 (6)	
	20:30	20:02 (5)	19:55		19:04	18:14	16:38	16:03 (6)	16:32	16:06 (6)	
20	05:43	19:13 (5)	06:13		06:44	07:17	06:53	15:06 (6)	07:22	15:18 (6)	
	20:30	20:02 (5)	19:54		19:02	18:13	16:37	16:04 (6)	16:33	16:07 (6)	
21	05:44	19:14 (5)	06:14		06:45	07:18	06:55	15:05 (6)	07:23	15:18 (6)	
	20:29	20:02 (5)	19:52		19:01	18:11	16:36	16:04 (6)	16:33	16:07 (6)	
22	05:44	19:15 (5)	06:15		06:46	07:19	06:56	15:05 (6)	07:23	15:19 (6)	
	20:28	20:01 (5)	19:51		18:59	18:10	16:36	16:04 (6)	16:33	16:08 (6)	
23	05:45	19:16 (5)	06:16		06:47	07:20	06:57	15:05 (6)	07:24	15:19 (6)	
	20:27	20:01 (5)	19:49		18:57	18:09	16:35	16:04 (6)	16:34	16:08 (6)	
24	05:46	19:17 (5)	06:17		06:48	07:21	06:58	15:06 (6)	07:24	15:19 (6)	
	20:26	20:00 (5)	19:47		18:56	18:07	16:35	16:05 (6)	16:35	16:08 (6)	
25	05:47	19:18 (5)	06:18		06:50	06:22	06:59	15:06 (6)	07:24	15:20 (6)	
	20:25	20:00 (5)	19:46		18:54	17:06	16:34	16:06 (6)	16:35	16:09 (6)	
26	05:48	19:19 (5)	06:19		06:51	06:23	07:00	15:06 (6)	07:25	15:20 (6)	
	20:24	19:59 (5)	19:44		18:52	17:04	16:33	16:06 (6)	16:36	16:09 (6)	
27	05:49	19:19 (5)	06:20		06:52	06:25	07:02	15:06 (6)	07:25	15:20 (6)	
	20:24	19:57 (5)	19:43		18:50	17:03	16:33	16:06 (6)	16:36	16:10 (6)	
28	05:50	19:20 (5)	06:21		06:53	06:26	07:03	15:06 (6)	07:26	15:21 (6)	
	20:23	19:56 (5)	19:41		18:49	17:02	16:33	16:06 (6)	16:37	16:11 (6)	
29	05:51	19:21 (5)	06:22		06:54	06:27	07:04	15:08 (6)	07:26	15:21 (6)	
	20:22	19:54 (5)	19:40		18:47	17:00	16:32	16:07 (6)	16:38	16:12 (6)	
30	05:52	19:23 (5)	06:23		06:55	06:28	07:05	15:08 (6)	07:26	15:22 (6)	
	20:21	19:53 (5)	19:38		18:45	16:59	16:32	16:07 (6)	16:39	16:12 (6)	
31	05:53	19:25 (5)	06:24			06:29			07:26	15:22 (6)	
	20:19	19:51 (5)	19:36			16:58			16:39	16:13 (6)	
Potential sun hours	460		429		375	345	297		286	51	16:13 (6)
Total, worst case	1513		36				1500		1599		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar

Calculation: VVShadow receptor: I - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (30)

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	07:26 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:31
2	07:27 16:41	07:12 17:16	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:27	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	07:07 16:31
3	07:27 16:42	07:11 17:18	06:33 17:52	06:42 19:26	05:56 19:59	05:28 20:28	05:31 20:37	05:56 20:16	06:27 19:31	06:58 18:40	06:33 16:54	07:08 16:31
4	07:27 16:43	07:10 17:19	06:32 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	07:09 16:31
5	07:27 16:44	07:09 17:20	06:30 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	07:10 16:31
6	07:27 16:45	07:08 17:21	06:28 17:55	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35	06:37 16:50	07:11 16:30
7	07:27 16:46	07:06 17:23	06:27 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:36	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	07:12 16:30
8	07:26 16:47	07:05 17:24	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	07:13 16:30
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31	07:14 17:14		06:47 19:23		05:30 20:26		05:53 20:19	06:24 19:36		06:29 16:58		07:26 16:39
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
Total, worst case												

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

SHADOW - Calendar

Calculation: VVShadow receptor: J - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (31)

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	07:26 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:31
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Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
Total, worst case												

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

SHADOW - Calendar

Calculation: VVShadow receptor: K - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (32)

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	07:26 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:31
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25	07:19 17:06	06:42 17:45	05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38	05:47 20:25	06:18 19:46	06:50 18:54	07:22 17:06	06:59 16:34	07:24 16:35
26	07:18 17:07	06:41 17:46	05:55 18:18	06:05 19:51	05:33 20:22	05:28 20:38	05:48 20:24	06:19 19:44	06:51 18:52	07:23 17:04	07:00 16:34	07:25 16:36
27	07:17 17:09	06:39 17:47	05:53 18:19	06:04 19:52	05:32 20:23	05:28 20:38	05:49 20:24	06:20 19:43	06:52 18:50	07:24 17:03	07:02 16:33	07:25 16:36
28	07:16 17:10	06:38 17:48	05:52 18:20	06:03 19:53	05:31 20:23	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	07:25 17:02	07:03 16:33	07:25 16:37
29	07:16 17:11		06:50 19:21	06:01 19:55	05:31 20:24	05:29 20:38	05:51 20:22	06:22 19:40	06:54 18:47	07:26 17:00	07:04 16:32	07:26 16:38
30	07:15 17:12		06:48 19:22	06:00 19:56	05:30 20:25	05:29 20:38	05:52 20:21	06:23 19:38	06:55 18:45	07:27 16:59	07:05 16:32	07:26 16:39
31	07:14 17:14		06:47 19:23		05:30 20:26		05:53 20:19	06:24 19:36		06:29 16:58		07:26 16:39
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
Total, worst case												

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar

Calculation: VVShadow receptor: L - Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (33)

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	07:26 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:31
2	07:27 16:41	07:12 17:16	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:27	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	07:07 16:31
3	07:27 16:42	07:11 17:18	06:33 17:52	06:42 19:26	05:56 19:59	05:28 20:28	05:31 20:37	05:56 20:16	06:27 19:31	06:58 18:40	06:33 16:54	07:08 16:31
4	07:27 16:43	07:10 17:19	06:32 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	07:09 16:31
5	07:27 16:44	07:09 17:20	06:30 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	07:10 16:31
6	07:27 16:45	07:08 17:21	06:28 17:55	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35	06:37 16:50	07:11 16:30
7	07:27 16:46	07:06 17:23	06:27 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:36	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	07:12 16:30
8	07:26 16:47	07:05 17:24	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	07:13 16:30
9	07:26 16:48	07:04 17:25	06:24 17:59	06:32 19:33	05:49 20:05	05:26 20:32	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	07:14 16:30
10	07:26 16:49	07:03 17:26	06:22 18:00	06:30 19:34	05:47 20:06	05:26 20:33	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29	06:41 16:46	07:15 16:30
11	07:26 16:50	07:02 17:28	06:20 18:01	06:28 19:35	05:46 20:07	05:26 20:33	05:36 20:35	06:04 20:06	06:35 19:18	07:06 18:27	06:43 16:45	07:16 16:30
12	07:26 16:51	07:00 17:29	06:19 18:02	06:27 19:36	05:45 20:08	05:26 20:34	05:36 20:34	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	07:16 16:30
13	07:25 16:52	06:59 17:30	06:17 18:03	06:25 19:37	05:44 20:09	05:26 20:34	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	07:17 16:31
14	07:25 16:53	06:58 17:31	06:15 18:05	06:24 19:38	05:43 20:10	05:26 20:35	05:38 20:33	06:07 20:02	06:38 19:13	07:10 18:22	06:46 16:42	07:18 16:31
15	07:25 16:54	06:57 17:33	06:14 18:06	06:22 19:39	05:42 20:11	05:26 20:35	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	06:48 16:41	07:19 16:31
16	07:24 16:55	06:55 17:34	06:12 18:07	06:20 19:41	05:41 20:12	05:26 20:36	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	06:49 16:40	07:19 16:31
17	07:24 16:57	06:54 17:35	06:10 18:08	06:19 19:42	05:40 20:13	05:26 20:36	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:17	06:50 16:39	07:20 16:31
18	07:23 16:58	06:52 17:36	06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	06:51 16:39	07:21 16:32
19	07:23 16:59	06:51 17:38	06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14	06:52 16:38	07:21 16:32
20	07:22 17:00	06:50 17:39	06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37	05:43 20:30	06:13 19:54	06:44 19:02	07:16 18:13	06:53 16:37	07:22 16:33
21	07:22 17:01	06:48 17:40	06:03 18:12	06:13 19:46	05:37 20:17	05:26 20:37	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11	06:55 16:36	07:23 16:33
22	07:21 17:03	06:47 17:41	06:02 18:13	06:11 19:47	05:36 20:18	05:26 20:37	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10	06:56 16:36	07:23 16:33
23	07:20 17:04	06:45 17:42	06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:37	05:45 20:27	06:16 19:49	06:47 18:57	07:20 18:09	06:57 16:35	07:24 16:34
24	07:20 17:05	06:44 17:44	05:58 18:16	06:08 19:49	05:34 20:20	05:27 20:38	05:46 20:26	06:17 19:47	06:48 18:56	07:21 18:07	06:58 16:35	07:24 16:35
25	07:19 17:06	06:42 17:45	05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38	05:47 20:25	06:18 19:46	06:50 18:54	07:22 17:06	06:59 16:34	07:24 16:35
26	07:18 17:07	06:41 17:46	05:55 18:18	06:05 19:51	05:33 20:22	05:28 20:38	05:48 20:24	06:19 19:44	06:51 18:52	07:23 17:04	07:00 16:34	07:25 16:36
27	07:17 17:09	06:39 17:47	05:53 18:19	06:04 19:52	05:32 20:23	05:28 20:38	05:49 20:24	06:20 19:43	06:52 18:50	07:24 17:03	07:02 16:33	07:25 16:36
28	07:16 17:10	06:38 17:48	05:52 18:20	06:03 19:53	05:31 20:23	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	07:25 17:02	07:03 16:33	07:25 16:37
29	07:16 17:11		06:50 19:21	06:01 19:55	05:31 20:24	05:29 20:38	05:51 20:22	06:22 19:40	06:54 18:47	07:26 17:00	07:04 16:32	07:26 16:38
30	07:15 17:12		06:48 19:22	06:00 19:56	05:30 20:25	05:29 20:38	05:52 20:21	06:23 19:38	06:55 18:45	07:27 16:59	07:05 16:32	07:26 16:39
31	07:14 17:14		06:47 19:23		05:30 20:26		05:53 20:19	06:24 19:36		06:29 16:58		07:26 16:39
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
Total, worst case												

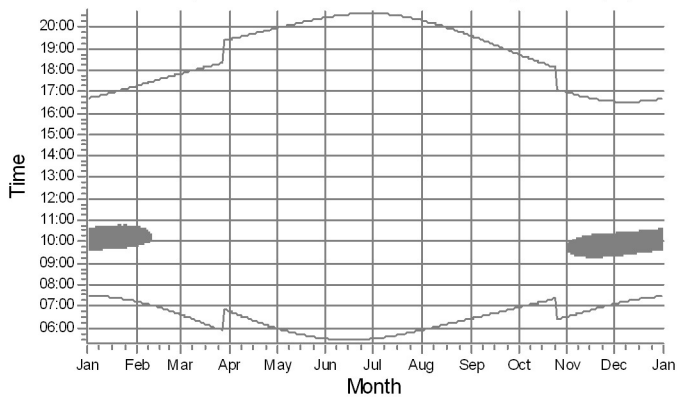
Table layout: For each day in each month the following matrix apply

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

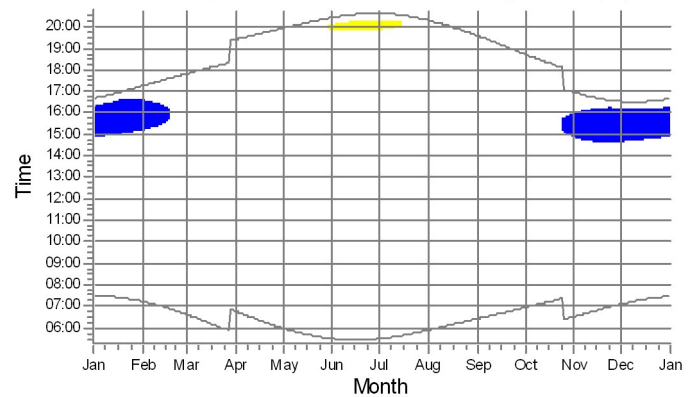
SHADOW - Calendar, graphical

Calculation: VV

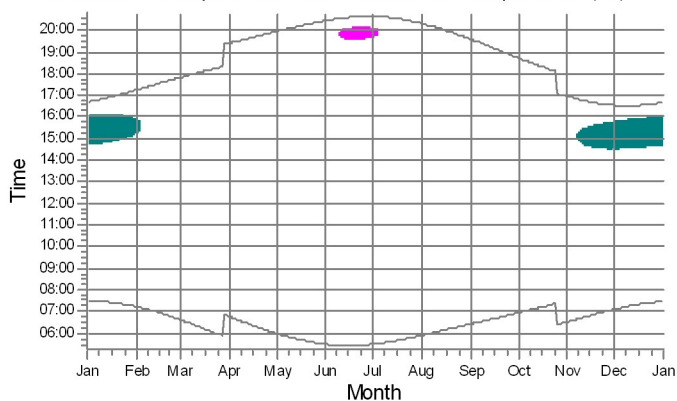
A: Shadow Receptor: 1,0 × 1,0 Azimuth: -40,0° Slope: 90,0° (22)



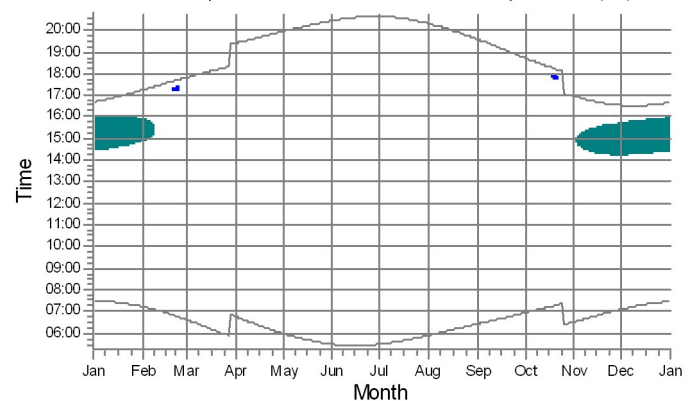
B: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (23)



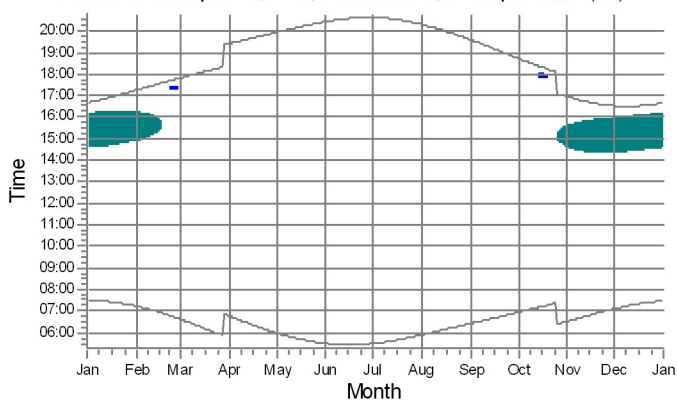
C: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (24)



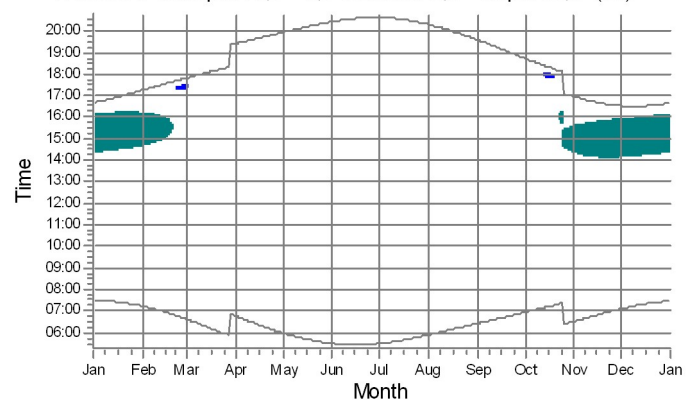
D: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (25)



E: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (26)



F: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (27)



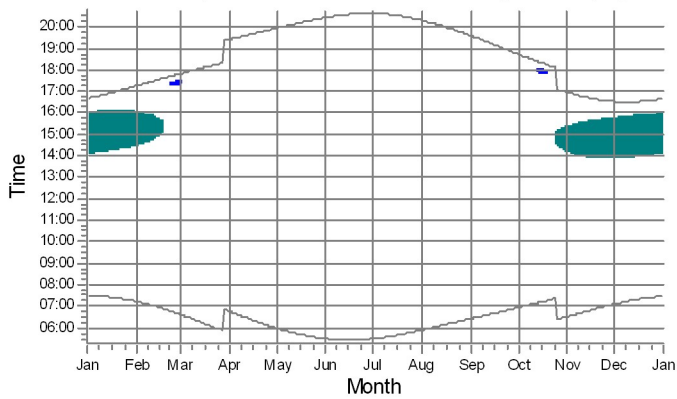
WTGs

- 2: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (18)
- 3: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (19)
- 4: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (20)
- 5: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (21)
- 6: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (22)

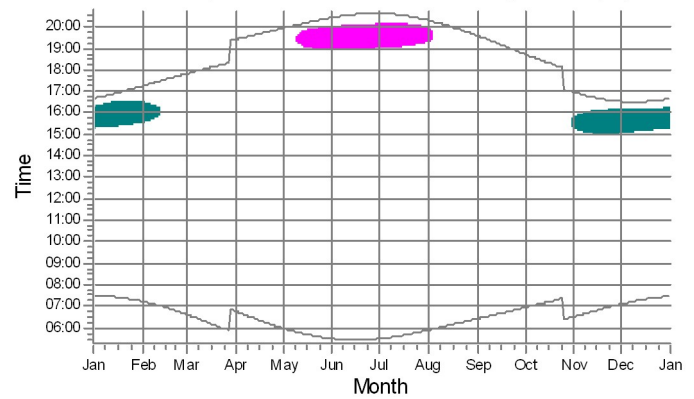
SHADOW - Calendar, graphical

Calculation: VV

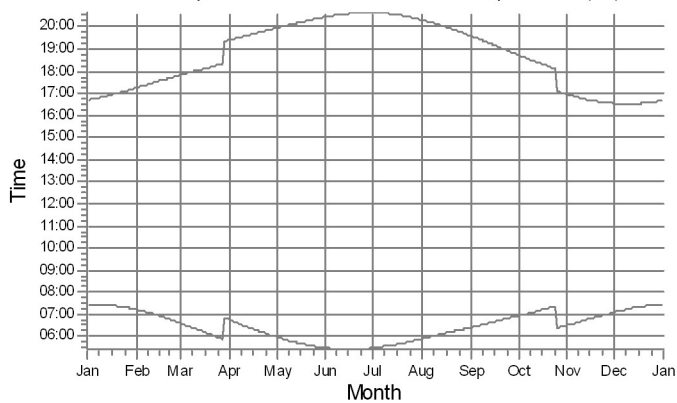
G: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (28)



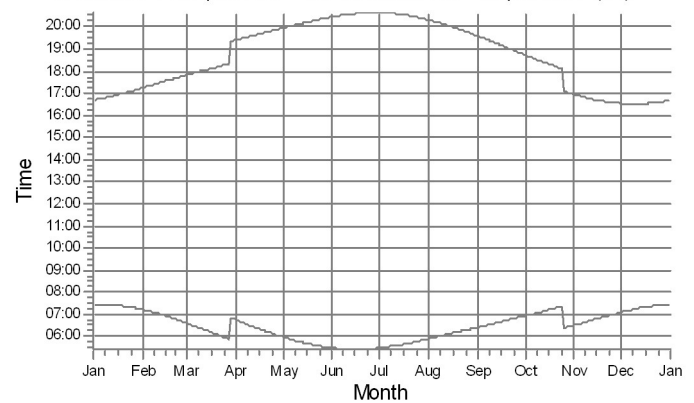
H: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (29)



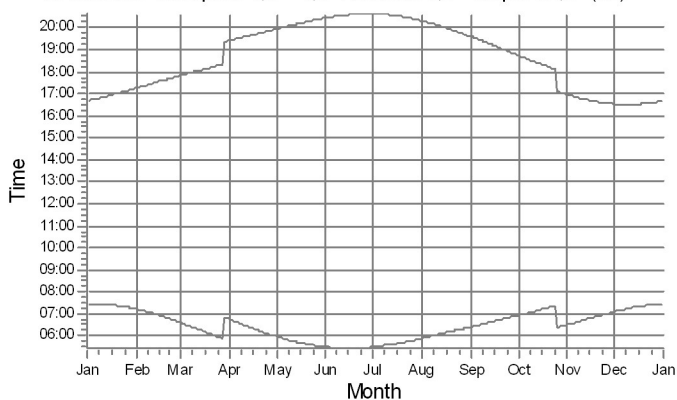
I: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (30)



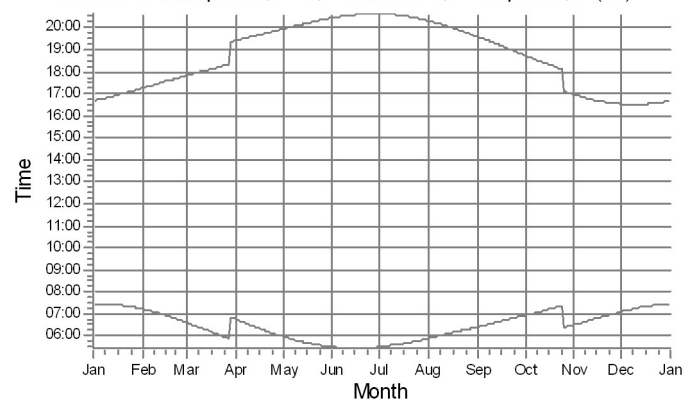
J: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (31)



K: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (32)



L: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (33)



WTGs

- 3: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (19)
- 5: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (21)
- 6: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (22)

SHADOW - Calendar per WTG

Calculation: VVWTG: 1 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (17)

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	07:27 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	05:30 20:38	05:54 20:19	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:32
2	07:27 16:41	07:12 17:16	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:28	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	07:07 16:31
3	07:27 16:42	07:11 17:18	06:33 17:52	06:42 19:27	05:56 19:59	05:28 20:28	05:31 20:38	05:56 20:16	06:27 19:32	06:58 18:40	06:33 16:54	07:08 16:31
4	07:27 16:43	07:10 17:19	06:32 17:53	06:40 19:28	05:55 20:00	05:28 20:29	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	07:09 16:31
5	07:27 16:44	07:09 17:20	06:30 17:54	06:38 19:29	05:53 20:01	05:28 20:30	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:36 16:52	07:10 16:31
6	07:27 16:45	07:08 17:21	06:28 17:56	06:37 19:30	05:52 20:02	05:27 20:30	05:32 20:37	05:59 20:13	06:30 19:27	07:01 18:35	06:37 16:50	07:11 16:30
7	07:27 16:46	07:07 17:23	06:27 17:57	06:35 19:31	05:51 20:03	05:27 20:31	05:33 20:37	06:00 20:12	06:31 19:25	07:02 18:34	06:38 16:49	07:12 16:30
8	07:27 16:47	07:05 17:24	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	07:13 16:30
9	07:26 16:48	07:04 17:25	06:24 17:59	06:32 19:33	05:49 20:05	05:26 20:32	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	07:14 16:30
10	07:26 16:49	07:03 17:26	06:22 18:00	06:30 19:34	05:47 20:06	05:26 20:33	05:35 20:36	06:03 20:08	06:34 19:20	07:05 18:29	06:42 16:46	07:15 16:30
11	07:26 16:50	07:02 17:28	06:20 18:01	06:28 19:35	05:46 20:07	05:26 20:33	05:36 20:35	06:04 20:06	06:35 19:18	07:07 18:27	06:43 16:45	07:16 16:30
12	07:26 16:51	07:01 17:29	06:19 18:02	06:27 19:36	05:45 20:08	05:26 20:34	05:36 20:35	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	07:16 16:30
13	07:25 16:52	06:59 17:30	06:17 18:04	06:25 19:37	05:44 20:09	05:26 20:34	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	07:17 16:31
14	07:25 16:53	06:58 17:31	06:15 18:05	06:24 19:38	05:43 20:11	05:26 20:35	05:38 20:34	06:07 20:02	06:38 19:13	07:10 18:22	06:46 16:42	07:18 16:31
15	07:25 16:54	06:57 17:33	06:14 18:06	06:22 19:40	05:42 20:12	05:26 20:35	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	06:48 16:41	07:19 16:31
16	07:24 16:56	06:55 17:34	06:12 18:07	06:20 19:41	05:41 20:13	05:26 20:36	05:39 20:32	06:09 20:00	06:40 19:09	07:12 18:19	06:49 16:40	07:20 16:31
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18	07:23 16:58	06:53 17:36	06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	06:51 16:39	07:21 16:32
19	07:23 16:59	06:51 17:38	06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:15	06:52 16:38	07:22 16:32
20	07:22 17:00	06:50 17:39	06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37	05:43 20:30	06:13 19:54	06:44 19:03	07:17 18:13	06:54 16:37	07:22 16:33
21	07:22 17:01	06:48 17:40	06:04 18:12	06:13 19:46	05:37 20:17	05:26 20:37	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:12	06:55 16:37	07:23 16:33
22	07:21 17:03	06:47 17:41	06:02 18:14	06:11 19:47	05:36 20:18	05:26 20:37	05:44 20:28	06:15 19:51	06:47 18:59	07:19 18:10	06:56 16:36	07:23 16:34
23	07:20 17:04	06:45 17:43	06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:38	05:45 20:27	06:16 19:49	06:48 18:57	07:20 18:09	06:57 16:35	07:24 16:34
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28	07:17 17:10	06:38 17:49	05:52 18:20	06:03 19:54	05:31 20:24	05:28 20:38	05:50 20:23	06:21 19:41	06:53 18:49	07:25 17:02	07:03 16:33	07:26 16:37
29	07:16 17:11		06:50 19:21	06:01 19:55	05:31 20:24	05:29 20:38	05:51 20:22	06:22 19:40	06:54 18:47	07:26 17:00	07:04 16:32	07:26 16:38
30	07:15 17:13		06:48 19:22	06:00 19:56	05:30 20:25	05:29 20:38	05:52 20:21	06:23 19:38	06:55 18:45	07:27 16:59	07:05 16:32	07:26 16:39
31	07:14 17:14		06:47 19:23		05:30 20:26		05:53 20:20	06:24 19:36		06:29 16:58		07:26 16:39
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
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

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar per WTG

Calculation: VVWTG: 2 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (18)

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	07:27 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	19:57-20:02/5 20:38	05:30 20:19	19:58-20:12/14 20:38	05:54 20:19	06:25 19:35	06:56 18:44	06:31 16:56	07:06 16:32
2	07:27 16:41	07:12 17:16	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:28	19:56-20:02/6 20:38	05:30 20:17	19:59-20:12/13 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	07:07 16:31
3	07:27 16:42	07:11 17:18	06:33 17:52	06:42 19:27	05:56 19:59	05:28 20:28	19:56-20:03/7 20:38	05:31 20:16	19:59-20:12/13 20:38	05:56 20:16	06:27 19:32	06:58 18:40	06:33 16:54	07:08 16:31
4	07:27 16:43	07:10 17:19	06:32 17:53	06:40 19:28	05:55 20:00	05:28 20:29	19:56-20:04/8 20:37	05:31 20:15	20:00-20:12/12 20:15	05:57 19:30	06:28 18:39	06:59 18:53	06:34 16:53	07:09 16:31
5	07:27 16:44	07:09 17:20	06:30 17:54	06:38 19:29	05:53 20:01	05:28 20:30	19:55-20:04/9 20:37	05:32 20:14	20:01-20:12/11 20:14	05:58 19:28	06:29 18:37	07:00 18:52	06:35 16:52	07:10 16:31
6	07:27 16:45	07:08 17:21	06:28 17:56	06:37 19:30	05:52 20:02	05:27 20:30	19:55-20:05/10 20:37	05:32 20:13	20:01-20:11/10 20:13	05:59 19:27	06:30 18:35	07:01 18:50	06:37 16:50	07:11 16:30
7	07:27 16:46	07:06 17:23	06:27 17:57	06:35 19:31	05:51 20:03	05:27 20:31	19:55-20:06/11 20:37	05:33 20:12	20:02-20:11/9 20:12	06:00 19:25	06:31 18:34	07:02 18:49	06:38 16:49	07:12 16:30
8	07:27 16:47	07:05 17:24	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32	19:55-20:06/11 20:36	05:34 20:10	20:02-20:10/8 20:10	06:01 19:23	06:32 18:32	07:03 18:48	06:39 16:48	07:13 16:30
9	07:26 16:48	07:04 17:25	06:24 17:59	06:32 19:33	05:49 20:05	05:26 20:32	19:55-20:07/12 20:36	05:34 20:09	20:03-20:10/7 20:09	06:02 19:21	06:33 18:30	07:04 18:47	06:40 16:47	07:14 16:30
10	07:26 16:49	07:03 17:26	06:22 18:00	06:30 19:34	05:47 20:06	05:26 20:33	19:54-20:07/13 20:35	05:35 20:08	20:04-20:10/6 20:08	06:03 19:20	06:34 18:29	07:05 18:46	06:42 16:46	07:15 16:30
11	07:26 16:50	07:02 17:28	06:20 18:01	06:28 19:35	05:46 20:07	05:26 20:33	19:54-20:08/14 20:35	05:36 20:06	20:04-20:09/5 20:06	06:04 19:18	06:35 18:27	07:07 18:45	06:43 16:45	07:16 16:30
12	07:26 16:51	07:00 17:29	06:19 18:02	06:27 19:36	05:45 20:08	05:26 20:34	19:54-20:08/14 20:35	05:36 20:05	20:05-20:09/4 20:05	06:05 19:16	06:36 18:25	07:08 18:44	06:44 16:44	07:16 16:30
13	07:25 16:52	06:59 17:30	06:17 18:04	06:25 19:37	05:44 20:09	05:26 20:34	19:54-20:09/15 20:34	05:37 20:04	20:07-20:09/2 20:04	06:06 19:15	06:37 18:24	07:09 18:43	06:45 16:43	07:17 16:31
14	07:25 16:53	06:58 17:31	06:15 18:05	06:24 19:38	05:43 20:10	05:26 20:35	19:54-20:09/15 20:34	05:38 20:02	20:08-20:09/1 20:02	06:07 19:13	06:38 18:22	07:10 18:42	06:46 16:42	07:18 16:31
15	07:25 16:54	06:57 17:33	06:14 18:06	06:22 19:40	05:42 20:11	05:26 20:35	19:55-20:09/14 20:33	05:39 20:01	05:39 20:01	06:08 19:11	06:39 18:21	07:11 18:41	06:48 16:41	07:19 16:31
16	07:24 16:56	06:55 17:34	06:12 18:07	06:20 19:41	05:41 20:12	05:26 20:36	19:55-20:10/15 20:32	05:39 20:02	06:09 19:59	06:40 19:09	07:12 18:19	06:49 18:40	06:49 16:40	07:19 16:31
17	07:24 16:57	06:54 17:35	06:10 18:08	06:19 19:42	05:40 20:13	05:26 20:36	19:55-20:10/15 20:32	05:40 20:01	06:10 19:58	06:41 19:08	07:13 18:18	06:50 18:40	06:50 16:40	07:20 16:31
18	07:23 16:58	06:53 17:36	06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36	19:55-20:10/15 20:31	05:41 20:00	06:11 19:57	06:42 19:06	07:14 18:16	06:51 18:39	06:51 16:39	07:21 16:32
19	07:23 16:59	06:51 17:38	06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37	19:55-20:10/15 20:30	05:42 20:00	06:12 19:55	06:43 19:04	07:15 18:15	06:52 18:38	06:52 16:38	07:21 16:32
20	07:22 17:00	06:50 17:39	06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37	19:56-20:12/16 20:30	05:43 20:00	06:13 19:54	06:44 19:03	07:17 18:13	06:54 18:37	06:54 16:37	07:22 16:33
21	07:22 17:01	06:48 17:40	06:04 18:12	06:13 19:46	05:37 20:17	05:26 20:37	19:56-20:12/16 20:29	05:44 20:00	06:14 19:52	06:45 19:01	07:18 18:12	06:55 18:37	06:55 16:37	07:23 16:33
22	07:21 17:03	06:47 17:41	06:02 18:13	06:11 19:47	05:36 20:18	05:26 20:37	19:56-20:12/16 20:28	05:44 20:00	06:15 19:51	06:47 18:59	07:19 18:10	06:56 18:36	06:56 16:36	07:23 16:34
23	07:20 17:04	06:45 17:43	06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:38	19:56-20:11/15 20:27	05:45 20:00	06:16 19:49	06:48 18:57	07:20 18:09	06:57 18:35	06:57 16:34	07:24 16:34
24	07:20 17:05	06:44 17:44	05:58 18:16	06:08 19:49	05:34 20:20	05:27 20:38	19:57-20:12/15 20:26	05:46 20:00	06:17 19:48	06:49 18:56	07:21 18:07	06:58 18:35	06:58 16:35	07:24 16:35
25	07:19 17:06	06:42 17:45	05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38	19:57-20:12/15 20:25	05:47 20:00	06:18 19:46	06:50 18:54	06:22 17:06	06:59 18:34	06:59 16:35	07:25 16:35
26	07:18 17:08	06:41 17:46	05:55 18:18	06:05 19:51	05:33 20:22	05:28 20:38	19:57-20:12/15 20:25	05:48 20:00	06:19 19:44	06:51 18:52	06:24 17:04	07:01 18:34	07:01 16:34	07:25 16:36
27	07:17 17:09	06:39 17:47	05:53 18:19	06:04 19:53	05:32 20:23	05:28 20:38	19:58-20:13/15 20:24	05:49 20:00	06:20 19:43	06:52 18:50	06:25 17:03	07:02 18:33	07:02 16:33	07:25 16:36
28	07:16 17:10	06:38 17:49	05:52 18:20	06:03 19:54	05:31 20:24	05:28 20:38	19:57-20:12/15 20:23	05:50 20:00	06:21 19:41	06:53 18:49	06:26 17:02	07:03 18:33	07:03 16:33	07:26 16:37
29	07:16 17:11	06:37 17:48	05:51 18:21	06:02 19:55	05:30 20:24	05:29 20:38	19:57-20:12/15 20:22	05:51 20:00	06:22 19:40	06:54 18:47	06:27 17:00	07:04 18:32	07:04 16:32	07:26 16:38
30	07:15 17:13	06:36 17:47	05:50 18:22	06:00 19:56	05:29 20:25	05:29 20:38	19:58-20:12/14 20:21	05:52 20:00	06:23 19:38	06:55 18:45	06:28 17:59	07:05 18:32	07:05 16:32	07:26 16:39
31	07:14 17:14	06:35 17:46	05:49 18:23	06:00 19:57	05:28 20:26	05:28 20:38	19:58-20:01/3 20:20	05:53 20:00	06:24 19:36	06:56 18:46	06:29 17:58	07:06 18:33	07:06 16:33	07:26 16:39
Potential sun hours	296	297	369	399	449	454	391	115	429	375	345	297	286	286
Sum of minutes with flicker	0	0	0	0	4	454	391	115	429	375	345	297	286	286

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: VVWTG: 3 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (19)

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	07:27 14:58-16:14/76 16:40	07:13 15:17-16:32/75 17:15	06:36 17:27-17:28/1 17:50	06:45 19:24	05:59 19:57	05:29 20:27
2	07:27 14:59-16:15/76 16:41	07:12 15:18-16:31/73 17:16	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:28
3	07:27 14:59-16:16/77 16:42	07:11 15:19-16:30/71 17:18	06:33 17:52	06:42 19:27	05:56 19:59	05:28 20:28
4	07:27 15:00-16:17/77 16:43	07:10 15:20-16:30/70 17:19	06:32 17:53	06:40 19:28	05:55 20:00	05:28 20:29
5	07:27 15:00-16:18/78 16:44	07:09 15:21-16:29/68 17:20	06:30 17:54	06:38 19:29	05:53 20:01	05:28 20:30
6	07:27 15:01-16:19/78 16:45	07:08 15:23-16:28/65 17:21	06:28 17:56	06:37 19:30	05:52 20:02	05:27 20:30
7	07:27 15:01-16:20/79 16:46	07:06 15:23-16:26/63 17:23	06:27 17:57	06:35 19:31	05:51 20:03	05:27 20:31
8	07:27 15:02-16:21/79 16:47	07:05 15:25-16:26/61 17:24	06:25 17:58	06:33 19:32	05:50 20:04	05:27 20:32
9	07:26 15:02-16:22/80 16:48	07:04 15:27-16:25/58 17:25	06:24 17:59	06:32 19:33	05:49 20:05	05:26 20:32
10	07:26 15:02-16:23/81 16:49	07:03 15:29-16:23/54 17:26	06:22 18:00	06:30 19:34	05:47 20:06	05:26 20:33
11	07:26 15:03-16:24/81 16:50	07:02 15:30-16:21/51 17:28	06:20 18:01	06:28 19:35	05:46 20:07	05:26 20:33
12	07:26 15:03-16:25/82 16:51	07:00 15:32-16:20/48 17:29	06:19 18:02	06:27 19:36	05:45 20:08	05:26 20:34
13	07:25 15:04-16:26/82 16:52	06:59 15:35-16:18/43 17:30	06:17 18:03	06:25 19:37	05:44 20:09	05:26 20:34
14	07:25 15:05-16:28/83 16:53	06:58 15:37-16:15/38 17:31	06:15 18:05	06:24 19:38	05:43 20:10	05:26 20:35
15	07:25 15:05-16:29/84 16:54	06:57 15:41-16:12/31 17:33	06:14 18:06	06:22 19:40	05:42 20:11	05:26 20:35
16	07:24 15:06-16:30/84 16:56	06:55 15:45-16:08/23 17:34	06:12 18:07	06:20 19:41	05:41 20:12	05:26 20:36
17	07:24 15:06-16:31/85 16:57	06:54 15:52-16:01/9 17:35	06:10 18:08	06:19 19:42	05:40 20:13	05:26 20:36
18	07:23 15:07-16:33/86 16:58	06:53 17:36	06:09 18:09	06:17 19:43	05:39 20:14	05:26 20:36
19	07:23 15:07-16:34/87 16:59	06:51 17:38	06:07 18:10	06:16 19:44	05:38 20:15	05:26 20:37
20	07:22 15:07-16:33/86 17:00	06:50 17:16-17:17/1 17:39	06:05 18:11	06:14 19:45	05:37 20:16	05:26 20:37
21	07:22 15:09-16:34/85 17:01	06:48 17:40	06:04 18:12	06:13 19:46	05:37 20:17	05:26 20:37
22	07:21 15:09-16:34/85 17:03	06:47 17:18-17:19/1 17:41	06:02 18:13	06:11 19:47	05:36 20:18	05:26 20:37
23	07:20 15:09-16:34/85 17:04	06:45 17:20-17:21/1 17:43	06:00 18:15	06:10 19:48	05:35 20:19	05:27 20:38
24	07:20 15:10-16:33/83 17:05	06:44 17:20-17:22/2 17:44	05:58 18:16	06:08 19:49	05:34 20:20	05:27 20:38
25	07:19 15:11-16:34/83 17:06	06:42 17:22-17:23/1 17:45	05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38
26	07:18 15:12-16:34/82 17:08	06:41 17:22-17:24/2 17:46	05:55 18:18	06:05 19:51	05:33 20:22	05:28 20:38
27	07:17 15:12-16:34/82 17:09	06:39 17:24-17:26/2 17:47	05:53 18:19	06:04 19:52	05:32 20:23	05:28 20:38
28	07:16 15:13-16:33/80 17:10	06:38 17:25-17:27/2 17:48	05:52 18:20	06:03 19:54	05:31 20:24	05:28 20:38
29	07:16 15:14-16:33/79 17:11		06:50 19:21	06:01 19:55	05:31 20:24	05:29 20:38
30	07:15 15:15-16:32/77 17:13		06:48 19:22	06:00 19:56	05:30 20:25	05:29 20:38
31	07:14 15:16-16:32/76 17:14		06:47 19:23		05:30 20:26	
Potential sun hours	296	297	369	399	449	454
Sum of minutes with flicker	2518	913	1	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: VVWTG: 3 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (19)

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	05:30 20:38	05:54 20:18	06:25 19:35	06:56 18:44	06:31 16:56	14:57-15:52/55 16:32
2	05:30 20:38	05:55 20:17	06:26 19:33	06:57 18:42	06:32 16:55	14:56-15:55/59 16:31
3	05:31 20:38	05:56 20:16	06:27 19:32	06:58 18:40	06:33 16:54	14:55-15:56/61 16:31
4	05:31 20:37	05:57 20:15	06:28 19:30	06:59 18:39	06:34 16:53	14:53-15:56/63 16:31
5	05:32 20:37	05:58 20:14	06:29 19:28	07:00 18:37	06:35 16:51	14:52-15:58/66 16:31
6	05:32 20:37	05:59 20:13	06:30 19:26	07:01 18:35	06:37 16:50	14:51-15:59/68 16:30
7	05:33 20:37	06:00 20:11	06:31 19:25	07:02 18:34	06:38 16:49	14:50-16:00/70 16:30
8	05:34 20:36	06:01 20:10	06:32 19:23	07:03 18:32	06:39 16:48	14:48-16:00/72 16:30
9	05:34 20:36	06:02 20:09	06:33 19:21	07:04 18:30	06:40 16:47	14:48-16:02/74 16:30
10	05:35 20:35	06:03 20:08	06:34 19:20	07:05 18:29	06:42 16:46	14:47-16:02/75 16:30
11	05:36 20:35	06:04 20:06	06:35 19:18	07:07 18:27	06:43 16:45	14:46-16:03/77 16:30
12	05:36 20:35	06:05 20:05	06:36 19:16	07:08 18:25	06:44 16:44	14:47-16:04/77 16:30
13	05:37 20:34	06:06 20:04	06:37 19:15	07:09 18:24	06:45 16:43	14:46-16:05/79 16:31
14	05:38 20:33	06:07 20:02	06:38 19:13	07:10 18:22	06:46 16:42	14:45-16:05/80 16:31
15	05:39 20:33	06:08 20:01	06:39 19:11	07:11 18:21	06:48 16:41	14:44-16:05/81 16:31
16	05:39 20:32	06:09 19:59	06:40 19:09	07:12 18:19	06:49 16:40	14:45-16:07/82 16:31
17	05:40 20:32	06:10 19:58	06:41 19:08	07:13 18:18	06:50 16:40	14:44-16:07/83 16:32
18	05:41 20:31	06:11 19:57	06:42 19:06	07:14 18:16	06:51 16:39	14:44-16:07/83 16:32
19	05:42 20:30	06:12 19:55	06:43 19:04	07:15 18:14	06:52 16:38	14:44-16:09/85 16:32
20	05:43 20:30	06:13 19:54	06:44 19:03	07:17 18:13	06:54 16:37	14:44-16:09/85 16:33
21	05:44 20:29	06:14 19:52	06:45 19:01	07:18 18:11	06:55 16:37	14:44-16:09/85 16:33
22	05:44 20:28	06:15 19:51	06:46 18:59	07:19 18:10	06:56 16:36	14:43-16:09/86 16:34
23	05:45 20:27	06:16 19:49	06:48 18:57	07:20 18:09	06:57 16:35	14:44-16:11/87 16:34
24	05:46 20:26	06:17 19:48	06:49 18:56	07:21 18:07	06:58 16:35	14:44-16:10/86 16:35
25	05:47 20:25	06:18 19:46	06:50 18:54	06:22 17:06	06:59 16:34	14:44-16:09/85 16:35
26	05:48 20:25	06:19 19:44	06:51 18:52	06:24 17:04	07:01 16:34	14:44-16:08/84 16:36
27	05:49 20:24	06:20 19:43	06:52 18:50	06:25 17:03	07:02 16:33	14:44-16:08/84 16:36
28	05:50 20:23	06:21 19:41	06:53 18:49	06:26 17:02	07:03 16:33	14:44-16:07/83 16:37
29	05:51 20:22	06:22 19:40	06:54 18:47	06:27 17:00	07:04 16:32	14:45-16:07/82 16:38
30	05:52 20:21	06:23 19:38	06:55 18:45	06:28 16:59	07:05 16:32	14:45-16:07/82 16:39
31	05:53 20:20	06:24 19:36		06:29 16:58		14:59-15:51/52 16:39
Potential sun hours	460	429	375	345	297	286
Sum of minutes with flicker	0	0	0	266	2319	2343

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

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar per WTG

Calculation: VVWTG: 4 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (20)

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	07:27 09:40-10:32/52 16:40	07:13 09:53-10:37/44 17:15	06:36 06:45 17:50	06:45 19:24 19:57	05:59 20:27 20:38	05:29 20:38 20:18	05:30 20:18 19:35	05:54 20:18 19:35	06:25 18:44 16:56	06:56 16:56 16:31	06:31 16:31 16:06	07:06 09:25-10:20/55 16:31
2	07:27 09:40-10:33/53 16:41	07:12 09:54-10:37/43 17:16	06:35 06:43 17:51	06:43 19:25 19:58	05:57 20:28 20:38	05:29 20:38 20:17	05:30 20:17 19:33	05:55 20:17 19:33	06:26 18:42 16:55	06:57 16:55 16:31	06:32 09:37-09:51/14 16:31	07:07 09:26-10:20/54 16:31
3	07:27 09:41-10:33/52 16:42	07:11 09:55-10:35/40 17:18	06:33 06:42 17:52	06:42 19:27 19:59	05:56 20:28 20:38	05:28 20:38 20:16	05:31 20:16 19:31	05:56 20:16 19:31	06:27 18:40 16:54	06:58 16:54 16:31	06:33 09:33-09:55/22 16:31	07:08 09:26-10:21/55 16:31
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Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286
Sum of minutes with flicker	1662	289	0	0	0	0	0	0	0	0	1374	1603

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

Project:

IR_VolturinoVolturaraMotta

Licensed user:

Vega sas

Via delli Carri, 48

IT-71100 Foggia

+39 0881 756251

VEGA / info@studiovega.org

Calculated:

18/10/2023 09:25/3.5.584

SHADOW - Calendar per WTG

Calculation: VVWTG: 5 - Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0 m) (21)

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	07:27 16:40	07:13 17:15	06:36 17:50	06:45 19:24	05:59 19:57	05:29 20:27	19:02-19:57/55 20:38	05:30 20:18	19:06-20:03/57 20:18	05:54 20:18	19:27-19:49/22 19:35	06:25 18:44	06:56 16:56	06:31 16:31	07:06 16:31
2	07:27 16:41	07:12 17:16	06:35 17:51	06:43 19:25	05:57 19:58	05:29 20:28	19:01-19:56/55 20:38	05:30 20:17	19:07-20:04/57 20:17	05:55 20:17	19:31-19:45/14 19:33	06:26 18:42	06:57 16:55	06:32 16:31	07:07 16:31
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24	07:20 17:05	06:44 17:44	05:58 18:16	06:08 19:49	05:34 20:20	05:27 20:38	19:05-20:05/60 20:26	05:46 20:00	19:17-20:00/43 19:48	06:17 19:48	06:49 18:56	07:21 18:07	06:58 16:35	06:58 16:31	07:24 16:31
25	07:19 17:06	06:42 17:45	05:57 18:17	06:07 19:50	05:33 20:21	05:27 20:38	19:05-20:05/60 20:25	05:47 20:00	19:18-20:00/42 19:46	06:18 19:46	06:50 18:54	07:22 17:06	06:59 16:34	06:59 16:31	07:24 16:31
26	07:18 17:07	06:41 17:46	05:55 18:18	06:05 19:51	05:33 20:22	05:27 20:38	19:05-20:04/59 20:25	05:48 20:00	19:19-19:59/40 19:44	06:19 19:44	06:51 18:52	07:23 17:04	07:00 16:34	07:00 16:31	07:25 16:31
27	07:17 17:09	06:39 17:47	05:53 18:19	06:04 19:52	05:32 20:23	05:28 20:38	19:06-20:05/59 20:24	05:49 20:00	19:19-19:57/38 19:43	06:20 19:43	06:52 18:50	07:24 17:03	07:02 16:33	07:02 16:31	07:25 16:31
28	07:16 17:10	06:38 17:48	05:52 18:20	06:03 19:54	05:31 20:24	05:28 20:38	19:06-20:04/58 20:23	05:50 20:00	19:20-19:56/36 19:41	06:21 19:41	06:53 18:49	07:25 17:02	07:03 16:33	07:03 16:31	07:26 16:31
29	07:16 17:11	06:37 17:49	05:51 18:21	06:02 19:55	05:30 20:25	05:29 20:38	19:06-20:03/57 20:22	05:51 20:00	19:21-19:54/33 19:40	06:22 19:40	06:54 18:47	07:26 17:00	07:04 16:32	07:04 16:31	07:26 16:31
30	07:15 17:12	06:36 17:50	05:50 18:22	06:01 19:56	05:29 20:26	05:29 20:38	19:07-20:04/57 20:21	05:52 20:00	19:23-19:53/30 19:38	06:23 19:38	06:55 18:45	07:27 16:59	07:05 16:32	07:05 16:31	07:26 16:31
31	07:14 17:14	06:35 17:51	05:49 18:23	06:00 19:57	05:28 20:27	05:28 20:38	19:07-20:04/57 20:20	05:53 20:00	19:25-19:51/26 19:36	06:24 19:36	06:56 18:46	07:28 16:58	07:06 16:33	07:06 16:31	07:26 16:31
Potential sun hours	296	297	369	399	449	454	460	429	375	345	297	286	0	0	0
Sum of minutes with flicker	0	0	0	0	899	1737	1513	36	0	0	0	0	0	0	0

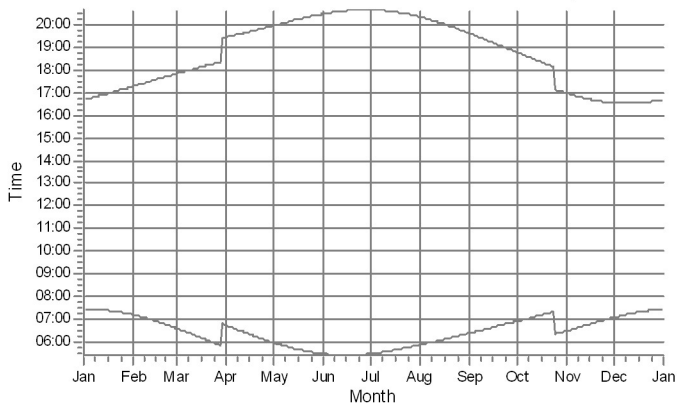
Table layout: For each day in each month the following matrix apply

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

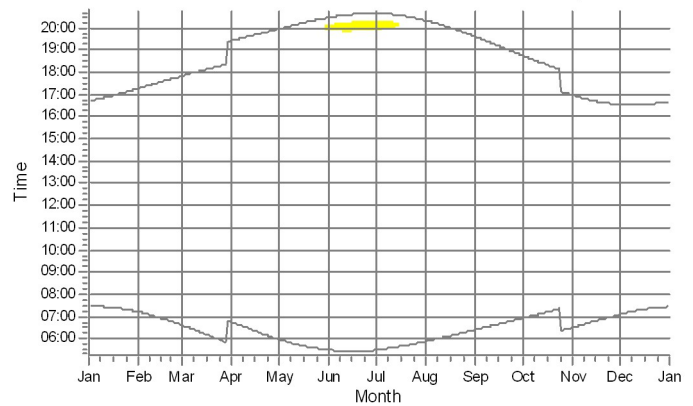
SHADOW - Calendar per WTG, graphical

Calculation: VV

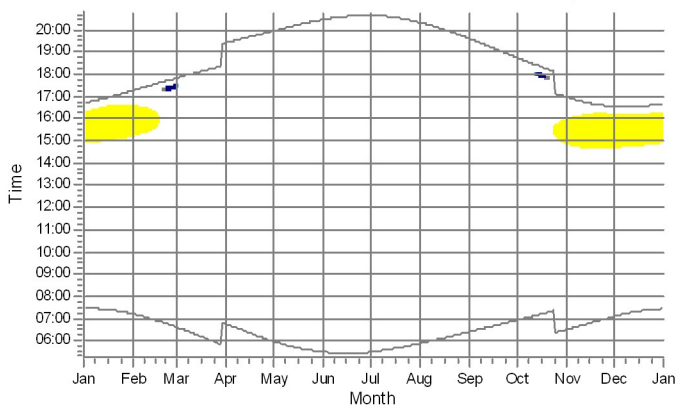
1: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0



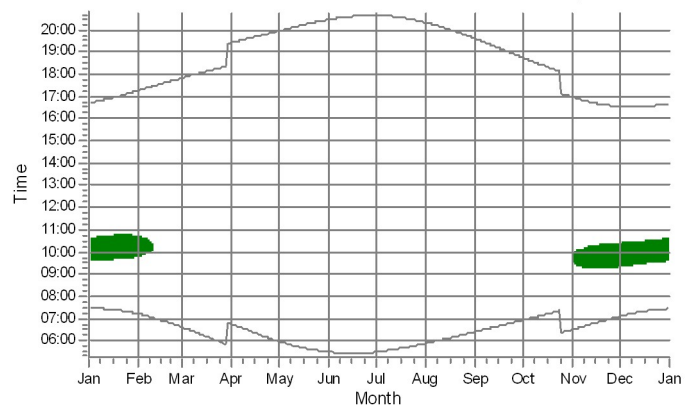
2: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0



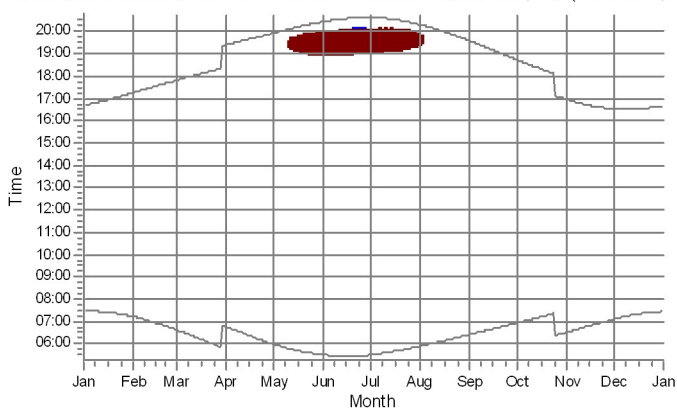
3: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0



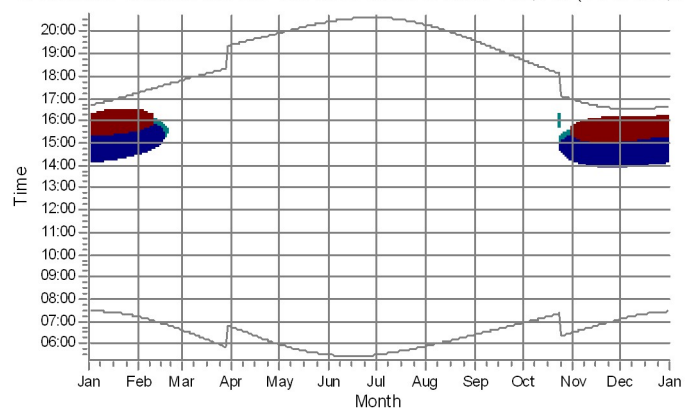
4: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0



5: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0



6: Siemens Gamesa SG 6.6-155 6600 155.0 !O! hub: 102,5 m (TOT: 180,0



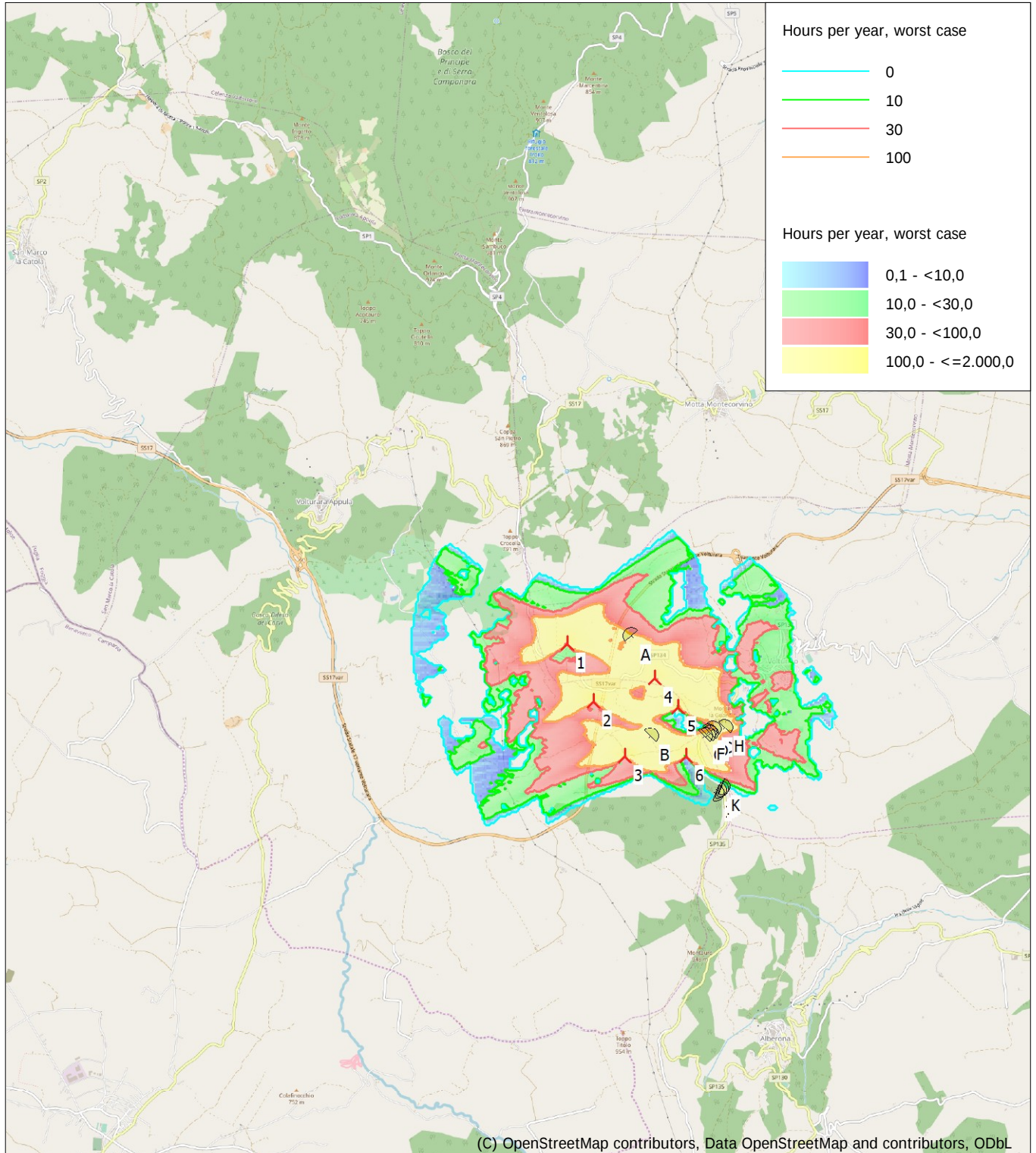
Shadow receptors

	A: Shadow Receptor: 1,0 × 1,0 Azimuth: -40,0° Slope: 90,0° (22)
	B: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (23)
	C: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (24)
	D: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (25)

	E: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (26)
	F: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (27)
	G: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (28)
	H: Shadow Receptor: 1,0 × 1,0 Azimuth: 0,0° Slope: 90,0° (29)

SHADOW - Map

Calculation: VV



0 1 2 3 4 km

Map: EMD OpenStreetMap , Print scale 1:75.000, Map center UTM (north)-WGS84 Zone: 33 East: 506.880 North: 4.592.790
 New WTG Shadow receptor
 Flicker map level: Elevation Grid Data Object: IR_VolturinoVolturaraMotta_EMDGrid_0.wpg (1)
 Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m