

PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO PER LA PRODUZIONE DI ENERGIA
MEDIANTE LO SFRUTTAMENTO DEL VENTO NEI TERRITORI COMUNALI
DI PIOMBINO E CAMPIGLIA MARITTIMA (LI) LOC. CAMPO ALL'OLMO
POTENZA NOMINALE 57,6 MW

PROGETTO DEFINITIVO - SIA

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**ES.6 Analisi dell'evoluzione dell'ombra indotta
dagli aereogeneratori - Shadow flickering**

REV.	DATA	DESCRIZIONE
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1. INTRODUZIONE

Il presente elaborato ha lo scopo di valutare in maniera tecnica l'eventuale impatto generato dall'evoluzione dell'ombra derivante dalla futura installazione di un impianto di produzione di energia da fonte eolica in territorio extra urbano dei comuni di Piombino e Campiglia Marittima (LI). Il progetto è composto da n°8 aerogeneratori del tipo IEC S - 150, con potenza unitaria pari a 7.2 MW, altezza al mozzo pari a 150 e diametro rotorico pari a 172.

In particolare, la posizione degli aerogeneratori è la seguente:

WTG	COORDINATE WGS84 FUSO 32N	
	EST	NORD
PB1	626416.91	4760797.78
PB2	626455.14	4761770.22
PB3	624964.94	4762192.78
PB4	628549.42	4759547.74
PB5	632826.13	4759662.36
CMP1	632533.31	4761947.79
CMP2	633617.14	4762307.04
CMP3	632938.19	4763738.36

Tab. 1 – Coordinate aerogeneratori



Figura 1: Planimetria dell'impianto

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

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

2. 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 2 riporta l'evoluzione annuale dell'ombra di una turbina considerando il caso peggiore di pale sempre in rotazione intorno al mozzo, e orientate sempre ortogonalmente al sole durante la sua evoluzione giornaliera.

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



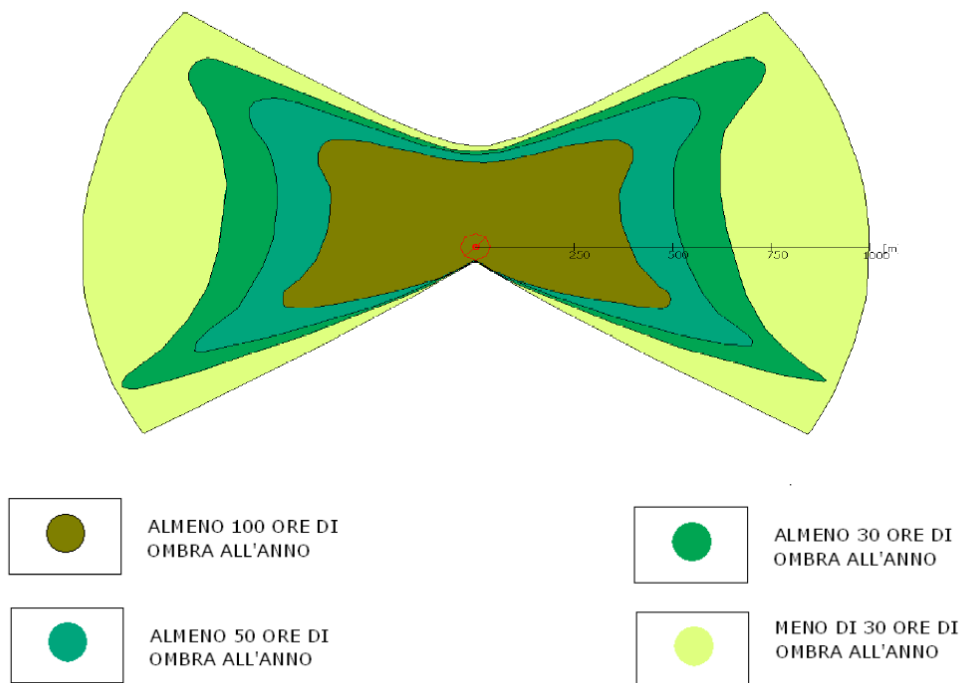


Figura 2: Evoluzione annuale tipo dell'ombra di una pala

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

In Italia, così come nella maggior parte dei paesi Europei ed extraeuropei non esiste una normativa specifica 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”.

3. INDIVIDUAZIONE DEI RECETTORI ED IPOTESI DI CALCOLO

3.1 Individuazione dei ricettori

Il progetto in esame nei comuni di Piombino e Campiglia Marittima (LI) prevede l'installazione di 8 aerogeneratori.

L'analisi di shadow-flickering di cui al presente studio è scaturita da una attività di censimento nell'area del parco eolico in progetto così come descritto nell'elaborato ES.8.1 Individuazione recettori.

Da tale studio ne è derivato che i recettori da considerare effettivamente sensibili sono esterni all'intorno di 500 m (distanza pari a 2,5 volte l'altezza complessiva) dall'asse di ciascun aerogeneratore o al limite. Ad ogni modo si è ritenuto opportuno procedere con l'analisi.

L'analisi è stata elaborata per specifici 25 recettori che circondano l'impianto per i quali è stata stabilita l'abitabilità.



Codifica (WINDPRO)	Denominazione manufatto	Coordinate geografiche UTM WGS84 33N		Z [m]
		Est	Nord	
A	5	626663.28	4760262.33	3.7
B	6	626924.68	4761006.78	2.9
C	7	626142.94	4762193.72	6.2
D	9	625424.37	4762106.06	10.5
E	10	632392.11	4759817.43	4.7
F	11	632348.54	4759844.59	4.6
G	12	632884.02	4759205.03	3
H	13	633230.54	4759862.06	5.5
I	16	633401.82	4761859.49	9.7
J	20	633675.17	4761840.61	10.3
K	21	633685.23	4761829.14	10.3
L	24	633801.94	4761863.42	10
M	25	633807.05	4761857.14	9.9
N	26	633831.37	4761823.64	9.8
O	30	633852.75	4761805.42	9.8
P	32	633860.40	4762747.59	13.7
Q	33	633896.29	4762742.09	13.7
R	34	633882.72	4762721.59	13.6
S	35	633922.78	4762732.60	13.6
T	36	632735.28	4763238.95	12.7
U	37	632744.90	4763232.21	12.8
V	40	633327.00	4763502.15	14
W	43	633344.17	4764109.20	14.1
X	45	632544.89	4763960.11	13
Y	46	632521.56	4763850.08	12.8

Tab. 2 – Coordinate recettori



SHADOW - Map

Calculation: WON023_ShadowFlickering

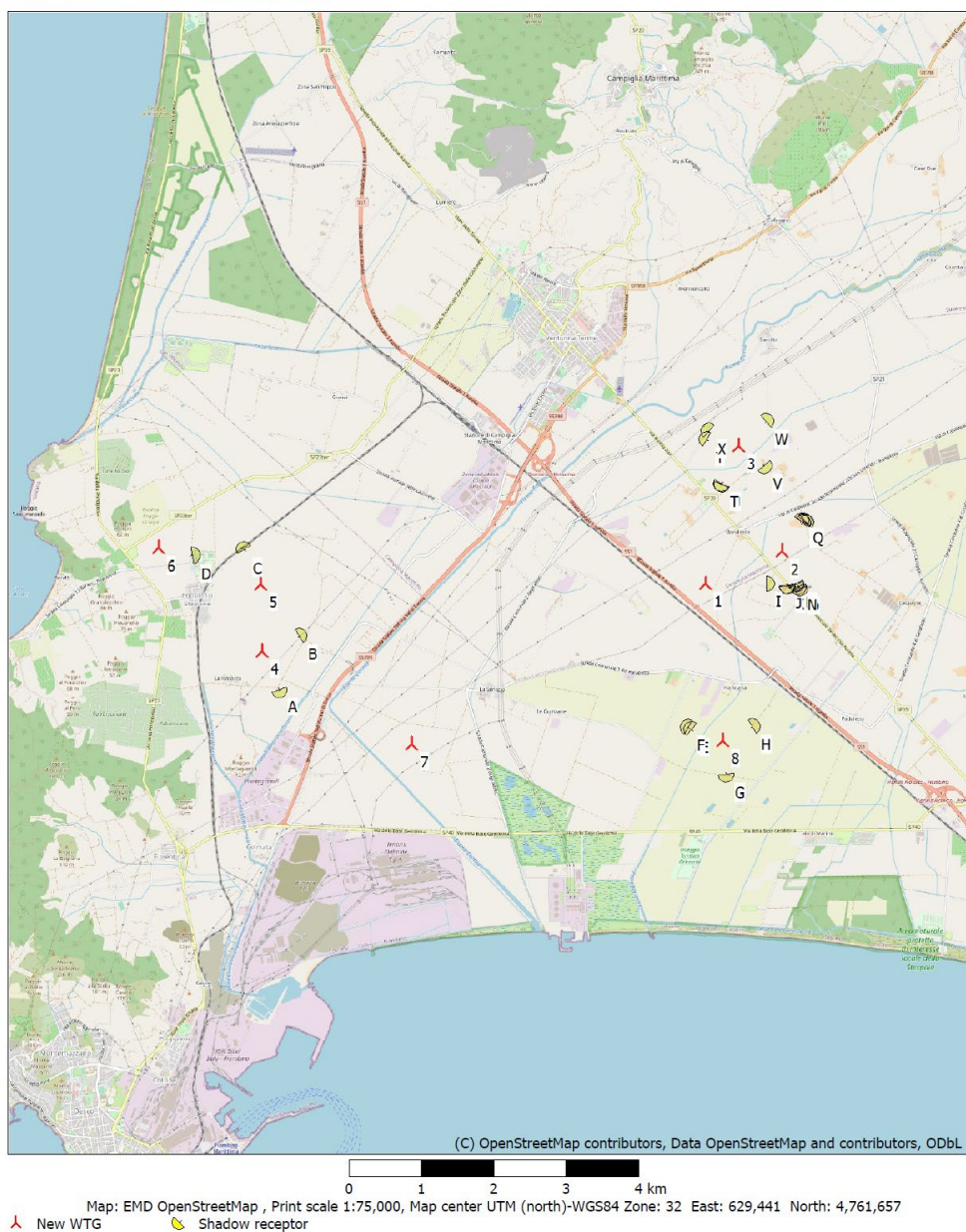


Figura 3 -Indicazione dei recettori

Nella tabella a seguire sono riportate le distanze minime intercorrenti tra recettori in oggetto e l'aerogeneratore più prossimo.



Codifica (WINDPRO)	Denominazione manufatto	Distanza WTG più vicina [m]	WTG più vicina [m]
A	5	599	PB1
B	6	546	PB1
C	7	533	PB2
D	9	466	PB3
E	10	461	PB5
F	11	513	PB5
G	12	462	PB5
H	13	450	PB5
I	16	499	CMP2
J	20	468	CMP2
K	21	483	CMP2
L	24	480	CMP2
M	25	488	CMP2
N	26	528	CMP2
O	30	555	CMP2
P	32	502	CMP2
Q	33	518	CMP2
R	34	492	CMP2
S	35	524	CMP2
T	36	542	CMP3
U	37	544	CMP3
V	40	452	CMP3
W	43	551	CMP3
X	45	452	CMP3
Y	46	431	CMP3

Tab. 3 –Distanze delle turbine dai recettori più prossimi

In relazione a ciò, si fa presente che già in fase di scelta delle aree sulle quali ubicare l'impianto si è cercato di allontanarsi il più possibile dall'area urbana e dalle abitazioni ed edifici ritenuti sensibili.

Tale fascia è stata definita in fase di progetto al fine di garantire il rispetto dei limiti in merito non solo all'ombreggiamento ma anche agli impatti acustici, elettromagnetici e in termini di calcolo della gittata.

Lo studio, i cui risultati in dettaglio sono riportati di seguito, 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 fastidio del flickering.

Ciò significa che i risultati ai quali si perverrà sono ampiamente cautelativi.



3.2 Base dati e parametri di calcolo

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

- a) **Il DTM o Modello del terreno digitale** per caratterizzare l'orografia è stato estrapolato dal grid disponibile in download dal SIT della Regione Puglia, georeferenziato, sovrapposto, confrontato e adeguato con le curve di livello presenti sulla cartografia ufficiale CTR 1:5.000 con uno step di 5 m. Il modello digitale ottenuto copre un'area sufficiente ad inglobare l'area del parco eolico di progetto e trova un buon riscontro con l'andamento orografico verificato in sito.
- b) **Posizioni geografiche di recettori con dettaglio dimensionale delle aree più esposte.** Sono i ricettori individuati dallo studio acustico e classificati secondo la loro abitabilità e destinazione d'uso. Per tutti i ricettori si è ritenuto opportuno usare l'ipotesi di cautela della modalità "green house mode". Questa scelta è stata operata poiché in talune circostanze anche lo spazio antistante le strutture può essere considerato o adibito a luogo di riposo e relax. La scelta di una singola finestra o di una facciata in alcune condizioni potrebbe risultare riduttiva allo scopo di una vera valutazione d'impatto.
- c) **Posizioni geografiche delle turbine eoliche e loro caratteristiche dimensionali**
Gli aerogeneratori di progetto con le loro caratteristiche dimensionali e tecnologiche
- d) **Nessun ostacolo naturale o artificiale è stato modellato.**

4. I RISULTATI DEL CALCOLO DELL'EVOLUZIONE DELL'OMBRA

Nella procedura "Worst case" il fenomeno di shadow/flickering viene calcolato non tenendo conto delle condizioni di soleggiamento del sito e del vento, dati che allo stato dell'arte per il sito in questione non sono disponibili. Invece se avessimo di dati di cui sopra potremmo calcolare il fenomeno di shadow/flickering con la metodologia ("real case"), che secondo altri casi simili comporterebbe la riduzione del fenomeno ad 1/3 dei valori, il quale seppur più realistico, è comunque sovrastimato poiché non tiene conto della presenza di nubi e di vegetazione ad alto fusto. Dalle simulazioni effettuate, si evince che gli aerogeneratori di progetto generano maggiormente il fenomeno di shadow/flickering sul recettore "k" individuato nell'analisi che, nelle ipotesi di "Worst case", subisce il fenomeno per un periodo che si avvicina o supera di poco le 100 ore/anno, per tutti gli altri rimanenti recettori considerati invece, l'effetto calcolato è più modesto e/o comunque meno rilevante fino a divenire irrilevante e in alcuni casi nullo.

Con le considerazioni di cui sopra, ovvero prevedendo la riduzione ad 1/3 si avranno valori sicuramente più ridotti per i ricettori con $k = 33$ ore/anno e comunque sono abitati meno di 4 ore giorno e quindi la probabilità di accadimento si riduce quasi al nulla.

È stato elaborato un calendario dell'ombra riportato in appendice (rif. Appendice Calendar), che riporta in maniera grafica giorno per giorno, per tutto l'anno, la durata giornaliera del fenomeno, l'orario di inizio e di fine del fenomeno, nelle condizioni di caso reale. Dalla lettura del "Calendar" si legge che il fenomeno



dell'ombreggiamento, si esplica sui recettori con intensità maggiore nel periodo compreso tra Gennaio, Marzo, Aprile, Settembre, Novembre e Dicembre nelle prime ore della giornata, oppure al primo pomeriggio. Nella figura che segue è riportato a titolo di esempio il grafico "calendar" di un recettore: le macchie individuano i momenti di shadow, la posizione nel grafico individua tempo e durata del fenomeno, il colore della macchia individua la turbina che causa il fenomeno.

L'allegato 2 riporta il dettaglio analitico di quanto espresso dal grafico precedente con gli specifici orari di inizio e di fine del fenomeno. A seguire è altresì riportata la sintesi grafica annuale (come mostra l'immagine precedente) dell'apporto di ombreggiamento a carico di ogni recettore ed il/gli aerogeneratore/i responsabile/i del fenomeno.

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

Il fenomeno dell'ombreggiamento interessa marginalmente tratti di strade comunali e/o private per un numero di ore all'anno del tutto irrilevanti e cioè pari ad un massimo di 30 ore/anno, ma solo in alcuni tratti. Preme tuttavia evidenziare che nelle simulazioni non si è tenuto conto della possibile presenza di vegetazione capace di offrire un effetto "barriera" ai recettori e/o alle strade limitrofe. Inoltre, la percezione dell'impianto dalla strada risulterebbe essere "in movimento" e quindi legata alla breve permanenza delle automobili in transito, per cui il fastidio indotto sarebbe temporalmente limitato. A questo si aggiunge che le simulazioni sono state effettuate assumendo le "condizioni peggiori", sovrastimando pertanto l'effetto di flickering.

5. 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 risultano essere nulli per molte strutture, e piuttosto modesti (o non particolarmente problematici) per altre.**

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

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 dei recettori.



SHADOW - Main Result

Calculation: WON023_ShadowFlickering
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 ZVI 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: WON023_EMDGrid_1.wpg
Receptor grid resolution: 1.0 m

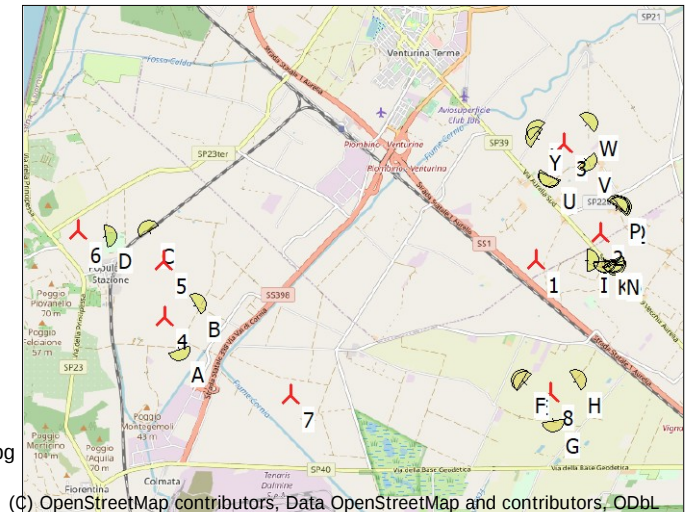
All coordinates are in
UTM (north)-WGS84 Zone: 32

WTGs

	Easting	Northing	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.	Type-generator				Calculation distance [m]	RPM
			[m]									[RPM]
1	632,546	4,761,848	9.7	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
2	633,604	4,762,317	11.7	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
3	632,966	4,763,765	13.7	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
4	626,417	4,760,798	2.3	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
5	626,379	4,761,714	4.2	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
6	624,959	4,762,191	13.8	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
7	628,517	4,759,536	2.0	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1
8	632,826	4,759,662	4.6	VESTAS V172-7.2 7200 172.0 !O! hu...	Yes	VESTAS	V172-7.2-7,200	7,200	172.0	150.0	2,039	12.1

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Degrees from south cw	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]	[°]		[m]
A	626,663	4,760,262	3.7	1.0	1.0	1.0	160.0	90.0	Fixed direction	2.0
B	626,925	4,761,007	2.9	1.0	1.0	1.0	60.0	90.0	Fixed direction	2.0
C	626,143	4,762,194	6.2	1.0	1.0	1.0	-30.0	90.0	Fixed direction	2.0
D	625,424	4,762,106	10.5	1.0	1.0	1.0	80.0	90.0	Fixed direction	2.0
E	632,392	4,759,817	4.7	1.0	1.0	1.0	-50.0	90.0	Fixed direction	2.0
F	632,349	4,759,845	4.6	1.0	1.0	1.0	-60.0	90.0	Fixed direction	2.0
G	632,884	4,759,205	3.0	1.0	1.0	1.0	170.0	90.0	Fixed direction	2.0
H	633,231	4,759,862	5.5	1.0	1.0	1.0	60.0	90.0	Fixed direction	2.0
I	633,402	4,761,859	9.7	1.0	1.0	1.0	90.0	90.0	Fixed direction	2.0
J	633,675	4,761,841	10.3	1.0	1.0	1.0	170.0	90.0	Fixed direction	2.0
K	633,685	4,761,829	10.3	1.0	1.0	1.0	180.0	90.0	Fixed direction	2.0
L	633,802	4,761,863	10.0	1.0	1.0	1.0	150.0	90.0	Fixed direction	2.0
M	633,807	4,761,857	9.9	1.0	1.0	1.0	150.0	90.0	Fixed direction	2.0
N	633,831	4,761,824	9.8	1.0	1.0	1.0	150.0	90.0	Fixed direction	2.0
O	633,853	4,761,805	9.8	1.0	1.0	1.0	160.0	90.0	Fixed direction	2.0
P	633,860	4,762,748	13.7	1.0	1.0	1.0	30.0	90.0	Fixed direction	2.0
Q	633,896	4,762,742	13.7	1.0	1.0	1.0	40.0	90.0	Fixed direction	2.0
R	633,883	4,762,722	13.6	1.0	1.0	1.0	40.0	90.0	Fixed direction	2.0
S	633,923	4,762,733	13.6	1.0	1.0	1.0	50.0	90.0	Fixed direction	2.0
T	632,735	4,763,239	12.7	1.0	1.0	1.0	-150.0	90.0	Fixed direction	2.0
U	632,745	4,763,232	12.8	1.0	1.0	1.0	-160.0	90.0	Fixed direction	2.0
V	633,327	4,763,502	14.0	1.0	1.0	1.0	140.0	90.0	Fixed direction	2.0
W	633,344	4,764,109	14.1	1.0	1.0	1.0	50.0	90.0	Fixed direction	2.0
X	632,545	4,763,960	13.0	1.0	1.0	1.0	-50.0	90.0	Fixed direction	2.0
Y	632,522	4,763,850	12.8	1.0	1.0	1.0	-60.0	90.0	Fixed direction	2.0



Project:
WON023

Licensed user:
Iron solar s.r.l.
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Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Main Result

Calculation: WON023_ShadowFlickering

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	0:00	0	0:00
B	81:28	91	1:10
C	66:22	70	1:10
D	161:23	132	1:23
E	110:10	106	1:21
F	92:31	97	1:14
G	0:00	0	0:00
H	117:00	109	1:23
I	36:46	62	0:46
J	21:01	47	0:35
K	16:38	46	0:34
L	16:48	42	0:32
M	16:32	40	0:31
N	16:03	41	0:31
O	15:41	40	0:30
P	131:12	98	1:39
Q	135:32	104	1:38
R	149:12	110	1:44
S	140:44	110	1:39
T	0:00	0	0:00
U	0:00	0	0:00
V	0:00	0	0:00
W	146:07	143	1:17
X	111:56	109	1:21
Y	115:53	110	1:22

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

No.	Name	Worst case [h/year]
1	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)	64:29
2	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (2)	168:14
3	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (3)	347:32
4	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (4)	81:28
5	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (5)	66:22
6	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (6)	161:23
7	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (7)	0:00
8	VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (8)	233:16

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

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: A - Shadow Receptor: 1.0 × 1.0 Azimuth: 160.0° Slope: 90.0° (1)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:50 16:54	07:34 17:30	06:56 18:06	07:02 19:44	06:14 20:18	05:42 20:50	05:42 21:01	06:08 20:41	06:42 19:55	07:14 19:01	06:52 17:12	07:29 16:45
2	07:50 16:55	07:33 17:31	06:54 18:08	07:00 19:45	06:12 20:19	05:42 20:51	05:43 21:01	06:09 20:39	06:43 19:53	07:16 19:00	06:53 17:10	07:30 16:45
3	07:50 16:55	07:32 17:32	06:53 18:09	06:59 19:46	06:11 20:20	05:41 20:52	05:44 21:01	06:10 20:38	06:44 19:51	07:17 18:58	06:54 17:09	07:31 16:44
4	07:50 16:56	07:31 17:34	06:51 18:10	06:57 19:47	06:09 20:22	05:41 20:52	05:44 21:01	06:11 20:37	06:45 19:50	07:18 18:56	06:55 17:08	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 18:11	06:55 19:48	06:08 20:23	05:41 20:53	05:45 21:01	06:12 20:36	06:46 19:48	07:19 18:54	06:57 17:07	07:33 16:44
6	07:50 16:58	07:29 17:36	06:48 18:13	06:53 19:49	06:07 20:24	05:40 20:54	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:53	06:58 17:05	07:34 16:44
7	07:50 16:59	07:28 17:38	06:46 18:14	06:52 19:50	06:06 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:51	06:59 17:04	07:35 16:44
8	07:49 17:00	07:26 17:39	06:44 18:15	06:50 19:52	06:04 20:26	05:40 20:55	05:47 21:00	06:16 20:32	06:49 19:43	07:22 18:49	07:01 17:03	07:36 16:44
9	07:49 17:01	07:25 17:41	06:43 18:16	06:48 19:53	06:03 20:27	05:39 20:56	05:47 20:59	06:17 20:31	06:50 19:41	07:24 18:47	07:02 17:02	07:37 16:44
10	07:49 17:02	07:24 17:42	06:41 18:18	06:47 19:54	06:02 20:28	05:39 20:56	05:48 20:59	06:18 20:29	06:51 19:39	07:25 18:46	07:03 17:01	07:38 16:44
11	07:49 17:04	07:23 17:43	06:39 18:19	06:45 19:55	06:01 20:29	05:39 20:57	05:49 20:58	06:19 20:28	06:52 19:37	07:26 18:44	07:04 17:00	07:39 16:44
12	07:48 17:05	07:21 17:44	06:37 18:20	06:43 19:56	06:00 20:31	05:39 20:57	05:50 20:58	06:20 20:26	06:54 19:35	07:27 18:42	07:06 16:59	07:40 16:44
13	07:48 17:06	07:20 17:46	06:36 18:21	06:42 19:57	05:58 20:32	05:39 20:58	05:50 20:57	06:21 20:25	06:55 19:34	07:28 18:41	07:07 16:58	07:40 16:44
14	07:48 17:07	07:19 17:47	06:34 18:22	06:40 19:59	05:57 20:33	05:39 20:58	05:51 20:57	06:22 20:23	06:56 19:32	07:29 18:39	07:08 16:57	07:41 16:44
15	07:47 17:08	07:17 17:48	06:32 18:24	06:38 20:00	05:56 20:34	05:39 20:59	05:52 20:56	06:23 20:22	06:57 19:30	07:31 18:37	07:09 16:56	07:42 16:44
16	07:47 17:09	07:16 17:50	06:30 18:25	06:37 20:01	05:55 20:35	05:39 20:59	05:53 20:55	06:24 20:21	06:58 19:28	07:32 18:36	07:11 16:55	07:43 16:44
17	07:46 17:11	07:14 17:51	06:29 18:26	06:35 20:02	05:54 20:36	05:39 21:00	05:54 20:55	06:25 20:19	06:59 19:26	07:33 18:34	07:12 16:54	07:43 16:45
18	07:46 17:12	07:13 17:52	06:27 18:27	06:33 20:03	05:53 20:37	05:39 21:00	05:54 20:54	06:26 20:18	07:00 19:25	07:34 18:32	07:13 16:53	07:44 16:45
19	07:45 17:13	07:11 17:54	06:25 18:28	06:32 20:04	05:52 20:38	05:39 21:00	05:55 20:53	06:27 20:16	07:01 19:23	07:35 18:31	07:15 16:52	07:45 16:45
20	07:45 17:14	07:10 17:55	06:23 18:30	06:30 20:06	05:51 20:39	05:39 21:01	05:56 20:52	06:29 20:14	07:02 19:21	07:37 18:29	07:16 16:51	07:45 16:46
21	07:44 17:15	07:09 17:56	06:22 18:31	06:29 20:07	05:50 20:40	05:39 21:01	05:57 20:52	06:30 20:13	07:03 19:19	07:38 18:28	07:17 16:51	07:46 16:46
22	07:43 17:17	07:07 17:58	06:20 18:32	06:27 20:08	05:49 20:41	05:39 21:01	05:58 20:51	06:31 20:11	07:04 19:17	07:39 18:26	07:18 16:50	07:46 16:47
23	07:42 17:18	07:05 17:59	06:18 18:33	06:25 20:09	05:49 20:42	05:39 21:01	05:59 20:50	06:32 20:10	07:06 19:16	07:40 18:25	07:19 16:49	07:47 16:47
24	07:42 17:19	07:04 18:00	06:16 18:34	06:24 20:10	05:48 20:43	05:40 21:01	06:00 20:49	06:33 20:08	07:07 19:14	07:42 18:23	07:21 16:49	07:47 16:48
25	07:41 17:21	07:02 18:01	06:15 18:35	06:22 20:11	05:47 20:44	05:40 21:01	06:01 20:48	06:34 20:06	07:08 19:12	06:43 17:22	07:22 16:48	07:48 16:48
26	07:40 17:22	07:01 18:03	06:13 18:37	06:21 20:12	05:46 20:45	05:40 21:01	06:02 20:47	06:35 20:05	07:09 19:10	06:44 17:20	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 18:04	06:11 18:38	06:19 20:14	05:46 20:46	05:41 21:02	06:03 20:46	06:36 20:03	07:10 19:08	06:45 17:19	07:24 16:47	07:48 16:50
28	07:38 17:25	06:58 18:05	06:09 18:39	06:18 20:15	05:45 20:47	05:41 21:02	06:04 20:45	06:37 20:01	07:11 19:07	06:47 17:17	07:25 16:46	07:49 16:50
29	07:37 17:26		07:07 19:40	06:16 20:16	05:44 20:47	05:42 21:01	06:05 20:44	06:38 20:00	07:12 19:05	06:48 17:16	07:27 16:46	07:49 16:51
30	07:36 17:27		07:06 19:41	06:15 20:17	05:44 20:48	05:42 21:01	06:06 20:43	06:39 19:58	07:13 19:03	06:49 17:14	07:28 16:45	07:49 16:52
31	07:35 17:28		07:04 19:42		05:43 20:49		06:07 20:42	06:41 19:56		06:50 17:13		07:49 16:53
Potential sun hours Total, worst case	292	294	369	401	454	459	465	432	376	343	293	281

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:

WON023

Licensed user:

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Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: B - Shadow Receptor: 1.0 × 1.0 Azimuth: 60.0° Slope: 90.0° (2)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:50 16:54	07:34 17:30	06:56 18:06	16:16 (4) 17:21 (4)	07:02 19:44	06:14 20:18	05:42 20:50	05:42 21:01	06:08 20:41	06:42 19:55	07:14 19:01	16:51 (4) 17:59 (4)	06:52 17:12	07:29 16:45
2	07:50 16:55	07:33 17:31	06:54 18:08	16:15 (4) 17:21 (4)	07:00 19:45	06:12 20:19	05:42 20:51	05:43 21:01	06:09 20:39	06:43 19:53	07:16 19:00	16:51 (4) 17:59 (4)	06:53 17:10	07:30 16:45
3	07:50 16:55	07:32 17:32	06:53 18:09	16:14 (4) 17:21 (4)	06:59 19:46	06:11 20:20	05:41 20:52	05:43 21:01	06:10 20:38	06:44 19:51	07:17 18:58	16:50 (4) 17:58 (4)	06:54 17:09	07:31 16:44
4	07:50 16:56	07:31 17:34	06:51 18:10	16:13 (4) 17:21 (4)	06:57 19:47	06:09 20:22	05:41 20:52	05:44 21:01	06:11 20:37	06:45 19:50	07:18 18:56	16:50 (4) 17:59 (4)	06:55 17:08	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 18:11	16:13 (4) 17:22 (4)	06:55 19:48	06:08 20:23	05:41 20:53	05:45 21:01	06:12 20:36	06:46 19:48	07:19 18:54	16:49 (4) 17:59 (4)	06:57 17:07	07:33 16:44
6	07:50 16:58	07:29 17:36	06:48 18:13	16:13 (4) 17:22 (4)	06:53 19:49	06:07 20:24	05:40 20:54	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:53	16:49 (4) 17:58 (4)	06:58 17:05	07:34 16:44
7	07:50 16:59	07:28 17:38	06:46 18:14	16:12 (4) 17:21 (4)	06:52 19:50	06:06 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:51	16:48 (4) 17:58 (4)	06:59 17:04	07:35 16:44
8	07:49 17:00	07:26 17:39	06:44 18:15	16:13 (4) 17:22 (4)	06:50 19:52	06:04 20:26	05:40 20:55	05:47 21:00	06:15 20:32	06:49 19:43	07:22 18:49	16:48 (4) 17:57 (4)	07:01 17:03	07:36 16:44
9	07:49 17:01	07:25 17:40	06:43 18:16	16:12 (4) 17:21 (4)	06:48 19:53	06:03 20:27	05:39 20:56	05:47 20:59	06:17 20:31	06:50 19:41	07:24 18:47	16:48 (4) 17:56 (4)	07:02 17:02	07:37 16:44
10	07:49 17:02	07:24 17:42	06:41 18:18	16:12 (4) 17:21 (4)	06:47 19:54	06:02 20:28	05:39 20:56	05:48 20:59	06:18 20:29	06:51 19:39	07:25 18:46	16:49 (4) 17:56 (4)	07:03 17:01	07:38 16:44
11	07:49 17:04	07:23 17:43	06:39 18:19	16:12 (4) 17:20 (4)	06:45 19:55	06:01 20:29	05:39 20:57	05:49 20:58	06:19 20:28	06:52 19:37	07:26 18:44	16:48 (4) 17:55 (4)	07:04 17:00	07:39 16:44
12	07:48 17:05	07:21 17:44	06:37 18:20	16:13 (4) 17:21 (4)	06:43 19:56	05:59 20:31	05:39 20:57	05:49 20:58	06:20 20:26	06:54 19:35	07:27 18:42	16:48 (4) 17:55 (4)	07:06 16:59	07:40 16:44
13	07:48 17:06	07:20 17:46	06:36 18:21	16:13 (4) 17:20 (4)	06:42 19:57	05:58 20:32	05:39 20:58	05:50 20:57	06:21 20:25	06:55 19:34	17:29 (4) 18:41	16:48 (4) 17:54 (4)	07:07 16:58	07:40 16:44
14	07:48 17:07	07:19 17:47	16:41 (4) 18:22	06:34 17:19 (4)	06:40 19:59	05:57 20:33	05:39 20:58	05:51 20:57	06:22 20:23	06:56 19:32	17:23 (4) 18:39	16:49 (4) 18:39	07:08 16:57	07:41 16:44
15	07:47 17:08	07:17 17:48	16:36 (4) 18:24	06:32 17:02 (4)	06:38 18:24	05:56 20:00	05:39 20:34	05:52 20:59	06:23 20:22	06:57 19:30	17:19 (4) 18:37	16:50 (4) 18:37	07:09 16:56	07:42 16:44
16	07:47 17:09	07:16 17:50	16:34 (4) 18:25	06:30 17:05 (4)	06:30 18:25	05:55 20:01	05:39 20:35	05:53 20:59	06:24 20:21	06:58 19:28	17:15 (4) 18:36	16:50 (4) 18:36	07:11 16:55	07:43 16:44
17	07:46 17:10	07:14 17:51	16:30 (4) 18:26	06:29 17:07 (4)	06:29 18:26	05:54 20:02	05:39 20:36	05:54 21:00	06:25 20:19	06:59 19:26	17:13 (4) 18:34	16:50 (4) 18:34	07:12 16:54	07:43 16:45
18	07:46 17:12	07:13 17:52	16:29 (4) 18:27	06:27 17:10 (4)	06:27 18:27	05:53 20:03	05:39 20:37	05:54 21:00	06:26 20:18	07:00 19:25	17:10 (4) 18:32	16:52 (4) 18:32	07:13 16:53	07:44 16:45
19	07:45 17:13	07:11 17:54	16:26 (4) 18:28	06:25 17:11 (4)	06:25 18:28	05:52 20:04	05:39 20:38	05:55 21:00	06:27 20:16	07:01 19:23	17:08 (4) 18:31	16:52 (4) 18:31	07:15 16:52	07:45 16:45
20	07:45 17:14	07:10 17:55	16:25 (4) 18:30	06:23 17:13 (4)	06:23 18:30	05:51 20:06	05:39 20:39	05:56 21:01	06:28 20:14	07:02 19:21	17:06 (4) 18:29	16:53 (4) 18:29	07:16 16:51	07:45 16:46
21	07:44 17:15	07:09 17:56	16:23 (4) 18:31	06:22 17:14 (4)	06:22 18:31	05:50 20:07	05:39 20:40	05:57 21:01	06:30 20:13	07:03 19:19	17:04 (4) 18:28	16:54 (4) 18:28	07:17 16:51	07:46 16:46
22	07:43 17:17	07:07 17:58	16:22 (4) 18:32	06:20 17:16 (4)	06:20 18:32	05:49 20:08	05:39 20:41	05:58 21:01	06:31 20:11	07:04 19:17	17:02 (4) 18:26	16:56 (4) 18:26	07:18 16:50	07:46 16:47
23	07:42 17:18	07:05 17:59	16:21 (4) 18:33	06:18 17:17 (4)	06:18 18:33	05:49 20:09	05:39 20:42	05:59 21:01	06:32 20:10	07:06 19:16	17:00 (4) 18:25	16:57 (4) 18:25	07:19 16:49	07:47 16:47
24	07:42 17:19	07:04 18:00	16:20 (4) 18:34	06:16 17:18 (4)	06:16 18:34	05:48 20:10	05:40 20:43	06:00 21:01	06:33 20:08	07:07 19:14	16:59 (4) 18:23	16:59 (4) 18:23	07:21 16:49	07:47 16:48
25	07:41 17:21	07:02 18:01	16:19 (4) 18:35	06:15 17:19 (4)	06:15 18:35	05:47 20:11	05:40 20:44	06:01 21:01	06:34 20:06	07:08 19:12	16:58 (4) 17:22	16:58 (4) 17:22	07:22 16:48	07:48 16:48
26	07:40 17:22	07:01 18:03	16:17 (4) 18:37	06:14 17:19 (4)	06:14 18:37	05:46 20:12	05:40 20:45	06:02 21:01	06:35 20:07	07:09 19:10	16:57 (4) 17:20	16:57 (4) 17:20	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 18:04	16:17 (4) 18:38	06:11 17:20 (4)	06:11 18:38	05:45 20:14	05:41 20:46	06:03 21:02	06:36 20:03	07:10 19:08	16:56 (4) 17:19	16:56 (4) 17:19	07:24 16:50	07:48 16:50
28	07:38 17:24	06:58 18:05	16:16 (4) 17:20 (4)	06:09 17:20 (4)	06:09 18:39	05:45 20:15	05:41 20:47	06:04 21:02	06:37 20:01	07:11 19:07	16:54 (4) 17:17	16:54 (4) 17:17	07:25 16:46	07:49 16:50
29	07:37 17:26	06:57 19:40	16:15 (4) 19:40	06:07 17:31 (4)	06:07 19:40	05:44 20:16	05:41 20:47	06:05 21:01	06:38 20:00	07:12 19:05	16:53 (4) 17:16	16:53 (4) 17:16	07:26 16:46	07:49 16:51
30	07:36 17:27	06:56 19:41	16:14 (4) 19:41	06:06 17:30 (4)	06:06 19:41	05:44 20:17	05:42 20:48	06:06 21:01	06:39 20:43	07:13 19:03	16:52 (4) 17:14	16:52 (4) 17:14	07:27 16:45	07:49 16:52
31	07:35 17:28	06:55 19:42	16:13 (4) 19:42	06:05 17:31 (4)	06:05 19:42	05:43 20:18	05:41 20:49	06:07 21:02	06:41 20:42	07:14 19:56	16:51 (4) 17:13	16:51 (4) 17:13	07:28 16:45	07:49 16:53
Potential sun hours	292	294	369	401	454	459	465	432	376	881	343	1581	293	281
Total, worst case		713	1713											

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:

WON023

Licensed user:

Iron solar s.r.l.

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IT-20122 Milano

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Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: C - Shadow Receptor: 1.0 × 1.0 Azimuth: -30.0° Slope: 90.0° (3)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1 07:50	09:55 (5) 07:34	06:56	07:02	06:14	05:42	05:42	06:08	06:42	07:14	06:52		07:29	
2 16:54	68 11:03 (5) 17:30	18:06	19:44	20:18	20:50	21:01	20:41	19:55	19:01	17:12		16:45	
3 07:50	09:56 (5) 07:33	06:54	07:00	06:12	05:42	05:43	06:09	06:43	07:16	06:53		07:30	
4 16:55	67 11:03 (5) 17:31	18:08	19:45	20:19	20:51	21:01	20:39	19:53	19:00	17:10		16:45	
5 07:50	09:56 (5) 07:32	06:53	06:59	06:11	05:41	05:43	06:10	06:44	07:17	06:54		07:31	
6 16:55	67 11:03 (5) 17:32	18:09	19:46	20:21	20:52	21:01	20:38	19:51	18:58	17:09		16:44	
7 07:50	09:57 (5) 07:31	06:51	06:57	06:09	05:41	05:44	06:11	06:45	07:18	06:55		07:32	
8 16:56	67 11:04 (5) 17:34	18:10	19:47	20:22	20:52	21:01	20:37	19:50	18:56	17:08		16:44	
9 07:50	09:58 (5) 07:30	06:49	06:55	06:08	05:41	05:45	06:12	06:46	07:19	06:57		07:33	
10 16:57	66 11:04 (5) 17:35	18:11	19:48	20:23	20:53	21:01	20:36	19:48	18:54	17:07		16:44	
11 07:50	09:59 (5) 07:29	06:48	06:53	06:07	05:40	05:45	06:13	06:47	07:20	06:58		07:34	
12 16:58	65 11:04 (5) 17:36	18:13	19:49	20:24	20:54	21:00	20:35	19:46	18:53	17:05		16:44	
13 07:50	10:00 (5) 07:28	06:46	06:52	06:06	05:40	05:46	06:14	06:48	07:21	06:59		07:35	
14 16:59	64 11:04 (5) 17:38	18:14	19:51	20:25	20:54	21:00	20:33	19:44	18:51	17:04		16:44	
15 07:50	10:00 (5) 07:27	06:44	06:50	06:04	05:40	05:47	06:15	06:49	07:22	07:01		07:36	
16 17:00	63 11:03 (5) 17:39	18:15	19:52	20:26	20:55	21:00	20:32	19:43	18:49	17:03		16:44	
17 07:49	10:01 (5) 07:25	06:43	06:48	06:03	05:39	05:47	06:17	06:50	07:24	07:02		07:37	
18 17:01	62 11:03 (5) 17:40	18:16	19:53	20:27	20:56	20:59	20:31	19:41	18:47	17:02		16:44	
19 07:49	10:02 (5) 07:24	06:41	06:47	06:02	05:39	05:48	06:18	06:51	07:25	07:03		07:38	
20 17:02	61 11:03 (5) 17:42	18:18	19:54	20:28	20:56	20:59	20:29	19:39	18:46	17:01		16:44	
21 07:49	10:03 (5) 07:23	06:39	06:45	06:01	05:39	05:49	06:19	06:52	07:26	07:04		07:39	
22 17:04	60 11:03 (5) 17:43	18:19	19:55	20:30	20:57	20:58	20:28	19:37	18:44	17:00		16:44	
23 07:49	10:04 (5) 07:21	06:37	06:43	05:59	05:39	05:49	06:20	06:54	07:27	07:06		07:40	
24 17:05	59 11:03 (5) 17:44	18:20	19:56	20:31	20:57	20:58	20:26	19:35	18:42	16:59		16:44	
25 07:48	10:06 (5) 07:20	06:36	06:42	05:58	05:39	05:50	06:21	06:55	07:28	07:07		07:40	
26 17:06	57 11:03 (5) 17:46	18:21	19:57	20:32	20:58	20:57	20:25	19:34	18:41	16:58		16:44	
27 07:48	10:06 (5) 07:19	06:34	06:40	05:57	05:39	05:51	06:22	06:56	07:29	07:08		07:41	
28 17:07	55 11:01 (5) 17:47	18:22	19:59	20:33	20:58	20:57	20:24	19:32	18:39	16:57		16:44	
29 07:47	10:08 (5) 07:17	06:32	06:38	05:56	05:39	05:52	06:23	06:57	07:31	07:10		07:42	
30 17:08	53 11:01 (5) 17:48	18:24	20:00	20:34	20:59	20:56	20:22	19:30	18:37	16:56		16:44	
31 07:47	10:09 (5) 07:16	06:30	06:37	05:55	05:39	05:53	06:24	06:58	07:32	07:11		07:43	
32 17:09	51 11:00 (5) 17:50	18:25	20:01	20:35	20:59	20:55	20:21	19:28	18:36	16:55		16:44	
33 07:46	10:10 (5) 07:14	06:29	06:35	05:54	05:39	05:54	06:25	06:59	07:33	07:12	10:04 (5)	07:43	
34 17:10	49 10:59 (5) 17:51	18:26	20:02	20:36	21:00	20:55	20:19	19:26	18:34	16:54	11	10:15 (5)	
35 07:46	10:12 (5) 07:13	06:27	06:33	05:53	05:39	05:54	06:26	07:00	07:34	07:13	09:59 (5)	07:44	
36 17:12	47 10:59 (5) 17:52	18:27	20:03	20:37	21:00	20:54	20:18	19:25	18:32	16:53	21	10:20 (5)	
37 07:45	10:13 (5) 07:12	06:25	06:32	05:52	05:39	05:55	06:27	07:01	07:35	07:15	09:57 (5)	07:45	
38 17:13	44 10:57 (5) 17:54	18:28	20:04	20:38	21:00	20:53	20:16	19:23	18:31	16:52	27	10:24 (5)	
39 07:45	10:14 (5) 07:10	06:23	06:30	05:51	05:39	05:56	06:29	07:02	07:37	07:16	09:54 (5)	07:45	
40 17:14	41 10:55 (5) 17:55	18:30	20:06	20:39	21:01	20:52	20:14	19:21	18:29	16:51	33	10:27 (5)	
41 07:44	10:17 (5) 07:09	06:22	06:29	05:50	05:39	05:57	06:30	07:03	07:38	07:17	09:52 (5)	07:46	
42 17:15	37 10:54 (5) 17:56	18:31	20:07	20:40	21:01	20:52	20:13	19:19	18:28	16:51	37	10:29 (5)	
43 07:43	10:19 (5) 07:07	06:20	06:27	05:49	05:39	05:58	06:31	07:04	07:39	07:18	09:50 (5)	07:46	
44 17:17	33 10:52 (5) 17:58	18:32	20:08	20:41	21:01	20:51	20:11	19:17	18:26	16:50	41	10:31 (5)	
45 07:43	10:22 (5) 07:06	06:18	06:25	05:49	05:39	05:59	06:32	07:06	07:40	07:20	09:50 (5)	07:47	
46 17:18	27 10:49 (5) 17:59	18:33	20:09	20:42	21:01	20:50	20:10	19:16	18:25	16:49	44	10:34 (5)	
47 07:42	10:25 (5) 07:04	06:16	06:24	05:48	05:40	06:00	06:33	07:07	07:42	07:21	09:49 (5)	07:47	
48 17:19	21 10:46 (5) 18:00	18:34	20:10	20:43	21:01	20:49	20:08	19:14	18:23	16:49	46	10:35 (5)	
49 07:41	10:30 (5) 07:02	06:15	06:22	05:47	05:40	06:01	06:34	07:08	06:43	07:22	09:48 (5)	07:48	
50 17:21	11 10:41 (5) 18:01	18:35	20:11	20:44	21:01	20:48	20:06	19:12	17:22	16:48	49	10:37 (5)	
51 07:40		07:01	06:13	06:21	05:46	05:40	06:02	06:35	07:09	06:44	07:23	09:48 (5)	
52 17:22		18:03	18:37	20:12	20:45	21:02	20:47	20:05	19:10	17:20	16:47	51	10:39 (5)
53 07:39		06:59	06:11	06:19	05:45	05:41	06:03	06:36	07:10	06:45	07:24	09:47 (5)	
54 17:23		18:04	18:38	20:14	20:46	21:02	20:46	20:03	19:08	17:19	16:47	53	10:40 (5)
55 07:38		06:58	06:09	06:18	05:45	05:41	06:04	06:37	07:11	06:47	07:25	09:46 (5)	
56 17:24		18:05	18:39	20:15	20:47	21:02	20:45	20:02	19:07	17:17	16:46	55	10:41 (5)
57 07:37			07:07	06:16	05:44	05:41	06:05	06:38	07:12	06:48	07:27	09:46 (5)	
58 17:26			19:40	20:16	20:48	21:02	20:44	20:00	19:05	17:16	16:46	57	10:43 (5)
59 07:37			07:06	06:15	05:44	05:42	06:06	06:39	07:13	06:49	07:28	09:45 (5)	
60 17:27			19:41	20:17	20:48	21:01	20:43	19:58	17:14	16:45	59	10:44 (5)	
61 07:36			07:04		05:43		06:07	06:41		06:50		07:50	
62 17:28			19:42		20:49		20:42	19:56		17:13		16:53	
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281	
Total, worst case	1295									584		2103	

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: WON023_ShadowFlickering Shadow receptor: D - Shadow Receptor: 1.0 × 1.0 Azimuth: 80.0° Slope: 90.0° (4)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June
1	07:50 16:54	07:35 17:30	06:56 18:07	07:02 19:44	06:14 20:18	18:16 (6) 19:27 (6)
2	07:50 16:55	07:33 17:31	06:54 18:08	07:00 19:45	06:12 20:19	18:14 (6) 19:27 (6)
3	07:50 16:55	07:32 17:33	06:53 18:09	06:59 19:46	06:11 20:21	18:14 (6) 19:28 (6)
4	07:50 16:56	07:31 17:34	06:51 18:10	06:57 19:47	06:09 20:22	18:14 (6) 19:29 (6)
5	07:50 16:57	07:30 17:35	06:49 18:11	06:55 19:48	06:08 20:23	18:12 (6) 19:29 (6)
6	07:50 16:58	07:29 17:37	06:48 18:13	06:53 19:49	06:07 20:24	18:12 (6) 19:29 (6)
7	07:50 16:59	07:28 17:38	06:46 18:14	06:52 19:51	06:06 20:25	18:12 (6) 19:30 (6)
8	07:50 17:00	07:27 17:39	06:44 18:15	06:50 19:52	06:04 20:26	18:11 (6) 19:30 (6)
9	07:49 17:01	07:25 17:41	06:43 18:16	06:48 19:53	06:03 20:27	18:11 (6) 19:31 (6)
10	07:49 17:02	07:24 17:42	06:41 18:18	06:47 19:54	06:02 20:28	18:10 (6) 19:30 (6)
11	07:49 17:04	07:23 17:43	06:39 18:19	06:45 19:55	06:01 20:30	18:10 (6) 19:31 (6)
12	07:49 17:05	07:21 17:45	06:37 18:20	06:43 19:56	06:00 20:31	18:10 (6) 19:31 (6)
13	07:48 17:06	07:20 17:46	06:36 18:21	06:42 19:58	05:58 20:32	18:10 (6) 19:31 (6)
14	07:48 17:07	07:19 17:47	06:34 18:22	06:40 19:59	05:57 20:33	18:10 (6) 19:32 (6)
15	07:47 17:08	07:17 17:48	06:32 18:24	06:38 20:00	05:56 20:34	18:10 (6) 19:32 (6)
16	07:47 17:09	07:16 17:50	06:30 18:25	06:37 20:01	05:55 20:35	18:09 (6) 19:32 (6)
17	07:46 17:11	07:14 17:51	06:29 18:26	06:35 20:02	05:54 19:00 (6)	18:09 (6) 19:32 (6)
18	07:46 17:12	07:13 17:52	06:27 18:27	06:33 20:03	05:53 19:07 (6)	18:09 (6) 19:32 (6)
19	07:45 17:13	07:12 17:54	06:25 18:28	06:32 20:04	05:52 19:10 (6)	18:09 (6) 19:32 (6)
20	07:45 17:14	07:10 17:55	06:23 18:30	06:30 20:06	05:51 19:13 (6)	18:10 (6) 19:33 (6)
21	07:44 17:15	07:09 17:56	06:22 18:31	06:29 20:07	05:50 19:15 (6)	18:10 (6) 19:33 (6)
22	07:43 17:17	07:07 17:58	06:20 18:32	06:27 20:08	05:49 19:16 (6)	18:10 (6) 19:33 (6)
23	07:43 17:18	07:06 17:59	06:18 18:33	06:25 20:09	05:49 19:18 (6)	18:10 (6) 19:33 (6)
24	07:42 17:19	07:04 18:00	06:16 18:34	06:24 20:10	05:48 19:19 (6)	18:10 (6) 19:33 (6)
25	07:41 17:21	07:02 18:01	06:15 18:35	06:22 20:11	05:47 19:21 (6)	18:11 (6) 19:33 (6)
26	07:40 17:22	07:01 18:03	06:13 18:37	06:21 20:13	05:46 19:23 (6)	18:11 (6) 19:33 (6)
27	07:39 17:23	06:59 18:04	06:11 18:38	06:19 20:14	05:46 19:25 (6)	18:11 (6) 19:34 (6)
28	07:38 17:26	06:58 18:05	06:09 18:39	06:18 20:15	05:45 18:17 (6)	18:12 (6) 19:34 (6)
29	07:37 17:27		06:08 19:40	06:16 20:16	05:44 19:25 (6)	18:11 (6) 19:33 (6)
30	07:37 17:27		07:06 19:41	06:15 20:17	05:44 19:26 (6)	18:12 (6) 19:34 (6)
31	07:36 17:28		07:04 19:42		05:43 20:49	18:12 (6) 19:33 (6)
Potential sun hours	292	294	369	401	454	459
Total, worst case				699	2491	2357

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: WON023_ShadowFlickering Shadow receptor: D - Shadow Receptor: 1.0 × 1.0 Azimuth: 80.0° Slope: 90.0° (4)
Assumptions for shadow calculations

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

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

		July				August				September		October		November		December	
1	05:42		18:20 (6)	06:08		18:20 (6)	06:42	07:15	06:52	07:29							
	21:01	79	19:39 (6)	20:41	82	19:42 (6)	19:55	19:01	17:12	16:45							
2	05:43		18:21 (6)	06:09		18:21 (6)	06:43	07:16	06:53	07:30							
	21:01	78	19:39 (6)	20:40	80	19:41 (6)	19:53	19:00	17:10	16:45							
3	05:44		18:20 (6)	06:10		18:21 (6)	06:44	07:17	06:54	07:31							
	21:01	79	19:39 (6)	20:38	80	19:41 (6)	19:51	18:58	17:09	16:44							
4	05:44		18:21 (6)	06:11		18:21 (6)	06:45	07:18	06:56	07:32							
	21:01	79	19:40 (6)	20:37	79	19:40 (6)	19:50	18:56	17:08	16:44							
5	05:45		18:20 (6)	06:12		18:21 (6)	06:46	07:19	06:57	07:33							
	21:01	80	19:40 (6)	20:36	79	19:40 (6)	19:48	18:54	17:07	16:44							
6	05:45		18:21 (6)	06:13		18:21 (6)	06:47	07:20	06:58	07:34							
	21:00	79	19:40 (6)	20:35	78	19:39 (6)	19:46	18:53	17:05	16:44							
7	05:46		18:21 (6)	06:14		18:22 (6)	06:48	07:21	06:59	07:35							
	21:00	80	19:41 (6)	20:33	77	19:39 (6)	19:44	18:51	17:04	16:44							
8	05:47		18:20 (6)	06:16		18:22 (6)	06:49	07:23	07:01	07:36							
	21:00	80	19:40 (6)	20:32	76	19:38 (6)	19:43	18:49	17:03	16:44							
9	05:47		18:21 (6)	06:17		18:22 (6)	06:50	07:24	07:02	07:37							
	20:59	80	19:41 (6)	20:31	75	19:37 (6)	19:41	18:47	17:02	16:44							
10	05:48		18:21 (6)	06:18		18:23 (6)	06:51	07:25	07:03	07:38							
	20:59	81	19:42 (6)	20:29	73	19:36 (6)	19:39	18:46	17:01	16:44							
11	05:49		18:20 (6)	06:19		18:23 (6)	06:53	07:26	07:04	07:39							
	20:58	81	19:41 (6)	20:28	73	19:36 (6)	19:37	18:44	17:00	16:44							
12	05:50		18:20 (6)	06:20		18:24 (6)	06:54	07:27	07:06	07:40							
	20:58	82	19:42 (6)	20:26	71	19:35 (6)	19:35	18:42	16:59	16:44							
13	05:50		18:21 (6)	06:21		18:24 (6)	06:55	07:28	07:07	07:40							
	20:57	81	19:42 (6)	20:25	70	19:34 (6)	19:34	18:41	16:58	16:44							
14	05:51		18:21 (6)	06:22		18:25 (6)	06:56	07:30	07:08	07:41							
	20:57	81	19:42 (6)	20:24	67	19:32 (6)	19:32	18:39	16:57	16:44							
15	05:52		18:20 (6)	06:23		18:26 (6)	06:57	07:31	07:10	07:42							
	20:56	82	19:42 (6)	20:22	65	19:31 (6)	19:30	18:37	16:56	16:44							
16	05:53		18:20 (6)	06:24		18:28 (6)	06:58	07:32	07:11	07:43							
	20:55	82	19:42 (6)	20:21	63	19:31 (6)	19:28	18:36	16:55	16:44							
17	05:54		18:20 (6)	06:25		18:29 (6)	06:59	07:33	07:12	07:43							
	20:55	82	19:42 (6)	20:19	60	19:29 (6)	19:26	18:34	16:54	16:45							
18	05:54		18:20 (6)	06:26		18:30 (6)	07:00	07:34	07:13	07:44							
	20:54	83	19:43 (6)	20:18	58	19:28 (6)	19:25	18:32	16:53	16:45							
19	05:55		18:20 (6)	06:27		18:31 (6)	07:01	07:36	07:15	07:45							
	20:53	83	19:43 (6)	20:16	55	19:26 (6)	19:23	18:31	16:52	16:45							
20	05:56		18:21 (6)	06:29		18:32 (6)	07:02	07:37	07:16	07:45							
	20:52	82	19:43 (6)	20:15	52	19:24 (6)	19:21	18:29	16:51	16:46							
21	05:57		18:21 (6)	06:30		18:34 (6)	07:03	07:38	07:17	07:46							
	20:52	82	19:43 (6)	20:13	48	19:22 (6)	19:19	18:28	16:51	16:46							
22	05:58		18:20 (6)	06:31		18:36 (6)	07:05	07:39	07:18	07:46							
	20:51	83	19:43 (6)	20:11	43	19:19 (6)	19:17	18:26	16:50	16:47							
23	05:59		18:20 (6)	06:32		18:38 (6)	07:06	07:40	07:20	07:47							
	20:50	83	19:43 (6)	20:10	39	19:17 (6)	19:16	18:25	16:49	16:47							
24	06:00		18:20 (6)	06:33		18:40 (6)	07:07	07:42	07:21	07:47							
	20:49	83	19:43 (6)	20:08	33	19:13 (6)	19:14	18:23	16:49	16:48							
25	06:01		18:20 (6)	06:34		18:44 (6)	07:08	06:43	07:22	07:48							
	20:48	83	19:43 (6)	20:07	25	19:09 (6)	19:12	17:22	16:48	16:48							
26	06:02		18:20 (6)	06:35		18:50 (6)	07:09	06:44	07:23	07:48							
	20:47	83	19:43 (6)	20:05	12	19:02 (6)	19:10	17:20	16:47	16:49							
27	06:03		18:20 (6)	06:36			07:10	06:45	07:24	07:49							
	20:46	83	19:43 (6)	20:03			19:08	17:19	16:47	16:50							
28	06:04		18:20 (6)	06:37			07:11	06:47	07:25	07:49							
	20:45	83	19:43 (6)	20:02			19:07	17:17	16:46	16:50							
29	06:05		18:20 (6)	06:38			07:12	06:48	07:27	07:49							
	20:44	82	19:42 (6)	20:00			19:05	17:16	16:46	16:51							
30	06:06		18:20 (6)	06:39			07:13	06:49	07:28	07:49							
	20:43	82	19:42 (6)	19:58			19:03	17:14	16:46	16:52							
31	06:07		18:20 (6)	06:41				06:50		07:50							
	20:42	82	19:42 (6)	19:57				17:13		16:53							
Potential sun hours	465			432			376	343	293	281							
Total, worst case		2523			1613												

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: E - Shadow Receptor: 1.0 × 1.0 Azimuth: -50.0° Slope: 90.0° (5)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:49	07:34	06:56	07:43 (8)	07:02	08:38 (8)	06:13	05:42	05:42	06:08	06:41	07:14
	16:53	17:30	18:06	08:53 (8)	19:43	57	09:35 (8)	20:18	20:50	21:01	20:40	19:54
2	07:49	07:33	06:54	07:43 (8)	07:00	08:39 (8)	06:12	05:42	05:43	06:09	06:42	07:15
	16:54	17:31	18:07	08:54 (8)	19:44	53	09:32 (8)	20:19	20:50	21:01	20:39	19:53
3	07:50	07:32	06:52	07:41 (8)	06:58	08:40 (8)	06:11	05:41	05:43	06:10	06:44	07:16
	16:55	17:32	18:09	08:55 (8)	19:46	50	09:30 (8)	20:20	20:51	21:01	20:38	19:51
4	07:50	07:31	06:51	07:40 (8)	06:57	08:42 (8)	06:09	05:41	05:44	06:11	06:45	07:18
	16:56	17:34	18:10	08:55 (8)	19:47	46	09:28 (8)	20:21	20:52	21:00	20:37	19:49
5	07:50	07:30	06:49	07:40 (8)	06:55	08:44 (8)	06:08	05:40	05:44	06:12	06:46	07:19
	16:57	17:35	18:11	08:56 (8)	19:48	41	09:25 (8)	20:22	20:53	21:00	20:35	19:48
6	07:49	07:29	06:47	07:39 (8)	06:53	08:45 (8)	06:07	05:40	05:45	06:13	06:47	07:20
	16:58	17:36	18:12	08:56 (8)	19:49	37	09:22 (8)	20:24	20:53	21:00	20:34	19:46
7	07:49	07:27	06:46	07:38 (8)	06:51	08:48 (8)	06:05	05:40	05:46	06:14	06:48	07:21
	16:59	17:38	18:14	08:56 (8)	19:50	32	09:20 (8)	20:25	20:54	21:00	20:33	19:44
8	07:49	07:26	06:44	07:37 (8)	06:50	08:51 (8)	06:04	05:39	05:46	06:15	06:49	07:22
	17:00	17:39	18:15	08:56 (8)	19:51	24	09:15 (8)	20:26	20:55	20:59	20:32	19:42
9	07:49	07:25	06:42	07:37 (8)	06:48	08:56 (8)	06:03	05:39	05:47	06:16	06:50	07:23
	17:01	17:40	18:16	08:56 (8)	19:53	13	09:09 (8)	20:27	20:55	20:59	20:30	19:40
10	07:49	07:24	06:41	07:36 (8)	06:46	08:57 (8)	06:02	05:39	05:48	06:17	06:51	07:24
	17:02	17:42	18:17	08:56 (8)	19:54	20:28	20:56	20:58	20:29	19:39	52	09:25 (8)
11	07:48	07:22	06:39	07:35 (8)	06:45	06:00	05:39	05:49	06:18	06:52	08:31 (8)	07:26
	17:03	17:43	18:19	08:56 (8)	19:55	20:29	20:57	20:58	20:27	19:37	56	09:27 (8)
12	07:48	07:21	06:37	07:35 (8)	06:43	05:59	05:39	05:49	06:20	06:53	08:29 (8)	07:27
	17:04	17:44	18:20	08:55 (8)	19:56	20:30	20:57	20:57	20:26	19:35	59	09:28 (8)
13	07:48	07:20	06:35	07:35 (8)	06:41	05:58	05:38	05:50	06:21	06:54	08:28 (8)	07:28
	17:06	17:46	18:21	08:56 (8)	19:57	20:31	20:58	20:57	20:25	19:33	61	09:29 (8)
14	07:47	07:18	06:34	07:34 (8)	06:40	05:57	05:38	05:51	06:22	06:55	08:26 (8)	07:29
	17:07	17:47	18:22	08:55 (8)	19:58	20:32	20:58	20:56	20:23	19:32	64	09:30 (8)
15	07:47	07:17	06:32	07:34 (8)	06:38	05:56	05:38	05:52	06:23	06:57	08:25 (8)	07:30
	17:08	17:48	18:23	08:54 (8)	19:59	20:33	20:58	20:56	20:22	19:30	66	09:31 (8)
16	07:47	07:16	06:30	07:33 (8)	06:36	05:55	05:38	05:53	06:24	06:58	08:24 (8)	07:32
	17:09	17:50	8	08:24 (8)	18:25	81	08:54 (8)	20:01	20:35	20:59	20:55	20:20
17	07:46	07:14	06:28	08:08 (8)	06:28	07:34 (8)	06:35	05:54	05:38	05:53	06:25	06:59
	17:10	17:51	23	08:31 (8)	18:26	80	08:54 (8)	20:02	20:36	20:59	20:54	20:19
18	07:45	07:13	06:27	08:04 (8)	06:27	07:34 (8)	06:33	05:53	05:38	05:54	06:26	07:00
	17:11	17:52	31	08:35 (8)	18:27	79	08:53 (8)	20:03	20:37	21:00	20:54	20:17
19	07:45	07:11	06:25	08:01 (8)	06:25	07:33 (8)	06:31	05:52	05:38	05:55	06:27	07:01
	17:13	17:53	37	08:38 (8)	18:28	79	08:52 (8)	20:04	20:38	21:00	20:53	20:16
20	07:44	07:10	06:23	07:59 (8)	06:23	07:33 (8)	06:30	05:51	05:39	05:56	06:28	07:02
	17:14	17:55	42	08:41 (8)	18:29	78	08:51 (8)	20:05	20:39	21:00	20:52	20:14
21	07:44	07:08	06:21	07:56 (8)	06:21	07:33 (8)	06:28	05:50	05:39	05:57	06:29	07:03
	17:15	17:56	47	08:43 (8)	18:30	77	08:50 (8)	20:06	20:40	21:00	20:51	20:13
22	07:43	07:07	06:20	07:54 (8)	06:20	07:34 (8)	06:27	05:49	05:39	05:58	06:30	07:04
	17:16	17:57	51	08:45 (8)	18:32	76	08:50 (8)	20:08	20:41	21:01	20:50	20:11
23	07:42	07:05	06:18	07:52 (8)	06:18	07:34 (8)	06:25	05:48	05:39	05:59	06:32	07:05
	17:18	17:59	55	08:47 (8)	18:33	74	08:48 (8)	20:09	20:42	21:01	20:50	20:09
24	07:41	07:04	06:16	07:50 (8)	06:16	07:34 (8)	06:24	05:47	05:39	06:00	06:33	07:06
	17:19	18:00	58	08:48 (8)	18:34	73	08:47 (8)	20:10	20:43	21:01	20:49	20:08
25	07:41	07:02	06:14	07:49 (8)	06:14	07:34 (8)	06:22	05:47	05:40	06:01	06:34	07:07
	17:20	18:01	61	08:50 (8)	18:35	71	08:45 (8)	20:11	20:44	21:01	20:48	20:06
26	07:40	07:00	06:12	07:47 (8)	06:12	07:35 (8)	06:21	05:46	05:40	06:02	06:35	07:09
	17:22	18:02	63	08:50 (8)	18:36	70	08:45 (8)	20:12	20:44	21:01	20:47	20:05
27	07:39	06:59	06:11	07:46 (8)	06:11	07:35 (8)	06:19	05:45	05:40	06:03	06:36	07:10
	17:23	18:04	66	08:52 (8)	18:37	68	08:43 (8)	20:13	20:45	21:01	20:46	20:03
28	07:38	06:57	06:09	07:45 (8)	06:09	07:35 (8)	06:18	05:45	05:41	06:04	06:37	07:11
	17:24	18:05	68	08:53 (8)	18:39	67	08:42 (8)	20:14	20:46	21:01	20:45	20:01
29	07:37		07:07	08:36 (8)	06:16	05:44	05:41	06:05	06:38	07:12	08:15 (8)	06:47
	17:26		19:40	09:40 (8)	20:16	20:47	21:01	20:44	20:00	19:05	81	09:36 (8)
30	07:36		07:05	08:36 (8)	06:15	05:43	05:42	06:06	06:39	07:13	08:14 (8)	06:49
	17:27		19:41	09:38 (8)	20:17	20:48	21:01	20:43	19:58	19:03	81	09:35 (8)
31	07:35		07:04	08:38 (8)		05:43		06:07	06:40			06:50
	17:28		19:42	09:37 (8)		20:49		20:41	19:56			17:13
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281
Total, worst case		610	2320	353					1745	1582		

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: WON023_ShadowFlickering Shadow receptor: G - Shadow Receptor: 1.0 × 1.0 Azimuth: 170.0° Slope: 90.0° (7)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:49 16:53	07:34 17:30	06:56 18:06	07:02 19:43	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	06:51 17:11	07:28 16:45
2	07:49 16:54	07:33 17:31	06:54 18:07	07:00 19:44	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59	06:53 17:10	07:29 16:45
3	07:49 16:55	07:32 17:32	06:52 18:09	06:58 19:46	06:11 20:20	05:41 20:51	05:43 21:01	06:10 20:38	06:43 19:51	07:16 18:57	06:54 17:09	07:31 16:44
4	07:49 16:56	07:31 17:34	06:51 18:10	06:57 19:47	06:09 20:21	05:41 20:52	05:44 21:00	06:11 20:37	06:45 19:49	07:18 18:56	06:55 17:08	07:32 16:44
5	07:49 16:57	07:30 17:35	06:49 18:11	06:55 19:48	06:08 20:22	05:40 20:53	05:44 21:00	06:12 20:35	06:46 19:47	07:19 18:54	06:56 17:06	07:33 16:44
6	07:49 16:58	07:29 17:36	06:47 18:12	06:53 19:49	06:07 20:24	05:40 20:53	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:52	06:58 17:05	07:34 16:44
7	07:49 16:59	07:27 17:38	06:46 18:14	06:51 19:50	06:05 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:51	06:59 17:04	07:35 16:43
8	07:49 17:00	07:26 17:39	06:44 18:15	06:50 19:51	06:04 20:26	05:39 20:55	05:46 20:59	06:15 20:32	06:49 19:42	07:22 18:49	07:00 17:03	07:36 16:43
9	07:49 17:01	07:25 17:40	06:42 18:16	06:48 19:52	06:03 20:27	05:39 20:55	05:47 20:59	06:16 20:30	06:50 19:40	07:23 18:47	07:01 17:02	07:37 16:43
10	07:49 17:02	07:24 17:42	06:41 18:17	06:46 19:54	06:02 20:28	05:39 20:56	05:48 20:58	06:17 20:29	06:51 19:39	07:24 18:45	07:03 17:00	07:37 16:43
11	07:48 17:03	07:22 17:43	06:39 18:18	06:45 19:55	06:00 20:29	05:39 20:56	05:49 20:58	06:18 20:27	06:52 19:37	07:26 18:44	07:04 16:59	07:38 16:43
12	07:48 17:04	07:21 17:44	06:37 18:20	06:43 19:56	05:59 20:30	05:39 20:57	05:49 20:57	06:20 20:26	06:53 19:35	07:27 18:42	07:05 16:58	07:39 16:43
13	07:48 17:06	07:20 17:46	06:35 18:21	06:41 19:57	05:58 20:31	05:38 20:58	05:50 20:57	06:21 20:25	06:54 19:33	07:28 18:40	07:07 16:57	07:40 16:44
14	07:47 17:07	07:18 17:47	06:34 18:22	06:40 19:58	05:57 20:32	05:38 20:58	05:51 20:56	06:22 20:23	06:55 19:32	07:29 18:39	07:08 16:56	07:41 16:44
15	07:47 17:08	07:17 17:48	06:32 18:23	06:38 19:59	05:56 20:33	05:38 20:58	05:52 20:56	06:23 20:22	06:57 19:30	07:30 18:37	07:09 16:55	07:42 16:44
16	07:47 17:09	07:16 17:49	06:30 18:24	06:36 20:01	05:55 20:34	05:38 20:59	05:52 20:55	06:24 20:20	06:58 19:28	07:32 18:35	07:10 16:54	07:42 16:44
17	07:46 17:10	07:14 17:51	06:28 18:26	06:35 20:02	05:54 20:36	05:38 20:59	05:53 20:54	06:25 20:19	06:59 19:26	07:33 18:34	07:12 16:54	07:43 16:44
18	07:45 17:11	07:13 17:52	06:27 18:27	06:33 20:03	05:53 20:37	05:38 21:00	05:54 20:54	06:26 20:17	07:00 19:24	07:34 18:32	07:13 16:53	07:44 16:45
19	07:45 17:13	07:11 17:53	06:25 18:28	06:31 20:04	05:52 20:38	05:38 21:00	05:55 20:53	06:27 20:16	07:01 19:23	07:35 18:31	07:14 16:52	07:44 16:45
20	07:44 17:14	07:10 17:55	06:23 18:29	06:30 20:05	05:51 20:39	05:39 21:00	05:56 20:52	06:28 20:14	07:02 19:21	07:36 18:29	07:15 16:51	07:45 16:45
21	07:44 17:15	07:08 17:56	06:21 18:30	06:28 20:06	05:50 20:40	05:39 21:00	05:57 20:51	06:29 20:13	07:03 19:19	07:38 18:27	07:17 16:50	07:45 16:46
22	07:43 17:16	07:07 17:57	06:20 18:32	06:27 20:08	05:49 20:41	05:39 21:01	05:58 20:50	06:30 20:11	07:04 19:17	07:39 18:26	07:18 16:50	07:46 16:46
23	07:42 17:18	07:05 17:59	06:18 18:33	06:25 20:09	05:48 20:42	05:39 21:01	05:59 20:49	06:32 20:09	07:05 19:15	07:40 18:24	07:19 16:49	07:47 16:47
24	07:41 17:19	07:04 18:00	06:16 18:34	06:24 20:10	05:47 20:43	05:39 21:01	06:00 20:49	06:33 20:08	07:06 19:14	07:41 18:23	07:20 16:48	07:47 16:47
25	07:41 17:20	07:02 18:01	06:14 18:35	06:22 20:11	05:47 20:43	05:40 21:01	06:01 20:48	06:34 20:06	07:07 19:12	07:42 17:21	07:22 16:48	07:47 16:48
26	07:40 17:22	07:00 18:02	06:12 18:36	06:21 20:12	05:46 20:44	05:40 21:01	06:02 20:47	06:35 20:04	07:09 19:10	07:44 17:20	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 18:04	06:11 18:37	06:19 20:13	05:45 20:45	05:40 21:01	06:03 20:46	06:36 20:03	07:10 19:08	07:45 17:18	07:24 16:47	07:48 16:49
28	07:38 17:24	06:57 18:05	06:09 18:39	06:18 20:14	05:45 20:46	05:41 21:01	06:04 20:45	06:37 20:01	07:11 19:06	07:46 17:17	07:25 16:46	07:48 16:50
29	07:37 17:26		07:07 19:40	06:16 20:16	05:44 20:47	05:41 21:01	06:05 20:44	06:38 19:59	07:12 19:05	07:47 17:16	07:26 16:46	07:49 16:51
30	07:36 17:27		07:05 19:41	06:15 20:17	05:43 20:48	05:42 21:01	06:06 20:42	06:39 19:58	07:13 19:03	07:48 17:14	07:27 16:45	07:49 16:52
31	07:35 17:28		07:04 19:42		05:43 20:49		06:07 20:41	06:40 19:56		06:50 17:13		07:49 16:52
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281
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)

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: H - Shadow Receptor: 1.0 × 1.0 Azimuth: 60.0° Slope: 90.0° (8)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June
1	07:49 16:53	07:34 17:29	06:56 18:06	15:48 (8) 17:09 (8)	07:02 19:43	17:11 (8) 20:18
2	07:49 16:54	07:33 17:31	06:54 18:07	15:48 (8) 17:10 (8)	07:00 19:44	17:15 (8) 20:19
3	07:49 16:55	07:32 17:32	06:52 18:09	15:48 (8) 17:09 (8)	06:58 19:46	06:11 20:20
4	07:49 16:56	07:31 17:34	06:51 18:10	15:47 (8) 17:09 (8)	06:57 19:47	06:09 20:21
5	07:49 16:57	07:30 17:35	06:49 18:11	15:46 (8) 17:09 (8)	06:55 19:48	06:08 20:22
6	07:49 16:58	07:29 17:36	06:47 18:12	15:47 (8) 17:10 (8)	06:53 19:49	06:07 20:24
7	07:49 16:59	07:27 17:38	06:46 18:14	15:46 (8) 17:09 (8)	06:51 19:50	06:05 20:25
8	07:49 17:00	07:26 17:39	16:21 (8) 16:39 (8)	06:44 18:15	15:46 (8) 17:09 (8)	06:50 19:51
9	07:49 17:01	07:25 17:40	16:16 (8) 16:43 (8)	06:42 18:16	15:47 (8) 17:09 (8)	06:48 19:52
10	07:49 17:02	07:24 17:42	16:13 (8) 16:47 (8)	06:41 18:17	15:47 (8) 17:09 (8)	06:46 19:54
11	07:48 17:03	07:22 17:43	16:10 (8) 16:50 (8)	06:39 18:18	15:46 (8) 17:08 (8)	06:45 19:55
12	07:48 17:04	07:21 17:44	16:07 (8) 16:52 (8)	06:37 18:20	15:46 (8) 17:07 (8)	06:43 19:56
13	07:48 17:06	07:20 17:46	16:06 (8) 16:54 (8)	06:35 18:21	15:47 (8) 17:07 (8)	06:41 19:57
14	07:47 17:07	07:18 17:47	16:03 (8) 16:55 (8)	06:34 18:22	15:47 (8) 17:07 (8)	06:40 19:58
15	07:47 17:08	07:17 17:48	16:02 (8) 16:57 (8)	06:32 18:23	15:48 (8) 17:06 (8)	06:38 19:59
16	07:47 17:09	07:16 17:49	16:01 (8) 16:59 (8)	06:30 18:24	15:48 (8) 17:05 (8)	06:36 20:01
17	07:46 17:10	07:14 17:51	15:59 (8) 17:00 (8)	06:28 18:26	15:49 (8) 17:05 (8)	06:35 20:02
18	07:45 17:11	07:13 17:52	15:58 (8) 17:02 (8)	06:27 18:27	15:49 (8) 17:04 (8)	06:33 20:03
19	07:45 17:13	07:11 17:53	15:56 (8) 17:03 (8)	06:25 18:28	15:50 (8) 17:03 (8)	06:31 20:04
20	07:44 17:14	07:10 17:55	15:56 (8) 17:04 (8)	06:23 18:29	15:50 (8) 17:01 (8)	06:30 20:05
21	07:44 17:15	07:08 17:56	15:54 (8) 17:05 (8)	06:21 18:30	15:51 (8) 17:00 (8)	06:28 20:06
22	07:43 17:16	07:07 17:57	15:53 (8) 17:05 (8)	06:20 18:32	15:53 (8) 17:00 (8)	06:27 20:07
23	07:42 17:18	07:05 17:59	15:52 (8) 17:06 (8)	06:18 18:33	15:54 (8) 16:58 (8)	06:25 20:09
24	07:41 17:19	07:04 18:00	15:51 (8) 17:07 (8)	06:16 18:34	15:55 (8) 16:56 (8)	06:24 20:10
25	07:41 17:20	07:02 18:01	15:51 (8) 17:08 (8)	06:14 18:35	15:56 (8) 16:55 (8)	06:22 20:11
26	07:40 17:22	07:00 18:02	15:50 (8) 17:08 (8)	06:12 18:36	15:58 (8) 16:54 (8)	06:21 20:12
27	07:39 17:23	06:59 18:04	15:49 (8) 17:08 (8)	06:11 18:37	15:59 (8) 16:52 (8)	06:19 20:13
28	07:38 17:24	06:57 18:05	15:49 (8) 17:09 (8)	06:09 18:39	16:01 (8) 16:50 (8)	06:18 20:14
29	07:37 17:26		07:07 19:40		17:02 (8) 17:47 (8)	06:16 20:16
30	07:36 17:27		07:05 19:41	45	17:04 (8) 17:45 (8)	06:15 20:17
31	07:35 17:28		07:04 19:42	41	17:08 (8) 17:43 (8)	06:14 20:18
Potential sun hours	292	294	369	401	454	459
Total, worst case		1244	2194	47		

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: WON023_ShadowFlickering Shadow receptor: H - Shadow Receptor: 1.0 × 1.0 Azimuth: 60.0° Slope: 90.0° (8)
Assumptions for shadow calculations

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

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

	July	August	September	October	November	December		
1	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	16:26 (8) 17:47 (8)	06:51 17:11	15:43 (8) 16:16 (8)	07:28 16:45
2	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59	16:25 (8) 17:46 (8)	06:53 17:10	15:46 (8) 16:12 (8)	07:29 16:44
3	05:43 21:01	06:10 20:38	06:43 19:51	07:16 18:57	16:24 (8) 17:46 (8)	06:54 17:09	15:51 (8) 16:07 (8)	07:31 16:44
4	05:44 21:00	06:11 20:37	06:45 19:49	07:18 18:56	16:24 (8) 17:46 (8)	06:55 17:08		07:32 16:44
5	05:44 21:00	06:12 20:35	06:46 19:47	07:19 18:54	16:23 (8) 17:45 (8)	06:56 17:06		07:33 16:44
6	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:52	16:23 (8) 17:46 (8)	06:58 17:05		07:34 16:44
7	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:50	16:23 (8) 17:45 (8)	06:59 17:04		07:35 16:43
8	05:46 20:59	06:15 20:32	06:49 19:42	07:22 18:49	16:22 (8) 17:45 (8)	07:00 17:03		07:36 16:43
9	05:47 20:59	06:16 20:30	06:50 19:40	07:23 18:47	16:22 (8) 17:44 (8)	07:01 17:02		07:37 16:43
10	05:48 20:58	06:17 20:29	06:51 19:39	17:08 (8) 18:45	07:24 18:45	07:03 17:00		07:37 16:43
11	05:48 20:58	06:18 20:27	06:52 19:37	17:03 (8) 18:44	07:26 18:44	07:04 16:59		07:38 16:43
12	05:49 20:57	06:20 20:26	06:53 19:35	16:59 (8) 17:33 (8)	07:27 18:42	07:05 16:58		07:39 16:43
13	05:50 20:57	06:21 20:25	06:54 19:33	16:56 (8) 17:35 (8)	07:28 18:40	07:07 16:57		07:40 16:43
14	05:51 20:56	06:22 20:23	06:55 19:32	16:53 (8) 17:37 (8)	07:29 18:39	07:08 16:56		07:41 16:44
15	05:52 20:56	06:23 20:22	06:56 19:30	16:50 (8) 17:39 (8)	07:30 18:37	07:09 16:55		07:42 16:44
16	05:52 20:55	06:24 20:20	06:58 19:28	16:49 (8) 17:41 (8)	07:31 18:35	07:10 16:54		07:42 16:44
17	05:53 20:54	06:25 20:19	06:59 19:26	16:47 (8) 17:42 (8)	07:33 18:34	07:12 16:54		07:43 16:44
18	05:54 20:54	06:26 20:17	07:00 19:24	16:44 (8) 17:43 (8)	07:34 18:32	07:13 16:53		07:44 16:45
19	05:55 20:53	06:27 20:16	07:01 19:23	16:42 (8) 17:44 (8)	07:35 18:31	07:14 16:52		07:44 16:45
20	05:56 20:52	06:28 20:14	07:02 19:21	16:40 (8) 17:44 (8)	07:36 18:29	07:15 16:51		07:45 16:45
21	05:57 20:51	06:29 20:13	07:03 19:19	16:39 (8) 17:45 (8)	07:38 18:27	07:17 16:50		07:45 16:46
22	05:58 20:50	06:30 20:11	07:04 19:17	16:37 (8) 17:45 (8)	07:39 18:26	07:18 16:50		07:46 16:46
23	05:59 20:49	06:31 20:09	07:05 19:15	16:35 (8) 17:46 (8)	07:40 18:24	07:19 16:49		07:47 16:47
24	06:00 20:49	06:33 20:08	07:06 19:14	16:34 (8) 17:46 (8)	07:41 18:23	07:20 16:48		07:47 16:47
25	06:01 20:48	06:34 20:06	07:07 19:12	16:32 (8) 17:46 (8)	06:42 17:21	07:22 16:48		07:47 16:48
26	06:02 20:47	06:35 20:04	07:09 19:10	16:31 (8) 17:46 (8)	06:44 17:20	07:23 16:47		07:48 16:49
27	06:03 20:46	06:36 20:03	07:10 19:08	16:30 (8) 17:46 (8)	06:45 17:18	07:24 16:47		07:48 16:49
28	06:04 20:45	06:37 20:01	07:11 19:06	16:29 (8) 17:47 (8)	06:46 17:17	07:25 16:46		07:48 16:50
29	06:05 20:44	06:38 19:59	07:12 19:05	16:28 (8) 17:47 (8)	06:47 17:16	07:26 16:46		07:49 16:51
30	06:06 20:42	06:39 19:58	07:13 19:03	16:27 (8) 17:47 (8)	06:49 17:14	07:27 16:45		07:49 16:52
31	06:07 20:41	06:40 19:56		06:50 17:13	15:39 (8) 16:18 (8)			07:49 16:52
Potential sun hours	465	432	376	343	293			281
Total, worst case			1244	2216	75			

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: I - Shadow Receptor: 1.0 × 1.0 Azimuth: 90.0° Slope: 90.0° (9)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

		January	February	March		April		May	June	July	August		September		October	November	December	
1	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	41	18:33 (1) 19:14 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40		06:41 19:54	44	18:28 (1) 19:12 (1)	07:14 19:01	06:51 17:11	07:28 16:45
2	07:49 16:54	07:33 17:31	06:54 18:07		07:00 19:44	42	18:32 (1) 19:14 (1)	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39		06:42 19:53	45	18:27 (1) 19:12 (1)	07:15 18:59	06:53 17:10	07:30 16:44
3	07:50 16:55	07:32 17:32	06:52 18:09		06:58 19:46	44	18:30 (1) 19:14 (1)	06:10 20:20	05:41 20:51	05:43 21:01	06:10 20:38		06:43 19:51	46	18:26 (1) 19:12 (1)	07:16 18:57	06:54 17:09	07:31 16:44
4	07:50 16:56	07:31 17:33	06:51 18:10		06:57 19:47	44	18:31 (1) 19:15 (1)	06:09 20:21	05:41 20:52	05:44 21:00	06:11 20:37		06:45 19:49	46	18:26 (1) 19:12 (1)	07:18 18:56	06:55 17:08	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 18:11		06:55 19:48	45	18:30 (1) 19:15 (1)	06:08 20:22	05:40 20:53	05:44 21:00	06:12 20:35		06:46 19:47	46	18:25 (1) 19:11 (1)	07:19 18:54	06:56 17:06	07:33 16:44
6	07:49 16:58	07:29 17:36	06:47 18:12		06:53 19:49	46	18:29 (1) 19:15 (1)	06:06 20:24	05:40 20:53	05:45 21:00	06:13 20:34		06:47 19:46	46	18:25 (1) 19:11 (1)	07:20 18:52	06:58 17:05	07:34 16:43
7	07:49 16:59	07:27 17:37	06:46 18:14		06:51 19:50	46	18:28 (1) 19:14 (1)	06:05 20:25	05:40 20:54	05:46 21:00	06:14 20:33		06:48 19:44	45	18:25 (1) 19:10 (1)	07:21 18:50	06:59 17:04	07:35 16:43
8	07:49 17:00	07:26 17:39	06:44 18:15		06:50 19:51	45	18:29 (1) 19:14 (1)	06:04 20:26	05:39 20:55	05:46 20:59	06:15 20:32		06:49 19:42	44	18:25 (1) 19:09 (1)	07:22 18:49	07:00 17:03	07:36 16:43
9	07:49 17:01	07:25 17:40	06:42 18:16		06:48 19:52	46	18:28 (1) 19:14 (1)	06:03 20:27	05:39 20:55	05:47 20:59	06:16 20:30		06:50 19:40	44	18:25 (1) 19:09 (1)	07:23 18:47	07:02 17:02	07:37 16:43
10	07:49 17:02	07:24 17:41	06:41 18:17		06:46 19:54	45	18:28 (1) 19:13 (1)	06:01 20:28	05:39 20:56	05:48 20:58	06:17 20:29		06:51 19:39	43	18:25 (1) 19:08 (1)	07:24 18:45	07:03 17:00	07:38 16:43
11	07:48 17:03	07:22 17:43	06:39 18:18		06:45 19:55	44	18:29 (1) 19:13 (1)	06:00 20:29	05:39 20:57	05:48 20:58	06:18 20:27		06:52 19:37	42	18:25 (1) 19:07 (1)	07:26 18:44	07:04 16:59	07:38 16:43
12	07:48 17:04	07:21 17:44	06:37 18:20		06:43 19:56	43	18:29 (1) 19:12 (1)	05:59 20:30	05:38 20:57	05:49 20:57	06:19 20:26		06:53 19:35	40	18:25 (1) 19:05 (1)	07:27 18:42	07:05 16:58	07:39 16:43
13	07:48 17:05	07:20 17:45	06:35 18:21		06:41 19:57	42	18:29 (1) 19:11 (1)	05:58 20:31	05:38 20:58	05:50 20:57	06:21 20:25		06:54 19:33	38	18:26 (1) 19:04 (1)	07:28 18:40	07:07 16:57	07:40 16:43
14	07:47 17:07	07:18 17:47	06:34 18:22		06:40 19:58	41	18:30 (1) 19:11 (1)	05:57 20:32	05:38 20:58	05:51 20:56	06:22 20:23		06:55 19:32	36	18:26 (1) 19:02 (1)	07:29 18:39	07:08 16:56	07:41 16:44
15	07:47 17:08	07:17 17:48	06:32 18:23		06:38 19:59	39	18:30 (1) 19:09 (1)	05:56 20:33	05:38 20:58	05:52 20:56	06:23 20:22		06:56 19:30	34	18:27 (1) 19:01 (1)	07:30 18:37	07:09 16:55	07:42 16:44
16	07:47 17:09	07:16 17:49	06:30 18:24		06:36 20:01	38	18:30 (1) 19:08 (1)	05:55 20:35	05:38 20:59	05:52 20:55	06:24 20:20		06:58 19:28	31	18:28 (1) 19:00 (1)	07:31 18:35	07:10 16:54	07:42 16:44
17	07:46 17:10	07:14 17:51	06:28 18:26		06:35 20:02	35	18:32 (1) 19:07 (1)	05:54 20:36	05:38 20:59	05:53 20:54	06:25 20:19		06:59 19:26	26	18:31 (1) 18:57 (1)	07:33 18:34	07:12 16:53	07:43 16:44
18	07:45 17:11	07:13 17:52	06:27 18:27		06:33 20:03	33	18:32 (1) 19:05 (1)	05:53 20:37	05:38 21:00	05:54 20:54	06:26 20:17		07:00 19:24	21	18:33 (1) 18:54 (1)	07:34 18:32	07:13 16:53	07:44 16:45
19	07:45 17:13	07:11 17:53	06:25 18:28		06:31 20:04	30	18:34 (1) 19:04 (1)	05:52 20:38	05:38 21:00	05:55 20:53	06:27 20:16		07:01 19:23	14	18:36 (1) 18:50 (1)	07:35 18:30	07:14 16:52	07:44 16:45
20	07:44 17:14	07:10 17:55	06:23 18:29		06:30 20:05	27	18:35 (1) 19:02 (1)	05:51 20:39	05:38 21:00	05:56 20:52	06:28 20:14	18:48 (1) 18:58 (1)	07:02 19:21		18:50 (1) 19:21	07:36 18:29	07:15 16:51	07:45 16:45
21	07:44 17:15	07:08 17:56	06:21 18:30		06:28 20:06	22	18:38 (1) 19:00 (1)	05:50 20:40	05:39 21:00	05:57 20:51	06:29 20:13	18:44 (1) 19:02 (1)	07:03 19:19		18:36 (1) 19:01 (1)	07:07 18:27	07:17 16:50	07:46 16:46
22	07:43 17:16	07:07 17:57	06:20 18:32		06:27 20:08	17	18:40 (1) 18:57 (1)	05:49 20:41	05:39 21:01	05:58 20:50	06:30 20:11	18:41 (1) 19:04 (1)	07:04 19:17	23	18:41 (1) 18:39 (1)	07:04 19:05	07:18 16:50	07:46 16:47
23	07:42 17:18	07:05 17:59	06:18 18:33		06:25 20:09	7	18:45 (1) 18:52 (1)	05:48 20:42	05:39 21:01	05:59 20:50	06:31 20:09	18:39 (1) 19:06 (1)	07:05 19:15		18:39 (1) 19:06 (1)	07:05 19:15	07:19 16:49	07:47 16:47
24	07:41 17:19	07:04 18:00	06:16 18:34	17:50 (1) 18:01 (1)	06:24 20:10		05:47 20:43	06:00 20:49	06:33 21:01	06:00 20:49	06:33 20:08	18:37 (1) 19:07 (1)	07:06 19:13	27	18:37 (1) 19:07 (1)	07:06 19:13	07:20 16:48	07:47 16:47
25	07:41 17:20	07:02 18:01	06:14 18:35	17:45 (1) 18:05 (1)	06:22 20:11		05:47 20:44	06:01 21:01	06:34 21:01	06:01 20:48	06:34 20:06	18:36 (1) 19:09 (1)	07:07 19:12	30	18:36 (1) 19:09 (1)	07:07 19:12	07:22 16:48	07:47 16:48
26	07:40 17:22	07:00 18:02	06:12 18:36	17:43 (1) 18:08 (1)	06:20 20:12		05:46 20:44	06:02 21:01	06:35 21:01	06:02 20:47	06:35 20:04	18:34 (1) 19:10 (1)	07:09 19:10	33	18:34 (1) 19:10 (1)	07:09 19:10	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 18:04	06:11 18:37	18:08 (1) 17:38 (1)	06:19 18:13	30	18:10 (1) 17:38 (1)	06:19 18:13	05:45 20:44	06:03 21:01	06:36 20:03	18:33 (1) 19:11 (1)	07:10 19:08	36	18:33 (1) 18:32 (1)	07:10 19:08	07:24 16:46	07:48 16:49
28	07:38 17:24	06:57 18:05	06:09 18:39	18:04 (1) 18:11 (1)	06:18 20:14	33	18:03 (1) 18:11 (1)	06:18 20:14	05:44 20:46	06:04 21:01	06:37 20:01	18:32 (1) 19:11 (1)	07:11 19:06	38	18:32 (1) 19:11 (1)	07:11 19:06	07:25 16:46	07:48 16:50
29	07:37 17:25	06:56 19:00	06:07 18:40	18:05 (1) 19:12 (1)	06:16 20:16	36	18:36 (1) 19:12 (1)	06:16 20:16	05:44 20:47	06:05 21:01	06:38 19:59	18:31 (1) 19:12 (1)	07:12 19:05	41	18:31 (1) 19:12 (1)	07:12 19:05	07:26 16:46	07:49 16:51
30	07:36 17:27	06:55 19:01	06:05 18:41	18:06 (1) 19:13 (1)	06:15 20:17	38	18:35 (1) 19:13 (1)	06:15 20:17	05:43 20:48	06:06 21:01	06:39 19:58	18:30 (1) 19:12 (1)	07:13 19:03	42	18:30 (1) 19:12 (1)	07:13 19:03	07:27 16:45	07:49 16:51
31	07:35 17:28	06:54 19:02	06:04 18:40	18:07 (1) 19:14 (1)	06:14 20:18	40	18:34 (1) 19:14 (1)	06:14 20:18	05:43 20:49	06:07 20:41	06:40 19:56	18:29 (1) 19:12 (1)	07:13 19:03	43	18:29 (1) 19:12 (1)	07:13 19:03	07:28 16:45	07:49 16:52
Potential sun hours	292	294	369		401		454	459	465	432	380	376	731		343	293	281	
Total, worst case			233		862													

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: J - Shadow Receptor: 1.0 × 1.0 Azimuth: 170.0° Slope: 90.0° (10)
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	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	32	18:48 (1) 19:20 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40		06:41 19:54	30	18:45 (1) 19:15 (1)	07:14 19:01	06:51 17:11	07:28 16:45				
2	07:49 16:54	07:33 17:31	06:54 18:07		07:00 19:44	34	18:46 (1) 19:20 (1)	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39		06:42 19:53	31	18:44 (1) 19:15 (1)	07:15 18:59	06:53 17:10	07:30 16:44				
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21	07:44 17:15	07:08 17:56	06:21 18:30		06:28 20:06			05:50 20:40	05:39 21:00	05:57 20:51	06:29 20:13		07:03 19:19		18:37 18:27	07:38 18:30	07:17 16:50	07:46 16:46				
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23	07:42 17:18	07:05 17:58	06:18 18:33		06:25 20:09			05:48 20:42	05:39 21:01	05:59 20:50	06:31 20:09		07:05 19:15		18:39 18:24	07:40 18:32	07:19 16:49	07:47 16:47				
24	07:41 17:19	07:04 18:00	06:16 18:34		06:23 20:10			05:47 20:43	05:39 21:01	06:00 20:49	06:33 20:08		07:06 19:13		18:40 18:23	07:41 18:33	07:20 16:48	07:47 16:47				
25	07:41 17:20	07:02 18:01	06:14 18:35		06:22 20:11			05:47 20:44	05:40 21:01	06:01 20:48	06:34 20:06		07:07 19:12		18:41 18:24	07:42 18:34	07:21 16:48	07:47 16:48				
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28	07:38 17:24	06:57 18:05	06:09 18:39		06:18 17:53 (1)		20:14	05:44 20:46	05:41 21:01	06:04 20:45	06:37 20:01		07:11 19:11 (1)	19	18:51 (1) 18:49 (1)	07:11 18:37	07:25 16:46	07:48 16:50				
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Potential sun hours	292	294	369		401		480	454	459	465	432		376	519		343	293	281				
Total, worst case			144								118											

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

Project:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: K - Shadow Receptor: 1.0 × 1.0 Azimuth: -180.0° Slope: 90.0° (11)
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	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	19:02 (1) 19:21 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	18:46 (1) 19:17 (1)	07:14 19:01	06:51 17:11	07:28 16:45							
2	07:49 16:54	07:33 17:31	06:54 18:07		07:00 19:44	19:00 (1) 19:21 (1)	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39	06:42 19:53	18:45 (1) 19:18 (1)	07:15 18:59	06:53 17:10	07:30 16:44							
3	07:50 16:55	07:32 17:32	06:52 18:09		06:58 19:46	18:58 (1) 19:21 (1)	06:10 20:20	05:41 20:51	05:43 21:01	06:10 20:38	06:43 19:51	18:44 (1) 19:18 (1)	07:16 18:57	06:54 17:09	07:31 16:44							
4	07:50 16:56	07:31 17:33	06:51 18:10		06:57 19:47	18:56 (1) 19:22 (1)	06:09 20:21	05:41 20:52	05:44 21:00	06:11 20:37	06:45 19:49	18:45 (1) 19:18 (1)	07:18 18:56	06:55 17:07	07:32 16:44							
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Potential sun hours	292	294	369		401	447	454	459	465	432	145	376	358	343	293	281						
Total, worst case			48																			

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: L - Shadow Receptor: 1.0 × 1.0 Azimuth: 150.0° Slope: 90.0° (12)
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	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	32	18:47 (1) 19:19 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	15	18:52 (1) 19:07 (1)	07:14 19:01	06:51 17:11	07:28 16:45
2	07:49 16:54	07:33 17:31	06:54 18:07		07:00 19:44	31	18:47 (1) 19:18 (1)	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39	06:42 19:53	20	18:49 (1) 19:09 (1)	07:15 18:59	06:53 17:10	07:30 16:44
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6	07:49 16:58	07:29 17:36	06:47 18:12		06:53 19:49	28	18:47 (1) 19:15 (1)	06:06 20:24	05:40 20:53	05:45 21:00	06:13 20:34	06:47 19:46	29	18:43 (1) 19:12 (1)	07:20 18:52	06:58 17:05	07:34 16:43
7	07:49 16:59	07:27 17:37	06:46 18:14		06:51 19:50	27	18:47 (1) 19:14 (1)	06:05 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	30	18:42 (1) 19:12 (1)	07:21 18:50	06:59 17:04	07:35 16:43
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20	07:44 17:14	07:10 17:55	06:23 18:29		06:30 20:05			05:51 20:39	05:38 21:00	05:56 20:52	06:28 20:14	07:02 19:21	8	18:48 (1) 18:56 (1)	07:36 18:29	07:15 16:51	07:45 16:45
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22	07:43 17:16	07:07 17:57	06:19 18:32		06:27 20:07			05:49 20:41	05:39 21:01	05:58 20:50	06:30 20:11	07:04 19:17			07:39 18:26	07:18 16:50	07:46 16:46
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Potential sun hours	292	294	369		401			454	459	465	432	376	501		343	293	281
Total, worst case			198		301							8					

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

Project:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: M - Shadow Receptor: 1.0 × 1.0 Azimuth: 150.0° Slope: 90.0° (13)
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	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	18:48 (1) 19:19 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	18:51 (1) 19:09 (1)	07:14 19:01	06:51 17:11	07:28 16:45
2	07:49 16:54	07:33 17:31	06:54 18:07		07:00 19:44	18:48 (1) 19:19 (1)	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39	06:42 19:53	18:49 (1) 19:10 (1)	07:15 18:59	06:53 17:10	07:30 16:44
3	07:50 16:55	07:32 17:32	06:52 18:09		06:58 19:45	18:47 (1) 19:18 (1)	06:10 20:20	05:41 20:51	05:43 21:01	06:10 20:38	06:43 19:51	18:47 (1) 19:11 (1)	07:16 18:57	06:54 17:09	07:31 16:44
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18	07:45 17:11	07:13 17:52	06:27 18:27		06:33 20:03	19:01 (1) 20:37	05:53 21:00	05:38 20:54	05:54 20:54	06:26 20:17	07:00 19:24	18:45 (1) 19:02 (1)	07:34 18:32	07:13 16:53	07:44 16:45
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Potential sun hours	292	294	369		401	454	459	465	432	376	376	343	293	281	
Total, worst case			180		313				12	487					

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: N - Shadow Receptor: 1.0 × 1.0 Azimuth: 150.0° Slope: 90.0° (14)
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	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	18:54 (1) 19:21 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	18:52 (1) 19:17 (1)	07:14 19:01	06:51 17:11		07:28 16:45	
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4	07:50 16:56	07:31 17:33	06:51 18:10		06:57 19:47	18:52 (1) 19:23 (1)	06:09 20:21	05:41 20:52	05:44 21:00	06:11 20:37	06:45 19:49	18:49 (1) 19:18 (1)	07:18 18:56	06:55 17:07		07:32 16:44	
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6	07:49 16:58	07:29 17:36	06:47 18:12		06:53 19:49	18:51 (1) 19:22 (1)	06:06 20:24	05:40 20:53	05:45 21:00	06:13 20:34	06:47 19:46	18:47 (1) 19:18 (1)	07:20 18:52	06:58 17:05		07:34 16:43	
7	07:49 16:59	07:27 17:37	06:46 18:14		06:51 19:50	18:51 (1) 19:21 (1)	06:05 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	18:47 (1) 19:17 (1)	07:21 18:50	06:59 17:04		07:35 16:43	
8	07:49 17:00	07:26 17:39	06:44 18:15		06:50 19:51	18:52 (1) 19:21 (1)	06:04 20:26	05:39 20:55	05:46 20:59	06:15 20:32	06:49 19:42	18:46 (1) 19:17 (1)	07:22 18:49	07:00 17:03		07:36 16:43	
9	07:49 17:01	07:25 17:40	06:42 18:16		06:48 19:52	18:52 (1) 19:20 (1)	06:03 20:27	05:39 20:55	05:47 20:59	06:16 20:30	06:50 19:40	18:46 (1) 19:16 (1)	07:23 18:47	07:01 17:02		07:37 16:43	
10	07:49 17:02	07:24 17:41	06:41 18:17		06:46 19:54	18:52 (1) 19:18 (1)	06:01 20:28	05:39 20:56	05:48 20:58	06:17 20:29	06:51 19:39	18:46 (1) 19:15 (1)	07:24 18:45	07:03 17:00		07:37 16:43	
11	07:48 17:03	07:22 17:43	06:39 18:18		06:45 19:55	18:53 (1) 19:18 (1)	06:00 20:29	05:39 20:56	05:48 20:58	06:18 20:27	06:52 19:37	18:46 (1) 19:14 (1)	07:26 18:44	07:04 16:59		07:38 16:43	
12	07:48 17:04	07:21 17:44	06:37 18:20		06:43 19:56	18:54 (1) 19:16 (1)	05:59 20:30	05:38 20:57	05:49 20:57	06:19 20:26	06:53 19:35	18:47 (1) 19:12 (1)	07:27 18:42	07:05 16:58		07:39 16:43	
13	07:48 17:05	07:20 17:45	06:35 18:21		06:41 19:57	18:55 (1) 19:14 (1)	05:58 20:31	05:38 20:58	05:50 20:57	06:21 20:25	06:54 19:33	18:47 (1) 19:10 (1)	07:28 18:40	07:07 16:57		07:40 16:43	
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15	07:47 17:08	07:17 17:48	06:32 18:23		06:38 19:59	19:00 (1) 19:08 (1)	05:56 20:33	05:38 20:58	05:52 20:56	06:23 20:22	06:56 19:30	18:49 (1) 19:06 (1)	07:30 18:37	07:09 16:55		07:42 16:44	
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21	07:44 17:15	07:08 17:56	06:21 18:30		06:28 20:06	05:50 20:40	05:39 21:00	05:57 20:51	05:57 20:13	06:29 20:13	07:03 19:19	19:16 (1) 19:17 (1)	07:37 18:27	07:17 16:50		07:46 16:46	
22	07:43 17:16	07:07 17:57	06:19 18:32		06:27 20:07	05:49 20:41	05:39 21:01	05:58 20:50	05:58 20:11	06:30 20:11	07:04 19:17	19:18 (1) 19:19 (1)	07:38 18:26	07:18 16:50		07:46 16:46	
23	07:42 17:18	07:05 17:58	06:18 18:33		06:25 20:09	05:48 20:42	05:39 21:01	05:59 20:50	05:59 20:09	06:31 20:09	07:05 19:15	19:20 (1) 19:21 (1)	07:39 18:24	07:19 16:49		07:47 16:47	
24	07:41 17:19	07:04 18:00	06:16 18:34		06:23 20:10	05:47 20:43	05:39 21:01	06:00 20:49	06:00 20:08	06:33 20:08	07:06 19:13	19:22 (1) 19:23 (1)	07:40 18:23	07:20 16:48		07:47 16:47	
25	07:41 17:20	07:02 18:01	06:14 18:35		06:22 20:11	05:47 20:44	05:40 21:01	06:01 20:48	06:01 20:06	06:34 20:06	07:07 19:12	19:24 (1) 19:25 (1)	07:41 18:24	07:22 16:48		07:47 16:48	
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28	07:38 17:24	06:57 18:05	06:09 18:39	17	06:17 18:17 (1)	05:44 20:14	05:41 21:01	06:04 20:45	06:04 20:01	06:37 20:01	07:11 19:09	19:30 (1) 19:31 (1)	07:44 18:27	07:25 16:46		07:48 16:50	
29	07:37 17:25	06:56 18:06	06:07 18:40	20	06:16 19:58 (1)	05:44 20:16	05:41 21:01	06:05 20:44	06:05 19:59	06:38 19:59	07:12 19:10	19:32 (1) 19:33 (1)	07:45 18:28	07:26 16:46		07:49 16:51	
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31	07:35 17:28	06:54 18:08	06:04 18:42	25	06:14 19:21 (1)	05:43 20:49	05:41 21:02	06:07 20:41	06:07 19:56	06:40 19:56	07:14 19:12	19:36 (1) 19:37 (1)	07:47 18:30	07:28 16:45		07:49 16:52	
Potential sun hours	292	294	369		401	454	459	465	432		376	418	343	293	281		
Total, worst case			97		380				68								

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

Project:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: O - Shadow Receptor: 1.0 × 1.0 Azimuth: 160.0° Slope: 90.0° (15)
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	07:49 16:53	07:34 17:29	06:56 18:06		07:02 19:43	23	18:58 (1) 19:21 (1)	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40		06:41 19:54	27	18:53 (1) 19:20 (1)	07:14 19:01	06:51 17:11	07:28 16:45				
2	07:49 16:54	07:33 17:31	06:54 18:07		07:00 19:44	25	18:57 (1) 19:22 (1)	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39		06:42 19:53	29	18:52 (1) 19:21 (1)	07:15 18:59	06:53 17:10	07:30 16:44				
3	07:50 16:55	07:32 17:32	06:52 18:09		06:58 19:45	28	18:55 (1) 19:23 (1)	06:10 20:20	05:41 20:51	05:43 21:01	06:10 20:38		06:43 19:51	30	18:51 (1) 19:21 (1)	07:16 18:57	06:54 17:09	07:31 16:44				
4	07:50 16:56	07:31 17:33	06:51 18:10		06:57 19:47	30	18:55 (1) 19:25 (1)	06:09 20:21	05:41 20:52	05:44 21:00	06:11 20:37		06:45 19:49	30	18:51 (1) 19:21 (1)	07:18 18:56	06:55 17:07	07:32 16:44				
5	07:49 16:57	07:30 17:35	06:49 18:11		06:55 19:48	30	18:54 (1) 19:24 (1)	06:08 20:22	05:40 20:53	05:44 21:00	06:12 20:35		06:46 19:47	30	18:50 (1) 19:20 (1)	07:19 18:54	06:56 17:06	07:33 16:44				
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7	07:49 16:59	07:27 17:37	06:46 18:14		06:51 19:50	30	18:53 (1) 19:23 (1)	06:05 20:25	05:40 20:54	05:46 21:00	06:14 20:33		06:48 19:44	30	18:49 (1) 19:19 (1)	07:21 18:50	06:59 17:04	07:35 16:43				
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14	07:47 17:07	07:18 17:47	06:34 18:22		06:39 19:58	20	18:57 (1) 19:17 (1)	05:57 20:32	05:38 20:58	05:51 20:56	06:22 20:23		06:55 19:31	15	18:53 (1) 19:08 (1)	07:29 18:39	07:08 16:56	07:41 16:44				
15	07:47 17:08	07:17 17:48	06:32 18:23		06:38 19:59	16	18:58 (1) 19:14 (1)	05:56 20:33	05:38 20:58	05:52 20:56	06:23 20:22		06:56 19:30	10	18:56 (1) 19:06 (1)	07:30 18:37	07:09 16:55	07:42 16:44				
16	07:47 17:09	07:16 17:49	06:30 18:24		06:36 20:01	10	19:01 (1) 19:11 (1)	05:55 20:35	05:38 20:59	05:52 20:55	06:24 20:20		06:58 19:28		18:56 (1) 07:31	07:30 18:35	07:10 16:54	07:42 16:44				
17	07:46 17:10	07:14 17:51	06:28 18:26		06:35 20:02		05:54 20:36	05:38 20:59	05:53 20:54	05:53 20:19	06:25 20:19		06:59 19:26		18:35 07:33	18:35 18:34	16:54 16:53	07:43 16:44				
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31	07:35 17:28		07:04 19:42	21	19:00 (1) 19:21 (1)		05:43 20:49	05:43 21:02	06:07 20:41	06:07 19:56	06:40 19:20 (1)	25	18:55 (1) 19:20 (1)		07:14 19:04	18:15 17:13	16:48 16:52	07:49 16:52				
Potential sun hours	292	294	369	61	401	406	454	459	465	432	376	378	343	293	281							
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)	Minutes with flicker	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: P - Shadow Receptor: 1.0 × 1.0 Azimuth: 30.0° Slope: 90.0° (16)
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	07:49 16:53	82	13:54 (2) 15:16 (2)	66	14:21 (2) 16:46 (1)	07:02 19:43	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	06:51 17:11	07:28 16:45	94	13:41 (2) 16:19 (1)	
2	07:49 16:54	82	13:54 (2) 15:16 (2)	58	14:23 (2) 16:44 (1)	07:00 19:44	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59	06:53 17:10	07:30 16:44	92	13:41 (2) 16:18 (1)	
3	07:50 16:55	82	13:55 (2) 15:17 (2)	45	14:26 (2) 15:11 (2)	06:58 18:09	06:58 19:46	06:10 20:20	05:43 20:51	06:10 20:38	06:43 19:51	07:16 18:57	06:54 17:09	10	14:14 (2) 14:24 (2)	07:31 16:44	13:41 (2) 16:18 (1)
4	07:50 16:56	84	13:55 (2) 15:17 (2)	40	14:29 (2) 15:09 (2)	06:57 18:10	06:57 19:47	06:09 20:21	05:44 20:52	06:11 20:37	06:45 19:49	07:18 18:56	06:55 17:07	23	14:08 (2) 14:31 (2)	07:32 16:44	13:41 (2) 16:17 (1)
5	07:50 16:57	86	13:56 (2) 15:18 (1)	35	14:31 (2) 15:06 (2)	06:49 18:11	06:55 19:48	06:08 20:22	05:44 20:53	06:12 20:35	06:46 19:47	07:19 18:54	06:56 17:06	30	14:04 (2) 14:34 (2)	07:33 16:44	13:42 (2) 16:17 (1)
6	07:49 16:58	87	13:57 (2) 15:19 (1)	30	14:34 (2) 15:04 (2)	06:47 18:12	06:53 19:49	06:06 20:24	05:45 20:53	06:13 20:34	06:47 19:46	07:20 18:52	06:58 17:05	36	14:00 (2) 14:36 (2)	07:34 16:43	13:43 (2) 16:18 (1)
7	07:49 16:59	89	13:57 (2) 15:20 (2)	21	14:39 (2) 15:00 (2)	06:46 18:14	06:51 19:50	06:05 20:25	05:46 20:54	06:14 20:33	06:48 19:44	07:21 18:50	06:59 17:04	41	13:58 (2) 14:39 (2)	07:35 16:43	13:43 (2) 16:17 (1)
8	07:49 17:00	90	13:57 (2) 15:21 (1)	5	14:48 (2) 14:53 (2)	06:44 18:15	06:50 19:51	06:04 20:26	05:46 20:55	06:15 20:32	06:49 19:42	07:22 18:49	07:00 17:03	46	13:55 (2) 14:41 (2)	07:36 16:43	13:42 (2) 16:16 (1)
9	07:49 17:01	91	13:58 (2) 15:22 (1)			06:42 18:16	06:48 19:52	06:03 20:27	05:47 20:55	06:16 20:30	06:50 19:40	07:23 18:47	07:02 17:01	58	13:54 (2) 16:15 (1)	07:37 16:43	13:43 (2) 15:05 (2)
10	07:49 17:02	92	13:58 (2) 15:23 (1)			06:41 18:17	06:46 19:54	06:01 20:28	05:48 20:56	06:17 20:29	06:51 19:39	07:24 18:45	07:03 17:00	66	13:52 (2) 16:17 (1)	07:38 16:43	13:43 (2) 15:05 (2)
11	07:48 17:03	93	13:59 (2) 15:24 (1)			06:39 18:18	06:45 19:55	06:00 20:29	05:39 20:57	06:18 20:27	06:52 19:37	07:26 18:44	07:04 16:59	72	13:50 (2) 16:18 (1)	07:38 16:43	13:44 (2) 15:06 (2)
12	07:48 17:04	95	14:00 (2) 15:25 (1)			06:37 18:20	06:43 19:56	05:59 20:30	05:49 20:57	06:19 20:26	06:53 19:35	07:27 18:42	07:05 16:58	77	13:49 (2) 16:20 (1)	07:39 16:43	13:46 (2) 15:07 (2)
13	07:48 17:05	95	14:00 (2) 15:26 (1)			06:35 18:21	06:41 19:57	05:58 20:31	05:38 20:58	06:21 20:25	06:54 19:33	07:28 18:40	07:07 16:57	81	13:48 (2) 16:21 (1)	07:40 16:43	13:45 (2) 15:07 (2)
14	07:47 17:07	95	14:02 (2) 15:27 (1)			06:34 18:22	06:39 19:58	05:57 20:32	05:38 20:56	06:22 20:23	06:55 19:31	07:29 18:39	07:08 16:56	84	13:47 (2) 16:22 (1)	07:41 16:44	13:45 (2) 15:08 (2)
15	07:47 17:08	97	14:02 (2) 15:28 (1)			06:32 18:23	06:38 19:59	05:56 20:33	05:38 20:58	06:23 20:22	06:56 19:30	07:30 18:37	07:09 16:55	88	13:46 (2) 16:23 (1)	07:42 16:44	13:45 (2) 15:08 (2)
16	07:47 17:09	97	14:03 (2) 15:29 (1)			06:30 18:24	06:36 20:01	05:55 20:35	05:38 20:59	06:24 20:20	06:58 19:28	07:31 18:35	07:10 16:54	91	13:43 (2) 16:24 (1)	07:42 16:44	13:46 (2) 15:09 (2)
17	07:46 17:10	98	14:03 (2) 15:30 (1)			06:28 18:26	06:35 20:02	05:54 20:36	05:38 20:59	06:25 20:19	06:59 19:26	07:33 18:34	07:12 16:53	92	13:42 (2) 16:25 (1)	07:43 16:44	13:47 (2) 15:09 (2)
18	07:45 17:11	98	14:04 (2) 15:31 (1)			06:27 18:27	06:33 20:03	05:53 20:37	05:38 21:00	06:26 20:14	07:00 19:24	07:34 18:32	07:13 16:53	95	13:44 (2) 16:26 (1)	07:44 16:45	13:48 (2) 15:09 (2)
19	07:45 17:13	99	14:05 (2) 15:32 (1)			06:25 18:28	06:31 20:04	05:52 20:38	05:38 21:00	06:27 20:16	07:01 19:22	07:35 18:30	07:14 16:52	96	13:43 (2) 16:27 (1)	07:44 16:45	13:49 (2) 15:10 (2)
20	07:44 17:14	99	14:06 (2) 15:33 (1)			06:23 18:29	06:30 20:05	05:51 20:39	05:38 21:00	06:28 20:12	07:02 19:21	07:36 18:29	07:15 16:51	98	13:43 (2) 16:28 (1)	07:45 16:46	13:47 (2) 15:10 (2)
21	07:44 17:15	98	14:07 (2) 15:34 (1)			06:21 18:30	06:28 20:06	05:50 20:40	05:39 21:00	06:52 20:13	07:03 19:19	07:37 18:27	07:17 16:50	98	13:42 (2) 16:29 (1)	07:46 16:46	13:48 (2) 15:11 (2)
22	07:43 17:16	98	14:08 (2) 15:35 (1)			06:19 18:32	06:27 20:08	05:49 20:41	05:39 21:00	06:30 20:11	07:04 19:17	07:39 18:26	07:18 16:49	99	13:42 (2) 16:30 (1)	07:46 16:47	13:49 (2) 15:11 (2)
23	07:42 17:18	96	14:09 (2) 15:36 (1)			06:18 18:33	06:25 20:09	05:48 20:42	05:39 21:00	06:31 20:09	07:05 19:15	07:40 18:24	07:19 16:49	99	13:41 (2) 16:31 (1)	07:47 16:47	13:49 (2) 15:12 (2)
24	07:41 17:19	95	14:10 (2) 15:37 (1)			06:16 18:34	06:23 20:10	05:47 20:43	05:39 21:00	06:32 20:08	07:06 19:13	07:41 18:23	07:20 16:48	98	13:42 (2) 16:32 (1)	07:47 16:47	13:49 (2) 15:12 (2)
25	07:41 17:20	92	14:11 (2) 15:38 (1)			06:14 18:35	06:22 20:11	05:45 20:44	05:40 21:00	06:34 20:06	07:07 19:12	07:42 18:24	07:22 16:48	98	13:41 (2) 16:33 (1)	07:47 16:48	13:50 (2) 15:13 (2)
26	07:40 17:21	91	14:12 (2) 15:39 (1)			06:12 18:36	06:20 20:12	05:46 20:44	05:40 21:00	06:35 20:04	07:09 19:10	07:43 18:25	07:23 16:49	97	13:41 (2) 16:34 (1)	07:48 16:49	13:51 (2) 15:14 (2)
27	07:39 17:23	88	14:13 (2) 15:40 (1)			06:11 18:37	06:19 20:13	05:45 20:45	05:40 21:00	06:36 20:03	07:10 19:08	07:45 18:26	07:24 16:49	97	13:41 (2) 16:35 (1)	07:48 16:50	13:51 (2) 15:15 (2)
28	07:38 17:24	84	14:15 (2) 15:41 (1)			06:09 18:39	06:17 20:14	05:44 20:46	05:41 21:00	06:37 20:01	07:11 19:06	07:46 18:27	07:25 16:49	95	13:42 (2) 16:36 (1)	07:48 16:50	13:52 (2) 15:16 (2)
29	07:37 17:25	81	14:16 (2) 15:42 (1)			07:07 19:40	06:16 20:16	05:44 20:47	05:41 21:00	06:38 19:59	07:12 19:05	07:47 18:28	07:26 16:49	95	13:41 (2) 16:37 (1)	07:49 16:51	13:52 (2) 15:17 (2)
30	07:36 17:27	76	14:18 (2) 15:44 (1)			07:05 19:41	06:15 20:17	05:43 20:48	05:42 21:00	06:39 19:58	07:13 19:03	07:49 18:29	07:27 16:49	95	13:41 (2) 16:38 (1)	07:49 16:51	13:53 (2) 15:18 (2)
31	07:35 17:28	72	14:19 (2) 15:47 (1)			07:04 19:42	06:14 20:18	05:43 20:49	05:43 21:00	06:07 20:41	07:14 19:56	07:50 18:30	07:28 16:49	82	13:41 (2) 16:39 (1)	07:50 16:52	13:53 (2) 15:19 (2)
Potential sun hours	292		294		369	401	454	459	465	432	376	343	293	281			
Total, worst case	2802		300										2155		2615		

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

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

Project:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: Q - Shadow Receptor: 1.0 × 1.0 Azimuth: 40.0° Slope: 90.0° (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	07:49 16:53	14:10 (2) 07:34 15:30 (2) 17:29	14:32 (2) 06:56 16:51 (1) 18:06	07:02 19:43	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	06:51 17:11	14:22 (2) 07:28 14:46 (2) 16:45
2	07:49 16:54	14:10 (2) 07:33 15:30 (2) 17:31	14:33 (2) 06:54 16:50 (1) 18:07	07:00 19:44	06:12 20:19	05:42 20:50	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59	06:53 17:10	14:18 (2) 07:30 14:49 (2) 16:44
3	07:50 16:55	14:10 (2) 07:32 15:31 (2) 17:32	14:35 (2) 06:52 16:49 (1) 18:09	06:58 19:45	06:10 20:20	05:41 20:51	05:43 21:01	06:10 20:38	06:43 19:51	07:16 18:57	06:54 17:09	14:14 (2) 07:31 14:51 (2) 16:44
4	07:50 16:56	14:11 (2) 07:31 15:31 (2) 17:33	14:37 (2) 06:51 16:45 (1) 18:10	06:57 19:47	06:09 20:21	05:41 20:52	05:44 21:00	06:11 20:37	06:44 19:49	07:18 18:56	06:55 17:07	14:13 (2) 07:32 14:54 (2) 16:44
5	07:50 16:57	14:12 (2) 07:30 15:32 (2) 17:35	14:38 (2) 06:49 15:27 (2) 18:11	06:55 19:48	06:08 20:22	05:40 20:53	05:44 21:00	06:12 20:35	06:46 19:47	07:19 18:54	06:56 17:06	14:10 (2) 07:33 14:56 (2) 16:44
6	07:49 16:58	14:12 (2) 07:29 15:32 (2) 17:36	14:40 (2) 06:47 15:26 (2) 18:12	06:53 19:49	06:06 20:24	05:40 20:53	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:52	06:58 17:05	14:08 (2) 07:34 14:57 (2) 16:43
7	07:49 16:59	14:12 (2) 07:27 15:32 (2) 17:37	14:43 (2) 06:46 15:24 (2) 18:14	06:51 19:50	06:05 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:50	06:59 17:04	14:07 (2) 07:35 16:16 (1) 16:43
8	07:49 17:00	14:13 (2) 07:26 16:33 (1) 17:39	14:46 (2) 06:44 15:22 (2) 18:15	06:50 19:51	06:04 20:26	05:39 20:55	05:46 20:59	06:15 20:32	06:49 19:42	07:22 18:49	07:00 17:03	14:05 (2) 07:36 16:19 (1) 16:43
9	07:49 17:01	14:13 (2) 07:25 16:34 (1) 17:40	14:49 (2) 06:42 15:19 (2) 18:16	06:48 19:52	06:03 20:27	05:39 20:55	05:47 20:59	06:16 20:30	06:50 19:40	07:23 18:47	07:02 17:01	14:04 (2) 07:37 16:21 (1) 16:43
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11	07:48 17:03	14:14 (2) 07:22 16:36 (1) 17:43	15:00 (2) 06:39 15:10 (2) 18:18	06:45 19:55	06:00 20:29	05:39 20:57	05:48 20:58	06:18 20:27	06:52 19:37	07:26 18:44	07:04 16:59	14:01 (2) 07:38 16:23 (1) 16:43
12	07:48 17:04	14:15 (2) 07:21 16:38 (1) 17:44	15:02 (2) 06:37 14:15 (2) 18:19	06:43 19:56	05:59 20:30	05:38 20:57	05:49 20:57	06:19 20:26	06:53 19:35	07:27 18:42	07:05 16:58	14:01 (2) 07:39 16:25 (1) 16:43
13	07:48 17:05	14:15 (2) 07:20 16:39 (1) 17:45	15:04 (2) 06:35 14:16 (2) 18:20	06:41 19:57	05:58 20:31	05:37 20:58	05:50 20:57	06:21 20:25	06:54 19:33	07:28 18:40	07:07 16:57	14:00 (2) 07:40 16:25 (1) 16:43
14	07:47 17:07	14:16 (2) 07:18 16:40 (1) 17:47	15:06 (2) 06:33 14:17 (2) 18:21	06:39 19:58	05:57 20:32	05:38 20:58	05:51 20:56	06:22 20:23	06:55 19:31	07:29 18:39	07:08 16:56	13:58 (2) 07:41 16:25 (1) 16:44
15	07:47 17:08	14:16 (2) 07:17 16:41 (1) 17:48	15:08 (2) 06:31 14:18 (2) 18:22	06:38 19:59	05:56 20:33	05:38 20:58	05:52 20:56	06:23 20:22	06:56 19:30	07:30 18:37	07:09 16:55	13:57 (2) 07:42 16:26 (1) 16:44
16	07:47 17:09	14:17 (2) 07:16 16:43 (1) 17:49	15:10 (2) 06:29 14:19 (2) 18:23	06:36 19:59	05:55 20:34	05:38 20:59	05:52 20:55	06:24 20:20	06:58 19:28	07:31 18:35	07:10 16:54	13:56 (2) 07:43 16:27 (1) 16:44
17	07:46 17:10	14:18 (2) 07:14 16:44 (1) 17:51	15:12 (2) 06:27 14:20 (2) 18:24	06:35 19:59	05:54 20:35	05:38 20:59	05:53 20:54	06:25 20:19	06:59 19:26	07:33 18:34	07:12 16:53	13:55 (2) 07:44 16:28 (1) 16:44
18	07:45 17:11	14:18 (2) 07:13 16:45 (1) 17:52	15:14 (2) 06:25 14:21 (2) 18:25	06:33 19:59	05:53 20:36	05:38 20:59	05:54 20:54	06:26 20:17	07:00 19:24	07:34 18:32	07:13 16:53	13:54 (2) 07:45 16:29 (1) 16:45
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20	07:44 17:14	14:20 (2) 07:10 16:48 (1) 17:55	15:18 (2) 06:21 14:23 (2) 18:27	06:30 19:59	05:51 20:38	05:38 20:59	05:56 20:52	06:28 20:14	07:02 19:21	07:36 18:29	07:15 16:51	13:52 (2) 07:47 16:31 (1) 16:45
21	07:44 17:15	14:20 (2) 07:08 16:49 (1) 17:56	15:20 (2) 06:19 14:24 (2) 18:28	06:29 19:59	05:50 20:39	05:39 20:59	05:57 20:51	06:29 20:13	07:03 19:19	07:38 18:27	07:17 16:50	13:51 (2) 07:48 16:32 (1) 16:46
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23	07:42 17:18	14:22 (2) 07:05 16:52 (1) 17:58	15:24 (2) 06:15 14:26 (2) 18:30	06:25 19:59	05:48 20:41	05:39 20:59	05:59 20:50	06:31 20:10	07:05 19:15	07:40 18:24	07:19 16:48	13:49 (2) 07:50 16:34 (1) 16:47
24	07:41 17:19	14:23 (2) 07:04 16:53 (1) 18:00	15:26 (2) 06:13 14:27 (2) 18:31	06:23 19:59	05:47 20:42	05:39 20:59	06:00 20:50	06:32 20:09	07:06 19:15	07:41 18:23	07:20 16:48	13:48 (2) 07:51 16:35 (1) 16:48
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26	07:40 17:21	14:25 (2) 07:00 16:53 (1) 18:02	15:30 (2) 06:09 14:29 (2) 18:33	06:19 19:59	05:45 20:44	05:40 20:59	06:02 20:50	06:35 20:07	07:09 19:10	07:44 18:24	07:23 16:48	13:46 (2) 07:53 16:37 (1) 16:50
27	07:39 17:23	14:26 (2) 06:59 16:53 (1) 18:04	15:32 (2) 06:07 14:30 (2) 18:34	06:17 19:59	05:44 20:45	05:40 20:59	06:03 20:50	06:36 20:06	07:10 19:08	07:45 18:25	07:24 16:48	13:45 (2) 07:54 16:38 (1) 16:51
28	07:38 17:24	14:27 (2) 06:57 16:53 (1) 18:05	15:34 (2) 06:05 14:31 (2) 18:35	06:15 19:59	05:43 20:46	05:40 20:59	06:04 20:50	06:37 20:05	07:11 19:06	07:46 18:26	07:25 16:48	13:44 (2) 07:55 16:39 (1) 16:52
29	07:37 17:25	14:28 (2) 06:55 16:53 (1) 18:06	15:36 (2) 06:03 14:32 (2) 18:36	06:13 19:59	05:42 20:47	05:40 20:59	06:05 20:50	06:38 20:04	07:12 19:05	07:47 18:27	07:26 16:48	13:43 (2) 07:56 16:40 (1) 16:53
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31	07:35 17:28	14:30 (2) 06:51 16:52 (1) 18:08	15:40 (2) 05:59 14:34 (2) 18:38	06:09 19:59	05:40 20:49	05:40 20:59	06:07 20:41	06:40 20:02	07:14 19:02	07:49 18:29	14:27 (2) 07:58 14:41 (2) 16:55	
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	261
Total, worst case	2751	508								14	2361	2498

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: R - Shadow Receptor: 1.0 × 1.0 Azimuth: 40.0° Slope: 90.0° (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	07:49	14:07 (2) 07:34	14:26 (2) 06:56	07:02	06:13	05:42	05:42	06:08	06:41	07:14	06:51	14:10 (2) 07:28	13:53 (2)
2	07:49	14:07 (2) 07:33	14:27 (2) 06:54	07:00	06:12	05:42	05:43	06:09	06:42	07:15	06:53	14:08 (2) 07:30	13:53 (2)
3	07:50	14:07 (2) 07:32	14:29 (2) 06:52	06:58	06:10	05:41	05:43	06:10	06:43	07:16	06:54	14:05 (2) 07:31	13:53 (2)
4	07:50	14:08 (2) 07:31	14:30 (2) 06:51	06:57	06:09	05:41	05:44	06:11	06:44	07:18	06:55	14:04 (2) 07:32	13:54 (2)
5	07:50	14:09 (2) 07:30	14:31 (2) 06:49	06:55	06:08	05:40	05:44	06:12	06:46	07:19	06:56	14:02 (2) 07:33	13:54 (2)
6	07:49	14:09 (2) 07:29	14:33 (2) 06:47	06:53	06:06	05:40	05:45	06:13	06:47	07:20	06:58	14:01 (2) 07:34	13:55 (2)
7	07:49	14:09 (2) 07:27	14:35 (2) 06:46	06:51	06:05	05:40	05:46	06:14	06:48	07:21	06:59	14:00 (2) 07:35	13:55 (2)
8	07:49	14:09 (2) 07:26	14:37 (2) 06:44	06:50	06:04	05:39	05:46	06:15	06:49	07:22	07:00	13:58 (2) 07:36	13:55 (2)
9	07:49	14:10 (2) 07:25	14:38 (2) 06:42	06:48	06:03	05:39	05:47	06:16	06:50	07:23	07:02	13:58 (2) 07:37	13:56 (2)
10	07:49	14:10 (2) 07:24	14:41 (2) 06:41	06:46	06:01	05:39	05:48	06:17	06:51	07:24	07:03	13:57 (2) 07:38	13:56 (2)
11	07:48	14:11 (2) 07:22	14:44 (2) 06:39	06:45	06:00	05:39	05:48	06:18	06:52	07:26	07:04	13:55 (2) 07:38	13:57 (2)
12	07:48	14:12 (2) 07:21	14:47 (2) 06:37	06:43	05:59	05:38	05:49	06:19	06:53	07:27	07:05	13:55 (2) 07:39	13:57 (2)
13	07:48	14:12 (2) 07:20	14:51 (2) 06:35	06:41	05:58	05:38	05:50	06:21	06:54	07:28	07:07	13:54 (2) 07:40	13:58 (2)
14	07:47	14:13 (2) 07:18	14:57 (2) 06:34	06:39	05:57	05:38	05:51	06:22	06:55	07:29	07:08	13:53 (2) 07:41	13:59 (2)
15	07:47	14:13 (2) 07:17	15:01 (2) 06:32	06:38	05:56	05:38	05:52	06:23	06:56	07:30	07:09	13:52 (2) 07:42	13:58 (2)
16	07:47	14:14 (2) 07:16	15:04 (2) 06:30	06:36	05:55	05:38	05:52	06:24	06:58	07:31	07:10	13:53 (2) 07:42	13:59 (2)
17	07:46	14:14 (2) 07:14	15:08 (2) 06:28	06:35	05:54	05:38	05:53	06:25	06:59	07:33	07:12	13:53 (2) 07:43	14:00 (2)
18	07:45	14:14 (2) 07:13	15:12 (2) 06:27	06:33	05:53	05:38	05:54	06:26	07:00	07:34	07:13	13:52 (2) 07:44	14:00 (2)
19	07:45	14:15 (2) 07:11	15:17 (2) 06:25	06:31	05:52	05:38	05:55	06:27	07:01	07:35	07:14	13:52 (2) 07:44	14:01 (2)
20	07:44	14:16 (2) 07:10	15:22 (2) 06:23	06:30	05:51	05:38	05:56	06:28	07:02	07:36	07:15	13:52 (2) 07:45	14:00 (2)
21	07:44	14:16 (2) 07:08	15:27 (2) 06:21	06:28	05:50	05:39	05:57	06:29	07:03	07:38	07:17	13:52 (2) 07:46	14:01 (2)
22	07:43	14:17 (2) 07:07	15:32 (2) 06:19	06:27	05:49	05:39	05:58	06:30	07:04	07:39	07:18	13:52 (2) 07:46	14:01 (2)
23	07:42	14:18 (2) 07:05	15:37 (2) 06:18	06:25	05:48	05:39	05:59	06:31	07:05	07:40	07:19	13:51 (2) 07:47	14:02 (2)
24	07:41	14:18 (2) 07:04	15:42 (2) 06:16	06:23	05:47	05:39	06:00	06:32	07:06	07:41	07:20	13:52 (2) 07:47	14:03 (2)
25	07:41	14:19 (2) 07:02	15:47 (2) 06:14	06:22	05:47	05:40	06:01	06:34	07:07	07:42	07:22	13:52 (2) 07:47	14:04 (2)
26	07:40	14:20 (2) 07:00	15:52 (2) 06:12	06:20	05:46	05:40	06:02	06:35	07:09	07:44	07:23	13:52 (2) 07:48	14:04 (2)
27	07:39	14:21 (2) 06:59	15:57 (2) 06:11	06:19	05:45	05:40	06:03	06:36	07:10	07:45	07:24	13:52 (2) 07:48	14:04 (2)
28	07:38	14:21 (2) 06:57	16:02 (2) 06:09	06:17	05:44	05:41	06:04	06:37	07:11	07:46	07:25	13:53 (2) 07:48	14:04 (2)
29	07:37	14:22 (2) 06:55	16:07 (2) 06:07	06:16	05:44	05:41	06:05	06:38	07:12	07:47	07:26	13:53 (2) 07:49	14:05 (2)
30	07:36	14:23 (2) 06:54	16:12 (2) 06:05	06:15	05:43	05:42	06:06	06:39	07:13	07:48	07:27	13:53 (2) 07:49	14:06 (2)
31	07:35	14:25 (2) 06:54	16:17 (2) 06:04	06:14	05:43	05:43	06:07	06:40	07:14	07:50	07:28	13:54 (2) 07:50	14:07 (2)
Potential sun hours	292	294	296	301	306	311	316	321	326	331	336	341	346
Total, worst case	2883	2944	3005	3066	3127	3188	3249	3310	3371	3432	3493	3554	3615

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: S - Shadow Receptor: 1.0 × 1.0 Azimuth: 50.0° Slope: 90.0° (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	July	August	September	October	November	December	
1	07:49	14:22 (2) 07:34	14:40 (2) 06:56	07:02	06:13	05:42	05:42	06:08	06:41	07:14	06:51	14:23 (2) 07:28	14:08 (2)	
	16:53	78	15:40 (2) 17:29	86	16:55 (1) 18:06	19:43	20:18	20:50	21:01	20:40	19:54	15:06 (2) 16:45	78	15:26 (2)
2	07:49	14:22 (2) 07:33	14:41 (2) 06:54	07:00	06:12	05:42	05:43	06:09	06:42	07:15	06:53	14:21 (2) 07:30	14:08 (2)	
	16:54	78	15:40 (2) 17:31	84	16:55 (1) 18:07	19:44	20:19	20:50	21:01	20:39	19:53	15:07 (2) 16:44	78	15:26 (2)
3	07:50	14:23 (2) 07:32	14:42 (2) 06:52	06:58	06:10	05:41	05:43	06:10	06:43	07:16	06:54	14:19 (2) 07:31	14:08 (2)	
	16:55	78	15:41 (2) 17:32	79	16:54 (1) 18:09	19:45	20:20	20:51	21:01	20:38	19:51	15:08 (2) 16:44	79	15:27 (2)
4	07:50	14:23 (2) 07:31	14:44 (2) 06:51	06:57	06:09	05:41	05:44	06:11	06:44	07:18	06:55	14:17 (2) 07:32	14:09 (2)	
	16:56	78	15:41 (2) 17:33	74	16:53 (1) 18:10	19:47	20:21	20:52	21:00	20:37	19:49	15:10 (2) 16:44	78	15:27 (2)
5	07:50	14:24 (2) 07:30	14:44 (2) 06:49	06:55	06:08	05:40	05:44	06:12	06:46	07:19	06:56	14:16 (2) 07:33	14:09 (2)	
	16:57	78	15:42 (2) 17:35	66	16:49 (1) 18:11	19:48	20:22	20:53	21:00	20:35	19:47	15:11 (2) 16:44	78	15:27 (2)
6	07:49	14:24 (2) 07:29	14:46 (2) 06:47	06:53	06:06	05:40	05:45	06:13	06:47	07:20	06:58	14:14 (2) 07:34	14:10 (2)	
	16:58	78	15:42 (2) 17:36	55	15:41 (2) 18:12	19:49	20:24	20:53	21:00	20:34	19:46	16:20 (1) 16:43	79	15:29 (2)
7	07:49	14:24 (2) 07:27	14:48 (2) 06:46	06:51	06:05	05:39	05:46	06:14	06:48	07:21	06:59	14:13 (2) 07:35	14:10 (2)	
	16:59	78	14:25 (2) 17:37	52	15:40 (2) 18:14	19:50	20:25	20:54	21:00	20:34	19:47	15:12 (2) 16:43	78	15:29 (2)
8	07:49	14:25 (2) 07:26	14:50 (2) 06:44	06:50	06:04	05:39	05:46	06:15	06:49	07:22	07:00	14:12 (2) 07:36	14:10 (2)	
	17:00	78	15:43 (2) 17:39	49	15:39 (2) 18:15	19:51	20:26	20:55	20:59	20:32	19:42	16:24 (1) 16:43	78	15:28 (2)
9	07:49	14:25 (2) 07:25	14:51 (2) 06:42	06:48	06:03	05:39	05:47	06:16	06:50	07:23	07:02	14:12 (2) 07:37	14:11 (2)	
	17:01	79	15:44 (2) 17:40	46	15:37 (2) 18:16	19:52	20:27	20:55	20:59	20:30	19:40	16:26 (1) 16:43	78	15:29 (2)
10	07:49	14:25 (2) 07:24	14:54 (2) 06:41	06:46	06:01	05:39	05:48	06:17	06:51	07:24	07:03	14:10 (2) 07:38	14:11 (2)	
	17:02	78	15:43 (2) 17:41	42	15:36 (2) 18:17	19:54	20:28	20:56	20:58	20:29	19:39	16:26 (1) 16:43	78	15:29 (2)
11	07:48	14:26 (2) 07:22	14:57 (2) 06:39	06:45	06:00	05:39	05:48	06:18	06:52	07:26	07:04	14:09 (2) 07:38	14:12 (2)	
	17:03	78	15:44 (2) 17:43	37	15:34 (2) 18:18	19:55	20:29	20:57	20:58	20:27	19:37	16:27 (1) 16:43	78	15:30 (2)
12	07:48	14:27 (2) 07:21	14:59 (2) 06:37	06:43	05:59	05:38	05:49	06:19	06:53	07:27	07:05	14:09 (2) 07:39	14:13 (2)	
	17:04	80	16:38 (1) 17:44	32	15:31 (2) 18:20	19:56	20:30	20:57	20:57	20:26	19:35	16:28 (1) 16:43	77	15:30 (2)
13	07:48	14:27 (2) 07:20	15:03 (2) 06:35	06:41	05:58	05:38	05:50	06:21	06:54	07:28	07:08	14:08 (2) 07:40	14:13 (2)	
	17:05	83	16:39 (1) 17:45	25	15:28 (2) 18:21	19:57	20:31	20:58	20:57	20:25	19:33	16:28 (1) 16:43	78	15:31 (2)
14	07:47	14:28 (2) 07:18	15:08 (2) 06:34	06:39	05:57	05:38	05:51	06:22	06:55	07:29	07:07	14:07 (2) 07:41	14:14 (2)	
	17:07	85	16:40 (1) 17:47	15	15:23 (2) 18:22	19:58	20:32	20:58	20:56	20:23	19:31	16:28 (1) 16:44	77	15:31 (2)
15	07:47	14:28 (2) 07:17	15:09 (2) 06:32	06:38	05:56	05:38	05:53	06:23	06:56	07:30	07:09	14:08 (2) 07:42	14:14 (2)	
	17:08	86	16:41 (1) 17:48	13	15:19 (2) 18:23	19:59	20:33	20:58	20:56	20:22	19:30	16:29 (1) 16:44	77	15:31 (2)
16	07:47	14:29 (2) 07:16	15:10 (2) 06:30	06:36	05:55	05:38	05:52	06:24	06:58	07:31	07:10	14:07 (2) 07:42	14:15 (2)	
	17:09	88	16:43 (1) 17:49	18	15:24 (2) 18:24	20:01	20:35	20:59	20:55	20:20	19:28	16:29 (1) 16:44	77	15:32 (2)
17	07:46	14:29 (2) 07:14	15:11 (2) 06:28	06:35	05:54	05:38	05:53	06:25	06:59	07:33	07:12	14:07 (2) 07:43	14:15 (2)	
	17:10	90	16:44 (1) 17:51	18	15:26 (2) 18:26	20:02	20:36	20:59	20:54	20:19	19:26	16:29 (1) 16:44	78	15:33 (2)
18	07:45	14:29 (2) 07:13	15:12 (2) 06:27	06:33	05:53	05:38	05:54	06:26	07:00	07:34	07:13	14:07 (2) 07:44	14:15 (2)	
	17:11	92	16:45 (1) 17:52	18	15:27 (2) 18:27	20:03	20:37	21:00	20:54	20:17	19:24	16:27 (1) 16:45	77	15:32 (2)
19	07:45	14:30 (2) 07:11	15:13 (2) 06:25	06:31	05:52	05:38	05:55	06:27	07:01	07:35	07:14	14:06 (2) 07:44	14:16 (2)	
	17:13	93	16:47 (1) 17:53	18	15:28 (2) 18:28	20:04	20:38	21:00	20:53	20:16	19:22	16:26 (1) 16:45	77	15:33 (2)
20	07:44	14:30 (2) 07:10	15:14 (2) 06:23	06:30	05:51	05:38	05:56	06:28	07:02	07:36	07:15	14:06 (2) 07:45	14:16 (2)	
	17:14	95	16:48 (1) 17:55	18	15:29 (2) 18:29	20:05	20:39	21:00	20:52	20:14	19:21	16:27 (1) 16:45	77	15:33 (2)
21	07:44	14:31 (2) 07:08	15:15 (2) 06:21	06:28	05:50	05:39	05:57	06:29	07:03	07:38	07:17	14:07 (2) 07:46	14:17 (2)	
	17:15	95	16:49 (1) 17:56	18	15:30 (2) 18:30	20:06	20:40	21:00	20:51	20:13	19:19	16:28 (1) 16:46	77	15:34 (2)
22	07:43	14:32 (2) 07:07	15:16 (2) 06:19	06:27	05:49	05:39	05:58	06:30	07:04	07:39	07:18	14:06 (2) 07:46	14:17 (2)	
	17:16	95	16:51 (1) 17:57	18	15:32 (2) 18:32	20:08	20:41	21:01	20:50	20:11	19:17	16:29 (1) 16:46	77	15:34 (2)
23	07:42	14:32 (2) 07:05	15:17 (2) 06:18	06:25	05:48	05:39	05:59	06:31	07:05	07:40	07:19	14:05 (2) 07:47	14:18 (2)	
	17:18	96	16:52 (1) 17:58	18	15:33 (2) 18:33	20:09	20:42	21:01	20:50	20:09	19:15	16:29 (1) 16:47	77	15:35 (2)
24	07:41	14:33 (2) 07:04	15:18 (2) 06:16	06:23	05:47	05:39	06:00	06:32	07:06	07:41	07:20	14:07 (2) 07:47	14:18 (2)	
	17:19	97	16:53 (1) 18:00	18	15:34 (2) 18:34	20:10	20:43	21:01	20:49	20:08	19:13	16:28 (1) 16:47	77	15:35 (2)
25	07:41	14:33 (2) 07:02	15:19 (2) 06:14	06:22	05:47	05:40	06:01	06:34	07:07	07:42	07:22	14:07 (2) 07:47	14:19 (2)	
	17:20	98	16:55 (1) 18:01	18	15:35 (2) 18:35	20:11	20:44	21:01	20:48	20:06	19:12	16:22 (1) 16:48	77	15:36 (2)
26	07:40	14:34 (2) 07:00	15:20 (2) 06:12	06:20	05:46	05:40	06:02	06:35	07:09	07:44	07:23	14:07 (2) 07:48	14:19 (2)	
	17:21	98	16:56 (1) 18:02	18	15:36 (2) 18:36	20:12	20:44	21:01	20:47	20:04	19:10	16:21 (1) 16:49	78	15:37 (2)
27	07:39	14:35 (2) 06:59	15:21 (2) 06:11	06:19	05:45	05:40	06:03	06:36	07:10	07:45	07:24	14:07 (2) 07:48	14:19 (2)	
	17:23	97	16:56 (1) 18:04	18	15:37 (2) 18:37	20:13	20:45	21:01	20:46	20:03	19:08	16:20 (1) 16:49	78	15:37 (2)
28	07:38	14:36 (2) 06:57	15:22 (2) 06:09	06:17	05:44	05:41	06:04	06:37	07:11	07:46	07:25	14:08 (2) 07:48	14:20 (2)	
	17:24	95	16:56 (1) 18:05	18	15:38 (2) 18:38	20:14	20:46	21:01	20:45	20:01	19:06	16:21 (1) 16:50	77	15:37 (2)
29	07:37	14:36 (2) 06:58	15:23 (2) 06:08	06:16	05:44	05:41	06:05	06:38	07:12	07:47	07:26	14:08 (2) 07:49	14:21 (2)	
	17:25	94	16:56 (1) 18:03	18	15:39 (2) 18:39	20:15	20:47	21:01	20:44	20:00	19:05	16:22 (1) 16:51	77	15:38 (2)
30	07:36	14:37 (2) 06:59	15:24 (2) 06:07	06:15	05:43	05:42	06:06	06:39	07:13	07:48	07:27	14:08 (2) 07:49	14:21 (2)	
	17:27	93	16:57 (1) 18:06	18	15:40 (2) 18:40	20:16	20:48	21:01	20:54	20:01	19:03	16:23 (1) 16:52	78	15:39 (2)
31	07:35	14:38 (2) 06:57	15:25 (2) 06:06	06:14	05:42	05:41	06:07	06:40	07:14	07:49	07:28	14:09 (2) 07:50	14:22 (2)	
	17:28	90	16:56 (1) 18:05	18	15:41 (2) 18:41	20:17	20:49	21:01	20:56	20:02	19:04	16:24 (1) 16:53	78	15:39 (2)
Potential sun hours	292	294	296	300	304	308	312	316	320	324	328	332	336	
Total, worst case	2699	2742	2785	2828	2871	2914	2957	3000	3043	3086	3129	3172	3215	

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

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: T - Shadow Receptor: 1.0 × 1.0 Azimuth: -150.0° Slope: 90.0° (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	07:49 16:53	07:34 17:29	06:56 18:06	07:02 19:43	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	06:51 17:11	07:29 16:45
2	07:50 16:54	07:33 17:31	06:54 18:07	07:00 19:44	06:12 20:19	05:42 20:51	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59	06:53 17:10	07:30 16:44
3	07:50 16:55	07:32 17:32	06:52 18:09	06:58 19:46	06:10 20:20	05:41 20:51	05:43 21:01	06:10 20:38	06:43 19:51	07:16 18:57	06:54 17:09	07:31 16:44
4	07:50 16:56	07:31 17:33	06:51 18:10	06:57 19:47	06:09 20:21	05:41 20:52	05:44 21:01	06:11 20:37	06:45 19:49	07:18 18:56	06:55 17:08	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 18:11	06:55 19:48	06:08 20:23	05:40 20:53	05:44 21:00	06:12 20:36	06:46 19:48	07:19 18:54	06:56 17:06	07:33 16:44
6	07:50 16:58	07:29 17:36	06:47 18:12	06:53 19:49	06:06 20:24	05:40 20:53	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:52	06:58 17:05	07:34 16:43
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Potential sun hours Total, worst case	292	294	369	401	454	459	465	432	376	343	293	281

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: WON023_ShadowFlickering Shadow receptor: U - Shadow Receptor: 1.0 × 1.0 Azimuth: -160.0° Slope: 90.0° (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	07:49 16:53	07:34 17:29	06:56 18:06	07:02 19:43	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	06:51 17:11	07:29 16:45
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Potential sun hours Total, worst case	292	294	369	401	454	459	465	432	376	343	293	281

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: WON023_ShadowFlickering Shadow receptor: V - Shadow Receptor: 1.0 × 1.0 Azimuth: 140.0° 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	07:49 16:53	07:34 17:29	06:56 18:06	07:02 19:43	06:13 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	06:51 17:11	07:28 16:45
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30	07:36 17:27		07:05 19:41	06:15 20:17	05:43 20:48	05:42 21:01	06:06 20:43	06:39 19:58	07:13 19:03	07:49 17:14	07:27 16:45	07:49 16:51
31	07:35 17:28		07:04 19:42		05:43 20:49		06:07 20:41	06:40 19:56		06:50 17:13		07:49 16:52
Potential sun hours Total, worst case	292	294	369	401	454	459	465	432	376	343	293	281

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: WON023_ShadowFlickering Shadow receptor: W - Shadow Receptor: 1.0 × 1.0 Azimuth: 50.0° 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	07:49		15:09 (3)	07:34		15:07 (3)	06:56		15:34 (3)	07:02		06:13		05:42	
	16:53	51	16:00 (3)	17:29	76	16:23 (3)	18:06	28	16:02 (3)	19:43		20:18		20:50	
2	07:50		15:09 (3)	07:33		15:07 (3)	06:54		15:40 (3)	07:00		06:12		05:41	
	16:54	52	16:01 (3)	17:31	77	16:24 (3)	18:07	18	15:58 (3)	19:44		20:19		20:51	
3	07:50		15:10 (3)	07:32		15:07 (3)	06:52			06:58		06:10		05:41	
	16:55	52	16:02 (3)	17:32	77	16:24 (3)	18:09			19:46		20:20		20:51	
4	07:50		15:10 (3)	07:31		15:08 (3)	06:51			06:57		06:09		05:41	
	16:56	53	16:03 (3)	17:33	77	16:25 (3)	18:10			19:47		20:21		20:52	
5	07:50		15:10 (3)	07:30		15:07 (3)	06:49			06:55		06:08		05:40	
	16:57	54	16:04 (3)	17:35	77	16:24 (3)	18:11			19:48		20:22		20:53	
6	07:50		15:10 (3)	07:29		15:07 (3)	06:47			06:53		06:06		05:40	
	16:58	55	16:05 (3)	17:36	77	16:24 (3)	18:12			19:49		20:24		20:53	
7	07:49		15:09 (3)	07:27		15:08 (3)	06:46			06:51		06:05		05:39	
	16:59	56	16:05 (3)	17:37	77	16:25 (3)	18:14			19:50		20:25		20:54	
8	07:49		15:09 (3)	07:26		15:09 (3)	06:44			06:50		06:04		05:39	
	17:00	57	16:06 (3)	17:39	76	16:25 (3)	18:15			19:51		20:26		20:55	
9	07:49		15:09 (3)	07:25		15:08 (3)	06:42			06:48		06:03		05:39	
	17:01	58	16:07 (3)	17:40	76	16:24 (3)	18:16			19:52		20:27		20:55	
10	07:49		15:09 (3)	07:24		15:09 (3)	06:41			06:46		06:01		05:39	
	17:02	60	16:09 (3)	17:41	75	16:24 (3)	18:17			19:54		20:28		20:56	
11	07:49		15:08 (3)	07:22		15:10 (3)	06:39			06:45		06:00		05:39	
	17:03	61	16:09 (3)	17:43	74	16:24 (3)	18:18			19:55		20:29		20:57	
12	07:48		15:09 (3)	07:21		15:10 (3)	06:37			06:43		05:59		05:38	
	17:04	61	16:10 (3)	17:44	73	16:23 (3)	18:20			19:56		20:30		20:57	
13	07:48		15:08 (3)	07:20		15:11 (3)	06:35			06:41		05:58		05:38	
	17:05	63	16:11 (3)	17:45	72	16:23 (3)	18:21			19:57		20:31		20:58	
14	07:48		15:08 (3)	07:18		15:11 (3)	06:34			06:39		05:57		05:38	
	17:07	64	16:12 (3)	17:47	71	16:22 (3)	18:22			19:58		20:32		20:58	
15	07:47		15:08 (3)	07:17		15:12 (3)	06:32			06:38		05:56		05:38	
	17:08	64	16:12 (3)	17:48	70	16:22 (3)	18:23			19:59		20:34		20:59	
16	07:47		15:08 (3)	07:16		15:13 (3)	06:30			06:36		05:55		05:38	
	17:09	66	16:14 (3)	17:49	69	16:22 (3)	18:24			20:01		20:35		20:59	
17	07:46		15:08 (3)	07:14		15:13 (3)	06:28			06:35		05:54		05:38	
	17:10	66	16:14 (3)	17:51	68	16:21 (3)	18:26			20:02		20:36		20:59	
18	07:46		15:08 (3)	07:13		15:15 (3)	06:27			06:33		05:53		05:38	
	17:11	68	16:16 (3)	17:52	66	16:21 (3)	18:27			20:03		20:37		21:00	
19	07:45		15:08 (3)	07:11		15:15 (3)	06:25			06:31		05:52		05:38	
	17:13	68	16:16 (3)	17:53	64	16:19 (3)	18:28			20:04		20:38		21:00	
20	07:44		15:07 (3)	07:10		15:17 (3)	06:23			06:30		05:51		05:38	
	17:14	70	16:17 (3)	17:55	62	16:19 (3)	18:29			20:05		20:39		21:00	
21	07:44		15:07 (3)	07:08		15:18 (3)	06:21			06:28		05:50		05:39	
	17:15	70	16:17 (3)	17:56	60	16:18 (3)	18:30			20:06		20:40		21:01	
22	07:43		15:07 (3)	07:07		15:20 (3)	06:20			06:27		05:49		05:39	
	17:16	72	16:19 (3)	17:57	57	16:17 (3)	18:32			20:08		20:41		21:01	
23	07:42		15:07 (3)	07:05		15:21 (3)	06:18			06:25		05:48		05:39	
	17:18	72	16:19 (3)	17:58	54	16:15 (3)	18:33			20:09		20:42		21:01	
24	07:41		15:07 (3)	07:04		15:22 (3)	06:16			06:23		05:47		05:39	
	17:19	73	16:20 (3)	18:00	51	16:13 (3)	18:34			20:10		20:43		21:01	
25	07:41		15:07 (3)	07:02		15:24 (3)	06:14			06:22		05:47		05:40	
	17:20	73	16:20 (3)	18:01	48	16:12 (3)	18:35			20:11		20:44		21:01	
26	07:40		15:07 (3)	07:00		15:26 (3)	06:12			06:20		05:46		05:40	
	17:21	74	16:21 (3)	18:02	44	16:10 (3)	18:36			20:12		20:45		21:01	
27	07:39		15:06 (3)	06:59		15:29 (3)	06:11			06:19		05:45		05:40	
	17:23	75	16:21 (3)	18:04	39	16:08 (3)	18:37			20:13		20:45		21:01	
28	07:38		15:06 (3)	06:57		15:31 (3)	06:09			06:17		05:44		05:41	
	17:24	76	16:22 (3)	18:05	34	16:05 (3)	18:39			20:14		20:46		21:01	
29	07:37		15:06 (3)				07:07			06:16		05:44		05:41	
	17:25	76	16:22 (3)				19:40			20:16		20:47		21:01	
30	07:36		15:06 (3)				07:05			06:15		05:43		05:42	
	17:27	77	16:23 (3)				19:41			20:17		20:48		21:01	
31	07:35		15:07 (3)				07:04					05:43			
	17:28	76	16:23 (3)				19:42					20:49			
Potential sun hours	292			294			369			401		454		459	
Total, worst case	2013			1841			46								

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: WON023_ShadowFlickering Shadow receptor: W - Shadow Receptor: 1.0 × 1.0 Azimuth: 50.0° 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	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01		06:51 17:11	14:39 (3)	07:29 16:45	14:51 (3) 15:51 (3)	
2	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59		06:53 17:10	75 76	15:54 (3) 16:44	60 15:51 (3)	
3	05:43 21:01	06:10 20:38	06:43 19:51	07:16 18:57		06:54 17:09	77	15:54 (3) 16:44	58 15:50 (3)	
4	05:44 21:01	06:11 20:37	06:45 19:49	07:18 18:56		06:55 17:07	76	15:54 (3) 16:44	57 15:50 (3)	
5	05:44 21:00	06:12 20:35	06:46 19:48	07:19 18:54		06:56 17:06	77	15:54 (3) 16:44	56 15:51 (3)	
6	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:52		06:58 17:05	77	14:38 (3) 15:55 (3)	14:56 (3) 15:51 (3)	
7	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:50		06:59 17:04	77	14:37 (3) 15:54 (3)	07:35 16:43	14:57 (3) 15:51 (3)
8	05:46 20:59	06:15 20:32	06:49 19:42	07:22 18:49		07:00 17:03	77	14:37 (3) 15:54 (3)	07:36 16:43	14:58 (3) 15:51 (3)
9	05:47 20:59	06:16 20:30	06:50 19:40	07:23 18:47		07:02 17:01	77	14:38 (3) 15:55 (3)	07:37 16:43	14:58 (3) 15:50 (3)
10	05:48 20:58	06:17 20:29	06:51 19:39	07:24 18:45		07:03 17:00	76	14:38 (3) 15:54 (3)	07:38 16:43	14:58 (3) 15:50 (3)
11	05:48 20:58	06:18 20:28	06:52 19:37	07:26 18:44	10	16:18 (3) 16:28 (3)	07:04 16:59	14:37 (3) 15:54 (3)	07:38 16:43	14:59 (3) 15:50 (3)
12	05:49 20:57	06:19 20:26	06:53 19:35	07:27 18:42	22	16:11 (3) 16:33 (3)	07:05 16:58	14:38 (3) 15:54 (3)	07:39 16:43	15:00 (3) 15:50 (3)
13	05:50 20:57	06:21 20:25	06:54 19:33	07:28 18:40	31	16:06 (3) 16:37 (3)	07:07 16:57	14:38 (3) 15:54 (3)	07:40 16:43	15:01 (3) 15:50 (3)
14	05:51 20:56	06:22 20:23	06:55 19:32	07:29 18:39	37	16:02 (3) 16:39 (3)	07:08 16:56	14:39 (3) 15:55 (3)	07:41 16:44	15:03 (3) 15:51 (3)
15	05:51 20:56	06:23 20:22	06:56 19:30	07:30 18:37	42	16:00 (3) 16:42 (3)	07:09 16:55	14:39 (3) 15:54 (3)	07:42 16:44	15:03 (3) 15:50 (3)
16	05:52 20:55	06:24 20:20	06:58 19:28	07:32 18:35	45	15:58 (3) 16:43 (3)	07:10 16:54	14:39 (3) 15:54 (3)	07:42 16:44	15:04 (3) 15:50 (3)
17	05:53 20:54	06:25 20:19	06:59 19:26	07:33 18:34	49	15:55 (3) 16:44 (3)	07:12 16:53	14:41 (3) 15:54 (3)	07:43 16:44	15:05 (3) 15:51 (3)
18	05:54 20:54	06:26 20:17	07:00 19:24	07:34 18:32	52	15:53 (3) 16:45 (3)	07:13 16:53	14:41 (3) 15:54 (3)	07:44 16:45	15:05 (3) 15:51 (3)
19	05:55 20:53	06:27 20:16	07:01 19:23	07:35 18:30	55	15:52 (3) 16:47 (3)	07:14 16:52	14:41 (3) 15:53 (3)	07:44 16:45	15:06 (3) 15:51 (3)
20	05:56 20:52	06:28 20:14	07:02 19:21	07:36 18:29	58	15:50 (3) 16:48 (3)	07:16 16:51	14:42 (3) 15:54 (3)	07:45 16:45	15:07 (3) 15:52 (3)
21	05:57 20:51	06:29 20:13	07:03 19:19	07:38 18:27	60	15:48 (3) 16:48 (3)	07:17 16:50	14:43 (3) 15:53 (3)	07:46 16:46	15:07 (3) 15:52 (3)
22	05:58 20:50	06:30 20:11	07:04 19:17	07:39 18:26	63	15:46 (3) 16:49 (3)	07:18 16:49	14:43 (3) 15:53 (3)	07:46 16:46	15:08 (3) 15:53 (3)
23	05:59 20:50	06:31 20:09	07:05 19:15	07:40 18:24	64	15:46 (3) 16:50 (3)	07:19 16:49	14:44 (3) 15:52 (3)	07:47 16:47	15:08 (3) 15:53 (3)
24	06:00 20:49	06:33 20:08	07:06 19:13	07:41 18:23	67	15:44 (3) 16:51 (3)	07:20 16:48	14:45 (3) 15:53 (3)	07:47 16:47	15:08 (3) 15:53 (3)
25	06:01 20:48	06:34 20:06	07:07 19:12	07:42 17:21	68	14:43 (3) 15:51 (3)	07:22 16:48	14:46 (3) 15:52 (3)	07:48 16:48	15:09 (3) 15:54 (3)
26	06:02 20:47	06:35 20:05	07:09 19:10	07:44 17:20	69	14:43 (3) 15:52 (3)	07:23 16:47	14:46 (3) 15:52 (3)	07:48 16:49	15:09 (3) 15:55 (3)
27	06:03 20:46	06:36 20:03	07:10 19:08	07:45 17:18	71	14:41 (3) 15:52 (3)	07:24 16:46	14:47 (3) 15:51 (3)	07:48 16:49	15:09 (3) 15:55 (3)
28	06:04 20:45	06:37 20:01	07:11 19:06	07:46 17:17	72	14:40 (3) 15:52 (3)	07:25 16:46	14:48 (3) 15:52 (3)	07:49 16:50	15:10 (3) 15:57 (3)
29	06:05 20:44	06:38 20:00	07:12 19:05	07:48 17:15	73	14:40 (3) 15:53 (3)	07:26 16:45	14:49 (3) 15:52 (3)	07:49 16:51	15:10 (3) 15:57 (3)
30	06:06 20:43	06:39 19:58	07:13 19:03	07:49 17:14	74	14:39 (3) 15:53 (3)	07:27 16:45	14:50 (3) 15:51 (3)	07:49 16:51	15:09 (3) 15:58 (3)
31	06:07 20:41	06:40 19:56		06:50 17:13	75	14:38 (3) 15:53 (3)			07:49 16:52	15:09 (3) 15:59 (3)
Potential sun hours	465	432	376	343		293			281	
Total, worst case					1157		2170			1540

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: WON023_ShadowFlickering Shadow receptor: X - Shadow Receptor: 1.0 × 1.0 Azimuth: -50.0° 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	07:49 16:53	07:34 17:29	06:56 18:06	79 07:53 (3) 09:12 (3)	07:02 19:43	06:13 20:50
2	07:50 16:54	07:33 17:31	06:54 18:07	80 07:53 (3) 09:13 (3)	07:00 19:44	06:12 20:51
3	07:50 16:55	07:32 17:32	06:52 18:09	81 07:52 (3) 09:13 (3)	06:58 19:46	06:10 20:51
4	07:50 16:56	07:31 17:33	06:51 18:10	81 07:51 (3) 09:12 (3)	06:57 19:47	06:09 20:52
5	07:50 16:57	07:30 17:35	06:49 18:11	80 07:52 (3) 09:12 (3)	06:55 19:48	06:08 20:53
6	07:50 16:58	07:29 17:36	08:30 (3) 08:38 (3)	81 06:47 09:12 (3)	06:53 19:49	06:06 20:54
7	07:49 16:59	07:27 17:37	08:23 (3) 08:45 (3)	80 06:46 09:11 (3)	06:51 19:50	06:05 20:54
8	07:49 17:00	07:26 17:39	08:20 (3) 08:49 (3)	80 06:44 09:10 (3)	06:50 19:51	06:04 20:55
9	07:49 17:01	07:25 17:40	08:16 (3) 08:52 (3)	79 06:42 09:10 (3)	06:48 19:53	06:03 20:55
10	07:49 17:02	07:24 17:41	08:14 (3) 08:55 (3)	79 06:41 09:10 (3)	06:46 19:54	06:01 20:56
11	07:49 17:03	07:22 17:43	08:12 (3) 08:57 (3)	79 06:39 09:09 (3)	06:45 19:55	06:00 20:57
12	07:48 17:04	07:21 17:44	08:10 (3) 08:59 (3)	77 06:37 09:07 (3)	06:43 19:56	05:59 20:57
13	07:48 17:05	07:20 17:45	08:08 (3) 09:01 (3)	76 06:35 09:07 (3)	06:41 19:57	05:58 20:58
14	07:48 17:07	07:18 17:47	08:07 (3) 09:03 (3)	75 06:34 09:06 (3)	06:40 19:58	05:57 20:58
15	07:47 17:08	07:17 17:48	08:05 (3) 09:04 (3)	74 06:32 09:05 (3)	06:38 19:59	05:56 20:59
16	07:47 17:09	07:16 17:49	08:04 (3) 09:05 (3)	72 06:30 09:03 (3)	06:36 20:01	05:55 20:59
17	07:46 17:10	07:14 17:51	08:02 (3) 09:06 (3)	71 06:28 09:03 (3)	06:35 20:02	05:54 20:59
18	07:46 17:11	07:13 17:52	08:02 (3) 09:08 (3)	69 06:27 09:01 (3)	06:33 20:03	05:53 21:00
19	07:45 17:13	07:11 17:53	08:00 (3) 09:08 (3)	67 06:25 09:00 (3)	06:31 20:04	05:52 21:00
20	07:44 17:14	07:10 17:55	08:00 (3) 09:09 (3)	65 06:23 08:58 (3)	06:30 20:05	05:51 21:00
21	07:44 17:15	07:08 17:56	07:58 (3) 09:10 (3)	63 06:21 08:56 (3)	06:28 20:06	05:50 21:01
22	07:43 17:16	07:07 17:57	07:58 (3) 09:11 (3)	60 06:20 08:55 (3)	06:27 20:08	05:49 21:01
23	07:42 17:18	07:05 17:59	07:57 (3) 09:11 (3)	57 06:25 08:53 (3)	06:25 20:09	05:48 21:01
24	07:42 17:19	07:04 18:00	07:55 (3) 09:11 (3)	54 06:24 08:51 (3)	06:24 20:10	05:47 21:01
25	07:41 17:20	07:02 18:01	07:55 (3) 09:12 (3)	50 06:22 08:48 (3)	06:22 20:11	05:47 21:01
26	07:40 17:22	07:01 18:02	07:54 (3) 09:12 (3)	46 06:20 08:46 (3)	06:20 20:12	05:46 21:01
27	07:39 17:23	06:59 18:04	07:54 (3) 09:13 (3)	42 06:19 08:43 (3)	06:19 20:13	05:45 21:01
28	07:38 17:24	06:57 18:05	07:53 (3) 09:13 (3)	37 06:18 08:40 (3)	06:18 20:15	05:44 21:01
29	07:37 17:25		07:07 19:40	32 09:05 (3) 09:37 (3)	06:16 20:16	05:44 21:01
30	07:36 17:27		07:05 19:41	24 09:08 (3) 09:32 (3)	06:15 20:17	05:43 21:01
31	07:35 17:28		07:04 19:42	12 09:14 (3) 09:26 (3)	05:43 20:49	
Potential sun hours	292	294	369	401	454	459
Total, worst case		1335	2002			

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: WON023_ShadowFlickering Shadow receptor: X - Shadow Receptor: 1.0 × 1.0 Azimuth: -50.0° 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	05:42 21:01	06:08 20:40	06:41 19:54	07:14 19:01	08:30 (3) 09:47 (3)	06:51 17:11	07:44 (3) 08:24 (3)	07:29 16:45
2	05:43 21:01	06:09 20:39	06:42 19:53	07:15 18:59	08:29 (3) 09:47 (3)	06:53 17:10	07:46 (3) 08:21 (3)	07:30 16:44
3	05:43 21:01	06:10 20:38	06:43 19:51	07:16 18:57	08:28 (3) 09:47 (3)	06:54 17:09	07:49 (3) 08:18 (3)	07:31 16:44
4	05:44 21:01	06:11 20:37	06:45 19:49	07:18 18:56	08:28 (3) 09:47 (3)	06:55 17:08	07:54 (3) 08:14 (3)	07:32 16:44
5	05:44 21:00	06:12 20:36	06:46 19:48	07:19 18:54	08:28 (3) 09:48 (3)	06:56 17:06	08:02 (3) 08:05 (3)	07:33 16:44
6	05:45 21:00	06:13 20:34	06:47 19:46	07:20 18:52	08:27 (3) 09:48 (3)	06:58 17:05		07:34 16:43
7	05:46 21:00	06:14 20:33	06:48 19:44	07:21 18:50	08:27 (3) 09:47 (3)	06:59 17:04		07:35 16:43
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10	05:48 20:59	06:17 20:29	06:51 19:39	07:24 18:45	08:26 (3) 09:46 (3)	07:03 17:00		07:38 16:43
11	05:48 20:58	06:18 20:28	06:52 19:37	07:26 18:44	08:26 (3) 09:47 (3)	07:04 16:59		07:38 16:43
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13	05:50 20:57	06:21 20:25	06:54 19:33	09:00 (3) 09:22 (3)	07:28 18:40	08:26 (3) 09:46 (3)	07:07 16:57	07:40 16:43
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17	05:53 20:54	06:25 20:19	06:59 19:26	08:48 (3) 09:34 (3)	07:33 18:34	08:27 (3) 09:43 (3)	07:12 16:53	07:43 16:44
18	05:54 20:54	06:26 20:17	07:00 19:24	08:46 (3) 09:36 (3)	07:34 18:32	08:27 (3) 09:42 (3)	07:13 16:53	07:44 16:45
19	05:55 20:53	06:27 20:16	07:01 19:23	08:44 (3) 09:37 (3)	07:35 18:30	08:28 (3) 09:42 (3)	07:14 16:52	07:44 16:45
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21	05:57 20:51	06:29 20:13	07:03 19:19	08:41 (3) 09:40 (3)	07:38 18:27	08:29 (3) 09:40 (3)	07:17 16:50	07:46 16:46
22	05:58 20:51	06:30 20:11	07:04 19:17	08:39 (3) 09:41 (3)	07:39 18:26	08:29 (3) 09:39 (3)	07:18 16:50	07:46 16:46
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24	06:00 20:49	06:33 20:08	07:06 19:14	08:36 (3) 09:43 (3)	07:41 18:23	08:32 (3) 09:37 (3)	07:20 16:48	07:47 16:47
25	06:01 20:48	06:34 20:06	07:07 19:12	08:35 (3) 09:43 (3)	06:43 17:21	07:32 (3) 08:35 (3)	07:22 16:48	07:48 16:48
26	06:02 20:47	06:35 20:05	07:09 19:10	08:34 (3) 09:44 (3)	06:44 17:20	07:34 (3) 08:35 (3)	07:23 16:47	07:48 16:49
27	06:03 20:46	06:36 20:03	07:10 19:08	08:33 (3) 09:45 (3)	06:45 17:18	07:35 (3) 08:33 (3)	07:24 16:46	07:48 16:49
28	06:04 20:45	06:37 20:01	07:11 19:06	08:33 (3) 09:46 (3)	06:46 17:17	07:36 (3) 08:31 (3)	07:25 16:46	07:49 16:50
29	06:05 20:44	06:38 20:00	07:12 19:05	08:32 (3) 09:46 (3)	06:48 17:16	07:38 (3) 08:30 (3)	07:26 16:46	07:49 16:51
30	06:06 20:43	06:39 19:58	07:13 19:03	08:31 (3) 09:47 (3)	06:49 17:14	07:40 (3) 08:28 (3)	07:27 16:45	07:49 16:51
31	06:07 20:42	06:40 19:56		06:50 17:13		07:41 (3) 08:26 (3)		07:49 16:52
Potential sun hours	465	432	376	343	293			281
Total, worst case			1029	2223	127			

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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

Calculated:

26/09/2023 17:51/3.6.361

SHADOW - Calendar

Calculation: WON023_ShadowFlickering Shadow receptor: Y - Shadow Receptor: 1.0 × 1.0 Azimuth: -60.0° 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

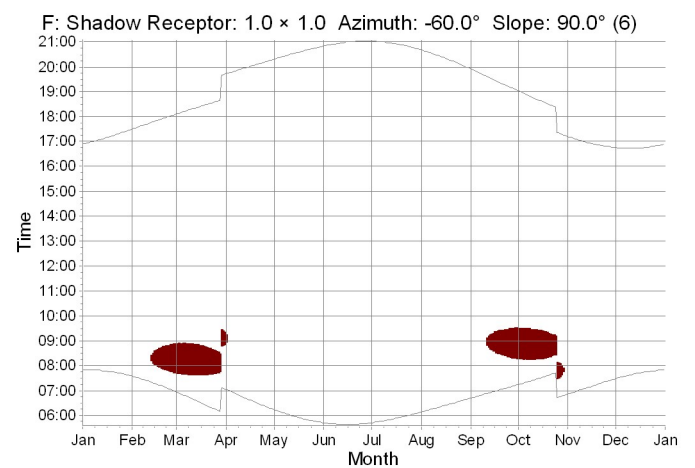
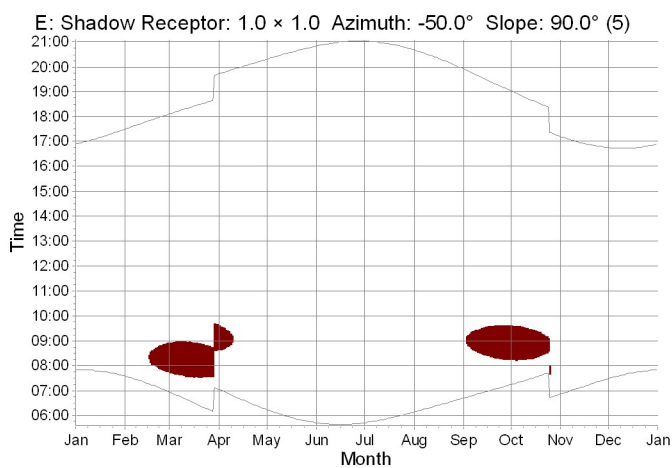
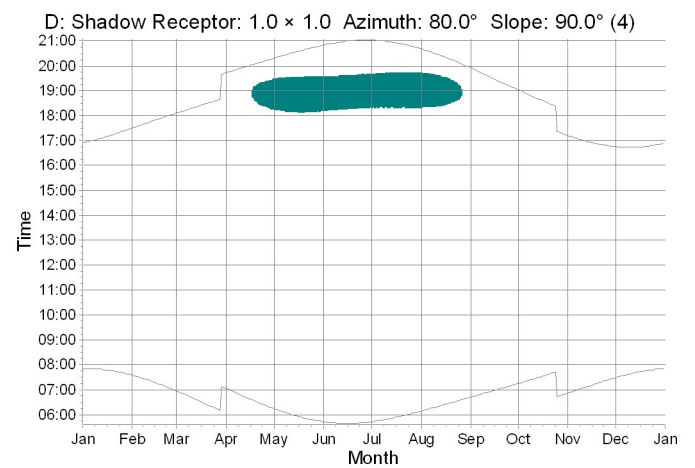
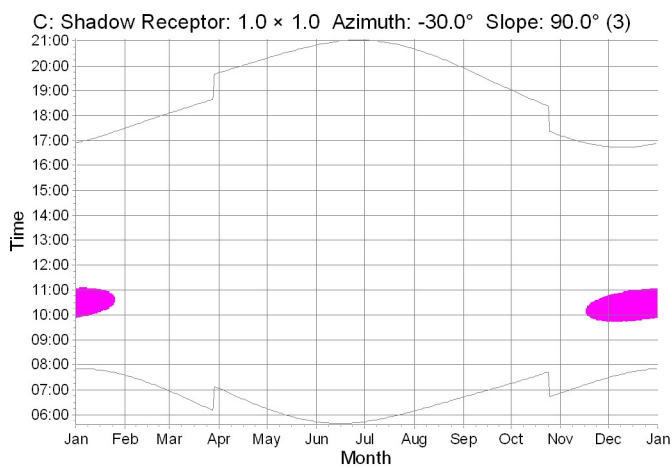
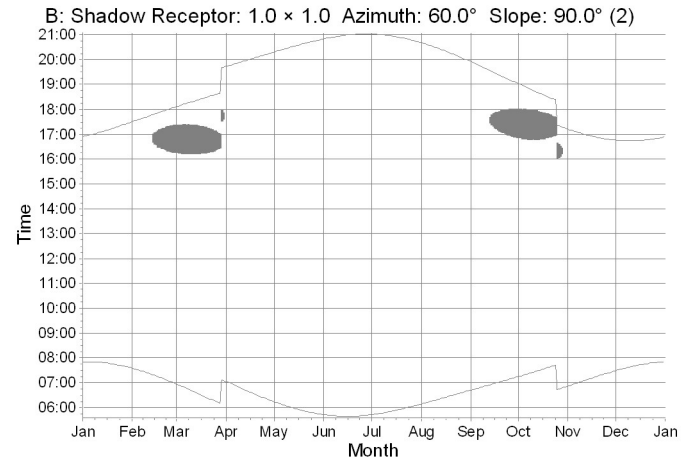
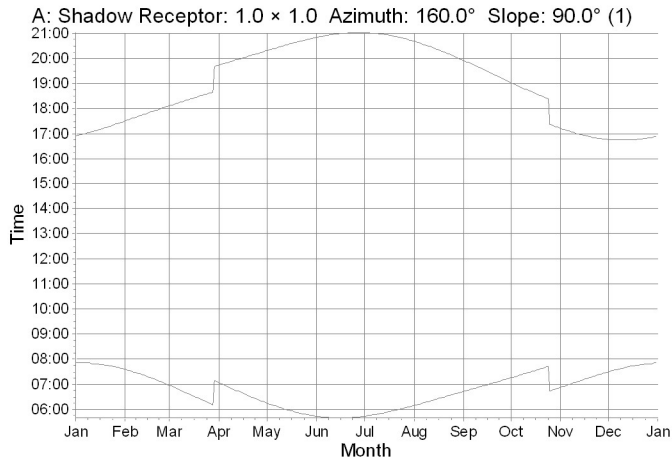
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	16:53	17:29	18:06		19:43	82	09:27 (3)	20:18	20:50	21:01	20:40		19:54	72	09:17 (3)	19:01	09:03 (3)	17:11	16:45
2	07:50	07:33	06:54		07:00		08:05 (3)	06:12	05:42	05:43	06:09		06:42		08:04 (3)	07:15	08:03 (3)	06:53	07:30
	16:54	17:31	18:07		19:44	81	09:26 (3)	20:19	20:51	21:01	20:39		19:53	73	09:17 (3)	18:59	09:01 (3)	17:10	16:44
3	07:50	07:32	06:52		06:58		08:04 (3)	06:10	05:41	05:43	06:10		06:43		08:03 (3)	07:16	08:05 (3)	06:54	07:31
	16:55	17:32	18:09		19:46	81	09:25 (3)	20:20	20:51	21:01	20:38		19:51	75	09:18 (3)	18:57	08:58 (3)	17:09	16:44
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	17:02	17:41	18:17	52	08:20 (3)	19:54	09:18 (3)	20:28	20:56	20:58	20:29		19:39	81	09:19 (3)	18:45		17:00	16:43
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31	07:35		07:04		08:06 (3)			05:43		06:									

Project:
WON023

Licensed user:
Iron solar s.r.l.
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IT-20122 Milano
+393487125089
Fabio Paccapelo / francesca.saccarola@hopegroup.it
Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Calendar, graphical

Calculation: WON023_ShadowFlickering

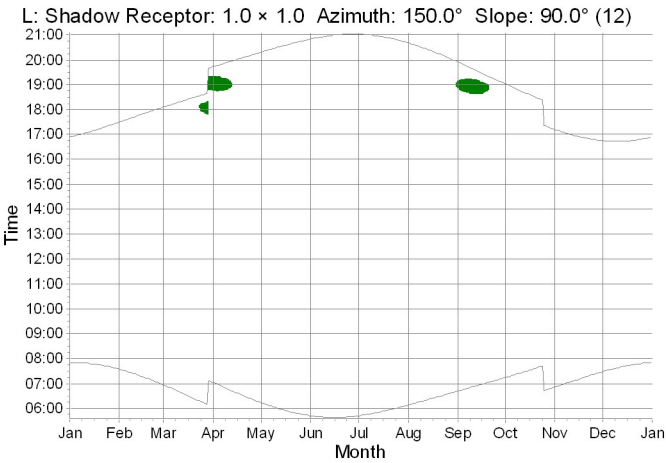
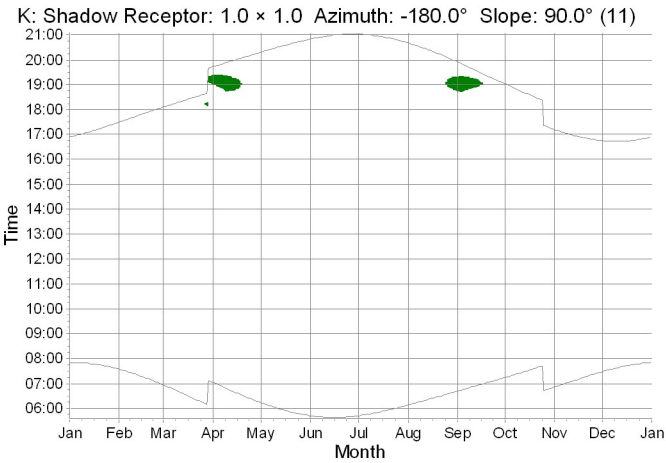
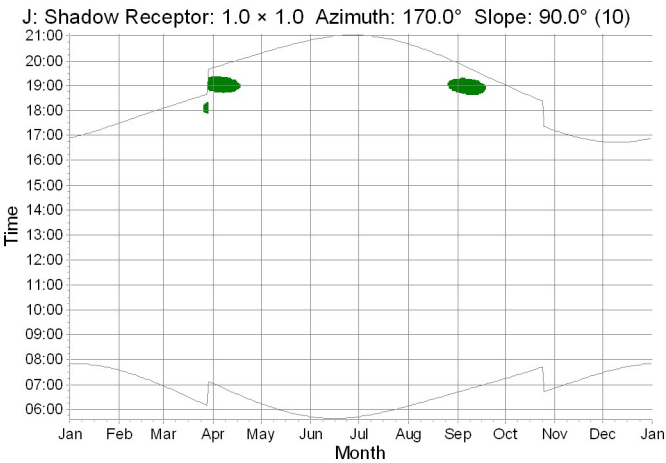
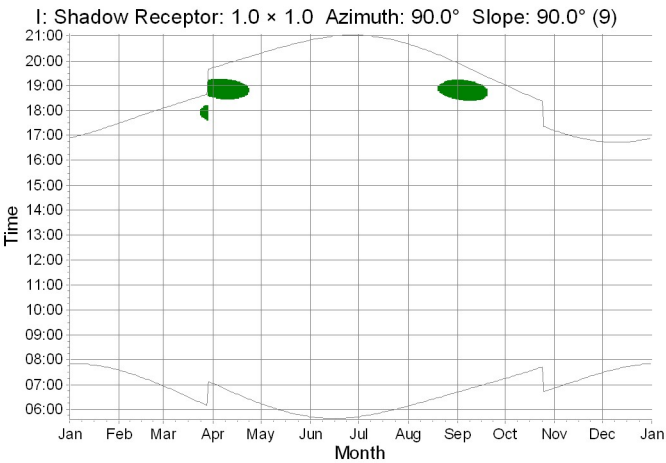
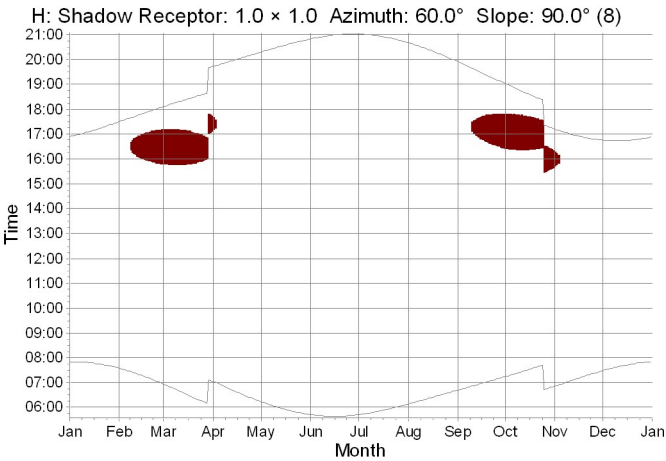
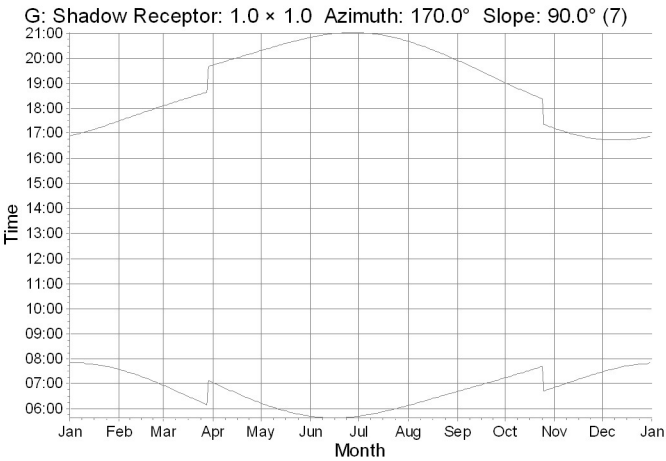


WTGs

4: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (4)
5: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (5)

6: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (6)
8: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (8)

SHADOW - Calendar, graphical
Calculation: WON023_ShadowFlickering

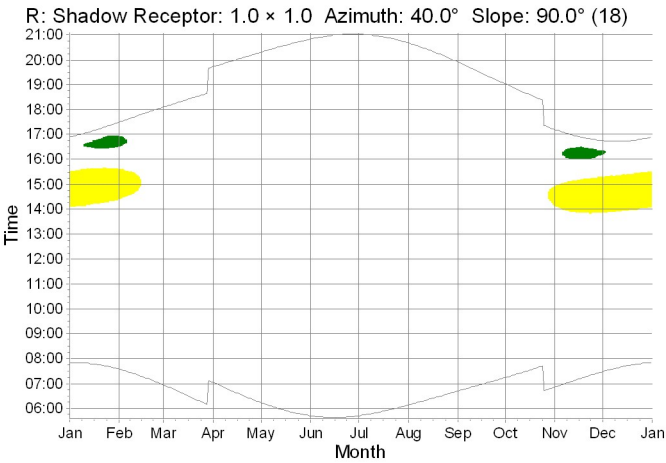
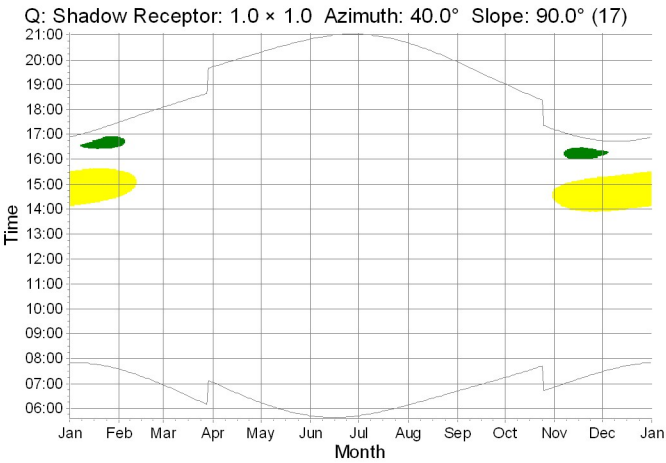
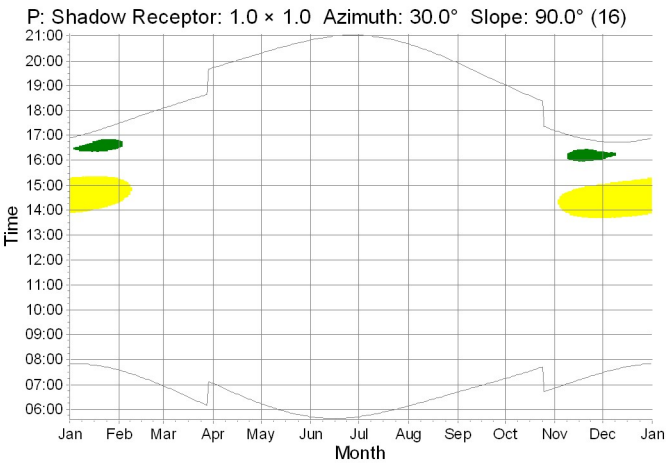
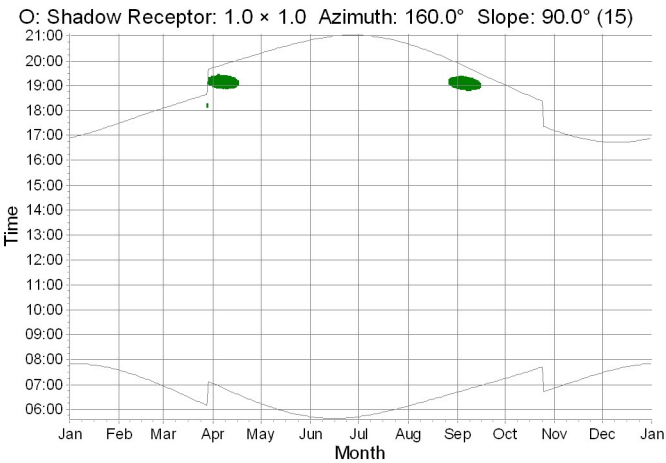
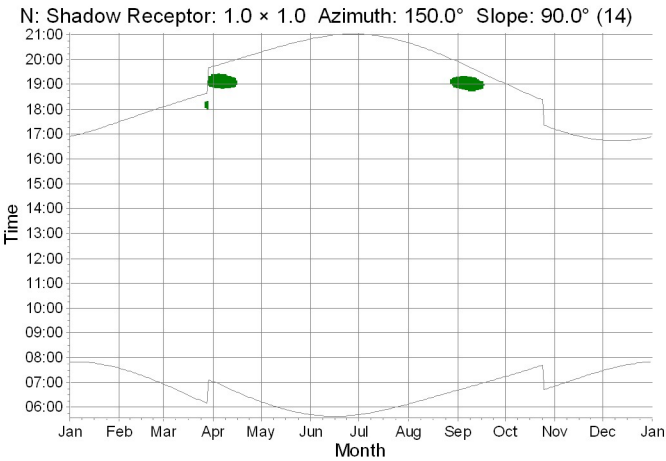
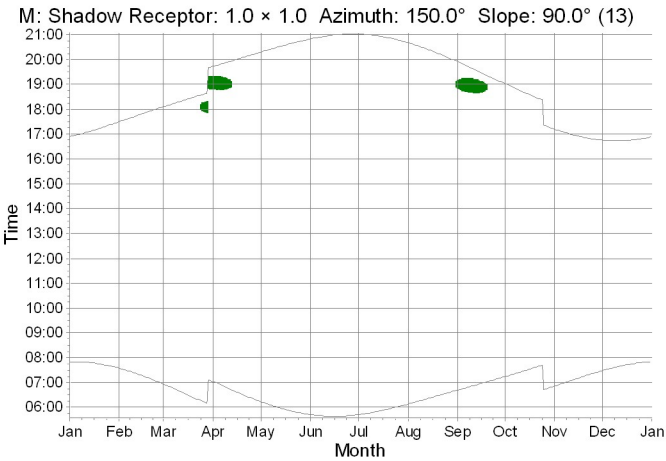


WTGs

1: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)

8: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (8)

SHADOW - Calendar, graphical
Calculation: WON023_ShadowFlickering



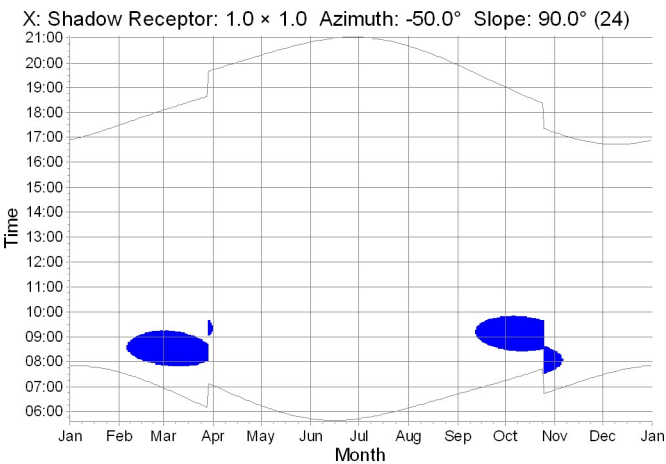
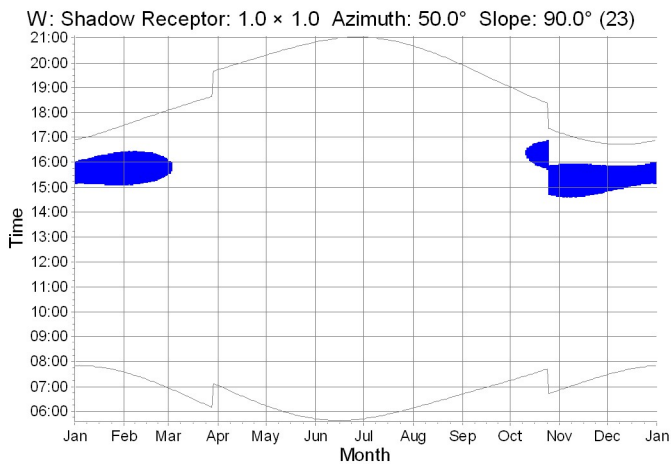
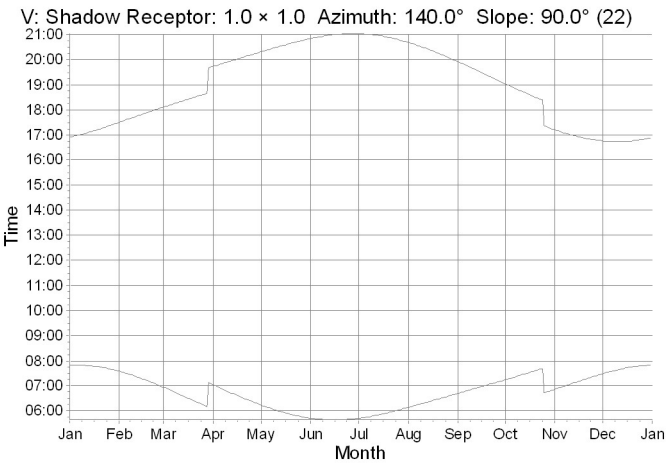
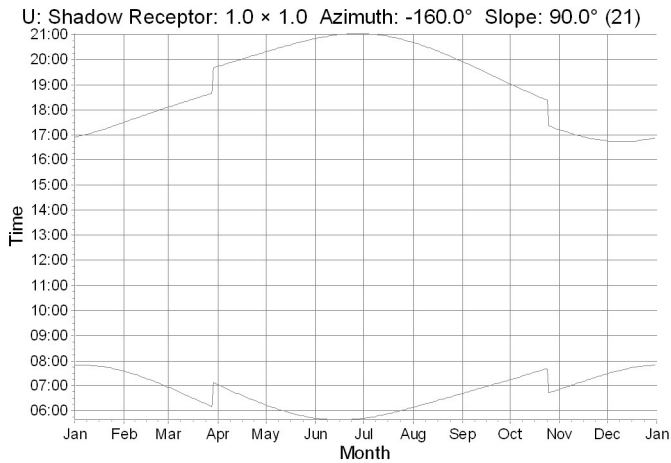
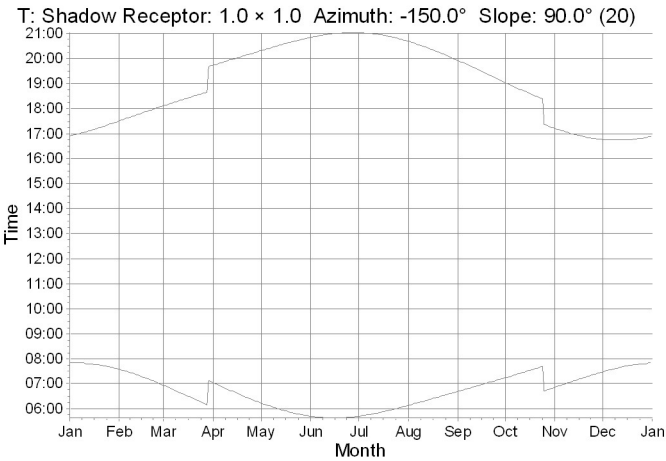
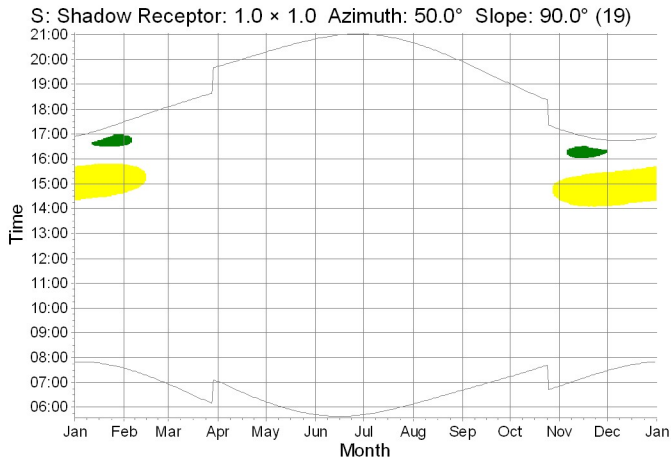
WTGs

1: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)

2: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (2)

SHADOW - Calendar, graphical

Calculation: WON023_ShadowFlickering



WTGs

- 1: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)
- 2: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (2)

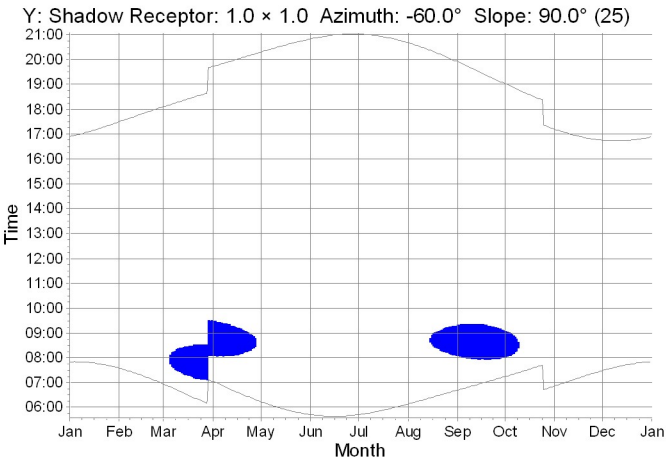
- 3: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (3)

Project:
WON023

Licensed user:
Iron solar s.r.l.
via Lanzone, 31
IT-20122 Milano
+393487125089
Fabio Paccapelo / francesca.saccarola@hopegroup.it
Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Calendar, graphical

Calculation: WON023_ShadowFlickering



WTGs

3: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (3)

SHADOW - Calendar per WTG

Calculation: WON023_ShadowFlickering WTG: 1 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June
1	07:49 16:53	07:34 16:32-16:55/23 17:29	06:56 18:06	07:02 18:33-19:21/48 19:43	06:13 20:18	05:42 20:50
2	07:50 16:54	07:33 16:34-16:55/21 17:31	06:54 18:07	07:00 18:32-19:22/50 19:44	06:12 20:19	05:42 20:51
3	07:50 16:55	07:32 16:36-16:54/18 17:32	06:52 18:09	06:58 18:30-19:23/53 19:46	06:11 20:20	05:41 20:51
4	07:50 16:27-16:29/2 16:56	07:31 16:38-16:53/15 17:33	06:51 18:10	06:57 18:31-19:25/54 19:47	06:09 20:21	05:41 20:52
5	07:50 16:26-16:30/4 16:57	07:30 16:41-16:49/8 17:35	06:49 18:11	06:55 18:30-19:24/54 19:48	06:08 20:22	05:40 20:53
6	07:49 16:25-16:31/6 16:58	07:29 17:36	06:47 18:12	06:53 18:29-19:24/55 19:49	06:07 20:24	05:40 20:53
7	07:49 16:24-16:32/8 16:59	07:27 17:38	06:46 18:14	06:51 18:28-19:23/55 19:50	06:05 20:25	05:40 20:54
8	07:49 16:24-16:33/9 17:00	07:26 17:39	06:44 18:15	06:50 18:29-19:24/55 19:51	06:04 20:26	05:39 20:55
9	07:49 16:24-16:34/10 17:01	07:25 17:40	06:42 18:16	06:48 18:28-19:23/55 19:53	06:03 20:27	05:39 20:55
10	07:49 16:23-16:35/12 17:02	07:24 17:42	06:41 18:17	06:46 18:28-19:22/54 19:54	06:02 20:28	05:39 20:56
11	07:49 16:23-16:36/13 17:03	07:22 17:43	06:39 18:18	06:45 18:29-19:21/52 19:55	06:00 20:29	05:39 20:57
12	07:48 16:23-16:38/15 17:04	07:21 17:44	06:37 18:20	06:43 18:29-19:20/51 19:56	05:59 20:30	05:38 20:57
13	07:48 16:23-16:39/16 17:05	07:20 17:46	06:35 18:21	06:41 18:29-19:18/49 19:57	05:58 20:31	05:38 20:58
14	07:47 16:23-16:40/17 17:07	07:18 17:47	06:34 18:22	06:40 18:30-19:17/47 19:58	05:57 20:32	05:38 20:58
15	07:47 16:22-16:41/19 17:08	07:17 17:48	06:32 18:23	06:38 18:30-19:14/44 19:59	05:56 20:34	05:38 20:59
16	07:47 16:23-16:43/20 17:09	07:16 17:49	06:30 18:24	06:36 18:30-19:11/41 20:01	05:55 20:35	05:38 20:59
17	07:46 16:23-16:44/21 17:10	07:14 17:51	06:28 18:26	06:35 18:32-19:08/36 20:02	05:54 20:36	05:38 20:59
18	07:46 16:22-16:45/23 17:11	07:13 17:52	06:27 18:27	06:33 18:32-19:05/33 20:03	05:53 20:37	05:38 21:00
19	07:45 16:23-16:47/24 17:13	07:11 17:53	06:25 18:28	06:31 18:34-19:04/30 20:04	05:52 20:38	05:38 21:00
20	07:44 16:23-16:48/25 17:14	07:10 17:55	06:23 18:29	06:30 18:35-19:02/27 20:05	05:51 20:39	05:39 21:00
21	07:44 16:23-16:49/26 17:15	07:08 17:56	06:21 18:30	06:28 18:38-19:00/22 20:06	05:50 20:40	05:39 21:01
22	07:43 16:24-16:51/27 17:16	07:07 17:57	06:20 18:32	06:27 18:40-18:57/17 20:08	05:49 20:41	05:39 21:01
23	07:42 16:24-16:52/28 17:18	07:05 17:59	06:18 18:04-18:08/4 18:33	06:25 18:45-18:52/7 20:09	05:48 20:42	05:39 21:01
24	07:41 16:24-16:53/29 17:19	07:04 18:00	06:16 17:50-18:12/22 18:34	06:24 20:10	05:47 20:43	05:39 21:01
25	07:41 16:25-16:55/30 17:20	07:02 18:01	06:14 17:45-18:13/28 18:35	06:22 20:11	05:47 20:44	05:40 21:01
26	07:40 16:25-16:56/31 17:22	07:00 18:02	06:12 17:43-18:14/31 18:36	06:21 20:12	05:46 20:45	05:40 21:01
27	07:39 16:26-16:56/30 17:23	06:59 18:04	06:11 17:40-18:16/36 18:37	06:19 20:13	05:45 20:45	05:40 21:01
28	07:38 16:27-16:56/29 17:24	06:57 18:05	06:09 17:38-18:17/39 18:39	06:18 20:14	05:45 20:46	05:41 21:01
29	07:37 16:28-16:56/28 17:26		07:07 18:36-19:18/42 19:40	06:16 20:16	05:44 20:47	05:41 21:01
30	07:36 16:29-16:56/27 17:27		07:05 18:35-19:19/44 19:41	06:15 20:17	05:43 20:48	05:42 21:01
31	07:35 16:30-16:56/26 17:28		07:04 18:34-19:21/47 19:42		05:43 20:49	
Potential sun hours	292	294	369	401	454	459
Sum of minutes with flicker	555	85	293	989	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: WON023_ShadowFlickering WTG: 1 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)
Assumptions for shadow calculations

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

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

	July	August	September	October	November	December
1	05:42 21:01	06:08 20:40	06:41 18:28-19:20/52 19:54	07:14 19:01	06:51 17:11	07:28 16:05-16:19/14 16:45
2	05:43 21:01	06:09 20:39	06:42 18:27-19:21/54 19:53	07:15 18:59	06:53 17:10	07:30 16:06-16:18/12 16:44
3	05:43 21:01	06:10 20:38	06:43 18:26-19:21/55 19:51	07:16 18:57	06:54 17:09	07:31 16:07-16:18/11 16:44
4	05:44 21:01	06:11 20:37	06:45 18:26-19:21/55 19:49	07:18 18:56	06:55 17:08	07:32 16:08-16:17/9 16:44
5	05:44 21:00	06:12 20:35	06:46 18:25-19:20/55 19:48	07:19 18:54	06:56 17:06	07:33 16:09-16:17/8 16:44
6	05:45 21:00	06:13 20:34	06:47 18:25-19:20/55 19:46	07:20 18:52	06:58 16:10-16:20/10 17:05	07:34 16:11-16:18/7 16:44
7	05:46 21:00	06:14 20:33	06:48 18:25-19:19/54 19:44	07:21 18:51	06:59 16:08-16:23/15 17:04	07:35 16:13-16:17/4 16:43
8	05:46 20:59	06:15 20:32	06:49 18:25-19:19/54 19:42	07:22 18:49	07:00 16:05-16:24/19 17:03	07:36 16:13-16:16/3 16:43
9	05:47 20:59	06:16 20:30	06:50 18:25-19:17/52 19:40	07:23 18:47	07:02 16:05-16:26/21 17:02	07:37 16:43
10	05:48 20:58	06:17 20:29	06:51 18:25-19:16/51 19:39	07:24 18:45	07:03 16:03-16:26/23 17:00	07:38 16:43
11	05:48 20:58	06:18 20:28	06:52 18:25-19:14/49 19:37	07:26 18:44	07:04 16:01-16:27/26 16:59	07:38 16:43
12	05:49 20:57	06:20 20:26	06:53 18:25-19:12/47 19:35	07:27 18:42	07:05 16:01-16:28/27 16:58	07:39 16:43
13	05:50 20:57	06:21 20:25	06:54 18:26-19:10/44 19:33	07:28 18:40	07:07 16:00-16:28/28 16:57	07:40 16:43
14	05:51 20:56	06:22 20:23	06:55 18:26-19:08/42 19:32	07:29 18:39	07:08 15:59-16:28/29 16:56	07:41 16:44
15	05:52 20:56	06:23 20:22	06:57 18:27-19:06/39 19:30	07:30 18:37	07:09 15:59-16:29/30 16:55	07:42 16:44
16	05:52 20:55	06:24 20:20	06:58 18:28-19:05/37 19:28	07:32 18:35	07:10 15:58-16:29/31 16:54	07:42 16:44
17	05:53 20:54	06:25 20:19	06:59 18:31-19:04/33 19:26	07:33 18:34	07:12 15:59-16:29/30 16:54	07:43 16:44
18	05:54 20:54	06:26 20:17	07:00 18:33-19:02/29 19:24	07:34 18:32	07:13 15:58-16:27/29 16:53	07:44 16:45
19	05:55 20:53	06:27 20:16	07:01 18:36-19:00/24 19:23	07:35 18:31	07:14 15:58-16:26/28 16:52	07:44 16:45
20	05:56 20:52	06:28 18:48-18:58/10 20:14	07:02 18:48-18:56/8 19:21	07:36 18:29	07:15 15:59-16:26/27 16:51	07:45 16:45
21	05:57 20:51	06:29 18:44-19:02/18 20:13	07:03 19:19	07:38 18:27	07:17 15:59-16:25/26 16:50	07:46 16:46
22	05:58 20:50	06:30 18:41-19:04/23 20:11	07:04 19:17	07:39 18:26	07:18 15:59-16:24/25 16:50	07:46 16:46
23	05:59 20:50	06:31 18:39-19:06/27 20:09	07:05 19:15	07:40 18:24	07:19 15:59-16:23/24 16:49	07:47 16:47
24	06:00 20:49	06:33 18:37-19:07/30 20:08	07:06 19:14	07:41 18:23	07:20 16:00-16:23/23 16:48	07:47 16:47
25	06:01 20:48	06:34 18:36-19:09/33 20:06	07:07 19:12	06:43 17:21	07:22 16:01-16:22/21 16:48	07:47 16:48
26	06:02 20:47	06:35 18:34-19:11/37 20:05	07:09 19:10	06:44 17:20	07:23 16:01-16:21/20 16:47	07:48 16:49
27	06:03 20:46	06:36 18:33-19:14/41 20:03	07:10 19:08	06:45 17:18	07:24 16:01-16:20/19 16:47	07:48 16:49
28	06:04 20:45	06:37 18:32-19:17/45 20:01	07:11 19:06	06:46 17:17	07:25 16:03-16:20/17 16:46	07:49 16:50
29	06:05 20:44	06:38 18:31-19:18/47 20:00	07:12 19:05	06:48 17:16	07:26 16:04-16:20/16 16:46	07:49 16:51
30	06:06 20:43	06:39 18:30-19:19/49 19:58	07:13 19:03	06:49 17:14	07:27 16:04-16:19/15 16:45	07:49 16:51
31	06:07 20:41	06:40 18:29-19:20/51 19:56		06:50 17:13		07:49 16:52
Potential sun hours	465	432	376	343	293	281
Sum of minutes with flicker	0	411	889	0	579	68

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:
WON023

Licensed user:
Iron solar s.r.l.
via Lanzone, 31
IT-20122 Milano
+393487125089
Fabio Paccapelo / francesca.saccarola@hopegroup.it
Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Calendar per WTG

Calculation: WON023_ShadowFlickering WTG: 2 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (2)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:49 13:54-15:40/106 16:53	07:34 14:21-15:45/84 17:29	06:56 07:02 18:06	06:13 19:43 20:18	05:42 20:50 21:01	05:42 20:40 21:01	06:08 19:54 20:40	06:41 19:54 20:40	07:14 19:01 19:54	06:51 14:10-15:06/56 17:11	07:28 13:41-15:26/105 16:45	
2	07:49 13:54-15:40/106 16:54	07:33 14:23-15:45/82 17:31	06:54 07:00 18:07	06:12 19:44 20:19	05:42 20:50 21:01	05:43 20:39 21:01	06:09 19:53 20:39	06:42 18:59 19:53	07:15 18:59 19:53	06:53 14:08-15:07/59 17:10	07:30 13:41-15:26/105 16:44	
3	07:50 13:55-15:41/106 16:55	07:32 14:26-15:44/78 17:32	06:52 06:58 18:09	06:10 19:46 20:20	05:41 20:51 21:01	05:43 20:38 21:01	06:10 19:51 20:38	06:43 18:57 19:51	07:16 18:57 19:51	06:54 14:05-15:08/63 17:09	07:31 13:41-15:27/106 16:44	
4	07:50 13:55-15:41/106 16:56	07:31 14:29-15:44/75 17:33	06:51 06:57 18:10	06:09 20:21 20:52	05:41 20:52 21:00	05:44 20:37 21:00	06:11 19:49 20:37	06:45 18:56 19:49	07:18 18:56 19:49	06:55 14:04-15:10/66 17:07	07:32 13:41-15:27/106 16:44	
5	07:50 13:56-15:42/106 16:57	07:30 14:31-15:42/71 17:35	06:49 06:55 18:11	06:08 20:22 20:53	05:40 20:53 21:00	05:44 20:35 21:00	06:12 19:47 20:35	06:46 18:54 19:47	07:19 18:54 19:47	06:56 14:02-15:11/69 17:06	07:33 13:42-15:27/105 16:44	
6	07:49 13:57-15:42/105 16:58	07:29 14:33-15:41/68 17:36	06:47 06:53 18:12	06:06 20:24 20:53	05:40 20:53 21:00	05:45 20:34 21:00	06:13 19:46 20:34	06:47 18:52 19:46	07:20 18:52 19:46	06:58 14:00-15:12/72 17:05	07:34 13:43-15:29/106 16:43	
7	07:49 13:57-15:42/105 16:59	07:27 14:35-15:40/65 17:37	06:46 06:51 18:14	06:05 20:25 20:54	05:40 20:54 21:00	05:46 20:33 21:00	06:14 19:44 20:33	06:48 18:50 19:44	07:21 18:50 19:44	06:59 13:58-15:13/75 17:04	07:35 13:43-15:28/105 16:43	
8	07:49 13:57-15:43/106 17:00	07:26 14:37-15:39/62 17:39	06:44 06:50 18:15	06:04 20:26 20:55	05:39 20:59 21:02	05:46 20:32 21:02	06:15 19:42 20:32	06:49 18:49 19:42	07:22 18:49 19:42	07:00 13:55-15:14/79 17:03	07:36 13:42-15:28/106 16:43	
9	07:49 13:58-15:44/106 17:01	07:25 14:38-15:37/59 17:40	06:42 06:48 18:16	06:03 20:27 20:55	05:39 20:59 21:02	05:47 20:30 21:02	06:16 19:40 20:30	06:50 18:47 19:40	07:23 18:47 19:40	07:02 13:54-15:16/82 17:02	07:37 13:43-15:29/106 16:43	
10	07:49 13:58-15:43/105 17:02	07:24 14:41-15:36/55 17:41	06:41 06:46 18:17	06:01 20:28 20:56	05:39 20:58 21:02	05:48 20:29 21:02	06:17 19:39 20:29	06:51 18:45 19:39	07:24 18:45 19:39	07:03 13:52-15:16/84 17:00	07:38 13:43-15:29/106 16:43	
11	07:49 13:59-15:44/105 17:03	07:22 14:44-15:34/50 17:43	06:39 06:45 18:18	06:00 20:29 20:57	05:39 20:58 21:02	05:48 20:27 21:02	06:18 19:37 20:27	06:52 18:44 19:37	07:26 18:44 19:37	07:04 13:50-15:16/86 16:59	07:38 13:44-15:30/106 16:43	
12	07:48 14:00-15:45/105 17:04	07:21 14:47-15:31/44 17:44	06:37 06:43 18:20	05:59 20:30 20:57	05:38 20:57 21:02	05:49 20:26 21:02	06:19 19:35 20:26	06:53 18:42 19:35	07:27 18:42 19:35	07:05 13:49-15:18/89 16:58	07:39 13:44-15:30/106 16:43	
13	07:48 14:00-15:45/105 17:05	07:20 14:51-15:28/37 17:45	06:35 06:41 18:21	05:58 20:31 20:58	05:38 20:57 21:02	05:50 20:25 21:02	06:21 19:33 20:25	06:54 18:40 19:33	07:28 18:40 19:33	07:07 13:48-15:18/90 16:57	07:40 13:45-15:31/106 16:43	
14	07:47 14:02-15:46/104 17:07	07:18 14:57-15:23/26 17:47	06:34 06:39 18:22	05:57 20:32 20:58	05:38 20:56 21:02	05:51 20:23 21:02	06:22 19:31 20:23	06:55 18:39 19:31	07:29 18:39 19:31	07:08 13:47-15:18/91 16:56	07:41 13:45-15:31/106 16:44	
15	07:47 14:02-15:45/103 17:08	07:17 17:48	06:32 06:38 18:23	05:56 20:33 20:58	05:38 20:56 21:02	05:52 20:22 21:02	06:23 19:30 20:22	06:56 18:37 19:30	07:30 18:37 19:30	07:09 13:46-15:20/94 16:55	07:42 13:45-15:31/106 16:44	
16	07:47 14:03-15:46/103 17:09	07:16 17:49	06:30 06:36 18:24	05:55 20:35 20:59	05:38 20:55 21:02	05:52 20:20 21:02	06:24 19:28 20:20	06:58 18:35 19:28	07:31 18:35 19:28	07:10 13:45-15:20/95 16:54	07:42 13:46-15:32/106 16:44	
17	07:46 14:03-15:46/103 17:10	07:14 17:51	06:28 06:35 18:26	05:54 20:36 20:59	05:38 20:54 21:02	05:53 20:19 21:02	06:25 19:26 20:19	06:59 18:34 19:26	07:33 18:34 19:26	07:12 13:45-15:21/96 16:53	07:43 13:47-15:33/106 16:44	
18	07:45 14:04-15:46/102 17:11	07:13 17:52	06:27 06:33 18:27	05:53 20:37 21:00	05:38 20:54 21:02	05:54 20:17 21:02	06:26 19:24 20:17	07:00 18:32 19:24	07:34 18:32 19:24	07:13 13:44-15:21/97 16:53	07:44 13:46-15:32/106 16:45	
19	07:45 14:05-15:47/102 17:13	07:11 17:53	06:25 06:31 18:28	05:52 20:38 21:00	05:38 20:53 21:02	05:55 20:16 21:02	06:27 19:22 20:16	07:01 18:30 19:22	07:35 18:30 19:22	07:14 13:43-15:21/98 16:52	07:44 13:47-15:33/106 16:45	
20	07:44 14:06-15:47/101 17:14	07:10 17:55	06:23 06:30 18:29	05:51 20:39 21:00	05:38 20:52 21:02	05:56 20:14 21:02	06:28 19:21 20:14	07:02 18:29 19:21	07:36 18:29 19:21	07:15 13:43-15:22/99 16:51	07:45 13:47-15:33/106 16:45	
21	07:44 14:07-15:47/100 17:15	07:08 17:56	06:21 06:28 18:30	05:50 20:40 21:00	05:39 20:51 21:02	05:57 20:13 21:02	06:29 19:19 20:13	07:03 18:27 19:19	07:38 18:27 19:19	07:17 13:43-15:23/100 16:50	07:46 13:48-15:34/106 16:46	
22	07:43 14:08-15:47/99 17:16	07:07 17:57	06:20 06:27 18:32	05:49 20:41 21:01	05:39 20:50 21:02	05:58 20:11 21:02	06:30 19:17 20:11	07:04 18:26 19:17	07:39 18:26 19:17	07:18 13:42-15:23/101 16:50	07:46 13:48-15:34/106 16:46	
23	07:42 14:09-15:47/98 17:18	07:05 17:58	06:18 06:25 18:33	05:48 20:42 21:01	05:39 20:50 21:02	05:59 20:09 21:02	06:31 19:15 20:09	07:05 18:24 19:15	07:40 18:24 19:15	07:19 13:41-15:23/102 16:49	07:47 13:49-15:35/106 16:47	
24	07:41 14:10-15:47/97 17:19	07:04 18:00	06:16 06:23 18:34	05:47 20:43 21:01	05:39 20:49 21:02	06:00 20:08 21:02	06:33 19:13 20:08	07:06 18:23 19:13	07:41 18:23 19:13	07:20 13:42-15:24/102 16:48	07:47 13:49-15:35/106 16:47	
25	07:41 14:11-15:47/96 17:20	07:02 18:01	06:14 06:22 18:35	05:47 20:44 21:01	05:40 20:48 21:02	06:01 20:06 21:02	06:34 19:12 20:06	07:07 17:21 19:12	07:42 17:21 19:12	07:22 13:41-15:24/103 16:48	07:47 13:50-15:36/106 16:48	
26	07:40 14:12-15:47/95 17:21	07:00 18:02	06:12 06:20 18:36	05:46 20:44 21:01	05:40 20:47 21:02	06:02 20:04 21:02	06:35 19:10 20:04	07:09 17:20 19:10	07:43 17:20 19:10	07:23 13:41-15:24/103 16:47	07:48 13:51-15:37/106 16:49	
27	07:39 14:13-15:47/94 17:23	06:59 18:04	06:11 06:19 18:37	05:45 20:45 21:01	05:40 20:46 21:02	06:03 20:03 21:02	06:36 19:08 20:03	07:10 17:18 19:08	07:44 17:18 19:08	07:24 13:41-15:24/103 16:46	07:48 13:51-15:37/106 16:49	
28	07:38 14:15-15:46/91 17:24	06:57 18:05	06:09 06:17 18:39	05:44 20:46 21:01	05:41 20:45 21:02	06:04 20:01 21:02	06:37 19:06 20:01	07:11 17:17 19:06	07:45 17:17 19:06	07:25 13:42-15:26/104 16:46	07:48 13:51-15:37/106 16:50	
29	07:37 14:16-15:46/90 17:25	06:56 18:06	06:07 06:16 18:40	05:44 20:47 21:01	05:41 20:44 21:02	06:05 20:00 21:02	06:38 19:05 20:00	07:12 17:16 19:05	07:46 17:16 19:05	06:47 14:20-14:59/39 16:46	07:49 13:52-15:38/106 16:51	
30	07:36 14:18-15:46/88 17:27	06:55 18:07	06:06 06:15 18:41	05:43 20:48 21:01	05:42 20:43 21:02	06:06 20:00 21:02	06:39 19:03 20:00	07:13 17:14 19:03	07:47 17:14 19:03	06:49 14:16-15:01/45 16:45	07:49 13:53-15:39/106 16:51	
31	07:35 14:19-15:45/86 17:28	06:54 18:08	06:05 06:14 18:42	05:43 20:49 21:01	05:43 20:41 21:02	06:07 20:00 21:02	06:40 19:56 20:00	07:14 17:13 19:03	07:48 17:13 19:03	06:50 14:12-15:03/51 16:45	07:49 13:53-15:39/106 16:52	
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281
Sum of minutes with flicker	3124	856	0	0	0	0	0	0	0	164	2668	3282

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: WON023_ShadowFlickering WTG: 3 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (3)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June
1	07:49 15:09-16:00/51 16:53	07:34 15:07-16:23/76 17:29	06:56 07:53-09:12/79 18:06 15:34-16:02/28	07:02 08:05-09:27/82 19:43	06:13 20:18 20:50	05:42 20:50
2	07:50 15:09-16:01/52 16:54	07:33 15:07-16:24/77 17:31	06:54 07:53-09:13/80 18:07 15:40-15:58/18	07:00 08:05-09:26/81 19:44	06:12 20:19 20:51	05:42 20:51
3	07:50 15:10-16:02/52 16:55	07:32 15:07-16:24/77 17:32	06:52 07:52-09:13/81 18:09	06:58 08:04-09:25/81 19:46	06:10 20:20 20:51	05:41 20:51
4	07:50 15:10-16:03/53 16:56	07:31 15:08-16:25/77 17:33	06:51 07:51-09:12/81 18:10	06:57 08:05-09:25/80 19:47	06:09 20:21 20:52	05:41 20:52
5	07:50 15:10-16:04/54 16:57	07:30 15:07-16:24/77 17:35	06:49 07:45-09:12/87 18:11	06:55 08:05-09:24/79 19:48	06:08 20:23 20:53	05:40 20:53
6	07:50 15:10-16:05/55 16:58	07:29 08:30-08:38/8 17:36 15:07-16:24/77	06:47 07:40-09:12/92 18:12	06:53 08:05-09:23/78 19:49	06:06 20:24 20:53	05:40 20:53
7	07:49 15:09-16:05/56 16:59	07:27 08:23-08:45/22 17:37 15:08-16:25/77	06:46 07:36-09:11/95 18:14	06:51 08:04-09:21/77 19:50	06:05 20:25 20:54	05:40 20:54
8	07:49 15:09-16:06/57 17:00	07:26 08:20-08:49/29 17:39 15:09-16:25/76	06:44 07:32-09:10/98 18:15	06:50 08:05-09:21/76 19:51	06:04 20:26 20:55	05:39 20:55
9	07:49 15:09-16:07/58 17:01	07:25 08:16-08:52/36 17:40 15:08-16:24/76	06:42 07:30-09:10/100 18:16	06:48 08:05-09:20/75 19:53	06:03 20:27 20:55	05:39 20:55
10	07:49 15:09-16:09/60 17:02	07:24 08:14-08:55/41 17:41 15:09-16:24/75	06:41 07:28-09:10/102 18:17	06:46 08:05-09:18/73 19:54	06:01 20:28 20:56	05:39 20:56
11	07:49 15:08-16:09/61 17:03	07:22 08:12-08:57/45 17:43 15:10-16:24/74	06:39 07:26-09:09/103 18:18	06:45 08:06-09:18/72 19:55	06:00 20:29 20:57	05:39 20:57
12	07:48 15:09-16:10/61 17:04	07:21 08:10-08:59/49 17:44 15:10-16:23/73	06:37 07:23-09:07/104 18:20	06:43 08:06-09:16/70 19:56	05:59 20:30 20:57	05:38 20:57
13	07:48 15:08-16:11/63 17:05	07:20 08:08-09:01/53 17:45 15:11-16:23/72	06:35 07:22-09:07/105 18:21	06:41 08:06-09:15/69 19:57	05:58 20:31 20:58	05:38 20:58
14	07:48 15:08-16:12/64 17:07	07:18 08:07-09:03/56 17:47 15:11-16:22/71	06:34 07:20-09:06/106 18:22	06:40 08:07-09:14/67 19:58	05:57 20:32 20:58	05:38 20:58
15	07:47 15:08-16:12/64 17:08	07:17 08:05-09:04/59 17:48 15:12-16:22/70	06:32 07:19-09:05/106 18:23	06:38 08:07-09:12/65 19:59	05:56 20:34 20:59	05:38 20:59
16	07:47 15:08-16:14/66 17:09	07:16 08:04-09:05/61 17:49 15:13-16:22/69	06:30 07:17-09:03/106 18:24	06:36 08:08-09:10/62 20:01	05:55 20:35 20:59	05:38 20:59
17	07:46 15:08-16:14/66 17:10	07:14 08:02-09:06/64 17:51 15:13-16:21/68	06:28 07:17-09:03/106 18:26	06:35 08:09-09:09/60 20:02	05:54 20:36 20:59	05:38 20:59
18	07:46 15:08-16:16/68 17:11	07:13 08:02-09:08/66 17:52 15:15-16:21/66	06:27 07:15-09:01/106 18:27	06:33 08:10-09:07/57 20:03	05:53 20:37 21:00	05:38 21:00
19	07:45 15:08-16:16/68 17:13	07:11 08:00-09:08/68 17:53 15:15-16:19/64	06:25 07:14-09:00/106 18:28	06:31 08:11-09:06/55 20:04	05:52 20:38 21:00	05:38 21:00
20	07:44 15:07-16:17/70 17:14	07:10 08:00-09:09/69 17:55 15:17-16:19/62	06:23 07:12-08:58/106 18:29	06:30 08:12-09:04/52 20:05	05:51 20:39 21:00	05:38 21:00
21	07:44 15:07-16:17/70 17:15	07:08 07:58-09:10/72 17:56 15:18-16:18/60	06:21 07:11-08:56/105 18:30	06:28 08:14-09:02/48 20:06	05:50 20:40 21:01	05:39 21:01
22	07:43 15:07-16:19/72 17:16	07:07 07:58-09:11/73 17:57 15:20-16:17/57	06:20 07:11-08:55/104 18:32	06:27 08:15-09:00/45 20:08	05:49 20:41 21:01	05:39 21:01
23	07:42 15:07-16:19/72 17:18	07:05 07:57-09:11/74 17:59 15:21-16:15/54	06:18 07:10-08:53/103 18:33	06:25 08:17-08:58/41 20:09	05:48 20:42 21:01	05:39 21:01
24	07:41 15:07-16:20/73 17:19	07:04 07:55-09:11/76 18:00 15:22-16:13/51	06:16 07:09-08:51/102 18:34	06:23 08:18-08:55/37 20:10	05:47 20:43 21:01	05:39 21:01
25	07:41 15:07-16:20/73 17:20	07:02 07:55-09:12/77 18:01 15:24-16:12/48	06:14 07:08-08:48/100 18:35	06:22 08:21-08:53/32 20:11	05:47 20:44 21:01	05:40 21:01
26	07:40 15:07-16:21/74 17:21	07:00 07:54-09:12/78 18:02 15:26-16:10/44	06:12 07:08-08:46/98 18:36	06:20 08:23-08:49/26 20:12	05:46 20:45 21:01	05:40 21:01
27	07:39 15:06-16:21/75 17:23	06:59 07:54-09:13/79 18:04 15:29-16:08/39	06:11 07:08-08:43/95 18:37	06:19 08:27-08:45/18 20:13	05:45 20:45 21:01	05:40 21:01
28	07:38 15:06-16:22/76 17:24	06:57 07:53-09:13/80 18:05 15:31-16:05/34	06:09 07:07-08:40/93 18:39	06:18 20:14 20:46	05:44 20:46 21:01	05:41 21:01
29	07:37 15:06-16:22/76 17:25		07:07 08:06-09:37/91 19:40	06:16 20:16 20:47	05:44 20:47 21:01	05:41 21:01
30	07:36 15:06-16:23/77 17:27		07:05 08:05-09:32/87 19:41	06:15 20:17 20:48	05:43 20:48 21:01	05:42 21:01
31	07:35 15:07-16:23/76 17:28		07:04 08:06-09:28/82 19:42		05:43 20:49 21:01	
Potential sun hours	292	294	369	401	454	459
Sum of minutes with flicker	2013	3176	3055	1658	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: WON023_ShadowFlickering WTG: 3 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (3)
Assumptions for shadow calculations

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

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

	July	August	September	October	November	December
1	05:42 21:01	06:08 20:40	06:41 08:05-09:17/72 19:54	07:14 08:02-09:47/105 19:01	06:51 07:44-08:24/40 17:11 14:39-15:54/75	07:29 14:51-15:51/60 16:45
2	05:43 21:01	06:09 20:39	06:42 08:04-09:17/73 19:53	07:15 08:03-09:47/104 18:59	06:53 07:46-08:21/35 17:10 14:38-15:54/76	07:30 14:51-15:51/60 16:44
3	05:43 21:01	06:10 20:38	06:43 08:03-09:18/75 19:51	07:16 08:05-09:47/102 18:57	06:54 07:49-08:18/29 17:09 14:37-15:54/77	07:31 14:52-15:50/58 16:44
4	05:44 21:01	06:11 20:37	06:45 08:02-09:18/76 19:49	07:18 08:06-09:47/101 18:56	06:55 07:54-08:14/20 17:07 14:38-15:54/76	07:32 14:53-15:50/57 16:44
5	05:44 21:00	06:12 20:36	06:46 08:01-09:18/77 19:48	07:19 08:09-09:48/99 18:54	06:56 08:02-08:05/3 17:06 14:37-15:54/77	07:33 14:55-15:51/56 16:44
6	05:45 21:00	06:13 20:34	06:47 08:01-09:19/78 19:46	07:20 08:11-09:48/97 18:52	06:58 14:38-15:55/77 17:05	07:34 14:56-15:51/55 16:43
7	05:46 21:00	06:14 20:33	06:48 08:00-09:19/79 19:44	07:21 08:14-09:47/93 18:50	06:59 14:37-15:54/77 17:04	07:35 14:57-15:51/54 16:43
8	05:46 20:59	06:15 20:32	06:49 07:59-09:19/80 19:42	07:22 08:17-09:47/90 18:49	07:00 14:37-15:54/77 17:03	07:36 14:58-15:51/53 16:43
9	05:47 20:59	06:16 20:30	06:50 07:59-09:19/80 19:40	07:23 08:23-09:47/84 18:47	07:02 14:38-15:55/77 17:02	07:37 14:58-15:50/52 16:43
10	05:48 20:58	06:17 20:29	06:51 07:58-09:19/81 19:39	07:24 08:26-09:46/80 18:45	07:03 14:38-15:54/76 17:00	07:38 14:58-15:50/52 16:43
11	05:48 20:58	06:18 20:28	06:52 07:58-09:19/81 19:37	07:26 08:26-09:47/81 18:44	07:04 14:37-15:54/77 16:59	07:38 14:59-15:50/51 16:43
12	05:49 20:57	06:19 20:26	06:53 07:57-09:19/82 19:35	07:27 08:26-09:46/80 18:42	07:05 14:38-15:54/76 16:58	07:39 15:00-15:50/50 16:43
13	05:50 20:57	06:21 20:25	06:54 07:57-09:22/85 19:33	07:28 08:26-09:46/80 18:40	07:07 14:38-15:54/76 16:57	07:40 15:01-15:50/49 16:43
14	05:51 20:56	06:22 20:23	06:55 07:56-09:26/90 19:32	07:29 08:26-09:45/79 18:39	07:08 14:39-15:55/76 16:56	07:41 15:03-15:51/48 16:44
15	05:52 20:56	06:23 08:39-08:46/7 20:22	06:56 07:56-09:29/93 19:30	07:30 08:27-09:45/78 18:37	07:09 14:39-15:54/75 16:55	07:42 15:03-15:50/47 16:44
16	05:52 20:55	06:24 08:33-08:53/20 20:20	06:58 07:57-09:32/95 19:28	07:32 08:27-09:44/77 18:35	07:10 14:39-15:54/75 16:54	07:42 15:04-15:50/46 16:44
17	05:53 20:54	06:25 08:29-08:56/27 20:19	06:59 07:57-09:34/97 19:26	07:33 08:27-09:43/76 18:34	07:12 14:41-15:54/73 16:53	07:43 15:05-15:51/46 16:44
18	05:54 20:54	06:26 08:26-08:59/33 20:17	07:00 07:56-09:36/100 19:24	07:34 08:27-09:42/75 18:32	07:13 14:41-15:54/73 16:53	07:44 15:05-15:51/46 16:45
19	05:55 20:53	06:27 08:23-09:01/38 20:16	07:01 07:56-09:37/101 19:23	07:35 08:28-09:42/74 18:30	07:14 14:41-15:53/72 16:52	07:44 15:06-15:51/45 16:45
20	05:56 20:52	06:28 08:21-09:03/42 20:14	07:02 07:56-09:39/103 19:21	07:36 08:29-09:41/72 18:29	07:16 14:42-15:54/72 16:51	07:45 15:07-15:52/45 16:45
21	05:57 20:51	06:29 08:19-09:05/46 20:13	07:03 07:56-09:40/104 19:19	07:38 08:29-09:40/71 18:27	07:17 14:43-15:53/70 16:50	07:46 15:07-15:52/45 16:46
22	05:58 20:50	06:30 08:17-09:06/49 20:11	07:04 07:57-09:41/104 19:17	07:39 08:29-09:39/70 18:26	07:18 14:43-15:53/70 16:49	07:46 15:08-15:53/45 16:46
23	05:59 20:50	06:31 08:15-09:08/53 20:09	07:05 07:57-09:42/105 19:15	07:40 08:31-09:38/67 18:24	07:19 14:44-15:52/68 16:49	07:47 15:08-15:53/45 16:47
24	06:00 20:49	06:33 08:14-09:09/55 20:08	07:06 07:57-09:43/106 19:14	07:41 08:32-09:37/65 18:23	07:20 14:45-15:53/68 16:48	07:47 15:08-15:53/45 16:47
25	06:01 20:48	06:34 08:13-09:11/58 20:06	07:07 07:57-09:43/106 19:12	06:43 07:32-08:35/63 17:21	07:22 14:46-15:52/66 16:48	07:48 15:09-15:54/45 16:48
26	06:02 20:47	06:35 08:12-09:12/60 20:05	07:09 07:58-09:44/106 19:10	06:44 07:34-08:35/61 17:20	07:23 14:46-15:52/66 16:47	07:48 15:09-15:55/46 16:49
27	06:03 20:46	06:36 08:11-09:13/62 20:03	07:10 07:58-09:45/107 19:08	06:45 07:35-08:33/58 17:18	07:24 14:47-15:51/64 16:46	07:48 15:09-15:55/46 16:49
28	06:04 20:45	06:37 08:09-09:14/65 20:01	07:11 08:00-09:46/106 19:06	06:46 07:36-08:31/55 17:17	07:25 14:48-15:52/64 16:46	07:49 15:10-15:57/47 16:50
29	06:05 20:44	06:38 08:08-09:15/67 20:00	07:12 08:01-09:46/105 19:05	06:48 07:38-08:30/52 17:15	07:26 14:49-15:52/63 16:46	07:49 15:10-15:57/47 16:51
30	06:06 20:43	06:39 08:07-09:16/69 19:58	07:13 08:01-09:47/106 19:03	06:49 07:40-08:28/48 17:14	07:27 14:50-15:51/61 16:45	07:49 15:09-15:58/49 16:51
31	06:07 20:41	06:40 08:06-09:16/70 19:56		06:50 07:41-08:26/45 17:13		07:49 15:09-15:59/50 16:52
Potential sun hours	465	432	376	343	293	281
Sum of minutes with flicker	0	821	2753	3539	2297	1540

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:
WON023

Licensed user:
Iron solar s.r.l.
via Lanzone, 31
IT-20122 Milano
+393487125089
Fabio Paccapelo / francesca.saccarola@hopegroup.it
Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Calendar per WTG

Calculation: WON023_ShadowFlickering WTG: 4 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (4)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:50 16:54	07:34 17:30	06:56 16:16-17:21/65 18:06	07:02 19:44	06:14 20:18	05:42 20:50	05:42 21:01	06:08 20:41	06:42 19:55	07:14 16:51-17:59/68 19:01	06:52 17:12	07:29 16:45
2	07:50 16:55	07:33 17:31	06:54 16:15-17:21/66 18:08	07:00 19:45	06:12 20:19	05:42 20:51	05:43 21:01	06:09 20:39	06:43 19:53	07:16 16:51-17:59/68 19:00	06:53 17:10	07:30 16:45
3	07:50 16:55	07:32 17:32	06:53 16:14-17:21/67 18:09	06:59 19:46	06:11 20:20	05:41 20:52	05:44 21:01	06:10 20:38	06:44 19:51	07:17 16:50-17:58/68 18:58	06:54 17:09	07:31 16:44
4	07:50 16:56	07:31 17:34	06:51 16:13-17:21/68 18:10	06:57 19:47	06:09 20:22	05:41 20:52	05:44 21:01	06:11 20:37	06:45 19:50	07:18 16:50-17:59/69 18:56	06:55 17:08	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 16:13-17:22/69 18:11	06:55 19:48	06:08 20:23	05:41 20:53	05:45 21:01	06:12 20:36	06:46 19:48	07:19 16:49-17:59/70 18:54	06:57 17:07	07:33 16:44
6	07:50 16:58	07:29 17:36	06:48 16:13-17:22/69 18:13	06:53 19:49	06:07 20:24	05:40 20:54	05:45 21:00	06:13 20:34	06:47 19:46	07:20 16:49-17:58/69 18:53	06:58 17:05	07:34 16:44
7	07:50 16:59	07:28 17:38	06:46 16:12-17:21/69 18:14	06:52 19:50	06:06 20:25	05:40 20:54	05:46 21:00	06:14 20:33	06:48 19:44	07:21 16:48-17:58/70 18:51	06:59 17:04	07:35 16:44
8	07:50 17:00	07:26 17:39	06:44 16:13-17:22/69 18:15	06:50 19:52	06:04 20:26	05:40 20:55	05:47 21:00	06:16 20:32	06:49 19:43	07:22 16:48-17:57/69 18:49	07:01 17:03	07:36 16:44
9	07:49 17:01	07:25 17:41	06:43 16:12-17:21/69 18:16	06:48 19:53	06:03 20:27	05:39 20:56	05:47 20:59	06:17 20:31	06:50 19:41	07:24 16:48-17:56/68 18:47	07:02 17:02	07:37 16:44
10	07:49 17:02	07:24 17:42	06:41 16:12-17:21/69 18:18	06:47 19:54	06:02 20:28	05:39 20:56	05:48 20:59	06:18 20:29	06:51 19:39	07:25 16:49-17:56/67 18:46	07:03 17:01	07:38 16:44
11	07:49 17:04	07:23 17:43	06:39 16:12-17:20/68 18:19	06:45 19:55	06:01 20:29	05:39 20:57	05:49 20:58	06:19 20:28	06:52 19:37	07:26 16:48-17:55/67 18:44	07:04 17:00	07:39 16:44
12	07:49 17:05	07:21 17:45	06:37 16:13-17:21/68 18:20	06:43 19:56	06:00 20:31	05:39 20:57	05:50 20:58	06:20 20:26	06:54 19:35	07:27 16:48-17:55/67 18:42	07:06 16:59	07:40 16:44
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14	07:48 17:07	07:19 16:41-16:58/17 17:47	06:34 16:13-17:19/66 18:22	06:40 19:59	05:57 20:33	05:39 20:58	05:51 20:57	06:22 20:24	06:56 17:23-17:45/22 19:32	07:29 16:49-17:53/64 18:39	07:08 16:57	07:41 16:44
15	07:47 17:08	07:17 16:36-17:02/26 17:48	06:32 16:13-17:18/65 18:24	06:38 20:00	05:56 20:34	05:39 20:59	05:52 20:56	06:23 20:22	06:57 17:19-17:48/29 19:30	07:31 16:50-17:52/62 18:37	07:09 16:56	07:42 16:44
16	07:47 17:09	07:16 16:34-17:05/31 17:50	06:30 16:14-17:18/64 18:25	06:37 20:01	05:55 20:35	05:39 20:59	05:53 20:55	06:24 20:21	06:58 17:15-17:50/35 19:28	07:32 16:50-17:51/61 18:36	07:11 16:55	07:43 16:44
17	07:46 17:11	07:14 16:30-17:07/37 17:51	06:29 16:14-17:17/63 18:26	06:35 20:02	05:54 20:36	05:39 21:00	05:54 20:55	06:25 20:19	06:59 17:13-17:52/39 19:26	07:33 16:50-17:50/60 18:34	07:12 16:54	07:43 16:45
18	07:46 17:12	07:13 16:29-17:10/41 17:52	06:27 16:14-17:16/62 18:27	06:33 20:03	05:53 20:37	05:39 21:00	05:54 20:54	06:26 20:18	07:00 17:10-17:53/43 19:25	07:34 16:52-17:49/57 18:32	07:13 16:53	07:44 16:45
19	07:45 17:13	07:12 16:26-17:11/45 17:54	06:25 16:15-17:15/60 18:28	06:32 20:04	05:52 20:38	05:39 21:00	05:55 20:53	06:27 20:16	07:01 17:08-17:54/46 19:23	07:35 16:52-17:48/56 18:31	07:15 16:52	07:45 16:45
20	07:45 17:14	07:10 16:25-17:13/48 17:55	06:23 16:16-17:14/58 18:30	06:30 20:06	05:51 20:39	05:39 21:01	05:56 20:52	06:29 20:14	07:02 17:06-17:55/49 19:21	07:37 16:53-17:46/53 18:29	07:16 16:51	07:45 16:46
21	07:44 17:15	07:09 16:23-17:14/51 17:56	06:22 16:17-17:13/56 18:31	06:29 20:07	05:50 20:40	05:39 21:01	05:57 20:52	06:30 20:13	07:03 17:04-17:56/52 19:19	07:38 16:54-17:44/50 18:28	07:17 16:51	07:46 16:46
22	07:43 17:17	07:07 16:22-17:16/54 17:58	06:20 16:18-17:11/53 18:32	06:27 20:08	05:49 20:41	05:39 21:01	05:58 20:51	06:31 20:11	07:04 17:02-17:57/55 19:17	07:39 16:56-17:43/47 18:26	07:18 16:50	07:46 16:47
23	07:43 17:18	07:05 16:21-17:17/56 17:59	06:18 16:19-17:09/50 18:33	06:25 20:09	05:49 20:42	05:39 21:01	05:59 20:50	06:32 20:10	07:06 17:00-17:57/57 19:16	07:40 16:57-17:41/44 18:25	07:19 16:49	07:47 16:47
24	07:42 17:19	07:04 16:20-17:18/58 18:00	06:16 16:20-17:07/47 18:34	06:24 20:10	05:48 20:43	05:40 21:01	06:00 20:49	06:33 20:08	07:07 16:59-17:58/59 19:14	07:42 16:59-17:39/40 18:23	07:21 16:49	07:47 16:48
25	07:41 17:21	07:02 16:19-17:19/60 18:01	06:15 16:22-17:06/44 18:35	06:22 20:11	05:47 20:44	05:40 21:01	06:01 20:48	06:34 20:06	07:08 16:58-17:59/61 19:12	06:43 16:02-16:37/35 17:22	07:22 16:48	07:48 16:48
26	07:40 17:22	07:01 16:17-17:19/62 18:03	06:13 16:24-17:04/40 18:37	06:21 20:12	05:46 20:45	05:40 21:01	06:02 20:47	06:35 20:05	07:09 16:57-17:59/62 19:10	06:44 16:04-16:34/30 17:20	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 16:17-17:20/63 18:04	06:11 16:26-17:01/35 18:38	06:19 20:14	05:46 20:46	05:41 21:02	06:03 20:46	06:36 20:03	07:10 16:56-17:59/63 19:08	06:45 16:07-16:30/23 17:19	07:24 16:47	07:48 16:50
28	07:38 17:25	06:58 16:16-17:20/64 18:05	06:09 16:28-16:58/30 18:39	06:18 20:15	05:45 20:47	05:41 21:02	06:04 20:45	06:37 20:02	07:11 16:54-17:59/65 19:07	06:47 16:13-16:26/13 17:17	07:25 16:46	07:49 16:50
29	07:37 17:26	07:07 17:31-17:55/24 18:06	07:07 17:31-17:55/24 19:40	06:16 20:16	05:44 20:47	05:42 21:01	06:05 20:44	06:38 20:00	07:12 16:53-17:59/66 19:05	06:48 17:16 17:16	07:27 16:46	07:49 16:51
30	07:36 17:27	07:06 17:37-17:50/13 18:07	07:06 17:37-17:50/13 19:41	06:15 20:17	05:44 20:48	05:42 21:01	06:06 20:43	06:39 19:58	07:13 16:52-17:59/67 19:03	06:49 17:14 17:14	07:28 16:45	07:49 16:52
31	07:35 17:28	07:04 18:08	07:04 19:42	06:14 20:18	05:43 20:49	06:07 21:02	06:41 20:42	06:41 19:56	07:14 19:56	06:50 17:13	07:49 16:53	07:49 16:53
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281
Sum of minutes with flicker	0	713	1713	0	0	0	0	0	881	1581	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: WON023_ShadowFlickering WTG: 5 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (5)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:50 09:55-11:03/68 16:54	07:34 17:30 18:06	07:02 19:44 20:18	06:14 20:50 21:01	05:42 21:01 20:41	05:42 21:01 20:41	06:08 21:01 20:41	06:42 19:55 19:01	07:14 19:01 17:12	06:52 17:12 16:45	07:29 16:45 16:45	09:45-10:45/60
2	07:50 09:56-11:03/67 16:55	07:33 17:31 18:08	07:00 19:45 20:19	06:12 20:51 21:01	05:42 21:01 20:39	05:43 21:01 20:39	06:09 19:53 19:00	06:43 19:00 17:10	07:16 19:00 17:10	06:53 17:10 16:45	07:30 16:45 16:45	09:46-10:46/60
3	07:50 09:56-11:03/67 16:55	07:32 17:32 18:09	06:53 19:46 20:21	06:11 20:52 21:01	05:41 21:01 20:38	05:43 21:01 20:38	06:10 19:51 18:58	06:44 18:58 17:09	07:17 18:58 17:09	06:54 17:09 16:44	07:31 16:44 16:44	09:45-10:47/62
4	07:50 09:57-11:04/67 16:56	07:31 17:34 18:10	06:51 19:47 20:22	06:09 20:52 21:01	05:41 21:01 20:37	05:44 21:01 20:37	06:11 19:50 18:56	06:45 18:56 17:08	07:18 18:56 17:08	06:55 17:08 16:44	07:32 16:44 16:44	09:45-10:48/63
5	07:50 09:58-11:04/66 16:57	07:30 17:35 18:11	06:49 19:48 20:23	06:08 20:53 21:01	05:41 21:01 20:36	05:45 21:01 20:36	06:12 19:48 18:54	06:46 18:54 17:07	07:19 18:54 17:07	06:57 17:07 16:44	07:33 16:44 16:44	09:45-10:49/64
6	07:50 09:59-11:04/65 16:58	07:29 17:36 18:13	06:48 19:49 20:24	06:07 20:54 21:00	05:40 21:00 20:35	05:45 21:00 20:35	06:13 19:46 18:53	06:47 18:53 17:05	07:20 18:53 17:05	06:58 17:05 16:44	07:34 16:44 16:44	09:45-10:50/65
7	07:50 10:00-11:04/64 16:59	07:28 17:38 18:14	06:46 19:51 20:25	06:06 20:54 21:00	05:40 21:00 20:33	05:46 21:00 20:33	06:14 19:44 18:51	06:48 18:51 17:04	07:21 18:51 17:04	06:59 17:04 16:44	07:35 16:44 16:44	09:45-10:51/66
8	07:50 10:00-11:03/63 17:00	07:26 17:39 18:15	06:44 19:52 20:26	06:04 20:55 21:00	05:40 21:00 20:32	05:47 21:00 20:32	06:15 19:43 18:49	06:49 18:49 17:03	07:22 18:49 17:03	07:01 17:03 16:44	07:36 16:44 16:44	09:45-10:52/67
9	07:49 10:01-11:03/62 17:01	07:25 17:40 18:16	06:43 19:53 20:27	06:03 20:56 20:59	05:39 20:59 20:31	05:47 20:59 20:31	06:17 19:41 18:47	06:50 18:47 17:02	07:24 18:47 17:02	07:02 17:02 16:44	07:37 16:44 16:44	09:45-10:52/67
10	07:49 10:02-11:03/61 17:02	07:24 17:42 18:18	06:41 19:54 20:28	06:02 20:56 20:59	05:39 20:59 20:29	05:48 20:59 20:29	06:18 19:39 18:46	06:51 18:46 17:01	07:25 18:46 17:01	07:03 17:01 16:44	07:38 16:44 16:44	09:46-10:53/67
11	07:49 10:03-11:03/60 17:04	07:23 17:43 18:19	06:39 19:55 20:29	06:01 20:57 20:58	05:39 20:58 20:28	05:49 20:58 20:28	06:19 19:37 18:44	06:52 18:44 17:00	07:26 18:44 17:00	07:04 17:00 16:44	07:39 16:44 16:44	09:46-10:54/68
12	07:49 10:04-11:03/59 17:05	07:21 17:44 18:20	06:37 19:56 20:31	05:59 20:57 20:58	05:39 20:58 20:26	05:49 20:58 20:26	06:20 19:35 18:42	06:54 18:42 16:59	07:27 18:42 16:59	07:06 16:59 16:44	07:40 16:44 16:44	09:45-10:54/69
13	07:48 10:06-11:03/57 17:06	07:20 17:46 18:21	06:36 19:57 20:32	05:58 20:58 20:57	05:39 20:57 20:25	05:50 20:57 20:25	06:21 19:34 18:41	06:55 18:41 16:58	07:28 18:41 16:58	07:07 16:58 16:44	07:40 16:44 16:44	09:46-10:55/69
14	07:48 10:06-11:01/55 17:07	07:19 17:47 18:22	06:34 19:59 20:33	05:57 20:58 20:57	05:39 20:57 20:24	05:51 20:57 20:24	06:22 19:32 18:39	06:56 18:39 16:57	07:29 18:39 16:57	07:08 16:57 16:44	07:41 16:44 16:44	09:46-10:56/70
15	07:47 10:08-11:01/53 17:08	07:17 17:48 18:24	06:38 20:00 20:34	05:56 20:59 20:56	05:39 20:56 20:22	05:52 20:56 20:22	06:23 19:30 18:37	06:57 18:37 16:56	07:31 18:37 16:56	07:10 16:56 16:44	07:42 16:44 16:44	09:47-10:57/70
16	07:47 10:09-11:00/51 17:09	07:16 17:50 18:25	06:37 20:01 20:35	05:55 20:59 20:55	05:39 20:55 20:21	05:53 20:55 20:21	06:24 19:28 18:36	06:58 18:36 16:55	07:32 18:36 16:55	07:11 16:55 16:44	07:43 16:44 16:44	09:47-10:56/69
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18	07:46 10:12-10:59/47 17:12	07:13 17:52 18:27	06:27 20:03 20:37	05:53 21:00 20:54	05:39 20:54 20:18	05:54 20:54 20:18	06:26 19:25 18:32	07:00 18:32 16:53	07:34 18:32 16:53	07:13 16:53 16:45	07:44 16:45 16:45	09:48-10:58/70
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20	07:45 10:14-10:55/41 17:14	07:10 17:55 18:30	06:23 20:06 20:39	05:51 21:01 20:52	05:39 20:52 20:14	05:56 20:52 20:14	06:29 19:21 18:29	07:02 18:29 16:51	07:37 18:29 16:51	07:16 16:51 16:46	07:46 16:46 16:46	09:49-10:59/70
21	07:44 10:17-10:54/37 17:15	07:09 17:56 18:31	06:22 20:07 20:40	05:50 21:01 20:52	05:39 20:52 20:13	05:57 20:52 20:13	06:30 19:19 18:28	07:03 18:28 16:51	07:38 18:28 16:51	07:17 16:51 16:46	07:46 16:46 16:46	09:49-10:59/70
22	07:43 10:19-10:52/33 17:17	07:07 17:58 18:32	06:20 20:08 20:41	05:49 21:01 20:51	05:39 20:51 20:11	05:58 20:51 20:11	06:31 19:17 18:26	07:04 18:26 16:50	07:39 18:26 16:50	07:18 16:50 16:47	07:47 16:47 16:47	09:50-11:00/70
23	07:43 10:22-10:49/27 17:18	07:05 17:59 18:33	06:18 20:09 20:42	05:49 21:01 20:50	05:39 20:50 20:10	05:59 20:50 20:10	06:32 19:16 18:25	07:06 18:25 16:49	07:40 18:25 16:49	07:19 16:49 16:47	07:47 16:47 16:47	09:50-11:00/70
24	07:42 10:25-10:46/21 17:19	07:04 18:00 18:34	06:16 20:10 20:43	05:48 21:01 20:49	05:40 20:49 20:08	06:00 20:08 19:14	06:33 18:23 16:49	07:07 18:23 16:49	07:42 18:23 16:49	07:21 16:49 16:48	07:47 16:48 16:48	09:51-11:01/70
25	07:41 10:30-10:41/11 17:21	07:02 18:01 18:35	06:15 20:11 20:44	05:47 21:01 20:48	05:40 20:48 20:06	06:01 20:06 19:12	06:34 18:09 17:22	07:08 17:22 16:48	07:22 17:22 16:48	07:22 16:48 16:48	07:48 16:48 16:48	09:51-11:01/70
26	07:40 17:22 17:39	07:01 18:03 18:37	06:13 20:12 20:45	05:46 21:02 20:47	05:40 20:47 20:05	06:02 20:05 19:10	06:35 19:10 17:20	07:09 17:20 16:47	07:23 17:20 16:47	07:23 16:47 16:49	07:48 16:49 16:49	09:51-11:01/70
27	07:39 17:23 17:38	06:59 18:04 18:38	06:11 20:14 20:46	05:45 21:02 20:46	05:41 20:46 20:03	06:03 20:03 19:08	06:36 17:19 16:47	07:10 17:19 16:47	07:24 17:19 16:47	07:24 16:47 16:50	07:49 16:50 16:50	09:53-11:02/69
28	07:38 17:24 17:37	06:58 18:05 18:39	06:09 20:15 20:47	05:45 21:02 20:45	05:41 20:45 20:02	06:04 20:02 19:07	06:37 17:17 16:46	07:11 17:17 16:46	07:25 17:17 16:46	07:25 16:46 16:50	07:49 16:50 16:50	09:53-11:03/70
29	07:37 17:26 17:36	07:07 19:00 19:06	06:16 20:16 20:47	05:44 21:02 20:42	05:41 20:44 20:00	06:05 20:00 19:05	06:38 17:16 16:46	07:12 17:16 16:46	07:27 17:16 16:46	07:27 16:46 16:51	07:49 16:51 16:51	09:53-11:03/70
30	07:36 17:27 17:35	07:06 19:41 19:41	06:15 20:17 20:48	05:44 21:01 20:43	05:42 20:43 19:58	06:06 19:58 19:03	06:39 17:14 16:45	07:13 17:14 16:45	07:28 17:14 16:45	07:28 16:45 16:52	07:49 16:52 16:52	09:54-11:03/69
31	07:35 17:28 17:35	07:04 19:42 19:42	06:14 20:49 20:49	05:43 20:49 20:49	05:41 20:42 19:56	06:07 19:56 19:56	06:41 17:13 16:45	07:14 17:13 16:45	07:29 17:13 16:45	07:29 16:45 16:53	07:50 16:53 16:53	09:54-11:03/69
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281
Sum of minutes with flicker	1295	0	0	0	0	0	0	0	0	0	584	2103

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:
WON023

Licensed user:
Iron solar s.r.l.
via Lanzone, 31
IT-20122 Milano
+393487125089
Fabio Paccapelo / francesca.saccarola@hopegroup.it
Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Calendar per WTG

Calculation: WON023_ShadowFlickering WTG: 6 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (6)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:50 16:54	07:35 17:30	06:56 18:07	07:02 19:44	06:14 20:18	18:16-19:27/71	05:42 20:50	18:13-19:34/81	05:42 21:01	18:20-19:39/79	06:08 20:41	18:20-19:42/82	06:42 19:55	07:15 19:01	06:52 17:12	07:29 16:45
2	07:50 16:55	07:33 17:31	06:54 18:08	07:00 19:45	06:12 20:19	18:14-19:27/73	05:42 20:51	18:13-19:33/80	05:43 21:01	18:21-19:39/78	06:09 20:40	18:21-19:41/80	06:43 19:53	07:16 19:00	06:53 17:10	07:30 16:45
3	07:50 16:55	07:32 17:33	06:53 18:09	06:59 19:46	06:11 20:21	18:14-19:28/74	05:41 20:52	18:13-19:34/81	05:44 21:01	18:20-19:39/79	06:10 20:38	18:21-19:41/80	06:44 19:51	07:17 18:58	06:54 17:09	07:31 16:45
4	07:50 16:56	07:31 17:34	06:51 18:10	06:57 19:47	06:10 20:22	18:14-19:29/75	05:41 20:52	18:14-19:34/80	05:44 21:01	18:21-19:40/79	06:11 20:37	18:21-19:40/79	06:45 19:50	07:18 18:54	06:56 17:07	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 18:12	06:55 19:48	06:08 20:23	18:12-19:29/77	05:41 20:53	18:14-19:34/80	05:45 21:01	18:20-19:40/80	06:12 20:36	18:21-19:40/79	06:46 19:48	07:19 18:54	06:57 17:07	07:33 16:44
6	07:50 16:58	07:29 17:37	06:48 18:13	06:54 19:49	06:07 20:24	18:12-19:29/77	05:40 20:54	18:14-19:34/80	05:45 21:00	18:21-19:40/79	06:13 20:35	18:21-19:39/78	06:47 19:46	07:20 18:53	06:58 17:05	07:34 16:44
7	07:50 16:59	07:28 17:38	06:46 18:14	06:52 19:51	06:06 20:25	18:12-19:30/78	05:39 20:55	18:15-19:34/79	05:46 21:00	18:21-19:41/80	06:14 20:33	18:22-19:39/77	06:48 19:44	07:21 18:51	06:59 17:04	07:35 16:44
8	07:50 17:00	07:27 17:39	06:44 18:15	06:50 19:52	06:04 20:26	18:11-19:30/79	05:39 20:55	18:15-19:34/79	05:47 21:00	18:20-19:40/80	06:16 20:32	18:22-19:38/76	06:49 19:43	07:23 18:49	07:01 17:03	07:36 16:44
9	07:49 17:01	07:25 17:41	06:43 18:16	06:48 19:53	06:03 20:27	18:11-19:31/80	05:39 20:56	18:15-19:34/79	05:47 20:59	18:21-19:41/80	06:17 20:31	18:22-19:37/75	06:50 19:41	07:24 18:47	07:02 17:02	07:37 16:44
10	07:49 17:02	07:24 17:42	06:41 18:18	06:47 19:54	06:02 20:28	18:10-19:30/80	05:39 20:56	18:16-19:34/78	05:48 20:59	18:21-19:42/81	06:18 20:29	18:23-19:36/73	06:51 19:39	07:25 18:46	07:03 17:01	07:38 16:44
11	07:49 17:04	07:23 17:43	06:39 18:19	06:45 19:55	06:01 20:30	18:10-19:31/81	05:39 20:57	18:16-19:35/79	05:49 20:58	18:20-19:41/81	06:19 20:28	18:23-19:36/73	06:53 19:37	07:26 18:44	07:04 17:00	07:39 16:44
12	07:49 17:05	07:21 17:45	06:37 18:20	06:43 19:56	06:00 20:31	18:10-19:31/81	05:39 20:57	18:16-19:35/79	05:50 20:58	18:20-19:42/82	06:20 20:26	18:24-19:35/71	06:54 19:36	07:27 18:42	07:06 16:59	07:40 16:44
13	07:48 17:06	07:20 17:46	06:36 18:21	06:42 19:58	05:58 20:32	18:10-19:31/81	05:39 20:58	18:17-19:35/78	05:50 20:57	18:21-19:42/81	06:21 20:25	18:24-19:34/70	06:55 19:34	07:28 18:41	07:07 16:58	07:40 16:44
14	07:48 17:07	07:19 17:47	06:34 18:22	06:40 19:59	05:57 20:33	18:10-19:32/82	05:39 20:58	18:17-19:35/78	05:51 20:57	18:21-19:42/81	06:22 20:24	18:25-19:32/67	06:56 19:32	07:30 18:39	07:08 16:57	07:41 16:44
15	07:47 17:08	07:17 17:49	06:32 18:24	06:38 20:00	05:56 20:34	18:10-19:32/82	05:39 20:59	18:17-19:35/78	05:52 20:56	18:20-19:42/82	06:23 20:22	18:26-19:31/65	06:57 19:30	07:31 18:37	07:10 16:56	07:42 16:44
16	07:47 17:09	07:16 17:50	06:31 18:25	06:37 20:01	05:55 20:35	18:09-19:32/83	05:39 20:59	18:18-19:35/77	05:53 20:55	18:20-19:42/82	06:24 20:21	18:28-19:31/63	06:58 19:28	07:32 18:36	07:11 16:55	07:43 16:44
17	07:46 17:11	07:15 17:51	06:29 18:26	06:35 20:02	05:54 20:36	18:09-19:32/83	05:39 21:00	18:18-19:36/78	05:54 20:55	18:20-19:42/82	06:25 20:19	18:29-19:29/60	06:59 19:27	07:33 18:34	07:12 16:54	07:43 16:45
18	07:46 17:12	07:13 17:52	06:27 18:27	06:33 20:03	05:53 20:37	18:09-19:32/83	05:39 21:00	18:18-19:36/78	05:55 20:54	18:20-19:43/83	06:26 20:18	18:30-19:28/58	07:00 19:25	07:34 18:32	07:13 16:53	07:44 16:45
19	07:45 17:13	07:12 17:54	06:25 18:28	06:32 20:04	05:52 20:38	18:09-19:32/83	05:39 21:00	18:18-19:36/78	05:55 20:53	18:20-19:43/83	06:27 20:16	18:31-19:26/55	07:01 19:23	07:36 18:31	07:15 16:52	07:45 16:45
20	07:45 17:14	07:10 17:55	06:23 18:30	06:30 20:06	05:51 20:39	18:10-19:33/83	05:39 21:01	18:18-19:36/78	05:56 20:53	18:21-19:43/82	06:29 20:15	18:32-19:24/52	07:02 19:21	07:37 18:29	07:16 16:51	07:45 16:46
21	07:44 17:15	07:09 17:56	06:22 18:31	06:29 20:07	05:50 20:40	18:10-19:33/83	05:39 21:01	18:18-19:36/78	05:57 20:52	18:21-19:43/82	06:30 20:13	18:34-19:22/48	07:03 19:19	07:38 18:28	07:17 16:51	07:46 16:46
22	07:43 17:17	07:07 17:58	06:20 18:32	06:27 20:08	05:49 20:41	18:10-19:33/83	05:39 21:01	18:19-19:37/78	05:58 20:51	18:20-19:43/83	06:31 20:11	18:36-19:19/43	07:05 19:18	07:39 18:26	07:18 16:50	07:47 16:47
23	07:43 17:18	07:06 17:59	06:18 18:33	06:25 20:09	05:49 20:42	18:10-19:33/83	05:39 21:01	18:19-19:37/78	05:59 20:50	18:20-19:43/83	06:32 20:10	18:38-19:17/39	07:06 19:16	07:40 18:25	07:20 16:49	07:47 16:47
24	07:42 17:19	07:04 18:00	06:16 18:34	06:24 20:10	05:48 20:43	18:10-19:33/83	05:40 21:01	18:19-19:37/78	06:00 20:49	18:20-19:43/83	06:33 20:08	18:40-19:13/33	07:07 19:14	07:42 18:23	07:21 16:49	07:47 16:48
25	07:41 17:21	07:02 18:01	06:15 18:35	06:22 20:11	05:47 20:44	18:11-19:33/82	05:40 21:02	18:20-19:38/78	06:01 20:48	18:20-19:43/83	06:34 20:07	18:44-19:09/25	07:08 19:12	06:43 17:22	07:22 16:48	07:48 16:48
26	07:40 17:22	07:01 18:03	06:13 18:37	06:21 20:13	05:46 20:45	18:11-19:33/82	05:40 21:02	18:20-19:38/78	06:02 20:47	18:20-19:43/83	06:35 20:05	18:50-19:02/12	07:09 19:10	06:44 17:20	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 18:04	06:11 18:38	06:19 20:14	05:46 20:46	18:11-19:33/82	05:41 21:02	18:20-19:37/77	06:03 20:46	18:20-19:43/83	06:36 20:03		07:10 19:09	06:45 17:19	07:24 16:47	07:49 16:50
28	07:38 17:25	06:58 18:05	06:09 18:39	06:18 20:15	05:45 20:47	18:12-19:34/82	05:41 21:02	18:20-19:38/78	06:04 20:45	18:20-19:43/83	06:37 20:02		07:11 19:07	06:47 17:17	07:25 16:46	07:49 16:50
29	07:38 17:26		07:08 19:40	06:16 20:16	05:44 20:48	18:11-19:33/82	05:42 21:02	18:20-19:38/78	06:05 20:44	18:20-19:42/82	06:38 20:00		07:12 19:05	06:48 17:16	07:27 16:46	07:49 16:51
30	07:37 17:27		07:06 19:41	06:15 20:17	05:44 20:48	18:12-19:34/82	05:42 21:02	18:21-19:39/78	06:06 20:43	18:20-19:42/82	06:39 19:58		07:13 19:03	06:49 17:15	07:28 16:46	07:49 16:52
31	07:36 17:29		07:04 19:42		05:43 20:49	18:12-19:33/81			06:07 20:42	18:20-19:42/82	06:41 19:57		07:14 19:04	06:50 17:13		07:50 16:53
Potential sun hours	292	294	369	401	454		459		465		432		376	343	293	281
Sum of minutes with flicker	0	0	0	699	2491		2357		2523		1613		0	0	0	0

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

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

SHADOW - Calendar per WTG

Calculation: WON023_ShadowFlickering WTG: 7 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (7)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:50 16:54	07:34 17:30	06:56 18:06	07:02 19:43	06:14 20:18	05:42 20:50	05:42 21:01	06:08 20:40	06:42 19:55	07:14 19:01	06:51 17:12	07:29 16:45
2	07:50 16:54	07:33 17:31	06:54 18:08	07:00 19:45	06:12 20:19	05:42 20:51	05:43 21:01	06:09 20:39	06:43 19:53	07:15 18:59	06:53 17:10	07:30 16:45
3	07:50 16:55	07:32 17:32	06:53 18:09	06:59 19:46	06:11 20:20	05:41 20:51	05:43 21:01	06:10 20:38	06:44 19:51	07:17 18:58	06:54 17:09	07:31 16:44
4	07:50 16:56	07:31 17:34	06:51 18:10	06:57 19:47	06:09 20:22	05:41 20:52	05:44 21:01	06:11 20:37	06:45 19:49	07:18 18:56	06:55 17:08	07:32 16:44
5	07:50 16:57	07:30 17:35	06:49 18:11	06:55 19:48	06:08 20:23	05:41 20:53	05:45 21:00	06:12 20:36	06:46 19:48	07:19 18:54	06:57 17:07	07:33 16:44
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9	07:49 17:01	07:25 17:40	06:42 18:16	06:48 19:53	06:03 20:27	05:39 20:56	05:47 20:59	06:17 20:30	06:50 19:41	07:23 18:47	07:02 17:02	07:37 16:44
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11	07:49 17:03	07:23 17:43	06:39 18:19	06:45 19:55	06:01 20:29	05:39 20:57	05:49 20:58	06:19 20:28	06:52 19:37	07:26 18:44	07:04 17:00	07:39 16:44
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23	07:42 17:18	07:05 17:59	06:18 18:33	06:25 20:09	05:49 20:42	05:39 21:01	05:59 20:50	06:32 20:10	07:05 19:16	07:40 18:25	07:19 16:49	07:47 16:47
24	07:42 17:19	07:04 18:00	06:16 18:34	06:24 20:10	05:48 20:43	05:40 21:01	06:00 20:49	06:33 20:08	07:07 19:14	07:41 18:23	07:21 16:48	07:47 16:48
25	07:41 17:21	07:02 18:01	06:14 18:35	06:22 20:11	05:47 20:44	05:40 21:01	06:01 20:48	06:34 20:06	07:08 19:12	06:43 17:22	07:22 16:48	07:48 16:48
26	07:40 17:22	07:01 18:03	06:13 18:36	06:21 20:12	05:46 20:45	05:40 21:01	06:02 20:47	06:35 20:05	07:09 19:10	06:44 17:20	07:23 16:47	07:48 16:49
27	07:39 17:23	06:59 18:04	06:11 18:38	06:19 20:13	05:45 20:46	05:41 21:01	06:03 20:46	06:36 20:03	07:10 19:08	06:45 17:19	07:24 16:47	07:48 16:50
28	07:38 17:24	06:57 18:05	06:09 18:39	06:18 20:15	05:45 20:46	05:41 21:01	06:04 20:45	06:37 20:01	07:11 19:07	06:46 17:17	07:25 16:46	07:49 16:50
29	07:37 17:26		07:07 19:40	06:16 20:16	05:44 20:47	05:41 21:01	06:05 20:44	06:38 20:00	07:12 19:05	06:48 17:16	07:26 16:46	07:49 16:51
30	07:36 17:27		07:06 19:41	06:15 20:17	05:44 20:48	05:42 21:01	06:06 20:43	06:39 19:58	07:13 19:03	06:49 17:14	07:28 16:45	07:49 16:52
31	07:35 17:28		07:04 19:42		05:43 20:49		06:07 20:42	06:40 19:56		06:50 17:13		07:49 16:53
Potential sun hours	292	294	369	401	454	459	465	432	376	343	293	281
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

SHADOW - Calendar per WTG

Calculation: WON023_ShadowFlickering WTG: 8 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (8)
Assumptions for shadow calculations

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

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

	January	February	March	April	May	June
1	07:49 16:53	07:34 17:30	06:56 15:48-17:09/81 18:06 07:42-08:53/71	07:02 17:11-17:39/28 19:43 08:38-09:35/57	06:13 20:18	05:42 20:50
2	07:49 16:54	07:33 17:31	06:54 15:48-17:10/82 18:07 07:42-08:54/72	07:00 17:15-17:34/19 19:44 08:39-09:32/53	06:12 20:19	05:42 20:50
3	07:49 16:55	07:32 17:32	06:52 15:48-17:09/81 18:09 07:41-08:55/74	06:58 08:40-09:30/50 19:46	06:11 20:20	05:41 20:51
4	07:50 16:56	07:31 17:34	06:51 15:47-17:09/82 18:10 07:40-08:55/75	06:57 08:42-09:28/46 19:47	06:09 20:21	05:41 20:52
5	07:49 16:57	07:30 17:35	06:49 15:46-17:09/83 18:11 07:40-08:56/76	06:55 08:44-09:25/41 19:48	06:08 20:22	05:40 20:53
6	07:49 16:58	07:29 17:36	06:47 15:47-17:10/83 18:12 07:39-08:56/77	06:53 08:45-09:22/37 19:49	06:07 20:24	05:40 20:53
7	07:49 16:59	07:27 17:38	06:46 15:46-17:09/83 18:14 07:38-08:56/78	06:51 08:48-09:20/32 19:50	06:05 20:25	05:40 20:54
8	07:49 17:00	07:26 16:21-16:39/18 17:39	06:44 15:46-17:09/83 18:15 07:37-08:56/79	06:50 08:51-09:15/24 19:51	06:04 20:26	05:39 20:55
9	07:49 17:01	07:25 16:16-16:43/27 17:40	06:42 15:47-17:09/82 18:16 07:37-08:56/79	06:48 08:56-09:09/13 19:52	06:03 20:27	05:39 20:55
10	07:49 17:02	07:24 16:13-16:47/34 17:42	06:41 15:47-17:09/82 18:17 07:36-08:56/80	06:46 19:54	06:02 20:28	05:39 20:56
11	07:48 17:03	07:22 16:10-16:50/40 17:43	06:39 15:46-17:08/82 18:18 07:35-08:56/81	06:45 19:55	06:00 20:29	05:39 20:56
12	07:48 17:04	07:21 16:07-16:52/45 17:44	06:37 15:46-17:07/81 18:20 07:35-08:55/80	06:43 19:56	05:59 20:30	05:39 20:57
13	07:48 17:06	07:20 16:06-16:54/48 17:46	06:35 15:47-17:07/80 18:21 07:35-08:56/81	06:41 19:57	05:58 20:31	05:38 20:58
14	07:47 17:07	07:18 16:03-16:55/52 17:47	06:34 15:47-17:07/80 18:22 07:34-08:55/81	06:40 19:58	05:57 20:32	05:38 20:58
15	07:47 17:08	07:17 16:02-16:57/55 17:48	06:32 15:48-17:06/78 18:23 07:34-08:54/80	06:38 19:59	05:56 20:33	05:38 20:58
16	07:47 17:09	07:16 16:01-16:59/58 17:49	06:30 15:48-17:05/77 18:24 07:33-08:54/81	06:36 20:01	05:55 20:35	05:38 20:59
17	07:46 17:10	07:14 15:59-17:00/61 17:51	06:28 15:49-17:05/76 18:26 07:34-08:54/80	06:35 20:02	05:54 20:36	05:38 20:59
18	07:45 17:11	07:13 15:58-17:02/64 17:52	06:27 15:49-17:04/75 18:27 07:34-08:53/79	06:33 20:03	05:53 20:37	05:38 21:00
19	07:45 17:13	07:11 15:56-17:03/67 17:53	06:25 15:50-17:03/73 18:28 07:33-08:52/79	06:31 20:04	05:52 20:38	05:38 21:00
20	07:44 17:14	07:10 15:56-17:04/68 17:55	06:23 15:50-17:01/71 18:29 07:33-08:51/78	06:30 20:05	05:51 20:39	05:39 21:00
21	07:44 17:15	07:08 15:54-17:05/71 17:56	06:21 15:51-17:00/69 18:30 07:33-08:50/77	06:28 20:06	05:50 20:40	05:39 21:00
22	07:43 17:16	07:07 15:53-17:05/72 17:57	06:20 15:53-17:00/67 18:32 07:34-08:50/76	06:27 20:08	05:49 20:41	05:39 21:01
23	07:42 17:18	07:05 15:52-17:06/74 17:59	06:18 15:54-16:58/64 18:33 07:34-08:48/74	06:25 20:09	05:48 20:42	05:39 21:01
24	07:41 17:19	07:04 15:51-17:07/66 18:00	06:16 15:55-16:56/61 18:34 07:34-08:47/73	06:24 20:10	05:47 20:43	05:39 21:01
25	07:41 17:20	07:02 15:51-17:08/77 18:01	06:14 15:56-16:55/59 18:35 07:34-08:45/71	06:22 20:11	05:47 20:44	05:40 21:01
26	07:40 17:22	07:00 15:50-17:08/78 18:02	06:12 15:58-16:54/56 18:36 07:35-08:45/70	06:21 20:12	05:46 20:44	05:40 21:01
27	07:39 17:23	06:59 15:49-17:08/79 18:04	06:11 15:59-16:52/53 18:37 07:35-08:43/68	06:19 20:13	05:45 20:45	05:40 21:01
28	07:38 17:24	06:57 15:49-17:09/80 18:05	06:09 16:01-16:50/49 18:39 07:35-08:42/67	06:18 20:14	05:45 20:46	05:41 21:01
29	07:37 17:26		07:07 17:02-17:47/45 19:40 08:36-09:40/64	06:16 20:16	05:44 20:47	05:41 21:01
30	07:36 17:27		07:05 17:04-17:45/41 19:41 08:36-09:38/62	06:15 20:17	05:43 20:48	05:42 21:01
31	07:35 17:28		07:04 17:08-17:43/35 19:42 08:38-09:37/59		05:43 20:49	
Potential sun hours	292	294	369	401	454	459
Sum of minutes with flicker	0	2033	4516	400	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: WON023_ShadowFlickering WTG: 8 - VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (8)
Assumptions for shadow calculations

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

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

	July	August	September	October	November	December
1	05:42 21:01	06:08 20:40	06:41 19:54	07:14 16:26-17:47/81 19:01 08:14-09:35/81	06:51 15:43-16:16/33 17:11	07:28 16:45
2	05:43 21:01	06:09 20:39	06:42 19:53	07:15 16:25-17:46/81 18:59 08:14-09:34/80	06:53 15:46-16:12/26 17:10	07:30 16:45
3	05:43 21:01	06:10 20:38	06:43 08:54-09:07/13 19:51	07:16 16:24-17:46/82 18:57 08:14-09:34/80	06:54 15:51-16:07/16 17:09	07:31 16:44
4	05:44 21:00	06:11 20:37	06:45 08:48-09:12/24 19:49	07:18 16:24-17:46/82 18:56 08:13-09:33/80	06:55 17:08	07:32 16:44
5	05:44 21:00	06:12 20:35	06:46 08:45-09:16/31 19:47	07:19 16:23-17:45/82 18:54 08:14-09:33/79	06:56 17:06	07:33 16:44
6	05:45 21:00	06:13 20:34	06:47 08:42-09:18/36 19:46	07:20 16:23-17:46/83 18:52 08:14-09:33/79	06:58 17:05	07:34 16:44
7	05:46 21:00	06:14 20:33	06:48 08:39-09:20/41 19:44	07:21 16:23-17:45/82 18:51 08:14-09:32/78	06:59 17:04	07:35 16:43
8	05:46 20:59	06:15 20:32	06:49 08:37-09:22/45 19:42	07:22 16:22-17:45/83 18:49 08:14-09:31/77	07:00 17:03	07:36 16:43
9	05:47 20:59	06:16 20:30	06:50 08:34-09:24/50 19:40	07:23 16:22-17:44/82 18:47 08:15-09:30/75	07:01 17:02	07:37 16:43
10	05:48 20:58	06:17 20:29	06:51 17:08-17:27/19 19:39 08:33-09:25/52	07:24 16:21-17:43/82 18:45 08:15-09:29/74	07:03 17:00	07:37 16:43
11	05:48 20:58	06:18 20:27	06:52 17:03-17:31/28 19:37 08:31-09:27/56	07:26 16:22-17:44/82 18:44 08:15-09:29/74	07:04 16:59	07:38 16:43
12	05:49 20:57	06:20 20:26	06:53 16:59-17:33/34 19:35 08:29-09:28/59	07:27 16:22-17:43/81 18:42 08:16-09:27/71	07:05 16:58	07:39 16:43
13	05:50 20:57	06:21 20:25	06:54 16:56-17:35/39 19:33 08:28-09:29/61	07:28 16:22-17:42/80 18:40 08:16-09:26/70	07:07 16:57	07:40 16:44
14	05:51 20:56	06:22 20:23	06:55 16:53-17:37/44 19:32 08:26-09:30/64	07:29 16:21-17:41/80 18:39 08:16-09:24/68	07:08 16:56	07:41 16:44
15	05:52 20:56	06:23 20:22	06:57 16:50-17:39/49 19:30 08:25-09:31/66	07:30 16:21-17:40/79 18:37 08:17-09:24/67	07:09 16:55	07:42 16:44
16	05:52 20:55	06:24 20:20	06:58 16:49-17:41/52 19:28 08:24-09:32/68	07:32 16:23-17:40/77 18:35 08:17-09:22/65	07:10 16:54	07:42 16:44
17	05:53 20:54	06:25 20:19	06:59 16:47-17:42/55 19:26 08:23-09:33/70	07:33 16:23-17:39/76 18:34 08:18-09:21/63	07:12 16:54	07:43 16:44
18	05:54 20:54	06:26 20:17	07:00 16:44-17:43/59 19:24 08:22-09:34/72	07:34 16:23-17:38/75 18:32 08:18-09:20/62	07:13 16:53	07:44 16:45
19	05:55 20:53	06:27 20:16	07:01 16:42-17:44/62 19:23 08:21-09:34/73	07:35 16:23-17:37/74 18:31 08:20-09:19/59	07:14 16:52	07:44 16:45
20	05:56 20:52	06:28 20:14	07:02 16:40-17:44/64 19:21 08:20-09:34/74	07:36 16:25-17:36/71 18:29 08:21-09:17/56	07:15 16:51	07:45 16:45
21	05:57 20:51	06:29 20:13	07:03 16:39-17:45/66 19:19 08:19-09:35/76	07:38 16:25-17:35/70 18:27 08:22-09:16/54	07:17 16:50	07:46 16:46
22	05:58 20:50	06:30 20:11	07:04 16:37-17:45/68 19:17 08:18-09:35/77	07:39 16:26-17:33/67 18:26 08:23-09:14/51	07:18 16:50	07:46 16:46
23	05:59 20:50	06:32 20:09	07:05 16:35-17:46/71 19:15 08:18-09:35/77	07:40 16:27-17:33/66 18:24 08:25-09:13/48	07:19 16:49	07:47 16:47
24	06:00 20:49	06:33 20:08	07:06 16:34-17:46/72 19:14 08:17-09:35/78	07:41 16:28-17:31/63 18:23 08:26-09:10/44	07:20 16:48	07:47 16:47
25	06:01 20:48	06:34 20:06	07:07 16:32-17:46/74 19:12 08:16-09:35/79	06:42 15:29-16:29/60 17:21 07:28-08:08/40	07:22 16:48	07:47 16:48
26	06:02 20:47	06:35 20:04	07:09 16:31-17:46/75 19:10 08:15-09:35/80	06:44 15:31-16:29/58 17:20 07:31-08:06/35	07:23 16:47	07:48 16:49
27	06:03 20:46	06:36 20:03	07:10 16:30-17:46/76 19:08 08:15-09:35/80	06:45 15:32-16:27/55 17:18 07:34-08:03/29	07:24 16:47	07:48 16:49
28	06:04 20:45	06:37 20:01	07:11 16:29-17:47/78 19:06 08:15-09:36/81	06:46 15:33-16:25/52 17:17 07:37-07:58/21	07:25 16:46	07:48 16:50
29	06:05 20:44	06:38 20:00	07:12 16:28-17:47/79 19:05 08:15-09:36/81	06:47 15:36-16:23/47 17:16 07:45-07:52/7	07:26 16:46	07:49 16:51
30	06:06 20:43	06:39 19:58	07:13 16:27-17:47/80 19:03 08:14-09:35/81	06:49 15:37-16:21/44 17:14	07:27 16:45	07:51 16:52
31	06:07 20:41	06:40 19:56		06:50 15:39-16:18/39 17:13		07:49 16:52
Potential sun hours	465	432	376	343	293	281
Sum of minutes with flicker	0	0	2989	3983	75	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:

WON023

Licensed user:

Iron solar s.r.l.

via Lanzone, 31

IT-20122 Milano

+393487125089

Fabio Paccapelo / francesca.saccarola@hopegroup.it

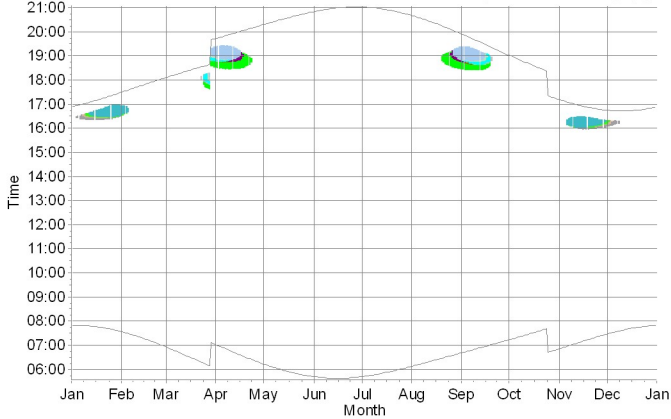
Calculated:

26/09/2023 17:51/3.6.361

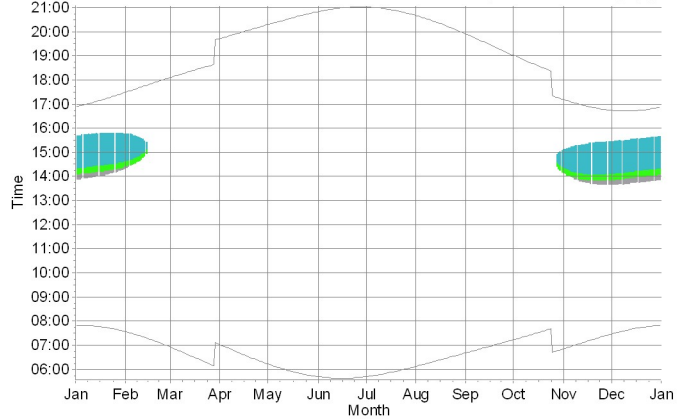
SHADOW - Calendar per WTG, graphical

Calculation: WON023_ShadowFlickering

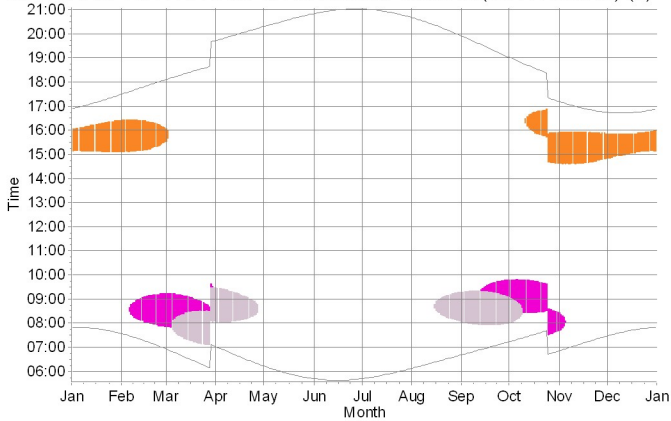
1: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (1)



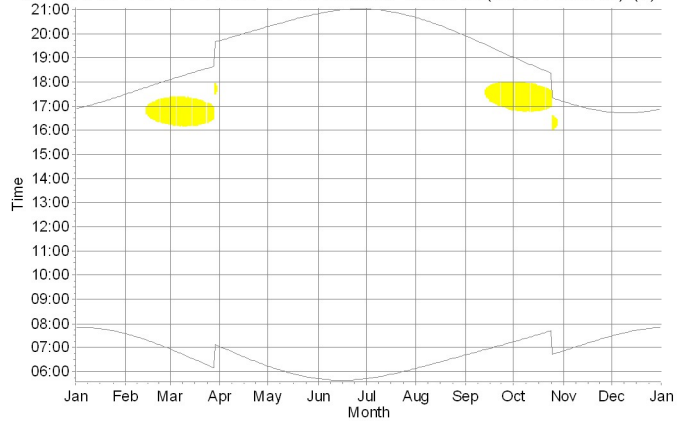
2: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (2)



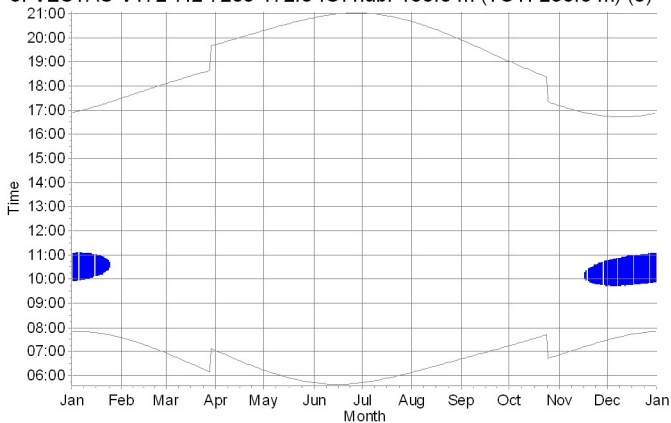
3: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (3)



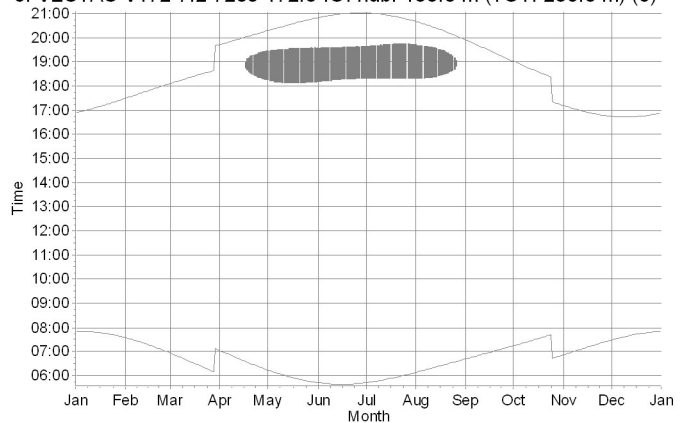
4: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (4)



5: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (5)



6: VESTAS V172-7.2 7200 172.0 !O! hub: 150.0 m (TOT: 236.0 m) (6)



Shadow receptors

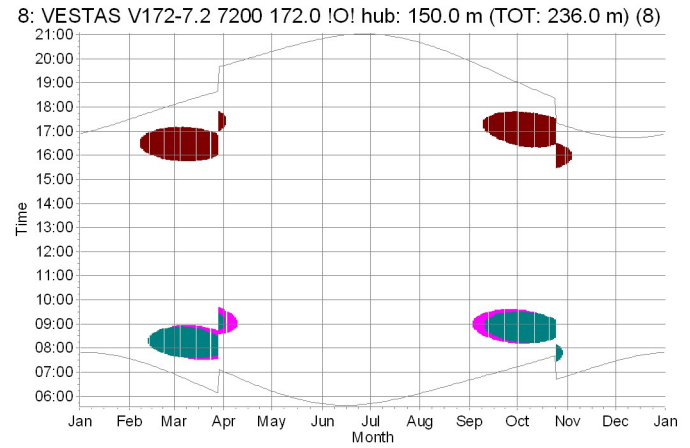
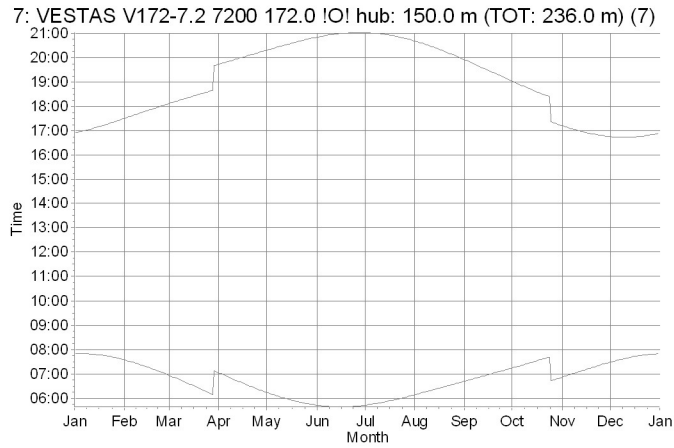
B: Shadow Receptor: 1.0 × 1.0 Azimuth: 60.0° Slope: 90.0° (2)
C: Shadow Receptor: 1.0 × 1.0 Azimuth: -30.0° Slope: 90.0° (3)
D: Shadow Receptor: 1.0 × 1.0 Azimuth: 80.0° Slope: 90.0° (4)
I: Shadow Receptor: 1.0 × 1.0 Azimuth: 90.0° Slope: 90.0° (9)
J: Shadow Receptor: 1.0 × 1.0 Azimuth: 170.0° Slope: 90.0° (10)
K: Shadow Receptor: 1.0 × 1.0 Azimuth: -180.0° Slope: 90.0° (11)

L: Shadow Receptor: 1.0 × 1.0 Azimuth: 150.0° Slope: 90.0° (12)
M: Shadow Receptor: 1.0 × 1.0 Azimuth: 150.0° Slope: 90.0° (13)
N: Shadow Receptor: 1.0 × 1.0 Azimuth: 150.0° Slope: 90.0° (14)
O: Shadow Receptor: 1.0 × 1.0 Azimuth: 160.0° Slope: 90.0° (15)
P: Shadow Receptor: 1.0 × 1.0 Azimuth: 30.0° Slope: 90.0° (16)
Q: Shadow Receptor: 1.0 × 1.0 Azimuth: 40.0° Slope: 90.0° (17)

R: Shadow Receptor: 1.0 × 1.0 Azimuth: 40.0° Slope: 90.0° (18)
S: Shadow Receptor: 1.0 × 1.0 Azimuth: 50.0° Slope: 90.0° (19)
W: Shadow Receptor: 1.0 × 1.0 Azimuth: 50.0° Slope: 90.0° (23)
X: Shadow Receptor: 1.0 × 1.0 Azimuth: -50.0° Slope: 90.0° (24)
Y: Shadow Receptor: 1.0 × 1.0 Azimuth: -60.0° Slope: 90.0° (25)

SHADOW - Calendar per WTG, graphical

Calculation: WON023_ShadowFlickering



Shadow receptors

E: Shadow Receptor: 1.0 × 1.0 Azimuth: -50.0° Slope: 90.0° (5)

F: Shadow Receptor: 1.0 × 1.0 Azimuth: -60.0° Slope: 90.0° (6)

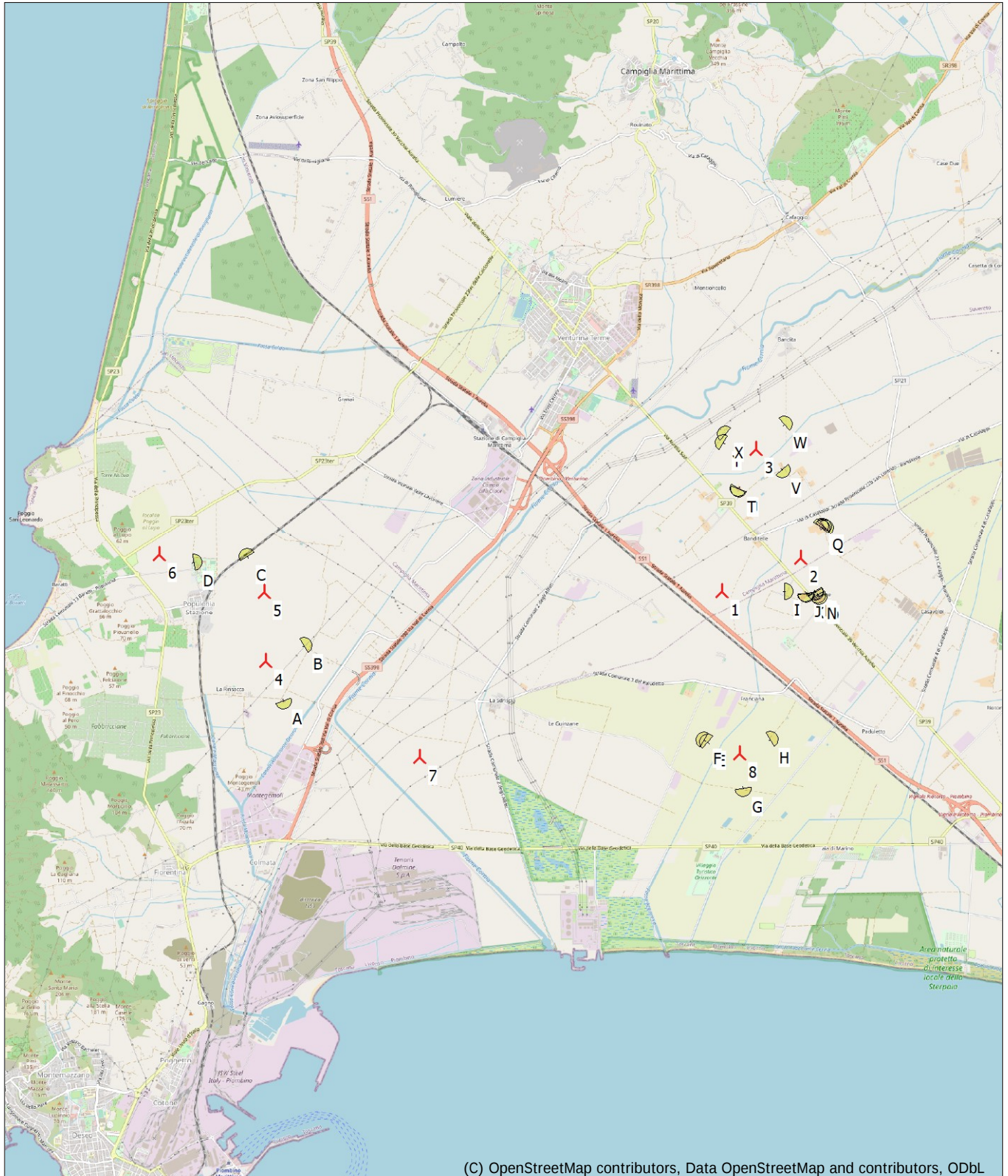
H: Shadow Receptor: 1.0 × 1.0 Azimuth: 60.0° Slope: 90.0° (8)

Project:
WON023

Licensed user:
Iron solar s.r.l.
via Lanzo, 31
IT-20122 Milano
+393487125089
Fabio Paccapelo / francesca.saccarola@hopegroup.it
Calculated:
26/09/2023 17:51/3.6.361

SHADOW - Map

Calculation: WON023_ShadowFlickering



0 1 2 3 4 km

Map: EMD OpenStreetMap , Print scale 1:75,000, Map center UTM (north)-WGS84 Zone: 32 East: 629,441 North: 4,761,657

New WTG Shadow receptor

Flicker map level: Elevation Grid Data Object: WON023_EMDGrid_1.wpg (1)