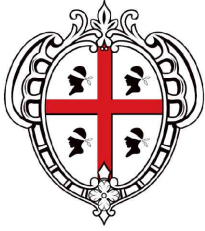


Regione Autonoma  
della Sardegna



Provincia Sud Sardegna



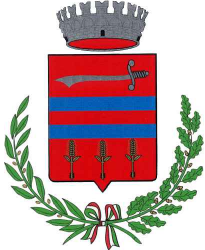
Comune di Mandas (SU)



Comune di Serri (SU)



Comune di Escolca (SU)



Comune di Isili (SU)



Comune di Nuragus (SU)



Comune di Genoni (SU)



Committente:

**RWE**

RWE RENEWABLES ITALIA S.R.L.  
via Andrea Doria, 41/G - 00192 Roma  
P.IVA/C.F. 06400370968

Titolo del Progetto:

**PARCO EOLICO "LOBADAS"**

- Comuni di Mandas, Serri, Escolca, Isili, Nuragus e Genoni(SU) -

Documento:

STUDIO DI IMPATTO AMBIENTALE

N° Documento:

**PELOB-RS08**

ID PROGETTO:

**PELOB**

SEZIONE:

**A**

TIPOLOGIA:

**T**

FORMATO:

**A4**

Elaborato:

**ANALISI DEGLI EFFETTI DI SHADOW-FLICKERING**

FOGLIO:

SCALA:

Nome file:

PELOB-RS08\_Analisi degli effetti di shadow-flickering

A cura di:

 **iat** CONSULENZA  
E PROGETTI  
www.iatprogetti.it



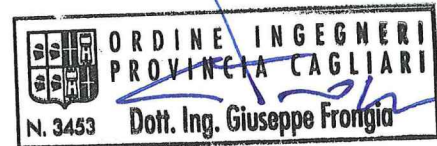
I.A.T. Consulenza e progetti S.r.l.  
Dott. Ing. Giuseppe Frongia

**Gruppo di progettazione:**



Ing. Giuseppe Frongia  
(coordinatore e responsabile)  
Ing. Marianna Barbarino  
Ing. Enrica Batzella  
Pian. Terr. Andrea Cappai  
Ing. Gianfranco Corda  
Ing. Paolo Desogus  
Pian. Terr. Veronica Fais  
Ing. Gianluca Melis  
Ing. Fabrizio Murru  
Ing. Andrea Onnis  
Pian. Terr. Eleonora Re  
Ing. Elisa Roych  
Ing. Marco Utzeri

**Contributi specialistici:**

Ing. Antonio Dedoni (Acustica)  
Dott.ssa Alice Nozza (Archeologia)  
Dott. Matteo Tatti (Archeologia)





Rev:	Data Revisione	Descrizione Revisione	Redatto	Controllato	Approvato
0	15/11/2023	Prima emissione	IAT	GF	RWE

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 2 di 18

## INDICE

<b>1</b>	<b>CRITERI GENERALI DI ANALISI E VALUTAZIONE .....</b>	<b>3</b>
<b>2</b>	<b>DESCRIZIONE DEL FENOMENO .....</b>	<b>4</b>
<b>3</b>	<b>INDIVIDUAZIONE DEI RICETTORI .....</b>	<b>6</b>
<b>4</b>	<b>IPOTESI ALLA BASE DEL CALCOLO E SOGLIE DI RIFERIMENTO .....</b>	<b>8</b>
<b>4.1</b>	<b>Introduzione .....</b>	<b>8</b>
<b>4.2</b>	<b>Lo scenario peggiore (worst case) .....</b>	<b>10</b>
<b>4.3</b>	<b>Lo scenario reale (real case) .....</b>	<b>11</b>
<b>5</b>	<b>RISULTATI.....</b>	<b>12</b>
<b>6</b>	<b>ANALISI DEI RISULTATI .....</b>	<b>13</b>
<b>7</b>	<b>CONCLUSIONI .....</b>	<b>17</b>
	<b>APPENDICE: REPORT DEI RISULTATI DEL CALCOLO MODELLISTICO .....</b>	<b>18</b>

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 3 di 18	

## 1 CRITERI GENERALI DI ANALISI E VALUTAZIONE

La Società RWE Renewables Italia S.r.l. ha in programma la realizzazione di un impianto eolico denominato "Lobadas" da realizzarsi nei comuni di Escolca, Isili Serri e Mandas nella Provincia del Sud Sardegna (SU).



L'intervento prevede l'installazione di n. 12 turbine di grande taglia della potenza unitaria di 7,2 MW per valore nominale complessivo di 86,4 MW, posizionate su torri di sostegno in acciaio dell'altezza massima pari a 117 m ed aventi diametro massimo del rotore pari a 172 m (altezza massima al *tip* 203 m), nonché l'approntamento delle opere accessorie indispensabili per un ottimale funzionamento e gestione della centrale.

L'impianto raggiungerà complessivamente una potenza nominale di 86,4 MW, in accordo con il valore massimo in immissione stabilito dal preventivo di connessione con codice pratica 202203370, rilasciato dal Gestore della Rete di Trasmissione Nazionale (Terna).

Il presente elaborato, facente parte integrante dello Studio di impatto ambientale, esamina compiutamente il potenziale disturbo da ombreggiamento intermittente (*shadow flickering*) sui potenziali ricettori individuati nell'area interessata dal proposto impianto eolico, entro una distanza indicativa di 1000 metri dagli aerogeneratori.

A tal fine, nel seguito, si farà riferimento alla ricognizione sugli edifici esistenti eseguita nell'ambito della definizione del layout di impianto e dell'analisi ambientale, i cui risultati sono riepilogati in opportune "schede fabbricati" all'interno di apposito report allegato al progetto del parco eolico (Elaborato PELOB-RS10).

Sotto il profilo metodologico, il documento è strutturato in una sezione introduttiva atta a descrivere la natura del fenomeno dell'ombreggiamento intermittente e le ipotesi alla base dei calcoli previsionali, eseguiti a mezzo di specifico software specialistico.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 4 di 18	

## 2 DESCRIZIONE DEL FENOMENO

Un ostacolo solido opaco posto tra il sole e il terreno genera un'ombra. Generalmente se l'ostacolo è fermo, l'ombra si proietta al suolo seguendo le regole del movimento relativo del sole sull'orizzonte. Le dimensioni dell'ombra proiettata sono funzione inversa dell'angolo che i raggi del sole formano sull'orizzonte per cui si ha la massima dimensione (elongazione sul terreno) dell'ombra all'alba ed al tramonto con il minimo quando il sole raggiunge la massima altezza (mezzogiorno).

Anche gli aerogeneratori durante il giorno proiettano un'ombra che in parte è fissa (torre e navicella) e in parte è mobile (pale del rotore).

Se l'ombra del rotore invece che sul terreno si proietta sulle aperture di un fabbricato può venirsi a creare l'effetto di ombra intermittente o *shadow flickering* (sfarfallio dell'ombra); in talune circostanze, tale fenomeno di pulsazioni "luce – ombra" può potenzialmente essere all'origine di un disturbo alle normali attività che possono svolgersi all'interno dell'ambiente abitativo.

Il fenomeno si verifica durante il giorno in presenza di cielo sereno ed in assenza di ostacoli naturali, quali vegetazione, alberi, muri ecc., e con le turbine in movimento.



Per le ragioni anzidette, a distanze turbine-ricettore superiori a circa 300 metri solitamente il fenomeno di *shadow flickering* si manifesta all'alba o al tramonto, allorché le ombre proiettate sono sufficientemente lunghe. Per le stesse ragioni il tremolio dell'ombra è un fenomeno particolarmente avvertito nelle regioni del nord Europa (Germania, Danimarca, ecc.) piuttosto che alle latitudini del Mediterraneo.

L'intensità del *shadow flickering* è definita come la differenza in luminosità, in un determinato sito, in presenza ed assenza di un'ombra.

Di seguito si riassumono alcuni aspetti caratteristici del fenomeno:

- la pala delle turbine eoliche è stretta in corrispondenza dell'estremità più esterna ed assume progressivamente maggiore larghezza verso la giunzione con il mozzo. Quando una turbina è posizionata sufficientemente vicino ad un ricettore, cosicché la porzione più larga della pala oscura una porzione maggiore del campo visivo (o meglio del disco solare), l'intensità di *shadow flickering* aumenterà. A distanze maggiori l'intensità del fenomeno sarà minore in quanto le pale copriranno una porzione inferiore del disco solare;
- l'intensità del *shadow flickering* è più bassa quando l'ombra che intercetta un ricettore si origina dall'estremità esterna del rotore (minore spessore della pala). L'intensità aumenterà allorché l'ombra si muove lungo lo sviluppo della pala fino ad arrivare ad un massimo in corrispondenza del mozzo; a tal punto l'intensità diminuisce quando l'ombra si sposta verso l'estremità della pala opposta;
- bassi impatti da *shadow flickering* sono generalmente indicativi di grandi distanze tra turbine e ricettore e ombre incidenti originate dalle estremità del rotore;
- situazioni di precaria visibilità determineranno modeste intensità del fenomeno;



<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 5 di 18	



- a distanze ancora maggiori le ombre proiettate risulteranno “fuori-fuoco”. Ciò non è causa di un’intensità inferiore del *shadow flickering* ma contribuisce a rendere meno distinto il fenomeno;
- all’interno di un ambiente ben illuminato le ombre svaniscono. Conseguentemente l’accensione di luci in un ambiente riduce l’incidenza del *shadow flickering*;
- schermare una finestra (con tende o quant’altro) previene il fenomeno;
- schermare un edificio (ad esempio con alberature) può rappresentare una efficace misura di mitigazione per prevenire il fenomeno.

La frequenza di pulsazione del tremolio dell’ombra è proporzionale alla velocità di rotazione del rotore. La tipica frequenza di passo fra le pale del rotore (tripala) è compresa tra 0.6 ed 1 Hz (velocità con cui le pale passano attraverso una posizione specifica).

Nel caso specifico, considerando un rotore del diametro indicativo di 172 metri con una velocità massima nominale di rotazione di circa 12 RPM si avrà una frequenza di passo pari a circa 0,6 Hz. Tali frequenze di oscillazione luminosa sono prive di rischi significativi per la salute.

Ricerche finalizzate alla definizione di relazioni cause-effetto tra fenomeni stroboscopici ed attacchi epilettici (Graham e Pamela Harding della Aston University e Arnold Wilkins della University of Essex) attestano che, al fine di escludere rischi sulla salute, le turbine eoliche dovrebbero ruotare a velocità superiori a 60 RPM (velocità di passo superiori a 3 Hz). Peraltro, non può disconoscersi come il fenomeno del *shadow flickering* possa talvolta costituire, in particolari situazioni, un disturbo per i ricettori più esposti.

Per analizzare i risultati e quindi definire l’effettiva portata del disturbo, è dunque fondamentale conoscere l’esatta destinazione del fabbricato ricettore. Nel seguito saranno considerati potenziali ricettori i soli edifici che, sulla base delle informazioni disponibili e delle verifiche condotte in sito, potrebbero prudenzialmente ricondursi alla fattispecie di “ambienti abitativi”.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 6 di 18



### 3 INDIVIDUAZIONE DEI RICETTORI

Al fine di procedere all'individuazione di potenziali ricettori nelle aree più direttamente interessate dalle installazioni eoliche, ricomprese entro una distanza massima di 1000 m dalle postazioni di macchina, si è proceduto ad una individuazione complessiva dei fabbricati con l'ausilio della cartografia ufficiale di riferimento (Carta Tecnica Regionale in scala 1:10.000). Successivamente si è proceduto a verificarne l'effettiva esistenza e consistenza dall'esame di foto aeree e satellitari nonché attraverso specifici sopralluoghi sul campo. In tal modo sono state acquisite le necessarie informazioni preliminari sulle caratteristiche tipologico-costruttive e le condizioni di utilizzo degli edifici. Per completezza di analisi sono stati inclusi nel censimento anche quei fabbricati che, in modo manifesto, non presentavano caratteristiche di potenziali abitazioni (p.e. ruderi o depositi). A valle di tali riscontri, si è proceduto ad accertare la categoria catastale di appartenenza degli edifici, laddove disponibile.

L'Elaborato PELOB-RS10.01 (Carta con individuazione dei fabbricati) riporta l'individuazione dei fabbricati censiti in accordo con la metodologia precedentemente indicata. Lo stralcio della ripresa aerea zenitale, la categoria catastale di appartenenza ed una fotografia prospettica degli edifici sono riportati nell'Elaborato PELOB-RS10 allegato alla documentazione progettuale.



Nel caso specifico, ai fini dei calcoli di esposizione all'ombra intermittente, sono stati individuati come ricettori n. 13 fabbricati riferibili alla categoria catastale "A" (*abitazioni*) nonché, prudenzialmente, ulteriori 12 edifici con caratteristiche tipologico-costruttive o funzionali assimilabili ad ambienti abitativi, localizzati entro l'ambito distanziale di 1000 metri dagli aerogeneratori. Entro tali distanze è, infatti, ragionevole che si manifestino i più avvertiti effetti di disturbo in rapporto al fattore di impatto in esame.

La Tabella 1 riporta, per ciascun ricettore individuato, le relative coordinate secondo il sistema Gauss Boaga, la categoria Catastale e la distanza dal più prossimo aerogeneratore.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 7 di 18

*Tabella 1 – Potenziali ricettori esposti al possibile disturbo da shadow flickering*

FABBRICATO	COMUNE	GB EST	GB NORD	DISTANZA DAL PIÙ PROSSIMO WTG [M]	WTG PIÙ PROSSIMO [M]	CATEGORIA CATASTO FABBRICATI / TIPOLOGIA
F007	Serri	1512711	4394231	868	WTG8	A02
F010	Mandas	1512725	4389494	664	WTG13	A04
F015	Mandas	1511572	4390044	910	WTG13	A07
F016	Mandas	1512242	4390673	611	WTG13	A04
F017	Mandas	1512016	4391197	839	WTG11	A04
F018	Mandas	1512059	4391153	901	WTG11	A04
F019	Mandas	1513226	4391168	528	WTG12	A04
F024	Mandas	1511586	4390573	990	WTG13	A02
F030	Mandas	1511182	4391269	556	WTG11	A10
F047	Mandas	1511770	4390036	689	WTG13	D08
F051	Mandas	1512342	4389180	928	WTG13	D10
F052	Mandas	1512312	4389221	891	WTG13	D10
F187	Mandas	1512302	4389208	906	WTG13	D10
F196	Escolca	1512886	4393339	994	WTG8	C02
F200	Escolca	1512754	4393644	778	WTG8	C03
F208	Mandas	1509717	4391497	731	WTG10	C02
F237	Serri	1511542	4395250	455	WTG5	B04
F267	Isili	1511184	4398029	893	WTG1	A02
F269	Isili	1511079	4398056	997	WTG1	A07
F295	Serri	1512378	4394303	673	WTG8	A02
F304	Mandas	1511624	4389963	843	WTG13	D06 - D01
F322	Serri	1512753	4395128	991	WTG6	Seminativo
F342	Serri	1512304	4394436	750	WTG8	A03
F347	Escolca	1512602	4393741	618	WTG8	Pascolo
F367	Serri	1512026	4394601	844	WTG8	D06

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 8 di 18

## 4 IPOTESI ALLA BASE DEL CALCOLO E SOGLIE DI RIFERIMENTO

### 4.1 Introduzione

L'analisi dell'effetto di shadow flickering è stata condotta con l'utilizzo del modulo SHADOW del software WindPro 3.4. Il programma esegue una simulazione completa del percorso del sole durante un intero anno.

I calcoli possono essere eseguiti secondo due scenari: lo scenario peggiore (*worst case*) e il caso reale (*real case*).

Nello scenario *worst case* nessuno, tra i fattori di influenza indicati al capitolo 2 è contemplato nei calcoli del modello di simulazione. In situazioni di cielo coperto o calma di vento, o in caso di direzione del vento tale da porre il piano del rotore in posizione parallela rispetto alla linea sole-ricettore, la WTG non produrrà ombra intermittente, ma il suo contributo teorico è comunque computato dal *software*.



Conseguentemente, nello scenario peggiore, è altamente verosimile che i ricettori considerati saranno soggetti ad un impatto da *shadow flickering* significativamente inferiore a quello ipotizzato dal modello.

Nello scenario *real case*, il software può tenere conto delle reali **condizioni di funzionamento degli aerogeneratori** (in termini di ore di funzionamento attese per ogni settore angolare di provenienza del vento) nonché delle condizioni di **Eliofania**, ossia di durata media del soleggiamento della specifica zona di studio.

Peraltro, in entrambi gli scenari di calcolo, se la simulazione contempla l'effetto dell'orografia sulla propagazione dell'ombra, la stessa ignora l'azione schermante "sito-specifica" esercitata dai manufatti e dalle alberature. In altre parole, **il calcolo è sempre conservativo e rappresenta quindi il massimo rischio potenziale di disturbo.**

In definitiva, affinché il fenomeno dell'ombra intermittente possa costituire un disturbo per i soggetti più sensibili dovrebbero verificarsi simultaneamente le seguenti circostanze:

- il vento deve soffiare ad una velocità superiore a 3 m/s (velocità di *cut-in* del rotore);
- presenza di luminosità solare diretta;
- l'osservatore deve risultare sufficientemente vicino alla sorgente di *shadow flickering*;
- il ricettore deve essere effettivamente esposto al campo di luce tremolante;
- l'illuminazione dell'ambiente residenziale deve essere bassa;

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 9 di 18	

- il contrasto tra luci ed ombre deve essere alto;
- non devono essere presenti schermature che ostacolino la propagazione dell'ombra (come tendaggi o alberature);
- gli individui potenzialmente soggetti ad un impatto da *shadow flickering* dovrebbero permanere esposti alla luce tremolante per un tempo sufficiente ad avvertire fastidio.

Per le finalità del presente studio, in assenza di una specifica disciplina normativa nazionale o regionale, si è fatto riferimento alle linee guida elaborate dal Gruppo Federale tedesco di Controllo delle Emissioni (*Bund-/Länder-Arbeitsgemeinschaft für Immissionsschutz - LAI*) – aggiornamento 2020.

Per la valutazione degli effetti del tremolio dell'ombra, peraltro, lo stesso legislatore tedesco non ha finora emanato, né risulta che sia in procinto di emanare, norme giuridicamente vincolanti.

Secondo le richiamate linee guida, affinché il fenomeno di ombreggiamento sia significativo dovrebbero essere simultaneamente verificate le seguenti circostanze:

- l'angolo del sole sopra l'orizzonte deve essere almeno 3°;
- l'ingombro della pala della turbina eolica deve coprire almeno il 20% del disco solare.

Il massimo ombreggiamento su un edificio secondo tali linee-guida è stabilito in:



- 30 ore di ombreggiamento annuale;
- 30 minuti di ombreggiamento giornaliero.

In tali archi temporali (30 ore/anno e 30 minuti/giorno), trattandosi di un disturbo effettivamente avvertito dagli occupanti l'edificio, dovrebbero risultare simultaneamente verificate le seguenti condizioni:

- gli ambienti esposti all'ombreggiamento sono occupati;
- gli occupanti sono svegli.

Considerata l'esigua probabilità che si verifichino contemporaneamente tutte le condizioni precedentemente illustrate per l'intera durata del fenomeno, ne deriva che il risultato del calcolo rappresenta comunque una stima prudenziale dell'impatto.

La Figura 4.1 e la Figura 4.2 mostrano i parametri necessari al modello utilizzato dal modulo SHADOW per valutare l'impatto del tremolio dell'ombra.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>CONSULENZA E PROGETTI</b> www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 10 di 18	

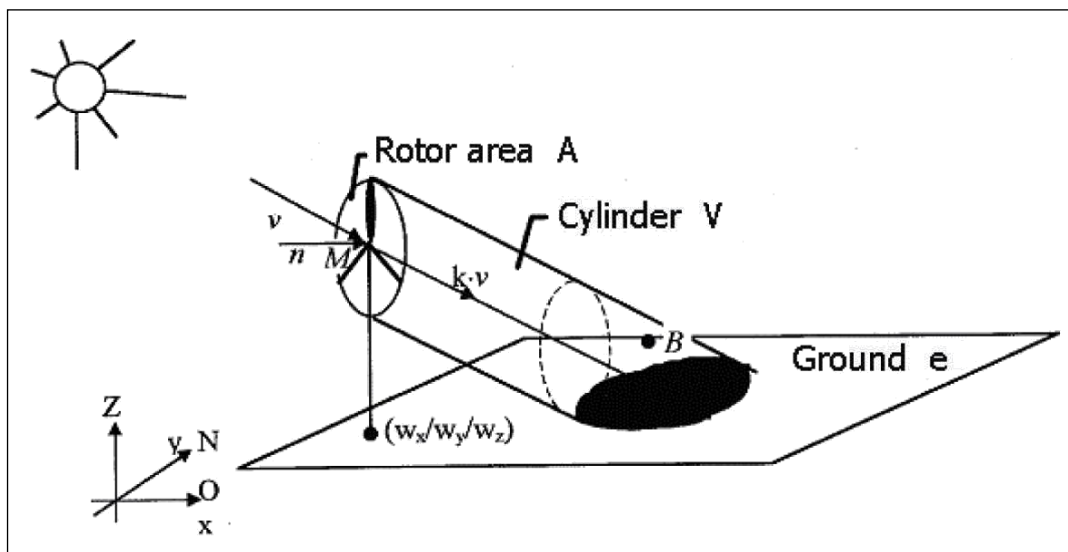


Figura 4.1: Rappresentazione schematica della proiezione dell'ombra del rotore.

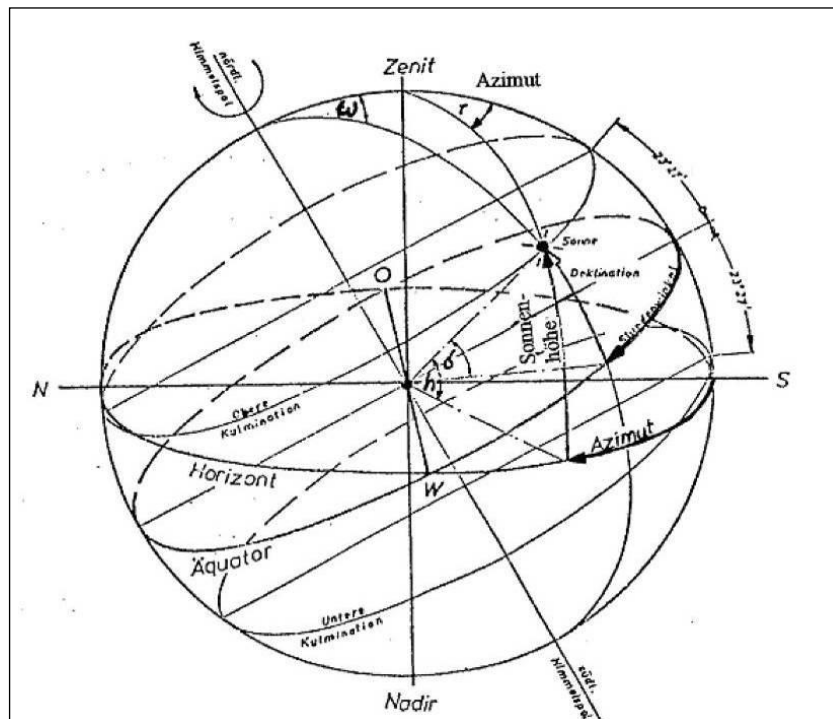




Figura 4.2: Schema dei moti terrestri e parametri di calcolo.

#### 4.2 Lo scenario peggiore (worst case)

Questi calcoli sono basati sullo scenario più conservativo (ombra massima astronomica, ossia basata sulla posizione del sole rispetto alle WTG). Se il cielo è coperto o c'è calma di vento, o la

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 11 di 18

direzione del vento è tale da porre il piano del rotore in posizione parallela rispetto alla linea sole-edificio, la WTG non produrrà ombra, ma la sua influenza apparirà comunque nei calcoli. In altre parole, il calcolo descrive lo scenario peggiore possibile, e rappresenta quindi il massimo rischio potenziale di impatto. Per ciascun ricettore il software produce un calendario che indica i giorni ed i periodi di tempo in cui l'ombra sarà presente.

### 4.3 Lo scenario reale (real case)

Oltre al calcolo che contempla le ore di "ombra massima astronomica" (detta anche ombra peggiore), il software WINDPRO consente di configurare i parametri statistici per calcolare l'"ombra meteorologica probabile" (detta anche ombra reale). In particolare, possono essere configurati due parametri statistici:



1. Statistica delle ore di funzionamento. È il periodo in cui le turbine saranno operative per ciascuna direzione di provenienza del vento nel corso dell'anno.
2. Statistica dell'eliofania. È la percentuale di ore di sole durante il dì (dall'alba al tramonto). Questa varia notevolmente da luogo a luogo, e si rende opportuno utilizzare, pertanto, una statistica proveniente da stazioni di misura vicine al sito.

WindPRO combina ZVI ed il calcolo dell'ombra in modo da escludere il contributo delle turbine non visibili dai recettori. Questo vale anche per la mappa dell'ombra, in cui saranno incluse solo le WTG visibili da ciascun punto di griglia.

Ai fini del calcolo del tremolio dell'ombra il software di simulazione considera i seguenti parametri:

- diametro del sole, D (1.390.000 km);
- distanza Terra-Sole, d (150.000.000 km);
- angolo di attacco (3°);
- coordinate geografiche e altitudine delle turbine in progetto;
- altezza al mozzo (125 m) e diametro del rotore (170 m);
- coordinate dei recettori;
- recettori considerati in modalità "serra", assumendo che vengano interessati dal fenomeno di shadow-flickering indipendentemente dall'orientamento delle finestre (ipotesi conservativa);
- modello digitale del terreno;
- eliofania del sito;
- statistica delle ore di funzionamento degli aerogeneratori in funzione delle frequenze di provenienza del vento su 12 quadranti convenzionali;
- modello di calcolo della simulazione, che tiene conto sia dell'orbita terrestre rispetto al Sole (rivoluzione), sia della rotazione rispetto al proprio asse.



<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 12 di 18	

## 5 RISULTATI

Il risultato dei calcoli è reso disponibile dal programma di simulazione (Windpro) sotto diversi formati:



- Tabellare, (calendario per ciascun ricettore) nel quale per ogni giorno dell'anno sono indicate le ore di luce e l'intervallo di tempo di esposizione all'ombra con l'orario in cui si verifica il fenomeno;
- Grafico, (per ciascun ricettore) nel quale vengono rappresentati i periodi dell'anno in cui si verifica il fenomeno, l'orario e le turbine responsabili dell'ombra;
- grafico globale, con la rappresentazione di isolinee rappresentanti l'incidenza dell'ombra espressa in ore/anno.

Con riferimento allo "scenario peggiore", le isolinee d'ombra sono state rappresentate su specifica tavola grafica, in scala adeguata alla dimensione territoriale da rappresentare, per facilitarne la lettura. La tavola è stata realizzata, pertanto, su base cartografica in scala 1:10.000 (Elaborato PELOB-RS08.01).

I risultati forniti dal modello di calcolo consentono di valutare approssimativamente sia l'impatto puntuale sul singolo ricettore, sia l'impatto distribuito sul territorio (movimento e persistenza dell'ombra).

Nello specifico, all'interno degli allegati report di calcolo sono indicati, per il singolo ricettore, i valori totali di interferenza da *shadow flickering* (espressi in h/anno), il numero di giorni in cui si verifica l'interferenza ed infine la durata massima per singolo giorno.

I risultati numerici delle simulazioni modellistiche, condotti con riferimento a ciascuno scenario di calcolo (*worst e real case*), sono riportati in Appendice.



<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>CONSULENZA E PROGETTI</b> www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 13 di 18

## 6 ANALISI DEI RISULTATI

Le risultanze del calcolo modellistico atto a stimare i valori totali di potenziale interferenza da *shadow flickering* in corrispondenza dei ricettori nello scenario di progetto sono riportate in Tabella 2.

*Tabella 2 - Risultati dei calcoli di ombreggiamento intermittente presso i ricettori considerati nello scenario real case*

ID	RICETTORE	Cat. Catastale / tipologia	WTG SF	WTG Più prossimo	Dist. Min. WTG	h/anno SF Worst Case	h/giorno SF Worst Case	h/anno SF Real Case
1	F007	A02	WTG08	WTG8	868	16:29	00:17	04:04
2	F010	A04	-	WTG13	664	00:00	00:00	00:00
3	F015	A07	WTG12- WTG13	WTG13	910	55:59:00	00:44	22:19
4	F016	A04	WTG12	WTG13	611	42:36:00	00:52	17:05
5	F017	A04	WTG10- WTG12	WTG11	839	26:29:00	00:36	09:08
6	F018	A04	WTG12	WTG11	901	28:37:00	00:38	09:58
7	F019	A04	-	WTG12	528	00:00	00:00	00:00
8	F024	A02	WTG12- WTG13	WTG13	990	46:12:00	00:42	16:14
9	F030	A10	WTG12	WTG11	556	07:33	00:21	02:40
10	F047	D08	WTG12- WTG13	WTG13	689	74:34:00	00:58	30:10:00
11	F051	D10	-	WTG13	928	00:00	00:00	00:00
12	F052	D10	-	WTG13	891	00:00	00:00	00:00
13	F187	D10	-	WTG13	906	00:00	00:00	00:00
14	F196	C02	WTG08- WTG09	WTG8	994	38:56:00	00:23	14:44
15	F200	C03	WTG08	WTG8	778	15:54	00:24	06:48
16	F208	C02	WTG10- WTG11	WTG10	731	15:54	00:23	06:08
17	F237	B04	-	WTG5	455	00:00	00:00	00:00
18	F267	A02	WTG01- WTG02	WTG1	893	32:28:00	00:42	12:54
19	F269	A07	WTG01- WTG02	WTG1	997	23:20	00:35	09:09
20	F295	A02	-	WTG8	673	00:00	00:00	00:00

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 14 di 18

ID	RICETTORE	Cat. Catastale / tipologia	WTG SF	WTG Più prossimo	Dist. Min. WTG	h/anno SF Worst Case	h/giorno SF Worst Case	h/anno SF Real Case
21	F304	D06 - D01	WTG12- WTG13	WTG13	843	53:35:00	00:47	21:32
22	F322	Seminativo	WTG05	WTG6	991	29:08:00	00:35	13:18
23	F342	A03	-	WTG8	750	00:00	00:00	00:00
24	F347	Pascolo	WTG08	WTG8	618	36:22:00	00:42	14:41
25	F367	D06	-	WTG8	844	00:00	00:00	00:00

Come si può osservare dall'esame della Tabella 6.1, l'incidenza dell'ombreggiamento intermittente presso i ricettori considerati nello scenario **real case** è sempre inferiore, o al più coincidente, con il valore guida di 30 h/anno.



Nello specifico:

- su n. 9 ricettori su 25 totali (F010, F019, F051, F052, F187, F237, F295, F342, F367) non si prevede alcun effetto di *shadow-flickering*,
- n. 15 ricettori presentano un'incidenza del fenomeno di SF inferiore alla soglia guida di 30 h/anno;
- su un unico ricettore (F047) il modello di calcolo restituisce una durata coincidente con il valore di riferimento di 30 h/anno.

In riferimento al ricettore F047, riferibile all'edificio di accoglienza del parco urbano Acquabona in comune di Mandas, l'esame del calendario dell'ombra (Figura 6.1) mostra come i potenziali effetti di ombreggiamento intermittente, ad opera degli aerogeneratori WTG12 e WTG13, siano attesi nel periodo estivo, nel primissimo mattino, entro una fascia oraria (anteriore alle 9.00 a.m.) in cui è ragionevole ipotizzare l'assenza di occupanti l'edificio.

Peraltro, come chiaramente desumibile dall'esame della ripresa aerea, l'edificio è schermato sul lato est da una fitta cortina arborea in grado di esercitare un'efficace azione schermante rispetto al potenziale ombreggiamento (Figura 6.2).

In relazione all'incidenza giornaliera, sebbene la stessa sia risultata leggermente superiore alla soglia di 30 minuti/giorno, alla luce delle ipotesi estremamente conservative che contraddistinguono le verifiche previsionali nello "scenario peggiore" (cfr. par. 4.3), si può senz'altro affermare che l'incidenza reale del fenomeno di shadow-flickering presso i ricettori considerati risulterà drasticamente ridotta rispetto a quella calcolata e tale da non arrecare alcun disturbo agli occupanti gli edifici.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 15 di 18

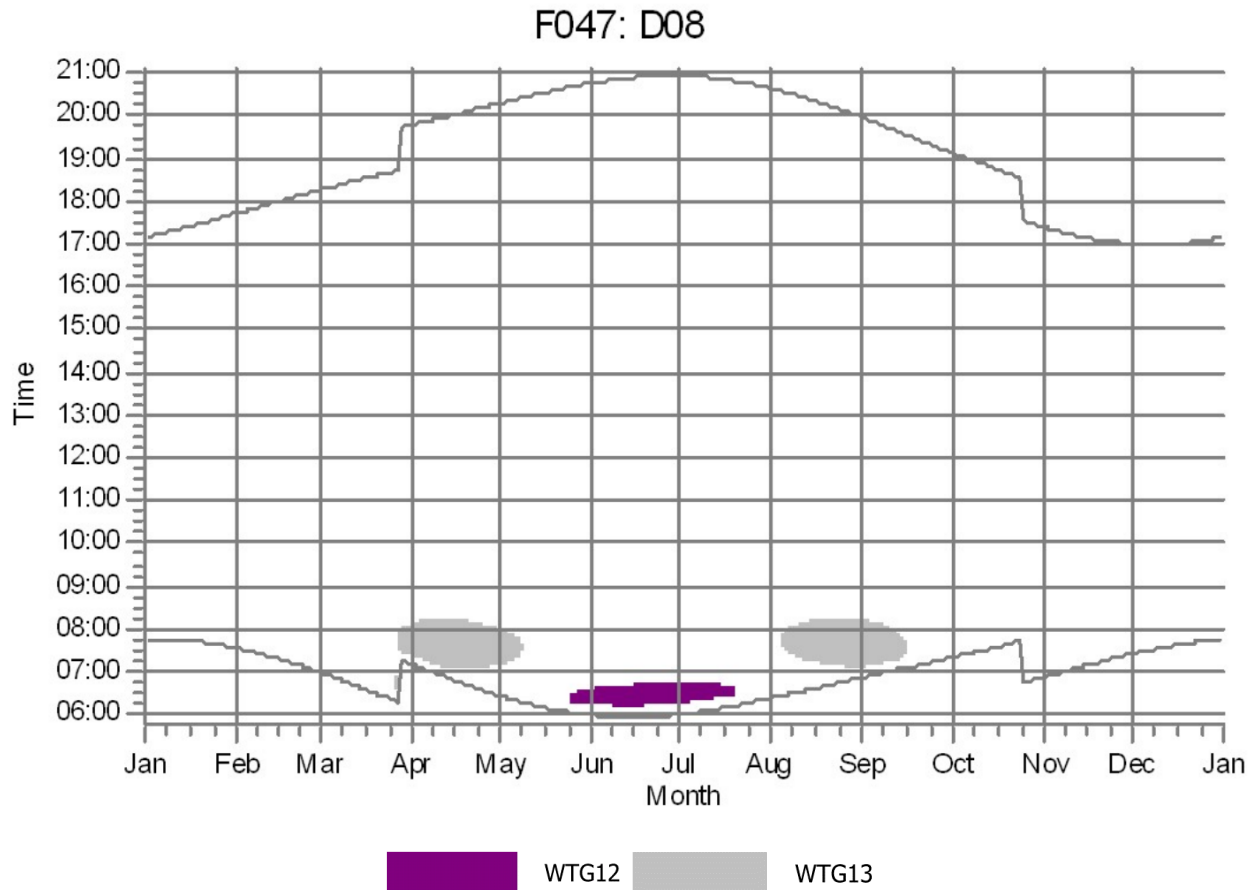




Figura 6.1 – Calendario dell’ombra relativo al ricettore F047 (edificio di accoglienza del parco urbano Acquabona in comune di Mandas)



<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 www.iatprogetti.it		<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 16 di 18

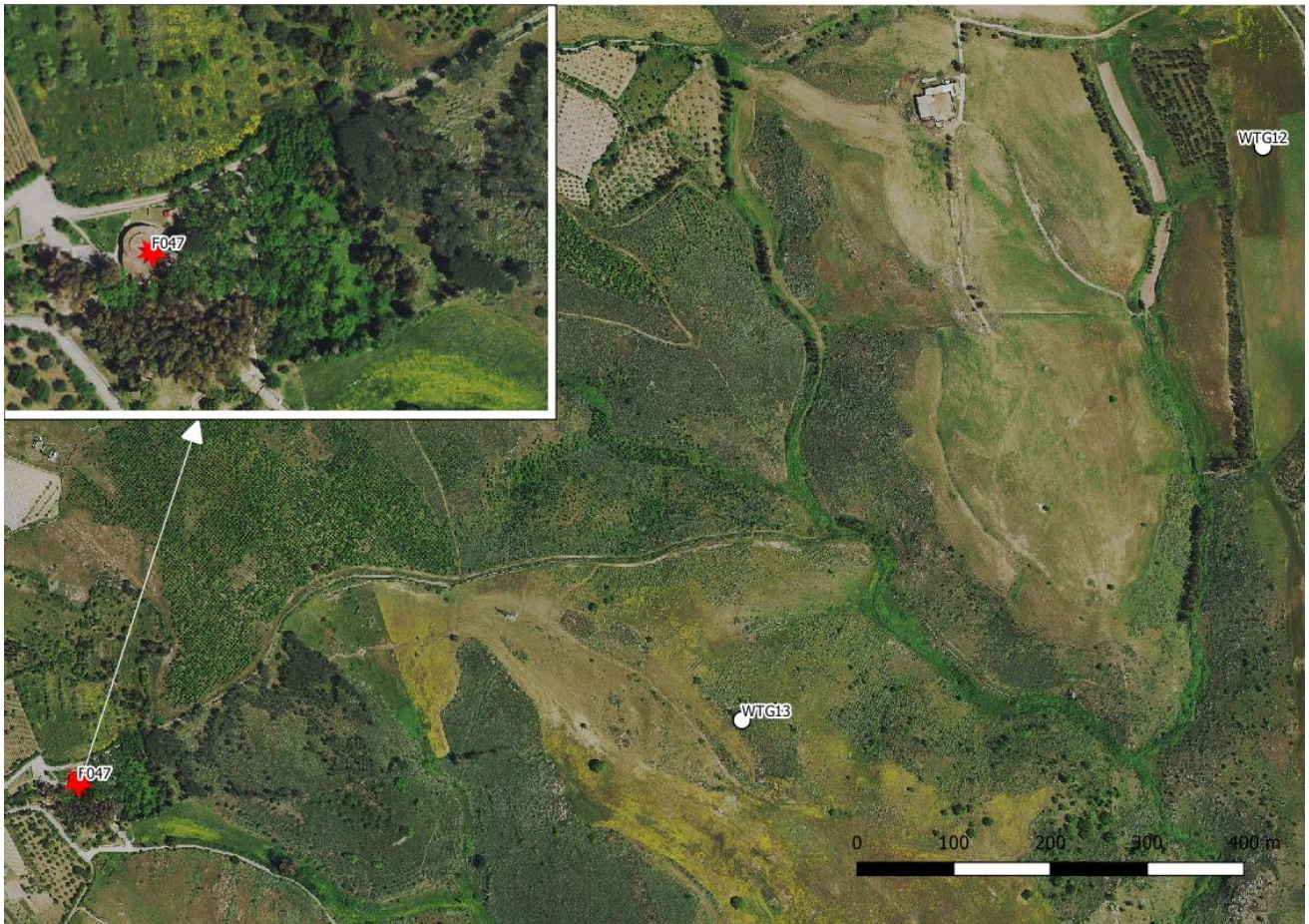




Figura 6.2 – Posizionamento del ricevitore F047 rispetto agli aerogeneratori WTG12 e WTG13, all'origine del potenziale fenomeno di ombreggiamento intermittente. Si noti come l'edificio sia delimitato sui lati est e sud da una fitta cortina arborea in grado di esercitare un efficace azione schermante.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 17 di 18	

## 7 CONCLUSIONI

Il documento ha esaminato compiutamente il potenziale disturbo da ombreggiamento intermittente (*shadow flickering*) in corrispondenza dei più prossimi fabbricati presenti nell'area interessata dal proposto parco eolico denominato "Lobadas". L'individuazione dei ricettori ha fatto riferimento alla ricognizione sugli edifici esistenti eseguita nell'ambito della definizione del layout di impianto e dell'analisi ambientale, i cui risultati sono riepilogati in opportune "schede fabbricati" all'interno di apposito report allegato alla documentazione progettuale.

Ai fini dei calcoli di esposizione all'ombra intermittente, sono stati individuati come ricettori n. 13 fabbricati riferibili alla categoria catastale "A" (*abitazioni*) nonché, prudenzialmente, ulteriori 16 edifici con caratteristiche tipologico-costruttive o funzionali assimilabili ad ambienti abitativi, localizzati entro l'ambito distanziale di 1000 metri dagli aerogeneratori.



Per le finalità del presente studio, in assenza di una specifica disciplina normativa nazionale o regionale, si è fatto riferimento alle linee guida elaborate dal Gruppo Federale tedesco di Controllo delle Emissioni (*Bund-/Länder-Arbeitsgemeinschaft für Immissionsschutz - LAI*) – aggiornamento 2020.

L'incidenza dell'ombreggiamento intermittente presso i ricettori considerati nello scenario *real case* è sempre inferiore, o al più coincidente, con il valore guida di 30 h/anno. In corrispondenza di n. 9 fabbricati (F010, F019, F051, F052, F187, F237, F295, F342, F367), peraltro, non si prevede alcun effetto di ombreggiamento.

In riferimento al ricettore F047, riferibile all'edificio di accoglienza del parco urbano Acquabona in comune di Mandas, l'esame del calendario dell'ombra mostra come i potenziali effetti di ombreggiamento intermittente, ad opera degli aerogeneratori WTG12 e WTG13, siano attesi nel periodo estivo, nel primissimo mattino, entro una fascia oraria (anteriore alle 9.00 a.m.) in cui è ragionevole ipotizzare l'assenza di occupanti l'edificio.

Peraltro, l'edificio è schermato sul lato est da una fitta cortina arborea in grado di esercitare un'efficace azione schermante rispetto al potenziale ombreggiamento.

Per quanto sopra, anche in ragione della conservatività delle stime, è ragionevole affermare che l'effettivo potenziale disturbo da *shadow flickering* risulterà estremamente più contenuto di quello prospettato dal software di simulazione, tale da potersi ricondurre ai predetti "valori guida" e da non arrecare apprezzabili disturbi agli occupanti gli edifici in esame.

<b>COMMITTENTE</b> RWE Renewables Italia S.r.l. Via Andrea Doria, 41/G - Roma (RM)		<b>OGGETTO</b> PARCO EOLICO "LOBADAS" STUDIO DI IMPATTO AMBIENTALE	<b>COD. ELABORATO</b> PELOB-RS08
 <b>iat</b> CONSULENZA E PROGETTI www.iatprogetti.it	<b>TITOLO</b> ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	<b>PAGINA</b> 18 di 18	

## APPENDICE: REPORT DEI RISULTATI DEL CALCOLO MODELLISTICO



## SHADOW - Main Result

Calculation: Real\_case\_Progetto\_V172

### 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

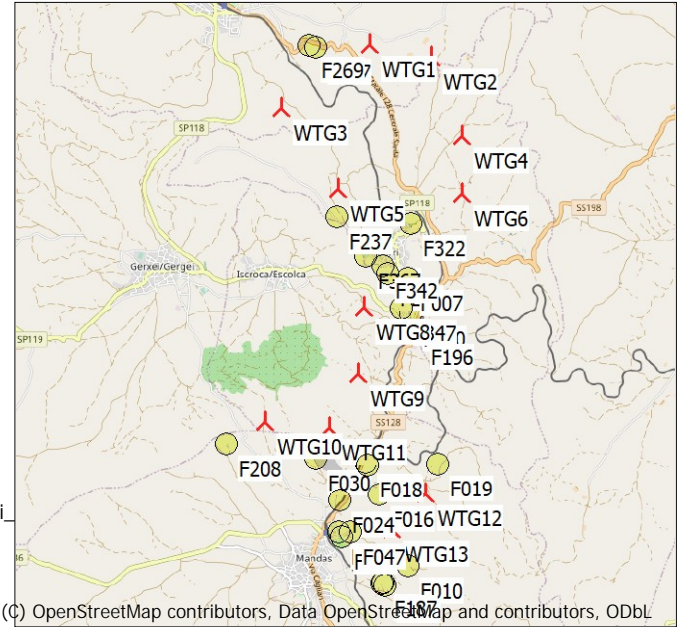
Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:  
Height contours used: Height Contours: CONTOURLINE\_Progetto\_RWE\_Serri\_Mandas  
Obstacles used in calculation  
Eye height for map: 1,5 m  
Grid resolution: 1,0 m

All coordinates are in  
Italian Gauss-Boaga west-ROMA40 (IT-peninsular < ±4m)

### WTGs



WTG	Easting	Northing	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
WTG1	1.512.077	4.398.071	460,3	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG10	1.510.342	4.391.877	423,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG11	1.511.408	4.391.776	456,2	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG12	1.512.995	4.390.693	490,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG13	1.512.456	4.390.101	490,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG2	1.513.088	4.397.873	494,4	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG3	1.510.607	4.397.039	564,8	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG4	1.513.605	4.396.581	500,7	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG5	1.511.554	4.395.705	588,4	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG6	1.513.610	4.395.626	491,8	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG8	1.511.984	4.393.758	500,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG9	1.511.899	4.392.663	500,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0

### Shadow receptor-Input

No.	Name	Easting	Northing	Z	Width	Height	Elevation	Slope of	Direction mode	Eye height
				[m]	[m]	[m]	a.g.l.	window		(ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
F007	A02	1.512.711	4.394.231	613,2	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F010	A04	1.512.725	4.389.494	440,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F015	A07	1.511.572	4.390.044	497,7	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F016	A04	1.512.242	4.390.673	508,5	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F017	A04	1.512.016	4.391.197	503,5	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F018	A04	1.512.059	4.391.153	500,9	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F019	A04	1.513.226	4.391.168	501,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F024	A02	1.511.586	4.390.573	495,2	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F030	A10	1.511.182	4.391.269	435,7	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F047	D08	1.511.770	4.390.036	491,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F051	D10	1.512.342	4.389.180	450,9	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F052	D10	1.512.312	4.389.221	455,1	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F187	D10	1.512.302	4.389.208	458,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F196	C02	1.512.886	4.393.339	580,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F200	C03	1.512.754	4.393.644	597,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F208	C02	1.509.717	4.391.497	420,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F237	B04	1.511.542	4.395.250	630,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6

To be continued on next page...

## SHADOW - Main Result

Calculation: Real\_case\_Progetto\_V172

...continued from previous page

No.	Name	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
F267	A02	1.511.184	4.398.029	483,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F269	A07	1.511.079	4.398.056	488,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F295	A02	1.512.378	4.394.303	620,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F304	D06 - D01	1.511.624	4.389.963	493,7	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F322	Seminativo	1.512.753	4.395.128	600,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F342	A03	1.512.304	4.394.436	620,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F347	Pascolo	1.512.602	4.393.741	580,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F367	D06	1.512.026	4.394.601	620,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6

## Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
F007	A02	4:04
F010	A04	0:00
F015	A07	22:19
F016	A04	17:05
F017	A04	9:08
F018	A04	9:58
F019	A04	0:00
F024	A02	16:14
F030	A10	2:40
F047	D08	30:10
F051	D10	0:00
F052	D10	0:00
F187	D10	0:00
F196	C02	14:44
F200	C03	6:48
F208	C02	6:08
F237	B04	0:00
F267	A02	12:54
F269	A07	9:09
F295	A02	0:00
F304	D06 - D01	21:32
F322	Seminativo	13:18
F342	A03	0:00
F347	Pascolo	14:41
F367	D06	0:00

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

No.	Name	Worst case [h/year]	Expected [h/year]
WTG1	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)	30:03	11:58
WTG10	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (87)	8:08	3:05
WTG11	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (88)	9:20	3:45
WTG12	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (89)	106:25	40:04
WTG13	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90)	110:03	42:24
WTG2	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80)	5:05	1:59
WTG3	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (81)	0:00	0:00
WTG4	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (82)	0:00	0:00
WTG5	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (83)	24:41	11:39
WTG6	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (84)	4:27	1:39
WTG8	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)	84:29	33:28
WTG9	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (86)	14:11	3:24

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
IT-09124 Cagliari
+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
22/12/2023 09:31/3.4.415

SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F007 - A02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Table with 12 columns (Jan-Dec) and 1 row of values: 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

Table with 13 columns (N, NNE, ENE, E, ESE, SSE, S, SSW, WSW, W, WNW, NNW, Sum) and 1 row of values: 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

Main shadow calculation table with columns for months (January-December) and rows for each day of the year (1-31), including sun rise/set times, shadow reduction factors, and total real sun hours.

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

Matrix with 4 columns: 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)

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F010 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:58 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:49 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:45	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:32	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:09 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:43	06:45 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39	07:05 19:44	06:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40	07:06 19:45	06:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42	07:07 19:46	06:11 19:46	06:27 20:44	06:00 20:44	05:59 20:56	06:21 20:39	06:50 19:58	07:19 17:24	06:50 17:24	07:25 17:09	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F015 - A07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	07:28 (WTG13) 19:59 (WTG13)	06:26 20:17
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	07:26 (WTG13) 07:59 (WTG13)	06:25 20:18
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	07:25 (WTG13) 08:00 (WTG13)	06:23 20:19
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	07:23 (WTG13) 08:00 (WTG13)	06:22 20:20
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	07:22 (WTG13) 08:01 (WTG13)	06:21 20:21
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	07:20 (WTG13) 08:00 (WTG13)	06:20 20:22
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	07:18 (WTG13) 07:59 (WTG13)	06:19 20:23
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	07:17 (WTG13) 08:00 (WTG13)	06:18 20:24
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	07:15 (WTG13) 07:59 (WTG13)	06:17 20:25
10	07:45 17:18	07:24 17:54	06:45 18:25	06:56 19:56	07:15 (WTG13) 07:59 (WTG13)	06:16 20:26
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	07:14 (WTG13) 07:58 (WTG13)	06:14 20:27
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	07:15 (WTG13) 07:58 (WTG13)	06:13 20:28
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	07:14 (WTG13) 07:56 (WTG13)	06:12 20:29
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	07:15 (WTG13) 07:56 (WTG13)	06:11 20:30
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	07:15 (WTG13) 07:55 (WTG13)	06:11 20:31
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	07:16 (WTG13) 07:54 (WTG13)	06:10 20:32
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	07:16 (WTG13) 07:52 (WTG13)	06:09 20:33
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	07:18 (WTG13) 07:51 (WTG13)	06:08 20:33
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	07:19 (WTG13) 07:50 (WTG13)	06:07 20:34
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	07:20 (WTG13) 07:48 (WTG13)	06:06 20:35
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	07:22 (WTG13) 07:46 (WTG13)	06:05 20:36
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	07:23 (WTG13) 07:42 (WTG13)	06:05 20:37
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	07:27 (WTG13) 07:39 (WTG13)	06:04 20:38
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	06:03 20:39
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	06:02 20:40
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	06:02 20:40
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	06:01 20:41
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	06:01 20:42
29	07:35 17:39	07:15 19:44	07:33 (WTG13) 07:57 (WTG13)	06:28 20:15	06:00 20:43	06:00 20:43
30	07:34 17:40	07:13 19:45	07:31 (WTG13) 07:58 (WTG13)	06:27 20:16	06:00 20:44	06:00 20:44
31	07:34 17:42	07:11 19:46	07:30 (WTG13) 07:59 (WTG13)	06:26 20:17	05:59 20:44	05:59 20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case			142	818	264	636
Sun reduction			0,49	0,53	0,59	0,66
Oper. time red.			0,86	0,86	0,86	0,86
Wind dir. red.			0,77	0,77	0,67	0,67
Total reduction			0,33	0,35	0,34	0,38
Total, real			47	290	90	244

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

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



## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F015 - A07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December		
1	05:59	06:23 (WTG12)	06:22	06:51	07:13 (WTG13)	07:19	06:51	07:25
	20:56	22 06:45 (WTG12)	20:38	19:57	44 07:57 (WTG13)	19:08	17:23	17:01
2	06:00	06:23 (WTG12)	06:23	06:52	07:13 (WTG13)	07:20	06:53	07:26
	20:56	22 06:45 (WTG12)	20:37	19:55	44 07:57 (WTG13)	19:06	17:22	17:00
3	06:00	06:23 (WTG12)	06:24	06:53	07:13 (WTG13)	07:21	06:54	07:27
	20:55	22 06:45 (WTG12)	20:36	19:54	44 07:57 (WTG13)	19:05	17:21	17:00
4	06:01	06:23 (WTG12)	06:25	06:54	07:14 (WTG13)	07:22	06:55	07:28
	20:55	23 06:46 (WTG12)	20:35	19:52	43 07:57 (WTG13)	19:03	17:20	17:00
5	06:01	06:23 (WTG12)	06:26	06:55	07:15 (WTG13)	07:23	06:56	07:29
	20:55	23 06:46 (WTG12)	20:34	19:50	42 07:57 (WTG13)	19:02	17:19	17:00
6	06:02	06:24 (WTG12)	06:27	06:56	07:16 (WTG13)	07:24	06:57	07:30
	20:55	23 06:47 (WTG12)	20:32	19:49	40 07:56 (WTG13)	19:00	17:18	17:00
7	06:03	06:25 (WTG12)	06:28	06:57	07:17 (WTG13)	07:25	06:58	07:30
	20:55	23 06:48 (WTG12)	20:31	19:47	39 07:56 (WTG13)	18:58	17:17	17:00
8	06:03	06:25 (WTG12)	06:29	06:58	07:18 (WTG13)	07:26	06:59	07:31
	20:54	23 06:48 (WTG12)	20:30	19:46	37 07:55 (WTG13)	18:57	17:16	17:00
9	06:04	06:26 (WTG12)	06:30	06:59	07:19 (WTG13)	07:27	07:00	07:32
	20:54	22 06:48 (WTG12)	20:29	19:44	35 07:54 (WTG13)	18:55	17:15	17:00
10	06:04	06:26 (WTG12)	06:31	06:59	07:19 (WTG13)	07:28	07:02	07:33
	20:54	22 06:48 (WTG12)	20:28	19:42	34 07:53 (WTG13)	18:54	17:14	17:00
11	06:05	06:27 (WTG12)	06:31	07:00	07:20 (WTG13)	07:29	07:03	07:34
	20:53	22 06:49 (WTG12)	20:26	19:41	32 07:52 (WTG13)	18:52	17:13	17:00
12	06:06	06:28 (WTG12)	06:32	07:01	07:21 (WTG13)	07:30	07:04	07:35
	20:53	22 06:50 (WTG12)	20:25	19:39	29 07:50 (WTG13)	18:51	17:12	17:00
13	06:07	06:28 (WTG12)	06:33	07:02	07:22 (WTG13)	07:31	07:05	07:36
	20:52	21 06:49 (WTG12)	20:24	19:37	27 07:49 (WTG13)	18:49	17:11	17:00
14	06:07	06:29 (WTG12)	06:34	07:03	07:23 (WTG13)	07:32	07:06	07:36
	20:52	21 06:50 (WTG12)	20:23	19:36	25 07:48 (WTG13)	18:48	17:10	17:00
15	06:08	06:30 (WTG12)	06:35	07:04	07:24 (WTG13)	07:33	07:07	07:37
	20:51	20 06:50 (WTG12)	20:21	19:34	22 07:46 (WTG13)	18:46	17:09	17:00
16	06:09	06:31 (WTG12)	06:36	07:05	07:25 (WTG13)	07:34	07:08	07:38
	20:51	20 06:51 (WTG12)	20:20	19:33	19 07:44 (WTG13)	18:45	17:08	17:01
17	06:09	06:31 (WTG12)	06:37	07:06	07:26 (WTG13)	07:35	07:10	07:38
	20:50	19 06:50 (WTG12)	20:19	19:31	15 07:41 (WTG13)	18:43	17:08	17:01
18	06:10	06:32 (WTG12)	06:38	07:07	07:27 (WTG13)	07:36	07:11	07:39
	20:50	18 06:50 (WTG12)	20:17	19:29	10 07:37 (WTG13)	18:42	17:07	17:01
19	06:11	06:33 (WTG12)	06:39	07:08		07:37	07:12	07:40
	20:49	18 06:51 (WTG12)	20:16	19:28		18:40	17:06	17:02
20	06:12	06:34 (WTG12)	06:40	07:32 (WTG13)	07:09	07:38	07:13	07:40
	20:48	17 06:51 (WTG12)	20:14	19:26		18:39	17:06	17:02
21	06:13	06:34 (WTG12)	06:41	07:29 (WTG13)	07:10	07:39	07:14	07:41
	20:48	16 06:50 (WTG12)	20:13	19:24		18:38	17:05	17:03
22	06:13	06:35 (WTG12)	06:42	07:26 (WTG13)	07:11	07:40	07:15	07:41
	20:47	15 06:50 (WTG12)	20:12	19:23		18:36	17:04	17:03
23	06:14	06:36 (WTG12)	06:43	07:23 (WTG13)	07:12	07:42	07:16	07:42
	20:46	14 06:50 (WTG12)	20:10	19:21		18:35	17:04	17:04
24	06:15	06:37 (WTG12)	06:44	07:22 (WTG13)	07:13	07:43	07:17	07:42
	20:45	13 06:50 (WTG12)	20:09	19:19		18:33	17:03	17:04
25	06:16	06:38 (WTG12)	06:45	07:20 (WTG13)	07:13	06:44	07:18	07:43
	20:44	11 06:49 (WTG12)	20:07	19:18		17:32	17:03	17:05
26	06:17	06:39 (WTG12)	06:46	07:19 (WTG13)	07:14	06:45	07:20	07:43
	20:44	10 06:49 (WTG12)	20:06	19:16		17:31	17:02	17:05
27	06:18	06:39 (WTG12)	06:46	07:18 (WTG13)	07:15	06:46	07:21	07:43
	20:43	9 06:48 (WTG12)	20:04	19:15		17:30	17:02	17:06
28	06:19	06:40 (WTG12)	06:47	07:17 (WTG13)	07:16	06:47	07:22	07:44
	20:42	7 06:47 (WTG12)	20:03	19:13		17:28	17:01	17:07
29	06:20	06:41 (WTG12)	06:48	07:16 (WTG13)	07:17	06:48	07:23	07:44
	20:41	5 06:46 (WTG12)	20:01	19:11		17:27	17:01	17:07
30	06:20	06:42 (WTG12)	06:49	07:15 (WTG13)	07:18	06:49	07:24	07:44
	20:40	3 06:45 (WTG12)	20:00	19:10		17:26	17:01	17:08
31	06:21		06:50	07:15 (WTG13)		06:50		07:45
	20:39		19:58	43 07:58 (WTG13)		17:25		17:09
Potential sun hours	455		425	374		347	301	292
Total, worst case		526		392		581		
Sun reduction		0,74		0,73		0,65		
Oper. time red.		0,86		0,86		0,86		
Wind dir. red.		0,67		0,77		0,77		
Total reduction		0,43		0,49		0,43		
Total, real		225		192		252		

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F016 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June		
1	07:45	07:33	06:59	07:10	07:28 (WTG12)	06:26	05:59	
	17:10	17:43	18:15	19:47	44 08:12 (WTG12)	20:17	20:45	
2	07:45	07:32	06:57	07:08	07:26 (WTG12)	06:25	05:58	
	17:11	17:44	18:16	19:48	46 08:12 (WTG12)	20:18	20:46	
3	07:45	07:31	06:56	07:07	07:25 (WTG12)	06:23	05:58	
	17:11	17:45	18:17	19:49	47 08:12 (WTG12)	20:19	20:46	
4	07:45	07:30	06:54	07:05	07:23 (WTG12)	06:22	05:57	
	17:12	17:46	18:18	19:50	48 08:11 (WTG12)	20:20	20:47	
5	07:45	07:29	06:53	07:03	07:22 (WTG12)	06:21	05:57	
	17:13	17:48	18:19	19:51	49 08:11 (WTG12)	20:21	20:48	
6	07:45	07:28	06:51	07:02	07:20 (WTG12)	06:20	05:57	
	17:14	17:49	18:21	19:52	51 08:11 (WTG12)	20:22	20:48	
7	07:45	07:27	06:50	07:00	07:18 (WTG12)	06:19	05:57	
	17:15	17:50	18:22	19:53	52 08:10 (WTG12)	20:23	20:49	
8	07:45	07:26	06:48	06:59	07:18 (WTG12)	06:18	05:56	
	17:16	17:51	18:23	19:54	51 08:09 (WTG12)	20:24	20:50	
9	07:45	07:25	06:46	06:57	07:18 (WTG12)	06:17	05:56	
	17:17	17:52	18:24	19:55	50 08:08 (WTG12)	20:25	20:50	
10	07:45	07:24	06:45	06:56	07:19 (WTG12)	06:15	05:56	
	17:18	17:53	18:25	19:56	49 08:08 (WTG12)	20:26	20:51	
11	07:45	07:22	06:43	06:54	07:19 (WTG12)	06:14	05:56	
	17:19	17:55	18:26	19:57	48 08:07 (WTG12)	20:27	20:51	
12	07:44	07:21	06:42	06:53	07:19 (WTG12)	06:13	05:56	
	17:20	17:56	18:27	19:58	47 08:06 (WTG12)	20:28	20:52	
13	07:44	07:20	06:40	06:51	07:19 (WTG12)	06:12	05:56	
	17:21	17:57	18:28	19:59	45 08:04 (WTG12)	20:29	20:52	
14	07:44	07:19	06:39	06:50	07:21 (WTG12)	06:11	05:56	
	17:22	17:58	18:29	20:00	43 08:04 (WTG12)	20:30	20:53	
15	07:44	07:18	06:37	06:48	07:21 (WTG12)	06:10	05:56	
	17:23	17:59	18:30	20:01	41 08:02 (WTG12)	20:31	20:53	
16	07:43	07:16	06:35	06:47	07:22 (WTG12)	06:10	05:56	
	17:24	18:00	18:31	20:02	39 08:01 (WTG12)	20:32	20:53	
17	07:43	07:15	06:34	06:45	07:23 (WTG12)	06:09	05:56	
	17:25	18:02	18:32	20:03	36 07:59 (WTG12)	20:33	20:54	
18	07:42	07:14	06:32	06:44	07:25 (WTG12)	06:08	05:56	
	17:26	18:03	18:33	20:04	32 07:57 (WTG12)	20:33	20:54	
19	07:42	07:12	06:31	06:49 (WTG12)	06:42	07:27 (WTG12)	06:07	05:56
	17:28	18:04	18:34	9 06:58 (WTG12)	20:05	28 07:55 (WTG12)	20:34	20:54
20	07:41	07:11	06:29	06:47 (WTG12)	06:41	07:28 (WTG12)	06:06	05:56
	17:29	18:05	18:35	14 07:01 (WTG12)	20:06	24 07:52 (WTG12)	20:35	20:55
21	07:41	07:10	06:27	06:46 (WTG12)	06:39	07:31 (WTG12)	06:05	05:56
	17:30	18:06	18:36	18 07:04 (WTG12)	20:07	18 07:49 (WTG12)	20:36	20:55
22	07:40	07:08	06:26	06:44 (WTG12)	06:38	07:35 (WTG12)	06:05	05:56
	17:31	18:07	18:37	22 07:06 (WTG12)	20:08	9 07:44 (WTG12)	20:37	20:55
23	07:40	07:07	06:24	06:42 (WTG12)	06:36		06:04	05:57
	17:32	18:08	18:38	25 07:07 (WTG12)	20:09		20:38	20:55
24	07:39	07:06	06:23	06:41 (WTG12)	06:35		06:03	05:57
	17:33	18:10	18:39	28 07:09 (WTG12)	20:10		20:39	20:56
25	07:38	07:04	06:21	06:39 (WTG12)	06:34		06:02	05:57
	17:34	18:11	18:40	30 07:09 (WTG12)	20:11		20:40	20:56
26	07:38	07:03	06:19	06:38 (WTG12)	06:32		06:02	05:57
	17:36	18:12	18:41	33 07:11 (WTG12)	20:12		20:40	20:56
27	07:37	07:01	06:18	06:36 (WTG12)	06:31		06:01	05:58
	17:37	18:13	18:42	35 07:11 (WTG12)	20:13		20:41	20:56
28	07:36	07:00	06:16	06:34 (WTG12)	06:30		06:01	05:58
	17:38	18:14	18:43	37 07:11 (WTG12)	20:14		20:42	20:56
29	07:35		07:15	07:33 (WTG12)	06:28		06:00	05:59
	17:39		19:44	39 08:12 (WTG12)	20:15		20:43	20:56
30	07:34		07:13	07:31 (WTG12)	06:27		06:00	05:59
	17:40		19:45	41 08:12 (WTG12)	20:16		20:44	20:56
31	07:34		07:11	07:30 (WTG12)			05:59	
	17:42		19:46	42 08:12 (WTG12)			20:44	
Potential sun hours	301	299	370	397	445	448		
Total, worst case			373	897				
Sun reduction			0,49	0,53				
Oper. time red.			0,86	0,86				
Wind dir. red.			0,78	0,78				
Total reduction			0,33	0,36				
Total, real			124	320				

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

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



### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F016 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59 20:56	06:22 20:38	06:51 19:57	07:18 (WTG12) 08:06 (WTG12)	07:19 19:08	06:51 17:23
2	06:00 20:56	06:23 20:37	06:52 19:55	07:17 (WTG12) 08:06 (WTG12)	07:20 19:06	06:53 17:22
3	06:00 20:55	06:24 20:36	06:53 19:53	07:16 (WTG12) 08:06 (WTG12)	07:21 19:05	06:54 17:21
4	06:01 20:55	06:25 20:35	06:54 19:52	07:15 (WTG12) 08:06 (WTG12)	07:22 19:03	06:55 17:20
5	06:01 20:55	06:26 20:34	06:55 19:50	07:15 (WTG12) 08:07 (WTG12)	07:23 19:02	06:56 17:19
6	06:02 20:55	06:27 20:32	06:56 19:49	07:16 (WTG12) 08:07 (WTG12)	07:24 19:00	06:57 17:18
7	06:03 20:55	06:28 20:31	06:57 19:47	07:17 (WTG12) 08:06 (WTG12)	07:25 18:58	06:58 17:17
8	06:03 20:54	06:29 20:30	06:58 19:46	07:18 (WTG12) 08:06 (WTG12)	07:26 18:57	06:59 17:16
9	06:04 20:54	06:30 20:29	06:59 19:44	07:18 (WTG12) 08:05 (WTG12)	07:27 18:55	07:00 17:15
10	06:04 20:54	06:30 20:28	06:59 19:42	07:19 (WTG12) 08:05 (WTG12)	07:28 18:54	07:02 17:14
11	06:05 20:53	06:31 20:26	07:00 19:41	07:20 (WTG12) 08:04 (WTG12)	07:29 18:52	07:03 17:13
12	06:06 20:53	06:32 20:25	07:01 19:39	07:21 (WTG12) 08:04 (WTG12)	07:30 18:51	07:04 17:12
13	06:06 20:52	06:33 20:24	07:02 19:37	07:22 (WTG12) 08:03 (WTG12)	07:31 18:49	07:05 17:11
14	06:07 20:52	06:34 20:23	07:03 19:36	07:23 (WTG12) 08:02 (WTG12)	07:32 18:48	07:06 17:10
15	06:08 20:51	06:35 20:21	07:04 19:34	07:24 (WTG12) 08:01 (WTG12)	07:33 18:46	07:07 17:09
16	06:09 20:51	06:36 20:20	07:05 19:33	07:25 (WTG12) 08:00 (WTG12)	07:34 18:45	07:08 17:08
17	06:09 20:50	06:37 20:19	07:06 19:31	07:26 (WTG12) 07:59 (WTG12)	07:35 18:43	07:10 17:08
18	06:10 20:50	06:38 20:17	07:07 19:29	07:27 (WTG12) 07:58 (WTG12)	07:36 18:42	07:11 17:07
19	06:11 20:49	06:39 20:16	07:08 19:28	07:27 (WTG12) 07:55 (WTG12)	07:37 18:40	07:12 17:06
20	06:12 20:48	06:40 20:14	07:09 19:26	07:28 (WTG12) 07:54 (WTG12)	07:38 18:39	07:13 17:06
21	06:13 20:48	06:41 20:13	07:10 19:24	07:29 (WTG12) 07:52 (WTG12)	07:39 18:38	07:14 17:05
22	06:13 20:47	06:42 20:12	07:11 19:23	07:30 (WTG12) 07:49 (WTG12)	07:40 18:36	07:15 17:04
23	06:14 20:46	06:43 20:10	07:12 19:21	07:31 (WTG12) 07:46 (WTG12)	07:41 18:35	07:16 17:04
24	06:15 20:45	06:44 20:09	07:12 19:19	07:32 (WTG12) 07:42 (WTG12)	07:43 18:33	07:17 17:03
25	06:16 20:44	06:45 20:07	07:13 19:18	07:33 (WTG12) 08:00 (WTG12)	07:44 17:32	07:18 17:03
26	06:17 20:44	06:45 20:06	07:14 19:16	07:34 (WTG12) 08:02 (WTG12)	07:45 17:31	07:19 17:02
27	06:18 20:43	06:46 20:04	07:15 19:14	07:35 (WTG12) 08:03 (WTG12)	07:46 17:29	07:20 17:02
28	06:19 20:42	06:47 20:03	07:16 19:13	07:36 (WTG12) 08:04 (WTG12)	07:47 17:28	07:21 17:01
29	06:19 20:41	06:48 20:01	07:17 19:11	07:37 (WTG12) 08:05 (WTG12)	07:48 17:27	07:22 17:01
30	06:20 20:40	06:49 20:00	07:18 19:10	07:38 (WTG12) 08:05 (WTG12)	07:49 17:26	07:23 17:01
31	06:21 20:39	06:50 19:58	07:19 (WTG12) 08:06 (WTG12)		06:50 17:24	07:24 17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case		371	915			
Sun reduction		0,73	0,65			
Oper. time red.		0,86	0,86			
Wind dir. red.		0,78	0,78			
Total reduction		0,49	0,44			
Total, real		183	399			

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F017 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 17:43	07:52 (WTG12) 08:24 (WTG12)	06:59 18:15	07:10 19:47	06:26 20:17
2	07:45 17:11	07:32 17:44	07:51 (WTG12) 08:24 (WTG12)	06:57 18:16	07:08 19:48	06:25 20:18
3	07:45 17:11	07:31 17:45	07:50 (WTG12) 08:24 (WTG12)	06:56 18:17	07:07 19:49	06:23 20:19
4	07:45 17:12	07:30 17:46	07:49 (WTG12) 08:24 (WTG12)	06:54 18:18	07:05 19:50	06:22 20:20
5	07:45 17:13	07:29 17:48	07:48 (WTG12) 08:24 (WTG12)	06:53 18:19	07:03 19:51	06:21 20:21
6	07:45 17:14	07:28 17:49	07:48 (WTG12) 08:23 (WTG12)	06:51 18:21	07:02 19:52	06:20 20:22
7	07:45 17:15	07:27 17:50	07:49 (WTG12) 08:23 (WTG12)	06:50 18:22	07:00 19:53	06:19 20:23
8	07:45 17:16	07:26 17:51	07:49 (WTG12) 08:23 (WTG12)	06:48 18:23	06:59 19:54	06:18 20:24
9	07:45 17:17	07:25 17:52	07:50 (WTG12) 08:22 (WTG12)	06:46 18:24	06:57 19:55	06:17 20:25
10	07:45 17:18	07:24 17:53	07:52 (WTG12) 08:21 (WTG12)	06:45 18:25	06:56 19:56	06:15 20:26
11	07:45 17:19	07:22 17:55	07:53 (WTG12) 08:20 (WTG12)	06:43 18:26	06:54 19:57	06:14 20:27
12	07:44 17:20	07:21 17:56	07:54 (WTG12) 08:18 (WTG12)	06:42 18:27	06:53 19:58	06:13 20:28
13	07:44 17:21	07:20 17:57	07:56 (WTG12) 08:16 (WTG12)	06:40 18:28	06:51 19:59	06:12 20:29
14	07:44 17:22	08:05 (WTG12) 08:07 (WTG12)	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30
15	07:44 17:23	08:04 (WTG12) 08:09 (WTG12)	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31
16	07:43 17:24	08:04 (WTG12) 08:11 (WTG12)	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32
17	07:43 17:25	08:03 (WTG12) 08:12 (WTG12)	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33
18	07:42 17:26	08:03 (WTG12) 08:14 (WTG12)	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33
19	07:42 17:28	08:02 (WTG12) 08:15 (WTG12)	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34
20	07:41 17:29	08:02 (WTG12) 08:17 (WTG12)	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35
21	07:41 17:30	08:01 (WTG12) 08:17 (WTG12)	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36
22	07:40 17:31	08:00 (WTG12) 08:18 (WTG12)	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37
23	07:40 17:32	08:00 (WTG12) 08:20 (WTG12)	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38
24	07:39 17:33	07:59 (WTG12) 08:20 (WTG12)	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39
25	07:38 17:34	07:58 (WTG12) 08:21 (WTG12)	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40
26	07:38 17:36	07:58 (WTG12) 08:22 (WTG12)	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40
27	07:37 17:37	07:57 (WTG12) 08:22 (WTG12)	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41
28	07:36 17:38	07:56 (WTG12) 08:23 (WTG12)	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42
29	07:35 17:39	07:55 (WTG12) 08:23 (WTG12)		07:15 19:44	06:28 20:15	06:00 20:43
30	07:34 17:40	07:54 (WTG12) 08:23 (WTG12)		07:13 19:45	06:27 20:16	06:00 20:44
31	07:34 17:42	07:53 (WTG12) 08:24 (WTG12)		07:11 19:46		05:59 20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case	324	430			36	
Sun reduction	0,45	0,47			0,59	
Oper. time red.	0,86	0,86			0,86	
Wind dir. red.	0,81	0,81			0,81	
Total reduction	0,32	0,33			0,41	
Total, real	102	142			15	

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F017 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December						
1	05:59	06:22	20:13 (WTG10)	06:51	07:19	06:51	07:20 (WTG12)	07:25				
	20:56	20:38	2	20:15 (WTG10)	19:57	19:08	17:23	30	07:50 (WTG12)	17:00		
2	06:00	06:23	20:13 (WTG10)	06:52	07:20	06:53	07:20 (WTG12)	07:26				
	20:56	20:37	1	20:14 (WTG10)	19:55	19:06	17:22	32	07:52 (WTG12)	17:00		
3	06:00	06:24		06:53	07:21	06:54	07:19 (WTG12)	07:27				
	20:55	20:36		19:54	19:05	17:21	33	07:52 (WTG12)	17:00			
4	06:01	06:25		06:54	07:22	06:55	07:18 (WTG12)	07:28				
	20:55	20:35		19:52	19:03	17:20	35	07:53 (WTG12)	17:00			
5	06:01	06:26		06:55	07:23	06:56	07:18 (WTG12)	07:29				
	20:55	20:34		19:50	19:02	17:19	35	07:53 (WTG12)	17:00			
6	06:02	06:27		06:56	07:24	06:57	07:18 (WTG12)	07:30				
	20:55	20:32		19:49	19:00	17:18	35	07:53 (WTG12)	17:00			
7	06:03	06:28		06:57	07:25	06:58	07:20 (WTG12)	07:31				
	20:55	20:31		19:47	18:58	17:17	35	07:55 (WTG12)	17:00			
8	06:03	06:29		06:58	07:26	06:59	07:21 (WTG12)	07:31				
	20:54	20:30		19:46	18:57	17:16	34	07:55 (WTG12)	17:00			
9	06:04	06:30		06:59	07:27	07:00	07:22 (WTG12)	07:32				
	20:54	20:29		19:44	18:55	17:15	33	07:55 (WTG12)	17:00			
10	06:04	06:30		06:59	07:28	07:02	07:23 (WTG12)	07:33				
	20:54	20:28		19:42	18:54	17:14	32	07:55 (WTG12)	17:00			
11	06:05	06:31		07:00	07:29	07:03	07:25 (WTG12)	07:34				
	20:53	20:26		19:41	18:52	17:13	30	07:55 (WTG12)	17:00			
12	06:06	06:32		07:01	07:30	07:04	07:26 (WTG12)	07:35				
	20:53	20:25		19:39	18:51	17:12	29	07:55 (WTG12)	17:00			
13	06:06	06:33		07:02	07:31	07:05	07:27 (WTG12)	07:36				
	20:52	20:24		19:37	18:49	17:11	28	07:55 (WTG12)	17:00			
14	06:07	06:34		07:03	07:32	07:06	07:28 (WTG12)	07:36				
	20:52	20:23		19:36	18:48	17:10	27	07:55 (WTG12)	17:00			
15	06:08	06:35		07:04	07:33	07:07	07:29 (WTG12)	07:37				
	20:51	20:21		19:34	18:46	17:09	25	07:54 (WTG12)	17:00			
16	06:09	06:36		07:05	07:34	07:08	07:31 (WTG12)	07:38				
	20:51	20:20		19:33	18:45	17:08	24	07:55 (WTG12)	17:01			
17	06:09	06:37		07:06	07:35	07:10	07:32 (WTG12)	07:38				
	20:50	20:19		19:31	18:43	17:08	23	07:55 (WTG12)	17:01			
18	06:10	06:38		07:07	07:36	07:11	07:33 (WTG12)	07:39				
	20:50	20:17		19:29	18:42	17:07	21	07:54 (WTG12)	17:01			
19	06:11	06:39		07:08	07:37	07:12	07:34 (WTG12)	07:40				
	20:49	20:16		19:28	18:40	17:06	20	07:54 (WTG12)	17:02			
20	06:12	06:40		07:09	07:38	07:13	07:35 (WTG12)	07:40				
	20:48	20:14		19:26	18:39	17:06	18	07:53 (WTG12)	17:02			
21	06:13	06:41		07:10	07:39	07:14	07:37 (WTG12)	07:41				
	20:48	20:13		19:24	18:38	17:05	16	07:53 (WTG12)	17:03			
22	06:13	20:21 (WTG10)	06:42	07:11	07:40	07:15	07:38 (WTG12)	07:41				
	20:47	2	20:23 (WTG10)	20:12	19:23	18:36	17:04	15	07:53 (WTG12)	17:03		
23	06:14	20:19 (WTG10)	06:43	07:12	07:42	07:16	07:39 (WTG12)	07:42				
	20:46	3	20:22 (WTG10)	20:10	19:21	18:35	17:04	13	07:52 (WTG12)	17:04		
24	06:15	20:18 (WTG10)	06:44	07:12	07:43	07:17	07:40 (WTG12)	07:42				
	20:45	4	20:22 (WTG10)	20:09	19:19	18:33	17:03	11	07:51 (WTG12)	17:04		
25	06:16	20:17 (WTG10)	06:45	07:13	06:44	07:18	07:41 (WTG12)	07:43				
	20:44	4	20:21 (WTG10)	20:07	19:18	17:32	17:03	9	07:50 (WTG12)	17:05		
26	06:17	20:16 (WTG10)	06:45	07:14	06:45	07:20	07:42 (WTG12)	07:43				
	20:44	5	20:21 (WTG10)	20:06	19:16	17:31	17:02	7	07:49 (WTG12)	17:05		
27	06:18	20:15 (WTG10)	06:46	07:15	06:46	07:21	07:43 (WTG12)	07:43				
	20:43	4	20:19 (WTG10)	20:04	19:14	17:29	11	07:41 (WTG12)	17:02	5	07:48 (WTG12)	17:06
28	06:19	20:14 (WTG10)	06:47	07:16	06:47	07:27 (WTG12)	07:22	07:44 (WTG12)	07:44			
	20:42	4	20:18 (WTG10)	20:03	19:13	17:28	18	07:45 (WTG12)	17:01	2	07:46 (WTG12)	17:07
29	06:19	20:14 (WTG10)	06:48	07:17	06:48	07:25 (WTG12)	07:23	07:44				
	20:41	3	20:17 (WTG10)	20:01	19:11	17:27	22	07:47 (WTG12)	17:01		17:07	
30	06:20	20:14 (WTG10)	06:49	07:18	06:49	07:23 (WTG12)	07:24	07:44				
	20:40	3	20:17 (WTG10)	20:00	19:10	17:26	25	07:48 (WTG12)	17:01		17:08	
31	06:21	20:13 (WTG10)	06:50	07:19	06:50	07:21 (WTG12)		07:45				
	20:39	3	20:16 (WTG10)	19:58	17:24	28	07:49 (WTG12)	17:09				
Potential sun hours	455	425		374	347		301		292			
Total, worst case	35		3		104		657					
Sun reduction	0,74		0,73		0,54		0,51					
Oper. time red.	0,86		0,86		0,86		0,86					
Wind dir. red.	0,81		0,81		0,81		0,81					
Total reduction	0,52		0,51		0,38		0,35					
Total, real	18	2		39		231						

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F018 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 17:43	07:52 (WTG12) 08:22 (WTG12)	06:59 18:15	07:10 19:47	06:26 20:17
2	07:45 17:11	07:32 17:44	07:51 (WTG12) 08:23 (WTG12)	06:57 18:16	07:08 19:48	06:25 20:18
3	07:45 17:11	07:31 17:45	07:50 (WTG12) 08:23 (WTG12)	06:56 18:17	07:07 19:49	06:23 20:19
4	07:45 17:12	07:30 17:46	07:49 (WTG12) 08:23 (WTG12)	06:54 18:18	07:05 19:50	06:22 20:20
5	07:45 17:13	07:29 17:48	07:48 (WTG12) 08:23 (WTG12)	06:53 18:19	07:03 19:51	06:21 20:21
6	07:45 17:14	07:28 17:49	07:47 (WTG12) 08:23 (WTG12)	06:51 18:21	07:02 19:52	06:20 20:22
7	07:45 17:15	07:27 17:50	07:46 (WTG12) 08:23 (WTG12)	06:50 18:22	07:00 19:53	06:19 20:23
8	07:45 17:16	07:26 17:51	07:45 (WTG12) 08:23 (WTG12)	06:48 18:23	06:59 19:54	06:18 20:24
9	07:45 17:17	07:25 17:52	07:46 (WTG12) 08:23 (WTG12)	06:46 18:24	06:57 19:55	06:17 20:25
10	07:45 17:18	07:24 17:53	07:46 (WTG12) 08:23 (WTG12)	06:45 18:25	06:56 19:56	06:15 20:26
11	07:45 17:19	07:22 17:55	07:47 (WTG12) 08:23 (WTG12)	06:43 18:26	06:54 19:57	06:14 20:27
12	07:44 17:20	07:21 17:56	07:47 (WTG12) 08:21 (WTG12)	06:42 18:27	06:53 19:58	06:13 20:28
13	07:44 17:21	07:20 17:57	07:48 (WTG12) 08:20 (WTG12)	06:40 18:28	06:51 19:59	06:12 20:29
14	07:44 17:22	07:19 17:58	07:49 (WTG12) 08:20 (WTG12)	06:39 18:29	06:50 20:00	20:05 (WTG10) 20:06 (WTG10)
15	07:44 17:23	07:18 17:59	07:51 (WTG12) 08:19 (WTG12)	06:37 18:30	06:48 20:01	20:05 (WTG10) 20:07 (WTG10)
16	07:43 17:24	07:16 18:00	07:52 (WTG12) 08:16 (WTG12)	06:35 18:31	06:47 20:02	20:05 (WTG10) 20:08 (WTG10)
17	07:43 17:25	07:15 18:02	07:54 (WTG12) 08:15 (WTG12)	06:34 18:32	06:45 20:03	20:05 (WTG10) 20:09 (WTG10)
18	07:42 17:26	08:03 (WTG12) 08:06 (WTG12)	07:14 18:03	06:32 18:33	06:44 20:04	20:06 (WTG10) 20:10 (WTG10)
19	07:42 17:28	08:02 (WTG12) 08:08 (WTG12)	07:13 18:04	06:31 18:34	06:42 20:05	20:07 (WTG10) 20:11 (WTG10)
20	07:41 17:29	08:02 (WTG12) 08:11 (WTG12)	07:11 18:05	06:29 18:35	06:41 20:06	20:07 (WTG10) 20:11 (WTG10)
21	07:41 17:30	08:01 (WTG12) 08:12 (WTG12)	07:10 18:06	06:27 18:36	06:39 20:07	20:08 (WTG10) 20:12 (WTG10)
22	07:40 17:31	08:00 (WTG12) 08:13 (WTG12)	07:08 18:07	06:26 18:37	06:38 20:08	20:10 (WTG10) 20:13 (WTG10)
23	07:40 17:32	08:00 (WTG12) 08:15 (WTG12)	07:07 18:08	06:24 18:38	06:36 20:09	20:11 (WTG10) 20:14 (WTG10)
24	07:39 17:33	08:15 (WTG12) 07:59 (WTG12)	18:08 07:06	06:23 18:39	06:35 20:10	20:12 (WTG10) 20:14 (WTG10)
25	07:38 17:34	08:16 (WTG12) 07:58 (WTG12)	18:10 07:04	06:21 18:40	06:34 20:11	06:02 20:40
26	07:38 17:36	08:17 (WTG12) 07:58 (WTG12)	18:11 07:03	06:19 18:41	06:32 20:12	06:02 20:40
27	07:37 17:37	08:19 (WTG12) 07:57 (WTG12)	18:12 07:01	06:18 18:42	06:31 20:13	06:01 20:41
28	07:36 17:38	08:20 (WTG12) 08:20 (WTG12)	18:13 18:14	06:16 18:43	06:30 20:14	06:01 20:42
29	07:35 17:39	07:55 (WTG12) 08:21 (WTG12)		07:15 19:44	06:28 20:15	06:00 20:43
30	07:34 17:40	07:54 (WTG12) 08:21 (WTG12)		07:13 19:45	06:27 20:16	06:00 20:44
31	07:34 17:42	07:53 (WTG12) 08:22 (WTG12)		07:11 19:46	05:59 20:44	
Potential sun hours	301	299	370	397	445	448
Total, worst case	243	574			35	
Sun reduction	0,45	0,47			0,59	
Oper. time red.	0,86	0,86			0,86	
Wind dir. red.	0,81	0,81			0,81	
Total reduction	0,32	0,33			0,41	
Total, real	77	189			14	

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F018 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59	06:22	06:51	07:19	06:51	07:15 (WTG12)
	20:56	20:38	19:57	19:08	17:23	37 07:52 (WTG12)
2	06:00	06:23	06:52	07:20	06:53	07:15 (WTG12)
	20:56	20:37	19:55	19:06	17:22	38 07:53 (WTG12)
3	06:00	06:24	06:53	07:21	06:54	07:15 (WTG12)
	20:55	20:36	19:54	19:05	17:21	38 07:53 (WTG12)
4	06:01	06:25	06:54	07:22	06:55	07:16 (WTG12)
	20:55	20:35	19:52	19:03	17:20	37 07:53 (WTG12)
5	06:01	06:26	06:55	07:23	06:56	07:17 (WTG12)
	20:55	20:34	19:50	19:02	17:19	36 07:53 (WTG12)
6	06:02	06:27	06:56	07:24	06:57	07:18 (WTG12)
	20:55	20:32	19:49	19:00	17:18	35 07:53 (WTG12)
7	06:03	06:28	06:57	07:25	06:58	07:20 (WTG12)
	20:55	20:31	19:47	18:58	17:17	34 07:54 (WTG12)
8	06:03	06:29	06:58	07:26	06:59	07:21 (WTG12)
	20:54	20:30	19:46	18:57	17:16	33 07:54 (WTG12)
9	06:04	06:30	06:59	07:27	07:00	07:22 (WTG12)
	20:54	20:29	19:44	18:55	17:15	32 07:54 (WTG12)
10	06:04	06:30	06:59	07:28	07:02	07:23 (WTG12)
	20:54	20:28	19:42	18:54	17:14	30 07:53 (WTG12)
11	06:05	06:31	07:00	07:29	07:03	07:25 (WTG12)
	20:53	20:26	19:41	18:52	17:13	29 07:54 (WTG12)
12	06:06	06:32	07:01	07:30	07:04	07:26 (WTG12)
	20:53	20:25	19:39	18:51	17:12	27 07:53 (WTG12)
13	06:06	06:33	07:02	07:31	07:05	07:27 (WTG12)
	20:52	20:24	19:37	18:49	17:11	26 07:53 (WTG12)
14	06:07	06:34	07:03	07:32	07:06	07:28 (WTG12)
	20:52	20:23	19:36	18:48	17:10	24 07:52 (WTG12)
15	06:08	06:35	07:04	07:33	07:07	07:29 (WTG12)
	20:51	20:21	19:34	18:46	17:09	23 07:52 (WTG12)
16	06:09	06:36	07:05	07:34	07:08	07:31 (WTG12)
	20:51	20:20	19:33	18:45	17:08	21 07:52 (WTG12)
17	06:09	06:37	07:06	07:35	07:10	07:32 (WTG12)
	20:50	20:19	19:31	18:43	17:08	19 07:51 (WTG12)
18	06:10	06:38	07:07	07:36	07:11	07:33 (WTG12)
	20:50	20:17	19:29	18:42	17:07	17 07:50 (WTG12)
19	06:11	20:24 (WTG10)	06:39	07:08	07:37	07:12
	20:49	1 20:25 (WTG10)	20:16	19:28	18:40	17:06
20	06:12	20:22 (WTG10)	06:40	07:09	07:38	07:13
	20:48	3 20:25 (WTG10)	20:14	19:26	18:39	17:06
21	06:13	20:20 (WTG10)	06:41	07:10	07:39	07:14
	20:48	3 20:23 (WTG10)	20:13	19:24	18:38	17:05
22	06:13	20:19 (WTG10)	06:42	07:11	07:40	07:15
	20:47	4 20:23 (WTG10)	20:12	19:23	18:36	17:04
23	06:14	20:18 (WTG10)	06:43	07:12	07:42	08:30 (WTG12)
	20:46	4 20:22 (WTG10)	20:10	19:21	18:35	9 08:39 (WTG12)
24	06:15	20:18 (WTG10)	06:44	07:12	07:43	08:26 (WTG12)
	20:45	4 20:22 (WTG10)	20:09	19:19	18:33	17 08:43 (WTG12)
25	06:16	20:17 (WTG10)	06:45	07:13	06:44	07:23 (WTG12)
	20:44	4 20:21 (WTG10)	20:07	19:18	17:32	22 07:45 (WTG12)
26	06:17	20:17 (WTG10)	06:45	07:14	06:45	07:21 (WTG12)
	20:44	4 20:21 (WTG10)	20:06	19:16	17:31	25 07:46 (WTG12)
27	06:18	20:16 (WTG10)	06:46	07:15	06:46	07:19 (WTG12)
	20:43	3 20:19 (WTG10)	20:04	19:14	17:29	29 07:48 (WTG12)
28	06:19	20:15 (WTG10)	06:47	07:16	06:47	07:19 (WTG12)
	20:42	3 20:18 (WTG10)	20:03	19:13	17:28	31 07:50 (WTG12)
29	06:19	20:15 (WTG10)	06:48	07:17	06:48	07:18 (WTG12)
	20:41	2 20:17 (WTG10)	20:01	19:11	17:27	32 07:50 (WTG12)
30	06:20	20:15 (WTG10)	06:49	07:18	06:49	07:17 (WTG12)
	20:40	2 20:17 (WTG10)	20:00	19:10	17:26	34 07:51 (WTG12)
31	06:21	20:15 (WTG10)	06:50	06:50	06:50	07:16 (WTG12)
	20:39	1 20:16 (WTG10)	19:58	17:24	35 07:51 (WTG12)	
Potential sun hours	455	425	374	347	301	292
Total, worst case	38			234	593	
Sun reduction	0,74			0,54	0,51	
Oper. time red.	0,86			0,86	0,86	
Wind dir. red.	0,81			0,81	0,81	
Total reduction	0,52			0,38	0,35	
Total, real	20			89	209	

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F019 - A04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:58 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:49 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:45	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:11 19:21	07:41 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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



### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F024 - A02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 17:43	07:52 (WTG13) 08:33 (WTG13)	06:59 18:15	07:10 19:47	07:28 (WTG12) 20:17
2	07:45 17:11	07:32 17:44	07:51 (WTG13) 08:33 (WTG13)	06:57 18:16	07:08 19:48	07:26 (WTG12) 20:18
3	07:45 17:11	07:31 17:45	07:51 (WTG13) 08:33 (WTG13)	06:56 18:17	07:07 19:49	07:25 (WTG12) 20:19
4	07:45 17:12	07:30 17:46	07:52 (WTG13) 08:32 (WTG13)	06:54 18:18	07:05 19:50	07:23 (WTG12) 20:20
5	07:45 17:13	07:29 17:48	07:52 (WTG13) 08:32 (WTG13)	06:53 18:19	07:03 19:51	07:22 (WTG12) 20:21
6	07:45 17:14	07:28 17:49	07:53 (WTG13) 08:32 (WTG13)	06:51 18:21	07:02 19:52	07:20 (WTG12) 20:22
7	07:45 17:15	07:27 17:50	07:53 (WTG13) 08:32 (WTG13)	06:50 18:22	07:00 19:53	07:18 (WTG12) 20:23
8	07:45 17:16	07:26 17:51	07:54 (WTG13) 08:31 (WTG13)	06:48 18:23	06:59 19:54	07:17 (WTG12) 20:24
9	07:45 17:17	08:06 (WTG13) 07:25	07:55 (WTG13) 08:31 (WTG13)	06:46 18:24	06:57 19:55	07:15 (WTG12) 20:25
10	07:45 17:18	08:09 (WTG13) 07:24	07:56 (WTG13) 08:30 (WTG13)	06:45 18:25	06:56 19:56	07:14 (WTG12) 20:26
11	07:45 17:19	08:06 (WTG13) 07:22	07:57 (WTG13) 08:29 (WTG13)	06:43 18:26	06:54 19:57	07:13 (WTG12) 20:27
12	07:44 17:20	08:14 (WTG13) 07:21	07:58 (WTG13) 08:27 (WTG13)	06:42 18:27	06:53 19:58	07:38 (WTG12) 20:28
13	07:44 17:21	08:05 (WTG13) 07:20	07:58 (WTG13) 08:00 (WTG13)	06:42 18:28	06:51 19:59	07:15 (WTG12) 20:29
14	07:44 17:22	08:18 (WTG13) 07:19	08:02 (WTG13) 08:24 (WTG13)	06:39 18:29	06:50 20:00	07:17 (WTG12) 20:30
15	07:44 17:23	08:19 (WTG13) 07:18	08:05 (WTG13) 08:22 (WTG13)	06:37 18:30	06:48 20:01	07:19 (WTG12) 20:31
16	07:43 17:24	08:20 (WTG13) 07:16	08:08 (WTG13) 08:17 (WTG13)	06:35 18:31	06:47 20:02	07:30 (WTG12) 20:32
17	07:43 17:25	08:22 (WTG13) 18:01	08:03 (WTG13) 07:15	06:34 18:32	06:45 20:03	06:10 20:33
18	07:42 17:26	08:23 (WTG13) 18:02	08:03 (WTG13) 07:14	06:32 18:33	06:44 20:04	06:09 20:34
19	07:42 17:28	08:03 (WTG13) 07:14	08:02 (WTG13) 07:13	06:32 18:33	06:44 20:04	06:08 20:33
20	07:41 17:29	08:02 (WTG13) 07:11	08:02 (WTG13) 07:11	06:29 18:34	06:41 20:05	06:07 20:34
21	07:41 17:30	08:25 (WTG13) 18:04	08:02 (WTG13) 07:11	06:29 18:34	06:41 20:05	06:06 20:34
22	07:40 17:31	08:27 (WTG13) 18:05	08:01 (WTG13) 07:10	06:27 18:35	06:39 20:06	06:05 20:35
23	07:40 17:32	08:01 (WTG13) 07:10	08:01 (WTG13) 07:10	06:27 18:35	06:39 20:06	06:05 20:35
24	07:39 17:33	08:27 (WTG13) 18:06	08:27 (WTG13) 18:06	06:26 18:36	06:38 20:07	06:05 20:36
25	07:38 17:35	08:00 (WTG13) 07:08	08:28 (WTG13) 18:07	06:26 18:37	06:38 20:08	06:05 20:37
26	07:38 17:36	08:00 (WTG13) 07:07	08:28 (WTG13) 18:07	06:26 18:37	06:38 20:08	06:05 20:37
27	07:37 17:37	08:00 (WTG13) 07:07	08:28 (WTG13) 18:07	06:24 18:38	06:37 20:09	06:04 20:38
28	07:36 17:38	08:29 (WTG13) 18:08	08:29 (WTG13) 18:08	06:23 18:38	06:35 20:10	06:03 20:39
29	07:35 17:39	07:59 (WTG13) 07:06	07:59 (WTG13) 07:06	06:23 18:39	06:35 20:10	06:03 20:39
30	07:34 17:40	08:30 (WTG13) 18:10	08:30 (WTG13) 18:10	06:21 18:40	06:34 20:11	06:02 20:40
31	07:34 17:42	07:58 (WTG13) 07:03	07:58 (WTG13) 07:03	06:21 18:40	06:34 20:11	06:02 20:40
		08:31 (WTG13) 18:12	08:31 (WTG13) 18:12	06:19 18:41	06:32 20:12	06:02 20:40
		07:57 (WTG13) 07:01	07:57 (WTG13) 07:01	06:18 18:42	06:31 20:13	06:01 20:41
		08:32 (WTG13) 18:13	08:32 (WTG13) 18:13	06:18 18:42	06:31 20:13	06:01 20:41
		07:56 (WTG13) 07:00	07:56 (WTG13) 07:00	06:16 18:43	06:30 20:14	06:01 20:42
		08:32 (WTG13) 18:14	08:32 (WTG13) 18:14	06:16 18:43	06:30 20:14	06:01 20:42
		07:55 (WTG13)	07:55 (WTG13)	07:15 19:44	06:28 20:15	06:00 20:43
		08:32 (WTG13)	08:32 (WTG13)	07:13 19:45	06:27 20:16	06:00 20:44
		07:54 (WTG13)	07:54 (WTG13)	07:31 (WTG12)	06:27	06:00
		08:32 (WTG13)	08:32 (WTG13)	07:38 (WTG12)	20:16	20:44
		07:53 (WTG13)	07:53 (WTG13)	07:11		05:59
		08:32 (WTG13)	08:32 (WTG13)	19:46 10	07:40 (WTG12)	20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case	542	525		294		
Sun reduction	0,45	0,47		0,53		
Oper. time red.	0,86	0,86		0,86		
Wind dir. red.	0,80	0,80		0,77		
Total reduction	0,32	0,33		0,35		
Total, real	171	173		103		

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



Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F024 - A02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59 20:56	06:22 20:38	06:51 19:57	07:12 (WTG12) 25 07:37 (WTG12)	07:19 19:08	06:51 17:23
2	06:00 20:56	06:23 20:37	06:52 19:55	07:12 (WTG12) 25 07:37 (WTG12)	07:20 19:06	06:53 17:22
3	06:00 20:56	06:24 20:36	06:53 19:54	07:13 (WTG12) 24 07:37 (WTG12)	07:21 19:05	06:54 17:21
4	06:01 20:55	06:25 20:35	06:54 19:52	07:14 (WTG12) 24 07:38 (WTG12)	07:22 19:03	06:55 17:20
5	06:01 20:55	06:26 20:34	06:55 19:50	07:15 (WTG12) 23 07:38 (WTG12)	07:23 19:02	06:56 17:19
6	06:02 20:55	06:27 20:32	06:56 19:49	07:16 (WTG12) 21 07:37 (WTG12)	07:24 19:00	06:57 17:18
7	06:03 20:55	06:28 20:31	06:57 19:47	07:17 (WTG12) 20 07:37 (WTG12)	07:25 18:58	06:58 17:17
8	06:03 20:54	06:29 20:30	06:58 19:46	07:18 (WTG12) 19 07:37 (WTG12)	07:26 18:57	06:59 17:16
9	06:04 20:54	06:30 20:29	06:59 19:44	07:19 (WTG12) 17 07:36 (WTG12)	07:27 18:55	07:00 17:15
10	06:04 20:54	06:31 20:28	06:59 19:42	07:19 (WTG12) 15 07:34 (WTG12)	07:28 18:54	07:02 17:14
11	06:05 20:53	06:31 20:27	07:00 19:41	07:20 (WTG12) 13 07:33 (WTG12)	07:29 18:52	07:03 17:13
12	06:06 20:53	06:32 20:25	07:01 19:39	07:21 (WTG12) 10 07:31 (WTG12)	07:30 18:51	07:04 17:12
13	06:07 20:52	06:33 20:24	07:02 19:37	07:22 (WTG12) 8 07:30 (WTG12)	07:31 18:49	07:05 17:11
14	06:07 20:52	06:34 20:23	07:03 19:36	07:23 (WTG12) 4 07:27 (WTG12)	07:32 18:48	07:06 17:10
15	06:08 20:51	06:35 20:21	07:04 19:34		07:33 18:46	07:07 17:09
16	06:09 20:51	06:36 20:20	07:05 19:33		07:34 18:45	07:08 17:08
17	06:09 20:50	06:37 20:19	07:06 19:31		07:35 18:43	07:09 17:08
18	06:10 20:50	06:38 20:17	07:07 19:29		07:36 18:42	07:11 17:07
19	06:11 20:49	06:39 20:16	07:08 19:28		07:37 18:40	07:12 17:06
20	06:12 20:48	06:40 20:15	07:09 19:26		07:38 18:39	07:13 17:06
21	06:13 20:48	06:41 20:13	07:10 19:24		07:39 18:38	07:14 17:05
22	06:13 20:47	06:42 20:12	07:11 19:23		07:40 18:36	07:15 17:04
23	06:14 20:46	06:43 20:10	07:12 19:21		07:42 18:35	07:16 17:04
24	06:15 20:45	06:44 20:09	07:12 19:19		07:43 18:33	07:17 17:03
25	06:16 20:44	06:45 20:07	07:13 19:18		06:44 17:32	07:18 17:03
26	06:17 20:44	06:46 20:06	07:14 19:16		06:45 17:31	07:19 17:02
27	06:18 20:43	06:46 20:04	07:15 19:14		06:46 17:30	07:20 17:02
28	06:19 20:42	06:47 20:03	07:16 07:21 (WTG12)		06:47 17:28	07:21 17:01
29	06:19 20:41	06:48 20:01	07:18 (WTG12) 16 07:34 (WTG12)		06:48 17:27	07:22 17:01
30	06:20 20:40	06:49 20:00	07:18 (WTG12) 20 07:36 (WTG12)		06:49 17:26	07:23 17:01
31	06:21 20:39	06:50 19:58	07:15 (WTG12) 22 07:37 (WTG12)		06:50 17:25	07:24 17:01
Potential sun hours	455	425	374	347	301	292
Total, worst case		69	248	142	914	18
Sun reduction		0,73	0,65	0,54	0,51	0,45
Oper. time red.		0,86	0,86	0,86	0,86	0,86
Wind dir. red.		0,77	0,77	0,80	0,80	0,80
Total reduction		0,49	0,43	0,38	0,35	0,32
Total, real		33	107	54	322	6

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F030 - A10

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:26 17:49	06:48 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 17:00
10	07:45 17:18	07:24 17:54	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:08 17:01	07:38 17:00
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:01	07:38 17:00
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:01	07:39 17:00
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:00
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:00
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:00
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:00
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:00
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:13 19:19	07:43 18:33	07:17 17:03	07:42 17:00
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	07:44 18:32	07:18 17:03	07:43 17:00
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	07:45 18:31	07:19 17:02	07:43 17:00
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:15	07:46 18:30	07:20 17:02	07:44 17:00
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	07:47 18:28	07:21 17:01	07:44 17:00
29	07:35 17:39	07:00 18:15	06:15 18:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	07:48 18:27	07:23 17:01	07:44 17:00
30	07:35 17:40	07:00 18:16	06:14 18:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	07:49 18:26	07:24 17:01	07:44 17:00
31	07:34 17:42	07:00 18:17	06:13 18:46	06:26 20:17	06:01 20:45	05:58 20:57	06:20 20:41	06:50 20:01	07:19 19:09	07:50 18:25	07:25 17:02	07:45 17:00
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case		223	3							227		
Sun reduction		0,47	0,49							0,54		
Oper. time red.		0,86	0,86							0,86		
Wind dir. red.		0,81	0,81							0,81		
Total reduction		0,33	0,34							0,38		
Total, real		74	1							86		

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: Real\_case\_Progetto\_V172Shadow receptor: F047 - D08

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47		07:15 (WTG13) 05:59
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	33 08:01 (WTG13) 07:26 (WTG13)	20:17 06:25
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	36 08:02 (WTG13) 07:25 (WTG13)	20:18 06:23
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	39 08:04 (WTG13) 07:23 (WTG13)	20:19 06:22
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	42 08:05 (WTG13) 07:22 (WTG13)	20:20 06:21
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	44 08:06 (WTG13) 07:20 (WTG13)	20:21 06:20
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	46 08:06 (WTG13) 07:18 (WTG13)	20:22 06:19
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	48 08:06 (WTG13) 07:17 (WTG13)	20:23 06:18
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	50 08:07 (WTG13) 07:15 (WTG13)	20:24 06:17
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	52 08:07 (WTG13) 07:14 (WTG13)	20:25 06:15
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	54 08:08 (WTG13) 07:12 (WTG13)	20:26 06:14
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	55 08:07 (WTG13) 07:11 (WTG13)	20:27 06:13
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	57 08:08 (WTG13) 07:10 (WTG13)	20:28 06:12
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	57 08:07 (WTG13) 07:09 (WTG13)	20:29 06:11
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	58 08:08 (WTG13) 07:09 (WTG13)	20:30 06:10
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	58 08:07 (WTG13) 07:09 (WTG13)	20:31 06:10
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	57 08:07 (WTG13) 07:09 (WTG13)	20:32 06:09
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	57 08:06 (WTG13) 07:09 (WTG13)	20:33 06:08
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	57 08:06 (WTG13) 07:09 (WTG13)	20:33 06:07
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	57 08:06 (WTG13) 07:09 (WTG13)	20:34 06:06
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	56 08:05 (WTG13) 07:09 (WTG13)	20:35 06:05
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	56 08:05 (WTG13) 07:09 (WTG13)	20:36 06:05
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	54 08:03 (WTG13) 07:09 (WTG13)	20:37 06:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	54 08:03 (WTG13) 07:10 (WTG13)	20:38 06:03
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	53 08:03 (WTG13) 07:10 (WTG13)	20:39 06:02
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	51 08:01 (WTG13) 07:11 (WTG13)	20:40 06:02
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	49 08:00 (WTG13) 07:12 (WTG13)	20:40 06:01
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	48 08:00 (WTG13) 07:12 (WTG13)	20:41 06:01
29	07:35 17:39	07:15 19:44	07:34 (WTG13) 07:54 (WTG13)	06:28 20:15	46 07:58 (WTG13) 07:13 (WTG13)	20:42 06:00
30	07:34 17:40	07:13 19:45	07:31 (WTG13) 07:57 (WTG13)	06:27 20:16	44 07:57 (WTG13) 07:14 (WTG13)	20:43 06:00
31	07:34 17:42	07:11 19:46	07:30 (WTG13) 08:00 (WTG13)	06:26 20:17	42 07:56 (WTG13)	20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case			85	1510	254	564
Sun reduction			0,49	0,53	0,59	0,66
Oper. time red.			0,86	0,86	0,86	0,86
Wind dir. red.			0,76	0,76	0,74	0,65
Total reduction			0,33	0,35	0,38	0,37
Total, real			28	529	96	209

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F047 - D08

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59	06:21 (WTG12)   06:22	06:51	07:11 (WTG13)   07:19	06:51	07:25
	20:56	19 06:40 (WTG12)   20:38	19:57	55 08:06 (WTG13)   19:08	17:23	17:00
2	06:00	06:22 (WTG12)   06:23	06:52	07:12 (WTG13)   07:20	06:53	07:26
	20:56	19 06:41 (WTG12)   20:37	19:55	54 08:06 (WTG13)   19:06	17:22	17:00
3	06:00	06:22 (WTG12)   06:24	06:53	07:13 (WTG13)   07:21	06:54	07:27
	20:55	18 06:40 (WTG12)   20:36	19:54	52 08:05 (WTG13)   19:05	17:21	17:00
4	06:01	06:23 (WTG12)   06:25	06:54	07:14 (WTG13)   07:22	06:55	07:28
	20:55	18 06:41 (WTG12)   20:35	19:52	50 08:04 (WTG13)   19:03	17:20	17:00
5	06:01	06:23 (WTG12)   06:26	06:55	07:15 (WTG13)   07:23	06:56	07:29
	20:55	17 06:40 (WTG12)   20:34	19:50	48 08:03 (WTG13)   19:02	17:19	17:00
6	06:02	06:24 (WTG12)   06:27	06:56	07:16 (WTG13)   07:24	06:57	07:30
	20:55	17 06:41 (WTG12)   20:32	19:49	46 08:02 (WTG13)   19:00	17:18	17:00
7	06:03	06:25 (WTG12)   06:28	06:57	07:17 (WTG13)   07:25	06:58	07:30
	20:55	16 06:41 (WTG12)   20:31	19:47	44 08:01 (WTG13)   18:58	17:17	17:00
8	06:03	06:25 (WTG12)   06:29	06:58	07:18 (WTG13)   07:26	06:59	07:31
	20:54	15 06:40 (WTG12)   20:30	19:46	42 08:00 (WTG13)   18:57	17:16	17:00
9	06:04	06:26 (WTG12)   06:30	06:59	07:19 (WTG13)   07:27	07:00	07:32
	20:54	14 06:40 (WTG12)   20:29	19:44	39 07:58 (WTG13)   18:55	17:15	17:00
10	06:04	06:26 (WTG12)   06:31	06:59	07:19 (WTG13)   07:28	07:02	07:33
	20:54	13 06:39 (WTG12)   20:28	19:42	37 07:56 (WTG13)   18:54	17:14	17:00
11	06:05	06:27 (WTG12)   06:31	07:00	07:20 (WTG13)   07:29	07:03	07:34
	20:53	12 06:39 (WTG12)   20:26	19:41	34 07:54 (WTG13)   18:52	17:13	17:00
12	06:06	06:28 (WTG12)   06:32	07:01	07:21 (WTG13)   07:30	07:04	07:35
	20:53	11 06:39 (WTG12)   20:25	19:39	30 07:51 (WTG13)   18:51	17:12	17:00
13	06:07	06:28 (WTG12)   06:33	07:02	07:22 (WTG13)   07:31	07:05	07:36
	20:52	10 06:38 (WTG12)   20:24	19:37	27 07:49 (WTG13)   18:49	17:11	17:00
14	06:07	06:29 (WTG12)   06:34	07:03	07:23 (WTG13)   07:32	07:06	07:36
	20:52	9 06:38 (WTG12)   20:23	19:36	22 07:45 (WTG13)   18:48	17:10	17:00
15	06:08	06:30 (WTG12)   06:35	07:04	07:28 (WTG13)   07:33	07:07	07:37
	20:51	7 06:37 (WTG12)   20:21	19:34	12 07:40 (WTG13)   18:46	17:09	17:00
16	06:09	06:31 (WTG12)   06:36	07:05	07:18 (WTG13)   07:05	07:08	07:38
	20:51	6 06:37 (WTG12)   20:20	19:33	18:45	17:08	17:01
17	06:09	06:31 (WTG12)   06:37	07:06	07:17 (WTG13)   07:06	07:10	07:38
	20:50	4 06:35 (WTG12)   20:19	19:31	18:43	17:08	17:01
18	06:10	06:32 (WTG12)   06:38	07:07	07:16 (WTG13)   07:07	07:11	07:39
	20:50	1 06:33 (WTG12)   20:17	19:29	18:42	17:07	17:01
19	06:11	06:39	07:16 (WTG13)   07:08	07:37	07:12	07:40
	20:49	20:16	52 08:08 (WTG13)   19:28	18:40	17:06	17:02
20	06:12	06:40	07:15 (WTG13)   07:09	07:38	07:13	07:40
	20:48	20:14	54 08:09 (WTG13)   19:26	18:39	17:06	17:02
21	06:13	06:41	07:15 (WTG13)   07:10	07:39	07:14	07:41
	20:48	20:13	54 08:09 (WTG13)   19:24	18:38	17:05	17:03
22	06:13	06:42	07:14 (WTG13)   07:11	07:40	07:15	07:41
	20:47	20:12	56 08:10 (WTG13)   19:23	18:36	17:04	17:03
23	06:14	06:43	07:13 (WTG13)   07:12	07:42	07:16	07:42
	20:46	20:10	56 08:09 (WTG13)   19:21	18:35	17:04	17:04
24	06:15	06:44	07:12 (WTG13)   07:12	07:43	07:17	07:42
	20:45	20:09	57 08:09 (WTG13)   19:19	18:33	17:03	17:04
25	06:16	06:45	07:12 (WTG13)   07:13	06:44	07:18	07:43
	20:44	20:07	57 08:09 (WTG13)   19:18	17:32	17:03	17:05
26	06:17	06:46	07:12 (WTG13)   07:14	06:45	07:20	07:43
	20:44	20:06	57 08:09 (WTG13)   19:16	17:31	17:02	17:05
27	06:18	06:46	07:11 (WTG13)   07:15	06:46	07:21	07:43
	20:43	20:04	58 08:09 (WTG13)   19:14	17:29	17:02	17:06
28	06:19	06:47	07:11 (WTG13)   07:16	06:47	07:22	07:44
	20:42	20:03	58 08:09 (WTG13)   19:13	17:28	17:01	17:07
29	06:19	06:48	07:11 (WTG13)   07:17	06:48	07:23	07:44
	20:41	20:01	57 08:08 (WTG13)   19:11	17:27	17:01	17:07
30	06:20	06:49	07:11 (WTG13)   07:18	06:49	07:24	07:44
	20:40	20:00	57 08:08 (WTG13)   19:10	17:26	17:01	17:08
31	06:21	06:50	07:11 (WTG13)   06:50	06:50	07:25	07:45
	20:39	19:58	57 08:08 (WTG13)   17:25	17:25	17:09	17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case	226	1243	592			
Sun reduction	0,74	0,73	0,65			
Oper. time red.	0,86	0,86	0,86			
Wind dir. red.	0,65	0,76	0,76			
Total reduction	0,41	0,48	0,43			
Total, real	93	601	254			

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F051 - D10

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46	06:27 20:44	06:00 20:44	05:59 20:56	06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F052 - D10

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39	07:05 19:44	06:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40	07:06 19:45	06:14 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42	07:07 19:46	06:13 19:46	06:26 20:44	06:00 20:44	05:59 20:56	06:21 20:39	06:50 19:58	07:19 17:24	06:50 17:24	07:25 17:09	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F187 - D10

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F196 - C02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January		February		March		April		May		June	
1	07:45	16:30 (WTG9)	07:33	06:59	07:10	06:26					05:58	20:00 (WTG8)
	17:10	15 16:45 (WTG9)	17:43	18:15	19:47	20:17					20:45	20 20:20 (WTG8)
2	07:45	16:30 (WTG9)	07:32	06:57	07:08	06:25					05:58	20:01 (WTG8)
	17:11	15 16:45 (WTG9)	17:44	18:16	19:48	20:18					20:46	20 20:21 (WTG8)
3	07:45	16:31 (WTG9)	07:31	06:56	07:07	06:23					05:58	20:01 (WTG8)
	17:11	15 16:46 (WTG9)	17:45	18:17	19:49	20:19					20:46	21 20:22 (WTG8)
4	07:45	16:32 (WTG9)	07:30	06:54	07:05	06:22					05:57	20:01 (WTG8)
	17:12	15 16:47 (WTG9)	17:46	18:18	19:50	20:20					20:47	21 20:22 (WTG8)
5	07:45	16:32 (WTG9)	07:29	06:53	07:03	06:21					05:57	20:02 (WTG8)
	17:13	16 16:48 (WTG9)	17:47	18:19	19:51	20:21					20:48	21 20:23 (WTG8)
6	07:45	16:33 (WTG9)	07:28	06:51	07:02	06:20					05:57	20:02 (WTG8)
	17:14	16 16:49 (WTG9)	17:49	18:20	19:52	20:22					20:48	22 20:24 (WTG8)
7	07:45	16:34 (WTG9)	07:27	06:50	07:00	06:19					05:56	20:03 (WTG8)
	17:15	16 16:50 (WTG9)	17:50	18:22	19:53	20:23					20:49	22 20:25 (WTG8)
8	07:45	16:34 (WTG9)	07:26	06:48	06:59	06:18					05:56	20:03 (WTG8)
	17:16	16 16:50 (WTG9)	17:51	18:23	19:54	20:24					20:50	22 20:25 (WTG8)
9	07:45	16:35 (WTG9)	07:25	06:46	06:57	06:16					05:56	20:03 (WTG8)
	17:17	17 16:52 (WTG9)	17:52	18:24	19:55	20:25					20:50	22 20:25 (WTG8)
10	07:45	16:36 (WTG9)	07:24	06:45	06:56	06:15		20:02 (WTG8)			05:56	20:04 (WTG8)
	17:18	17 16:53 (WTG9)	17:53	18:25	19:56	20:26	1	20:03 (WTG8)			20:51	22 20:26 (WTG8)
11	07:45	16:37 (WTG9)	07:22	06:43	06:54	06:14		20:01 (WTG8)			05:56	20:04 (WTG8)
	17:19	17 16:54 (WTG9)	17:55	18:26	19:57	20:27	3	20:04 (WTG8)			20:51	22 20:26 (WTG8)
12	07:44	16:38 (WTG9)	07:21	06:42	06:53	06:13		20:00 (WTG8)			05:56	20:05 (WTG8)
	17:20	17 16:55 (WTG9)	17:56	18:27	19:58	20:28	5	20:05 (WTG8)			20:52	22 20:27 (WTG8)
13	07:44	16:39 (WTG9)	07:20	06:40	06:51	06:12		20:00 (WTG8)			05:55	20:05 (WTG8)
	17:21	17 16:56 (WTG9)	17:57	18:28	19:59	20:29	6	20:06 (WTG8)			20:52	22 20:27 (WTG8)
14	07:44	16:41 (WTG9)	07:19	06:39	06:49	06:11		19:59 (WTG8)			05:55	20:05 (WTG8)
	17:22	17 16:58 (WTG9)	17:58	18:29	20:00	20:30	7	20:06 (WTG8)			20:53	23 20:28 (WTG8)
15	07:44	16:42 (WTG9)	07:18	06:37	06:48	06:10		19:59 (WTG8)			05:55	20:06 (WTG8)
	17:23	16 16:58 (WTG9)	17:59	18:30	20:01	20:31	8	20:07 (WTG8)			20:53	22 20:28 (WTG8)
16	07:43	16:44 (WTG9)	07:16	06:35	06:47	06:09		19:58 (WTG8)			05:55	20:06 (WTG8)
	17:24	16 17:00 (WTG9)	18:00	18:31	20:02	20:32	10	20:08 (WTG8)			20:53	23 20:29 (WTG8)
17	07:43	16:45 (WTG9)	07:15	06:34	06:45	06:09		19:58 (WTG8)			05:55	20:06 (WTG8)
	17:25	15 17:00 (WTG9)	18:02	18:32	20:03	20:33	11	20:09 (WTG8)			20:54	23 20:29 (WTG8)
18	07:42	16:48 (WTG9)	07:14	06:32	06:44	06:08		19:58 (WTG8)			05:56	20:06 (WTG8)
	17:26	11 16:59 (WTG9)	18:03	18:33	20:04	20:33	12	20:10 (WTG8)			20:54	23 20:29 (WTG8)
19	07:42		07:12	06:31	06:42	06:07		19:58 (WTG8)			05:56	20:07 (WTG8)
	17:27		18:04	18:34	20:05	20:34	13	20:11 (WTG8)			20:54	22 20:29 (WTG8)
20	07:41		07:11	06:29	06:41	06:06		19:58 (WTG8)			05:56	20:08 (WTG8)
	17:29		18:05	18:35	20:06	20:35	14	20:12 (WTG8)			20:55	22 20:30 (WTG8)
21	07:41		07:10	06:27	06:39	06:05		19:57 (WTG8)			05:56	20:08 (WTG8)
	17:30		18:06	18:36	20:07	20:36	15	20:12 (WTG8)			20:55	22 20:30 (WTG8)
22	07:40		07:08	06:26	06:38	06:04		19:58 (WTG8)			05:56	20:08 (WTG8)
	17:31		18:07	18:37	20:08	20:37	16	20:14 (WTG8)			20:55	22 20:30 (WTG8)
23	07:40		07:07	06:24	06:36	06:04		19:58 (WTG8)			05:56	20:08 (WTG8)
	17:32		18:08	18:38	20:09	20:38	16	20:14 (WTG8)			20:55	22 20:30 (WTG8)
24	07:39		07:06	06:23	06:35	06:03		19:58 (WTG8)			05:57	20:08 (WTG8)
	17:33		18:10	18:39	20:10	20:39	16	20:14 (WTG8)			20:56	23 20:31 (WTG8)
25	07:38		07:04	06:21	06:34	06:02		19:59 (WTG8)			05:57	20:08 (WTG8)
	17:34		18:11	18:40	20:11	20:40	17	20:16 (WTG8)			20:56	23 20:31 (WTG8)
26	07:38		07:03	06:19	06:32	06:02		19:58 (WTG8)			05:57	20:08 (WTG8)
	17:36		18:12	18:41	20:12	20:40	18	20:16 (WTG8)			20:56	23 20:31 (WTG8)
27	07:37		07:01	06:18	06:31	06:01		19:59 (WTG8)			05:58	20:09 (WTG8)
	17:37		18:13	18:42	20:13	20:41	19	20:18 (WTG8)			20:56	22 20:31 (WTG8)
28	07:36		07:00	06:16	06:30	06:01		19:59 (WTG8)			05:58	20:09 (WTG8)
	17:38		18:14	18:43	20:14	20:42	19	20:18 (WTG8)			20:56	22 20:31 (WTG8)
29	07:35			07:15	06:28	06:00		20:00 (WTG8)			05:58	20:08 (WTG8)
	17:39			19:44	20:15	20:43	19	20:19 (WTG8)			20:56	23 20:31 (WTG8)
30	07:34			07:13	06:27	05:59		19:59 (WTG8)			05:59	20:09 (WTG8)
	17:40			19:45	20:16	20:44	20	20:19 (WTG8)			20:56	22 20:31 (WTG8)
31	07:34			07:11		05:59		20:00 (WTG8)				
	17:41			19:46		20:44	20	20:20 (WTG8)				
Potential sun hours	301		299	370	397	445		448				
Total, worst case	284					285		661				
Sun reduction	0,45					0,59		0,66				
Oper. time red.	0,86					0,86		0,86				
Wind dir. red.	0,60					0,81		0,81				
Total reduction	0,23					0,40		0,45				
Total, real	66					115		299				

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F196 - C02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

July			August			September			October			November			December		
1	05:59	20:08 (WTG8)	06:22	20:11 (WTG8)	06:51	07:19	06:51	07:25	16:19 (WTG9)								
	20:56	23 20:31 (WTG8)	20:38	4 20:15 (WTG8)	19:57	19:08	17:23	17:00	17 16:36 (WTG9)								
2	06:00	20:09 (WTG8)	06:23	20:11 (WTG8)	06:52	07:20	06:53	07:26	16:19 (WTG9)								
	20:56	22 20:31 (WTG8)	20:37	2 20:13 (WTG8)	19:55	19:06	17:22	17:00	17 16:36 (WTG9)								
3	06:00	20:08 (WTG8)	06:24		06:53	07:21	06:54	07:27	16:19 (WTG9)								
	20:56	23 20:31 (WTG8)	20:36		19:53	19:05	17:21	17:00	17 16:36 (WTG9)								
4	06:01	20:09 (WTG8)	06:25		06:54	07:22	06:55	07:28	16:19 (WTG9)								
	20:55	22 20:31 (WTG8)	20:35		19:52	19:03	17:20	17:00	16 16:35 (WTG9)								
5	06:01	20:08 (WTG8)	06:26		06:55	07:23	06:56	07:29	16:19 (WTG9)								
	20:55	22 20:30 (WTG8)	20:34		19:50	19:02	17:19	17:00	16 16:35 (WTG9)								
6	06:02	20:09 (WTG8)	06:27		06:56	07:24	06:57	07:30	16:19 (WTG9)								
	20:55	21 20:30 (WTG8)	20:32		19:49	19:00	17:18	16:59	16 16:35 (WTG9)								
7	06:02	20:08 (WTG8)	06:28		06:57	07:25	06:58	07:31	16:19 (WTG9)								
	20:55	22 20:30 (WTG8)	20:31		19:47	18:58	17:17	16:59	16 16:35 (WTG9)								
8	06:03	20:08 (WTG8)	06:29		06:58	07:26	06:59	07:31	16:19 (WTG9)								
	20:54	22 20:30 (WTG8)	20:30		19:46	18:57	17:16	16:59	15 16:34 (WTG9)								
9	06:04	20:09 (WTG8)	06:29		06:58	07:27	07:00	07:32	16:19 (WTG9)								
	20:54	21 20:30 (WTG8)	20:29		19:44	18:55	17:15	16:59	15 16:34 (WTG9)								
10	06:04	20:08 (WTG8)	06:30		06:59	07:28	07:02	07:33	16:19 (WTG9)								
	20:54	21 20:29 (WTG8)	20:28		19:42	18:54	17:14	16:59	16 16:35 (WTG9)								
11	06:05	20:08 (WTG8)	06:31		07:00	07:29	07:03	07:34	16:20 (WTG9)								
	20:53	21 20:29 (WTG8)	20:26		19:41	18:52	17:13	17:00	15 16:35 (WTG9)								
12	06:06	20:08 (WTG8)	06:32		07:01	07:30	07:04	07:35	16:20 (WTG9)								
	20:53	21 20:29 (WTG8)	20:25		19:39	18:51	17:12	17:00	15 16:35 (WTG9)								
13	06:06	20:08 (WTG8)	06:33		07:02	07:31	07:05	07:36	16:21 (WTG9)								
	20:52	20 20:28 (WTG8)	20:24		19:37	18:49	17:11	17:00	14 16:35 (WTG9)								
14	06:07	20:08 (WTG8)	06:34		07:03	07:32	07:06	07:36	16:21 (WTG9)								
	20:52	20 20:28 (WTG8)	20:23		19:36	18:48	17:10	17:00	14 16:35 (WTG9)								
15	06:08	20:08 (WTG8)	06:35		07:04	07:33	07:07	07:37	16:21 (WTG9)								
	20:51	19 20:27 (WTG8)	20:21		19:34	18:46	17:09	17:00	14 16:35 (WTG9)								
16	06:09	20:07 (WTG8)	06:36		07:05	07:34	07:08	07:38	16:22 (WTG9)								
	20:51	19 20:26 (WTG8)	20:20		19:32	18:45	17:08	17:01	14 16:36 (WTG9)								
17	06:09	20:08 (WTG8)	06:37		07:06	07:35	07:10	07:38	16:22 (WTG9)								
	20:50	18 20:26 (WTG8)	20:19		19:31	18:43	17:08	17:01	14 16:36 (WTG9)								
18	06:10	20:08 (WTG8)	06:38		07:07	07:36	07:11	07:39	16:22 (WTG9)								
	20:50	18 20:26 (WTG8)	20:17		19:29	18:42	17:07	17:01	14 16:36 (WTG9)								
19	06:11	20:08 (WTG8)	06:39		07:08	07:37	07:12	07:40	16:22 (WTG9)								
	20:49	17 20:25 (WTG8)	20:16		19:28	18:40	17:06	17:02	14 16:36 (WTG9)								
20	06:12	20:08 (WTG8)	06:40		07:09	07:38	07:13	07:40	16:23 (WTG9)								
	20:48	17 20:25 (WTG8)	20:14		19:26	18:39	17:05	17:02	14 16:37 (WTG9)								
21	06:13	20:08 (WTG8)	06:41		07:10	07:39	07:14	07:41	16:23 (WTG9)								
	20:48	15 20:23 (WTG8)	20:13		19:24	18:37	17:05	17:02	14 16:37 (WTG9)								
22	06:13	20:08 (WTG8)	06:42		07:11	07:40	07:15	07:41	16:24 (WTG9)								
	20:47	15 20:23 (WTG8)	20:12		19:23	18:36	17:04	17:03	14 16:38 (WTG9)								
23	06:14	20:08 (WTG8)	06:43		07:11	07:41	07:16	07:42	16:24 (WTG9)								
	20:46	14 20:22 (WTG8)	20:10		19:21	18:35	17:04	17:03	14 16:38 (WTG9)								
24	06:15	20:08 (WTG8)	06:44		07:12	07:43	07:17	07:42	16:25 (WTG9)								
	20:45	14 20:22 (WTG8)	20:09		19:19	18:33	17:03	17:04	14 16:39 (WTG9)								
25	06:16	20:09 (WTG8)	06:44		07:13	06:44	07:18	07:43	16:25 (WTG9)								
	20:44	12 20:21 (WTG8)	20:07		19:18	17:32	17:03	17:05	14 16:39 (WTG9)								
26	06:17	20:08 (WTG8)	06:45		07:14	06:45	07:20	07:43	16:26 (WTG9)								
	20:44	12 20:20 (WTG8)	20:06		19:16	17:31	17:02	17:05	13 16:39 (WTG9)								
27	06:18	20:08 (WTG8)	06:46		07:15	06:46	07:21	07:44	16:27 (WTG9)								
	20:43	11 20:19 (WTG8)	20:04		19:14	17:29	17:02	17:06	14 16:41 (WTG9)								
28	06:18	20:09 (WTG8)	06:47		07:16	06:47	07:22	07:44	16:27 (WTG9)								
	20:42	9 20:18 (WTG8)	20:03		19:13	17:28	17:01	17:06	14 16:41 (WTG9)								
29	06:19	20:09 (WTG8)	06:48		07:17	06:48	07:23	07:44	16:27 (WTG9)								
	20:41	9 20:18 (WTG8)	20:01		19:11	17:27	17:01	17:07	15 16:42 (WTG9)								
30	06:20	20:10 (WTG8)	06:49		07:18	06:49	07:24	07:44	16:28 (WTG9)								
	20:40	7 20:17 (WTG8)	20:00		19:10	17:26	17:01	17:08	14 16:42 (WTG9)								
31	06:21	20:10 (WTG8)	06:50			06:50		07:45	16:29 (WTG9)								
	20:39	6 20:16 (WTG8)	19:58			17:24		17:09	15 16:44 (WTG9)								
Potential sun hours	455		425		374	347	301	292									
Total, worst case	533		6				109		458								
Sun reduction	0,74		0,73				0,51		0,45								
Oper. time red.	0,86		0,86				0,86		0,86								
Wind dir. red.	0,81		0,81				0,60		0,60								
Total reduction	0,50		0,50				0,26		0,23								
Total, real	268		3				28		106								

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F200 - C03

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	
1	07:45	07:33	06:59	07:10	19:22 (WTG8)	06:26	05:58
	17:10	17:43	18:15	19:47	4 19:26 (WTG8)	20:17	20:45
2	07:45	07:32	06:57	07:08	19:21 (WTG8)	06:25	05:58
	17:11	17:44	18:16	19:48	6 19:27 (WTG8)	20:18	20:46
3	07:45	07:31	06:56	07:07	19:20 (WTG8)	06:23	05:58
	17:11	17:45	18:17	19:49	8 19:28 (WTG8)	20:19	20:47
4	07:45	07:30	06:54	07:05	19:19 (WTG8)	06:22	05:57
	17:12	17:46	18:18	19:50	10 19:29 (WTG8)	20:20	20:47
5	07:45	07:29	06:53	07:03	19:19 (WTG8)	06:21	05:57
	17:13	17:47	18:19	19:51	12 19:31 (WTG8)	20:21	20:48
6	07:45	07:28	06:51	07:02	19:18 (WTG8)	06:20	05:57
	17:14	17:49	18:20	19:52	13 19:31 (WTG8)	20:22	20:48
7	07:45	07:27	06:50	07:00	19:17 (WTG8)	06:19	05:56
	17:15	17:50	18:22	19:53	15 19:32 (WTG8)	20:23	20:49
8	07:45	07:26	06:48	06:59	19:17 (WTG8)	06:18	05:56
	17:16	17:51	18:23	19:54	16 19:33 (WTG8)	20:24	20:50
9	07:45	07:25	06:46	06:57	19:17 (WTG8)	06:16	05:56
	17:17	17:52	18:24	19:55	17 19:34 (WTG8)	20:25	20:50
10	07:45	07:24	06:45	06:56	19:17 (WTG8)	06:15	05:56
	17:18	17:53	18:25	19:56	18 19:35 (WTG8)	20:26	20:51
11	07:45	07:22	06:43	06:54	19:16 (WTG8)	06:14	05:56
	17:19	17:55	18:26	19:57	20 19:36 (WTG8)	20:27	20:51
12	07:44	07:21	06:42	06:53	19:17 (WTG8)	06:13	05:56
	17:20	17:56	18:27	19:58	20 19:37 (WTG8)	20:28	20:52
13	07:44	07:20	06:40	06:51	19:16 (WTG8)	06:12	05:55
	17:21	17:57	18:28	19:59	21 19:37 (WTG8)	20:29	20:52
14	07:44	07:19	06:39	06:50	19:17 (WTG8)	06:11	05:55
	17:22	17:58	18:29	20:00	22 19:39 (WTG8)	20:30	20:53
15	07:44	07:18	06:37	06:48	19:17 (WTG8)	06:10	05:55
	17:23	17:59	18:30	20:01	22 19:39 (WTG8)	20:31	20:53
16	07:43	07:16	06:35	06:47	19:18 (WTG8)	06:09	05:55
	17:24	18:00	18:31	20:02	23 19:41 (WTG8)	20:32	20:54
17	07:43	07:15	06:34	06:45	19:18 (WTG8)	06:09	05:55
	17:25	18:02	18:32	20:03	23 19:41 (WTG8)	20:33	20:54
18	07:42	07:14	06:32	06:44	19:19 (WTG8)	06:08	05:56
	17:26	18:03	18:33	20:04	23 19:42 (WTG8)	20:33	20:54
19	07:42	07:13	06:31	06:42	19:19 (WTG8)	06:07	05:56
	17:27	18:04	18:34	20:05	24 19:43 (WTG8)	20:34	20:55
20	07:41	07:11	06:29	06:41	19:20 (WTG8)	06:06	05:56
	17:29	18:05	18:35	20:06	24 19:44 (WTG8)	20:35	20:55
21	07:41	07:10	06:27	06:39	19:22 (WTG8)	06:05	05:56
	17:30	18:06	18:36	20:07	24 19:46 (WTG8)	20:36	20:55
22	07:40	07:08	06:26	06:38	19:22 (WTG8)	06:04	05:56
	17:31	18:07	18:37	20:08	24 19:46 (WTG8)	20:37	20:55
23	07:40	07:07	06:24	06:36	19:24 (WTG8)	06:04	05:56
	17:32	18:08	18:38	20:09	23 19:47 (WTG8)	20:38	20:55
24	07:39	07:06	06:23	06:35	19:26 (WTG8)	06:03	05:57
	17:33	18:10	18:39	20:10	22 19:48 (WTG8)	20:39	20:56
25	07:38	07:04	06:21	06:34	19:28 (WTG8)	06:02	05:57
	17:34	18:11	18:40	20:11	21 19:49 (WTG8)	20:40	20:56
26	07:38	07:03	06:19	06:32	19:31 (WTG8)	06:02	05:57
	17:36	18:12	18:41	20:12	15 19:46 (WTG8)	20:40	20:56
27	07:37	07:01	06:18	06:31		06:01	05:58
	17:37	18:13	18:42	20:13		20:41	20:56
28	07:36	07:00	06:16	06:30		06:01	05:58
	17:38	18:14	18:43	20:14		20:42	20:56
29	07:35		07:15	06:28		06:00	05:58
	17:39		19:44	20:15		20:43	20:56
30	07:34		07:13	06:27		05:59	05:59
	17:40		19:45	20:16		20:44	20:56
31	07:34		07:11	19:23 (WTG8)		05:59	
	17:41		19:46	2 19:25 (WTG8)		20:44	
Potential sun hours	301	299	370	397		445	448
Total, worst case			2	470			
Sun reduction			0,49	0,53			
Oper. time red.			0,86	0,86			
Wind dir. red.			0,80	0,80			
Total reduction			0,34	0,37			
Total, real			1	172			

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F200 - C03

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59 20:56	06:22 20:38	06:51 19:57	19:15 (WTG8) 19:34 (WTG8)	07:19 19:08	06:51 17:23
2	06:00 20:56	06:23 20:37	06:52 19:55	19:15 (WTG8) 19:33 (WTG8)	07:20 19:06	06:53 17:22
3	06:00 20:56	06:24 20:36	06:53 19:53	19:15 (WTG8) 19:32 (WTG8)	07:21 19:05	06:54 17:21
4	06:01 20:55	06:25 20:35	06:54 19:52	19:14 (WTG8) 19:30 (WTG8)	07:22 19:03	06:55 17:20
5	06:01 20:55	06:26 20:34	06:55 19:50	19:14 (WTG8) 19:29 (WTG8)	07:23 19:02	06:56 17:19
6	06:02 20:55	06:27 20:32	06:56 19:49	19:14 (WTG8) 19:27 (WTG8)	07:24 19:00	06:57 17:18
7	06:02 20:55	06:28 20:31	06:57 19:47	19:14 (WTG8) 19:26 (WTG8)	07:25 18:58	06:58 17:17
8	06:03 20:54	06:29 20:30	06:58 19:46	19:14 (WTG8) 19:24 (WTG8)	07:26 18:57	06:59 17:16
9	06:04 20:54	06:29 20:29	06:58 19:44	19:14 (WTG8) 19:22 (WTG8)	07:27 18:55	07:00 17:15
10	06:04 20:54	06:30 20:28	06:59 19:42	19:14 (WTG8) 19:20 (WTG8)	07:28 18:54	07:02 17:14
11	06:05 20:53	06:31 20:27	07:00 19:41	19:14 (WTG8) 19:19 (WTG8)	07:29 18:52	07:03 17:13
12	06:06 20:53	06:32 20:25	07:01 19:39	19:15 (WTG8) 19:17 (WTG8)	07:30 18:51	07:04 17:12
13	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	06:09 20:51	06:36 20:20	19:43 (WTG8) 19:48 (WTG8)	07:05 19:32	07:34 18:45	07:08 17:08
17	06:09 20:50	06:37 20:19	19:37 (WTG8) 19:54 (WTG8)	07:06 19:31	07:35 18:43	07:10 17:08
18	06:10 20:50	06:38 20:17	19:34 (WTG8) 19:55 (WTG8)	07:07 19:29	07:36 18:42	07:11 17:07
19	06:11 20:49	06:39 20:16	19:31 (WTG8) 19:54 (WTG8)	07:08 19:28	07:37 18:40	07:12 17:06
20	06:12 20:48	06:40 20:14	19:29 (WTG8) 19:53 (WTG8)	07:09 19:26	07:38 18:39	07:13 17:05
21	06:12 20:48	06:41 20:13	19:28 (WTG8) 19:51 (WTG8)	07:10 19:24	07:39 18:37	07:14 17:05
22	06:13 20:47	06:42 20:12	19:25 (WTG8) 19:49 (WTG8)	07:11 19:23	07:40 18:36	07:15 17:04
23	06:14 20:46	06:43 20:10	19:24 (WTG8) 19:48 (WTG8)	07:12 19:21	07:42 18:35	07:16 17:04
24	06:15 20:45	06:44 20:09	19:23 (WTG8) 19:47 (WTG8)	07:12 19:19	07:43 18:33	07:17 17:03
25	06:16 20:44	06:44 20:07	19:21 (WTG8) 19:45 (WTG8)	07:13 19:18	06:44 17:32	07:18 17:03
26	06:17 20:44	06:45 20:06	19:20 (WTG8) 19:44 (WTG8)	07:14 19:16	06:45 17:31	07:20 17:02
27	06:18 20:43	06:46 20:04	19:20 (WTG8) 19:43 (WTG8)	07:15 19:14	06:46 17:29	07:21 17:02
28	06:18 20:42	06:47 20:03	19:19 (WTG8) 19:41 (WTG8)	07:16 19:13	06:47 17:28	07:22 17:01
29	06:19 20:41	06:48 20:01	19:18 (WTG8) 19:40 (WTG8)	07:17 19:11	06:48 17:27	07:23 17:01
30	06:20 20:40	06:49 20:00	19:17 (WTG8) 19:38 (WTG8)	07:18 19:10	06:49 17:26	07:24 17:01
31	06:21 20:39	06:50 19:58	19:16 (WTG8) 19:36 (WTG8)	07:19	06:50 17:24	07:25 17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case		341	141			
Sun reduction		0,73	0,65			
Oper. time red.		0,86	0,86			
Wind dir. red.		0,80	0,80			
Total reduction		0,51	0,45			
Total, real		173	63			

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F208 - C02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	
1	07:45	07:33	06:59	07:10	06:26	05:59	
	17:10	17:43	18:15	19:47	20:17	20:45	
2	07:45	07:32	06:57	07:08	06:25	05:58	
	17:11	17:44	18:16	19:48	20:18	20:46	
3	07:45	07:31	06:56	07:07	06:24	05:58	
	17:12	17:45	18:17	19:49	20:19	20:47	
4	07:45	07:30	06:54	07:05	06:22	05:58	
	17:12	17:46	18:18	19:50	20:20	20:47	
5	07:45	07:29	06:53	07:04	06:21	05:57	
	17:13	17:48	18:20	19:51	20:21	20:48	
6	07:45	07:28	06:51	07:02	06:20	05:57	
	17:14	17:49	18:21	19:52	20:22	20:49	
7	07:45	07:27	06:50	07:00	06:19	05:57	
	17:15	17:50	18:22	19:53	20:23	20:49	
8	07:45	07:26	06:48	06:59	06:18	05:56	
	17:16	17:51	18:23	19:54	20:24	20:50	
9	07:45	07:25	06:47	06:57	07:15 (WTG11)	06:17	05:56
	17:17	17:52	18:24	19:55	4 07:19 (WTG11)	20:25	20:50
10	07:45	07:24	06:45	06:56	07:14 (WTG11)	06:16	05:56
	17:18	17:54	18:25	19:56	9 07:23 (WTG11)	20:26	20:51
11	07:45	07:23	06:43	06:54	07:12 (WTG11)	06:15	05:56
	17:19	17:55	18:26	19:57	12 07:24 (WTG11)	20:27	20:51
12	07:45	07:21	06:42	06:53	07:11 (WTG11)	06:13	05:56
	17:20	17:56	18:27	19:58	15 07:26 (WTG11)	20:28	20:52
13	07:44	07:20	06:40	06:51	07:09 (WTG11)	06:12	05:56
	17:21	17:57	18:28	19:59	17 07:26 (WTG11)	20:29	20:52
14	07:44	07:19	06:39	06:50	07:08 (WTG11)	06:12	05:56
	17:22	17:58	18:29	20:00	19 07:27 (WTG11)	20:30	20:53
15	07:44	07:18	06:37	06:48	07:06 (WTG11)	06:11	05:56
	17:23	17:59	18:30	20:01	20 07:26 (WTG11)	20:31	20:53
16	07:43	07:16	06:36	06:47	07:05 (WTG11)	06:10	05:56
	17:24	18:01	18:31	20:02	22 07:27 (WTG11)	20:32	20:54
17	07:43	07:15	06:34	06:45	07:04 (WTG11)	06:09	05:56
	17:25	18:02	18:32	20:03	23 07:27 (WTG11)	20:33	20:54
18	07:42	07:14	06:32	06:44	07:03 (WTG11)	06:08	05:56
	17:27	18:03	18:33	20:04	23 07:26 (WTG11)	20:34	20:54
19	07:42	07:13	06:31	06:42	07:03 (WTG11)	06:07	05:56
	17:28	18:04	18:34	20:05	23 07:26 (WTG11)	20:34	20:55
20	07:41	07:11	06:29	06:41	07:03 (WTG11)	06:06	05:56
	17:29	18:05	18:35	20:06	21 07:24 (WTG11)	20:35	20:55
21	07:41	07:10	06:28	06:39	07:04 (WTG11)	06:05	05:56
	17:30	18:06	18:36	20:07	20 07:24 (WTG11)	20:36	20:55
22	07:40	07:09	06:26	06:38	07:04 (WTG11)	06:05	05:56
	17:31	18:07	18:37	20:08	18 07:22 (WTG11)	20:37	20:55
23	07:40	07:07	06:24	06:37	07:05 (WTG11)	06:04	05:57
	17:32	18:09	18:38	20:09	16 07:21 (WTG11)	20:38	20:55
24	07:39	07:06	06:23	06:35	07:07 (WTG11)	06:03	05:57
	17:33	18:10	18:39	20:10	12 07:19 (WTG11)	20:39	20:56
25	07:38	07:04	06:21	06:34	07:10 (WTG11)	06:03	05:57
	17:35	18:11	18:40	20:11	5 07:15 (WTG11)	20:40	20:56
26	07:38	07:03	06:20	06:32		06:02	05:57
	17:36	18:12	18:41	20:12		20:41	20:56
27	07:37	07:02	06:18	06:31		06:01	05:58
	17:37	18:13	18:42	20:13		20:41	20:56
28	07:36	07:00	06:16	06:30		06:01	05:58
	17:38	18:14	18:43	20:14		20:42	20:56
29	07:35		07:15	06:29		06:00	05:59
	17:39		19:44	20:15		20:43	20:56
30	07:35		07:13	06:27		06:00	05:59
	17:40		19:45	20:16		20:44	20:56
31	07:34		07:11			05:59	
	17:42		19:46			20:44	
Potential sun hours	301	299	370	397	445	448	
Total, worst case				279			376
Sun reduction				0,53			0,66
Oper. time red.				0,86			0,86
Wind dir. red.				0,74			0,63
Total reduction				0,34			0,36
Total, real				95			135

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



Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
IT-09124 Cagliari
+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
22/12/2023 09:31/3.4.415

SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F208 - C02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Table with 12 columns (Jan-Dec) and 1 row of values: 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

Table with 13 columns (N, NNE, ENE, E, ESE, SSE, S, SSW, WSW, W, WNW, NNW, Sum) and 1 row of values: 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

Main shadow calculation table with columns for months (July-December) and rows for each day (1-31) showing sun rise/set times, WTG10/11 times, and reduction values.

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

Matrix with 4 columns: Day in month, Sun rise/set (hh:mm), Minutes with flicker, First/Last time (hh:mm) with flicker (WTG causing flicker first/last time)



Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F237 - B04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:30 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:32 16:59
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:39 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:56	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:45 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F267 - A02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June		
1	07:45	07:33	06:59	07:10	07:28 (WTG1)	06:26	05:58	
	17:10	17:43	18:15	19:47	32 08:00 (WTG1)	20:17	20:45	
2	07:45	07:32	06:57	07:08	07:26 (WTG1)	06:25	05:58	
	17:10	17:44	18:16	19:48	34 08:00 (WTG1)	20:18	20:46	
3	07:45	07:31	06:56	07:07	07:25 (WTG1)	06:23	05:58	
	17:11	17:45	18:17	19:49	35 08:00 (WTG1)	20:19	20:47	
4	07:45	07:30	06:54	07:05	07:23 (WTG1)	06:22	05:57	
	17:12	17:46	18:18	19:50	37 08:00 (WTG1)	20:20	20:47	
5	07:45	07:29	06:53	07:03	07:22 (WTG1)	06:21	05:57	
	17:13	17:47	18:19	19:51	38 08:00 (WTG1)	20:21	20:48	
6	07:45	07:28	06:51	07:02	07:20 (WTG1)	06:20	05:57	
	17:14	17:49	18:21	19:52	39 07:59 (WTG1)	20:22	20:49	
7	07:45	07:27	06:50	07:00	07:18 (WTG1)	06:19	05:56	
	17:15	17:50	18:22	19:53	40 07:58 (WTG1)	20:23	20:49	
8	07:45	07:26	06:48	06:59	07:17 (WTG1)	06:18	05:56	
	17:16	17:51	18:23	19:54	41 07:58 (WTG1)	20:24	20:50	
9	07:45	07:25	06:47	06:57	07:15 (WTG1)	06:16	05:56	
	17:17	17:52	18:24	19:55	42 07:57 (WTG1)	20:25	20:50	
10	07:45	07:24	06:45	06:56	07:16 (WTG1)	06:15	05:56	
	17:18	17:53	18:25	19:56	40 07:56 (WTG1)	20:26	20:51	
11	07:45	07:23	06:43	06:54	07:16 (WTG1)	06:14	05:56	
	17:19	17:55	18:26	19:57	39 07:55 (WTG1)	20:27	20:52	
12	07:45	07:21	06:42	07:00 (WTG2)	06:53	07:17 (WTG1)	06:13	05:56
	17:20	17:56	18:27	3 07:03 (WTG2)	19:58	37 07:54 (WTG1)	20:28	20:52
13	07:44	07:20	06:40	06:59 (WTG2)	06:51	07:17 (WTG1)	06:12	05:55
	17:21	17:57	18:28	6 07:05 (WTG2)	19:59	35 07:52 (WTG1)	20:29	20:52
14	07:44	07:19	06:39	06:57 (WTG2)	06:50	07:18 (WTG1)	06:11	05:55
	17:22	17:58	18:29	9 07:06 (WTG2)	20:00	33 07:51 (WTG1)	20:30	20:53
15	07:44	07:18	06:37	06:55 (WTG2)	06:48	07:19 (WTG1)	06:10	05:55
	17:23	17:59	18:30	11 07:06 (WTG2)	20:01	30 07:49 (WTG1)	20:31	20:53
16	07:43	07:17	06:36	06:54 (WTG2)	06:47	07:21 (WTG1)	06:09	05:55
	17:24	18:00	18:31	12 07:06 (WTG2)	20:02	27 07:48 (WTG1)	20:32	20:54
17	07:43	07:15	06:34	06:52 (WTG2)	06:45	07:22 (WTG1)	06:09	05:55
	17:25	18:02	18:32	14 07:06 (WTG2)	20:03	23 07:45 (WTG1)	20:33	20:54
18	07:43	07:14	06:32	06:51 (WTG2)	06:44	07:25 (WTG1)	06:08	05:56
	17:26	18:03	18:33	15 07:06 (WTG2)	20:04	17 07:42 (WTG1)	20:34	20:54
19	07:42	07:13	06:31	06:49 (WTG2)	06:42	07:30 (WTG1)	06:07	05:56
	17:27	18:04	18:34	16 07:05 (WTG2)	20:05	8 07:38 (WTG1)	20:35	20:55
20	07:42	07:11	06:29	06:47 (WTG2)	06:41		06:06	05:56
	17:29	18:05	18:35	17 07:04 (WTG2)	20:06		20:35	20:55
21	07:41	07:10	06:27	06:46 (WTG2)	06:39		06:05	05:56
	17:30	18:06	18:36	17 07:03 (WTG2)	20:07		20:36	20:55
22	07:40	07:09	06:26	06:44 (WTG1)	06:38		06:04	05:56
	17:31	18:07	18:37	17 07:01 (WTG2)	20:08		20:37	20:55
23	07:40	07:07	06:24	06:42 (WTG1)	06:36		06:04	05:56
	17:32	18:08	18:38	17 06:59 (WTG2)	20:09		20:38	20:56
24	07:39	07:06	06:23	06:41 (WTG1)	06:35		06:03	05:57
	17:33	18:10	18:39	14 06:55 (WTG1)	20:10		20:39	20:56
25	07:38	07:04	06:21	06:39 (WTG1)	06:34		06:02	05:57
	17:34	18:11	18:40	17 06:56 (WTG1)	20:11		20:40	20:56
26	07:38	07:03	06:19	06:38 (WTG1)	06:32		06:02	05:57
	17:36	18:12	18:41	20 06:58 (WTG1)	20:12		20:41	20:56
27	07:37	07:02	06:18	06:36 (WTG1)	06:31		06:01	05:58
	17:37	18:13	18:42	23 06:59 (WTG1)	20:13		20:41	20:56
28	07:36	07:00	06:16	06:34 (WTG1)	06:30		06:00	05:58
	17:38	18:14	18:43	25 06:59 (WTG1)	20:14		20:42	20:56
29	07:35		07:15	07:33 (WTG1)	06:28		06:00	05:58
	17:39		19:44	27 08:00 (WTG1)	20:15		20:43	20:56
30	07:35		07:13	07:31 (WTG1)	06:27		05:59	05:59
	17:40		19:45	29 08:00 (WTG1)	20:16		20:44	20:56
31	07:34		07:11	07:30 (WTG1)			05:59	
	17:41		19:46	31 08:01 (WTG1)			20:45	
Potential sun hours	301	299	370	397	445	448		
Total, worst case			340	627				
Sun reduction			0,49	0,53				
Oper. time red.			0,86	0,86				
Wind dir. red.			0,78	0,77				
Total reduction			0,33	0,35				
Total, real			114	222				

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F267 - A02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July		August		September		October		November		December	
1	05:59	06:22	06:51	07:15 (WTG1)	07:19	07:39 (WTG2)	06:52	07:25				
	20:56	20:38	19:57	39 07:54 (WTG1)	19:08	5 07:44 (WTG2)	17:23	17:00				
2	06:00	06:23	06:52	07:14 (WTG1)	07:20	07:40 (WTG2)	06:53	07:26				
	20:56	20:37	19:55	40 07:54 (WTG1)	19:06	1 07:41 (WTG2)	17:22	17:00				
3	06:00	06:24	06:53	07:13 (WTG1)	07:21		06:54	07:27				
	20:56	20:36	19:54	42 07:55 (WTG1)	19:05		17:21	17:00				
4	06:01	06:25	06:54	07:14 (WTG1)	07:22		06:55	07:28				
	20:56	20:35	19:52	41 07:55 (WTG1)	19:03		17:20	17:00				
5	06:01	06:26	06:55	07:15 (WTG1)	07:23		06:56	07:29				
	20:55	20:34	19:50	40 07:55 (WTG1)	19:02		17:19	17:00				
6	06:02	06:27	06:56	07:16 (WTG1)	07:24		06:57	07:30				
	20:55	20:33	19:49	39 07:55 (WTG1)	19:00		17:18	16:59				
7	06:02	06:28	06:57	07:17 (WTG1)	07:25		06:58	07:31				
	20:55	20:31	19:47	38 07:55 (WTG1)	18:58		17:17	16:59				
8	06:03	06:29	06:58	07:18 (WTG1)	07:26		06:59	07:32				
	20:55	20:30	19:46	37 07:55 (WTG1)	18:57		17:16	16:59				
9	06:04	06:29	06:59	07:19 (WTG1)	07:27		07:01	07:32				
	20:54	20:29	19:44	36 07:55 (WTG1)	18:55		17:15	16:59				
10	06:04	06:30	06:59	07:19 (WTG1)	07:28		07:02	07:33				
	20:54	20:28	19:42	34 07:53 (WTG1)	18:54		17:14	16:59				
11	06:05	06:31	07:00	07:20 (WTG1)	07:29		07:03	07:34				
	20:53	20:27	19:41	33 07:53 (WTG1)	18:52		17:13	17:00				
12	06:06	06:32	07:01	07:21 (WTG1)	07:30		07:04	07:35				
	20:53	20:25	19:39	31 07:52 (WTG1)	18:51		17:12	17:00				
13	06:06	06:33	07:02	07:22 (WTG1)	07:31		07:05	07:36				
	20:53	20:24	19:38	29 07:51 (WTG1)	18:49		17:11	17:00				
14	06:07	06:34	07:03	07:23 (WTG1)	07:32		07:06	07:37				
	20:52	20:23	19:36	27 07:50 (WTG1)	18:48		17:10	17:00				
15	06:08	06:35	07:04	07:24 (WTG1)	07:33		07:07	07:37				
	20:52	20:21	19:34	25 07:49 (WTG1)	18:46		17:09	17:00				
16	06:09	06:36	07:05	07:25 (WTG1)	07:34		07:09	07:38				
	20:51	20:20	19:33	23 07:48 (WTG1)	18:45		17:08	17:00				
17	06:09	06:37	07:06	07:26 (WTG1)	07:35		07:10	07:39				
	20:50	20:19	19:31	21 07:47 (WTG1)	18:43		17:08	17:01				
18	06:10	06:38	07:07	07:27 (WTG1)	07:36		07:11	07:39				
	20:50	20:17	19:29	18 07:45 (WTG1)	18:42		17:07	17:01				
19	06:11	06:39	07:08	07:28 (WTG1)	07:37		07:12	07:40				
	20:49	20:16	19:28	15 07:43 (WTG1)	18:40		17:06	17:02				
20	06:12	06:40	07:09	07:28 (WTG1)	07:38		07:13	07:40				
	20:48	20:15	19:26	16 07:44 (WTG2)	18:39		17:05	17:02				
21	06:12	06:41	07:10	07:29 (WTG1)	07:39		07:14	07:41				
	20:48	20:13	19:24	17 07:46 (WTG2)	18:38		17:05	17:02				
22	06:13	06:42	07:11	07:30 (WTG1)	07:41		07:15	07:42				
	20:47	20:12	19:23	17 07:47 (WTG2)	18:36		17:04	17:03				
23	06:14	06:43	07:12	07:31 (WTG2)	07:42		07:16	07:42				
	20:46	20:10	19:21	17 07:48 (WTG2)	18:35		17:04	17:03				
24	06:15	06:44	07:13	07:32 (WTG2)	07:43		07:18	07:43				
	20:45	20:09	19:19	17 07:49 (WTG2)	18:33		17:03	17:04				
25	06:16	06:45	07:13	07:33 (WTG2)	06:44		07:19	07:43				
	20:45	20:07	18 07:45 (WTG1)	19:18	16 07:49 (WTG2)	17:32	17:03	17:04				
26	06:17	06:45	07:14	07:34 (WTG2)	06:45		07:20	07:43				
	20:44	20:06	23 07:48 (WTG1)	19:16	14 07:48 (WTG2)	17:31	17:02	17:05				
27	06:18	06:46	07:15	07:35 (WTG2)	06:46		07:21	07:44				
	20:43	20:04	27 07:50 (WTG1)	19:15	13 07:48 (WTG2)	17:29	17:02	17:06				
28	06:18	06:47	07:16	07:36 (WTG2)	06:47		07:22	07:44				
	20:42	20:03	30 07:51 (WTG1)	19:13	11 07:47 (WTG2)	17:28	17:01	17:06				
29	06:19	06:48	07:17	07:37 (WTG2)	06:48		07:23	07:44				
	20:41	20:01	33 07:52 (WTG1)	19:11	9 07:46 (WTG2)	17:27	17:01	17:07				
30	06:20	06:49	07:18	07:38 (WTG2)	06:49		07:24	07:45				
	20:40	20:00	35 07:53 (WTG1)	19:10	7 07:45 (WTG2)	17:26	17:01	17:08				
31	06:21	06:50	07:17	07:39 (WTG2)	06:50			07:45				
	20:39	19:58	37 07:54 (WTG1)		17:24			17:09				
Potential sun hours	455	425	374		347		301	292				
Total, worst case		213	762		6							
Sun reduction		0,73	0,65		0,54							
Oper. time red.		0,86	0,86		0,86							
Wind dir. red.		0,77	0,78		0,80							
Total reduction		0,49	0,44		0,37							
Total, real		104	332		2							

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F269 - A07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March		April		May	June	
1	07:45	07:33	06:59		07:10		07:28 (WTG1)	06:26	05:58
	17:10	17:43	18:15		19:47	32	08:00 (WTG1)	20:17	20:45
2	07:45	07:32	06:57		07:08		07:26 (WTG1)	06:25	05:58
	17:10	17:44	18:16		19:48	33	07:59 (WTG1)	20:18	20:46
3	07:45	07:31	06:56		07:07		07:25 (WTG1)	06:23	05:58
	17:11	17:45	18:17		19:49	34	07:59 (WTG1)	20:19	20:47
4	07:45	07:30	06:54		07:05		07:23 (WTG1)	06:22	05:57
	17:12	17:46	18:18		19:50	35	07:58 (WTG1)	20:20	20:47
5	07:45	07:29	06:53		07:03		07:22 (WTG1)	06:21	05:57
	17:13	17:47	18:19		19:51	35	07:57 (WTG1)	20:21	20:48
6	07:45	07:28	06:51		07:02		07:22 (WTG1)	06:20	05:57
	17:14	17:49	18:21		19:52	34	07:56 (WTG1)	20:22	20:49
7	07:45	07:27	06:50		07:00		07:23 (WTG1)	06:19	05:56
	17:15	17:50	18:22		19:53	31	07:54 (WTG1)	20:23	20:49
8	07:45	07:26	06:48		06:59		07:24 (WTG1)	06:18	05:56
	17:16	17:51	18:23		19:54	29	07:53 (WTG1)	20:24	20:50
9	07:45	07:25	06:47		06:57		07:25 (WTG1)	06:16	05:56
	17:17	17:52	18:24		19:55	26	07:51 (WTG1)	20:25	20:50
10	07:45	07:24	06:45		06:56		07:27 (WTG1)	06:15	05:56
	17:18	17:53	18:25		19:56	22	07:49 (WTG1)	20:26	20:51
11	07:45	07:23	06:43		06:54		07:29 (WTG1)	06:14	05:56
	17:19	17:55	18:26	2	07:04 (WTG2)	16	07:45 (WTG1)	20:27	20:52
12	07:45	07:21	06:42		07:00 (WTG2)		07:34 (WTG1)	06:13	05:56
	17:20	17:56	18:27	5	07:05 (WTG2)	7	07:41 (WTG1)	20:28	20:52
13	07:44	07:20	06:40		06:59 (WTG2)			06:12	05:55
	17:21	17:57	18:28	8	07:07 (WTG2)			20:29	20:52
14	07:44	07:19	06:39		06:57 (WTG2)			06:11	05:55
	17:22	17:58	18:29	9	07:06 (WTG2)			20:30	20:53
15	07:44	07:18	06:37		06:55 (WTG2)			06:10	05:55
	17:23	17:59	18:30	11	07:06 (WTG2)			20:31	20:53
16	07:43	07:17	06:36		06:54 (WTG2)			06:09	05:55
	17:24	18:00	18:31	12	07:06 (WTG2)			20:32	20:54
17	07:43	07:15	06:34		06:52 (WTG2)			06:09	05:55
	17:25	18:02	18:32	14	07:06 (WTG2)			20:33	20:54
18	07:43	07:14	06:32		06:51 (WTG2)			06:08	05:56
	17:26	18:03	18:33	14	07:05 (WTG2)			20:34	20:54
19	07:42	07:13	06:31		06:49 (WTG2)			06:07	05:56
	17:27	18:04	18:34	15	07:04 (WTG2)			20:35	20:55
20	07:42	07:11	06:29		06:47 (WTG1)			06:06	05:56
	17:29	18:05	18:35	15	07:02 (WTG2)			20:35	20:55
21	07:41	07:10	06:27		06:46 (WTG1)			06:05	05:56
	17:30	18:06	18:36	14	07:00 (WTG2)			20:36	20:55
22	07:40	07:09	06:26		06:44 (WTG1)			06:04	05:56
	17:31	18:07	18:37	15	06:59 (WTG1)			20:37	20:55
23	07:40	07:07	06:24		06:42 (WTG1)			06:04	05:56
	17:32	18:08	18:38	18	07:00 (WTG1)			20:38	20:56
24	07:39	07:06	06:23		06:41 (WTG1)			06:03	05:57
	17:33	18:10	18:39	20	07:01 (WTG1)			20:39	20:56
25	07:39	07:04	06:21		06:39 (WTG1)			06:02	05:57
	17:34	18:11	18:40	22	07:01 (WTG1)			20:40	20:56
26	07:38	07:03	06:19		06:38 (WTG1)			06:02	05:57
	17:36	18:12	18:41	24	07:02 (WTG1)			20:41	20:56
27	07:37	07:02	06:18		06:36 (WTG1)			06:01	05:58
	17:37	18:13	18:42	26	07:02 (WTG1)			20:41	20:56
28	07:36	07:00	06:16		06:34 (WTG1)			06:00	05:58
	17:38	18:14	18:43	27	07:01 (WTG1)			20:42	20:56
29	07:35		07:15		07:33 (WTG1)			06:00	05:58
	17:39		19:44	29	08:02 (WTG1)			20:43	20:56
30	07:35		07:13		07:31 (WTG1)			05:59	05:59
	17:40		19:45	30	08:01 (WTG1)			20:44	20:56
31	07:34		07:11		07:30 (WTG1)			05:59	
	17:41		19:46	31	08:01 (WTG1)			20:45	
Potential sun hours	301	299	370		397		445	448	
Total, worst case			361		334				
Sun reduction			0,49		0,53				
Oper. time red.			0,86		0,86				
Wind dir. red.			0,79		0,78				
Total reduction			0,33		0,36				
Total, real			121		119				

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F269 - A07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July		August		September		October		November		December	
1	05:59	06:22	06:51	07:28 (WTG1)	07:19	07:39 (WTG2)	06:52	07:25				
	20:56	20:38	19:57	16 07:44 (WTG1)	19:08	6 07:45 (WTG2)	17:23	17:00				
2	06:00	06:23	06:52	07:25 (WTG1)	07:20	07:40 (WTG2)	06:53	07:26				
	20:56	20:37	19:55	22 07:47 (WTG1)	19:06	4 07:44 (WTG2)	17:22	17:00				
3	06:00	06:24	06:53	07:23 (WTG1)	07:21		06:54	07:27				
	20:56	20:36	19:54	26 07:49 (WTG1)	19:05		17:21	17:00				
4	06:01	06:25	06:54	07:21 (WTG1)	07:22		06:55	07:28				
	20:56	20:35	19:52	29 07:50 (WTG1)	19:03		17:20	17:00				
5	06:01	06:26	06:55	07:20 (WTG1)	07:23		06:56	07:29				
	20:55	20:34	19:50	31 07:51 (WTG1)	19:02		17:19	17:00				
6	06:02	06:27	06:56	07:18 (WTG1)	07:24		06:57	07:30				
	20:55	20:33	19:49	34 07:52 (WTG1)	19:00		17:18	16:59				
7	06:02	06:28	06:57	07:17 (WTG1)	07:25		06:58	07:31				
	20:55	20:32	19:47	35 07:52 (WTG1)	18:58		17:17	16:59				
8	06:03	06:29	06:58	07:18 (WTG1)	07:26		06:59	07:32				
	20:55	20:30	19:46	35 07:53 (WTG1)	18:57		17:16	16:59				
9	06:04	06:29	06:59	07:19 (WTG1)	07:27		07:01	07:32				
	20:54	20:29	19:44	34 07:53 (WTG1)	18:55		17:15	16:59				
10	06:04	06:30	06:59	07:19 (WTG1)	07:28		07:02	07:33				
	20:54	20:28	19:42	33 07:52 (WTG1)	18:54		17:14	16:59				
11	06:05	06:31	07:00	07:20 (WTG1)	07:29		07:03	07:34				
	20:53	20:27	19:41	33 07:53 (WTG1)	18:52		17:13	17:00				
12	06:06	06:32	07:01	07:21 (WTG1)	07:30		07:04	07:35				
	20:53	20:25	19:39	31 07:52 (WTG1)	18:51		17:12	17:00				
13	06:06	06:33	07:02	07:22 (WTG1)	07:31		07:05	07:36				
	20:53	20:24	19:38	30 07:52 (WTG1)	18:49		17:11	17:00				
14	06:07	06:34	07:03	07:23 (WTG1)	07:32		07:06	07:37				
	20:52	20:23	19:36	29 07:52 (WTG1)	18:48		17:10	17:00				
15	06:08	06:35	07:04	07:24 (WTG1)	07:33		07:07	07:37				
	20:52	20:21	19:34	28 07:52 (WTG1)	18:46		17:09	17:00				
16	06:09	06:36	07:05	07:25 (WTG1)	07:34		07:09	07:38				
	20:51	20:20	19:33	26 07:51 (WTG1)	18:45		17:08	17:00				
17	06:09	06:37	07:06	07:26 (WTG1)	07:35		07:10	07:39				
	20:50	20:19	19:31	24 07:50 (WTG1)	18:43		17:08	17:01				
18	06:10	06:38	07:07	07:27 (WTG1)	07:36		07:11	07:39				
	20:50	20:17	19:29	22 07:49 (WTG1)	18:42		17:07	17:01				
19	06:11	06:39	07:08	07:28 (WTG1)	07:37		07:12	07:40				
	20:49	20:16	19:28	20 07:48 (WTG1)	18:40		17:06	17:02				
20	06:12	06:40	07:09	07:28 (WTG1)	07:38		07:13	07:40				
	20:48	20:15	19:26	18 07:46 (WTG1)	18:39		17:05	17:02				
21	06:12	06:41	07:10	07:29 (WTG1)	07:39		07:14	07:41				
	20:48	20:13	19:24	16 07:45 (WTG1)	18:38		17:05	17:02				
22	06:13	06:42	07:11	07:30 (WTG1)	07:41		07:15	07:42				
	20:47	20:12	19:23	14 07:44 (WTG2)	18:36		17:04	17:03				
23	06:14	06:43	07:12	07:31 (WTG1)	07:42		07:16	07:42				
	20:46	20:10	19:21	15 07:46 (WTG2)	18:35		17:04	17:03				
24	06:15	06:44	07:13	07:32 (WTG2)	07:43		07:18	07:43				
	20:45	20:09	19:19	15 07:47 (WTG2)	18:33		17:03	17:04				
25	06:16	06:45	07:13	07:33 (WTG2)	06:44		07:19	07:43				
	20:45	20:07	19:18	15 07:48 (WTG2)	17:32		17:03	17:04				
26	06:17	06:45	07:14	07:34 (WTG2)	06:45		07:20	07:43				
	20:44	20:06	19:16	14 07:48 (WTG2)	17:31		17:02	17:05				
27	06:18	06:46	07:15	07:35 (WTG2)	06:46		07:21	07:44				
	20:43	20:04	19:15	13 07:48 (WTG2)	17:29		17:02	17:06				
28	06:18	06:47	07:16	07:36 (WTG2)	06:47		07:22	07:44				
	20:42	20:03	19:13	12 07:48 (WTG2)	17:28		17:01	17:06				
29	06:19	06:48	07:17	07:37 (WTG2)	06:48		07:23	07:44				
	20:41	20:01	19:11	10 07:47 (WTG2)	17:27		17:01	17:07				
30	06:20	06:49	07:18	07:38 (WTG2)	06:49		07:24	07:45				
	20:40	20:00	19:10	8 07:46 (WTG2)	17:26		17:01	17:08				
31	06:21	06:50	07:34 (WTG1)		06:50			07:45				
	20:39	19:58	7 07:41 (WTG1)		17:24			17:09				
Potential sun hours	455	425		374		347		301		292		
Total, worst case			7	688		10						
Sun reduction			0,73	0,65		0,54						
Oper. time red.			0,86	0,86		0,86						
Wind dir. red.			0,78	0,78		0,80						
Total reduction			0,49	0,44		0,38						
Total, real			3	302		4						

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
Via Santa Margherita 4  
IT-09124 Cagliari  
+39 070 658297  
Giuseppe Frongia / direttore@iatprogetti.it  
Calculated:  
22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F295 - A02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

Table with columns for months (January to December) and rows for days (1 to 31). Each cell contains a 2x2 matrix of times (Sunrise/Sunset and Sun set/Sun rise) and a 'Potential sun hours' row at the bottom.

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

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



## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F304 - D06 - D01

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	06:59 (WTG13) 20:45 10
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	07:00 (WTG13) 20:46 11
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	07:00 (WTG13) 20:46 12
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	07:01 (WTG13) 20:47 13
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	07:02 (WTG13) 20:48 14
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	13 07:20 (WTG13) 20:22	07:04 (WTG13) 20:48 14
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	18 07:18 (WTG13) 20:23	07:05 (WTG13) 20:49 15
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	22 07:17 (WTG13) 20:24	07:07 (WTG13) 20:50 15
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	25 07:15 (WTG13) 20:25	07:09 (WTG13) 20:50 16
10	07:45 17:18	07:24 17:54	06:45 18:25	06:56 19:56	28 07:14 (WTG13) 20:26	07:13 (WTG13) 20:51 16
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	30 07:12 (WTG13) 20:27	07:14 (WTG13) 20:51 17
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	32 07:11 (WTG13) 20:28	07:15 (WTG13) 20:52 17
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	35 07:09 (WTG13) 20:29	07:16 (WTG13) 20:52 17
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	37 07:08 (WTG13) 20:30	07:17 (WTG13) 20:53 18
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	38 07:06 (WTG13) 20:31	07:18 (WTG13) 20:53 18
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	40 07:05 (WTG13) 20:32	07:19 (WTG13) 20:53 18
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	42 07:03 (WTG13) 20:33	07:20 (WTG13) 20:54 18
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	43 07:02 (WTG13) 20:33	07:21 (WTG13) 20:54 18
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	45 07:01 (WTG13) 20:34	07:22 (WTG13) 20:54 18
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	46 06:59 (WTG13) 20:35	07:23 (WTG13) 20:55 18
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	47 06:58 (WTG13) 20:36	07:24 (WTG13) 20:55 18
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	47 06:57 (WTG13) 20:37	07:25 (WTG13) 20:55 18
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	47 06:57 (WTG13) 20:38	07:26 (WTG13) 20:55 18
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	47 06:57 (WTG13) 20:39	07:27 (WTG13) 20:56 18
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	46 06:57 (WTG13) 20:40	07:28 (WTG13) 20:56 18
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	46 06:57 (WTG13) 20:40	2 06:22 (WTG12) 20:56 18
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	45 06:58 (WTG13) 20:41	4 06:22 (WTG12) 20:56 18
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	44 06:57 (WTG13) 20:42	6 06:26 (WTG12) 20:56 18
29	07:35 17:39	06:59 19:44	06:15 19:45	06:28 20:15	43 06:58 (WTG13) 20:43	7 06:27 (WTG12) 20:56 17
30	07:34 17:40	07:00 19:45	06:14 19:46	06:27 20:16	41 06:59 (WTG13) 20:44	8 06:28 (WTG12) 20:56 17
31	07:34 17:42	07:01 19:46	06:14 19:46	06:27 20:16	41 07:40 (WTG13) 20:44	9 06:29 (WTG12) 20:56 17
Potential sun hours	301	299	370	397	445	448
Total, worst case				947	327	491
Sun reduction				0,53	0,59	0,66
Oper. time red.				0,86	0,86	0,86
Wind dir. red.				0,74	0,73	0,65
Total reduction				0,34	0,37	0,37
Total, real				323	122	182

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

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

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F304 - D06 - D01

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	July	August	September	October	November	December
1	05:59	06:21 (WTG12)   06:22	06:51	07:11 (WTG13)   07:19	06:51	07:25
	20:56	17 06:38 (WTG12)   20:38	19:57	30 07:41 (WTG13)   19:08	17:23	17:01
2	06:00	06:22 (WTG12)   06:23	07:27 (WTG13)   06:52	07:12 (WTG13)   07:20	06:53	07:26
	20:56	16 06:38 (WTG12)   20:37	3 07:30 (WTG13)   19:55	28 07:40 (WTG13)   19:06	17:22	17:00
3	06:00	06:22 (WTG12)   06:24	07:21 (WTG13)   06:53	07:13 (WTG13)   07:21	06:54	07:27
	20:55	16 06:38 (WTG12)   20:36	14 07:35 (WTG13)   19:54	25 07:38 (WTG13)   19:05	17:21	17:00
4	06:01	06:23 (WTG12)   06:25	07:18 (WTG13)   06:54	07:14 (WTG13)   07:22	06:55	07:28
	20:55	16 06:39 (WTG12)   20:35	20 07:38 (WTG13)   19:52	22 07:36 (WTG13)   19:03	17:20	17:00
5	06:01	06:23 (WTG12)   06:26	07:16 (WTG13)   06:55	07:15 (WTG13)   07:23	06:56	07:29
	20:55	15 06:38 (WTG12)   20:34	24 07:40 (WTG13)   19:50	18 07:33 (WTG13)   19:02	17:19	17:00
6	06:02	06:24 (WTG12)   06:27	07:14 (WTG13)   06:56	07:16 (WTG13)   07:24	06:57	07:30
	20:55	14 06:38 (WTG12)   20:32	28 07:42 (WTG13)   19:49	13 07:29 (WTG13)   19:00	17:18	17:00
7	06:03	06:25 (WTG12)   06:28	07:13 (WTG13)   06:57	07:25	06:58	07:30
	20:55	14 06:39 (WTG12)   20:31	30 07:43 (WTG13)   19:47	18:58	17:17	17:00
8	06:03	06:25 (WTG12)   06:29	07:12 (WTG13)   06:58	07:26	06:59	07:31
	20:54	13 06:38 (WTG12)   20:30	33 07:45 (WTG13)   19:46	18:57	17:16	17:00
9	06:04	06:26 (WTG12)   06:30	07:11 (WTG13)   06:59	07:27	07:00	07:32
	20:54	12 06:38 (WTG12)   20:29	35 07:46 (WTG13)   19:44	18:55	17:15	17:00
10	06:04	06:26 (WTG12)   06:31	07:10 (WTG13)   06:59	07:28	07:02	07:33
	20:54	12 06:38 (WTG12)   20:28	37 07:47 (WTG13)   19:42	18:54	17:14	17:00
11	06:05	06:27 (WTG12)   06:31	07:09 (WTG13)   07:00	07:29	07:03	07:34
	20:53	11 06:38 (WTG12)   20:26	39 07:48 (WTG13)   19:41	18:52	17:13	17:00
12	06:06	06:28 (WTG12)   06:32	07:08 (WTG13)   07:01	07:30	07:04	07:35
	20:53	10 06:38 (WTG12)   20:25	40 07:48 (WTG13)   19:39	18:51	17:12	17:00
13	06:07	06:28 (WTG12)   06:33	07:06 (WTG13)   07:02	07:31	07:05	07:36
	20:52	9 06:37 (WTG12)   20:24	42 07:48 (WTG13)   19:37	18:49	17:11	17:00
14	06:07	06:29 (WTG12)   06:34	07:05 (WTG13)   07:03	07:32	07:06	07:36
	20:52	8 06:37 (WTG12)   20:23	44 07:49 (WTG13)   19:36	18:48	17:10	17:00
15	06:08	06:30 (WTG12)   06:35	07:05 (WTG13)   07:04	07:33	07:07	07:37
	20:51	6 06:36 (WTG12)   20:21	44 07:49 (WTG13)   19:34	18:46	17:09	17:00
16	06:09	06:31 (WTG12)   06:36	07:04 (WTG13)   07:05	07:34	07:08	07:38
	20:51	5 06:36 (WTG12)   20:20	45 07:49 (WTG13)   19:33	18:45	17:08	17:01
17	06:09	06:31 (WTG12)   06:37	07:04 (WTG13)   07:06	07:35	07:10	07:38
	20:50	3 06:34 (WTG12)   20:19	46 07:50 (WTG13)   19:31	18:43	17:08	17:01
18	06:10	06:32 (WTG12)   06:38	07:03 (WTG13)   07:07	07:36	07:11	07:39
	20:50	1 06:33 (WTG12)   20:17	47 07:50 (WTG13)   19:29	18:42	17:07	17:01
19	06:11	06:39	07:03 (WTG13)   07:08	07:37	07:12	07:40
	20:49	47 20:16	47 07:50 (WTG13)   19:28	18:40	17:06	17:02
20	06:12	06:40	07:03 (WTG13)   07:09	07:38	07:13	07:40
	20:48	47 20:14	47 07:50 (WTG13)   19:26	18:39	17:06	17:02
21	06:13	06:41	07:03 (WTG13)   07:10	07:39	07:14	07:41
	20:48	47 20:13	47 07:50 (WTG13)   19:24	18:38	17:05	17:03
22	06:13	06:42	07:03 (WTG13)   07:11	07:40	07:15	07:41
	20:47	47 20:12	47 07:50 (WTG13)   19:23	18:36	17:04	17:03
23	06:14	06:43	07:03 (WTG13)   07:12	07:42	07:16	07:42
	20:46	46 20:10	46 07:49 (WTG13)   19:21	18:35	17:04	17:04
24	06:15	06:44	07:04 (WTG13)   07:12	07:43	07:17	07:42
	20:45	45 20:09	45 07:49 (WTG13)   19:19	18:33	17:03	17:04
25	06:16	06:45	07:05 (WTG13)   07:13	06:44	07:18	07:43
	20:44	43 20:07	43 07:48 (WTG13)   19:18	17:32	17:03	17:05
26	06:17	06:46	07:06 (WTG13)   07:14	06:45	07:20	07:43
	20:44	42 20:06	42 07:48 (WTG13)   19:16	17:31	17:02	17:05
27	06:18	06:46	07:07 (WTG13)   07:15	06:46	07:21	07:43
	20:43	40 20:04	40 07:47 (WTG13)   19:14	17:30	17:02	17:06
28	06:19	06:47	07:08 (WTG13)   07:16	06:47	07:22	07:44
	20:42	38 20:03	38 07:46 (WTG13)   19:13	17:28	17:01	17:07
29	06:20	06:48	07:09 (WTG13)   07:17	06:48	07:23	07:44
	20:41	36 20:01	36 07:45 (WTG13)   19:11	17:27	17:01	17:07
30	06:20	06:49	07:10 (WTG13)   07:18	06:49	07:24	07:44
	20:40	35 20:00	35 07:45 (WTG13)   19:10	17:26	17:01	17:08
31	06:21	06:50	07:11 (WTG13)   07:19	06:50	07:25	07:45
	20:39	32 19:58	32 07:43 (WTG13)   19:09	17:25	17:01	17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case	198	1116	136			
Sun reduction	0,74	0,73	0,65			
Oper. time red.	0,86	0,86	0,86			
Wind dir. red.	0,65	0,74	0,74			
Total reduction	0,41	0,47	0,42			
Total, real	82	526	57			

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F322 - Seminativo  
Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
Assumptions for shadow calculations

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

### Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	06:19 (WTG6) 20:20 (WTG5)	05:59 20:38	06:21 (WTG6) 20:31 (WTG5)	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:19 (WTG6) 20:21 (WTG5)	06:00 20:56	06:22 (WTG6) 20:31 (WTG5)	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:19 (WTG6) 20:22 (WTG5)	06:00 20:56	06:22 (WTG6) 20:31 (WTG5)	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:18 (WTG6) 20:22 (WTG5)	06:01 20:55	06:23 (WTG6) 20:31 (WTG5)	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:18 (WTG6) 20:23 (WTG5)	06:01 20:55	06:23 (WTG6) 20:30 (WTG5)	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:18 (WTG6) 20:24 (WTG5)	06:02 20:55	06:24 (WTG6) 20:30 (WTG5)	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:18 (WTG6) 20:25 (WTG5)	06:02 20:55	06:24 (WTG6) 20:31 (WTG5)	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:17 (WTG6) 20:25 (WTG5)	06:03 20:54	06:25 (WTG6) 20:30 (WTG5)	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:15
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:17 (WTG6) 20:25 (WTG5)	06:04 20:54	06:26 (WTG6) 20:29 (WTG5)	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:14
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:17 (WTG6) 20:26 (WTG5)	06:04 20:54	06:26 (WTG6) 20:28 (WTG5)	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:17 (WTG6) 20:27 (WTG5)	06:05 20:53	06:27 (WTG6) 20:27 (WTG5)	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:17 (WTG6) 20:27 (WTG5)	06:06 20:53	06:28 (WTG6) 20:25 (WTG5)	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:17 (WTG6) 20:28 (WTG5)	06:06 20:52	06:28 (WTG6) 20:24 (WTG5)	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11
14	07:44 17:22	07:19 17:58	06:39 18:29	06:49 20:00	06:11 20:30	05:55 20:53	06:17 (WTG6) 20:28 (WTG5)	06:07 20:52	06:29 (WTG6) 20:23 (WTG5)	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:17 (WTG6) 20:28 (WTG5)	06:08 20:51	06:28 (WTG6) 20:21 (WTG5)	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	06:09 20:32	05:55 20:54	06:17 (WTG6) 20:29 (WTG5)	06:09 20:51	06:28 (WTG6) 20:20 (WTG5)	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:17 (WTG6) 20:29 (WTG5)	06:09 20:50	06:28 (WTG6) 20:19 (WTG5)	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:17 (WTG6) 20:29 (WTG5)	06:10 20:50	06:29 (WTG6) 20:17 (WTG5)	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:17 (WTG6) 20:29 (WTG5)	06:11 20:49	06:29 (WTG6) 20:16 (WTG5)	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:18 (WTG6) 20:30 (WTG5)	06:12 20:48	06:29 (WTG6) 20:15 (WTG5)	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:18 (WTG6) 20:30 (WTG5)	06:12 20:48	06:29 (WTG6) 20:13 (WTG5)	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:18 (WTG6) 20:30 (WTG5)	06:13 20:47	06:29 (WTG6) 20:12 (WTG5)	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:18 (WTG6) 20:30 (WTG5)	06:14 20:46	06:29 (WTG6) 20:10 (WTG5)	06:43 20:10	07:11 19:21	07:42 18:35	07:16 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:19 (WTG6) 20:31 (WTG5)	06:15 20:45	06:29 (WTG6) 20:09 (WTG5)	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:19 (WTG6) 20:31 (WTG5)	06:16 20:44	06:29 (WTG6) 20:07 (WTG5)	06:44 20:07	07:13 19:18	07:44 18:33	07:19 17:03
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:19 (WTG6) 20:31 (WTG5)	06:17 20:44	06:29 (WTG6) 20:06 (WTG5)	06:45 20:06	07:14 19:16	07:45 18:31	07:20 17:02
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:20 (WTG6) 20:31 (WTG5)	06:18 20:43	06:29 (WTG6) 20:04 (WTG5)	06:46 20:04	07:15 19:14	07:46 18:29	07:21 17:02
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:20 (WTG6) 20:31 (WTG5)	06:18 20:42	06:29 (WTG6) 20:03 (WTG5)	06:47 20:03	07:16 19:13	07:47 18:28	07:22 17:01
29	07:35 17:39	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:20 (WTG6) 20:31 (WTG5)	06:19 20:41	06:29 (WTG6) 20:01 (WTG5)	06:48 20:01	07:17 19:11	07:48 18:27	07:23 17:01
30	07:35 17:40	07:13 18:15	06:17 18:44	06:27 20:15	05:59 20:43	05:59 20:56	06:21 (WTG6) 20:31 (WTG5)	06:20 20:41	06:49 20:00	06:49 19:10	07:18 19:10	07:49 18:26	07:24 17:01
31	07:34 17:41	07:11 18:16	06:18 18:45	06:28 20:16	06:01 20:44	05:59 20:56	06:20 (WTG6) 20:31 (WTG5)	06:18 20:40	06:46 20:00	06:46 19:10	07:15 19:10	07:46 18:26	07:21 17:01
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292	
Total, worst case					218	976	554						
Sun reduction					0.59	0.66	0.74						
Oper. time red.					0.86	0.86	0.86						
Wind dir. red.					0.80	0.77	0.79						
Total reduction					0.41	0.44	0.50						
Total, real					89	431	279						

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
Via Santa Margherita 4  
IT-09124 Cagliari  
+39 070 658297  
Giuseppe Frongia / direttore@iatprogetti.it  
Calculated:  
22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F342 - A03

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F347 - Pascolo

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June		
1	07:45	07:33	06:59	07:10	18:50 (WTG8)	06:26	05:58	
	17:10	17:43	18:15	19:47	36 19:26 (WTG8)	20:17	20:45	
2	07:45	07:32	06:57	07:08	18:50 (WTG8)	06:25	05:58	
	17:11	17:44	18:16	19:48	37 19:27 (WTG8)	20:18	20:46	
3	07:45	07:31	06:56	07:07	18:51 (WTG8)	06:23	05:58	
	17:11	17:45	18:17	19:49	37 19:28 (WTG8)	20:19	20:47	
4	07:45	07:30	06:54	07:05	18:50 (WTG8)	06:22	05:57	
	17:12	17:46	18:18	19:50	39 19:29 (WTG8)	20:20	20:47	
5	07:45	07:29	06:53	07:03	18:51 (WTG8)	06:21	05:57	
	17:13	17:47	18:19	19:51	40 19:31 (WTG8)	20:21	20:48	
6	07:45	07:28	06:51	07:02	18:51 (WTG8)	06:20	05:57	
	17:14	17:49	18:20	19:52	40 19:31 (WTG8)	20:22	20:48	
7	07:45	07:27	06:50	07:00	18:51 (WTG8)	06:19	05:56	
	17:15	17:50	18:22	19:53	41 19:32 (WTG8)	20:23	20:49	
8	07:45	07:26	06:48	06:59	18:52 (WTG8)	06:18	05:56	
	17:16	17:51	18:23	19:54	41 19:33 (WTG8)	20:24	20:50	
9	07:45	07:25	06:46	06:57	18:52 (WTG8)	06:16	05:56	
	17:17	17:52	18:24	19:55	42 19:34 (WTG8)	20:25	20:50	
10	07:45	07:24	06:45	06:56	18:54 (WTG8)	06:15	05:56	
	17:18	17:53	18:25	19:56	41 19:35 (WTG8)	20:26	20:51	
11	07:45	07:22	06:43	06:54	18:54 (WTG8)	06:14	05:56	
	17:19	17:55	18:26	19:57	42 19:36 (WTG8)	20:27	20:51	
12	07:44	07:21	06:42	06:53	18:55 (WTG8)	06:13	05:56	
	17:20	17:56	18:27	19:58	42 19:37 (WTG8)	20:28	20:52	
13	07:44	07:20	06:40	06:51	18:56 (WTG8)	06:12	05:55	
	17:21	17:57	18:28	19:59	41 19:37 (WTG8)	20:29	20:52	
14	07:44	07:19	06:39	18:05 (WTG8)	06:50	18:58 (WTG8)	06:11	05:55
	17:22	17:58	18:29	3 18:08 (WTG8)	20:00	41 19:39 (WTG8)	20:30	20:53
15	07:44	07:18	06:37	18:03 (WTG8)	06:48	18:59 (WTG8)	06:10	05:55
	17:23	17:59	18:30	6 18:09 (WTG8)	20:01	38 19:37 (WTG8)	20:31	20:53
16	07:43	07:16	06:35	18:02 (WTG8)	06:47	19:01 (WTG8)	06:09	05:55
	17:24	18:00	18:31	9 18:11 (WTG8)	20:02	34 19:35 (WTG8)	20:32	20:54
17	07:43	07:15	06:34	18:00 (WTG8)	06:45	19:03 (WTG8)	06:09	05:55
	17:25	18:02	18:32	11 18:11 (WTG8)	20:03	29 19:32 (WTG8)	20:33	20:54
18	07:42	07:14	06:32	17:59 (WTG8)	06:44	19:06 (WTG8)	06:08	05:56
	17:26	18:03	18:33	14 18:13 (WTG8)	20:04	23 19:29 (WTG8)	20:34	20:54
19	07:42	07:13	06:31	17:58 (WTG8)	06:42	19:10 (WTG8)	06:07	05:56
	17:27	18:04	18:34	16 18:14 (WTG8)	20:05	13 19:23 (WTG8)	20:34	20:55
20	07:41	07:11	06:29	17:56 (WTG8)	06:41		06:06	05:56
	17:29	18:05	18:35	18 18:14 (WTG8)	20:06		20:35	20:55
21	07:41	07:10	06:27	17:56 (WTG8)	06:39		06:05	05:56
	17:30	18:06	18:36	20 18:16 (WTG8)	20:07		20:36	20:55
22	07:40	07:08	06:26	17:55 (WTG8)	06:38		06:04	05:56
	17:31	18:07	18:37	21 18:16 (WTG8)	20:08		20:37	20:55
23	07:40	07:07	06:24	17:53 (WTG8)	06:36		06:04	05:56
	17:32	18:08	18:38	24 18:17 (WTG8)	20:09		20:38	20:55
24	07:39	07:06	06:23	17:53 (WTG8)	06:35		06:03	05:57
	17:33	18:10	18:39	26 18:19 (WTG8)	20:10		20:39	20:56
25	07:38	07:04	06:21	17:52 (WTG8)	06:34		06:02	05:57
	17:34	18:11	18:40	27 18:19 (WTG8)	20:11		20:40	20:56
26	07:38	07:03	06:19	17:52 (WTG8)	06:32		06:02	05:57
	17:36	18:12	18:41	29 18:21 (WTG8)	20:12		20:40	20:56
27	07:37	07:01	06:18	17:51 (WTG8)	06:31		06:01	05:58
	17:37	18:13	18:42	30 18:21 (WTG8)	20:13		20:41	20:56
28	07:36	07:00	06:16	17:51 (WTG8)	06:30		06:01	05:58
	17:38	18:14	18:43	31 18:22 (WTG8)	20:14		20:42	20:56
29	07:35		07:15	18:51 (WTG8)	06:28		06:00	05:58
	17:39		19:44	33 19:24 (WTG8)	20:15		20:43	20:56
30	07:35		07:13	18:50 (WTG8)	06:27		05:59	05:59
	17:40		19:45	34 19:24 (WTG8)	20:16		20:44	20:56
31	07:34		07:11	18:50 (WTG8)			05:59	
	17:41		19:46	35 19:25 (WTG8)			20:44	
Potential sun hours	301	299	370	397		445	448	
Total, worst case			387		697			
Sun reduction			0,49		0,53			
Oper. time red.			0,86		0,86			
Wind dir. red.			0,79		0,79			
Total reduction			0,34		0,36			
Total, real			130		251			

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

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



## SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F347 - Pascolo

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July		August		September		October		November		December	
1	05:59	06:22	06:51	18:53 (WTG8)	07:19	06:51	07:25					
	20:56	20:38	19:57	41 19:34 (WTG8)	19:08	17:23	17:00					
2	06:00	06:23	06:52	18:51 (WTG8)	07:20	06:53	07:26					
	20:56	20:37	19:55	42 19:33 (WTG8)	19:06	17:22	17:00					
3	06:00	06:24	06:53	18:50 (WTG8)	07:21	06:54	07:27					
	20:56	20:36	19:53	42 19:32 (WTG8)	19:05	17:21	17:00					
4	06:01	06:25	06:54	18:49 (WTG8)	07:22	06:55	07:28					
	20:55	20:35	19:52	41 19:30 (WTG8)	19:03	17:20	17:00					
5	06:01	06:26	06:55	18:48 (WTG8)	07:23	06:56	07:29					
	20:55	20:34	19:50	41 19:29 (WTG8)	19:02	17:19	17:00					
6	06:02	06:27	06:56	18:47 (WTG8)	07:24	06:57	07:30					
	20:55	20:33	19:49	40 19:27 (WTG8)	19:00	17:18	16:59					
7	06:02	06:28	06:57	18:46 (WTG8)	07:25	06:58	07:31					
	20:55	20:31	19:47	40 19:26 (WTG8)	18:58	17:17	16:59					
8	06:03	06:29	06:58	18:45 (WTG8)	07:26	06:59	07:31					
	20:54	20:30	19:46	39 19:24 (WTG8)	18:57	17:16	16:59					
9	06:04	06:29	06:58	18:44 (WTG8)	07:27	07:00	07:32					
	20:54	20:29	19:44	38 19:22 (WTG8)	18:55	17:15	16:59					
10	06:04	06:30	06:59	18:43 (WTG8)	07:28	07:02	07:33					
	20:54	20:28	19:42	37 19:20 (WTG8)	18:54	17:14	16:59					
11	06:05	06:31	07:00	18:42 (WTG8)	07:29	07:03	07:34					
	20:53	20:27	19:41	37 19:19 (WTG8)	18:52	17:13	17:00					
12	06:06	06:32	07:01	18:42 (WTG8)	07:30	07:04	07:35					
	20:53	20:25	19:39	35 19:17 (WTG8)	18:51	17:12	17:00					
13	06:06	06:33	07:02	18:42 (WTG8)	07:31	07:05	07:36					
	20:52	20:24	19:37	34 19:16 (WTG8)	18:49	17:11	17:00					
14	06:07	06:34	07:03	18:41 (WTG8)	07:32	07:06	07:36					
	20:52	20:23	19:36	33 19:14 (WTG8)	18:48	17:10	17:00					
15	06:08	06:35	07:04	18:41 (WTG8)	07:33	07:07	07:37					
	20:51	20:21	19:34	32 19:13 (WTG8)	18:46	17:09	17:00					
16	06:09	06:36	07:05	18:41 (WTG8)	07:34	07:08	07:38					
	20:51	20:20	19:33	30 19:11 (WTG8)	18:45	17:08	17:01					
17	06:09	06:37	07:06	18:41 (WTG8)	07:35	07:10	07:38					
	20:50	20:19	19:31	28 19:09 (WTG8)	18:43	17:08	17:01					
18	06:10	06:38	07:07	18:40 (WTG8)	07:36	07:11	07:39					
	20:50	20:17	19:29	28 19:08 (WTG8)	18:42	17:07	17:01					
19	06:11	06:39	07:08	18:40 (WTG8)	07:37	07:12	07:40					
	20:49	20:16	19:28	25 19:05 (WTG8)	18:40	17:06	17:02					
20	06:12	06:40	07:09	18:40 (WTG8)	07:38	07:13	07:40					
	20:48	20:14	19:26	24 19:04 (WTG8)	18:39	17:05	17:02					
21	06:13	06:41	07:10	18:40 (WTG8)	07:39	07:14	07:41					
	20:48	20:13	19:24	22 19:02 (WTG8)	18:37	17:05	17:02					
22	06:13	06:42	07:11	18:40 (WTG8)	07:40	07:15	07:41					
	20:47	20:12	19:23	21 19:01 (WTG8)	18:36	17:04	17:03					
23	06:14	06:43	07:12	18:40 (WTG8)	07:42	07:16	07:42					
	20:46	20:10	19:21	19 18:59 (WTG8)	18:35	17:04	17:03					
24	06:15	06:44	19:13 (WTG8)	07:12	18:41 (WTG8)	07:43	07:42					
	20:45	20:09	15 19:28 (WTG8)	19:19	16 18:57 (WTG8)	18:33	17:03	17:04				
25	06:16	06:45	19:09 (WTG8)	07:13	18:41 (WTG8)	06:44	07:18	07:43				
	20:44	20:07	23 19:32 (WTG8)	19:18	15 18:56 (WTG8)	17:32	17:03	17:05				
26	06:17	06:45	19:05 (WTG8)	07:14	18:42 (WTG8)	06:45	07:20	07:43				
	20:44	20:06	30 19:35 (WTG8)	19:16	12 18:54 (WTG8)	17:31	17:02	17:05				
27	06:18	06:46	19:03 (WTG8)	07:15	18:43 (WTG8)	06:46	07:21	07:44				
	20:43	20:04	34 19:37 (WTG8)	19:14	10 18:53 (WTG8)	17:29	17:02	17:06				
28	06:18	06:47	19:01 (WTG8)	07:16	18:44 (WTG8)	06:47	07:22	07:44				
	20:42	20:03	38 19:39 (WTG8)	19:13	7 18:51 (WTG8)	17:28	17:01	17:06				
29	06:19	06:48	18:59 (WTG8)	07:17	18:45 (WTG8)	06:48	07:23	07:44				
	20:41	20:01	41 19:40 (WTG8)	19:11	4 18:49 (WTG8)	17:27	17:01	17:07				
30	06:20	06:49	18:57 (WTG8)	07:18	18:47 (WTG8)	06:49	07:24	07:44				
	20:40	20:00	41 19:38 (WTG8)	19:10	1 18:48 (WTG8)	17:26	17:01	17:08				
31	06:21	06:50	18:54 (WTG8)					07:45				
	20:39	19:58	42 19:36 (WTG8)					17:09				
Potential sun hours	455	425		374		347	301	292				
Total, worst case			264	834								
Sun reduction			0,73	0,65								
Oper. time red.			0,86	0,86								
Wind dir. red.			0,79	0,79								
Total reduction			0,50	0,44								
Total, real			132	368								

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar

Calculation: Real\_case\_Progetto\_V172Shadow receptor: F367 - D06

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

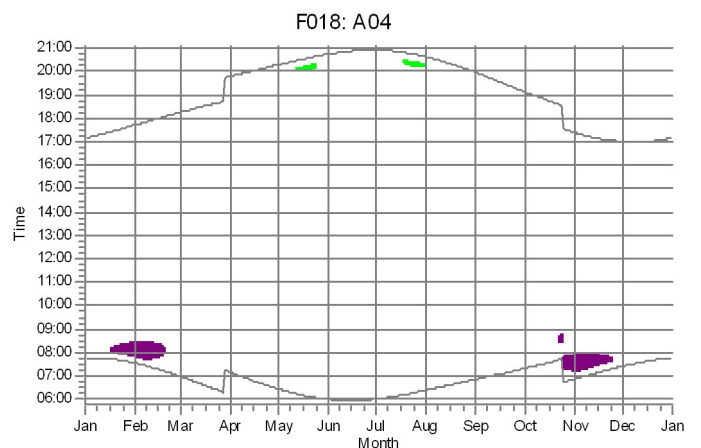
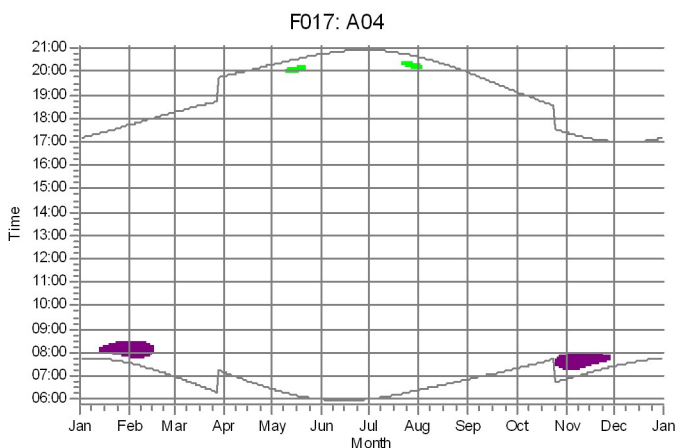
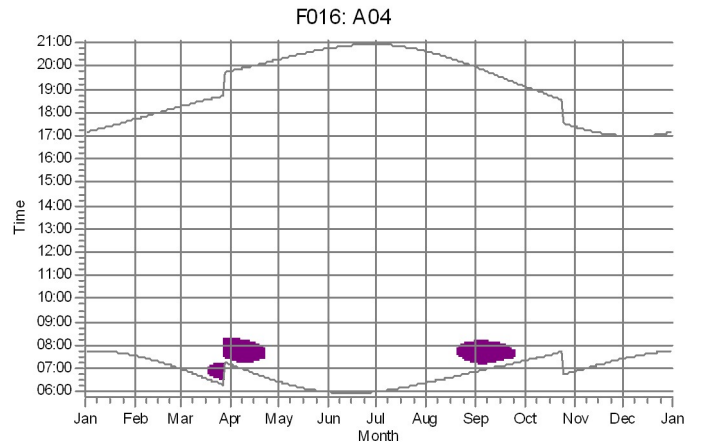
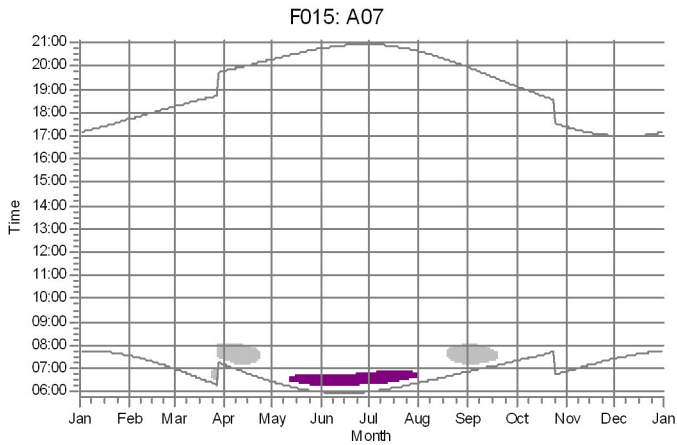
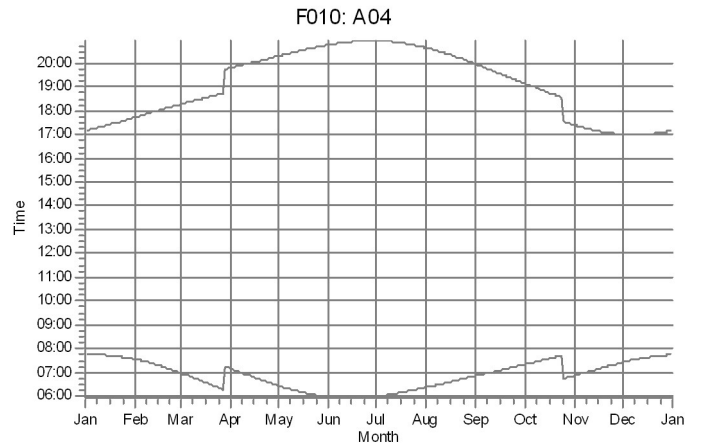
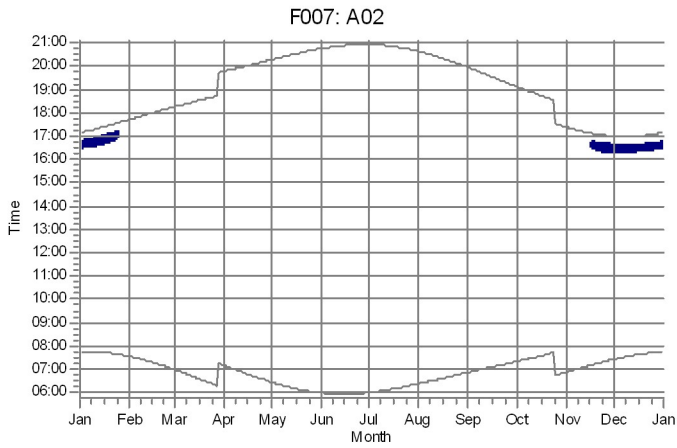
	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:30 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

## SHADOW - Calendar, graphical

Calculation: Real\_case\_Progetto\_V172



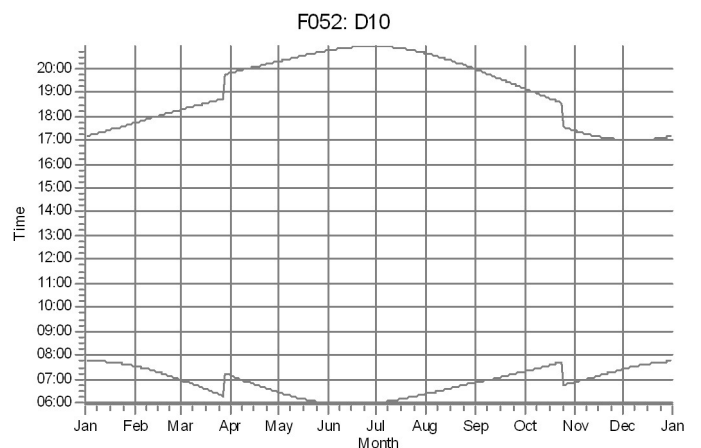
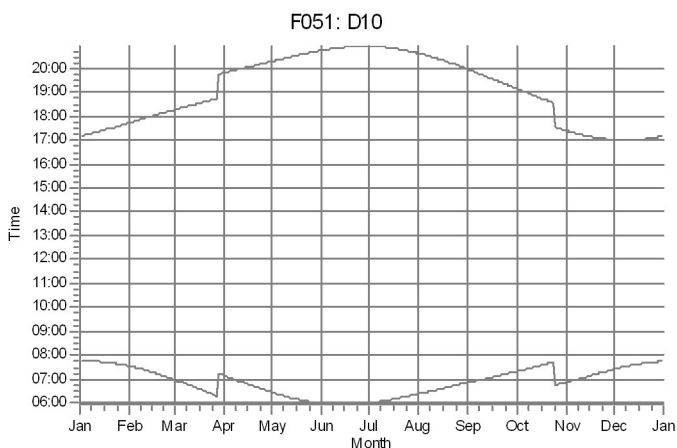
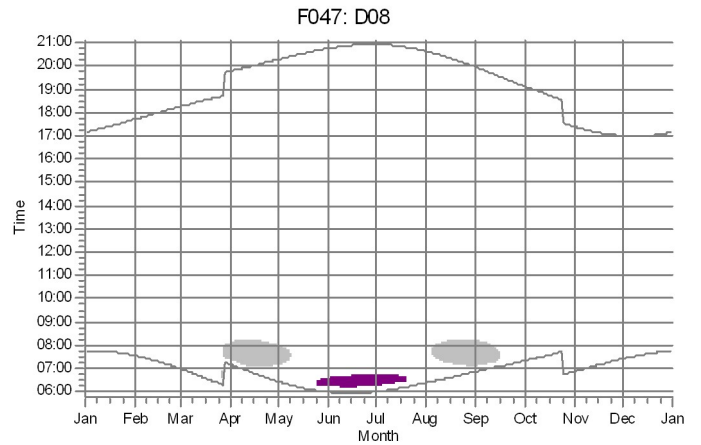
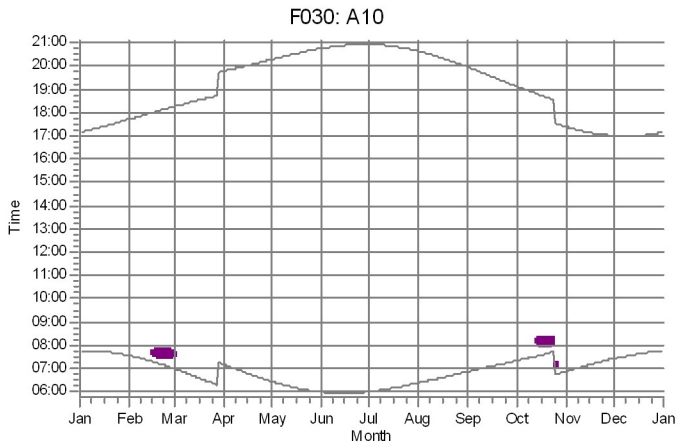
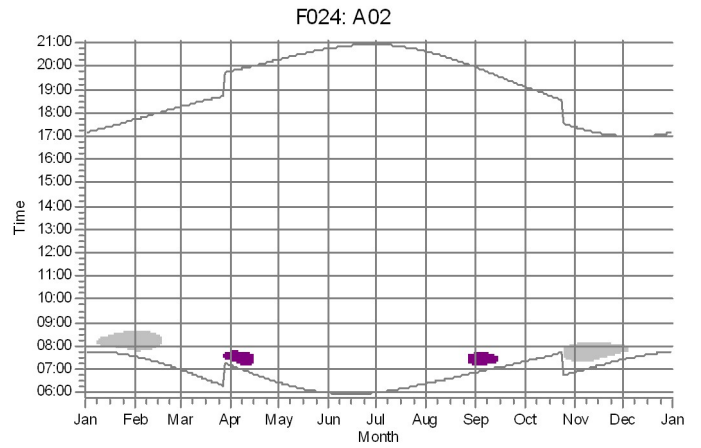
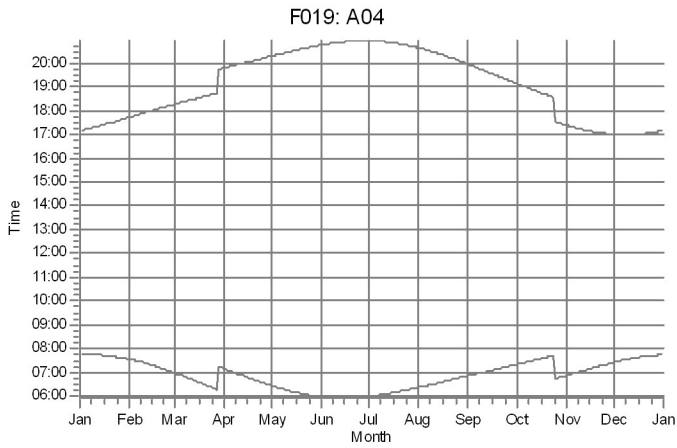
### WTGs

WTG8: VESTAS-7200 V172 7200 172.0 IOI hub: 117,0 m (TOT: 203,0 m) (85)  
 WTG10: VESTAS-7200 V172 7200 172.0 IOI hub: 117,0 m (TOT: 203,0 m) (87)

WTG12: VESTAS-7200 V172 7200 172.0 IOI hub: 117,0 m (TOT: 203,0 m) (89)  
 WTG13: VESTAS-7200 V172 7200 172.0 IOI hub: 117,0 m (TOT: 203,0 m) (90)

## SHADOW - Calendar, graphical

Calculation: Real\_case\_Progetto\_V172



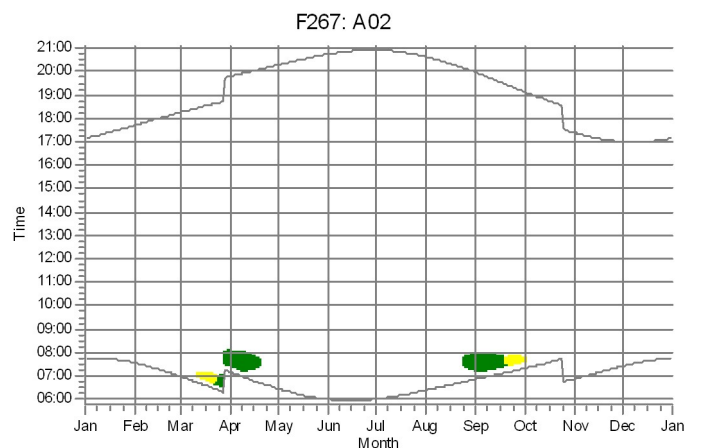
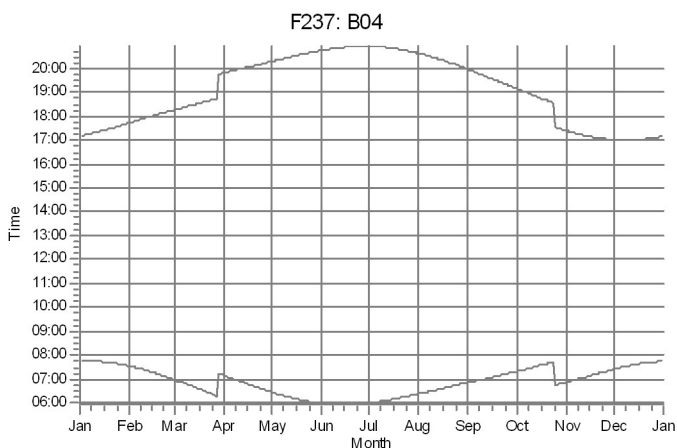
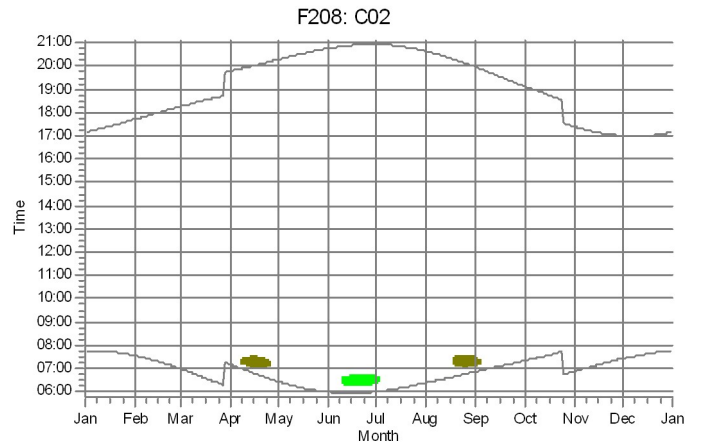
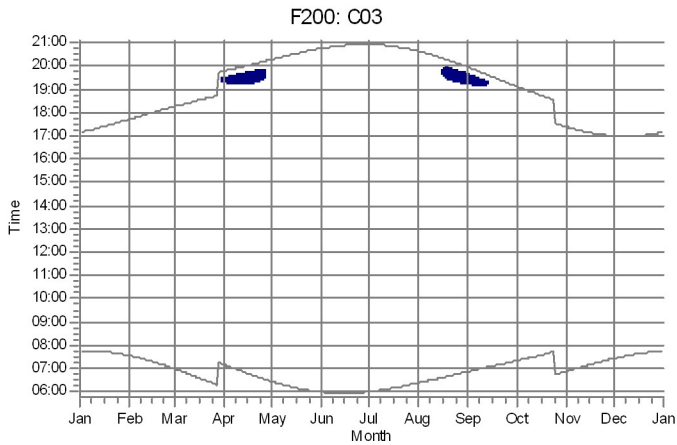
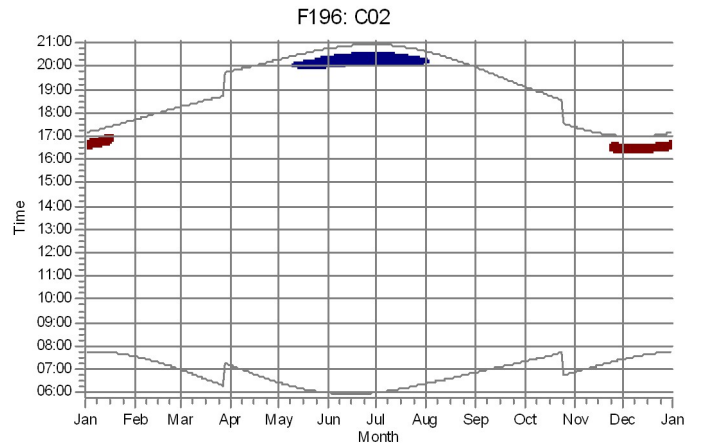
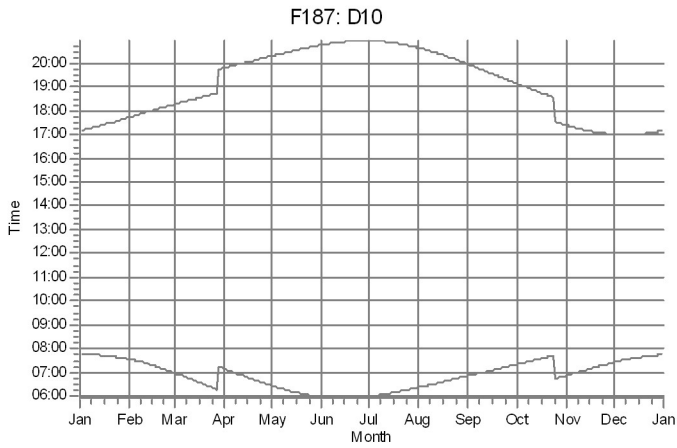
### WTGs

WTG12: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (89)

WTG13: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (90)

## SHADOW - Calendar, graphical

Calculation: Real\_case\_Progetto\_V172



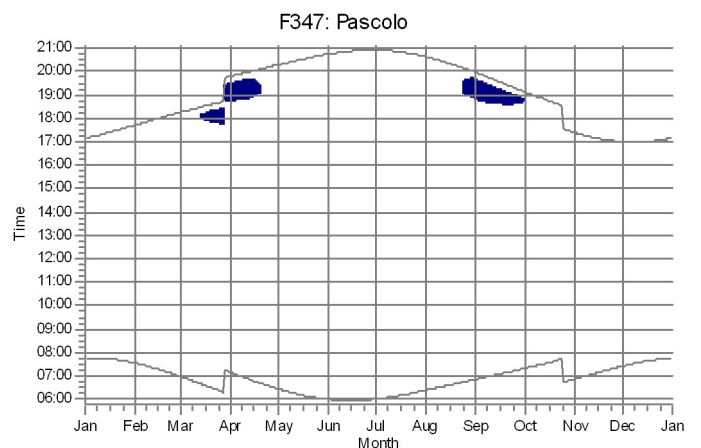
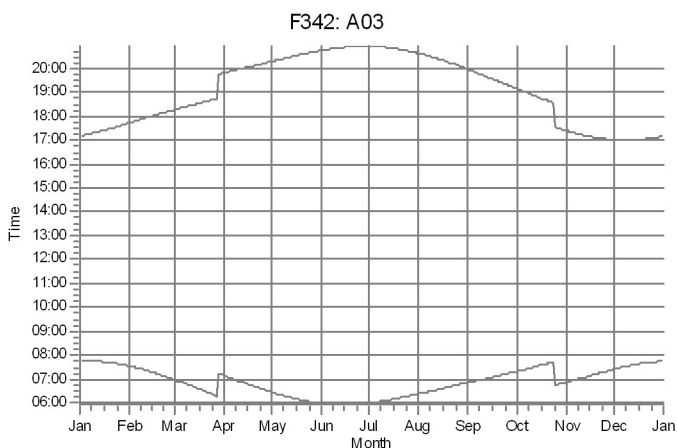
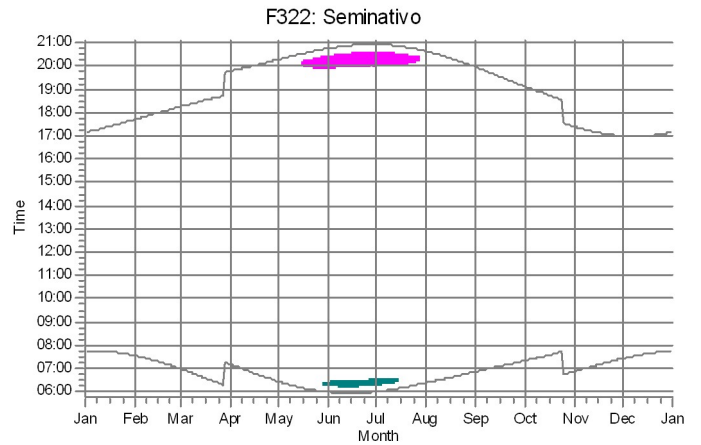
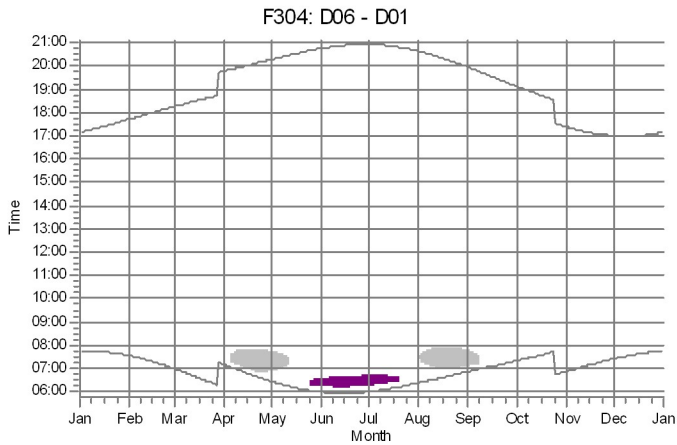
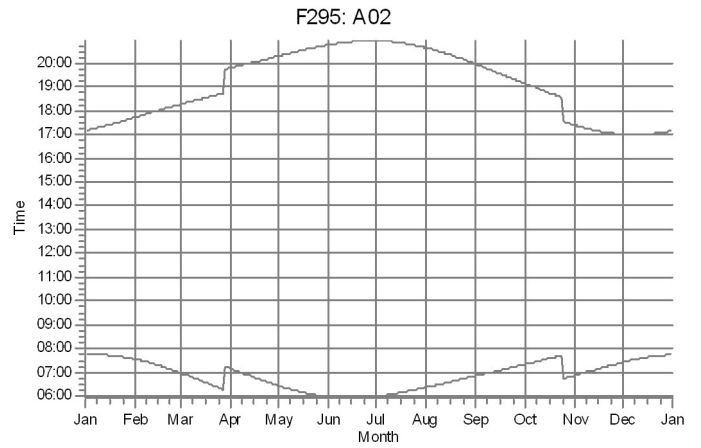
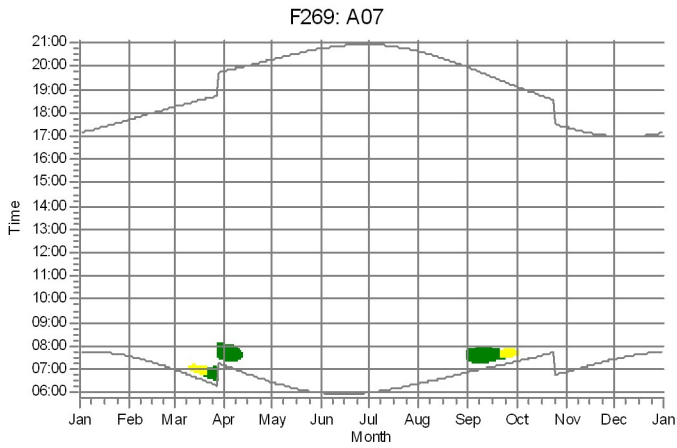
### WTGs

- WTG1: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)
- WTG2: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80)
- WTG8: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)

- WTG9: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (86)
- WTG10: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (87)
- WTG11: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (88)

## SHADOW - Calendar, graphical

Calculation: Real\_case\_Progetto\_V172



### WTGs

- WTG1: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (79)
- WTG2: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (80)
- WTG5: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (83)
- WTG6: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (84)

- WTG8: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (85)
- WTG12: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (89)
- WTG13: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (90)

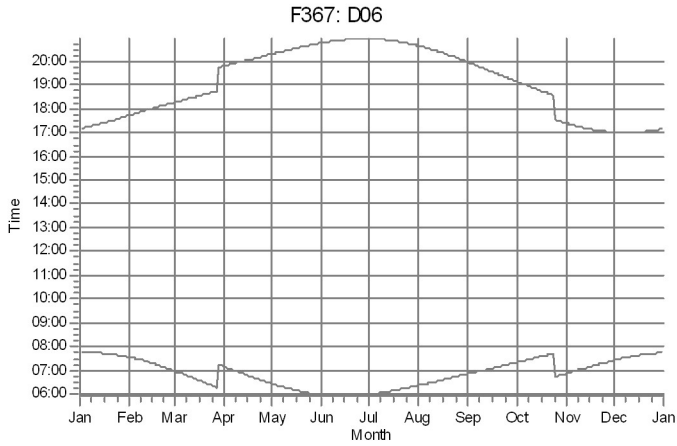


Project:  
Progetto\_RWE\_Serri\_Mandas

Licensed user:  
I.A.T. Consulenza e progetti S.r.l.  
Via Santa Margherita 4  
IT-09124 Cagliari  
+39 070 658297  
Giuseppe Frongia / direttore@iatprogetti.it  
Calculated:  
22/12/2023 09:31/3.4.415

## SHADOW - Calendar, graphical

Calculation: Real\_case\_Progetto\_V172



WTGs

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
IT-09124 Cagliari
+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
22/12/2023 09:31/3.4.415

SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG1 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)
Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Table with 12 columns: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec. Values: 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

Table with 13 columns: N, NNE, ENE, E, ESE, SSE, S, SSW, WSW, W, WNW, NNW, Sum. Values: 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

Main shadow calculation table with columns for months (January to December) and rows for each day (1 to 31). Columns include start/end times and potential sun hours. Sum of minutes with flicker is provided at the bottom.

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
IT-09124 Cagliari
+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
22/12/2023 09:31/3.4.415

SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG10 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (87)
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

Table with columns for months (January to December) and rows for days (1 to 31). Each cell contains time ranges for sunrise, sunset, and potential sun hours. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

### SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG11 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (88)  
 Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

#### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:12-07:24/12	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:12-07:21/9	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:13-07:17/4	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52		07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50		07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:33	06:56 19:49		07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47		07:25 18:58	06:58 17:17	07:31 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46		07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	07:15-07:19/4	06:17 20:25	06:04 20:50	06:30 20:29	06:59 19:44		07:27 18:55	07:01 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	07:14-07:23/9	06:15 20:26	06:04 20:51	06:31 20:28	06:59 19:42		07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	07:12-07:24/12	06:14 20:27	06:05 20:53	06:31 20:27	07:00 19:41		07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	07:11-07:26/15	06:13 20:28	06:06 20:53	06:32 20:25	07:01 19:39		07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	07:09-07:26/17	06:12 20:29	06:06 20:52	06:33 20:24	07:02 19:37		07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	07:08-07:27/19	06:11 20:30	06:07 20:53	06:34 20:23	07:03 19:36		07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	07:06-07:26/20	06:10 20:31	06:08 20:51	06:35 20:21	07:04 19:34		07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	07:05-07:27/22	06:10 20:32	06:09 20:51	06:36 20:20	07:05 19:33		07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	07:04-07:27/23	06:09 20:33	06:09 20:50	06:37 20:19	07:06 19:31		07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	07:03-07:26/23	06:08 20:34	06:10 20:50	06:38 20:17	07:07 19:29		07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	07:03-07:26/23	06:07 20:34	06:11 20:49	06:39 20:16	07:08 19:28		07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	07:03-07:24/21	06:06 20:35	06:12 20:55	06:40 20:15	07:09 19:26		07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	07:04-07:24/20	06:05 20:36	06:13 20:48	06:41 20:13	07:10 19:24		07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	07:04-07:22/18	06:05 20:37	06:13 20:47	06:42 20:12	07:11 19:23		07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	07:05-07:21/16	06:04 20:38	06:14 20:55	06:43 20:10	07:12 19:21		07:42 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	07:07-07:19/12	06:03 20:39	06:15 20:45	06:44 20:09	07:13 19:19		07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	07:10-07:15/5	06:02 20:40	06:16 20:44	06:45 20:07	07:13 19:18		07:44 18:34	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12		06:02 20:40	06:17 20:44	06:46 20:06	07:14 19:16		07:45 18:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13		06:01 20:41	06:18 20:43	06:46 20:04	07:15 19:15		07:46 18:30	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14		06:01 20:42	06:19 20:42	06:47 20:03	07:16 19:13		07:47 18:30	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15		06:00 20:43	06:19 20:56	06:48 20:41	07:17 19:11		07:48 18:30	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16		06:00 20:44	06:20 20:56	06:49 20:00	07:18 19:10		07:49 18:30	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46	06:27 20:16		06:00 20:44	06:21 20:56	06:50 20:39	07:19 19:58		07:50 18:30	07:25 17:01	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	25	347	301	292
Sum of minutes with flicker	0	0	0	279	0	0	0	256	0	25	0	0	0

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

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

### SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG12 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (89)  
 Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

#### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 07:52-08:24/32 17:43	06:58 07:36-07:39/3 18:15	07:10 07:28-08:12/44 19:47	06:26 20:17	05:59 06:19-06:42/23 20:45
2	07:45 17:11	07:32 07:51-08:24/33 17:44	06:57 18:16	07:08 07:26-08:12/46 19:48	06:25 20:18	05:58 06:19-06:41/22 20:46
3	07:45 17:11	07:31 07:50-08:24/34 17:45	06:56 18:17	07:07 07:25-08:12/47 19:49	06:23 20:19	05:58 06:19-06:41/22 20:46
4	07:45 17:12	07:30 07:49-08:24/35 17:46	06:54 18:18	07:05 07:23-08:11/48 19:50	06:22 20:20	05:57 06:18-06:42/24 20:47
5	07:45 17:13	07:29 07:48-08:24/36 17:47	06:53 18:19	07:03 07:22-08:11/49 19:51	06:21 20:21	05:57 06:18-06:41/23 20:48
6	07:45 17:14	07:28 07:47-08:23/36 17:49	06:51 18:20	07:02 07:20-08:11/51 19:52	06:20 20:22	05:57 06:18-06:41/23 20:48
7	07:45 17:15	07:27 07:46-08:23/37 17:50	06:49 18:22	07:00 07:18-08:10/52 19:53	06:19 20:23	05:56 06:18-06:41/23 20:49
8	07:45 17:16	07:26 07:45-08:23/38 17:51	06:48 18:23	06:59 07:17-08:09/52 19:54	06:18 20:24	05:56 06:18-06:41/23 20:50
9	07:45 17:17	07:25 07:46-08:23/37 17:52	06:46 18:24	06:57 07:15-08:08/53 19:55	06:16 20:25	05:56 06:17-06:40/23 20:50
10	07:45 17:18	07:24 07:46-08:23/37 17:53	06:45 18:25	06:56 07:14-08:08/54 19:56	06:15 20:26	05:56 06:17-06:40/23 20:51
11	07:45 17:19	07:22 07:47-08:23/36 17:55	06:43 18:26	06:54 07:13-08:07/54 19:57	06:14 20:27	05:56 06:17-06:41/24 20:51
12	07:44 17:20	07:21 07:47-08:21/34 17:56	06:42 18:27	06:53 07:15-08:06/51 19:58	06:13 20:28	05:56 06:17-06:41/24 20:52
13	07:44 17:21	07:20 07:48-08:20/32 17:57	06:40 18:28	06:51 07:15-08:04/49 19:59	06:12 06:32-06:33/1 20:29	05:56 06:17-06:41/24 20:52
14	07:44 08:05-08:07/2 17:22	07:19 07:49-08:20/31 17:58	06:39 18:29	06:50 07:17-08:04/47 20:00	06:11 06:31-06:35/4 20:30	05:56 06:17-06:41/24 20:53
15	07:43 08:04-08:09/5 17:23	07:18 07:37-07:42/5 17:59 07:51-08:19/28	06:37 18:30	06:48 07:19-08:02/43 20:01	06:10 06:30-06:36/6 20:31	05:55 06:17-06:41/24 20:53
16	07:43 08:04-08:11/7 17:24	07:16 07:35-07:44/9 18:00 07:52-08:16/24	06:35 18:31	06:47 07:22-08:01/39 20:02	06:09 06:29-06:37/8 20:32	05:56 06:17-06:41/24 20:53
17	07:43 08:03-08:12/9 17:25	07:15 07:34-07:46/12 18:02 07:54-08:15/21	06:34 18:32	06:45 07:23-07:59/36 20:03	06:09 06:29-06:38/9 20:33	05:56 06:17-06:41/24 20:54
18	07:42 08:03-08:14/11 17:26	07:14 07:33-07:48/15 18:03 07:57-08:12/15	06:32 18:33	06:44 07:25-07:57/32 20:04	06:08 06:28-06:39/11 20:33	05:56 06:17-06:41/24 20:54
19	07:42 08:02-08:15/13 17:28	07:12 07:31-07:48/17 18:04 08:02-08:06/4	06:31 06:49-06:58/9 18:34	06:42 07:27-07:55/28 20:05	06:07 06:27-06:39/12 20:34	05:56 06:18-06:42/24 20:54
20	07:41 08:02-08:17/15 17:29	07:11 07:30-07:49/19 18:05	06:29 06:47-07:01/14 18:35	06:41 07:28-07:52/24 20:06	06:06 06:26-06:39/13 20:35	05:56 06:18-06:42/24 20:55
21	07:41 08:01-08:17/16 17:30	07:10 07:29-07:49/20 18:06	06:27 06:46-07:04/18 18:36	06:39 07:31-07:49/18 20:07	06:05 06:25-06:39/14 20:36	05:56 06:18-06:42/24 20:55
22	07:40 08:00-08:18/18 17:31	07:08 07:28-07:49/21 18:07	06:26 06:44-07:06/22 18:37	06:38 07:35-07:44/9 20:08	06:05 06:25-06:40/15 20:37	05:56 06:18-06:42/24 20:55
23	07:40 08:00-08:20/20 17:32	07:07 07:28-07:49/21 18:08	06:24 06:42-07:07/25 18:38	06:36 20:09	06:04 06:24-06:40/16 20:38	05:56 06:18-06:42/24 20:55
24	07:39 07:59-08:20/21 17:33	07:06 07:28-07:48/20 18:10	06:23 06:41-07:09/28 18:39	06:35 20:10	06:03 06:24-06:41/17 20:39	05:57 06:19-06:43/24 20:55
25	07:38 07:58-08:21/23 17:34	07:04 07:28-07:48/20 18:11	06:21 06:39-07:09/30 18:40	06:34 20:11	06:02 06:23-06:41/18 20:40	05:57 06:19-06:43/24 20:56
26	07:38 07:58-08:22/24 17:36	07:03 07:30-07:47/17 18:12	06:19 06:38-07:11/33 18:41	06:32 20:12	06:02 06:22-06:41/19 20:40	05:57 06:19-06:43/24 20:56
27	07:37 07:57-08:22/25 17:37	07:01 07:30-07:45/15 18:13	06:18 06:36-07:11/35 18:42	06:31 20:13	06:01 06:22-06:41/19 20:41	05:58 06:20-06:44/24 20:56
28	07:36 07:56-08:23/27 17:38	07:00 07:32-07:44/12 18:14	06:16 06:34-07:11/37 18:43	06:30 20:14	06:01 06:21-06:41/20 20:42	05:58 06:20-06:44/24 20:56
29	07:35 07:55-08:23/28 17:39		07:15 07:33-08:12/39 19:44	06:28 20:15	06:00 06:21-06:41/20 20:43	05:58 06:20-06:44/24 20:56
30	07:34 07:54-08:23/29 17:40		07:13 07:31-08:12/41 19:45	06:27 20:16	06:00 06:20-06:41/21 20:44	05:59 06:21-06:45/24 20:56
31	07:34 07:53-08:24/31 17:42		07:11 07:30-08:12/42 19:46		05:59 06:20-06:41/21 20:44	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	324	803	376	926	264	709

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: Real\_case\_Progetto\_V172WTG: WTG12 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (89)  
 Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59 06:21-06:45/24 20:56	06:22 20:38	06:51 07:12-08:06/54 19:57	07:19 19:08	06:51 07:15-07:52/37 17:23	07:25 17:00
2	06:00 06:22-06:45/23 20:56	06:23 20:37	06:52 07:12-08:06/54 19:55	07:20 19:06	06:52 07:15-07:53/38 17:22	07:26 17:00
3	06:00 06:22-06:45/23 20:55	06:24 20:36	06:53 07:13-08:06/53 19:53	07:21 19:05	06:54 07:15-07:53/38 17:21	07:27 17:00
4	06:01 06:23-06:46/23 20:55	06:25 20:35	06:54 07:14-08:06/52 19:52	07:22 19:03	06:55 07:16-07:53/37 17:20	07:28 17:00
5	06:01 06:23-06:46/23 20:55	06:26 20:34	06:55 07:15-08:07/52 19:50	07:23 19:02	06:56 07:17-07:53/36 17:19	07:29 17:00
6	06:02 06:24-06:47/23 20:55	06:27 20:32	06:56 07:16-08:07/51 19:49	07:24 19:00	06:57 07:18-07:53/35 17:18	07:30 17:00
7	06:03 06:25-06:48/23 20:55	06:28 20:31	06:57 07:17-08:06/49 19:47	07:25 18:58	06:58 07:20-07:55/35 17:17	07:30 16:59
8	06:03 06:25-06:48/23 20:54	06:29 20:30	06:58 07:18-08:06/48 19:45	07:26 18:57	06:59 07:21-07:55/34 17:16	07:31 16:59
9	06:04 06:26-06:48/22 20:54	06:30 20:29	06:58 07:18-08:05/47 19:44	07:27 18:55	07:00 07:22-07:55/33 17:15	07:32 16:59
10	06:04 06:26-06:48/22 20:54	06:30 20:28	06:59 07:19-08:05/46 19:42	07:28 18:54	07:02 07:23-07:55/32 17:14	07:33 17:00
11	06:05 06:27-06:49/22 20:53	06:31 20:26	07:00 07:20-08:04/44 19:41	07:29 18:52	07:03 07:25-07:55/30 17:13	07:34 17:00
12	06:06 06:28-06:50/22 20:53	06:32 20:25	07:01 07:21-08:04/43 19:39	07:30 18:51	07:04 07:26-07:55/29 17:12	07:35 17:00
13	06:06 06:28-06:49/21 20:52	06:33 20:24	07:02 07:22-08:03/41 19:37	07:31 08:07-08:15/8 18:49	07:05 07:27-07:55/28 17:11	07:35 17:00
14	06:07 06:29-06:50/21 20:52	06:34 20:23	07:03 07:23-08:02/39 19:36	07:32 08:04-08:17/13 18:48	07:06 07:28-07:55/27 17:10	07:36 17:00
15	06:08 06:30-06:50/20 20:51	06:35 20:21	07:04 07:24-08:01/37 19:34	07:33 08:02-08:18/16 18:46	07:07 07:29-07:54/25 17:09	07:37 17:00
16	06:09 06:31-06:51/20 20:51	06:36 20:20	07:05 07:25-08:00/35 19:32	07:34 08:01-08:19/18 18:45	07:08 07:31-07:55/24 17:08	07:38 17:01
17	06:09 06:31-06:50/19 20:50	06:37 20:19	07:06 07:26-07:59/33 19:31	07:35 08:00-08:19/19 18:43	07:10 07:32-07:55/23 17:08	07:38 17:01
18	06:10 06:32-06:50/18 20:50	06:38 20:17	07:07 07:27-07:58/31 19:29	07:36 07:59-08:20/21 18:42	07:11 07:33-07:54/21 17:07	07:39 17:01
19	06:11 06:33-06:51/18 20:49	06:39 20:16	07:08 07:27-07:55/28 19:28	07:37 07:59-08:20/21 18:40	07:12 07:34-07:54/20 17:06	07:40 17:02
20	06:12 06:34-06:51/17 20:48	06:40 20:14	07:09 07:28-07:54/26 19:26	07:38 07:59-08:20/21 18:39	07:13 07:35-07:53/18 17:05	07:40 17:02
21	06:13 06:34-06:50/16 20:47	06:41 07:40-07:51/11 20:13	07:10 07:29-07:52/23 19:24	07:39 08:00-08:20/20 18:37	07:14 07:37-07:53/16 17:05	07:41 17:02
22	06:13 06:35-06:50/15 20:47	06:42 07:34-07:54/20 20:12	07:11 07:30-07:49/19 19:23	07:40 08:01-08:19/18 18:36	07:15 07:38-07:53/15 17:04	07:41 17:03
23	06:14 06:36-06:50/14 20:46	06:43 07:32-07:57/25 20:10	07:11 07:31-07:46/15 19:21	07:41 08:02-08:18/16 18:35	07:16 07:39-07:52/13 17:04	07:42 17:03
24	06:15 06:37-06:50/13 20:45	06:44 07:29-07:59/30 20:09	07:12 07:32-07:42/10 19:19	07:43 08:03-08:17/14 18:33	07:17 07:40-07:51/11 17:03	07:42 17:04
25	06:16 06:38-06:49/11 20:44	06:45 07:27-08:00/33 20:07	07:13 19:18	06:44 07:04-07:16/12 17:32	07:18 07:41-07:50/9 17:03	07:43 17:05
26	06:17 06:39-06:49/10 20:44	06:45 07:26-08:02/36 20:06	07:14 19:16	06:45 07:05-07:13/8 17:31	07:19 07:42-07:49/7 17:02	07:43 17:05
27	06:18 06:39-06:48/9 20:43	06:46 07:24-08:03/39 20:04	07:15 19:14	06:46 07:08-07:10/2 17:29	07:21 07:43-07:48/5 17:02	07:43 17:06
28	06:19 06:40-06:47/7 20:42	06:47 07:21-08:04/43 20:03	07:16 19:13	06:47 07:19-07:50/31 17:28	07:22 07:44-07:46/2 17:01	07:44 17:07
29	06:19 06:41-06:46/5 20:41	06:48 07:18-08:05/47 20:01	07:17 19:11	06:48 07:18-07:50/32 17:27	07:23 17:01	07:44 17:07
30	06:20 06:42-06:45/3 20:40	06:49 07:16-08:05/49 20:00	07:18 19:10	06:49 07:17-07:51/34 17:26	07:24 17:01	07:44 17:08
31	06:21 20:39	06:50 07:15-08:06/51 19:58		06:50 07:16-07:51/35 17:24		07:45 17:09
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	530	384	930	461	678	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: Real\_case\_Progetto\_V172WTG: WTG13 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90) Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

#### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June
1	07:45 17:10	07:33 07:52-08:33/41 17:43	06:59 18:15	07:10 07:28-08:01/33 19:47	06:26 06:59-07:55/56 20:17	05:59 20:45
2	07:45 17:11	07:32 07:51-08:33/42 17:44	06:57 18:16	07:08 07:26-08:02/36 19:48	06:25 07:00-07:53/53 20:18	05:58 20:46
3	07:45 17:11	07:31 07:51-08:33/42 17:45	06:56 18:17	07:07 07:25-08:04/39 19:49	06:23 07:00-07:51/51 20:19	05:58 20:46
4	07:45 17:12	07:30 07:52-08:32/40 17:46	06:54 18:18	07:05 07:23-08:05/42 19:50	06:22 07:01-07:49/48 20:20	05:57 20:47
5	07:45 17:13	07:29 07:52-08:32/40 17:48	06:53 18:19	07:03 07:22-08:06/44 19:51	06:21 07:02-07:47/45 20:21	05:57 20:48
6	07:45 17:14	07:28 07:53-08:32/39 17:49	06:51 18:20	07:02 07:20-08:06/46 19:52	06:20 07:04-07:45/41 20:22	05:57 20:48
7	07:45 17:15	07:27 07:53-08:32/39 17:50	06:50 18:22	07:00 07:18-08:06/48 19:53	06:19 07:05-07:42/37 20:23	05:57 20:49
8	07:45 17:16	07:26 07:54-08:31/37 17:51	06:48 18:23	06:59 07:17-08:07/50 19:54	06:18 07:07-07:30/23 20:24	05:56 20:50
9	07:45 08:06-08:09/3 17:17	07:25 07:55-08:31/36 17:52	06:46 18:24	06:57 07:15-08:07/52 19:55	06:17 07:09-07:27/18 20:25	05:56 20:50
10	07:45 08:06-08:12/6 17:18	07:24 07:56-08:30/34 17:53	06:45 18:25	06:56 07:14-08:08/54 19:56	06:15 07:13-07:24/11 20:26	05:56 20:51
11	07:45 08:06-08:14/8 17:19	07:22 07:57-08:29/32 17:55	06:43 18:26	06:54 07:12-08:07/55 19:57	06:14 20:27	05:56 20:51
12	07:44 08:05-08:16/11 17:20	07:21 07:58-08:27/29 17:56	06:42 18:27	06:53 07:11-08:08/57 19:58	06:13 20:28	05:56 20:52
13	07:44 08:05-08:18/13 17:21	07:20 08:00-08:26/26 17:57	06:40 18:28	06:51 07:09-08:07/58 19:59	06:12 20:29	05:56 20:52
14	07:44 08:05-08:19/14 17:22	07:19 08:02-08:24/22 17:58	06:39 18:29	06:50 07:08-08:08/60 20:00	06:11 20:30	05:56 20:53
15	07:44 08:04-08:20/16 17:23	07:18 08:05-08:22/17 17:59	06:37 18:30	06:48 07:06-08:07/61 20:01	06:10 20:31	05:56 20:53
16	07:43 08:04-08:22/18 17:24	07:16 08:08-08:17/9 18:00	06:35 18:31	06:47 07:05-08:07/62 20:02	06:10 20:32	05:56 20:53
17	07:43 08:03-08:23/20 17:25	07:15 18:02	06:34 18:32	06:45 07:03-08:06/63 20:03	06:09 20:33	05:56 20:54
18	07:42 08:03-08:24/21 17:26	07:14 18:03	06:32 18:33	06:44 07:02-08:06/64 20:04	06:08 20:33	05:56 20:54
19	07:42 08:02-08:25/23 17:28	07:12 18:04	06:31 18:34	06:42 07:01-08:06/65 20:05	06:07 20:34	05:56 20:54
20	07:41 08:02-08:27/25 17:29	07:11 18:05	06:29 18:35	06:41 06:59-08:05/66 20:06	06:06 20:35	05:56 20:55
21	07:41 08:01-08:27/26 17:30	07:10 18:06	06:27 18:36	06:39 06:58-08:05/67 20:07	06:05 20:36	05:56 20:55
22	07:40 08:00-08:28/28 17:31	07:08 18:07	06:26 18:37	06:38 06:57-08:03/66 20:08	06:05 20:37	05:56 20:55
23	07:40 08:00-08:29/29 17:32	07:07 18:08	06:24 18:38	06:36 06:57-08:03/66 20:09	06:04 20:38	05:57 20:55
24	07:39 07:59-08:30/31 17:33	07:06 18:10	06:23 18:39	06:35 06:57-08:03/66 20:10	06:03 20:39	05:57 20:55
25	07:38 07:58-08:30/32 17:34	07:04 18:11	06:21 06:39-06:48/9 18:40	06:34 06:57-08:01/64 20:11	06:02 20:40	05:57 20:56
26	07:38 07:58-08:31/33 17:36	07:03 18:12	06:19 06:38-06:52/14 18:41	06:32 06:57-08:00/63 20:12	06:02 20:40	05:57 20:56
27	07:37 07:57-08:32/35 17:37	07:01 18:13	06:18 06:36-06:54/18 18:42	06:31 06:58-08:00/62 20:13	06:01 20:41	05:58 20:56
28	07:36 07:56-08:32/36 17:38	07:00 18:14	06:16 06:34-06:55/21 18:43	06:30 06:57-07:58/61 20:14	06:01 20:42	05:58 20:56
29	07:35 07:55-08:32/37 17:39		07:15 07:33-07:57/24 19:44	06:28 06:58-07:57/59 20:15	06:00 20:43	05:59 20:56
30	07:34 07:54-08:32/38 17:40		07:13 07:31-07:58/27 19:45	06:27 06:59-07:56/57 20:16	06:00 20:44	05:59 20:56
31	07:34 07:53-08:32/39 17:42		07:11 07:30-08:00/30 19:46		05:59 20:44	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	542	525	143	1686	387	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: Real\_case\_Progetto\_V172WTG: WTG13 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90)  
 Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

### Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	July	August	September	October	November	December
1	05:59 20:56	06:22 20:38	06:51 07:11-08:06/55 19:57	07:19 19:08	06:51 07:25-07:59/34 17:23	07:25 07:48-07:57/9 17:00
2	06:00 20:56	06:23 07:27-07:30/3 20:37	06:52 07:12-08:06/54 19:55	07:20 19:06	06:52 07:25-08:01/36 17:22	07:26 07:49-07:55/6 17:00
3	06:00 20:55	06:24 07:21-07:35/14 20:36	06:53 07:13-08:05/52 19:53	07:21 19:05	06:54 07:24-08:01/37 17:21	07:27 07:50-07:53/3 17:00
4	06:01 20:55	06:25 07:18-07:38/20 20:35	06:54 07:14-08:04/50 19:52	07:22 19:03	06:55 07:23-08:02/39 17:20	07:28 17:00
5	06:01 20:55	06:26 07:16-07:49/33 20:34	06:55 07:15-08:03/48 19:50	07:23 19:02	06:56 07:22-08:02/40 17:19	07:29 17:00
6	06:02 20:55	06:27 07:14-07:53/39 20:32	06:56 07:16-08:02/46 19:49	07:24 19:00	06:57 07:22-08:02/40 17:18	07:30 17:00
7	06:03 20:55	06:28 07:13-07:56/43 20:31	06:57 07:17-08:01/44 19:47	07:25 18:58	06:58 07:22-08:03/41 17:17	07:30 17:00
8	06:03 20:54	06:29 07:12-07:58/46 20:30	06:58 07:18-08:00/42 19:46	07:26 18:57	06:59 07:22-08:03/41 17:16	07:31 17:00
9	06:04 20:54	06:30 07:11-08:00/49 20:29	06:59 07:19-07:58/39 19:44	07:27 18:55	07:00 07:22-08:03/41 17:15	07:32 17:00
10	06:04 20:54	06:30 07:10-08:01/51 20:28	06:59 07:19-07:56/37 19:42	07:28 18:54	07:02 07:23-08:03/40 17:14	07:33 17:00
11	06:05 20:53	06:31 07:09-08:03/54 20:26	07:00 07:20-07:54/34 19:41	07:29 18:52	07:03 07:25-08:04/39 17:13	07:34 17:00
12	06:06 20:53	06:32 07:08-08:04/56 20:25	07:01 07:21-07:51/30 19:39	07:30 18:51	07:04 07:26-08:04/38 17:12	07:35 17:00
13	06:06 20:52	06:33 07:06-08:04/58 20:24	07:02 07:22-07:49/27 19:37	07:31 18:49	07:05 07:27-08:04/37 17:11	07:35 17:00
14	06:07 20:52	06:34 07:05-08:05/60 20:23	07:03 07:23-07:48/25 19:36	07:32 18:48	07:06 07:28-08:04/36 17:10	07:36 17:00
15	06:08 20:51	06:35 07:05-08:06/61 20:21	07:04 07:24-07:46/22 19:34	07:33 18:46	07:07 07:29-08:04/35 17:09	07:37 17:00
16	06:09 20:51	06:36 07:04-08:07/63 20:20	07:05 07:25-07:44/19 19:32	07:34 18:45	07:08 07:31-08:04/33 17:08	07:38 17:01
17	06:09 20:50	06:37 07:04-08:07/63 20:19	07:06 07:26-07:41/15 19:31	07:35 18:43	07:10 07:32-08:04/32 17:08	07:38 17:01
18	06:10 20:50	06:38 07:03-08:08/65 20:17	07:07 07:27-07:37/10 19:29	07:36 18:42	07:11 07:33-08:03/30 17:07	07:39 17:01
19	06:11 20:49	06:39 07:03-08:08/65 20:16	07:08 19:28	07:37 18:40	07:12 07:34-08:03/29 17:06	07:40 17:02
20	06:12 20:48	06:40 07:03-08:09/66 20:14	07:09 19:26	07:38 18:39	07:13 07:35-08:03/28 17:06	07:40 17:02
21	06:13 20:48	06:41 07:03-08:09/66 20:13	07:10 19:24	07:39 18:38	07:14 07:37-08:03/26 17:05	07:41 17:03
22	06:13 20:47	06:42 07:03-08:10/67 20:12	07:11 19:23	07:40 18:36	07:15 07:38-08:03/25 17:04	07:41 17:03
23	06:14 20:46	06:43 07:03-08:09/66 20:10	07:12 19:21	07:41 18:35	07:16 07:39-08:02/23 17:04	07:42 17:04
24	06:15 20:45	06:44 07:04-08:09/65 20:09	07:12 19:19	07:43 18:33	07:17 07:40-08:01/21 17:03	07:42 17:04
25	06:16 20:44	06:45 07:05-08:09/64 20:07	07:13 19:18	06:44 17:32	07:18 07:41-08:01/20 17:03	07:43 17:05
26	06:17 20:44	06:45 07:06-08:09/63 20:06	07:14 19:16	06:45 07:36-07:48/12 17:31	07:19 07:42-08:00/18 17:02	07:43 17:05
27	06:18 20:43	06:46 07:07-08:09/62 20:04	07:15 19:14	06:46 07:34-07:52/18 17:29	07:21 07:43-07:59/16 17:02	07:43 17:06
28	06:19 20:42	06:47 07:08-08:09/61 20:03	07:16 19:13	06:47 07:31-07:54/23 17:28	07:22 07:44-07:59/15 17:01	07:44 17:07
29	06:19 20:41	06:48 07:09-08:08/59 20:01	07:17 19:11	06:48 07:29-07:56/27 17:27	07:23 07:46-07:59/13 17:01	07:44 17:07
30	06:20 20:40	06:49 07:10-08:08/58 20:00	07:18 19:10	06:49 07:27-07:57/30 17:26	07:24 07:47-07:58/11 17:01	07:44 17:08
31	06:21 20:39	06:50 07:11-08:08/57 19:58		06:50 07:26-07:58/32 17:24		07:45 17:09
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	0	1597	649	142	914	18

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG2 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80) Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:45	07:33	06:59	07:10	06:26	05:58	05:59	06:22	06:51	07:19	07:39-07:45/6	06:51	07:25
	17:10	17:43	18:15	19:47	20:17	20:45	20:56	20:38	19:57	19:08		17:23	17:00
2	07:45	07:32	06:57	07:08	06:24	05:58	06:00	06:23	06:52	07:20	07:40-07:44/4	06:53	07:26
	17:10	17:44	18:16	19:48	20:18	20:46	20:56	20:37	19:55	19:06		17:22	17:00
3	07:45	07:31	06:56	07:07	06:23	05:58	06:00	06:24	06:53	07:21		06:54	07:27
	17:11	17:45	18:17	19:49	20:19	20:47	20:56	20:36	19:54	19:05		17:21	17:00
4	07:45	07:30	06:54	07:05	06:22	05:57	06:01	06:25	06:54	07:22		06:55	07:28
	17:12	17:46	18:18	19:50	20:20	20:47	20:55	20:35	19:52	19:03		17:20	17:00
5	07:45	07:29	06:53	07:03	06:21	05:57	06:01	06:26	06:55	07:23		06:56	07:29
	17:13	17:47	18:19	19:51	20:21	20:48	20:55	20:34	19:50	19:02		17:19	16:59
6	07:45	07:28	06:51	07:02	06:20	05:57	06:02	06:27	06:56	07:24		06:57	07:30
	17:14	17:49	18:20	19:52	20:22	20:49	20:55	20:33	19:49	19:00		17:18	16:59
7	07:45	07:27	06:50	07:00	06:19	05:56	06:02	06:28	06:57	07:25		06:58	07:31
	17:15	17:50	18:21	19:53	20:23	20:49	20:55	20:31	19:47	18:58		17:16	16:59
8	07:45	07:26	06:48	06:59	06:17	05:56	06:03	06:28	06:58	07:26		06:59	07:32
	17:16	17:51	18:23	19:54	20:24	20:50	20:54	20:30	19:46	18:57		17:15	16:59
9	07:45	07:25	06:46	06:57	06:16	05:56	06:04	06:29	06:58	07:27		07:01	07:32
	17:17	17:52	18:24	19:55	20:25	20:50	20:54	20:29	19:44	18:55		17:14	16:59
10	07:45	07:24	06:45	06:56	06:15	05:56	06:04	06:30	06:59	07:28		07:02	07:33
	17:18	17:53	18:25	19:56	20:26	20:51	20:54	20:28	19:42	18:54		17:13	16:59
11	07:45	07:22	06:43	07:02-07:04/2	06:54	06:14	05:56	06:05	06:31	07:00		07:03	07:34
	17:19	17:54	18:26	19:57	20:27	20:51	20:53	20:27	19:41	18:52		17:13	16:59
12	07:45	07:21	06:42	07:00-07:05/5	06:52	06:13	05:55	06:06	06:32	07:01		07:04	07:35
	17:20	17:56	18:27	19:58	20:28	20:52	20:53	20:25	19:39	18:51		17:12	17:00
13	07:44	07:20	06:40	06:59-07:07/8	06:51	06:12	05:55	06:06	06:33	07:02		07:05	07:36
	17:21	17:57	18:28	19:59	20:29	20:52	20:52	20:24	19:37	18:49		17:11	17:00
14	07:44	07:19	06:39	06:57-07:06/9	06:49	06:11	05:55	06:07	06:34	07:03		07:06	07:36
	17:22	17:58	18:29	20:00	20:30	20:53	20:52	20:23	19:36	18:48		17:10	17:00
15	07:44	07:18	06:37	06:55-07:06/11	06:48	06:10	05:55	06:08	06:35	07:04		07:07	07:37
	17:23	17:59	18:30	20:01	20:31	20:53	20:51	20:21	19:34	18:46		17:09	17:00
16	07:43	07:16	06:35	06:54-07:06/12	06:46	06:09	05:55	06:08	06:36	07:05		07:09	07:38
	17:24	18:00	18:31	20:02	20:32	20:54	20:51	20:20	19:32	18:45		17:08	17:00
17	07:43	07:15	06:34	06:52-07:06/14	06:45	06:08	05:55	06:09	06:37	07:06		07:10	07:39
	17:25	18:01	18:32	20:03	20:33	20:54	20:50	20:19	19:31	18:43		17:07	17:01
18	07:42	07:14	06:32	06:51-07:06/15	06:44	06:08	05:55	06:10	06:38	07:07		07:11	07:39
	17:26	18:03	18:33	20:04	20:34	20:54	20:50	20:17	19:29	18:42		17:07	17:01
19	07:42	07:13	06:31	06:49-07:05/16	06:42	06:07	05:56	06:11	06:39	07:08		07:12	07:40
	17:27	18:04	18:34	20:05	20:34	20:55	20:49	20:16	19:28	18:40		17:06	17:01
20	07:41	07:11	06:29	06:47-07:04/17	06:41	06:06	05:56	06:12	06:40	07:09	07:36-07:44/8	07:38	07:40
	17:29	18:05	18:35	20:06	20:35	20:55	20:48	20:15	19:26	18:39		17:05	17:02
21	07:41	07:10	06:27	06:46-07:03/17	06:39	06:05	05:56	06:12	06:41	07:10	07:33-07:46/13	07:39	07:41
	17:30	18:06	18:36	20:07	20:36	20:55	20:48	20:13	19:24	18:37		17:05	17:02
22	07:40	07:09	06:26	06:47-07:01/14	06:38	06:04	05:56	06:13	06:42	07:11	07:31-07:47/16	07:40	07:41
	17:31	18:07	18:37	20:08	20:37	20:55	20:47	20:12	19:23	18:36		17:04	17:03
23	07:40	07:07	06:24	06:48-06:59/11	06:36	06:04	05:56	06:14	06:43	07:11	07:31-07:48/17	07:42	07:42
	17:32	18:08	18:38	20:09	20:38	20:56	20:46	20:10	19:21	18:35		17:04	17:03
24	07:39	07:06	06:23		06:35	06:03	05:57	06:15	06:43	07:12	07:32-07:49/17	07:43	07:42
	17:33	18:09	18:39		20:10	20:39	20:56	20:45	20:09	19:19		18:33	17:04
25	07:38	07:04	06:21		06:34	06:02	05:57	06:16	06:44	07:13	07:33-07:49/16	06:44	07:43
	17:34	18:11	18:40		20:11	20:40	20:56	20:45	20:07	19:18		17:32	17:04
26	07:38	07:03	06:19		06:32	06:02	05:57	06:17	06:45	07:14	07:34-07:48/14	06:45	07:43
	17:35	18:12	18:41		20:12	20:41	20:56	20:44	20:06	19:16		17:31	17:02
27	07:37	07:01	06:18		06:31	06:01	05:57	06:17	06:46	07:15	07:35-07:48/13	06:46	07:41
	17:37	18:13	18:42		20:13	20:41	20:56	20:43	20:04	19:14		17:29	17:02
28	07:36	07:00	06:16		06:30	06:00	05:58	06:18	06:47	07:16	07:36-07:48/12	06:47	07:44
	17:38	18:14	18:43		20:14	20:42	20:56	20:42	20:03	19:13		17:28	17:01
29	07:35		07:15		06:28	06:00	05:58	06:19	06:48	07:17	07:37-07:47/10	06:48	07:44
	17:39		19:44		20:15	20:43	20:56	20:41	20:01	19:11		17:27	17:01
30	07:35		07:13		06:27	06:59	05:59	06:20	06:49	07:18	07:38-07:46/8	06:49	07:45
	17:40		19:45		20:16	20:44	20:56	20:40	20:00	19:10		17:26	17:08
31	07:34		07:11			06:59		06:21	06:50			06:50	07:45
	17:41		19:46			20:44		20:39	19:58			17:24	17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347		301	292
Sum of minutes with flicker	0	0	151	0	0	0	0	0	144	10		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: Real\_case\_Progetto\_V172WTG: WTG3 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (81)  
 Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:52 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:56	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:32	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:55	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:32 16:59
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:52	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:19 17:57	06:39 18:28	06:50 19:59	06:11 20:29	05:55 20:52	06:07 20:53	06:34 20:24	07:03 19:38	07:32 18:49	07:06 17:11	07:37 17:00
14	07:44 17:22	07:18 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:37 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:52	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:17 18:00	06:36 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:39 17:01
18	07:43 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:35	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:42 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:28 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:40 18:38	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:42 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:56	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:13 19:19	07:43 18:33	07:18 17:03	07:43 17:04
25	07:39 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:15	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39	07:05 19:44	06:28 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40	07:05 19:45	06:28 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:45 17:08
31	07:34 17:42	07:05 19:46	06:27 19:46	06:26 20:17	05:59 20:45	05:59 20:56	06:20 20:40	06:49 19:58	07:18 374	06:49 347	07:24 301	07:45 292
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
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) Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
--------------	-------------------------------------	---	---

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG4 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (82) Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

#### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

| January | February | March | April | May | June | July | August | September | October | November | December

1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:24 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:01	06:56 17:19	07:29 16:59
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:49 18:21	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:16	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:17 20:24	05:56 20:50	06:03 20:54	06:28 20:30	06:57 19:46	07:26 18:57	06:59 17:15	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:14	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:13	07:33 16:59
11	07:45 17:19	07:22 17:54	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 16:59
12	07:44 17:20	07:21 17:56	06:42 18:27	06:52 19:58	06:13 20:28	05:55 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:19 17:57	06:39 18:28	06:49 19:59	06:11 20:29	05:55 20:52	06:07 20:52	06:34 20:24	07:03 19:37	07:32 18:49	07:06 17:11	07:36 17:00
14	07:44 17:22	07:18 17:58	06:39 18:29	06:49 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	06:09 20:32	05:55 20:54	06:08 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:00
17	07:43 17:25	07:15 18:01	06:34 18:32	06:45 20:03	06:08 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:07	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:43 20:04	06:08 20:34	05:55 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:01
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:12 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:11 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:09	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:43 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:44 20:07	07:13 19:18	06:44 17:32	07:18 17:02	07:43 17:04
26	07:38 17:35	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:17 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39	07:00 19:44	06:14 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40	07:00 19:45	06:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41	07:00 19:46	06:11 19:46	06:25 20:17	05:59 20:44	05:59 20:56	06:21 20:39	06:50 19:58	07:19 17:24	06:50 17:24	07:25 17:01	07:45 17:09

Potential sun hours

Sum of minutes with flicker

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

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 22/12/2023 09:31/3.4.415

## SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG5 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (83)  
 Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	19:59-20:20/21 20:56	05:59 20:05-20:31/26 20:38	06:22 20:33	06:51 19:57	07:19 19:08	06:52 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	19:59-20:21/22 20:56	06:00 20:05-20:31/26 20:37	06:23 20:34	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	19:59-20:22/23 20:56	06:00 20:05-20:31/26 20:36	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	19:59-20:22/23 20:55	06:01 20:06-20:31/25 20:35	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	19:59-20:23/24 20:55	06:01 20:05-20:30/25 20:34	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	20:00-20:24/24 20:55	06:02 20:06-20:30/24 20:33	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	20:00-20:25/25 20:55	06:02 20:05-20:30/25 20:31	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	20:00-20:25/25 20:54	06:03 20:06-20:30/24 20:30	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:32 16:59
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:16 20:25	05:56 20:50	20:00-20:25/25 20:54	06:04 20:07-20:30/23 20:29	06:29 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	20:00-20:26/26 20:54	06:04 20:06-20:29/23 20:28	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	20:01-20:27/26 20:53	06:05 20:07-20:29/22 20:27	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	20:01-20:27/26 20:53	06:06 20:07-20:29/22 20:25	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	20:01-20:28/27 20:53	06:06 20:07-20:28/21 20:24	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	20:01-20:28/27 20:52	06:07 20:07-20:28/21 20:23	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	20:02-20:28/26 20:51	06:08 20:08-20:27/19 20:21	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	20:02-20:29/27 20:51	06:09 20:08-20:26/18 20:20	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	20:02-20:29/27 20:50	06:09 20:08-20:26/18 20:19	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:39 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	20:02-20:29/27 20:50	06:10 20:09-20:26/17 20:17	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:35	05:56 20:55	20:02-20:29/27 20:49	06:11 20:10-20:25/15 20:16	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	20:03-20:30/27 20:48	06:12 20:09-20:24/15 20:15	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	20:03-20:30/27 20:48	06:13 20:10-20:23/13 20:13	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	20:03-20:30/27 20:47	06:13 20:11-20:23/12 20:12	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:56	20:03-20:30/27 20:46	06:14 20:12-20:22/10 20:10	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	20:04-20:31/27 20:45	06:15 20:13-20:22/9 20:09	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	20:04-20:31/27 20:45	06:16 20:14-20:21/7 20:07	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	20:04-20:31/27 20:44	06:17 20:15-20:20/5 20:06	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	20:05-20:31/26 20:43	06:18 20:16-20:19/3 20:04	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	20:05-20:31/26 20:42	06:18 20:04-20:31/26 20:19	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	20:04-20:31/27 20:41	06:19 20:01	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	20:05-20:31/26 20:40	06:20 20:00	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:45 17:08
31	07:34 17:41		07:11 19:46	06:26 20:44	05:59 20:44	05:59 20:39	19:59-20:20/21 20:39	06:21 20:39	06:50 19:58	07:16 17:24	06:50 17:24	07:25 17:09	07:45 17:09
Potential sun hours	301	299	370	397	445	448	772	494	425	374	347	301	292
Sum of minutes with flicker	0	0	0	0	215	0	0	0	0	0	0	0	0

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

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



Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG6 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (84) Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

#### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:45 17:10	07:33 17:43	06:58 18:15	07:10 19:47	06:26 20:17	05:58 20:45	06:19-06:21/2 20:56	05:59 20:38	06:21-06:28/7 20:38	06:22 19:57	06:51 19:08	07:19 17:23	06:51 17:23
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:19-06:22/3 20:56	06:00 20:37	06:22-06:29/7 20:37	06:23 19:55	06:52 19:06	07:20 17:22	06:53 17:22
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:19-06:23/4 20:56	06:00 20:36	06:22-06:28/6 20:36	06:24 19:53	06:53 19:05	07:21 17:21	06:54 17:21
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:18-06:22/4 20:55	06:01 20:35	06:23-06:29/6 20:35	06:25 19:52	06:54 19:03	07:22 17:20	06:55 17:20
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:18-06:23/5 20:55	06:01 20:34	06:23-06:29/6 20:34	06:26 19:50	06:55 19:02	07:23 17:19	06:56 17:20
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:48	06:18-06:23/5 20:55	06:02 20:32	06:24-06:29/5 20:32	06:27 19:49	06:56 19:00	07:24 17:18	06:57 16:59
7	07:45 17:15	07:27 17:50	06:49 18:21	07:00 19:53	06:19 20:23	05:56 20:49	06:18-06:24/6 20:55	06:02 20:31	06:24-06:29/5 20:31	06:28 19:47	06:57 18:58	07:25 17:16	06:58 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:17 20:24	05:56 20:50	06:17-06:23/6 20:54	06:03 20:30	06:25-06:29/4 20:30	06:28 19:45	06:57 18:57	07:26 17:15	06:59 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:17-06:23/6 20:54	06:04 20:29	06:26-06:30/4 20:29	06:29 19:44	06:58 18:55	07:27 17:14	07:00 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:17-06:24/7 20:54	06:04 20:28	06:26-06:29/3 20:28	06:30 19:42	06:59 18:54	07:28 17:13	07:02 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:17-06:24/7 20:53	06:05 20:26	06:27-06:30/3 20:26	06:31 19:41	07:00 18:52	07:29 17:13	07:03 16:59
12	07:44 17:20	07:21 17:56	06:42 18:27	06:52 19:58	06:13 20:28	05:55 20:52	06:17-06:24/7 20:53	06:06 20:25	06:28-06:30/2 20:25	06:32 19:39	07:01 18:51	07:30 17:12	07:04 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:17-06:24/7 20:52	06:06 20:24	06:28-06:29/1 20:24	06:33 19:37	07:02 18:49	07:31 17:11	07:05 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:49 20:00	06:11 20:30	05:55 20:53	06:17-06:25/8 20:52	06:07 20:23	06:29-06:30/1 20:23	06:34 19:36	07:03 18:48	07:32 17:10	07:06 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:17-06:25/8 20:51	06:08 20:21	06:35 19:34	06:35 18:46	07:04 17:09	07:33 17:09	07:07 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	06:09 20:32	05:55 20:54	06:17-06:25/8 20:51	06:08 20:20	06:36 19:32	06:36 18:45	07:05 17:08	07:34 17:08	07:08 17:00
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:08 20:33	05:55 20:54	06:17-06:25/8 20:50	06:09 20:19	06:37 19:31	06:37 18:43	07:06 17:07	07:35 17:07	07:10 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:55 20:54	06:17-06:25/8 20:50	06:10 20:17	06:38 19:29	06:38 18:42	07:07 17:07	07:36 17:07	07:11 17:01
19	07:42 17:27	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:17-06:25/8 20:49	06:11 20:16	06:39 19:28	06:39 18:40	07:08 17:06	07:37 17:06	07:12 17:01
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:18-06:26/8 20:48	06:12 20:14	06:40 19:26	06:40 18:39	07:09 17:05	07:38 17:04	07:13 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:18-06:26/8 20:48	06:12 20:13	06:41 19:24	06:41 18:37	07:10 17:05	07:39 17:04	07:14 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:18-06:26/8 20:47	06:13 20:12	06:42 19:23	06:42 18:36	07:11 17:04	07:40 17:04	07:15 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:18-06:26/8 20:46	06:14 20:10	06:43 19:21	06:43 18:35	07:11 17:04	07:41 17:04	07:16 17:03
24	07:39 17:33	07:06 18:09	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:19-06:27/8 20:45	06:15 20:09	06:43 19:19	06:43 18:33	07:12 17:03	07:43 17:03	07:17 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:19-06:27/8 20:44	06:16 20:07	06:44 19:18	06:44 17:32	07:13 17:03	07:44 17:04	07:18 17:04
26	07:38 17:35	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:19-06:27/8 20:44	06:17 20:06	06:45 19:16	06:45 17:31	07:14 17:02	07:45 17:05	07:20 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:20-06:28/8 20:43	06:18 20:04	06:46 19:14	06:46 17:29	07:15 17:02	07:46 17:06	07:21 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:20-06:28/8 20:42	06:18 20:03	06:47 19:13	06:47 17:28	07:16 17:01	07:22 17:01	07:44 17:06
29	07:35 17:39		07:14 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:20-06:28/8 20:41	06:19 20:01	06:48 19:11	06:48 17:27	07:17 17:01	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20-06:21/1 20:40	06:20 20:00	06:49 19:10	06:49 17:26	07:18 17:01	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		06:20-06:22/2 20:44		06:21 20:39	06:21 19:58	06:50 17:24	06:50 17:24	06:50 17:24	07:45 17:09	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292	
Sum of minutes with flicker	0	0	0	0	3	204	60	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: Real\_case\_Progetto\_V172WTG: WTG8 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)  
 Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

#### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	January	February	March	April	May	June
1	07:45 16:32-16:45/13 17:10	07:33 17:43	06:59 18:15	07:10 18:50-19:26/36 19:47	06:26 20:17	05:59 20:00-20:20/20 20:45
2	07:45 16:32-16:45/13 17:11	07:32 17:44	06:57 18:16	07:08 18:50-19:27/37 19:48	06:25 20:18	05:58 20:01-20:21/20 20:46
3	07:45 16:33-16:46/13 17:11	07:31 17:45	06:56 18:17	07:07 18:51-19:28/37 19:49	06:23 20:19	05:58 20:01-20:22/21 20:47
4	07:45 16:33-16:47/14 17:12	07:30 17:46	06:54 18:18	07:05 18:50-19:29/39 19:50	06:22 20:20	05:57 20:01-20:22/21 20:47
5	07:45 16:34-16:48/14 17:13	07:29 17:47	06:53 18:19	07:03 18:51-19:31/40 19:51	06:21 20:21	05:57 20:02-20:23/21 20:48
6	07:45 16:35-16:49/14 17:14	07:28 17:49	06:51 18:20	07:02 18:51-19:31/40 19:52	06:20 20:22	05:57 20:02-20:24/22 20:49
7	07:45 16:36-16:50/14 17:15	07:27 17:50	06:50 18:22	07:00 18:51-19:32/41 19:53	06:19 20:23	05:56 20:03-20:25/22 20:49
8	07:45 16:35-16:50/15 17:16	07:26 17:51	06:48 18:23	06:59 18:52-19:33/41 19:54	06:18 20:24	05:56 20:03-20:25/22 20:50
9	07:45 16:36-16:52/16 17:17	07:25 17:52	06:46 18:24	06:57 18:52-19:34/42 19:55	06:16 20:25	05:56 20:03-20:25/22 20:50
10	07:45 16:37-16:53/16 17:18	07:24 17:53	06:45 18:25	06:56 18:54-19:35/41 19:56	06:15 20:02-20:03/1 20:26	05:56 20:04-20:26/22 20:51
11	07:45 16:38-16:54/16 17:19	07:22 17:55	06:43 18:26	06:54 18:54-19:36/42 19:57	06:14 20:01-20:04/3 20:27	05:56 20:04-20:26/22 20:51
12	07:45 16:38-16:55/17 17:20	07:21 17:56	06:42 18:27	06:53 18:55-19:37/42 19:58	06:13 20:00-20:05/5 20:28	05:56 20:05-20:27/22 20:52
13	07:44 16:40-16:56/16 17:21	07:20 17:57	06:40 18:28	06:51 18:56-19:37/41 19:59	06:12 20:00-20:06/6 20:29	05:56 20:05-20:27/22 20:52
14	07:44 16:41-16:57/16 17:22	07:19 17:58	06:39 18:05-18:08/3 18:29	06:50 18:58-19:39/41 20:00	06:11 19:59-20:06/7 20:30	05:55 20:05-20:28/23 20:53
15	07:44 16:41-16:58/17 17:23	07:18 17:59	06:37 18:03-18:09/6 18:30	06:48 18:59-19:39/40 20:01	06:10 19:59-20:07/8 20:31	05:55 20:06-20:28/22 20:53
16	07:43 16:43-17:00/17 17:24	07:16 18:00	06:35 18:02-18:11/9 18:31	06:47 19:01-19:41/40 20:02	06:09 19:58-20:08/10 20:32	05:55 20:06-20:29/23 20:54
17	07:43 16:43-17:00/17 17:25	07:15 18:02	06:34 18:00-18:11/11 18:32	06:45 19:03-19:41/38 20:03	06:09 19:58-20:09/11 20:33	05:56 20:06-20:29/23 20:54
18	07:42 16:45-17:02/17 17:26	07:14 18:03	06:32 17:59-18:13/14 18:33	06:44 19:06-19:42/36 20:04	06:08 19:58-20:10/12 20:34	05:56 20:06-20:29/23 20:54
19	07:42 16:46-17:03/17 17:28	07:13 18:04	06:31 17:58-18:14/16 18:34	06:42 19:10-19:43/33 20:05	06:07 19:58-20:11/13 20:34	05:56 20:07-20:29/22 20:55
20	07:41 16:48-17:04/16 17:29	07:11 18:05	06:29 17:56-18:14/18 18:35	06:41 19:20-19:44/24 20:06	06:06 19:58-20:12/14 20:35	05:56 20:08-20:30/22 20:55
21	07:41 16:49-17:05/16 17:30	07:10 18:06	06:27 17:56-18:16/20 18:36	06:39 19:22-19:46/24 20:07	06:05 19:57-20:12/15 20:36	05:56 20:08-20:30/22 20:55
22	07:40 16:51-17:06/15 17:31	07:09 18:07	06:26 17:55-18:16/21 18:37	06:38 19:22-19:46/24 20:08	06:04 19:58-20:14/16 20:37	05:56 20:08-20:30/22 20:55
23	07:40 16:54-17:08/14 17:32	07:07 18:08	06:24 17:53-18:17/24 18:38	06:36 19:24-19:47/23 20:09	06:04 19:58-20:14/16 20:38	05:56 20:08-20:30/22 20:55
24	07:39 16:56-17:09/13 17:33	07:06 18:10	06:23 17:53-18:19/26 18:39	06:35 19:26-19:48/22 20:10	06:03 19:58-20:14/16 20:39	05:57 20:08-20:31/23 20:56
25	07:38 17:01-17:08/7 17:34	07:04 18:11	06:21 17:52-18:19/27 18:40	06:34 19:28-19:49/21 20:11	06:02 19:59-20:16/17 20:40	05:57 20:08-20:31/23 20:56
26	07:38 17:36 17:37	07:03 18:12	06:19 17:52-18:21/29 18:41	06:32 19:31-19:46/15 20:12	06:02 19:58-20:16/18 20:40	05:57 20:08-20:31/23 20:56
27	07:37 17:37 17:38	07:01 18:13	06:18 17:51-18:21/30 18:42	06:31 20:13 20:13	06:01 19:59-20:18/19 20:41	05:58 20:09-20:31/22 20:56
28	07:36 17:38 17:39	07:00 18:14	06:16 17:51-18:22/31 18:43	06:30 20:14 20:14	06:01 19:59-20:18/19 20:42	05:58 20:09-20:31/22 20:56
29	07:35 17:39 17:40		07:15 18:51-19:24/33 19:44	06:28 20:15 20:15	06:00 20:00-20:19/19 20:43	05:58 20:08-20:31/23 20:56
30	07:35 17:40 17:41		07:13 18:50-19:24/34 19:45	06:27 20:16 20:16	05:59 19:59-20:19/20 20:44	05:59 20:09-20:31/22 20:56
31	07:34 17:42		07:11 18:50-19:25/35 19:46		05:59 20:00-20:20/20 20:44	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	373	0	387	900	285	661

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: Real\_case\_Progetto\_V172WTG: WTG8 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)  
 Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]  
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
 4,40 5,05 5,88 7,00 8,45 9,88 10,82 10,03 8,08 6,09 5,07 4,27

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
 319 183 190 436 759 530 340 319 409 721 2.333 1.038 7.577

	July	August	September	October	November	December
1	05:59 20:08-20:31/23 20:56	06:22 20:11-20:15/4 20:38	06:51 18:53-19:34/41 19:57	07:19 19:08	06:51 17:23	07:25 16:20-16:36/16 17:00
2	06:00 20:09-20:31/22 20:56	06:23 20:11-20:13/2 20:37	06:52 18:51-19:33/42 19:55	07:20 19:06	06:53 17:22	07:26 16:20-16:36/16 17:00
3	06:00 20:08-20:31/23 20:56	06:24 20:36	06:53 18:50-19:32/42 19:54	07:21 19:05	06:54 17:21	07:27 16:20-16:36/16 17:00
4	06:01 20:09-20:31/22 20:55	06:25 20:35	06:54 18:49-19:30/41 19:52	07:22 19:03	06:55 17:20	07:28 16:20-16:35/15 17:00
5	06:01 20:08-20:30/22 20:55	06:26 20:34	06:55 18:48-19:29/41 19:50	07:23 19:02	06:56 17:19	07:29 16:21-16:35/14 17:00
6	06:02 20:09-20:30/21 20:55	06:27 20:33	06:56 18:47-19:27/40 19:49	07:24 19:00	06:57 17:18	07:30 16:21-16:35/14 17:00
7	06:02 20:08-20:30/22 20:55	06:28 20:31	06:57 18:46-19:26/40 19:47	07:25 18:58	06:58 17:17	07:31 16:21-16:35/14 16:59
8	06:03 20:08-20:30/22 20:54	06:29 20:30	06:58 18:45-19:24/39 19:46	07:26 18:57	06:59 17:16	07:31 16:20-16:34/14 16:59
9	06:04 20:09-20:30/21 20:54	06:30 20:29	06:59 18:44-19:22/38 19:44	07:27 18:55	07:01 17:15	07:32 16:21-16:34/13 16:59
10	06:04 20:08-20:29/21 20:54	06:30 20:28	06:59 18:43-19:20/37 19:42	07:28 18:54	07:02 17:14	07:33 16:21-16:34/13 16:59
11	06:05 20:08-20:29/21 20:53	06:31 20:27	07:00 18:42-19:19/37 19:41	07:29 18:52	07:03 17:13	07:34 16:22-16:35/13 17:00
12	06:06 20:08-20:29/21 20:53	06:32 20:25	07:01 18:42-19:17/35 19:39	07:30 18:51	07:04 17:12	07:35 16:22-16:35/13 17:00
13	06:06 20:08-20:28/20 20:52	06:33 20:24	07:02 18:42-19:16/34 19:37	07:31 18:49	07:05 17:11	07:36 16:23-16:35/12 17:00
14	06:07 20:08-20:28/20 20:52	06:34 20:23	07:03 18:41-19:14/33 19:36	07:32 18:48	07:06 17:10	07:36 16:22-16:35/13 17:00
15	06:08 20:08-20:27/19 20:51	06:35 20:21	07:04 18:41-19:13/32 19:34	07:33 18:46	07:07 17:09	07:37 16:23-16:35/12 17:00
16	06:09 20:07-20:26/19 20:51	06:36 19:43-19:48/5 20:20	07:05 18:41-19:11/30 19:33	07:34 18:45	07:08 17:08	07:38 16:24-16:36/12 17:01
17	06:09 20:08-20:26/18 20:50	06:37 19:37-19:54/17 20:19	07:06 18:41-19:09/28 19:31	07:35 18:43	07:10 16:34-16:42/8 17:08	07:38 16:24-16:35/11 17:01
18	06:10 20:08-20:26/18 20:50	06:38 19:34-19:55/21 20:17	07:07 18:40-19:08/28 19:29	07:36 18:42	07:11 16:30-16:43/13 17:07	07:39 16:24-16:36/12 17:01
19	06:11 20:08-20:25/17 20:49	06:39 19:31-19:54/23 20:16	07:08 18:40-19:05/25 19:28	07:37 18:40	07:12 16:28-16:42/14 17:06	07:40 16:24-16:36/12 17:02
20	06:12 20:08-20:25/17 20:48	06:40 19:29-19:53/24 20:15	07:09 18:40-19:04/24 19:26	07:38 18:39	07:13 16:26-16:41/15 17:05	07:40 16:25-16:37/12 17:02
21	06:13 20:08-20:23/15 20:48	06:41 19:28-19:51/23 20:13	07:10 18:40-19:02/22 19:24	07:39 18:38	07:14 16:25-16:41/16 17:05	07:41 16:26-16:38/12 17:02
22	06:13 20:08-20:23/15 20:47	06:42 19:25-19:49/24 20:12	07:11 18:40-19:01/21 19:23	07:40 18:36	07:15 16:24-16:41/17 17:04	07:41 16:26-16:38/12 17:03
23	06:14 20:08-20:22/14 20:46	06:43 19:24-19:48/24 20:10	07:12 18:40-18:59/19 19:21	07:42 18:35	07:16 16:23-16:40/17 17:04	07:42 16:26-16:38/12 17:03
24	06:15 20:08-20:22/14 20:45	06:44 19:13-19:47/34 20:09	07:12 18:41-18:57/16 19:19	07:43 18:33	07:17 16:22-16:39/17 17:03	07:42 16:27-16:39/12 17:04
25	06:16 20:09-20:21/12 20:44	06:45 19:09-19:45/36 20:07	07:13 18:41-18:56/15 19:18	06:44 17:32	07:19 16:22-16:38/16 17:03	07:43 16:27-16:39/12 17:05
26	06:17 20:08-20:20/12 20:44	06:45 19:05-19:44/39 20:06	07:14 18:42-18:54/12 19:16	06:45 17:31	07:20 16:21-16:38/17 17:02	07:43 16:29-16:40/11 17:05
27	06:18 20:08-20:19/11 20:43	06:46 19:03-19:43/40 20:04	07:15 18:43-18:53/10 19:14	06:46 17:29	07:21 16:20-16:37/17 17:02	07:44 16:29-16:41/12 17:06
28	06:19 20:09-20:18/9 20:42	06:47 19:01-19:41/40 20:03	07:16 18:44-18:51/7 19:13	06:47 17:28	07:22 16:21-16:38/17 17:01	07:44 16:29-16:41/12 17:06
29	06:19 20:09-20:18/9 20:41	06:48 18:59-19:40/41 20:01	07:17 18:45-18:49/4 19:11	06:48 17:27	07:23 16:21-16:37/16 17:01	07:44 16:29-16:42/13 17:07
30	06:20 20:10-20:17/7 20:40	06:49 18:57-19:38/41 20:00	07:18 18:47-18:48/1 19:10	06:49 17:26	07:24 16:21-16:37/16 17:01	07:44 16:30-16:42/12 17:08
31	06:21 20:10-20:16/6 20:39	06:50 18:54-19:36/42 19:58		06:50 17:24		07:45 16:31-16:44/13 17:09
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	533	480	834	0	216	400

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

22/12/2023 09:31/3.4.415

### SHADOW - Calendar per WTG

Calculation: Real\_case\_Progetto\_V172WTG: WTG9 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (86) Sunshine probability S (Average daily sunshine hours) [CAGLIARI / ELMA S]

Assumptions for shadow calculations

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,40	5,05	5,88	7,00	8,45	9,88	10,82	10,03	8,08	6,09	5,07	4,27

#### Operational time

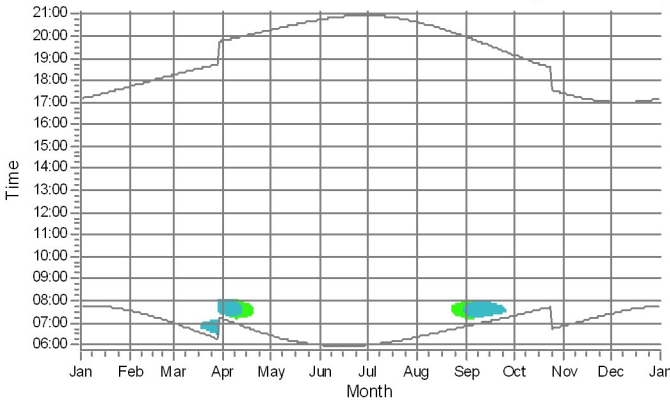
N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
319	183	190	436	759	530	340	319	409	721	2.333	1.038	7.577

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

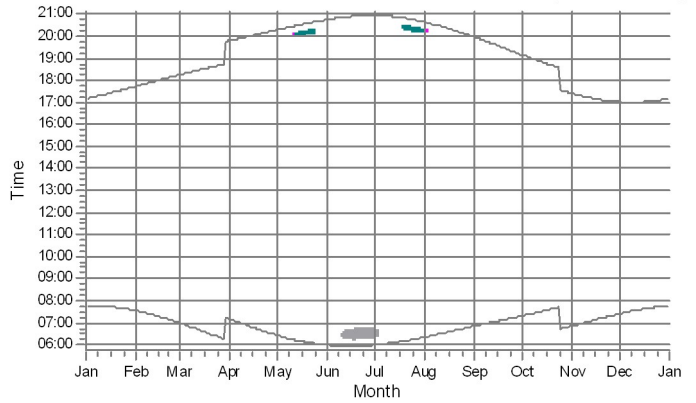
## SHADOW - Calendar per WTG, graphical

Calculation: Real\_case\_Progetto\_V172

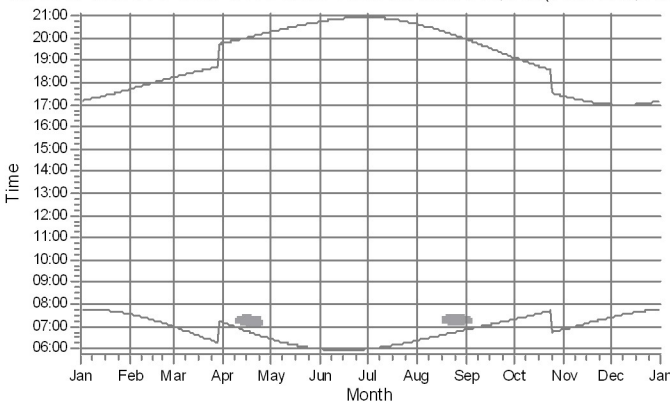
WTG1: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



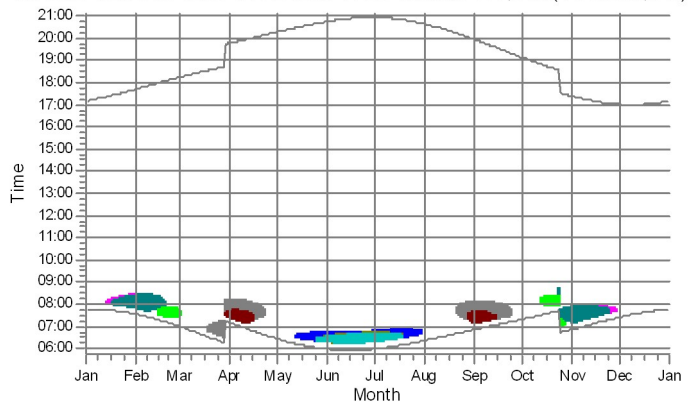
WTG10: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



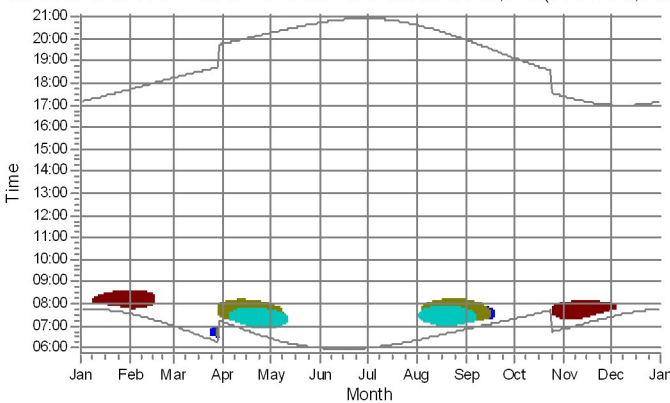
WTG11: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



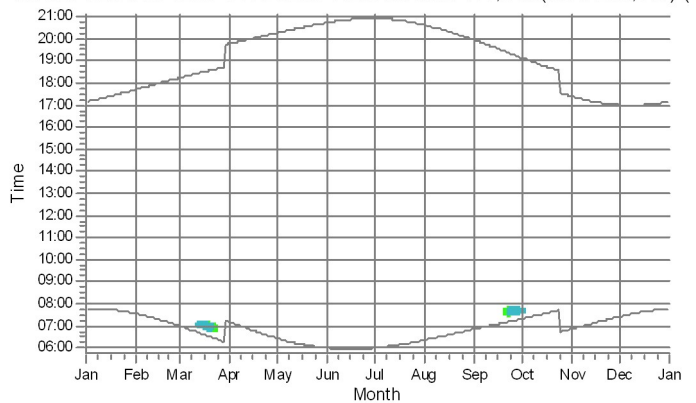
WTG12: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



WTG13: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



WTG2: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



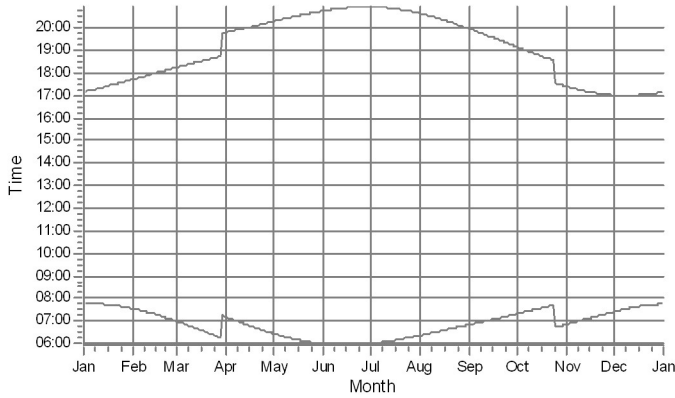
### Shadow receptors

	F015: A07		F018: A04		F047: D08		F269: A07
	F016: A04		F024: A02		F208: C02		F304: D06 - D01
	F017: A04		F030: A10		F267: A02		

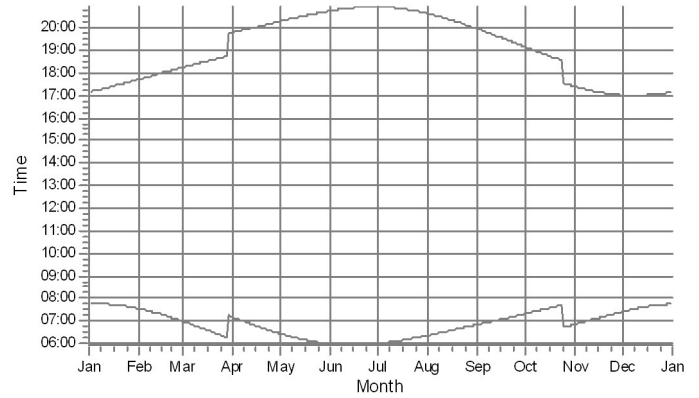
## SHADOW - Calendar per WTG, graphical

Calculation: Real\_case\_Progetto\_V172

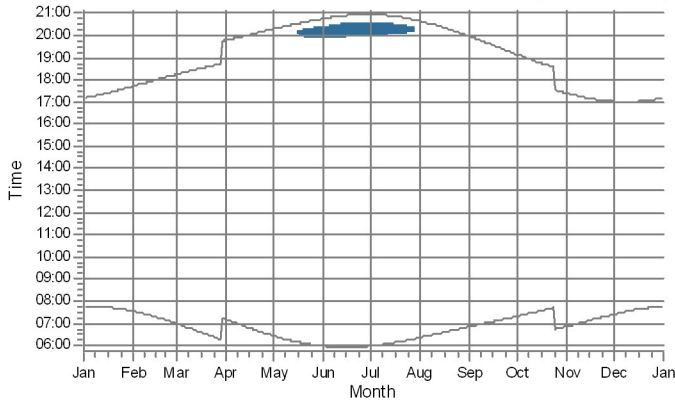
WTG3: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



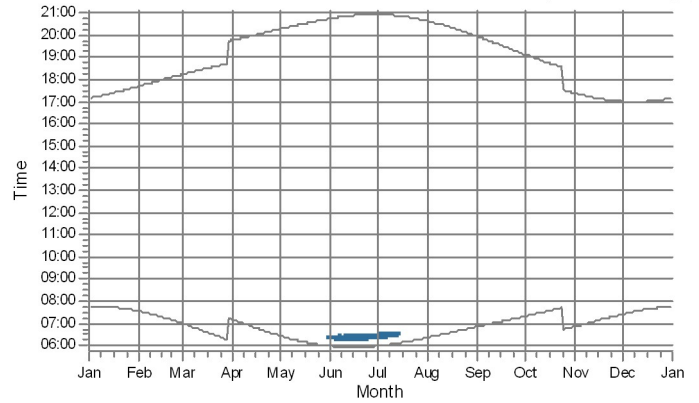
WTG4: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



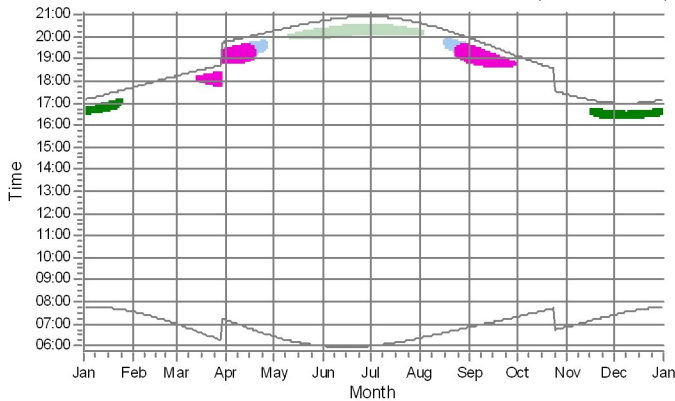
WTG5: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



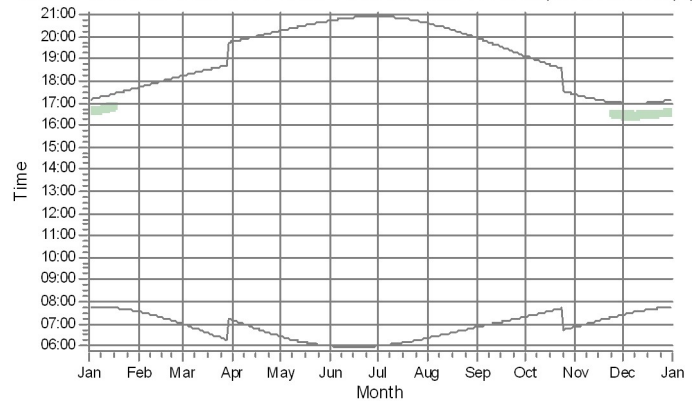
WTG6: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



WTG8: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



WTG9: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



### Shadow receptors

<span style="display: inline-block; width: 15px; height: 10px; background-color: #008000; border: 1px solid black;"></span> F007: A02	<span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black;"></span> F200: C03	<span style="display: inline-block; width: 15px; height: 10px; background-color: #FF00FF; border: 1px solid black;"></span> F347: Pascolo
<span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black;"></span> F196: C02	<span style="display: inline-block; width: 15px; height: 10px; background-color: #000080; border: 1px solid black;"></span> F322: Seminativo	



## SHADOW - Main Result

Calculation: Progetto\_layout\_20231108

### Assumptions for shadow calculations

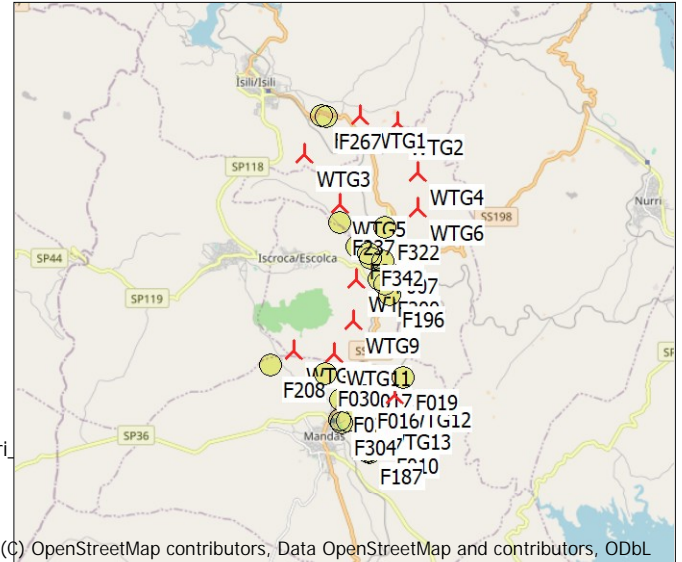
Maximum distance for influence  
 Calculate only when more than 20 % of sun is covered by the blade  
 Please look in WTG table

Minimum sun height over horizon for influence 3 °  
 Day step for calculation 1 days  
 Time step for calculation 1 minutes  
 The calculated times are "worst case" given by the following assumptions:  
 The sun is shining all the day, from sunrise to sunset  
 The rotor plane is always perpendicular to the line from the WTG to the sun  
 The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:  
 Height contours used: Height Contours: CONTOURLINE\_Progetto\_RWE\_Serri  
 Obstacles used in calculation  
 Eye height for map: 1,5 m  
 Grid resolution: 1,0 m

All coordinates are in  
 Italian Gauss-Boaga west-ROMA40 (IT-peninsular <±4m)

### WTGs



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

Scale 1:200.000  
 New WTG  
 Shadow receptor

	Easting	Northing	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
			[m]									
WTG1	1.512.077	4.398.071	460,3	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG10	1.510.342	4.391.877	423,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG11	1.511.408	4.391.776	456,2	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG12	1.512.995	4.390.693	490,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG13	1.512.456	4.390.101	490,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG2	1.513.088	4.397.873	494,4	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG3	1.510.607	4.397.039	564,8	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG4	1.513.605	4.396.581	500,7	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG5	1.511.554	4.395.705	588,4	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG6	1.513.610	4.395.626	491,8	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG8	1.511.984	4.393.758	500,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0
WTG9	1.511.899	4.392.663	500,0	VESTAS-7200 V172 720...	Yes	VESTAS-7200	V172-7.200	7.200	172,0	117,0	2.044	0,0

### Shadow receptor-Input

No.	Name	Easting	Northing	Z	Width	Height	Elevation	Slope of	Direction mode	Eye height
				[m]	[m]	[m]	a.g.l. [m]	window [°]		(ZVI) a.g.l. [m]
F007	A02	1.512.711	4.394.231	613,2	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F010	A04	1.512.725	4.389.494	440,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F015	A07	1.511.572	4.390.044	497,7	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F016	A04	1.512.242	4.390.673	508,5	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F017	A04	1.512.016	4.391.197	503,5	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F018	A04	1.512.059	4.391.153	500,9	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F019	A04	1.513.226	4.391.168	501,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F024	A02	1.511.586	4.390.573	495,2	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F030	A10	1.511.182	4.391.269	435,7	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F047	D08	1.511.770	4.390.036	491,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F051	D10	1.512.342	4.389.180	450,9	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F052	D10	1.512.312	4.389.221	455,1	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F187	D10	1.512.302	4.389.208	458,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F196	C02	1.512.886	4.393.339	580,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F200	C03	1.512.754	4.393.644	597,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F208	C02	1.509.717	4.391.497	420,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F237	B04	1.511.542	4.395.250	630,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F267	A02	1.511.184	4.398.029	483,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F269	A07	1.511.079	4.398.056	488,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F295	A02	1.512.378	4.394.303	620,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6

To be continued on next page...

## SHADOW - Main Result

Calculation: Progetto\_layout\_20231108

...continued from previous page

No.	Name	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
F304	D06 - D01	1.511.624	4.389.963	493,7	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F322	Seminativo	1.512.753	4.395.128	600,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F342	A03	1.512.304	4.394.436	620,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F347	Pascolo	1.512.602	4.393.741	580,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F367	D06	1.512.026	4.394.601	620,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6

## Calculation Results

Shadow receptor

No.	Name	Shadow, worst case		
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
F007	A02	16:29	70	0:17
F010	A04	0:00	0	0:00
F015	A07	55:59	139	0:44
F016	A04	42:36	70	0:52
F017	A04	26:29	89	0:36
F018	A04	28:37	91	0:38
F019	A04	0:00	0	0:00
F024	A02	46:12	114	0:42
F030	A10	7:33	30	0:21
F047	D08	74:34	138	0:58
F051	D10	0:00	0	0:00
F052	D10	0:00	0	0:00
F187	D10	0:00	0	0:00
F196	C02	38:56	141	0:23
F200	C03	15:54	55	0:24
F208	C02	15:54	57	0:23
F237	B04	0:00	0	0:00
F267	A02	32:28	79	0:42
F269	A07	23:20	66	0:35
F295	A02	0:00	0	0:00
F304	D06 - D01	53:35	125	0:47
F322	Seminativo	29:08	73	0:35
F342	A03	0:00	0	0:00
F347	Pascolo	36:22	75	0:42
F367	D06	0:00	0	0:00

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

No.	Name	Worst case [h/year]
WTG1	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)	30:03
WTG10	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (87)	8:08
WTG11	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (88)	9:20
WTG12	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (89)	106:25
WTG13	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90)	110:03
WTG2	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80)	5:05
WTG3	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (81)	0:00
WTG4	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (82)	0:00
WTG5	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (83)	24:41
WTG6	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (84)	4:27
WTG8	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)	84:29
WTG9	VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (86)	14:11

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia | direttore@iatprogetti.it  
 Calculated:  
 21/12/2023 17:58/3.4.415

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F007 - A02

### 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	07:45 17:10	16:32 (WTG8) 17:43	07:33 18:15	06:59 19:47	07:10 20:17	06:26 20:45	05:58 20:56	05:59 20:38	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00	16:20 (WTG8) 16:36 (WTG8)
2	07:45 17:10	16:32 (WTG8) 17:44	07:32 18:16	06:57 19:48	07:08 20:18	06:25 20:46	05:58 20:56	06:00 20:37	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00	16:20 (WTG8) 16:36 (WTG8)
3	07:45 17:11	16:33 (WTG8) 17:45	07:31 18:17	06:56 19:49	07:07 20:19	06:23 20:47	05:58 20:56	06:00 20:36	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00	16:20 (WTG8) 16:36 (WTG8)
4	07:45 17:12	16:33 (WTG8) 17:46	07:30 18:18	06:54 19:50	07:05 20:20	06:22 20:47	05:57 20:55	06:01 20:35	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00	16:20 (WTG8) 16:35 (WTG8)
5	07:45 17:13	16:34 (WTG8) 17:47	07:29 18:19	06:53 19:51	07:03 20:21	06:21 20:48	05:57 20:55	06:01 20:34	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00	16:21 (WTG8) 16:35 (WTG8)
6	07:45 17:14	16:35 (WTG8) 17:49	07:28 18:20	06:51 19:52	07:02 20:22	06:20 20:48	05:57 20:55	06:02 20:33	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59	16:21 (WTG8) 16:35 (WTG8)
7	07:45 17:15	16:36 (WTG8) 17:50	07:27 18:22	06:50 19:53	07:00 20:23	06:19 20:49	05:56 20:55	06:02 20:31	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59	16:21 (WTG8) 16:35 (WTG8)
8	07:45 17:16	16:35 (WTG8) 17:51	07:26 18:23	06:48 19:54	06:59 20:24	06:18 20:50	05:56 20:54	06:03 20:30	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 16:59	16:20 (WTG8) 16:34 (WTG8)
9	07:45 17:17	16:36 (WTG8) 17:52	07:25 18:24	06:46 19:55	06:57 20:25	06:16 20:50	05:56 20:54	06:04 20:29	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:15	07:32 16:59	16:21 (WTG8) 16:34 (WTG8)
10	07:45 17:18	16:37 (WTG8) 17:53	07:24 18:25	06:45 19:56	06:56 20:26	06:15 20:51	05:56 20:54	06:04 20:28	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59	16:21 (WTG8) 16:34 (WTG8)
11	07:45 17:19	16:38 (WTG8) 17:54	07:23 18:26	06:43 19:57	06:54 20:27	06:14 20:51	05:56 20:53	06:05 20:27	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00	16:22 (WTG8) 16:35 (WTG8)
12	07:44 17:20	16:38 (WTG8) 17:56	07:21 18:27	06:42 19:58	06:53 20:28	06:13 20:52	05:56 20:53	06:06 20:25	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00	16:22 (WTG8) 16:35 (WTG8)
13	07:44 17:21	16:40 (WTG8) 17:57	07:20 18:28	06:40 19:59	06:51 20:29	06:12 20:52	05:55 20:52	06:06 20:24	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00	16:23 (WTG8) 16:35 (WTG8)
14	07:44 17:22	16:41 (WTG8) 17:58	07:19 18:29	06:39 20:00	06:49 20:30	06:11 20:53	05:55 20:52	06:07 20:23	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00	16:22 (WTG8) 16:35 (WTG8)
15	07:44 17:23	16:41 (WTG8) 17:59	07:18 18:30	06:37 20:01	06:48 20:31	06:10 20:53	05:55 20:51	06:08 20:21	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00	16:23 (WTG8) 16:35 (WTG8)
16	07:43 17:24	16:43 (WTG8) 18:00	07:16 18:31	06:35 20:02	06:47 20:32	06:09 20:54	05:55 20:51	06:09 20:20	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01	16:24 (WTG8) 16:36 (WTG8)
17	07:43 17:25	16:43 (WTG8) 18:02	07:15 18:32	06:34 20:03	06:45 20:33	06:09 20:54	05:55 20:50	06:09 20:19	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01	16:24 (WTG8) 16:35 (WTG8)
18	07:42 17:26	16:45 (WTG8) 18:03	07:14 18:33	06:32 20:04	06:44 20:34	06:08 20:54	05:56 20:50	06:10 20:17	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01	16:24 (WTG8) 16:36 (WTG8)
19	07:42 17:27	16:46 (WTG8) 18:04	07:13 18:34	06:31 20:05	06:42 20:34	06:07 20:55	05:56 20:49	06:11 20:16	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02	16:24 (WTG8) 16:36 (WTG8)
20	07:41 17:29	16:48 (WTG8) 18:05	07:11 18:35	06:29 20:06	06:41 20:35	06:06 20:55	05:56 20:48	06:12 20:15	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02	16:25 (WTG8) 16:37 (WTG8)
21	07:41 17:30	16:49 (WTG8) 18:06	07:10 18:36	06:27 20:07	06:39 20:36	06:05 20:55	05:56 20:48	06:12 20:13	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02	16:26 (WTG8) 16:38 (WTG8)
22	07:40 17:31	16:51 (WTG8) 18:07	07:08 18:37	06:26 20:08	06:38 20:37	06:04 20:55	05:56 20:47	06:13 20:12	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03	16:26 (WTG8) 16:38 (WTG8)
23	07:40 17:32	16:54 (WTG8) 18:08	07:07 18:38	06:24 20:09	06:36 20:38	06:04 20:55	05:56 20:46	06:14 20:10	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03	16:26 (WTG8) 16:38 (WTG8)
24	07:39 17:33	16:56 (WTG8) 18:10	07:06 18:39	06:23 20:10	06:35 20:39	06:03 20:56	05:57 20:45	06:15 20:09	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04	16:27 (WTG8) 16:39 (WTG8)
25	07:38 17:34	17:01 (WTG8) 18:11	07:04 18:40	06:21 20:11	06:34 20:40	06:02 20:56	05:57 20:44	06:16 20:47	06:44 20:47	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05	16:27 (WTG8) 16:39 (WTG8)
26	07:38 17:36	17:01 (WTG8) 18:12	07:03 18:41	06:19 20:12	06:32 20:40	06:02 20:56	05:57 20:44	06:17 20:46	06:45 20:46	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05	16:29 (WTG8) 16:40 (WTG8)
27	07:37 17:37	17:08 (WTG8) 18:13	07:01 18:42	06:18 20:13	06:31 20:41	06:01 20:56	05:58 20:43	06:18 20:44	06:46 20:44	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06	16:29 (WTG8) 16:41 (WTG8)
28	07:36 17:38	17:08 (WTG8) 18:14	07:00 18:43	06:16 20:14	06:30 20:42	06:00 20:56	05:58 20:42	06:18 20:03	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06	16:29 (WTG8) 16:41 (WTG8)
29	07:35 17:39	17:09 (WTG8) 18:15	07:01 18:44	06:15 20:15	06:28 20:43	06:00 20:56	05:58 20:41	06:19 20:01	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07	16:29 (WTG8) 16:42 (WTG8)
30	07:35 17:40	17:10 (WTG8) 18:16	07:02 18:45	06:14 20:16	06:27 20:44	05:59 20:56	05:59 20:40	06:20 20:00	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08	16:30 (WTG8) 16:42 (WTG8)
31	07:34 17:41	17:11 (WTG8) 18:17	07:11 18:46	07:11 20:17	07:11 20:45	07:11 20:59	07:11 20:40	07:11 20:00	07:11 20:00	07:11 19:10	07:11 17:26	07:11 17:01	07:11 17:08	16:31 (WTG8) 16:44 (WTG8)
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	216	292	400
Total, worst case	373													

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F010 - A04

### 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	07:45 17:10	07:33 17:43	06:58 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:49 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:45	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:32	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:09 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:43	06:45 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F015 - A07

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	07:28 (WTG13) 07:59 (WTG13)	06:26 20:17	05:59 20:45	06:20 (WTG12) 06:42 (WTG12)
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	07:26 (WTG13) 07:59 (WTG13)	06:25 20:18	05:58 20:46	06:19 (WTG12) 06:41 (WTG12)
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	07:25 (WTG13) 08:00 (WTG13)	06:23 20:19	05:58 20:46	06:19 (WTG12) 06:41 (WTG12)
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	07:23 (WTG13) 08:00 (WTG13)	06:22 20:20	05:57 20:47	06:19 (WTG12) 06:42 (WTG12)
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	07:22 (WTG13) 08:01 (WTG13)	06:21 20:21	05:57 20:48	06:18 (WTG12) 06:41 (WTG12)
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	07:20 (WTG13) 08:00 (WTG13)	06:20 20:22	05:57 20:48	06:18 (WTG12) 06:41 (WTG12)
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	07:18 (WTG13) 07:59 (WTG13)	06:19 20:23	05:57 20:49	06:18 (WTG12) 06:41 (WTG12)
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	07:17 (WTG13) 08:00 (WTG13)	06:18 20:24	05:56 20:50	06:18 (WTG12) 06:41 (WTG12)
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	07:15 (WTG13) 07:59 (WTG13)	06:17 20:25	05:56 20:50	06:18 (WTG12) 06:40 (WTG12)
10	07:45 17:18	07:24 17:54	06:45 18:25	06:56 19:56	07:15 (WTG13) 07:59 (WTG13)	06:16 20:26	05:56 20:51	06:18 (WTG12) 06:40 (WTG12)
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	07:14 (WTG13) 07:58 (WTG13)	06:14 20:27	05:56 20:51	06:19 (WTG12) 06:41 (WTG12)
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	07:15 (WTG13) 07:58 (WTG13)	06:13 20:28	05:56 20:52	06:19 (WTG12) 06:41 (WTG12)
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	07:14 (WTG13) 07:56 (WTG13)	06:12 20:29	05:56 20:52	06:20 (WTG12) 06:41 (WTG12)
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	07:15 (WTG13) 07:56 (WTG13)	06:11 20:30	05:56 20:53	06:20 (WTG12) 06:41 (WTG12)
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	07:15 (WTG13) 07:55 (WTG13)	06:11 20:31	05:56 20:53	06:20 (WTG12) 06:41 (WTG12)
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	07:16 (WTG13) 07:54 (WTG13)	06:10 20:32	05:56 20:53	06:21 (WTG12) 06:41 (WTG12)
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	07:16 (WTG13) 07:52 (WTG13)	06:09 20:33	05:56 20:54	06:21 (WTG12) 06:41 (WTG12)
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	07:18 (WTG13) 07:51 (WTG13)	06:08 20:33	05:56 20:54	06:21 (WTG12) 06:41 (WTG12)
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	07:19 (WTG13) 07:50 (WTG13)	06:07 20:34	05:56 20:54	06:22 (WTG12) 06:42 (WTG12)
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	07:20 (WTG13) 07:48 (WTG13)	06:06 20:35	05:56 20:55	06:22 (WTG12) 06:42 (WTG12)
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	07:22 (WTG13) 07:46 (WTG13)	06:05 20:36	05:56 20:55	06:22 (WTG12) 06:42 (WTG12)
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	07:23 (WTG13) 07:42 (WTG13)	06:05 20:37	05:56 20:55	06:22 (WTG12) 06:42 (WTG12)
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	07:27 (WTG13) 07:39 (WTG13)	06:04 20:38	05:57 20:55	06:22 (WTG12) 06:42 (WTG12)
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	07:39 (WTG13) 06:39 (WTG13)	06:03 20:39	05:57 20:56	06:23 (WTG12) 06:43 (WTG12)
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:39 (WTG13) 06:48 (WTG13)	06:02 20:40	05:57 20:56	06:23 (WTG12) 06:43 (WTG12)
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:38 (WTG13) 06:52 (WTG13)	06:02 20:40	05:57 20:56	06:23 (WTG12) 06:43 (WTG12)
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:36 (WTG13) 06:54 (WTG13)	06:01 20:41	05:58 20:56	06:24 (WTG12) 06:44 (WTG12)
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:34 (WTG13) 06:55 (WTG13)	06:01 20:42	05:58 20:56	06:23 (WTG12) 06:44 (WTG12)
29	07:35 17:39	07:15 19:44	06:15 19:43	06:28 20:15	07:33 (WTG13) 07:57 (WTG13)	06:00 20:43	05:59 20:56	06:23 (WTG12) 06:44 (WTG12)
30	07:34 17:40	07:13 19:45	06:14 19:42	06:27 20:16	07:31 (WTG13) 07:58 (WTG13)	06:00 20:44	05:59 20:56	06:23 (WTG12) 06:45 (WTG12)
31	07:34 17:42	07:11 19:46	06:13 19:41	06:26 20:17	07:30 (WTG13) 07:59 (WTG13)	05:59 20:44	05:59 20:56	06:23 (WTG12) 06:45 (WTG12)
Potential sun hours	301	299	370	397	445	448	636	
Total, worst case			142	818	264			

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F015 - A07

### 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	05:59	06:23 (WTG12)	06:22	06:51	07:13 (WTG13)	07:19	06:51	07:25
	20:56	22 06:45 (WTG12)	20:38	19:57	44 07:57 (WTG13)	19:08	17:23	17:01
2	06:00	06:23 (WTG12)	06:23	06:52	07:13 (WTG13)	07:20	06:53	07:26
	20:56	22 06:45 (WTG12)	20:37	19:55	44 07:57 (WTG13)	19:06	17:22	17:00
3	06:00	06:23 (WTG12)	06:24	06:53	07:13 (WTG13)	07:21	06:54	07:27
	20:55	22 06:45 (WTG12)	20:36	19:54	44 07:57 (WTG13)	19:05	17:21	17:00
4	06:01	06:23 (WTG12)	06:25	06:54	07:14 (WTG13)	07:22	06:55	07:28
	20:55	23 06:46 (WTG12)	20:35	19:52	43 07:57 (WTG13)	19:03	17:20	17:00
5	06:01	06:23 (WTG12)	06:26	06:55	07:15 (WTG13)	07:23	06:56	07:29
	20:55	23 06:46 (WTG12)	20:34	19:50	42 07:57 (WTG13)	19:02	17:19	17:00
6	06:02	06:24 (WTG12)	06:27	06:56	07:16 (WTG13)	07:24	06:57	07:30
	20:55	23 06:47 (WTG12)	20:32	19:49	40 07:56 (WTG13)	19:00	17:18	17:00
7	06:03	06:25 (WTG12)	06:28	06:57	07:17 (WTG13)	07:25	06:58	07:30
	20:55	23 06:48 (WTG12)	20:31	19:47	39 07:56 (WTG13)	18:58	17:17	17:00
8	06:03	06:25 (WTG12)	06:29	06:58	07:18 (WTG13)	07:26	06:59	07:31
	20:54	23 06:48 (WTG12)	20:30	19:46	37 07:55 (WTG13)	18:57	17:16	17:00
9	06:04	06:26 (WTG12)	06:30	06:59	07:19 (WTG13)	07:27	07:00	07:32
	20:54	22 06:48 (WTG12)	20:29	19:44	35 07:54 (WTG13)	18:55	17:15	17:00
10	06:04	06:26 (WTG12)	06:31	06:59	07:19 (WTG13)	07:28	07:02	07:33
	20:54	22 06:48 (WTG12)	20:28	19:42	34 07:53 (WTG13)	18:54	17:14	17:00
11	06:05	06:27 (WTG12)	06:31	07:00	07:20 (WTG13)	07:29	07:03	07:34
	20:53	22 06:49 (WTG12)	20:26	19:41	32 07:52 (WTG13)	18:52	17:13	17:00
12	06:06	06:28 (WTG12)	06:32	07:01	07:21 (WTG13)	07:30	07:04	07:35
	20:53	22 06:50 (WTG12)	20:25	19:39	29 07:50 (WTG13)	18:51	17:12	17:00
13	06:07	06:28 (WTG12)	06:33	07:02	07:22 (WTG13)	07:31	07:05	07:36
	20:52	21 06:49 (WTG12)	20:24	19:37	27 07:49 (WTG13)	18:49	17:11	17:00
14	06:07	06:29 (WTG12)	06:34	07:03	07:23 (WTG13)	07:32	07:06	07:36
	20:52	21 06:50 (WTG12)	20:23	19:36	25 07:48 (WTG13)	18:48	17:10	17:00
15	06:08	06:30 (WTG12)	06:35	07:04	07:24 (WTG13)	07:33	07:07	07:37
	20:51	20 06:50 (WTG12)	20:21	19:34	22 07:46 (WTG13)	18:46	17:09	17:00
16	06:09	06:31 (WTG12)	06:36	07:05	07:25 (WTG13)	07:34	07:08	07:38
	20:51	20 06:51 (WTG12)	20:20	19:33	19 07:44 (WTG13)	18:45	17:08	17:01
17	06:09	06:31 (WTG12)	06:37	07:06	07:26 (WTG13)	07:35	07:10	07:38
	20:50	19 06:50 (WTG12)	20:19	19:31	15 07:41 (WTG13)	18:43	17:08	17:01
18	06:10	06:32 (WTG12)	06:38	07:07	07:27 (WTG13)	07:36	07:11	07:39
	20:50	18 06:50 (WTG12)	20:17	19:29	10 07:37 (WTG13)	18:42	17:07	17:01
19	06:11	06:33 (WTG12)	06:39	07:08	07:28	07:37	07:12	07:40
	20:49	18 06:51 (WTG12)	20:16	19:28	07:38	18:40	17:06	17:02
20	06:12	06:34 (WTG12)	06:40	07:09	07:29 (WTG13)	07:38	07:13	07:40
	20:48	17 06:51 (WTG12)	20:14	14 07:46 (WTG13)	19:26	18:39	17:06	17:02
21	06:13	06:34 (WTG12)	06:41	07:10	07:29 (WTG13)	07:39	07:14	07:41
	20:48	16 06:50 (WTG12)	20:13	20 07:49 (WTG13)	19:24	18:38	17:05	17:03
22	06:13	06:35 (WTG12)	06:42	07:11	07:26 (WTG13)	07:11	07:40	07:41
	20:47	15 06:50 (WTG12)	20:12	25 07:51 (WTG13)	19:23	18:36	17:04	17:03
23	06:14	06:36 (WTG12)	06:43	07:12	07:23 (WTG13)	07:12	07:42	07:42
	20:46	14 06:50 (WTG12)	20:10	29 07:52 (WTG13)	19:21	18:35	17:04	17:04
24	06:15	06:37 (WTG12)	06:44	07:13	07:22 (WTG13)	07:13	07:43	07:42
	20:45	13 06:50 (WTG12)	20:09	31 07:53 (WTG13)	19:19	18:33	17:03	17:04
25	06:16	06:38 (WTG12)	06:45	07:13	07:20 (WTG13)	07:13	06:44	07:43
	20:44	11 06:49 (WTG12)	20:07	34 07:54 (WTG13)	19:18	17:32	17:03	17:05
26	06:17	06:39 (WTG12)	06:46	07:14	07:19 (WTG13)	07:14	06:45	07:43
	20:44	10 06:49 (WTG12)	20:06	36 07:55 (WTG13)	19:16	17:31	17:02	17:05
27	06:18	06:39 (WTG12)	06:46	07:15	07:18 (WTG13)	07:15	06:46	07:43
	20:43	9 06:48 (WTG12)	20:04	38 07:56 (WTG13)	19:15	17:30	17:02	17:06
28	06:19	06:40 (WTG12)	06:47	07:16	07:17 (WTG13)	07:16	06:47	07:44
	20:42	7 06:47 (WTG12)	20:03	39 07:56 (WTG13)	19:13	17:28	17:01	17:07
29	06:20	06:41 (WTG12)	06:48	07:17	07:16 (WTG13)	07:17	06:48	07:44
	20:41	5 06:46 (WTG12)	20:01	41 07:57 (WTG13)	19:11	17:27	17:01	17:07
30	06:20	06:42 (WTG12)	06:49	07:18	07:15 (WTG13)	07:18	06:49	07:44
	20:40	3 06:45 (WTG12)	20:00	42 07:57 (WTG13)	19:10	17:26	17:01	17:08
31	06:21	06:50	06:50	07:15 (WTG13)		06:50		07:45
	20:39	19:58	43 07:58 (WTG13)			17:25		17:09
Potential sun hours	455	425	374	581	347	301	292	
Total, worst case	526	392						

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F016 - A04

### 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	07:45	07:33	06:59		07:10		07:28 (WTG12)	06:26	05:59
	17:10	17:43	18:15		19:47	44	08:12 (WTG12)	20:17	20:45
2	07:45	07:32	06:57		07:08		07:26 (WTG12)	06:25	05:58
	17:11	17:44	18:16		19:48	46	08:12 (WTG12)	20:18	20:46
3	07:45	07:31	06:56		07:07		07:25 (WTG12)	06:23	05:58
	17:11	17:45	18:17		19:49	47	08:12 (WTG12)	20:19	20:46
4	07:45	07:30	06:54		07:05		07:23 (WTG12)	06:22	05:57
	17:12	17:46	18:18		19:50	48	08:11 (WTG12)	20:20	20:47
5	07:45	07:29	06:53		07:03		07:22 (WTG12)	06:21	05:57
	17:13	17:48	18:19		19:51	49	08:11 (WTG12)	20:21	20:48
6	07:45	07:28	06:51		07:02		07:20 (WTG12)	06:20	05:57
	17:14	17:49	18:21		19:52	51	08:11 (WTG12)	20:22	20:48
7	07:45	07:27	06:50		07:00		07:18 (WTG12)	06:19	05:57
	17:15	17:50	18:22		19:53	52	08:10 (WTG12)	20:23	20:49
8	07:45	07:26	06:48		06:59		07:18 (WTG12)	06:18	05:56
	17:16	17:51	18:23		19:54	51	08:09 (WTG12)	20:24	20:50
9	07:45	07:25	06:46		06:57		07:18 (WTG12)	06:17	05:56
	17:17	17:52	18:24		19:55	50	08:08 (WTG12)	20:25	20:50
10	07:45	07:24	06:45		06:56		07:19 (WTG12)	06:15	05:56
	17:18	17:53	18:25		19:56	49	08:08 (WTG12)	20:26	20:51
11	07:45	07:22	06:43		06:54		07:19 (WTG12)	06:14	05:56
	17:19	17:55	18:26		19:57	48	08:07 (WTG12)	20:27	20:51
12	07:44	07:21	06:42		06:53		07:19 (WTG12)	06:13	05:56
	17:20	17:56	18:27		19:58	47	08:06 (WTG12)	20:28	20:52
13	07:44	07:20	06:40		06:51		07:19 (WTG12)	06:12	05:56
	17:21	17:57	18:28		19:59	45	08:04 (WTG12)	20:29	20:52
14	07:44	07:19	06:39		06:50		07:21 (WTG12)	06:11	05:56
	17:22	17:58	18:29		20:00	43	08:04 (WTG12)	20:30	20:53
15	07:44	07:18	06:37		06:48		07:21 (WTG12)	06:10	05:56
	17:23	17:59	18:30		20:01	41	08:02 (WTG12)	20:31	20:53
16	07:43	07:16	06:35		06:47		07:22 (WTG12)	06:10	05:56
	17:24	18:00	18:31		20:02	39	08:01 (WTG12)	20:32	20:53
17	07:43	07:15	06:34		06:45		07:23 (WTG12)	06:09	05:56
	17:25	18:02	18:32		20:03	36	07:59 (WTG12)	20:33	20:54
18	07:42	07:14	06:32		06:44		07:25 (WTG12)	06:08	05:56
	17:26	18:03	18:33		20:04	32	07:57 (WTG12)	20:33	20:54
19	07:42	07:12	06:31		06:42		07:27 (WTG12)	06:07	05:56
	17:28	18:04	18:34	9	06:58 (WTG12)	20:05	07:55 (WTG12)	20:34	20:54
20	07:41	07:11	06:29		06:47 (WTG12)	06:41	07:28 (WTG12)	06:06	05:56
	17:29	18:05	18:35	14	07:01 (WTG12)	20:06	07:52 (WTG12)	20:35	20:55
21	07:41	07:10	06:27		06:46 (WTG12)	06:39	07:31 (WTG12)	06:05	05:56
	17:30	18:06	18:36	18	07:04 (WTG12)	20:07	07:49 (WTG12)	20:36	20:55
22	07:40	07:08	06:26		06:44 (WTG12)	06:38	07:35 (WTG12)	06:05	05:56
	17:31	18:07	18:37	22	07:06 (WTG12)	20:08	07:44 (WTG12)	20:37	20:55
23	07:40	07:07	06:24		06:42 (WTG12)	06:36		06:04	05:57
	17:32	18:08	18:38	25	07:07 (WTG12)	20:09		20:38	20:55
24	07:39	07:06	06:23		06:41 (WTG12)	06:35		06:03	05:57
	17:33	18:10	18:39	28	07:09 (WTG12)	20:10		20:39	20:56
25	07:38	07:04	06:21		06:39 (WTG12)	06:34		06:02	05:57
	17:34	18:11	18:40	30	07:09 (WTG12)	20:11		20:40	20:56
26	07:38	07:03	06:19		06:38 (WTG12)	06:32		06:02	05:57
	17:36	18:12	18:41	33	07:11 (WTG12)	20:12		20:40	20:56
27	07:37	07:01	06:18		06:36 (WTG12)	06:31		06:01	05:58
	17:37	18:13	18:42	35	07:11 (WTG12)	20:13		20:41	20:56
28	07:36	07:00	06:16		06:34 (WTG12)	06:30		06:01	05:58
	17:38	18:14	18:43	37	07:11 (WTG12)	20:14		20:42	20:56
29	07:35		07:15		07:33 (WTG12)	06:28		06:00	05:59
	17:39		19:44	39	08:12 (WTG12)	20:15		20:43	20:56
30	07:34		07:13		07:31 (WTG12)	06:27		06:00	05:59
	17:40		19:45	41	08:12 (WTG12)	20:16		20:44	20:56
31	07:34		07:11		07:30 (WTG12)			05:59	
	17:42		19:46	42	08:12 (WTG12)			20:44	
Potential sun hours	301	299	370		397		445	448	
Total, worst case			373		897				

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F016 - A04  
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	05:59 20:56	06:22 20:38	06:51 19:57	07:18 (WTG12) 08:06 (WTG12)	07:19 19:08	06:51 17:23	07:25 17:00
2	06:00 20:56	06:23 20:37	06:52 19:55	07:17 (WTG12) 08:06 (WTG12)	07:20 19:06	06:53 17:22	07:26 17:00
3	06:00 20:55	06:24 20:36	06:53 19:53	07:16 (WTG12) 08:06 (WTG12)	07:21 19:05	06:54 17:21	07:27 17:00
4	06:01 20:55	06:25 20:35	06:54 19:52	07:15 (WTG12) 08:06 (WTG12)	07:22 19:03	06:55 17:20	07:28 17:00
5	06:01 20:55	06:26 20:34	06:55 19:50	07:15 (WTG12) 08:07 (WTG12)	07:23 19:02	06:56 17:19	07:29 17:00
6	06:02 20:55	06:27 20:32	06:56 19:49	07:16 (WTG12) 08:07 (WTG12)	07:24 19:00	06:57 17:18	07:30 17:00
7	06:03 20:55	06:28 20:31	06:57 19:47	07:17 (WTG12) 08:06 (WTG12)	07:25 18:58	06:58 17:17	07:30 17:00
8	06:03 20:54	06:29 20:30	06:58 19:46	07:18 (WTG12) 08:06 (WTG12)	07:26 18:57	06:59 17:16	07:31 17:00
9	06:04 20:54	06:30 20:29	06:59 19:44	07:18 (WTG12) 08:05 (WTG12)	07:27 18:55	07:00 17:15	07:32 17:00
10	06:04 20:54	06:30 20:28	06:59 19:42	07:19 (WTG12) 08:05 (WTG12)	07:28 18:54	07:02 17:14	07:33 17:00
11	06:05 20:53	06:31 20:26	07:00 19:41	07:20 (WTG12) 08:04 (WTG12)	07:29 18:52	07:03 17:13	07:34 17:00
12	06:06 20:53	06:32 20:25	07:01 19:39	07:21 (WTG12) 08:04 (WTG12)	07:30 18:51	07:04 17:12	07:35 17:00
13	06:06 20:52	06:33 20:24	07:02 19:37	07:22 (WTG12) 08:03 (WTG12)	07:31 18:49	07:05 17:11	07:36 17:00
14	06:07 20:52	06:34 20:23	07:03 19:36	07:23 (WTG12) 08:02 (WTG12)	07:32 18:48	07:06 17:10	07:36 17:00
15	06:08 20:51	06:35 20:21	07:04 19:34	07:24 (WTG12) 08:01 (WTG12)	07:33 18:46	07:07 17:09	07:37 17:00
16	06:09 20:51	06:36 20:20	07:05 19:33	07:25 (WTG12) 08:00 (WTG12)	07:34 18:45	07:08 17:08	07:38 17:01
17	06:09 20:50	06:37 20:19	07:06 19:31	07:26 (WTG12) 07:59 (WTG12)	07:35 18:43	07:10 17:08	07:38 17:01
18	06:10 20:50	06:38 20:17	07:07 19:29	07:27 (WTG12) 07:58 (WTG12)	07:36 18:42	07:11 17:07	07:39 17:01
19	06:11 20:49	06:39 20:16	07:08 19:28	07:27 (WTG12) 07:55 (WTG12)	07:37 18:40	07:12 17:06	07:40 17:02
20	06:12 20:48	06:40 20:14	07:09 19:26	07:28 (WTG12) 07:54 (WTG12)	07:38 18:39	07:13 17:06	07:40 17:02
21	06:13 20:48	06:41 20:13	07:10 19:24	07:29 (WTG12) 07:52 (WTG12)	07:39 18:38	07:14 17:05	07:41 17:03
22	06:13 20:47	06:42 20:12	07:11 19:23	07:30 (WTG12) 07:49 (WTG12)	07:40 18:36	07:15 17:04	07:41 17:03
23	06:14 20:46	06:43 20:10	07:12 19:21	07:31 (WTG12) 07:46 (WTG12)	07:41 18:35	07:16 17:04	07:42 17:04
24	06:15 20:45	06:44 20:09	07:12 19:19	07:32 (WTG12) 07:42 (WTG12)	07:43 18:33	07:17 17:03	07:42 17:04
25	06:16 20:44	06:45 20:07	07:13 19:18	07:33 (WTG12) 08:00 (WTG12)	07:44 18:32	07:18 17:03	07:43 17:05
26	06:17 20:44	06:45 20:06	07:14 19:16	07:34 (WTG12) 08:02 (WTG12)	07:45 18:31	07:20 17:02	07:43 17:05
27	06:18 20:43	06:46 20:04	07:15 19:14	07:35 (WTG12) 08:03 (WTG12)	07:46 18:29	07:21 17:02	07:43 17:06
28	06:19 20:42	06:47 20:03	07:16 19:13	07:36 (WTG12) 08:04 (WTG12)	07:47 18:28	07:22 17:01	07:44 17:07
29	06:19 20:41	06:48 20:01	07:17 19:11	07:37 (WTG12) 08:05 (WTG12)	07:48 18:27	07:23 17:01	07:44 17:07
30	06:20 20:40	06:49 20:00	07:18 19:10	07:38 (WTG12) 08:05 (WTG12)	07:49 18:26	07:24 17:01	07:44 17:08
31	06:21 20:39	06:50 19:58	07:19 08:06 (WTG12)	07:39 (WTG12)	07:50 18:24	07:25 17:00	07:45 17:09
Potential sun hours	455	425	374	347	301	292	
Total, worst case		371	915				

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F017 - A04

### 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	07:45 17:10	07:33 17:43	07:52 (WTG12) 08:24 (WTG12)	06:59 18:15	07:10 19:47	06:26 20:45
2	07:45 17:11	07:32 17:44	07:51 (WTG12) 08:24 (WTG12)	06:57 18:16	07:08 19:48	06:25 20:18
3	07:45 17:11	07:31 17:45	07:50 (WTG12) 08:24 (WTG12)	06:56 18:17	07:07 19:49	06:23 20:19
4	07:45 17:12	07:30 17:46	07:49 (WTG12) 08:24 (WTG12)	06:54 18:18	07:05 19:50	06:22 20:20
5	07:45 17:13	07:29 17:48	07:48 (WTG12) 08:24 (WTG12)	06:53 18:19	07:03 19:51	06:21 20:21
6	07:45 17:14	07:28 17:49	07:48 (WTG12) 08:23 (WTG12)	06:51 18:21	07:02 19:52	06:20 20:22
7	07:45 17:15	07:27 17:50	07:49 (WTG12) 08:23 (WTG12)	06:50 18:22	07:00 19:53	06:19 20:23
8	07:45 17:16	07:26 17:51	07:49 (WTG12) 08:23 (WTG12)	06:48 18:23	06:59 19:54	06:18 20:24
9	07:45 17:17	07:25 17:52	07:50 (WTG12) 08:22 (WTG12)	06:46 18:24	06:57 19:55	06:17 20:25
10	07:45 17:18	07:24 17:53	07:52 (WTG12) 08:21 (WTG12)	06:45 18:25	06:56 19:56	06:15 20:26
11	07:45 17:19	07:22 17:55	07:53 (WTG12) 08:20 (WTG12)	06:43 18:26	06:54 19:57	06:14 20:27
12	07:44 17:20	07:21 17:56	07:54 (WTG12) 08:18 (WTG12)	06:42 18:27	06:53 19:58	06:13 20:28
13	07:44 17:21	07:20 17:57	07:56 (WTG12) 08:16 (WTG12)	06:40 18:28	06:51 19:59	06:12 20:29
14	07:44 17:22	08:05 (WTG12) 08:07 (WTG12)	07:19 17:58	07:58 (WTG12) 08:14 (WTG12)	06:39 18:29	06:50 20:00
15	07:44 17:23	2 08:04 (WTG12) 5 08:09 (WTG12)	07:18 17:59	9 08:11 (WTG12)	06:37 18:30	06:48 20:01
16	07:43 17:24	7 08:04 (WTG12) 8 08:11 (WTG12)	07:16 18:00		06:35 18:31	06:47 20:02
17	07:43 17:25	9 08:03 (WTG12) 8 08:12 (WTG12)	07:15 18:02		06:34 18:32	06:45 20:03
18	07:42 17:26	11 08:03 (WTG12) 8 08:14 (WTG12)	07:14 18:03		06:32 18:33	06:44 20:04
19	07:42 17:28	13 08:02 (WTG12) 8 08:15 (WTG12)	07:13 18:04		06:31 18:34	06:42 20:05
20	07:41 17:29	15 08:02 (WTG12) 8 08:17 (WTG12)	07:11 18:05		06:29 18:35	06:41 20:06
21	07:41 17:30	16 08:01 (WTG12) 8 08:17 (WTG12)	07:10 18:06		06:27 18:36	06:39 20:07
22	07:40 17:31	18 08:00 (WTG12) 8 08:18 (WTG12)	07:08 18:07		06:26 18:37	06:38 20:08
23	07:40 17:32	20 08:00 (WTG12) 7 07:59 (WTG12)	07:07 18:08		06:24 18:38	06:36 20:09
24	07:39 17:33	21 08:20 (WTG12) 7 07:58 (WTG12)	07:06 18:10		06:23 18:39	06:35 20:10
25	07:38 17:34	23 08:21 (WTG12) 7 07:58 (WTG12)	07:04 18:11		06:21 18:40	06:34 20:11
26	07:38 17:36	24 08:22 (WTG12) 7 07:57 (WTG12)	07:03 18:12		06:19 18:41	06:32 20:12
27	07:37 17:37	25 08:22 (WTG12) 7 07:56 (WTG12)	07:01 18:13		06:18 18:42	06:31 20:13
28	07:36 17:38	27 08:23 (WTG12) 7 07:55 (WTG12)	07:00 18:14		06:16 18:43	06:30 20:14
29	07:35 17:39	28 08:23 (WTG12) 7 07:54 (WTG12)			07:15 19:44	06:28 20:15
30	07:34 17:40	29 08:23 (WTG12) 7 07:53 (WTG12)			07:13 19:45	06:27 20:16
31	07:34 17:42	31 08:24 (WTG12)			07:11 19:46	06:00 20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case	324	430			36	

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F017 - A04

### 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	05:59	06:22	20:13 (WTG10)	06:51	07:19	06:51	07:20 (WTG12)	07:25				
	20:56	20:38	2	20:15 (WTG10)	19:57	19:08	17:23	30	07:50 (WTG12)	17:00		
2	06:00	06:23	20:13 (WTG10)	06:52	07:20	06:53	07:20 (WTG12)	07:26				
	20:56	20:37	1	20:14 (WTG10)	19:55	19:06	17:22	32	07:52 (WTG12)	17:00		
3	06:00	06:24	06:53	07:21	06:54	07:19 (WTG12)	07:27					
	20:55	20:36	19:54	19:05	17:21	33	07:52 (WTG12)	17:00				
4	06:01	06:25	06:54	07:22	06:55	07:18 (WTG12)	07:28					
	20:55	20:35	19:52	19:03	17:20	35	07:53 (WTG12)	17:00				
5	06:01	06:26	06:55	07:23	06:56	07:18 (WTG12)	07:29					
	20:55	20:34	19:50	19:02	17:19	35	07:53 (WTG12)	17:00				
6	06:02	06:27	06:56	07:24	06:57	07:18 (WTG12)	07:30					
	20:55	20:32	19:49	19:00	17:18	35	07:53 (WTG12)	17:00				
7	06:03	06:28	06:57	07:25	06:58	07:20 (WTG12)	07:31					
	20:55	20:31	19:47	18:58	17:17	35	07:55 (WTG12)	17:00				
8	06:03	06:29	06:58	07:26	06:59	07:21 (WTG12)	07:31					
	20:54	20:30	19:46	18:57	17:16	34	07:55 (WTG12)	17:00				
9	06:04	06:30	06:59	07:27	07:00	07:22 (WTG12)	07:32					
	20:54	20:29	19:44	18:55	17:15	33	07:55 (WTG12)	17:00				
10	06:04	06:30	06:59	07:28	07:02	07:23 (WTG12)	07:33					
	20:54	20:28	19:42	18:54	17:14	32	07:55 (WTG12)	17:00				
11	06:05	06:31	07:00	07:29	07:03	07:25 (WTG12)	07:34					
	20:53	20:26	19:41	18:52	17:13	30	07:55 (WTG12)	17:00				
12	06:06	06:32	07:01	07:30	07:04	07:26 (WTG12)	07:35					
	20:53	20:25	19:39	18:51	17:12	29	07:55 (WTG12)	17:00				
13	06:06	06:33	07:02	07:31	07:05	07:27 (WTG12)	07:36					
	20:52	20:24	19:37	18:49	17:11	28	07:55 (WTG12)	17:00				
14	06:07	06:34	07:03	07:32	07:06	07:28 (WTG12)	07:36					
	20:52	20:23	19:36	18:48	17:10	27	07:55 (WTG12)	17:00				
15	06:08	06:35	07:04	07:33	07:07	07:29 (WTG12)	07:37					
	20:51	20:21	19:34	18:46	17:09	25	07:54 (WTG12)	17:00				
16	06:09	06:36	07:05	07:34	07:08	07:31 (WTG12)	07:38					
	20:51	20:20	19:33	18:45	17:08	24	07:55 (WTG12)	17:01				
17	06:09	06:37	07:06	07:35	07:10	07:32 (WTG12)	07:38					
	20:50	20:19	19:31	18:43	17:08	23	07:55 (WTG12)	17:01				
18	06:10	06:38	07:07	07:36	07:11	07:33 (WTG12)	07:39					
	20:50	20:17	19:29	18:42	17:07	21	07:54 (WTG12)	17:01				
19	06:11	06:39	07:08	07:37	07:12	07:34 (WTG12)	07:40					
	20:49	20:16	19:28	18:40	17:06	20	07:54 (WTG12)	17:02				
20	06:12	06:40	07:09	07:38	07:13	07:35 (WTG12)	07:40					
	20:48	20:14	19:26	18:39	17:06	18	07:53 (WTG12)	17:02				
21	06:13	06:41	07:10	07:39	07:14	07:37 (WTG12)	07:41					
	20:48	20:13	19:24	18:38	17:05	16	07:53 (WTG12)	17:03				
22	06:13	20:21 (WTG10)	06:42	07:11	07:40	07:15	07:38 (WTG12)	07:41				
	20:47	2	20:23 (WTG10)	06:12	19:23	18:36	17:04	15	07:53 (WTG12)	17:03		
23	06:14	20:19 (WTG10)	06:43	07:12	07:42	07:16	07:39 (WTG12)	07:42				
	20:46	3	20:22 (WTG10)	06:10	19:21	18:35	17:04	13	07:52 (WTG12)	17:04		
24	06:15	20:18 (WTG10)	06:44	07:12	07:43	07:17	07:40 (WTG12)	07:42				
	20:45	4	20:22 (WTG10)	06:09	19:19	18:33	17:03	11	07:51 (WTG12)	17:04		
25	06:16	20:17 (WTG10)	06:45	07:13	06:44	07:18	07:41 (WTG12)	07:43				
	20:44	4	20:21 (WTG10)	06:07	19:18	17:32	17:03	9	07:50 (WTG12)	17:05		
26	06:17	20:16 (WTG10)	06:45	07:14	06:45	07:20	07:42 (WTG12)	07:43				
	20:44	5	20:21 (WTG10)	06:06	19:16	17:31	17:02	7	07:49 (WTG12)	17:05		
27	06:18	20:15 (WTG10)	06:46	07:15	06:46	07:21	07:43 (WTG12)	07:43				
	20:43	4	20:19 (WTG10)	06:04	19:14	17:29	11	07:41 (WTG12)	17:02	5	07:48 (WTG12)	17:06
28	06:19	20:14 (WTG10)	06:47	07:16	06:47	07:22	07:44 (WTG12)	07:44				
	20:42	4	20:18 (WTG10)	06:03	19:13	17:28	18	07:45 (WTG12)	17:01	2	07:46 (WTG12)	17:07
29	06:19	20:14 (WTG10)	06:48	07:17	06:48	07:25 (WTG12)	07:23	07:44				
	20:41	3	20:17 (WTG10)	06:01	19:11	17:27	22	07:47 (WTG12)	17:01	17:07		
30	06:20	20:14 (WTG10)	06:49	07:18	06:49	07:23 (WTG12)	07:24	07:44				
	20:40	3	20:17 (WTG10)	06:00	19:10	17:26	25	07:48 (WTG12)	17:01	17:08		
31	06:21	20:13 (WTG10)	06:50	07:19	06:50	07:21 (WTG12)	07:45					
	20:39	3	20:16 (WTG10)	06:58	17:24	28	07:49 (WTG12)	17:09				
Potential sun hours	455	425	374	347	301	292						
Total, worst case	35	3	104	657								

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

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

### SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F018 - A04

#### 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	07:45 17:10	07:33 17:43	07:52 (WTG12) 08:22 (WTG12)	06:59 18:15	07:10 19:47	06:26 20:45
2	07:45 17:11	07:32 17:44	07:51 (WTG12) 08:23 (WTG12)	06:57 18:16	07:08 19:48	06:25 20:18
3	07:45 17:11	07:31 17:45	07:50 (WTG12) 08:23 (WTG12)	06:56 18:17	07:07 19:49	06:23 20:19
4	07:45 17:12	07:30 17:46	07:49 (WTG12) 08:23 (WTG12)	06:54 18:18	07:05 19:50	06:22 20:20
5	07:45 17:13	07:29 17:48	07:48 (WTG12) 08:23 (WTG12)	06:53 18:19	07:03 19:51	06:21 20:21
6	07:45 17:14	07:28 17:49	07:47 (WTG12) 08:23 (WTG12)	06:51 18:21	07:02 19:52	06:20 20:22
7	07:45 17:15	07:27 17:50	07:46 (WTG12) 08:23 (WTG12)	06:50 18:22	07:00 19:53	06:19 20:23
8	07:45 17:16	07:26 17:51	07:45 (WTG12) 08:23 (WTG12)	06:48 18:23	06:59 19:54	06:18 20:24
9	07:45 17:17	07:25 17:52	07:46 (WTG12) 08:23 (WTG12)	06:46 18:24	06:57 19:55	06:17 20:25
10	07:45 17:18	07:24 17:53	07:46 (WTG12) 08:23 (WTG12)	06:45 18:25	06:56 19:56	06:15 20:26
11	07:45 17:19	07:22 17:55	07:47 (WTG12) 08:23 (WTG12)	06:43 18:26	06:54 19:57	06:14 20:27
12	07:44 17:20	07:21 17:56	07:47 (WTG12) 08:21 (WTG12)	06:42 18:27	06:53 19:58	06:13 20:28
13	07:44 17:21	07:20 17:57	07:48 (WTG12) 08:20 (WTG12)	06:40 18:28	06:51 19:59	06:12 20:29
14	07:44 17:22	07:19 17:58	07:49 (WTG12) 08:20 (WTG12)	06:39 18:29	06:50 20:00	06:11 20:30
15	07:44 17:23	07:18 17:59	07:51 (WTG12) 08:19 (WTG12)	06:37 18:30	06:48 20:01	06:10 20:31
16	07:43 17:24	07:16 18:00	07:52 (WTG12) 08:16 (WTG12)	06:35 18:31	06:47 20:02	06:10 20:32
17	07:43 17:25	07:15 18:02	07:54 (WTG12) 08:15 (WTG12)	06:34 18:32	06:45 20:03	06:09 20:33
18	07:42 17:26	08:03 (WTG12) 08:06 (WTG12)	07:14 18:03	07:57 (WTG12) 08:12 (WTG12)	06:32 18:33	06:44 20:04
19	07:42 17:28	08:02 (WTG12) 08:08 (WTG12)	07:13 18:04	08:02 (WTG12) 08:06 (WTG12)	06:31 18:34	06:42 20:05
20	07:41 17:29	08:02 (WTG12) 08:11 (WTG12)	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35
21	07:41 17:30	08:01 (WTG12) 08:12 (WTG12)	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36
22	07:40 17:31	08:00 (WTG12) 08:13 (WTG12)	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37
23	07:40 17:32	08:00 (WTG12) 08:15 (WTG12)	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38
24	07:39 17:33	07:59 (WTG12) 08:16 (WTG12)	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39
25	07:38 17:34	07:58 (WTG12) 08:17 (WTG12)	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40
26	07:38 17:36	07:58 (WTG12) 08:19 (WTG12)	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40
27	07:37 17:37	07:57 (WTG12) 08:20 (WTG12)	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41
28	07:36 17:38	07:56 (WTG12) 08:20 (WTG12)	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42
29	07:35 17:39	07:55 (WTG12) 08:21 (WTG12)	06:59 18:15	07:15 19:44	06:28 20:15	06:00 20:43
30	07:34 17:40	07:54 (WTG12) 08:21 (WTG12)	06:58 18:16	07:13 19:45	06:27 20:16	06:00 20:44
31	07:34 17:42	07:53 (WTG12) 08:22 (WTG12)	06:57 19:46	07:11 19:46	05:59 20:44	05:59 20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case	243	574			35	

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F018 - A04

### 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	05:59	06:22	06:51	07:19	06:51	07:15 (WTG12)	07:25		
	20:56	20:38	19:57	19:08	17:23	37 07:52 (WTG12)	17:00		
2	06:00	06:23	06:52	07:20	06:53	07:15 (WTG12)	07:26		
	20:56	20:37	19:55	19:06	17:22	38 07:53 (WTG12)	17:00		
3	06:00	06:24	06:53	07:21	06:54	07:15 (WTG12)	07:27		
	20:55	20:36	19:54	19:05	17:21	38 07:53 (WTG12)	17:00		
4	06:01	06:25	06:54	07:22	06:55	07:16 (WTG12)	07:28		
	20:55	20:35	19:52	19:03	17:20	37 07:53 (WTG12)	17:00		
5	06:01	06:26	06:55	07:23	06:56	07:17 (WTG12)	07:29		
	20:55	20:34	19:50	19:02	17:19	36 07:53 (WTG12)	17:00		
6	06:02	06:27	06:56	07:24	06:57	07:18 (WTG12)	07:30		
	20:55	20:32	19:49	19:00	17:18	35 07:53 (WTG12)	17:00		
7	06:03	06:28	06:57	07:25	06:58	07:20 (WTG12)	07:31		
	20:55	20:31	19:47	18:58	17:17	34 07:54 (WTG12)	17:00		
8	06:03	06:29	06:58	07:26	06:59	07:21 (WTG12)	07:31		
	20:54	20:30	19:46	18:57	17:16	33 07:54 (WTG12)	17:00		
9	06:04	06:30	06:59	07:27	07:00	07:22 (WTG12)	07:32		
	20:54	20:29	19:44	18:55	17:15	32 07:54 (WTG12)	17:00		
10	06:04	06:30	06:59	07:28	07:02	07:23 (WTG12)	07:33		
	20:54	20:28	19:42	18:54	17:14	30 07:53 (WTG12)	17:00		
11	06:05	06:31	07:00	07:29	07:03	07:25 (WTG12)	07:34		
	20:53	20:26	19:41	18:52	17:13	29 07:54 (WTG12)	17:00		
12	06:06	06:32	07:01	07:30	07:04	07:26 (WTG12)	07:35		
	20:53	20:25	19:39	18:51	17:12	27 07:53 (WTG12)	17:00		
13	06:06	06:33	07:02	07:31	07:05	07:27 (WTG12)	07:36		
	20:52	20:24	19:37	18:49	17:11	26 07:53 (WTG12)	17:00		
14	06:07	06:34	07:03	07:32	07:06	07:28 (WTG12)	07:36		
	20:52	20:23	19:36	18:48	17:10	24 07:52 (WTG12)	17:00		
15	06:08	06:35	07:04	07:33	07:07	07:29 (WTG12)	07:37		
	20:51	20:21	19:34	18:46	17:09	23 07:52 (WTG12)	17:00		
16	06:09	06:36	07:05	07:34	07:08	07:31 (WTG12)	07:38		
	20:51	20:20	19:33	18:45	17:08	21 07:52 (WTG12)	17:01		
17	06:09	06:37	07:06	07:35	07:10	07:32 (WTG12)	07:38		
	20:50	20:19	19:31	18:43	17:08	19 07:51 (WTG12)	17:01		
18	06:10	06:38	07:07	07:36	07:11	07:33 (WTG12)	07:39		
	20:50	20:17	19:29	18:42	17:07	17 07:50 (WTG12)	17:01		
19	06:11	20:24 (WTG10)	06:39	07:08	07:12	07:34 (WTG12)	07:40		
	20:49	1 20:25 (WTG10)	20:16	19:28	18:40	17:06	15 07:49 (WTG12)	17:02	
20	06:12	20:22 (WTG10)	06:40	07:09	07:13	07:35 (WTG12)	07:40		
	20:48	3 20:25 (WTG10)	20:14	19:26	18:39	17:06	13 07:48 (WTG12)	17:02	
21	06:13	20:20 (WTG10)	06:41	07:10	07:14	07:37 (WTG12)	07:41		
	20:48	3 20:23 (WTG10)	20:13	19:24	18:38	17:05	11 07:48 (WTG12)	17:03	
22	06:13	20:19 (WTG10)	06:42	07:11	07:15	07:38 (WTG12)	07:41		
	20:47	4 20:23 (WTG10)	20:12	19:23	18:36	17:04	9 07:47 (WTG12)	17:03	
23	06:14	20:18 (WTG10)	06:43	07:12	07:16	07:39 (WTG12)	07:42		
	20:46	4 20:22 (WTG10)	20:10	19:21	18:35	9 08:39 (WTG12)	17:04	6 07:45 (WTG12)	17:04
24	06:15	20:18 (WTG10)	06:44	07:12	07:17	08:26 (WTG12)	07:17	07:40 (WTG12)	07:42
	20:45	4 20:22 (WTG10)	20:09	19:19	18:33	17 08:43 (WTG12)	17:03	3 07:43 (WTG12)	17:04
25	06:16	20:17 (WTG10)	06:45	07:13	06:44	07:23 (WTG12)	07:18		07:43
	20:44	4 20:21 (WTG10)	20:07	19:18	17:32	22 07:45 (WTG12)	17:03		17:05
26	06:17	20:17 (WTG10)	06:45	07:14	06:45	07:21 (WTG12)	07:20		07:43
	20:44	4 20:21 (WTG10)	20:06	19:16	17:31	25 07:46 (WTG12)	17:02		17:05
27	06:18	20:16 (WTG10)	06:46	07:15	06:46	07:19 (WTG12)	07:21		07:43
	20:43	3 20:19 (WTG10)	20:04	19:14	17:29	29 07:48 (WTG12)	17:02		17:06
28	06:19	20:15 (WTG10)	06:47	07:16	06:47	07:19 (WTG12)	07:22		07:44
	20:42	3 20:18 (WTG10)	20:03	19:13	17:28	31 07:50 (WTG12)	17:01		17:07
29	06:19	20:15 (WTG10)	06:48	07:17	06:48	07:18 (WTG12)	07:23		07:44
	20:41	2 20:17 (WTG10)	20:01	19:11	17:27	32 07:50 (WTG12)	17:01		17:07
30	06:20	20:15 (WTG10)	06:49	07:18	06:49	07:17 (WTG12)	07:24		07:44
	20:40	2 20:17 (WTG10)	20:00	19:10	17:26	34 07:51 (WTG12)	17:01		17:08
31	06:21	20:15 (WTG10)	06:50		06:50	07:16 (WTG12)			07:45
	20:39	1 20:16 (WTG10)	19:58		17:24	35 07:51 (WTG12)			17:09
Potential sun hours	455		425	374	347	301	593		292
Total, worst case	38			234					

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F019 - A04

### 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	07:45 17:10	07:33 17:43	06:58 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:49 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:45	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:11 19:21	07:41 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F024 - A02

### 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	07:45 17:10	07:33 17:43	07:52 (WTG13) 08:33 (WTG13)	06:59 18:15	07:10 19:47	07:28 (WTG12) 07:41 (WTG12)	06:26 20:17	05:59 20:45
2	07:45 17:11	07:32 17:44	07:51 (WTG13) 08:33 (WTG13)	06:57 18:16	07:08 19:48	07:26 (WTG12) 07:41 (WTG12)	06:25 20:18	05:58 20:46
3	07:45 17:11	07:31 17:45	07:51 (WTG13) 08:33 (WTG13)	06:56 18:17	07:07 19:49	07:25 (WTG12) 07:42 (WTG12)	06:23 20:19	05:58 20:46
4	07:45 17:12	07:30 17:46	07:52 (WTG13) 08:32 (WTG13)	06:54 18:18	07:05 19:50	07:23 (WTG12) 07:41 (WTG12)	06:22 20:20	05:57 20:47
5	07:45 17:13	07:29 17:48	07:52 (WTG13) 08:32 (WTG13)	06:53 18:19	07:03 19:51	07:22 (WTG12) 07:42 (WTG12)	06:21 20:21	05:57 20:48
6	07:45 17:14	07:28 17:49	07:53 (WTG13) 08:32 (WTG13)	06:51 18:21	07:02 19:52	07:20 (WTG12) 07:41 (WTG12)	06:20 20:22	05:57 20:48
7	07:45 17:15	07:27 17:50	07:53 (WTG13) 08:32 (WTG13)	06:50 18:22	07:00 19:53	07:18 (WTG12) 07:41 (WTG12)	06:19 20:23	05:57 20:49
8	07:45 17:16	07:26 17:51	07:54 (WTG13) 08:31 (WTG13)	06:48 18:23	06:59 19:54	07:17 (WTG12) 07:41 (WTG12)	06:18 20:24	05:56 20:50
9	07:45 17:17	08:06 (WTG13) 08:09 (WTG13)	07:25 17:52	06:46 18:24	06:57 19:55	07:15 (WTG12) 07:39 (WTG12)	06:17 20:25	05:56 20:50
10	07:45 17:18	08:06 (WTG13) 08:12 (WTG13)	07:24 17:53	06:45 18:25	06:56 19:56	07:14 (WTG12) 07:39 (WTG12)	06:15 20:26	05:56 20:51
11	07:45 17:19	08:06 (WTG13) 08:14 (WTG13)	07:22 17:55	06:43 18:26	06:54 19:57	07:13 (WTG12) 07:38 (WTG12)	06:14 20:27	05:56 20:51
12	07:44 17:20	08:05 (WTG13) 08:16 (WTG13)	07:21 17:56	06:42 18:27	06:53 19:58	07:15 (WTG12) 07:37 (WTG12)	06:13 20:28	05:56 20:52
13	07:44 17:21	08:05 (WTG13) 08:18 (WTG13)	07:20 17:57	06:40 18:28	06:51 19:59	07:15 (WTG12) 07:35 (WTG12)	06:12 20:29	05:56 20:52
14	07:44 17:22	08:05 (WTG13) 08:19 (WTG13)	07:19 17:58	06:39 18:29	06:50 20:00	07:17 (WTG12) 07:33 (WTG12)	06:11 20:30	05:56 20:53
15	07:44 17:23	08:04 (WTG13) 08:20 (WTG13)	07:18 17:59	06:37 18:30	06:48 20:01	07:19 (WTG12) 07:30 (WTG12)	06:10 20:31	05:56 20:53
16	07:43 17:24	08:04 (WTG13) 08:22 (WTG13)	07:16 18:01	06:35 18:31	06:47 20:02	07:15 (WTG12) 07:33 (WTG12)	06:10 20:32	05:56 20:53
17	07:43 17:25	08:03 (WTG13) 08:23 (WTG13)	07:15 18:02	06:34 18:32	06:45 20:03	07:15 (WTG12) 07:33 (WTG12)	06:09 20:33	05:56 20:54
18	07:42 17:26	08:03 (WTG13) 08:24 (WTG13)	07:14 18:03	06:32 18:33	06:44 20:04	07:15 (WTG12) 07:33 (WTG12)	06:08 20:33	05:56 20:54
19	07:42 17:28	08:02 (WTG13) 08:25 (WTG13)	07:13 18:04	06:31 18:34	06:42 20:05	07:19 (WTG12) 07:30 (WTG12)	06:07 20:34	05:56 20:54
20	07:41 17:29	08:02 (WTG13) 08:27 (WTG13)	07:11 18:05	06:29 18:35	06:41 20:06	07:15 (WTG12) 07:33 (WTG12)	06:06 20:35	05:56 20:55
21	07:41 17:30	08:01 (WTG13) 08:27 (WTG13)	07:10 18:06	06:27 18:36	06:39 20:07	07:15 (WTG12) 07:33 (WTG12)	06:05 20:36	05:56 20:55
22	07:40 17:31	08:00 (WTG13) 08:28 (WTG13)	07:08 18:07	06:26 18:37	06:38 20:08	07:15 (WTG12) 07:33 (WTG12)	06:05 20:37	05:56 20:55
23	07:40 17:32	08:00 (WTG13) 08:29 (WTG13)	07:07 18:08	06:24 18:38	06:37 20:09	07:15 (WTG12) 07:33 (WTG12)	06:04 20:38	05:57 20:55
24	07:39 17:33	07:59 (WTG13) 08:30 (WTG13)	07:06 18:10	06:23 18:39	06:35 20:10	07:15 (WTG12) 07:33 (WTG12)	06:03 20:39	05:57 20:56
25	07:38 17:35	07:58 (WTG13) 08:30 (WTG13)	07:04 18:11	06:21 18:40	06:34 20:11	07:15 (WTG12) 07:33 (WTG12)	06:02 20:40	05:57 20:56
26	07:38 17:36	07:58 (WTG13) 08:31 (WTG13)	07:03 18:12	06:19 18:41	06:32 20:12	07:15 (WTG12) 07:33 (WTG12)	06:02 20:40	05:57 20:56
27	07:37 17:37	07:57 (WTG13) 08:32 (WTG13)	07:01 18:13	06:18 18:42	06:31 20:13	07:15 (WTG12) 07:33 (WTG12)	06:01 20:41	05:58 20:56
28	07:36 17:38	07:56 (WTG13) 08:32 (WTG13)	07:00 18:14	06:16 18:43	06:30 20:14	07:15 (WTG12) 07:33 (WTG12)	06:01 20:42	05:58 20:56
29	07:35 17:39	07:55 (WTG13) 08:32 (WTG13)	07:15 19:44	07:33 (WTG12) 07:36 (WTG12)	06:28 20:15	07:15 (WTG12) 07:33 (WTG12)	06:00 20:43	05:59 20:56
30	07:34 17:40	07:54 (WTG13) 08:32 (WTG13)	07:13 19:45	07:31 (WTG12) 07:38 (WTG12)	06:27 20:16	07:15 (WTG12) 07:33 (WTG12)	06:00 20:44	05:59 20:56
31	07:34 17:42	07:53 (WTG13) 08:32 (WTG13)	07:11 19:46	07:30 (WTG12) 07:40 (WTG12)	06:26 20:17	07:15 (WTG12) 07:33 (WTG12)	05:59 20:44	05:59 20:56
Potential sun hours	301	299	370	397	445	448		
Total, worst case	542	525	20	294				

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 21/12/2023 17:58/3.4.415

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F024 - A02

### 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	05:59 20:56	06:22 20:38	06:51 19:57	07:12 (WTG12) 07:37 (WTG12)	07:19 19:08	06:51 17:23
2	06:00 20:56	06:23 20:37	06:52 19:55	07:12 (WTG12) 07:37 (WTG12)	07:20 19:06	06:53 17:22
3	06:00 20:56	06:24 20:36	06:53 19:54	07:13 (WTG12) 07:37 (WTG12)	07:21 19:05	06:54 17:21
4	06:01 20:55	06:25 20:35	06:54 19:52	07:14 (WTG12) 07:38 (WTG12)	07:22 19:03	06:55 17:20
5	06:01 20:55	06:26 20:34	06:55 19:50	07:15 (WTG12) 07:38 (WTG12)	07:23 19:02	06:56 17:19
6	06:02 20:55	06:27 20:32	06:56 19:49	07:16 (WTG12) 07:37 (WTG12)	07:24 19:00	06:57 17:18
7	06:03 20:55	06:28 20:31	06:57 19:47	07:17 (WTG12) 07:37 (WTG12)	07:25 18:58	06:58 17:17
8	06:03 20:54	06:29 20:30	06:58 19:46	07:18 (WTG12) 07:37 (WTG12)	07:26 18:57	06:59 17:16
9	06:04 20:54	06:30 20:29	06:59 19:44	07:19 (WTG12) 07:36 (WTG12)	07:27 18:55	07:00 17:15
10	06:04 20:54	06:31 20:28	06:59 19:42	07:19 (WTG12) 07:34 (WTG12)	07:28 18:54	07:02 17:14
11	06:05 20:53	06:31 20:27	07:00 19:41	07:20 (WTG12) 07:33 (WTG12)	07:29 18:52	07:03 17:13
12	06:06 20:53	06:32 20:25	07:01 19:39	07:21 (WTG12) 07:31 (WTG12)	07:30 18:51	07:04 17:12
13	06:07 20:52	06:33 20:24	07:02 19:37	07:22 (WTG12) 07:30 (WTG12)	07:31 18:49	07:05 17:11
14	06:07 20:52	06:34 20:23	07:03 19:36	07:23 (WTG12) 07:27 (WTG12)	07:32 18:48	07:06 17:10
15	06:08 20:51	06:35 20:21	07:04 19:34	07:24 (WTG12) 18:46	07:33 18:46	07:07 17:09
16	06:09 20:51	06:36 20:20	07:05 19:33	07:25 (WTG12) 18:45	07:34 18:45	07:08 17:08
17	06:09 20:50	06:37 20:19	07:06 19:31	07:26 (WTG12) 18:43	07:35 18:43	07:10 17:08
18	06:10 20:50	06:38 20:17	07:07 19:29	07:27 (WTG12) 18:42	07:36 18:42	07:11 17:07
19	06:11 20:49	06:39 20:16	07:08 19:28	07:28 (WTG12) 18:40	07:37 18:40	07:12 17:06
20	06:12 20:48	06:40 20:15	07:09 19:26	07:29 (WTG12) 18:39	07:38 18:39	07:13 17:06
21	06:13 20:48	06:41 20:13	07:10 19:24	07:30 (WTG12) 18:38	07:39 18:38	07:14 17:05
22	06:13 20:47	06:42 20:12	07:11 19:23	07:31 (WTG12) 18:36	07:40 18:36	07:15 17:04
23	06:14 20:46	06:43 20:10	07:12 19:21	07:32 (WTG12) 18:35	07:42 18:35	07:16 17:04
24	06:15 20:45	06:44 20:09	07:12 19:19	07:33 (WTG12) 18:33	07:43 18:33	07:17 17:03
25	06:16 20:44	06:45 20:07	07:13 19:18	07:34 (WTG12) 18:32	07:44 18:32	07:18 17:03
26	06:17 20:44	06:46 20:06	07:14 19:16	07:35 (WTG12) 18:31	07:45 18:31	07:19 17:02
27	06:18 20:43	06:46 20:04	07:15 19:14	07:36 (WTG12) 18:30	07:46 18:30	07:20 17:02
28	06:19 20:42	06:47 20:03	07:16 19:13	07:37 (WTG12) 18:29	07:47 18:29	07:21 17:02
29	06:19 20:41	06:48 20:01	07:18 19:11	07:38 (WTG12) 18:28	07:48 18:28	07:23 17:01
30	06:20 20:40	06:49 20:00	07:19 19:10	07:39 (WTG12) 18:27	07:49 18:27	07:24 17:01
31	06:21 20:39	06:50 19:58	07:20 19:09	07:40 (WTG12) 18:26	07:50 18:26	07:25 17:01
Potential sun hours	455	425	374	347	301	292
Total, worst case	69	69	248	142	914	18

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
IT-09124 Cagliari
+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
21/12/2023 17:58/3.4.415

SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F030 - A10

Assumptions for shadow calculations

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

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

Table with 14 columns (January to December) and 31 rows of data. Each row represents a day with columns for sun rise, sun set, and minutes with flicker for each month. Includes a summary row for 'Potential sun hours' and 'Total, worst case'.

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

Matrix with 4 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F047 - D08

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	07:28 (WTG13) 08:01 (WTG13)	06:26 20:17
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	07:26 (WTG13) 08:02 (WTG13)	06:25 20:18
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	07:25 (WTG13) 08:04 (WTG13)	06:23 20:19
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	07:23 (WTG13) 08:05 (WTG13)	06:22 20:20
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	07:22 (WTG13) 08:06 (WTG13)	06:21 20:21
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	07:20 (WTG13) 08:06 (WTG13)	06:20 20:22
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	07:18 (WTG13) 08:06 (WTG13)	06:19 20:23
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	07:17 (WTG13) 08:07 (WTG13)	06:18 20:24
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	07:15 (WTG13) 08:07 (WTG13)	06:17 20:25
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	07:14 (WTG13) 08:08 (WTG13)	06:15 20:26
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	07:12 (WTG13) 08:07 (WTG13)	06:14 20:27
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	07:11 (WTG13) 08:08 (WTG13)	06:13 20:28
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	07:10 (WTG13) 08:07 (WTG13)	06:12 20:29
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	07:10 (WTG13) 08:08 (WTG13)	06:11 20:30
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	07:09 (WTG13) 08:07 (WTG13)	06:10 20:31
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	07:10 (WTG13) 08:07 (WTG13)	06:10 20:32
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	07:09 (WTG13) 08:06 (WTG13)	06:09 20:33
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	07:09 (WTG13) 08:06 (WTG13)	06:08 20:33
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	07:09 (WTG13) 08:06 (WTG13)	06:07 20:34
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	07:09 (WTG13) 08:05 (WTG13)	06:06 20:35
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	07:09 (WTG13) 08:05 (WTG13)	06:05 20:36
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	07:09 (WTG13) 08:03 (WTG13)	06:05 20:37
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	07:09 (WTG13) 08:03 (WTG13)	06:04 20:38
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	07:10 (WTG13) 08:03 (WTG13)	06:03 20:39
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	07:10 (WTG13) 08:01 (WTG13)	06:02 20:40
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	07:11 (WTG13) 08:00 (WTG13)	06:02 20:40
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	07:12 (WTG13) 08:00 (WTG13)	06:01 20:41
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	07:12 (WTG13) 07:58 (WTG13)	06:01 20:42
29	07:35 17:39	07:15 19:44	07:15 19:44	06:28 20:15	07:13 (WTG13) 07:57 (WTG13)	06:00 20:43
30	07:34 17:40	07:13 19:45	07:31 (WTG13) 19:45	06:27 20:16	07:14 (WTG13) 07:56 (WTG13)	06:00 20:44
31	07:34 17:42	07:11 19:46	07:30 (WTG13) 19:46	06:26 20:17	07:56 (WTG13)	06:00 20:44
Potential sun hours	301	299	370	397	445	448
Total, worst case			85	1510	254	564

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F047 - D08

### 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	05:59 20:56	06:21 (WTG12) 06:40 (WTG12)	06:22 20:38	06:51 19:57	07:11 (WTG13) 08:06 (WTG13)	07:19 17:23	06:51 17:00
2	06:00 20:56	06:22 (WTG12) 06:41 (WTG12)	06:23 20:37	06:52 19:55	07:12 (WTG13) 08:06 (WTG13)	07:20 19:06	06:53 17:22
3	06:00 20:55	06:22 (WTG12) 06:40 (WTG12)	06:24 20:36	06:53 19:54	07:13 (WTG13) 08:05 (WTG13)	07:21 19:05	06:54 17:21
4	06:01 20:55	06:23 (WTG12) 06:41 (WTG12)	06:25 20:35	06:54 19:52	07:14 (WTG13) 08:04 (WTG13)	07:22 19:03	06:55 17:20
5	06:01 20:55	06:23 (WTG12) 06:40 (WTG12)	06:26 20:34	06:55 19:50	07:15 (WTG13) 08:03 (WTG13)	07:23 19:02	06:56 17:19
6	06:02 20:55	06:24 (WTG12) 06:41 (WTG12)	06:27 20:32	06:56 19:49	07:16 (WTG13) 08:02 (WTG13)	07:24 19:00	06:57 17:18
7	06:03 20:55	06:25 (WTG12) 06:41 (WTG12)	06:28 20:31	06:57 19:47	07:17 (WTG13) 08:01 (WTG13)	07:25 18:58	06:58 17:17
8	06:03 20:54	06:25 (WTG12) 06:40 (WTG12)	06:29 20:30	06:58 19:46	07:18 (WTG13) 08:00 (WTG13)	07:26 18:57	06:59 17:16
9	06:04 20:54	06:26 (WTG12) 06:40 (WTG12)	06:30 20:29	06:59 19:44	07:19 (WTG13) 08:00 (WTG13)	07:27 18:55	07:00 17:15
10	06:04 20:54	06:26 (WTG12) 06:39 (WTG12)	06:31 20:28	06:59 19:42	07:19 (WTG13) 08:01 (WTG13)	07:28 18:54	07:02 17:14
11	06:05 20:53	06:27 (WTG12) 06:39 (WTG12)	06:31 20:26	07:00 19:41	07:20 (WTG13) 07:54 (WTG13)	07:29 18:52	07:03 17:13
12	06:06 20:53	06:28 (WTG12) 06:39 (WTG12)	06:32 20:25	07:01 19:39	07:21 (WTG13) 08:04 (WTG13)	07:30 18:51	07:04 17:12
13	06:07 20:52	06:28 (WTG12) 06:38 (WTG12)	06:33 20:24	07:02 19:37	07:22 (WTG13) 08:04 (WTG13)	07:31 18:49	07:05 17:11
14	06:07 20:52	06:29 (WTG12) 06:38 (WTG12)	06:34 20:23	07:03 19:36	07:23 (WTG13) 08:05 (WTG13)	07:32 18:48	07:06 17:10
15	06:08 20:51	06:30 (WTG12) 06:37 (WTG12)	06:35 20:21	07:04 19:34	07:19 (WTG13) 08:06 (WTG13)	07:33 18:46	07:07 17:09
16	06:09 20:51	06:31 (WTG12) 06:37 (WTG12)	06:36 20:20	07:05 19:33	07:18 (WTG13) 08:07 (WTG13)	07:34 18:45	07:08 17:08
17	06:09 20:50	06:31 (WTG12) 06:35 (WTG12)	06:37 20:19	07:06 19:31	07:17 (WTG13) 08:07 (WTG13)	07:35 18:43	07:10 17:08
18	06:10 20:50	06:32 (WTG12) 06:33 (WTG12)	06:38 20:17	07:07 19:29	07:17 (WTG13) 08:08 (WTG13)	07:36 18:42	07:11 17:07
19	06:11 20:49	06:33 (WTG12) 20:16	06:39 20:16	07:08 19:28	07:16 (WTG13) 08:08 (WTG13)	07:37 18:40	07:12 17:06
20	06:12 20:48	06:40 20:14	06:40 20:14	07:09 19:26	07:15 (WTG13) 08:09 (WTG13)	07:38 18:39	07:13 17:06
21	06:13 20:48	06:41 20:13	06:41 20:13	07:10 19:24	07:15 (WTG13) 08:09 (WTG13)	07:39 18:38	07:14 17:05
22	06:13 20:47	06:42 20:12	06:42 20:12	07:11 19:23	07:14 (WTG13) 08:10 (WTG13)	07:40 18:36	07:15 17:04
23	06:14 20:46	06:43 20:10	06:43 20:10	07:12 19:21	07:13 (WTG13) 08:09 (WTG13)	07:42 18:35	07:16 17:04
24	06:15 20:45	06:44 20:09	06:44 20:09	07:12 19:19	07:12 (WTG13) 08:09 (WTG13)	07:43 18:33	07:17 17:03
25	06:16 20:44	06:45 20:07	06:45 20:07	07:13 19:18	07:12 (WTG13) 08:09 (WTG13)	07:44 18:32	07:18 17:03
26	06:17 20:44	06:46 20:06	06:46 20:06	07:14 19:16	07:12 (WTG13) 08:09 (WTG13)	07:45 18:31	07:20 17:02
27	06:18 20:43	06:46 20:04	06:46 20:04	07:15 19:14	07:11 (WTG13) 08:09 (WTG13)	07:46 18:29	07:21 17:02
28	06:19 20:42	06:47 20:03	06:47 20:03	07:16 19:13	07:11 (WTG13) 08:09 (WTG13)	07:47 18:28	07:22 17:01
29	06:19 20:41	06:48 20:01	06:48 20:01	07:17 19:11	07:11 (WTG13) 08:08 (WTG13)	07:48 18:27	07:23 17:01
30	06:20 20:40	06:49 20:00	06:49 20:00	07:18 19:10	07:11 (WTG13) 08:08 (WTG13)	07:49 18:26	07:24 17:01
31	06:21 20:39	06:50 19:58	06:50 19:58	07:19 19:08	07:11 (WTG13) 08:08 (WTG13)	06:50 18:25	07:25 17:00
Potential sun hours	455	425	374	592	347	301	292
Total, worst case	226	1243	592	347	301	292	

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F051 - D10

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F052 - D10

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F187 - D10  
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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:52 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:46	06:00 20:55	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:32	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:30 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:00 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:31 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:26	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:56 20:52	06:07 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:35 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:56 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:43 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:56 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:10 20:32	05:56 20:53	06:09 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:33	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:54	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:47	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:05 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	06:04 20:38	05:57 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:41 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:55	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:46 20:06	07:14 19:16	06:45 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:43 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:19 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:59 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40		07:13 19:45	06:27 20:16	06:00 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F196 - C02

### 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	07:45	16:30 (WTG9)	07:33	06:59	07:10	06:26	05:58	20:00 (WTG8)				
	17:10	15	16:45 (WTG9)	17:43	18:15	19:47	20:17	20:45	20	20:20 (WTG8)		
2	07:45	16:30 (WTG9)	07:32	06:57	07:08	06:25	05:58	20:01 (WTG8)				
	17:11	15	16:45 (WTG9)	17:44	18:16	19:48	20:18	20:46	20	20:21 (WTG8)		
3	07:45	16:31 (WTG9)	07:31	06:56	07:07	06:23	05:58	20:01 (WTG8)				
	17:11	15	16:46 (WTG9)	17:45	18:17	19:49	20:19	20:46	21	20:22 (WTG8)		
4	07:45	16:32 (WTG9)	07:30	06:54	07:05	06:22	05:57	20:01 (WTG8)				
	17:12	15	16:47 (WTG9)	17:46	18:18	19:50	20:20	20:47	21	20:22 (WTG8)		
5	07:45	16:32 (WTG9)	07:29	06:53	07:03	06:21	05:57	20:02 (WTG8)				
	17:13	16	16:48 (WTG9)	17:47	18:19	19:51	20:21	20:48	21	20:23 (WTG8)		
6	07:45	16:33 (WTG9)	07:28	06:51	07:02	06:20	05:57	20:02 (WTG8)				
	17:14	16	16:49 (WTG9)	17:49	18:20	19:52	20:22	20:48	22	20:24 (WTG8)		
7	07:45	16:34 (WTG9)	07:27	06:50	07:00	06:19	05:56	20:03 (WTG8)				
	17:15	16	16:50 (WTG9)	17:50	18:22	19:53	20:23	20:49	22	20:25 (WTG8)		
8	07:45	16:34 (WTG9)	07:26	06:48	06:59	06:18	05:56	20:03 (WTG8)				
	17:16	16	16:50 (WTG9)	17:51	18:23	19:54	20:24	20:50	22	20:25 (WTG8)		
9	07:45	16:35 (WTG9)	07:25	06:46	06:57	06:16	05:56	20:03 (WTG8)				
	17:17	17	16:52 (WTG9)	17:52	18:24	19:55	20:25	20:50	22	20:25 (WTG8)		
10	07:45	16:36 (WTG9)	07:24	06:45	06:56	06:15	05:56	20:04 (WTG8)				
	17:18	17	16:53 (WTG9)	17:53	18:25	19:56	20:26	1	20:03 (WTG8)	20:51	22	20:26 (WTG8)
11	07:45	16:37 (WTG9)	07:22	06:43	06:54	06:14	05:56	20:04 (WTG8)				
	17:19	17	16:54 (WTG9)	17:55	18:26	19:57	20:27	3	20:04 (WTG8)	20:51	22	20:26 (WTG8)
12	07:44	16:38 (WTG9)	07:21	06:42	06:53	06:13	05:56	20:05 (WTG8)				
	17:20	17	16:55 (WTG9)	17:56	18:27	19:58	20:28	5	20:05 (WTG8)	20:52	22	20:27 (WTG8)
13	07:44	16:39 (WTG9)	07:20	06:40	06:51	06:12	05:55	20:05 (WTG8)				
	17:21	17	16:56 (WTG9)	17:57	18:28	19:59	20:29	6	20:06 (WTG8)	20:52	22	20:27 (WTG8)
14	07:44	16:41 (WTG9)	07:19	06:39	06:49	06:11	05:55	20:05 (WTG8)				
	17:22	17	16:58 (WTG9)	17:58	18:29	20:00	20:30	7	20:06 (WTG8)	20:53	23	20:28 (WTG8)
15	07:44	16:42 (WTG9)	07:18	06:37	06:48	06:10	05:55	20:06 (WTG8)				
	17:23	16	16:58 (WTG9)	17:59	18:30	20:01	20:31	8	20:07 (WTG8)	20:53	22	20:28 (WTG8)
16	07:43	16:44 (WTG9)	07:16	06:35	06:47	06:09	05:55	20:06 (WTG8)				
	17:24	16	17:00 (WTG9)	18:00	18:31	20:02	20:32	10	20:08 (WTG8)	20:53	23	20:29 (WTG8)
17	07:43	16:45 (WTG9)	07:15	06:34	06:45	06:09	05:55	20:06 (WTG8)				
	17:25	15	17:00 (WTG9)	18:02	18:32	20:03	20:33	11	20:09 (WTG8)	20:54	23	20:29 (WTG8)
18	07:42	16:48 (WTG9)	07:14	06:32	06:44	06:08	05:56	20:06 (WTG8)				
	17:26	11	16:59 (WTG9)	18:03	18:33	20:04	20:33	12	20:10 (WTG8)	20:54	23	20:29 (WTG8)
19	07:42	18:04	07:12	06:31	06:42	06:07	05:56	20:07 (WTG8)				
	17:27	18:04	18:34	20:05	20:34	13	20:11 (WTG8)	20:54	22	20:29 (WTG8)		
20	07:41	07:11	06:29	06:41	06:06	19:58 (WTG8)	05:56	20:08 (WTG8)				
	17:29	18:05	18:35	20:06	20:35	14	20:12 (WTG8)	20:55	22	20:30 (WTG8)		
21	07:41	07:10	06:27	06:39	06:05	19:57 (WTG8)	05:56	20:08 (WTG8)				
	17:30	18:06	18:36	20:07	20:36	15	20:12 (WTG8)	20:55	22	20:30 (WTG8)		
22	07:40	07:08	06:26	06:38	06:04	19:58 (WTG8)	05:56	20:08 (WTG8)				
	17:31	18:07	18:37	20:08	20:37	16	20:14 (WTG8)	20:55	22	20:30 (WTG8)		
23	07:40	07:07	06:24	06:36	06:04	19:58 (WTG8)	05:56	20:08 (WTG8)				
	17:32	18:08	18:38	20:09	20:38	16	20:14 (WTG8)	20:55	22	20:30 (WTG8)		
24	07:39	07:06	06:23	06:35	06:03	19:58 (WTG8)	05:57	20:08 (WTG8)				
	17:33	18:10	18:39	20:10	20:39	16	20:14 (WTG8)	20:56	23	20:31 (WTG8)		
25	07:38	07:04	06:21	06:34	06:02	19:59 (WTG8)	05:57	20:08 (WTG8)				
	17:34	18:11	18:40	20:11	20:40	17	20:16 (WTG8)	20:56	23	20:31 (WTG8)		
26	07:38	07:03	06:19	06:32	06:02	19:58 (WTG8)	05:57	20:08 (WTG8)				
	17:36	18:12	18:41	20:12	20:40	18	20:16 (WTG8)	20:56	23	20:31 (WTG8)		
27	07:37	07:01	06:18	06:31	06:01	19:59 (WTG8)	05:58	20:09 (WTG8)				
	17:37	18:13	18:42	20:13	20:41	19	20:18 (WTG8)	20:56	22	20:31 (WTG8)		
28	07:36	07:00	06:16	06:30	06:01	19:59 (WTG8)	05:58	20:09 (WTG8)				
	17:38	18:14	18:43	20:14	20:42	19	20:18 (WTG8)	20:56	22	20:31 (WTG8)		
29	07:35	07:15	06:28	06:00	20:00 (WTG8)	05:58	20:08 (WTG8)					
	17:39	19:44	20:15	20:43	19	20:19 (WTG8)	20:56	23	20:31 (WTG8)			
30	07:34	07:13	06:27	05:59	19:59 (WTG8)	05:59	20:09 (WTG8)					
	17:40	19:45	20:16	20:44	20	20:19 (WTG8)	20:56	22	20:31 (WTG8)			
31	07:34	07:11	05:59	20:00 (WTG8)								
	17:41	19:46	20:44	20:20 (WTG8)	20	20:20 (WTG8)						
Potential sun hours	301	299	370	397	445	285	448	661				
Total, worst case	284											

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F196 - C02

### 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	05:59	20:08 (WTG8)	06:22	20:11 (WTG8)	06:51	07:19	06:51				07:25	16:19 (WTG9)
	20:56	23 20:31 (WTG8)	20:38	4 20:15 (WTG8)	19:57	19:08	17:23				17:00	17 16:36 (WTG9)
2	06:00	20:09 (WTG8)	06:23	20:11 (WTG8)	06:52	07:20	06:53				07:26	16:19 (WTG9)
	20:56	22 20:31 (WTG8)	20:37	2 20:13 (WTG8)	19:55	19:06	17:22				17:00	17 16:36 (WTG9)
3	06:00	20:08 (WTG8)	06:24		06:53	07:21	06:54				07:27	16:19 (WTG9)
	20:56	23 20:31 (WTG8)	20:36		19:53	19:05	17:21				17:00	17 16:36 (WTG9)
4	06:01	20:09 (WTG8)	06:25		06:54	07:22	06:55				07:28	16:19 (WTG9)
	20:55	22 20:31 (WTG8)	20:35		19:52	19:03	17:20				17:00	16 16:35 (WTG9)
5	06:01	20:08 (WTG8)	06:26		06:55	07:23	06:56				07:29	16:19 (WTG9)
	20:55	22 20:30 (WTG8)	20:34		19:50	19:02	17:19				17:00	16 16:35 (WTG9)
6	06:02	20:09 (WTG8)	06:27		06:56	07:24	06:57				07:30	16:19 (WTG9)
	20:55	21 20:30 (WTG8)	20:32		19:49	19:00	17:18				16:59	16 16:35 (WTG9)
7	06:02	20:08 (WTG8)	06:28		06:57	07:25	06:58				07:31	16:19 (WTG9)
	20:55	22 20:30 (WTG8)	20:31		19:47	18:58	17:17				16:59	16 16:35 (WTG9)
8	06:03	20:08 (WTG8)	06:29		06:58	07:26	06:59				07:31	16:19 (WTG9)
	20:54	22 20:30 (WTG8)	20:30		19:46	18:57	17:16				16:59	15 16:34 (WTG9)
9	06:04	20:09 (WTG8)	06:29		06:58	07:27	07:00				07:32	16:19 (WTG9)
	20:54	21 20:30 (WTG8)	20:29		19:44	18:55	17:15				16:59	15 16:34 (WTG9)
10	06:04	20:08 (WTG8)	06:30		06:59	07:28	07:02				07:33	16:19 (WTG9)
	20:54	21 20:29 (WTG8)	20:28		19:42	18:54	17:14				16:59	16 16:35 (WTG9)
11	06:05	20:08 (WTG8)	06:31		07:00	07:29	07:03				07:34	16:20 (WTG9)
	20:53	21 20:29 (WTG8)	20:26		19:41	18:52	17:13				17:00	15 16:35 (WTG9)
12	06:06	20:08 (WTG8)	06:32		07:01	07:30	07:04				07:35	16:20 (WTG9)
	20:53	21 20:29 (WTG8)	20:25		19:39	18:51	17:12				17:00	15 16:35 (WTG9)
13	06:06	20:08 (WTG8)	06:33		07:02	07:31	07:05				07:36	16:21 (WTG9)
	20:52	20 20:28 (WTG8)	20:24		19:37	18:49	17:11				17:00	14 16:35 (WTG9)
14	06:07	20:08 (WTG8)	06:34		07:03	07:32	07:06				07:36	16:21 (WTG9)
	20:52	20 20:28 (WTG8)	20:23		19:36	18:48	17:10				17:00	14 16:35 (WTG9)
15	06:08	20:08 (WTG8)	06:35		07:04	07:33	07:07				07:37	16:21 (WTG9)
	20:51	19 20:27 (WTG8)	20:21		19:34	18:46	17:09				17:00	14 16:35 (WTG9)
16	06:09	20:07 (WTG8)	06:36		07:05	07:34	07:08				07:38	16:22 (WTG9)
	20:51	19 20:26 (WTG8)	20:20		19:32	18:45	17:08				17:01	14 16:36 (WTG9)
17	06:09	20:08 (WTG8)	06:37		07:06	07:35	07:10				07:38	16:22 (WTG9)
	20:50	18 20:26 (WTG8)	20:19		19:31	18:43	17:08				17:01	14 16:36 (WTG9)
18	06:10	20:08 (WTG8)	06:38		07:07	07:36	07:11				07:39	16:22 (WTG9)
	20:50	18 20:26 (WTG8)	20:17		19:29	18:42	17:07				17:01	14 16:36 (WTG9)
19	06:11	20:08 (WTG8)	06:39		07:08	07:37	07:12				07:40	16:22 (WTG9)
	20:49	17 20:25 (WTG8)	20:16		19:28	18:40	17:06				17:02	14 16:36 (WTG9)
20	06:12	20:08 (WTG8)	06:40		07:09	07:38	07:13				07:40	16:23 (WTG9)
	20:48	17 20:25 (WTG8)	20:14		19:26	18:39	17:05				17:02	14 16:37 (WTG9)
21	06:13	20:08 (WTG8)	06:41		07:10	07:39	07:14				07:41	16:23 (WTG9)
	20:48	15 20:23 (WTG8)	20:13		19:24	18:37	17:05				17:02	14 16:37 (WTG9)
22	06:13	20:08 (WTG8)	06:42		07:11	07:40	07:15				07:41	16:24 (WTG9)
	20:47	15 20:23 (WTG8)	20:12		19:23	18:36	17:04				17:03	14 16:38 (WTG9)
23	06:14	20:08 (WTG8)	06:43		07:11	07:41	07:16				07:42	16:24 (WTG9)
	20:46	14 20:22 (WTG8)	20:10		19:21	18:35	17:04				17:03	14 16:38 (WTG9)
24	06:15	20:08 (WTG8)	06:44		07:12	07:43	07:17			16:25 (WTG9)	07:42	16:25 (WTG9)
	20:45	14 20:22 (WTG8)	20:09		19:19	18:33	17:03		11 16:36 (WTG9)	17:04	14 16:39 (WTG9)	
25	06:16	20:09 (WTG8)	06:44		07:13	06:44	07:18		15 16:23 (WTG9)	07:43	16:25 (WTG9)	
	20:44	12 20:21 (WTG8)	20:07		19:18	17:32	17:03		16:38 (WTG9)	17:05	14 16:39 (WTG9)	
26	06:17	20:08 (WTG8)	06:45		07:14	06:45	07:20		16:22 (WTG9)	07:43	16:26 (WTG9)	
	20:44	12 20:20 (WTG8)	20:06		19:16	17:31	17:02		16 16:38 (WTG9)	17:05	13 16:39 (WTG9)	
27	06:18	20:08 (WTG8)	06:46		07:15	06:46	07:21		16:21 (WTG9)	07:44	16:27 (WTG9)	
	20:43	11 20:19 (WTG8)	20:04		19:14	17:29	17:02		16 16:37 (WTG9)	17:06	14 16:41 (WTG9)	
28	06:18	20:09 (WTG8)	06:47		07:16	06:47	07:22		16:21 (WTG9)	07:44	16:27 (WTG9)	
	20:42	9 20:18 (WTG8)	20:03		19:13	17:28	17:01		17 16:38 (WTG9)	17:06	14 16:41 (WTG9)	
29	06:19	20:09 (WTG8)	06:48		07:17	06:48	07:23		16:20 (WTG9)	07:44	16:27 (WTG9)	
	20:41	9 20:18 (WTG8)	20:01		19:11	17:27	17:01		17 16:37 (WTG9)	17:07	15 16:42 (WTG9)	
30	06:20	20:10 (WTG8)	06:49		07:18	06:49	07:24		16:20 (WTG9)	07:44	16:28 (WTG9)	
	20:40	7 20:17 (WTG8)	20:00		19:10	17:26	17:01		17 16:37 (WTG9)	17:08	14 16:42 (WTG9)	
31	06:21	20:10 (WTG8)	06:50			06:50				07:45	16:29 (WTG9)	
	20:39	6 20:16 (WTG8)	19:58			17:24				17:09	15 16:44 (WTG9)	
Potential sun hours	455		425		374		347		301		292	
Total, worst case	533		6						109			458

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F200 - C03

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47		05:58 20:17		
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	4 6	19:22 (WTG8) 19:21 (WTG8) 19:27 (WTG8)	06:26 06:25 20:18	05:58 20:46
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	8	19:20 (WTG8) 19:28 (WTG8)	06:23 20:19	05:58 20:47
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	10	19:19 (WTG8) 19:29 (WTG8)	06:22 20:20	05:57 20:47
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	12	19:19 (WTG8) 19:31 (WTG8)	06:21 20:21	05:57 20:48
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	13	19:18 (WTG8) 19:31 (WTG8)	06:20 20:22	05:57 20:48
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	15	19:17 (WTG8) 19:32 (WTG8)	06:19 20:23	05:56 20:49
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	16	19:17 (WTG8) 19:33 (WTG8)	06:18 20:24	05:56 20:50
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	17	19:17 (WTG8) 19:34 (WTG8)	06:16 20:25	05:56 20:50
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	18	19:17 (WTG8) 19:35 (WTG8)	06:15 20:26	05:56 20:51
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	20	19:16 (WTG8) 19:36 (WTG8)	06:14 20:27	05:56 20:51
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	20	19:17 (WTG8) 19:37 (WTG8)	06:13 20:28	05:56 20:52
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	21	19:16 (WTG8) 19:37 (WTG8)	06:12 20:29	05:55 20:52
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	22	19:17 (WTG8) 19:39 (WTG8)	06:11 20:30	05:55 20:53
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	22	19:17 (WTG8) 19:39 (WTG8)	06:10 20:31	05:55 20:53
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	23	19:18 (WTG8) 19:41 (WTG8)	06:09 20:32	05:55 20:54
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	23	19:18 (WTG8) 19:41 (WTG8)	06:09 20:33	05:55 20:54
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	23	19:19 (WTG8) 19:42 (WTG8)	06:08 20:33	05:56 20:54
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	24	19:19 (WTG8) 19:43 (WTG8)	06:07 20:34	05:56 20:55
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	24	19:20 (WTG8) 19:44 (WTG8)	06:06 20:35	05:56 20:55
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	24	19:22 (WTG8) 19:46 (WTG8)	06:05 20:36	05:56 20:55
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	24	19:22 (WTG8) 19:46 (WTG8)	06:04 20:37	05:56 20:55
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	23	19:24 (WTG8) 19:47 (WTG8)	06:04 20:38	05:56 20:55
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	22	19:26 (WTG8) 19:48 (WTG8)	06:03 20:39	05:57 20:56
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	21	19:28 (WTG8) 19:49 (WTG8)	06:02 20:40	05:57 20:56
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	15	19:31 (WTG8) 19:46 (WTG8)	06:02 20:40	05:57 20:56
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13			06:01 20:41	05:58 20:56
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14			06:01 20:42	05:58 20:56
29	07:35 17:39		07:15 19:44	06:28 20:15			06:00 20:43	05:58 20:56
30	07:34 17:40		07:13 19:45	06:27 20:16			05:59 20:44	05:59 20:56
31	07:34 17:41		07:11 19:46	19:23 (WTG8) 19:25 (WTG8)			05:59 20:44	
Potential sun hours	301	299	370	397	470		445	448
Total, worst case			2					

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F200 - C03

### 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	05:59 20:56	06:22 20:38	06:51 19:57	19:15 (WTG8) 19:34 (WTG8)	07:19 19:08	06:51 17:23
2	06:00 20:56	06:23 20:37	06:52 19:55	19:15 (WTG8) 19:33 (WTG8)	07:20 19:06	06:53 17:22
3	06:00 20:56	06:24 20:36	06:53 19:53	19:15 (WTG8) 19:32 (WTG8)	07:21 19:05	06:54 17:21
4	06:01 20:55	06:25 20:35	06:54 19:52	19:14 (WTG8) 19:30 (WTG8)	07:22 19:03	06:55 17:20
5	06:01 20:55	06:26 20:34	06:55 19:50	19:14 (WTG8) 19:29 (WTG8)	07:23 19:02	06:56 17:19
6	06:02 20:55	06:27 20:32	06:56 19:49	19:14 (WTG8) 19:27 (WTG8)	07:24 19:00	06:57 17:18
7	06:02 20:55	06:28 20:31	06:57 19:47	19:14 (WTG8) 19:26 (WTG8)	07:25 18:58	06:58 17:17
8	06:03 20:54	06:29 20:30	06:58 19:46	19:14 (WTG8) 19:24 (WTG8)	07:26 18:57	06:59 17:16
9	06:04 20:54	06:29 20:29	06:58 19:44	19:14 (WTG8) 19:22 (WTG8)	07:27 18:55	07:00 17:15
10	06:04 20:54	06:30 20:28	06:59 19:42	19:14 (WTG8) 19:20 (WTG8)	07:28 18:54	07:02 17:14
11	06:05 20:53	06:31 20:27	07:00 19:41	19:14 (WTG8) 19:19 (WTG8)	07:29 18:52	07:03 17:13
12	06:06 20:53	06:32 20:25	07:01 19:39	19:15 (WTG8) 19:17 (WTG8)	07:30 18:51	07:04 17:12
13	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	06:09 20:51	06:36 20:20	19:43 (WTG8) 07:05 19:48 (WTG8)	07:06 19:32	07:34 18:45	07:08 17:08
17	06:09 20:50	06:37 20:19	19:37 (WTG8) 07:06 19:54 (WTG8)	07:07 19:31	07:35 18:43	07:10 17:08
18	06:10 20:50	06:38 20:17	19:34 (WTG8) 07:07 19:55 (WTG8)	07:08 19:29	07:36 18:42	07:11 17:07
19	06:11 20:49	06:39 20:16	19:31 (WTG8) 07:08 19:54 (WTG8)	07:09 19:28	07:37 18:40	07:12 17:06
20	06:12 20:48	06:40 20:14	19:29 (WTG8) 07:09 19:53 (WTG8)	07:10 19:26	07:38 18:39	07:13 17:05
21	06:12 20:48	06:41 20:13	19:28 (WTG8) 07:10 19:51 (WTG8)	07:11 19:24	07:39 18:37	07:14 17:05
22	06:13 20:47	06:42 20:12	19:25 (WTG8) 07:11 19:49 (WTG8)	07:12 19:23	07:40 18:36	07:15 17:04
23	06:14 20:46	06:43 20:10	19:24 (WTG8) 07:12 19:48 (WTG8)	07:13 19:21	07:42 18:35	07:16 17:04
24	06:15 20:45	06:44 20:09	19:23 (WTG8) 07:12 19:47 (WTG8)	07:14 19:19	07:43 18:33	07:17 17:03
25	06:16 20:44	06:44 20:07	19:21 (WTG8) 07:13 19:45 (WTG8)	07:15 19:18	07:44 17:32	07:18 17:03
26	06:17 20:44	06:45 20:06	19:20 (WTG8) 07:14 19:44 (WTG8)	07:16 19:16	07:45 17:31	07:19 17:02
27	06:18 20:43	06:46 20:04	19:20 (WTG8) 07:15 19:43 (WTG8)	07:17 19:14	07:46 17:29	07:21 17:02
28	06:18 20:42	06:47 20:03	19:19 (WTG8) 07:16 19:41 (WTG8)	07:18 19:13	07:47 17:28	07:22 17:01
29	06:19 20:41	06:48 20:01	19:18 (WTG8) 07:17 19:40 (WTG8)	07:19 19:11	07:48 17:27	07:23 17:01
30	06:20 20:40	06:49 20:00	19:17 (WTG8) 07:18 19:38 (WTG8)	07:20 19:10	07:49 17:26	07:24 17:01
31	06:21 20:39	06:50 19:58	19:16 (WTG8) 07:19 19:36 (WTG8)	07:21 19:10	07:50 17:24	07:45 17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case		341	141			

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F208 - C02

### 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	07:45	07:33	06:59	07:10		06:26	05:59		
	17:10	17:43	18:15	19:47		20:17	20:45		
2	07:45	07:32	06:57	07:08		06:25	05:58		
	17:11	17:44	18:16	19:48		20:18	20:46		
3	07:45	07:31	06:56	07:07		06:24	05:58		
	17:12	17:45	18:17	19:49		20:19	20:47		
4	07:45	07:30	06:54	07:05		06:22	05:58		
	17:12	17:46	18:18	19:50		20:20	20:47		
5	07:45	07:29	06:53	07:04		06:21	05:57		
	17:13	17:48	18:20	19:51		20:21	20:48		
6	07:45	07:28	06:51	07:02		06:20	05:57		
	17:14	17:49	18:21	19:52		20:22	20:49		
7	07:45	07:27	06:50	07:00		06:19	05:57		
	17:15	17:50	18:22	19:53		20:23	20:49		
8	07:45	07:26	06:48	06:59		06:18	05:56		
	17:16	17:51	18:23	19:54		20:24	20:50		
9	07:45	07:25	06:47	06:57		06:17	05:56		
	17:17	17:52	18:24	19:55	4	07:15 (WTG11)	06:17		
						07:19 (WTG11)	20:25		
10	07:45	07:24	06:45	06:56		06:16	05:56	06:25 (WTG10)	
	17:18	17:54	18:25	19:56	9	07:23 (WTG11)	20:26	4	06:29 (WTG10)
11	07:45	07:23	06:43	06:54		06:15	05:56		06:23 (WTG10)
	17:19	17:55	18:26	19:57	12	07:24 (WTG11)	20:27	10	06:33 (WTG10)
12	07:45	07:21	06:42	06:53		06:13	05:56		06:21 (WTG10)
	17:20	17:56	18:27	19:58	15	07:26 (WTG11)	20:28	13	06:34 (WTG10)
13	07:44	07:20	06:40	06:51		06:12	05:56		06:20 (WTG10)
	17:21	17:57	18:28	19:59	17	07:26 (WTG11)	20:29	16	06:36 (WTG10)
14	07:44	07:19	06:39	06:50		06:12	05:56		06:20 (WTG10)
	17:22	17:58	18:29	20:00	19	07:27 (WTG11)	20:30	17	06:37 (WTG10)
15	07:44	07:18	06:37	06:48		06:11	05:56		06:19 (WTG10)
	17:23	17:59	18:30	20:01	20	07:26 (WTG11)	20:31	19	06:38 (WTG10)
16	07:43	07:16	06:36	06:47		06:10	05:56		06:19 (WTG10)
	17:24	18:01	18:31	20:02	22	07:27 (WTG11)	20:32	19	06:38 (WTG10)
17	07:43	07:15	06:34	06:45		06:09	05:56		06:19 (WTG10)
	17:25	18:02	18:32	20:03	23	07:27 (WTG11)	20:33	20	06:39 (WTG10)
18	07:42	07:14	06:32	06:44		06:08	05:56		06:18 (WTG10)
	17:27	18:03	18:33	20:04	23	07:26 (WTG11)	20:34	21	06:39 (WTG10)
19	07:42	07:13	06:31	06:42		06:07	05:56		06:19 (WTG10)
	17:28	18:04	18:34	20:05	23	07:26 (WTG11)	20:34	22	06:41 (WTG10)
20	07:41	07:11	06:29	06:41		06:06	05:56		06:19 (WTG10)
	17:29	18:05	18:35	20:06	21	07:24 (WTG11)	20:35	22	06:41 (WTG10)
21	07:41	07:10	06:28	06:39		06:05	05:56		06:19 (WTG10)
	17:30	18:06	18:36	20:07	20	07:24 (WTG11)	20:36	22	06:41 (WTG10)
22	07:40	07:09	06:26	06:38		06:05	05:56		06:19 (WTG10)
	17:31	18:07	18:37	20:08	18	07:22 (WTG11)	20:37	22	06:41 (WTG10)
23	07:40	07:07	06:24	06:37		06:04	05:57		06:19 (WTG10)
	17:32	18:09	18:38	20:09	16	07:21 (WTG11)	20:38	22	06:41 (WTG10)
24	07:39	07:06	06:23	06:35		06:03	05:57		06:20 (WTG10)
	17:33	18:10	18:39	20:10	12	07:19 (WTG11)	20:39	21	06:41 (WTG10)
25	07:38	07:04	06:21	06:34		06:03	05:57		06:21 (WTG10)
	17:35	18:11	18:40	20:11	5	07:15 (WTG11)	20:40	20	06:41 (WTG10)
26	07:38	07:03	06:20	06:32		06:02	05:57		06:21 (WTG10)
	17:36	18:12	18:41	20:12		20:41	20:56	20	06:41 (WTG10)
27	07:37	07:02	06:18	06:31		06:01	05:58		06:22 (WTG10)
	17:37	18:13	18:42	20:13		20:41	20:56	19	06:41 (WTG10)
28	07:36	07:00	06:16	06:30		06:01	05:58		06:23 (WTG10)
	17:38	18:14	18:43	20:14		20:42	20:56	17	06:40 (WTG10)
29	07:35		07:15	06:29		06:00	05:59		06:24 (WTG10)
	17:39		19:44	20:15		20:43	20:56	16	06:40 (WTG10)
30	07:35		07:13	06:27		06:00	05:59		06:25 (WTG10)
	17:40		19:45	20:16		20:44	20:56	14	06:39 (WTG10)
31	07:34		07:11			05:59			
	17:42		19:46			20:44			
Potential sun hours	301	299	370	397		445	448		376
Total, worst case				279					

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F208 - C02

### 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	05:59	06:26 (WTG10)	06:22	06:51	07:12 (WTG11)	07:19	06:52	07:25
	20:56	06:37 (WTG10)	20:38	19:57	07:24 (WTG11)	19:08	17:23	17:01
2	06:00	06:29 (WTG10)	06:23	06:52	07:12 (WTG11)	07:20	06:53	07:26
	20:56	06:36 (WTG10)	20:37	19:55	07:21 (WTG11)	19:06	17:22	17:00
3	06:00		06:24	06:53	07:13 (WTG11)	07:21	06:54	07:27
	20:56		20:36	19:54	07:17 (WTG11)	19:05	17:21	17:00
4	06:01		06:25	06:54		07:22	06:55	07:28
	20:55		20:35	19:52		19:03	17:20	17:00
5	06:02		06:26	06:55		07:23	06:56	07:29
	20:55		20:34	19:50		19:02	17:19	17:00
6	06:02		06:27	06:56		07:24	06:57	07:30
	20:55		20:33	19:49		19:00	17:18	17:00
7	06:03		06:28	06:57		07:25	06:58	07:31
	20:55		20:31	19:47		18:59	17:17	17:00
8	06:03		06:29	06:58		07:26	06:59	07:32
	20:54		20:30	19:46		18:57	17:16	17:00
9	06:04		06:30	06:59		07:27	07:01	07:32
	20:54		20:29	19:44		18:55	17:15	17:00
10	06:05		06:31	07:00		07:28	07:02	07:33
	20:54		20:28	19:42		18:54	17:14	17:00
11	06:05		06:32	07:00		07:29	07:03	07:34
	20:53		20:27	19:41		18:52	17:13	17:00
12	06:06		06:32	07:01		07:30	07:04	07:35
	20:53		20:25	19:39		18:51	17:12	17:00
13	06:07		06:33	07:02		07:31	07:05	07:36
	20:52		20:24	19:38		18:49	17:11	17:00
14	06:07		06:34	07:03		07:32	07:06	07:36
	20:52		20:23	19:36		18:48	17:10	17:00
15	06:08		06:35	07:04		07:33	07:07	07:37
	20:51		20:21	19:34		18:46	17:09	17:00
16	06:09		06:36	07:05		07:34	07:09	07:38
	20:51		20:20	19:33		18:45	17:09	17:01
17	06:10		06:37	07:06		07:35	07:10	07:39
	20:50		20:19	19:31		18:43	17:08	17:01
18	06:10		06:38	07:07	07:15 (WTG11)	07:36	07:11	07:39
	20:50		20:17	19:29	07:23 (WTG11)	18:42	17:07	17:01
19	06:11		06:39	07:08	07:13 (WTG11)	07:37	07:12	07:40
	20:49		20:16	19:28	07:25 (WTG11)	18:40	17:06	17:02
20	06:12		06:40	07:09	07:11 (WTG11)	07:38	07:13	07:40
	20:48		20:15	19:26	07:27 (WTG11)	18:39	17:06	17:02
21	06:13		06:41	07:10	07:09 (WTG11)	07:39	07:14	07:41
	20:48		20:13	19:24	07:28 (WTG11)	18:38	17:05	17:03
22	06:14		06:42	07:11	07:08 (WTG11)	07:41	07:15	07:41
	20:47		20:12	19:23	07:29 (WTG11)	18:36	17:04	17:03
23	06:14		06:43	07:12	07:07 (WTG11)	07:42	07:16	07:42
	20:46		20:10	19:21	07:28 (WTG11)	18:35	17:04	17:04
24	06:15		06:44	07:13	07:06 (WTG11)	07:43	07:17	07:42
	20:45		20:09	19:19	07:29 (WTG11)	18:34	17:03	17:04
25	06:16		06:45	07:14	07:06 (WTG11)	07:44	07:19	07:43
	20:45		20:07	19:18	07:29 (WTG11)	17:32	17:03	17:05
26	06:17		06:46	07:14	07:06 (WTG11)	07:45	07:20	07:43
	20:44		20:06	19:16	07:29 (WTG11)	17:31	17:02	17:05
27	06:18		06:47	07:15	07:07 (WTG11)	07:46	07:21	07:44
	20:43		20:04	19:15	07:28 (WTG11)	17:30	17:02	17:06
28	06:19		06:47	07:16	07:08 (WTG11)	07:47	07:22	07:44
	20:42		20:03	19:13	07:28 (WTG11)	17:28	17:02	17:07
29	06:20		06:48	07:17	07:09 (WTG11)	07:48	07:23	07:44
	20:41		20:01	19:11	07:27 (WTG11)	17:27	17:01	17:07
30	06:20		06:49	07:18	07:10 (WTG11)	07:49	07:24	07:44
	20:40		20:00	19:10	07:27 (WTG11)	17:26	17:01	17:08
31	06:21		06:50	07:19	07:11 (WTG11)	07:50		07:45
	20:39		19:58	14	07:25 (WTG11)	17:25		17:09
Potential sun hours	455	425	374	347	301	292		
Total, worst case	18	256	25					

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F237 - B04  
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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:32 16:59
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:56 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:39 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:56	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:45 20:07	07:13 19:18	07:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	07:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	07:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	07:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	07:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	07:49 17:26	07:24 17:01	07:45 17:08
31	07:34 17:42		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F267 - A02

### 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	07:45 17:10	07:33 17:43	06:59 18:15		07:10 19:47		07:28 (WTG1) 08:00 (WTG1)	06:26 20:17	05:58 20:45
2	07:45 17:10	07:32 17:44	06:57 18:16		07:08 19:48	34	07:26 (WTG1) 08:00 (WTG1)	06:25 20:18	05:58 20:46
3	07:45 17:11	07:31 17:45	06:56 18:17		07:07 19:49	35	07:25 (WTG1) 08:00 (WTG1)	06:23 20:19	05:58 20:47
4	07:45 17:12	07:30 17:46	06:54 18:18		07:05 19:50	37	07:23 (WTG1) 08:00 (WTG1)	06:22 20:20	05:57 20:47
5	07:45 17:13	07:29 17:47	06:53 18:19		07:03 19:51	38	07:22 (WTG1) 08:00 (WTG1)	06:21 20:21	05:57 20:48
6	07:45 17:14	07:28 17:49	06:51 18:21		07:02 19:52	39	07:20 (WTG1) 07:59 (WTG1)	06:20 20:22	05:57 20:49
7	07:45 17:15	07:27 17:50	06:50 18:22		07:00 19:53	40	07:18 (WTG1) 07:58 (WTG1)	06:19 20:23	05:56 20:49
8	07:45 17:16	07:26 17:51	06:48 18:23		06:59 19:54	41	07:17 (WTG1) 07:58 (WTG1)	06:18 20:24	05:56 20:50
9	07:45 17:17	07:25 17:52	06:47 18:24		06:57 19:55	42	07:15 (WTG1) 07:57 (WTG1)	06:16 20:25	05:56 20:50
10	07:45 17:18	07:24 17:53	06:45 18:25		06:56 19:56	40	07:16 (WTG1) 07:56 (WTG1)	06:15 20:26	05:56 20:51
11	07:45 17:19	07:23 17:55	06:43 18:26		06:54 19:57	39	07:16 (WTG1) 07:55 (WTG1)	06:14 20:27	05:56 20:52
12	07:45 17:20	07:21 17:56	06:42 18:27	3	07:00 (WTG2) 07:03 (WTG2)	37	07:17 (WTG1) 07:54 (WTG1)	06:13 20:28	05:56 20:52
13	07:44 17:21	07:20 17:57	06:40 18:28	6	06:59 (WTG2) 07:05 (WTG2)	35	07:17 (WTG1) 07:52 (WTG1)	06:12 20:29	05:55 20:52
14	07:44 17:22	07:19 17:58	06:39 18:29	9	06:57 (WTG2) 07:06 (WTG2)	33	07:18 (WTG1) 07:51 (WTG1)	06:11 20:30	05:55 20:53
15	07:44 17:23	07:18 17:59	06:37 18:30	11	06:55 (WTG2) 07:06 (WTG2)	30	07:19 (WTG1) 07:49 (WTG1)	06:10 20:31	05:55 20:53
16	07:43 17:24	07:17 18:00	06:36 18:31	12	06:54 (WTG2) 07:06 (WTG2)	27	07:21 (WTG1) 07:48 (WTG1)	06:09 20:32	05:55 20:54
17	07:43 17:25	07:15 18:02	06:34 18:32	14	06:52 (WTG2) 07:06 (WTG2)	23	07:22 (WTG1) 07:45 (WTG1)	06:09 20:33	05:55 20:54
18	07:43 17:26	07:14 18:03	06:32 18:33	15	06:51 (WTG2) 07:06 (WTG2)	17	07:25 (WTG1) 07:42 (WTG1)	06:08 20:34	05:56 20:54
19	07:42 17:27	07:13 18:04	06:31 18:34	16	06:49 (WTG2) 07:05 (WTG2)	8	07:30 (WTG1) 07:38 (WTG1)	06:07 20:35	05:56 20:55
20	07:42 17:29	07:11 18:05	06:29 18:35	17	06:47 (WTG2) 07:04 (WTG2)			06:06 20:35	05:56 20:55
21	07:41 17:30	07:10 18:06	06:27 18:36	17	06:46 (WTG2) 07:03 (WTG2)			06:05 20:36	05:56 20:55
22	07:40 17:31	07:09 18:07	06:26 18:37	17	06:44 (WTG1) 07:01 (WTG2)			06:04 20:37	05:56 20:55
23	07:40 17:32	07:07 18:08	06:24 18:38	17	06:42 (WTG1) 06:59 (WTG2)			06:04 20:38	05:56 20:56
24	07:39 17:33	07:06 18:10	06:23 18:39	14	06:41 (WTG1) 06:55 (WTG1)			06:03 20:39	05:57 20:56
25	07:38 17:34	07:04 18:11	06:21 18:40	17	06:39 (WTG1) 06:56 (WTG1)			06:02 20:40	05:57 20:56
26	07:38 17:36	07:03 18:12	06:19 18:41	20	06:38 (WTG1) 06:58 (WTG1)			06:02 20:41	05:57 20:56
27	07:37 17:37	07:02 18:13	06:18 18:42	23	06:36 (WTG1) 06:59 (WTG1)			06:01 20:41	05:58 20:56
28	07:36 17:38	07:00 18:14	06:16 18:43	25	06:34 (WTG1) 06:59 (WTG1)			06:00 20:42	05:58 20:56
29	07:35 17:39		07:15 19:44	27	07:33 (WTG1) 08:00 (WTG1)			06:00 20:43	05:58 20:56
30	07:35 17:40		07:13 19:45	29	07:31 (WTG1) 08:00 (WTG1)			05:59 20:44	05:59 20:56
31	07:34 17:41		07:11 19:46	31	07:30 (WTG1) 08:01 (WTG1)			05:59 20:45	
Potential sun hours	301	299	370		397			445	448
Total, worst case			340		627				

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F267 - A02

### 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	05:59 20:56	06:22 20:38	06:51 19:57	07:15 (WTG1) 19:08	07:39 (WTG2) 17:23	07:25 17:00
2	06:00 20:56	06:23 20:37	06:52 19:55	07:14 (WTG1) 19:06	07:40 (WTG2) 17:22	07:26 17:00
3	06:00 20:56	06:24 20:36	06:53 19:54	07:13 (WTG1) 19:05	07:41 (WTG2) 17:21	07:27 17:00
4	06:01 20:55	06:25 20:34	06:54 19:52	07:14 (WTG1) 19:03	07:42 (WTG2) 17:20	07:28 17:00
5	06:01 20:55	06:26 20:34	06:55 19:50	07:15 (WTG1) 19:02	07:43 (WTG2) 17:19	07:29 17:00
6	06:02 20:55	06:27 20:33	06:56 19:49	07:16 (WTG1) 19:00	07:44 (WTG2) 17:18	07:30 16:59
7	06:02 20:55	06:28 20:31	06:57 19:47	07:17 (WTG1) 18:58	07:45 (WTG2) 17:17	07:31 16:59
8	06:03 20:55	06:29 20:30	06:58 19:46	07:18 (WTG1) 18:57	07:46 (WTG2) 17:16	07:32 16:59
9	06:04 20:54	06:29 20:29	06:59 19:44	07:19 (WTG1) 18:55	07:47 (WTG2) 17:15	07:32 16:59
10	06:04 20:54	06:30 20:28	06:59 19:42	07:19 (WTG1) 18:54	07:48 (WTG2) 17:14	07:33 16:59
11	06:05 20:53	06:31 20:27	07:00 19:41	07:20 (WTG1) 18:52	07:49 (WTG2) 17:13	07:34 17:00
12	06:06 20:53	06:32 20:25	07:01 19:39	07:21 (WTG1) 18:51	07:50 (WTG2) 17:12	07:35 17:00
13	06:06 20:53	06:33 20:24	07:02 19:38	07:22 (WTG1) 18:49	07:51 (WTG2) 17:11	07:36 17:00
14	06:07 20:52	06:34 20:23	07:03 19:36	07:23 (WTG1) 18:48	07:52 (WTG2) 17:10	07:37 17:00
15	06:08 20:52	06:35 20:21	07:04 19:34	07:24 (WTG1) 18:46	07:53 (WTG2) 17:09	07:37 17:00
16	06:09 20:51	06:36 20:20	07:05 19:33	07:25 (WTG1) 18:45	07:54 (WTG2) 17:08	07:38 17:00
17	06:09 20:50	06:37 20:19	07:06 19:31	07:26 (WTG1) 18:43	07:55 (WTG2) 17:08	07:39 17:01
18	06:10 20:50	06:38 20:17	07:07 19:29	07:27 (WTG1) 18:42	07:56 (WTG2) 17:07	07:39 17:01
19	06:11 20:49	06:39 20:16	07:08 19:28	07:28 (WTG1) 18:40	07:57 (WTG2) 17:06	07:40 17:02
20	06:12 20:48	06:40 20:15	07:09 19:26	07:28 (WTG1) 18:39	07:58 (WTG2) 17:05	07:40 17:02
21	06:12 20:48	06:41 20:13	07:10 19:24	07:29 (WTG1) 18:38	07:59 (WTG2) 17:05	07:41 17:02
22	06:13 20:47	06:42 20:12	07:11 19:23	07:30 (WTG1) 18:36	08:00 (WTG2) 17:04	07:42 17:03
23	06:14 20:46	06:43 20:10	07:12 19:21	07:31 (WTG1) 18:35	08:01 (WTG2) 17:04	07:42 17:03
24	06:15 20:45	06:44 20:09	07:13 19:19	07:32 (WTG1) 18:33	08:02 (WTG2) 17:03	07:43 17:04
25	06:16 20:45	06:45 20:07	07:13 19:18	07:33 (WTG1) 18:32	08:03 (WTG2) 17:03	07:43 17:04
26	06:17 20:44	06:45 20:06	07:14 19:16	07:34 (WTG1) 18:31	08:04 (WTG2) 17:02	07:43 17:05
27	06:18 20:43	06:46 20:04	07:15 19:15	07:35 (WTG1) 18:29	08:05 (WTG2) 17:02	07:44 17:06
28	06:18 20:42	06:47 20:03	07:16 19:13	07:36 (WTG1) 18:28	08:06 (WTG2) 17:01	07:44 17:06
29	06:19 20:41	06:48 20:01	07:17 19:11	07:37 (WTG1) 18:27	08:07 (WTG2) 17:01	07:44 17:07
30	06:20 20:40	06:49 20:00	07:18 19:10	07:38 (WTG1) 18:26	08:08 (WTG2) 17:01	07:45 17:08
31	06:21 20:39	06:50 19:58	07:19 19:08	07:39 (WTG1) 18:25	08:09 (WTG2) 17:01	07:45 17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case		213	762	6		

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F269 - A07

### 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	07:45 17:10	07:33 17:43	06:59 18:15		07:10 19:47		07:28 (WTG1) 08:00 (WTG1)	06:26 20:17	05:58 20:45
2	07:45 17:10	07:32 17:44	06:57 18:16		07:08 19:48	32	07:26 (WTG1) 07:59 (WTG1)	06:25 20:18	05:58 20:46
3	07:45 17:11	07:31 17:45	06:56 18:17		07:07 19:49	33	07:25 (WTG1) 07:59 (WTG1)	06:23 20:19	05:58 20:47
4	07:45 17:12	07:30 17:46	06:54 18:18		07:05 19:50	34	07:23 (WTG1) 07:58 (WTG1)	06:22 20:20	05:57 20:47
5	07:45 17:13	07:29 17:47	06:53 18:19		07:03 19:51	35	07:22 (WTG1) 07:57 (WTG1)	06:21 20:21	05:57 20:48
6	07:45 17:14	07:28 17:49	06:51 18:21		07:02 19:52	35	07:22 (WTG1) 07:56 (WTG1)	06:20 20:22	05:57 20:49
7	07:45 17:15	07:27 17:50	06:50 18:22		07:00 19:53	31	07:23 (WTG1) 07:54 (WTG1)	06:19 20:23	05:56 20:49
8	07:45 17:16	07:26 17:51	06:48 18:23		06:59 19:54	29	07:24 (WTG1) 07:53 (WTG1)	06:18 20:24	05:56 20:50
9	07:45 17:17	07:25 17:52	06:47 18:24		06:57 19:55	26	07:25 (WTG1) 07:51 (WTG1)	06:16 20:25	05:56 20:50
10	07:45 17:18	07:24 17:53	06:45 18:25		06:56 19:56	22	07:27 (WTG1) 07:49 (WTG1)	06:15 20:26	05:56 20:51
11	07:45 17:19	07:23 17:55	06:43 18:26	2	07:02 (WTG2) 07:04 (WTG2)	16	07:29 (WTG1) 07:45 (WTG1)	06:14 20:27	05:56 20:52
12	07:45 17:20	07:21 17:56	06:42 18:27	5	07:00 (WTG2) 07:05 (WTG2)	7	07:00 (WTG2) 07:41 (WTG1)	06:53 20:28	05:56 20:52
13	07:44 17:21	07:20 17:57	06:40 18:28	8	06:59 (WTG2) 07:07 (WTG2)		06:51 19:59	06:12 20:29	05:55 20:52
14	07:44 17:22	07:19 17:58	06:39 18:29	9	06:57 (WTG2) 07:06 (WTG2)		06:50 20:00	06:11 20:30	05:55 20:53
15	07:44 17:23	07:18 17:59	06:37 18:30	11	06:55 (WTG2) 07:06 (WTG2)		06:48 20:01	06:10 20:31	05:55 20:53
16	07:43 17:24	07:17 18:00	06:36 18:31	12	06:54 (WTG2) 07:06 (WTG2)		06:47 20:02	06:09 20:32	05:55 20:54
17	07:43 17:25	07:15 18:02	06:34 18:32	14	06:52 (WTG2) 07:06 (WTG2)		06:45 20:03	06:09 20:33	05:55 20:54
18	07:43 17:26	07:14 18:03	06:32 18:33	14	06:51 (WTG2) 07:05 (WTG2)		06:44 20:04	06:08 20:34	05:56 20:54
19	07:42 17:27	07:13 18:04	06:31 18:34	15	06:49 (WTG2) 07:04 (WTG2)		06:42 20:05	06:07 20:35	05:56 20:55
20	07:42 17:29	07:11 18:05	06:29 18:35	15	06:47 (WTG1) 07:02 (WTG2)		06:41 20:06	06:06 20:35	05:56 20:55
21	07:41 17:30	07:10 18:06	06:27 18:36	14	06:27 (WTG1) 07:00 (WTG2)		06:39 20:07	06:05 20:36	05:56 20:55
22	07:40 17:31	07:09 18:07	06:26 18:37	15	06:44 (WTG1) 06:59 (WTG1)		06:38 20:08	06:04 20:37	05:56 20:55
23	07:40 17:32	07:07 18:08	06:24 18:38	18	06:42 (WTG1) 07:00 (WTG1)		06:36 20:09	06:04 20:38	05:56 20:56
24	07:39 17:33	07:06 18:10	06:23 18:39	20	06:41 (WTG1) 07:01 (WTG1)		06:35 20:10	06:03 20:39	05:57 20:56
25	07:39 17:34	07:04 18:11	06:21 18:40	22	06:39 (WTG1) 07:01 (WTG1)		06:34 20:11	06:02 20:40	05:57 20:56
26	07:38 17:36	07:03 18:12	06:19 18:41	24	06:38 (WTG1) 07:02 (WTG1)		06:32 20:12	06:02 20:41	05:57 20:56
27	07:37 17:37	07:02 18:13	06:18 18:42	26	06:36 (WTG1) 07:02 (WTG1)		06:31 20:13	06:01 20:41	05:58 20:56
28	07:36 17:38	07:00 18:14	06:16 18:43	27	06:34 (WTG1) 07:01 (WTG1)		06:30 20:14	06:00 20:42	05:58 20:56
29	07:35 17:39		07:15 19:44	29	07:33 (WTG1) 08:02 (WTG1)		06:28 20:15	06:00 20:43	05:58 20:56
30	07:35 17:40		07:13 19:45	30	07:31 (WTG1) 08:01 (WTG1)		06:27 20:16	05:59 20:44	05:59 20:56
31	07:34 17:41		07:11 19:46	31	07:30 (WTG1) 08:01 (WTG1)			05:59 20:45	
Potential sun hours	301	299	370		397		445	448	
Total, worst case			361		334				

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F269 - A07

### 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	05:59 20:56	06:22 20:38	06:51 19:57	07:28 (WTG1) 19:08	07:19 19:08	07:25 17:00
2	06:00 20:56	06:23 20:37	06:52 19:55	07:25 (WTG1) 19:06	07:20 19:06	07:26 17:00
3	06:00 20:56	06:24 20:36	06:53 19:54	07:23 (WTG1) 19:05	07:21 19:05	07:27 17:00
4	06:01 20:56	06:25 20:35	06:54 19:52	07:21 (WTG1) 19:03	07:22 19:03	07:28 17:00
5	06:01 20:55	06:26 20:34	06:55 19:50	07:20 (WTG1) 19:02	07:23 19:02	07:29 17:00
6	06:02 20:55	06:27 20:33	06:56 19:49	07:18 (WTG1) 19:00	07:24 19:00	07:30 16:59
7	06:02 20:55	06:28 20:32	06:57 19:47	07:17 (WTG1) 19:47	07:25 18:58	07:31 16:59
8	06:03 20:55	06:29 20:30	06:58 19:46	07:18 (WTG1) 19:46	07:26 18:57	07:32 16:59
9	06:04 20:54	06:29 20:29	06:59 19:44	07:19 (WTG1) 19:44	07:27 18:55	07:32 16:59
10	06:04 20:54	06:30 20:28	06:59 19:42	07:19 (WTG1) 19:42	07:28 18:54	07:33 16:59
11	06:05 20:53	06:31 20:27	07:00 19:41	07:20 (WTG1) 19:41	07:29 18:52	07:34 17:00
12	06:06 20:53	06:32 20:25	07:01 19:39	07:21 (WTG1) 19:39	07:30 18:51	07:35 17:00
13	06:06 20:53	06:33 20:24	07:02 19:38	07:22 (WTG1) 19:38	07:31 18:49	07:36 17:00
14	06:07 20:52	06:34 20:23	07:03 19:36	07:23 (WTG1) 19:36	07:32 18:48	07:37 17:00
15	06:08 20:52	06:35 20:21	07:04 19:34	07:24 (WTG1) 19:34	07:33 18:46	07:37 17:00
16	06:09 20:51	06:36 20:20	07:05 19:33	07:25 (WTG1) 19:33	07:34 18:45	07:38 17:00
17	06:09 20:50	06:37 20:19	07:06 19:31	07:26 (WTG1) 19:31	07:35 18:43	07:39 17:01
18	06:10 20:50	06:38 20:17	07:07 19:29	07:27 (WTG1) 19:29	07:36 18:42	07:39 17:01
19	06:11 20:49	06:39 20:16	07:08 19:28	07:28 (WTG1) 19:28	07:37 18:40	07:40 17:02
20	06:12 20:48	06:40 20:15	07:09 19:26	07:28 (WTG1) 19:26	07:38 18:39	07:40 17:02
21	06:12 20:48	06:41 20:13	07:10 19:24	07:29 (WTG1) 19:24	07:39 18:38	07:41 17:02
22	06:13 20:47	06:42 20:12	07:11 19:23	07:30 (WTG1) 19:23	07:41 18:36	07:42 17:03
23	06:14 20:46	06:43 20:10	07:12 19:21	07:31 (WTG1) 19:21	07:42 18:35	07:42 17:03
24	06:15 20:45	06:44 20:09	07:13 19:19	07:32 (WTG2) 19:19	07:43 18:33	07:43 17:04
25	06:16 20:45	06:45 20:07	07:13 19:18	07:33 (WTG2) 19:18	06:44 17:32	07:43 17:04
26	06:17 20:44	06:45 20:06	07:14 19:16	07:34 (WTG2) 19:16	06:45 17:31	07:43 17:05
27	06:18 20:43	06:46 20:04	07:15 19:15	07:35 (WTG2) 19:15	06:46 17:29	07:44 17:06
28	06:18 20:42	06:47 20:03	07:16 19:13	07:36 (WTG2) 19:13	06:47 17:28	07:44 17:06
29	06:19 20:41	06:48 20:01	07:17 19:11	07:37 (WTG2) 19:11	06:48 17:27	07:44 17:07
30	06:20 20:40	06:49 20:00	07:18 19:10	07:38 (WTG2) 19:10	06:49 17:26	07:45 17:08
31	06:21 20:39	06:50 19:58	07:19 19:08	07:39 (WTG2) 19:08	06:50 17:24	07:45 17:09
Potential sun hours	455	425	374	347	301	292
Total, worst case		7	688	10		

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F295 - A02  
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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	07:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	07:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	07:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	07:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	07:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	07:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F304 - D06 - D01

### 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	07:45	07:33	06:59	07:10		06:26	06:59 (WTG13)	05:59	06:20 (WTG12)	
	17:10	17:43	18:15	19:47		20:17	07:39 (WTG13)	20:45	10 06:30 (WTG12)	
2	07:45	07:32	06:57	07:08		06:25	07:00 (WTG13)	05:58	06:19 (WTG12)	
	17:11	17:44	18:16	19:48		20:18	07:39 (WTG13)	20:46	11 06:30 (WTG12)	
3	07:45	07:31	06:56	07:07		06:23	07:00 (WTG13)	05:58	06:19 (WTG12)	
	17:11	17:45	18:17	19:49		20:19	07:37 (WTG13)	20:46	12 06:31 (WTG12)	
4	07:45	07:30	06:54	07:05		06:22	07:01 (WTG13)	05:57	06:19 (WTG12)	
	17:12	17:46	18:18	19:50		20:20	07:36 (WTG13)	20:47	13 06:32 (WTG12)	
5	07:45	07:29	06:53	07:03		06:21	07:02 (WTG13)	05:57	06:18 (WTG12)	
	17:13	17:48	18:19	19:51		20:21	07:34 (WTG13)	20:48	14 06:32 (WTG12)	
6	07:45	07:28	06:51	07:02		07:20 (WTG13)	06:20	05:57	06:18 (WTG12)	
	17:14	17:49	18:21	19:52	13	07:33 (WTG13)	20:22	29 07:33 (WTG13)	20:48	14 06:32 (WTG12)
7	07:45	07:27	06:50	07:00		07:18 (WTG13)	06:19	07:05 (WTG13)	05:57	06:18 (WTG12)
	17:15	17:50	18:22	19:53	18	07:36 (WTG13)	20:23	27 07:32 (WTG13)	20:49	15 06:33 (WTG12)
8	07:45	07:26	06:48	06:59		07:17 (WTG13)	06:18	07:07 (WTG13)	05:56	06:18 (WTG12)
	17:16	17:51	18:23	19:54	22	07:39 (WTG13)	20:24	23 07:30 (WTG13)	20:50	15 06:33 (WTG12)
9	07:45	07:25	06:46	06:57		07:15 (WTG13)	06:17	07:09 (WTG13)	05:56	06:17 (WTG12)
	17:17	17:52	18:24	19:55	25	07:40 (WTG13)	20:25	18 07:27 (WTG13)	20:50	16 06:33 (WTG12)
10	07:45	07:24	06:45	06:56		07:14 (WTG13)	06:16	07:13 (WTG13)	05:56	06:17 (WTG12)
	17:18	17:54	18:25	19:56	28	07:42 (WTG13)	20:26	11 07:24 (WTG13)	20:51	16 06:33 (WTG12)
11	07:45	07:22	06:43	06:54		07:12 (WTG13)	06:14		05:56	06:17 (WTG12)
	17:19	17:55	18:26	19:57	30	07:42 (WTG13)	20:27		20:51	17 06:34 (WTG12)
12	07:44	07:21	06:42	06:53		07:11 (WTG13)	06:13		05:56	06:17 (WTG12)
	17:20	17:56	18:27	19:58	32	07:43 (WTG13)	20:28		20:52	17 06:34 (WTG12)
13	07:44	07:20	06:40	06:51		07:09 (WTG13)	06:12		05:56	06:17 (WTG12)
	17:21	17:57	18:28	19:59	35	07:44 (WTG13)	20:29		20:52	17 06:34 (WTG12)
14	07:44	07:19	06:39	06:50		07:08 (WTG13)	06:11		05:56	06:17 (WTG12)
	17:22	17:58	18:29	20:00	37	07:45 (WTG13)	20:30		20:53	18 06:35 (WTG12)
15	07:44	07:18	06:37	06:48		07:06 (WTG13)	06:11		05:56	06:17 (WTG12)
	17:23	17:59	18:30	20:01	38	07:44 (WTG13)	20:31		20:53	18 06:35 (WTG12)
16	07:43	07:16	06:35	06:47		07:05 (WTG13)	06:10		05:56	06:17 (WTG12)
	17:24	18:01	18:31	20:02	40	07:45 (WTG13)	20:32		20:53	18 06:35 (WTG12)
17	07:43	07:15	06:34	06:45		07:03 (WTG13)	06:09		05:56	06:17 (WTG12)
	17:25	18:02	18:32	20:03	42	07:45 (WTG13)	20:33		20:54	18 06:35 (WTG12)
18	07:42	07:14	06:32	06:44		07:02 (WTG13)	06:08		05:56	06:17 (WTG12)
	17:27	18:03	18:33	20:04	43	07:45 (WTG13)	20:33		20:54	18 06:35 (WTG12)
19	07:42	07:13	06:31	06:42		07:01 (WTG13)	06:07		05:56	06:18 (WTG12)
	17:28	18:04	18:34	20:05	45	07:46 (WTG13)	20:34		20:54	18 06:36 (WTG12)
20	07:41	07:11	06:29	06:41		06:59 (WTG13)	06:06		05:56	06:18 (WTG12)
	17:29	18:05	18:35	20:06	46	07:45 (WTG13)	20:35		20:55	18 06:36 (WTG12)
21	07:41	07:10	06:27	06:39		06:58 (WTG13)	06:05		05:56	06:18 (WTG12)
	17:30	18:06	18:36	20:07	47	07:45 (WTG13)	20:36		20:55	18 06:36 (WTG12)
22	07:40	07:08	06:26	06:38		06:57 (WTG13)	06:05		05:56	06:18 (WTG12)
	17:31	18:07	18:37	20:08	47	07:44 (WTG13)	20:37		20:55	18 06:36 (WTG12)
23	07:40	07:07	06:24	06:37		06:57 (WTG13)	06:04		05:57	06:18 (WTG12)
	17:32	18:08	18:38	20:09	47	07:44 (WTG13)	20:38		20:55	18 06:36 (WTG12)
24	07:39	07:06	06:23	06:35		06:57 (WTG13)	06:03		05:57	06:19 (WTG12)
	17:33	18:10	18:39	20:10	47	07:44 (WTG13)	20:39		20:56	18 06:37 (WTG12)
25	07:38	07:04	06:21	06:34		06:57 (WTG13)	06:02		05:57	06:19 (WTG12)
	17:35	18:11	18:40	20:11	46	07:43 (WTG13)	20:40		20:56	18 06:37 (WTG12)
26	07:38	07:03	06:19	06:32		06:57 (WTG13)	06:02	06:22 (WTG12)	05:57	06:19 (WTG12)
	17:36	18:12	18:41	20:12	46	07:43 (WTG13)	20:40	2 06:24 (WTG12)	20:56	18 06:37 (WTG12)
27	07:37	07:01	06:18	06:31		06:58 (WTG13)	06:01	06:22 (WTG12)	05:58	06:20 (WTG12)
	17:37	18:13	18:42	20:13	45	07:43 (WTG13)	20:41	4 06:26 (WTG12)	20:56	18 06:38 (WTG12)
28	07:36	07:00	06:16	06:30		06:57 (WTG13)	06:01	06:21 (WTG12)	05:58	06:20 (WTG12)
	17:38	18:14	18:43	20:14	44	07:41 (WTG13)	20:42	6 06:27 (WTG12)	20:56	18 06:38 (WTG12)
29	07:35		07:15	06:28		06:58 (WTG13)	06:00	06:21 (WTG12)	05:59	06:20 (WTG12)
	17:39		19:44	20:15	43	07:41 (WTG13)	20:43	7 06:28 (WTG12)	20:56	17 06:37 (WTG12)
30	07:34		07:13	06:27		06:59 (WTG13)	06:00	06:20 (WTG12)	05:59	06:21 (WTG12)
	17:40		19:45	20:16	41	07:40 (WTG13)	20:44	8 06:28 (WTG12)	20:56	17 06:38 (WTG12)
31	07:34		07:11				05:59	06:20 (WTG12)		
	17:42		19:46				20:44	9 06:29 (WTG12)		
Potential sun hours	301	299	370	397		445		448		491
Total, worst case				947		327				

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F304 - D06 - D01

### 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	05:59 20:56	06:21 (WTG12) 06:38 (WTG12)	06:22 20:38			
2	06:00 20:56	06:22 (WTG12) 06:38 (WTG12)	06:23 20:37	07:27 (WTG13) 07:30 (WTG13)	06:52 19:55	30
3	06:00 20:55	06:22 (WTG12) 06:38 (WTG12)	06:24 20:36	07:21 (WTG13) 07:35 (WTG13)	06:53 19:54	28
4	06:01 20:55	06:23 (WTG12) 06:38 (WTG12)	06:25 20:35	07:18 (WTG13) 07:40 (WTG13)	06:54 19:50	22
5	06:02 20:55	06:24 (WTG12) 06:38 (WTG12)	06:27 20:32	07:14 (WTG13) 07:42 (WTG13)	06:56 19:49	18
6	06:03 20:55	06:25 (WTG12) 06:39 (WTG12)	06:28 20:31	07:13 (WTG13) 07:43 (WTG13)	06:57 19:47	13
7	06:03 20:54	06:25 (WTG12) 06:38 (WTG12)	06:29 20:30	07:12 (WTG13) 07:45 (WTG13)	06:58 19:46	13
8	06:04 20:54	06:26 (WTG12) 06:38 (WTG12)	06:30 20:29	07:11 (WTG13) 07:46 (WTG13)	06:59 19:44	12
9	06:04 20:54	06:26 (WTG12) 06:38 (WTG12)	06:31 20:29	07:10 (WTG13) 07:46 (WTG13)	06:59 19:44	12
10	06:05 20:53	06:27 (WTG12) 06:38 (WTG12)	06:31 20:26	07:09 (WTG13) 07:48 (WTG13)	07:00 19:41	11
11	06:05 20:53	06:27 (WTG12) 06:38 (WTG12)	06:31 20:26	07:09 (WTG13) 07:48 (WTG13)	07:00 19:41	11
12	06:06 20:53	06:28 (WTG12) 06:38 (WTG12)	06:32 20:25	07:08 (WTG13) 07:48 (WTG13)	07:01 19:39	10
13	06:07 20:52	06:28 (WTG12) 06:37 (WTG12)	06:33 20:24	07:06 (WTG13) 07:48 (WTG13)	07:02 19:37	9
14	06:07 20:52	06:29 (WTG12) 06:37 (WTG12)	06:34 20:23	07:05 (WTG13) 07:49 (WTG13)	07:03 19:36	8
15	06:08 20:51	06:30 (WTG12) 06:36 (WTG12)	06:35 20:21	07:05 (WTG13) 07:49 (WTG13)	07:04 19:34	6
16	06:09 20:51	06:31 (WTG12) 06:36 (WTG12)	06:36 20:20	07:04 (WTG13) 07:49 (WTG13)	07:05 19:33	5
17	06:09 20:50	06:31 (WTG12) 06:34 (WTG12)	06:37 20:19	07:04 (WTG13) 07:50 (WTG13)	07:06 19:31	3
18	06:10 20:50	06:32 (WTG12) 06:33 (WTG12)	06:38 20:17	07:03 (WTG13) 07:50 (WTG13)	07:07 19:29	1
19	06:11 20:49	06:39 20:16	06:39 20:16	07:03 (WTG13) 07:50 (WTG13)	07:08 19:28	
20	06:12 20:48	06:40 20:14	06:40 20:14	07:03 (WTG13) 07:50 (WTG13)	07:09 19:26	
21	06:13 20:48	06:41 20:13	06:41 20:13	07:03 (WTG13) 07:50 (WTG13)	07:10 19:24	
22	06:13 20:47	06:42 20:12	06:42 20:12	07:03 (WTG13) 07:50 (WTG13)	07:11 19:23	
23	06:14 20:46	06:43 20:10	06:43 20:10	07:03 (WTG13) 07:49 (WTG13)	07:12 19:21	
24	06:15 20:45	06:44 20:09	06:44 20:09	07:04 (WTG13) 07:49 (WTG13)	07:12 19:19	
25	06:16 20:44	06:45 20:07	06:45 20:07	07:05 (WTG13) 07:48 (WTG13)	07:13 19:18	
26	06:17 20:44	06:46 20:06	06:46 20:06	07:06 (WTG13) 07:48 (WTG13)	07:14 19:16	
27	06:18 20:43	06:46 20:04	06:46 20:04	07:07 (WTG13) 07:47 (WTG13)	07:15 19:14	
28	06:19 20:42	06:47 20:03	06:47 20:03	07:08 (WTG13) 07:46 (WTG13)	07:16 19:13	
29	06:20 20:41	06:48 20:01	06:48 20:01	07:09 (WTG13) 07:45 (WTG13)	07:17 19:11	
30	06:20 20:40	06:49 20:00	06:49 20:00	07:10 (WTG13) 07:45 (WTG13)	07:18 19:10	
31	06:21 20:39	06:50 19:58	06:50 19:58	07:11 (WTG13) 07:43 (WTG13)		
Potential sun hours	455	425	374	347	301	292
Total, worst case	198	1116	136			

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F322 - Seminativo

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	06:19 (WTG6) 20:20 (WTG5)	05:59 20:56	06:21 (WTG6) 20:31 (WTG5)	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:19 (WTG6) 20:21 (WTG5)	06:00 20:56	06:22 (WTG6) 20:31 (WTG5)	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:19 (WTG6) 20:22 (WTG5)	06:00 20:56	06:24 (WTG6) 20:31 (WTG5)	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:18 (WTG6) 20:22 (WTG5)	06:01 20:55	06:23 (WTG6) 20:31 (WTG5)	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:18 (WTG6) 20:23 (WTG5)	06:01 20:55	06:23 (WTG6) 20:30 (WTG5)	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:18 (WTG6) 20:24 (WTG5)	06:02 20:55	06:24 (WTG6) 20:30 (WTG5)	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:18 (WTG6) 20:25 (WTG5)	06:02 20:55	06:24 (WTG6) 20:30 (WTG5)	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:17 (WTG6) 20:25 (WTG5)	06:03 20:54	06:25 (WTG6) 20:30 (WTG5)	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:15
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:17 (WTG6) 20:25 (WTG5)	06:04 20:54	06:26 (WTG6) 20:30 (WTG5)	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:14
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:17 (WTG6) 20:26 (WTG5)	06:04 20:54	06:26 (WTG6) 20:29 (WTG5)	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:17 (WTG6) 20:27 (WTG5)	06:05 20:53	06:27 (WTG6) 20:29 (WTG5)	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:17 (WTG6) 20:27 (WTG5)	06:06 20:53	06:28 (WTG6) 20:29 (WTG5)	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:17 (WTG6) 20:28 (WTG5)	06:06 20:52	06:28 (WTG6) 20:28 (WTG5)	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11
14	07:44 17:22	07:19 17:58	06:39 18:29	06:49 20:00	06:11 20:30	05:55 20:53	06:17 (WTG6) 20:28 (WTG5)	06:07 20:52	06:29 (WTG6) 20:28 (WTG5)	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:17 (WTG6) 20:28 (WTG5)	06:08 20:51	06:29 (WTG6) 20:27 (WTG5)	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	06:09 20:32	05:55 20:54	06:17 (WTG6) 20:29 (WTG5)	06:09 20:51	06:29 (WTG6) 20:26 (WTG5)	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:17 (WTG6) 20:29 (WTG5)	06:09 20:50	06:29 (WTG6) 20:26 (WTG5)	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:17 (WTG6) 20:30 (WTG5)	06:10 20:50	06:29 (WTG6) 20:26 (WTG5)	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:17 (WTG6) 20:31 (WTG5)	06:11 20:49	06:30 (WTG6) 20:26 (WTG5)	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:18 (WTG6) 20:32 (WTG5)	06:12 20:48	06:30 (WTG6) 20:26 (WTG5)	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:18 (WTG6) 20:33 (WTG5)	06:12 20:48	06:30 (WTG6) 20:26 (WTG5)	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:18 (WTG6) 20:34 (WTG5)	06:13 20:47	06:30 (WTG6) 20:26 (WTG5)	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:18 (WTG6) 20:35 (WTG5)	06:14 20:46	06:30 (WTG6) 20:26 (WTG5)	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:19 (WTG6) 20:36 (WTG5)	06:15 20:45	06:31 (WTG6) 20:26 (WTG5)	06:44 20:09	07:13 19:19	07:43 18:33	07:17 17:03
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:19 (WTG6) 20:37 (WTG5)	06:16 20:44	06:31 (WTG6) 20:26 (WTG5)	06:44 20:07	07:14 19:18	07:44 18:32	07:19 17:03
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:19 (WTG6) 20:38 (WTG5)	06:17 20:44	06:31 (WTG6) 20:26 (WTG5)	06:45 20:06	07:14 19:16	07:45 18:31	07:20 17:02
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:20 (WTG6) 20:39 (WTG5)	06:18 20:43	06:31 (WTG6) 20:26 (WTG5)	06:46 20:04	07:15 19:14	07:46 18:29	07:21 17:02
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:20 (WTG6) 20:40 (WTG5)	06:18 20:42	06:31 (WTG6) 20:26 (WTG5)	06:47 20:03	07:16 19:13	07:47 18:28	07:22 17:01
29	07:35 17:39	07:03 18:15	06:15 18:44	06:28 20:15	06:00 20:43	05:58 20:56	06:20 (WTG6) 20:41 (WTG5)	06:19 20:41	06:31 (WTG6) 20:26 (WTG5)	06:48 20:01	07:17 19:11	07:48 18:27	07:23 17:01
30	07:35 17:40	07:03 18:16	06:15 18:45	06:28 20:16	06:00 20:44	05:58 20:56	06:20 (WTG6) 20:42 (WTG5)	06:19 20:41	06:31 (WTG6) 20:26 (WTG5)	06:49 20:00	07:18 19:10	07:49 18:26	07:24 17:01
31	07:34 17:41	07:03 18:17	06:15 18:46	06:28 20:17	06:00 20:45	05:59 20:56	06:20 (WTG6) 20:43 (WTG5)	06:20 20:41	06:31 (WTG6) 20:26 (WTG5)	06:50 19:58	07:19 19:09	07:50 18:25	07:25 17:01
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292	
Total, worst case					218	976	554						

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

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



## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F342 - A03  
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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:45 20:07	07:13 19:18	07:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	07:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	07:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	07:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	07:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	07:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F347 - Pascolo  
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	07:45 17:10	07:33 17:43	06:59 18:15		07:10 19:47	36	18:50 (WTG8) 19:26 (WTG8)	06:26 20:17	05:58 20:45
2	07:45 17:11	07:32 17:44	06:57 18:16		07:08 19:48	37	18:50 (WTG8) 19:27 (WTG8)	06:25 20:18	05:58 20:46
3	07:45 17:11	07:31 17:45	06:56 18:17		07:07 19:49	37	18:51 (WTG8) 19:28 (WTG8)	06:23 20:19	05:58 20:47
4	07:45 17:12	07:30 17:46	06:54 18:18		07:05 19:50	39	18:50 (WTG8) 19:29 (WTG8)	06:22 20:20	05:57 20:47
5	07:45 17:13	07:29 17:47	06:53 18:19		07:03 19:51	40	18:51 (WTG8) 19:31 (WTG8)	06:21 20:21	05:57 20:48
6	07:45 17:14	07:28 17:49	06:51 18:20		07:02 19:52	40	18:51 (WTG8) 19:31 (WTG8)	06:20 20:22	05:57 20:48
7	07:45 17:15	07:27 17:50	06:50 18:22		07:00 19:53	41	18:51 (WTG8) 19:32 (WTG8)	06:19 20:23	05:56 20:49
8	07:45 17:16	07:26 17:51	06:48 18:23		06:59 19:54	41	18:52 (WTG8) 19:33 (WTG8)	06:18 20:24	05:56 20:50
9	07:45 17:17	07:25 17:52	06:46 18:24		06:57 19:55	42	18:52 (WTG8) 19:34 (WTG8)	06:16 20:25	05:56 20:50
10	07:45 17:18	07:24 17:53	06:45 18:25		06:56 19:56	41	18:54 (WTG8) 19:35 (WTG8)	06:15 20:26	05:56 20:51
11	07:45 17:19	07:22 17:55	06:43 18:26		06:54 19:57	42	18:54 (WTG8) 19:36 (WTG8)	06:14 20:27	05:56 20:51
12	07:44 17:20	07:21 17:56	06:42 18:27		06:53 19:58	42	18:55 (WTG8) 19:37 (WTG8)	06:13 20:28	05:56 20:52
13	07:44 17:21	07:20 17:57	06:40 18:28		06:51 19:59	41	18:56 (WTG8) 19:37 (WTG8)	06:12 20:29	05:55 20:52
14	07:44 17:22	07:19 17:58	06:39 18:29	3	18:05 (WTG8) 18:08 (WTG8)	06:50 20:00	18:58 (WTG8) 19:39 (WTG8)	06:11 20:30	05:55 20:53
15	07:44 17:23	07:18 17:59	06:37 18:30	6	18:03 (WTG8) 18:09 (WTG8)	06:48 20:01	18:59 (WTG8) 19:37 (WTG8)	06:10 20:31	05:55 20:53
16	07:43 17:24	07:16 18:00	06:35 18:31	9	18:02 (WTG8) 18:11 (WTG8)	06:47 20:02	19:01 (WTG8) 19:35 (WTG8)	06:09 20:32	05:55 20:54
17	07:43 17:25	07:15 18:02	06:34 18:32	11	18:00 (WTG8) 18:11 (WTG8)	06:45 20:03	19:03 (WTG8) 19:32 (WTG8)	06:09 20:33	05:55 20:54
18	07:42 17:26	07:14 18:03	06:32 18:33	14	17:59 (WTG8) 18:13 (WTG8)	06:44 20:04	19:06 (WTG8) 19:29 (WTG8)	06:08 20:34	05:56 20:54
19	07:42 17:27	07:13 18:04	06:31 18:34	16	17:58 (WTG8) 18:14 (WTG8)	06:42 20:05	19:10 (WTG8) 19:23 (WTG8)	06:07 20:34	05:56 20:55
20	07:41 17:29	07:11 18:05	06:29 18:35	18	17:56 (WTG8) 18:14 (WTG8)	06:41 20:06	19:23 (WTG8) 20:35	06:06 20:35	05:56 20:55
21	07:41 17:30	07:10 18:06	06:27 18:36	20	17:56 (WTG8) 18:16 (WTG8)	06:39 20:07	20:36 20:36	06:05 20:36	05:56 20:55
22	07:40 17:31	07:08 18:07	06:26 18:37	21	17:55 (WTG8) 18:16 (WTG8)	06:38 20:08	20:37 20:37	06:04 20:37	05:56 20:55
23	07:40 17:32	07:07 18:08	06:24 18:38	24	17:53 (WTG8) 18:17 (WTG8)	06:36 20:09	20:38 20:38	06:04 20:38	05:56 20:55
24	07:39 17:33	07:06 18:10	06:23 18:39	26	17:53 (WTG8) 18:19 (WTG8)	06:35 20:10	20:39 20:39	06:03 20:39	05:57 20:56
25	07:38 17:34	07:04 18:11	06:21 18:40	27	17:52 (WTG8) 18:19 (WTG8)	06:34 20:11	20:40 20:40	06:02 20:40	05:57 20:56
26	07:38 17:36	07:03 18:12	06:19 18:41	29	17:52 (WTG8) 18:21 (WTG8)	06:32 20:12	20:41 20:41	06:02 20:41	05:57 20:56
27	07:37 17:37	07:01 18:13	06:18 18:42	30	17:51 (WTG8) 18:21 (WTG8)	06:31 20:13	20:42 20:42	06:01 20:42	05:58 20:56
28	07:36 17:38	07:00 18:14	06:16 18:43	31	17:51 (WTG8) 18:22 (WTG8)	06:30 20:14	20:43 20:43	06:01 20:43	05:58 20:56
29	07:35 17:39		07:15 19:44	33	18:51 (WTG8) 19:24 (WTG8)	06:28 20:15	20:44 20:44	06:00 20:43	05:58 20:56
30	07:35 17:40		07:13 19:45	34	18:50 (WTG8) 19:24 (WTG8)	06:27 20:16	20:45 20:45	05:59 20:44	05:59 20:56
31	07:34 17:41		07:11 19:46	35	18:50 (WTG8) 19:25 (WTG8)		20:46 20:46	05:59 20:44	
Potential sun hours	301	299	370		397		445	448	
Total, worst case				387		697			

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F347 - Pascolo  
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	05:59 20:56	06:22 20:38	06:51 19:57	18:53 (WTG8) 19:34 (WTG8)	07:19 19:08	06:51 17:23	07:25 17:00
2	06:00 20:56	06:23 20:37	06:52 19:55	18:51 (WTG8) 19:33 (WTG8)	07:20 19:06	06:53 17:22	07:26 17:00
3	06:00 20:56	06:24 20:36	06:53 19:53	18:50 (WTG8) 19:32 (WTG8)	07:21 19:05	06:54 17:21	07:27 17:00
4	06:01 20:55	06:25 20:35	06:54 19:52	18:49 (WTG8) 19:30 (WTG8)	07:22 19:03	06:55 17:20	07:28 17:00
5	06:01 20:55	06:26 20:34	06:55 19:50	18:48 (WTG8) 19:29 (WTG8)	07:23 19:02	06:56 17:19	07:29 17:00
6	06:02 20:55	06:27 20:33	06:56 19:49	18:47 (WTG8) 19:27 (WTG8)	07:24 19:00	06:57 17:18	07:30 16:59
7	06:02 20:55	06:28 20:31	06:57 19:47	18:46 (WTG8) 19:26 (WTG8)	07:25 18:58	06:58 17:17	07:31 16:59
8	06:03 20:54	06:29 20:30	06:58 19:46	18:45 (WTG8) 19:24 (WTG8)	07:26 18:57	06:59 17:16	07:31 16:59
9	06:04 20:54	06:29 20:29	06:58 19:44	18:44 (WTG8) 19:22 (WTG8)	07:27 18:55	07:00 17:15	07:32 16:59
10	06:04 20:54	06:30 20:28	06:59 19:42	18:43 (WTG8) 19:20 (WTG8)	07:28 18:54	07:02 17:14	07:33 16:59
11	06:05 20:53	06:31 20:27	07:00 19:41	18:42 (WTG8) 19:19 (WTG8)	07:29 18:52	07:03 17:13	07:34 17:00
12	06:06 20:53	06:32 20:25	07:01 19:39	18:42 (WTG8) 19:17 (WTG8)	07:30 18:51	07:04 17:12	07:35 17:00
13	06:06 20:52	06:33 20:24	07:02 19:37	18:42 (WTG8) 19:16 (WTG8)	07:31 18:49	07:05 17:11	07:36 17:00
14	06:07 20:52	06:34 20:23	07:03 19:36	18:41 (WTG8) 19:14 (WTG8)	07:32 18:48	07:06 17:10	07:36 17:00
15	06:08 20:51	06:35 20:21	07:04 19:34	18:41 (WTG8) 19:13 (WTG8)	07:33 18:46	07:07 17:09	07:37 17:00
16	06:09 20:51	06:36 20:20	07:05 19:33	18:41 (WTG8) 19:11 (WTG8)	07:34 18:45	07:08 17:08	07:38 17:01
17	06:09 20:50	06:37 20:19	07:06 19:31	18:41 (WTG8) 19:09 (WTG8)	07:35 18:43	07:10 17:08	07:38 17:01
18	06:10 20:50	06:38 20:17	07:07 19:29	18:40 (WTG8) 19:08 (WTG8)	07:36 18:42	07:11 17:07	07:39 17:01
19	06:11 20:49	06:39 20:16	07:08 19:28	18:40 (WTG8) 19:05 (WTG8)	07:37 18:40	07:12 17:06	07:40 17:02
20	06:12 20:48	06:40 20:14	07:09 19:26	18:40 (WTG8) 19:04 (WTG8)	07:38 18:39	07:13 17:05	07:40 17:02
21	06:13 20:48	06:41 20:13	07:10 19:24	18:40 (WTG8) 19:02 (WTG8)	07:39 18:37	07:14 17:05	07:41 17:02
22	06:13 20:47	06:42 20:12	07:11 19:23	18:40 (WTG8) 19:01 (WTG8)	07:40 18:36	07:15 17:04	07:41 17:03
23	06:14 20:46	06:43 20:10	07:12 19:21	18:40 (WTG8) 18:59 (WTG8)	07:42 18:35	07:16 17:04	07:42 17:03
24	06:15 20:45	06:44 20:09	07:12 19:13 (WTG8)	18:41 (WTG8)	07:43	07:17	07:42
25	06:16 20:44	06:45 20:07	07:13 19:09 (WTG8)	18:41 (WTG8)	06:44	07:18	07:43
26	06:17 20:44	06:45 20:06	07:14 19:05 (WTG8)	18:42 (WTG8)	06:45	07:20	07:43
27	06:18 20:43	06:46 20:04	07:15 19:03 (WTG8)	18:43 (WTG8)	06:46	07:21	07:44
28	06:18 20:42	06:47 20:03	07:16 19:01 (WTG8)	18:44 (WTG8)	06:47	07:22	07:44
29	06:19 20:41	06:48 20:01	07:17 18:59 (WTG8)	18:45 (WTG8)	06:48	07:23	07:44
30	06:20 20:40	06:49 20:00	07:18 19:40 (WTG8)	18:49 (WTG8)	06:49	07:24	07:44
31	06:21 20:39	06:50 19:58	07:19 18:57 (WTG8)	18:47 (WTG8)	06:49	07:24	07:44
Potential sun hours	455	425	374	347	301	292	
Total, worst case		264	834				

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

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

## SHADOW - Calendar

Calculation: Progetto\_layout\_20231108Shadow receptor: F367 - D06  
Assumptions for shadow calculations

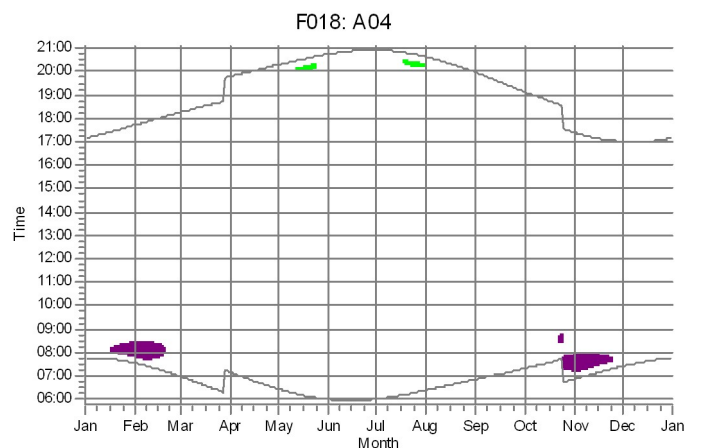
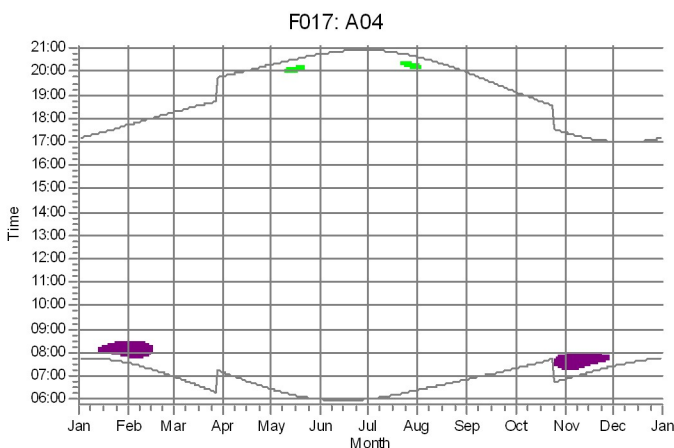
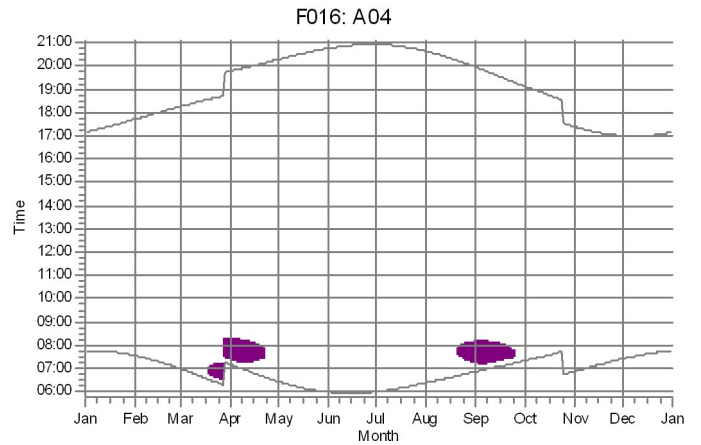
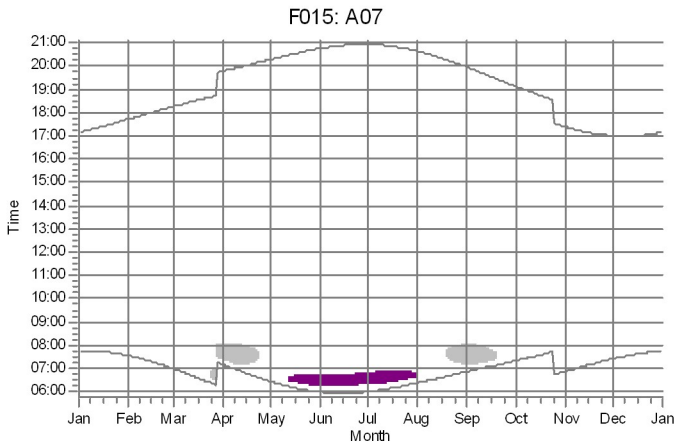
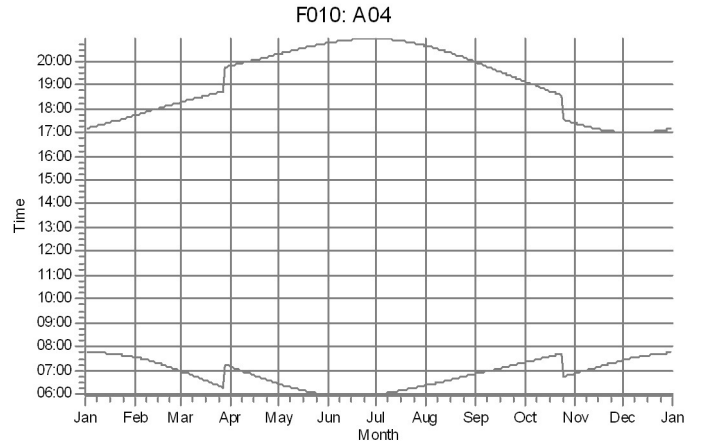
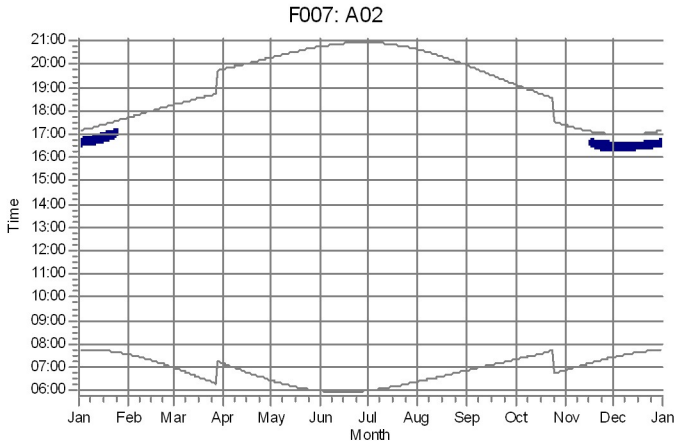
The calculated times are "worst case" given by the following assumptions:  
The sun is shining all the day, from sunrise to sunset  
The rotor plane is always perpendicular to the line from the WTG to the sun  
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Total, worst case												

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

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

**SHADOW - Calendar, graphical**  
 Calculation: Progetto\_layout\_20231108

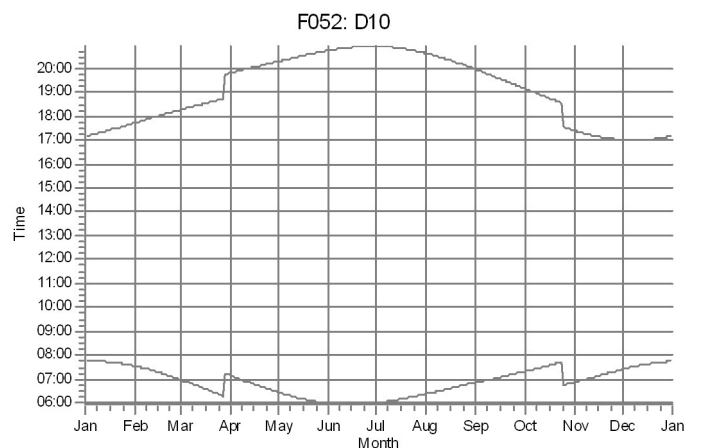
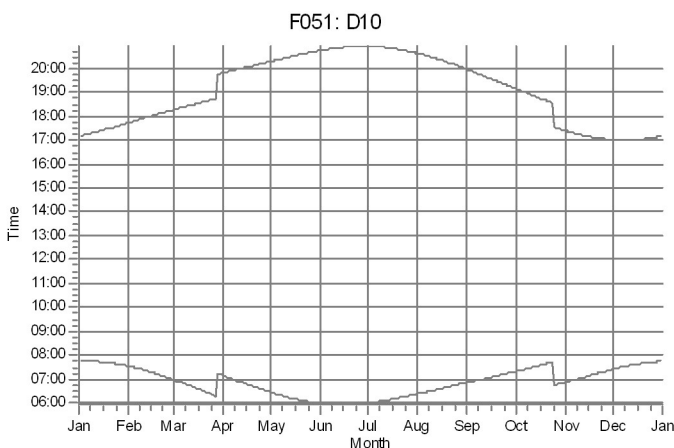
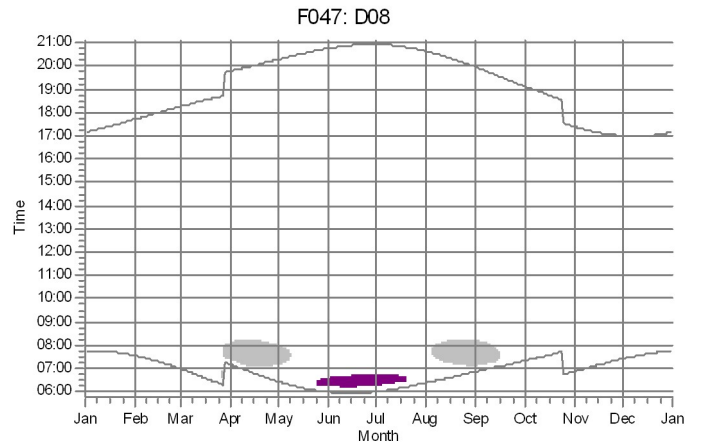
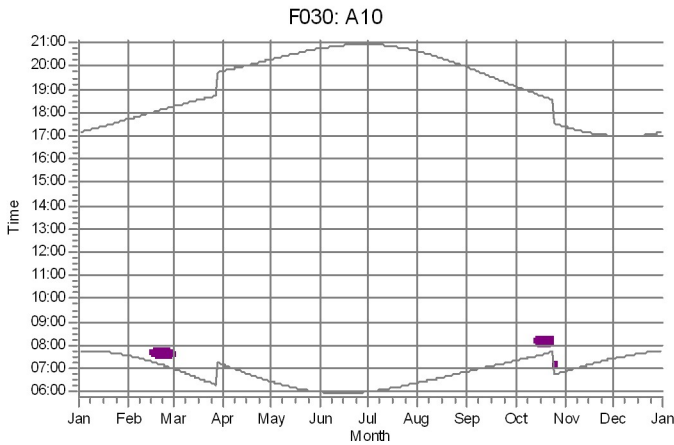
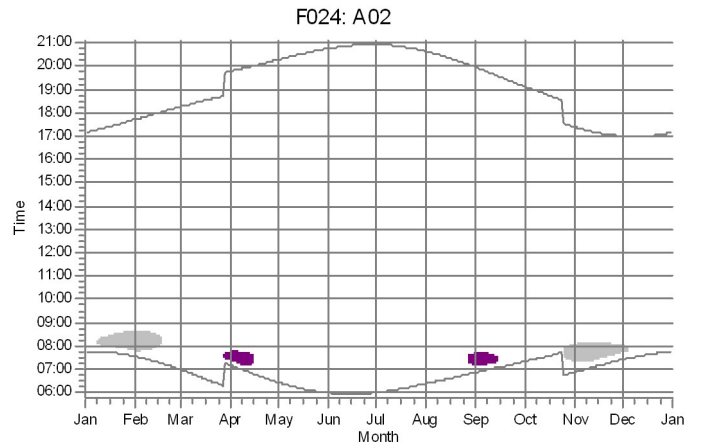
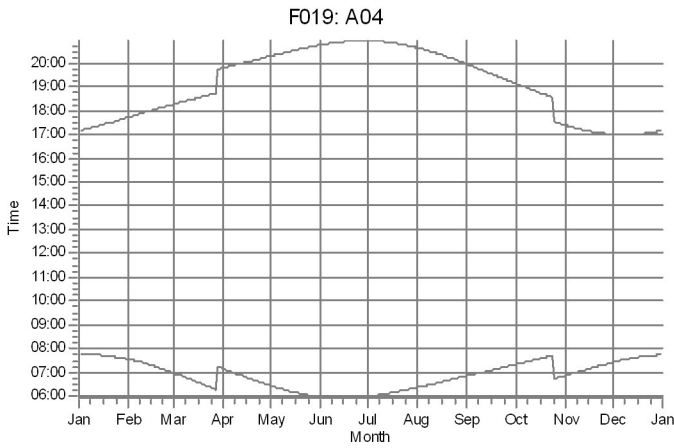


WTGs

- WTG8: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (85)
- WTG10: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (87)

- WTG12: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (89)
- WTG13: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (90)

SHADOW - Calendar, graphical  
 Calculation: Progetto\_layout\_20231108



WTGs

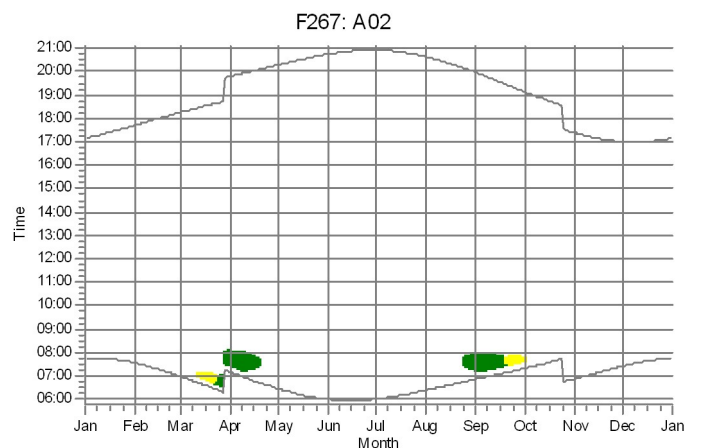
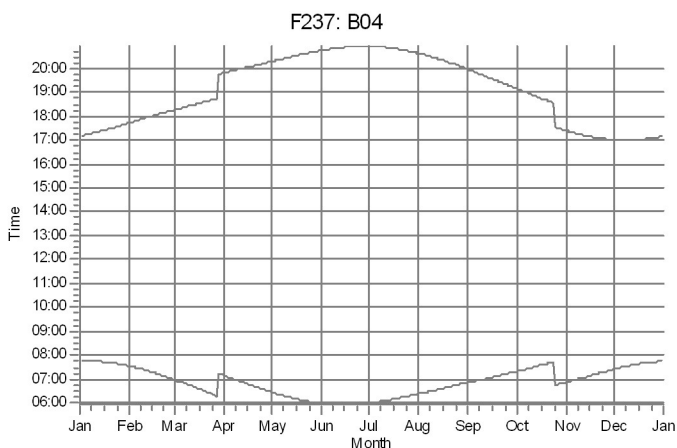
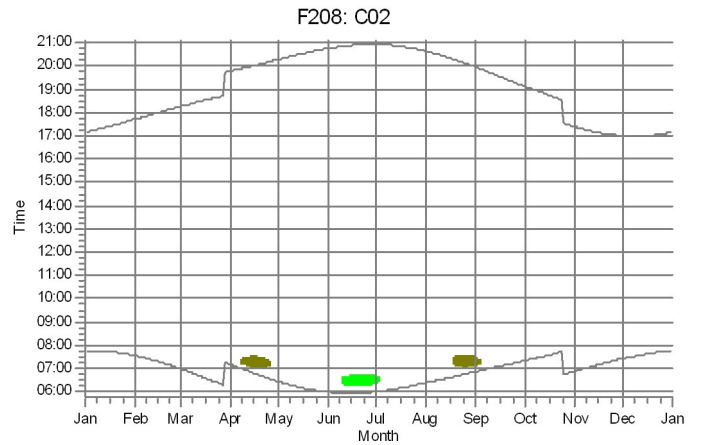
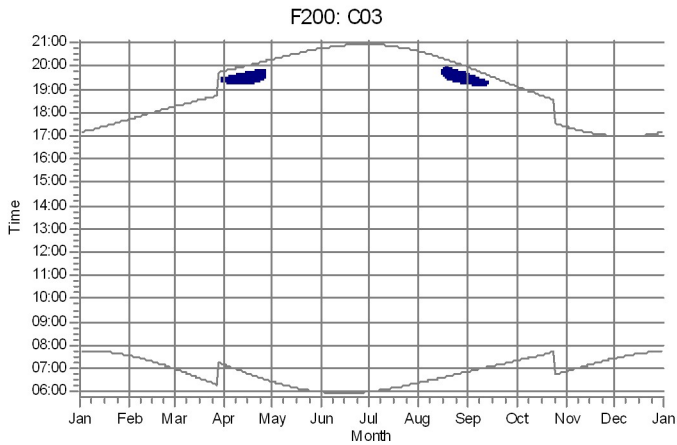
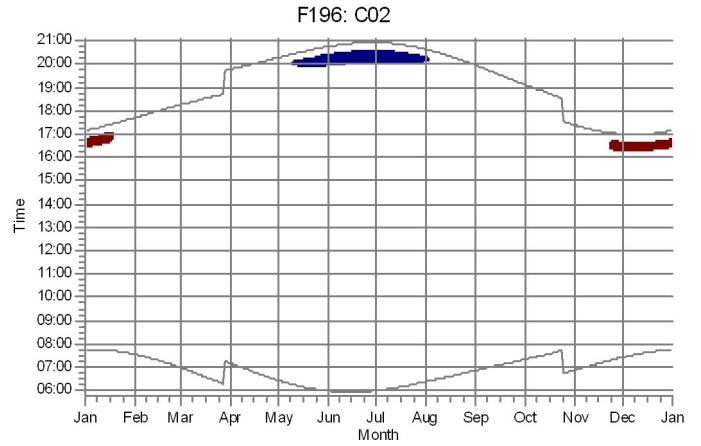
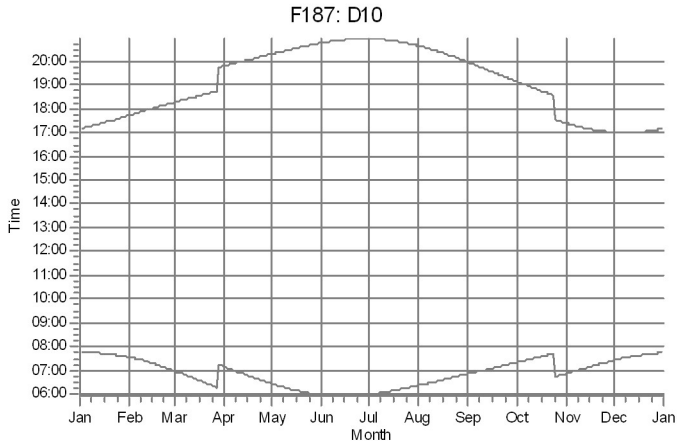
WTG12: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (89)

WTG13: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m) (90)



## SHADOW - Calendar, graphical

Calculation: Progetto\_layout\_20231108

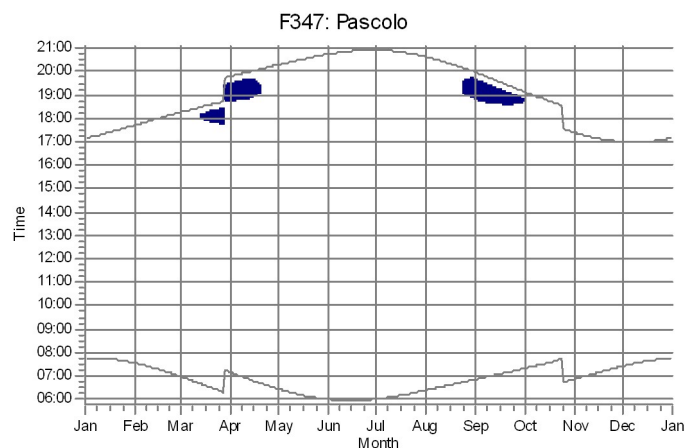
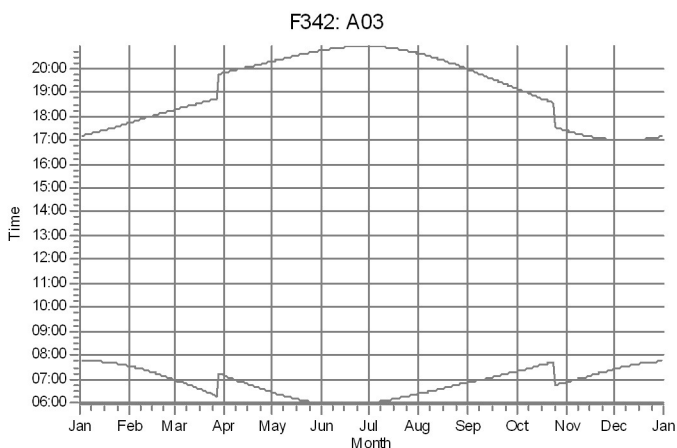
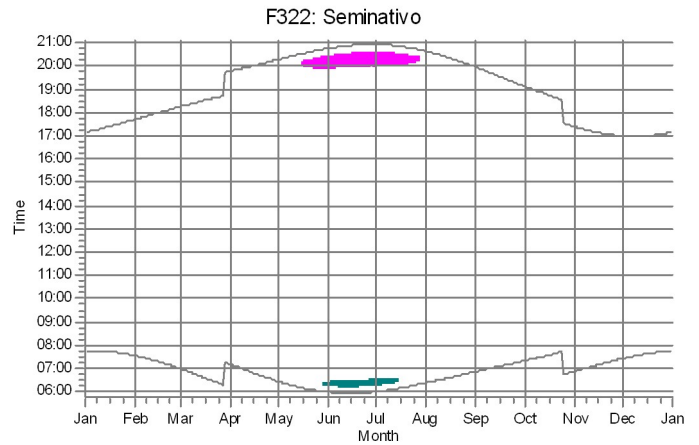
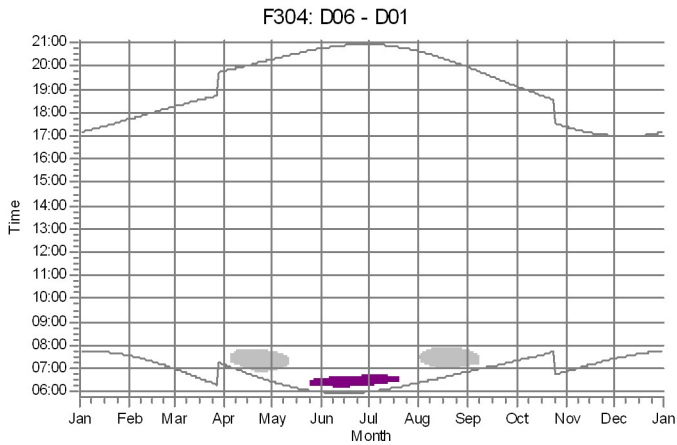
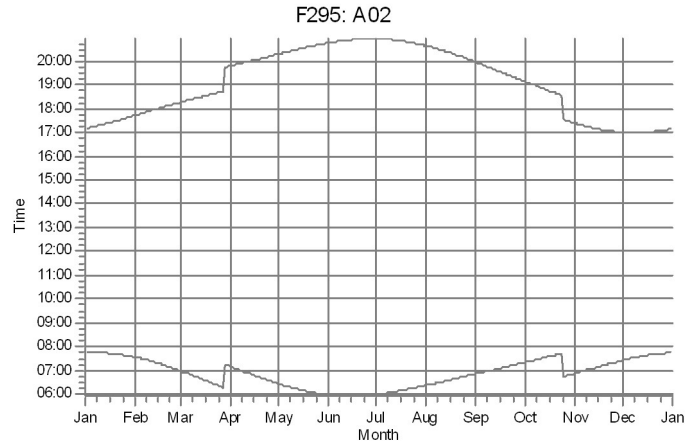
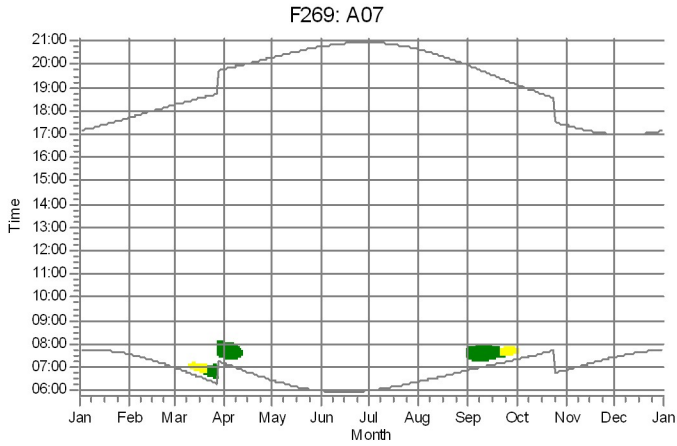


### WTGs

- WTG1: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)
- WTG2: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80)
- WTG8: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)

- WTG9: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (86)
- WTG10: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (87)
- WTG11: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (88)

SHADOW - Calendar, graphical  
 Calculation: Progetto\_layout\_20231108



WTGs

- WTG1: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)
- WTG2: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80)
- WTG5: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (83)
- WTG6: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (84)

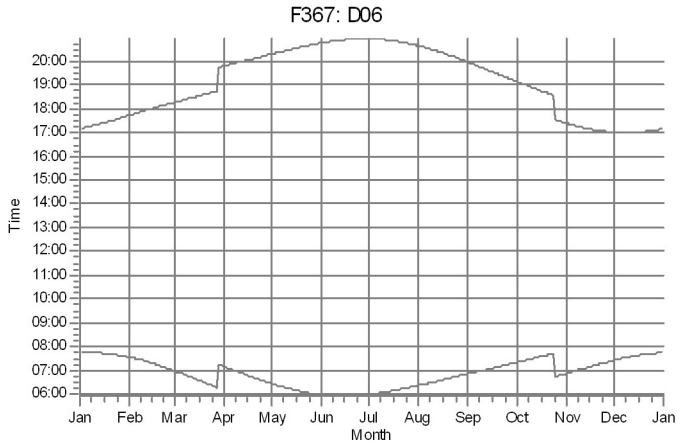
- WTG8: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)
- WTG12: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (89)
- WTG13: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90)

Project:  
Progetto\_RWE\_Serri\_Mandas

Licensed user:  
I.A.T. Consulenza e progetti S.r.l.  
Via Santa Margherita 4  
IT-09124 Cagliari  
+39 070 658297  
Giuseppe Frongia / direttore@iatprogetti.it  
Calculated:  
21/12/2023 17:58/3.4.415

## SHADOW - Calendar, graphical

Calculation: Progetto\_layout\_20231108



WTGs

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

21/12/2023 17:58/3.4.415

### SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG1 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (79)

#### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	07:28-08:00/32 20:17	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:15-07:54/39 19:08	07:19 17:23	06:52 17:00
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	07:26-08:00/34 20:18	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:14-07:54/40 19:06	07:20 17:22	06:53 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	07:25-08:00/35 20:19	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:13-07:55/42 19:05	07:21 17:21	06:54 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	07:23-08:00/37 20:20	06:22 20:20	05:57 20:47	06:01 20:56	06:25 20:35	06:54 19:52	07:14-07:55/41 19:03	07:22 17:20	06:55 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	07:22-08:00/38 20:21	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:15-07:55/40 19:02	07:23 17:19	06:56 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	07:20-07:59/39 20:22	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:16-07:55/39 19:00	07:24 17:18	06:57 16:59
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	07:18-07:58/40 20:23	06:19 20:23	05:56 20:49	06:05 20:55	06:28 20:31	06:57 19:47	07:17-07:55/38 18:58	07:25 17:16	06:58 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	07:17-07:58/41 20:24	06:17 20:24	05:56 20:50	06:03 20:55	06:28 20:30	06:58 19:46	07:18-07:55/37 18:57	07:26 17:15	06:59 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	07:15-07:57/42 20:25	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:19-07:55/36 18:55	07:27 17:14	07:01 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	07:16-07:56/40 20:26	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:19-07:53/34 18:54	07:28 17:13	07:02 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	07:16-07:55/39 20:27	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:20-07:53/33 18:52	07:29 17:13	07:03 16:59
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	07:17-07:54/37 20:28	06:13 20:28	05:55 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:21-07:52/31 18:51	07:30 17:12	07:04 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	07:17-07:52/35 20:29	06:12 20:29	05:55 20:52	06:06 20:53	06:33 20:24	07:02 19:37	07:22-07:52/30 18:49	07:31 17:11	07:05 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:49 20:00	07:18-07:51/33 20:30	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:23-07:52/29 18:48	07:32 17:10	07:06 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	07:19-07:49/30 20:31	06:10 20:31	05:55 20:53	06:08 20:52	06:35 20:21	07:04 19:34	07:24-07:52/28 18:46	07:33 17:09	07:07 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	07:21-07:48/27 20:32	06:09 20:32	05:55 20:54	06:08 20:51	06:36 20:20	07:05 19:33	07:25-07:51/26 18:45	07:34 17:08	07:09 17:00
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	07:22-07:45/23 20:33	06:08 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:26-07:50/24 18:43	07:35 17:07	07:10 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	07:25-07:42/17 20:34	06:08 20:34	05:55 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:27-07:49/22 18:42	07:36 17:07	07:11 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	07:30-07:38/8 20:35	06:07 20:35	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:28-07:48/20 18:40	07:37 17:06	07:12 17:01
20	07:42 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:47-06:56/9 20:36	06:06 20:36	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:28-07:46/18 18:39	07:38 17:05	07:13 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:46-06:58/12 20:37	06:05 20:37	05:56 20:55	06:12 20:48	06:41 20:13	07:10 19:24	07:29-07:45/16 18:37	07:39 17:05	07:14 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:44-06:59/15 20:38	06:04 20:38	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:30-07:43/13 18:36	07:41 17:04	07:15 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:42-07:00/18 20:39	06:04 20:39	05:56 20:56	06:14 20:46	06:43 20:10	07:12 19:21	07:31-07:41/10 18:35	07:42 17:04	07:16 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:41-07:01/20 20:40	06:03 20:40	05:57 20:56	06:15 20:45	06:44 20:09	07:12 19:19	07:32-07:39/7 18:33	07:43 17:03	07:18 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:39-07:01/22 20:41	06:02 20:41	05:57 20:56	06:16 20:45	06:44 20:07	07:13 19:18	07:33-07:35/2 17:32	07:44 17:03	07:19 17:04
26	07:38 17:35	07:03 18:12	06:19 18:41	06:32 20:12	06:38-07:02/24 20:42	06:02 20:42	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	07:25-07:48/23 17:31	07:45 17:02	07:20 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:36-07:02/26 20:43	06:01 20:43	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:14	07:23-07:50/27 17:29	07:46 17:02	07:21 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:34-07:01/27 20:44	06:00 20:44	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	07:21-07:51/30 17:28	07:47 17:01	07:22 17:06
29	07:35 17:39	07:15 18:14	06:15 18:43	06:28 20:15	07:33-08:02/29 20:45	06:00 20:45	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	07:19-07:52/33 17:27	07:48 17:01	07:23 17:07
30	07:35 17:40	07:13 18:14	06:13 18:44	06:27 20:16	07:31-08:01/30 20:46	05:59 20:46	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	07:18-07:53/35 17:26	07:49 17:01	07:24 17:08
31	07:34 17:41	07:11 18:14	06:11 18:46	06:25 20:17	07:30-08:01/31 20:47	05:59 20:47	05:59 20:56	06:21 20:40	06:50 19:58	07:17-07:54/37 19:58	07:17-07:54/37 19:58	06:50 17:24	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	695	347	301	292
Sum of minutes with flicker	0	0	268	627	0	0	0	213	0	0	0	0	0

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

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

21/12/2023 17:58/3.4.415

### SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG10 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (87)

#### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 06:26-06:37/11 20:56	06:22 20:13-20:15/2 20:38	06:51 19:57	07:19 19:08	06:52 17:23	07:25 17:01
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 06:29-06:36/7 20:56	06:23 20:13-20:14/1 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:12	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:20	07:04 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47	07:25 18:59	06:58 17:17	07:31 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:17 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 17:00
10	07:45 17:18	07:24 17:54	06:45 18:25	06:56 19:56	06:16 20:26	05:56 06:25-06:29/4 20:51	06:04 20:54	06:31 20:28	07:00 19:42	07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:03-20:04/1 20:27	05:56 06:23-06:33/10 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:03-20:05/2 20:28	05:56 06:21-06:34/13 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:03-20:06/3 20:29	05:56 06:20-06:36/16 20:52	06:07 20:52	06:33 20:24	07:02 19:38	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:03-20:06/3 20:30	05:56 06:20-06:37/17 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:11 20:03-20:07/4 20:31	05:56 06:19-06:38/19 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:01	06:36 18:31	06:47 20:02	06:10 20:04-20:08/4 20:32	05:56 06:19-06:38/19 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:04-20:09/5 20:33	05:56 06:19-06:39/20 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:27	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:06-20:10/4 20:34	05:56 06:18-06:39/21 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:07-20:11/4 20:34	05:56 06:19-06:41/22 20:55	06:11 20:24-20:25/1 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:07-20:11/4 20:35	05:56 06:19-06:41/22 20:55	06:12 20:22-20:25/3 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:28 18:36	06:39 20:07	06:05 20:08-20:12/4 20:36	05:56 06:19-06:41/22 20:55	06:13 20:20-20:23/3 20:48	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:05 20:10-20:13/3 20:37	05:56 06:19-06:41/22 20:55	06:13 20:19-20:23/4 20:47	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:09	06:24 18:38	06:37 20:09	06:04 20:11-20:14/3 20:38	05:57 06:19-06:41/22 20:55	06:14 20:18-20:22/4 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:04
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:12-20:14/2 20:39	05:57 06:20-06:41/21 20:56	06:15 20:18-20:22/4 20:45	06:44 20:09	07:13 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:35	07:04 18:11	06:21 18:40	06:34 20:11	06:03 20:11-20:14/3 20:40	05:57 06:21-06:41/20 20:56	06:16 20:17-20:21/4 20:45	06:45 20:07	07:14 19:18	07:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:12-20:14/2 20:41	05:57 06:21-06:41/20 20:56	06:17 20:16-20:21/5 20:44	06:46 20:06	07:14 19:16	07:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:13-20:14/3 20:41	05:58 06:22-06:41/19 20:56	06:18 20:15-20:19/4 20:43	06:47 20:04	07:15 19:15	07:46 17:30	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:14-20:14/3 20:42	05:58 06:23-06:40/17 20:56	06:19 20:14-20:18/4 20:42	06:47 20:03	07:16 19:13	07:47 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39	07:15 19:44	07:15 20:15	06:29 20:43	06:00 20:43	05:59 06:24-06:40/16 20:56	06:20 20:14-20:17/3 20:41	06:48 20:01	07:17 19:11	07:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40	07:13 19:45	07:13 20:16	06:27 20:44	06:00 20:44	05:59 06:25-06:39/14 20:56	06:20 20:14-20:17/3 20:40	06:49 20:00	07:18 19:10	07:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42	07:11 19:46	07:11 20:16	07:11 20:44	05:59 20:44	06:21 20:13-20:16/3 20:56	06:21 20:13-20:16/3 20:39	06:50 19:58	19:10 17:25	06:50 17:25	07:01 17:01	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Sum of minutes with flicker	0	0	0	0	46	376	63	3	0	0	0	0

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

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

21/12/2023 17:58/3.4.415

### SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG11 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (88)

#### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:59 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:12-07:24/12	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:12-07:21/9	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:13-07:17/4	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52		07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:48	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50		07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:48	06:02 20:55	06:27 20:33	06:56 19:49		07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:57 20:49	06:03 20:55	06:28 20:31	06:57 19:47		07:25 18:58	06:58 17:17	07:31 17:00
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:54	06:29 20:30	06:58 19:46		07:26 18:57	06:59 17:16	07:31 17:00
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	07:15-07:19/4	06:17 20:25	06:04 20:50	06:30 20:29	06:59 19:44		07:27 18:55	07:01 17:15	07:32 17:00
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	07:14-07:23/9	06:15 20:26	06:04 20:51	06:31 20:28	06:59 19:42		07:28 18:54	07:02 17:14	07:33 17:00
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	07:12-07:24/12	06:14 20:27	06:05 20:51	06:31 20:27	07:00 19:41		07:29 18:52	07:03 17:13	07:34 17:00
12	07:44 17:20	07:21 17:56	06:42 18:27	06:53 19:58	07:11-07:26/15	06:13 20:28	06:06 20:52	06:32 20:25	07:01 19:39		07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	07:09-07:26/17	06:12 20:29	06:06 20:52	06:33 20:24	07:02 19:37		07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	07:08-07:27/19	06:11 20:30	06:07 20:52	06:34 20:23	07:03 19:36		07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	07:06-07:26/20	06:10 20:31	06:08 20:51	06:35 20:21	07:04 19:34		07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:01	06:35 18:31	06:47 20:02	07:05-07:27/22	06:10 20:32	06:09 20:51	06:36 20:20	07:05 19:33		07:34 18:45	07:08 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	07:04-07:27/23	06:09 20:33	06:09 20:50	06:37 20:19	07:06 19:31		07:35 18:43	07:10 17:08	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	07:03-07:26/23	06:08 20:34	06:10 20:50	06:38 20:17	07:07 19:29	07:15-07:23/8	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	07:03-07:26/23	06:07 20:34	06:11 20:55	06:39 20:16	07:08 19:28	07:13-07:25/12	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	07:03-07:24/21	06:06 20:35	06:12 20:55	06:40 20:15	07:09 19:26	07:11-07:27/16	07:38 18:39	07:13 17:06	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	07:04-07:24/20	06:05 20:36	06:13 20:55	06:41 20:13	07:10 19:24	07:09-07:28/19	07:39 18:38	07:14 17:05	07:41 17:03
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	07:04-07:22/18	06:05 20:37	06:13 20:55	06:42 20:12	07:11 19:23	07:08-07:29/21	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:37 20:09	07:05-07:21/16	06:04 20:38	06:14 20:55	06:43 20:10	07:12 19:21	07:07-07:28/21	07:41 18:35	07:16 17:04	07:42 17:01
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	07:07-07:19/12	06:03 20:39	06:15 20:56	06:44 20:09	07:13 19:19	07:06-07:29/23	07:42 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	07:10-07:15/5	06:02 20:40	06:16 20:56	06:45 20:07	07:13 19:18	07:06-07:29/23	07:43 17:32	07:18 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12		06:02 20:40	06:17 20:56	06:46 20:06	07:14 19:16	07:06-07:29/23	07:44 17:31	07:19 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13		06:01 20:41	06:18 20:58	06:46 20:04	07:15 19:15	07:07-07:28/21	07:45 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14		06:01 20:42	06:19 20:56	06:47 20:03	07:16 19:13	07:08-07:28/20	07:46 17:28	07:22 17:01	07:44 17:07
29	07:35 17:39		07:15 19:44	06:28 20:15		06:00 20:43	06:19 20:56	06:48 20:01	07:17 19:11	07:09-07:27/18	07:47 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16		06:00 20:44	06:19 20:56	06:49 20:00	07:18 19:10	07:10-07:27/17	07:48 17:26	07:24 17:01	07:44 17:08
31	07:34 17:42		07:11 19:46			05:59 20:44	06:21 20:39	06:50 19:58	07:11-07:25/14		06:50 17:25	07:45 17:09	
Potential sun hours	301	299	370	397	445	448	455	425	374	25	347	301	292
Sum of minutes with flicker	0	0	0	279	0	0	0	256	0	25	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: Progetto\_layout\_20231108WTG: WTG12 - VESTAS-7200 V172 7200 172.0 !OI hub: 117,0 m (TOT: 203,0 m) (89)  
 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	07:45 17:10	07:33 07:52-08:24/32 17:43	06:58 07:36-07:39/3 18:15	07:10 07:28-08:12/44 19:47	06:26 20:17	05:59 06:19-06:42/23 20:45
2	07:45 17:11	07:32 07:51-08:24/33 17:44	06:57 18:16	07:08 07:26-08:12/46 19:48	06:25 20:18	05:58 06:19-06:41/22 20:46
3	07:45 17:11	07:31 07:50-08:24/34 17:45	06:56 18:17	07:07 07:25-08:12/47 19:49	06:23 20:19	05:58 06:19-06:41/22 20:46
4	07:45 17:12	07:30 07:49-08:24/35 17:46	06:54 18:18	07:05 07:23-08:11/48 19:50	06:22 20:20	05:57 06:18-06:42/24 20:47
5	07:45 17:13	07:29 07:48-08:24/36 17:47	06:53 18:19	07:03 07:22-08:11/49 19:51	06:21 20:21	05:57 06:18-06:41/23 20:48
6	07:45 17:14	07:28 07:47-08:23/36 17:49	06:51 18:20	07:02 07:20-08:11/51 19:52	06:20 20:22	05:57 06:18-06:41/23 20:48
7	07:45 17:15	07:27 07:46-08:23/37 17:50	06:49 18:22	07:00 07:18-08:10/52 19:53	06:19 20:23	05:56 06:18-06:41/23 20:49
8	07:45 17:16	07:26 07:45-08:23/38 17:51	06:48 18:23	06:59 07:17-08:09/52 19:54	06:18 20:24	05:56 06:18-06:41/23 20:50
9	07:45 17:17	07:25 07:46-08:23/37 17:52	06:46 18:24	06:57 07:15-08:08/53 19:55	06:16 20:25	05:56 06:17-06:40/23 20:50
10	07:45 17:18	07:24 07:46-08:23/37 17:53	06:45 18:25	06:56 07:14-08:08/54 19:56	06:15 20:26	05:56 06:17-06:40/23 20:51
11	07:45 17:19	07:22 07:47-08:23/36 17:55	06:43 18:26	06:54 07:13-08:07/54 19:57	06:14 20:27	05:56 06:17-06:41/24 20:51
12	07:44 17:20	07:21 07:47-08:21/34 17:56	06:42 18:27	06:53 07:15-08:06/51 19:58	06:13 20:28	05:56 06:17-06:41/24 20:52
13	07:44 17:21	07:20 07:48-08:20/32 17:57	06:40 18:28	06:51 07:15-08:04/49 19:59	06:12 06:32-06:33/1 20:29	05:56 06:17-06:41/24 20:52
14	07:44 08:05-08:07/2 17:22	07:19 07:49-08:20/31 17:58	06:39 18:29	06:50 07:17-08:04/47 20:00	06:11 06:31-06:35/4 20:30	05:56 06:17-06:41/24 20:53
15	07:43 08:04-08:09/5 17:23	07:18 07:37-07:42/5 17:59 07:51-08:19/28	06:37 18:30	06:48 07:19-08:02/43 20:01	06:10 06:30-06:36/6 20:31	05:55 06:17-06:41/24 20:53
16	07:43 08:04-08:11/7 17:24	07:16 07:35-07:44/9 18:00 07:52-08:16/24	06:35 18:31	06:47 07:22-08:01/39 20:02	06:09 06:29-06:37/8 20:32	05:56 06:17-06:41/24 20:53
17	07:43 08:03-08:12/9 17:25	07:15 07:34-07:46/12 18:02 07:54-08:15/21	06:34 18:32	06:45 07:23-07:59/36 20:03	06:09 06:29-06:38/9 20:33	05:56 06:17-06:41/24 20:54
18	07:42 08:03-08:14/11 17:26	07:14 07:33-07:48/15 18:03 07:57-08:12/15	06:32 18:33	06:44 07:25-07:57/32 20:04	06:08 06:28-06:39/11 20:33	05:56 06:17-06:41/24 20:54
19	07:42 08:02-08:15/13 17:28	07:12 07:31-07:48/17 18:04 08:02-08:06/4	06:31 06:49-06:58/9 18:34	06:42 07:27-07:55/28 20:05	06:07 06:27-06:39/12 20:34	05:56 06:18-06:42/24 20:54
20	07:41 08:02-08:17/15 17:29	07:11 07:30-07:49/19 18:05	06:29 06:47-07:01/14 18:35	06:41 07:28-07:52/24 20:06	06:06 06:26-06:39/13 20:35	05:56 06:18-06:42/24 20:55
21	07:41 08:01-08:17/16 17:30	07:10 07:29-07:49/20 18:06	06:27 06:46-07:04/18 18:36	06:39 07:31-07:49/18 20:07	06:05 06:25-06:39/14 20:36	05:56 06:18-06:42/24 20:55
22	07:40 08:00-08:18/18 17:31	07:08 07:28-07:49/21 18:07	06:26 06:44-07:06/22 18:37	06:38 07:35-07:44/9 20:08	06:05 06:25-06:40/15 20:37	05:56 06:18-06:42/24 20:55
23	07:40 08:00-08:20/20 17:32	07:07 07:28-07:49/21 18:08	06:24 06:42-07:07/25 18:38	06:36 20:09	06:04 06:24-06:40/16 20:38	05:56 06:18-06:42/24 20:55
24	07:39 07:59-08:20/21 17:33	07:06 07:28-07:48/20 18:10	06:23 06:41-07:09/28 18:39	06:35 20:10	06:03 06:24-06:41/17 20:39	05:57 06:19-06:43/24 20:55
25	07:38 07:58-08:21/23 17:34	07:04 07:28-07:48/20 18:11	06:21 06:39-07:09/30 18:40	06:34 20:11	06:02 06:23-06:41/18 20:40	05:57 06:19-06:43/24 20:56
26	07:38 07:58-08:22/24 17:36	07:03 07:30-07:47/17 18:12	06:19 06:38-07:11/33 18:41	06:32 20:12	06:02 06:22-06:41/19 20:40	05:57 06:19-06:43/24 20:56
27	07:37 07:57-08:22/25 17:37	07:01 07:30-07:45/15 18:13	06:18 06:36-07:11/35 18:42	06:31 20:13	06:01 06:22-06:41/19 20:41	05:58 06:20-06:44/24 20:56
28	07:36 07:56-08:23/27 17:38	07:00 07:32-07:44/12 18:14	06:16 06:34-07:11/37 18:43	06:30 20:14	06:01 06:21-06:41/20 20:42	05:58 06:20-06:44/24 20:56
29	07:35 07:55-08:23/28 17:39		07:15 07:33-08:12/39 19:44	06:28 20:15	06:00 06:21-06:41/20 20:43	05:58 06:20-06:44/24 20:56
30	07:34 07:54-08:23/29 17:40		07:13 07:31-08:12/41 19:45	06:27 20:16	06:00 06:20-06:41/21 20:44	05:59 06:21-06:45/24 20:56
31	07:34 07:53-08:24/31 17:42		07:11 07:30-08:12/42 19:46		05:59 06:20-06:41/21 20:44	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	324	803	376	926	264	709

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: Progetto\_layout\_20231108WTG: WTG12 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (89)

### 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	05:59 06:21-06:45/24 20:56	06:22 20:38	06:51 07:12-08:06/54 19:57	07:19 19:08	06:51 07:15-07:52/37 17:23	07:25 17:00
2	06:00 06:22-06:45/23 20:56	06:23 20:37	06:52 07:12-08:06/54 19:55	07:20 19:06	06:52 07:15-07:53/38 17:22	07:26 17:00
3	06:00 06:22-06:45/23 20:55	06:24 20:36	06:53 07:13-08:06/53 19:53	07:21 19:05	06:54 07:15-07:53/38 17:21	07:27 17:00
4	06:01 06:23-06:46/23 20:55	06:25 20:35	06:54 07:14-08:06/52 19:52	07:22 19:03	06:55 07:16-07:53/37 17:20	07:28 17:00
5	06:01 06:23-06:46/23 20:55	06:26 20:34	06:55 07:15-08:07/52 19:50	07:23 19:02	06:56 07:17-07:53/36 17:19	07:29 17:00
6	06:02 06:24-06:47/23 20:55	06:27 20:32	06:56 07:16-08:07/51 19:49	07:24 19:00	06:57 07:18-07:53/35 17:18	07:30 17:00
7	06:03 06:25-06:48/23 20:55	06:28 20:31	06:57 07:17-08:06/49 19:47	07:25 18:58	06:58 07:20-07:55/35 17:17	07:30 16:59
8	06:03 06:25-06:48/23 20:54	06:29 20:30	06:58 07:18-08:06/48 19:45	07:26 18:57	06:59 07:21-07:55/34 17:16	07:31 16:59
9	06:04 06:26-06:48/22 20:54	06:30 20:29	06:58 07:18-08:05/47 19:44	07:27 18:55	07:00 07:22-07:55/33 17:15	07:32 16:59
10	06:04 06:26-06:48/22 20:54	06:30 20:28	06:59 07:19-08:05/46 19:42	07:28 18:54	07:02 07:23-07:55/32 17:14	07:33 17:00
11	06:05 06:27-06:49/22 20:53	06:31 20:26	07:00 07:20-08:04/44 19:41	07:29 18:52	07:03 07:25-07:55/30 17:13	07:34 17:00
12	06:06 06:28-06:50/22 20:53	06:32 20:25	07:01 07:21-08:04/43 19:39	07:30 18:51	07:04 07:26-07:55/29 17:12	07:35 17:00
13	06:06 06:28-06:49/21 20:52	06:33 20:24	07:02 07:22-08:03/41 19:37	07:31 08:07-08:15/8 18:49	07:05 07:27-07:55/28 17:11	07:35 17:00
14	06:07 06:29-06:50/21 20:52	06:34 20:23	07:03 07:23-08:02/39 19:36	07:32 08:04-08:17/13 18:48	07:06 07:28-07:55/27 17:10	07:36 17:00
15	06:08 06:30-06:50/20 20:51	06:35 20:21	07:04 07:24-08:01/37 19:34	07:33 08:02-08:18/16 18:46	07:07 07:29-07:54/25 17:09	07:37 17:00
16	06:09 06:31-06:51/20 20:51	06:36 20:20	07:05 07:25-08:00/35 19:32	07:34 08:01-08:19/18 18:45	07:08 07:31-07:55/24 17:08	07:38 17:01
17	06:09 06:31-06:50/19 20:50	06:37 20:19	07:06 07:26-07:59/33 19:31	07:35 08:00-08:19/19 18:43	07:10 07:32-07:55/23 17:08	07:38 17:01
18	06:10 06:32-06:50/18 20:50	06:38 20:17	07:07 07:27-07:58/31 19:29	07:36 07:59-08:20/21 18:42	07:11 07:33-07:54/21 17:07	07:39 17:01
19	06:11 06:33-06:51/18 20:49	06:39 20:16	07:08 07:27-07:55/28 19:28	07:37 07:59-08:20/21 18:40	07:12 07:34-07:54/20 17:06	07:40 17:02
20	06:12 06:34-06:51/17 20:48	06:40 20:14	07:09 07:28-07:54/26 19:26	07:38 07:59-08:20/21 18:39	07:13 07:35-07:53/18 17:05	07:40 17:02
21	06:13 06:34-06:50/16 20:47	06:41 07:40-07:51/11 20:13	07:10 07:29-07:52/23 19:24	07:39 08:00-08:20/20 18:37	07:14 07:37-07:53/16 17:05	07:41 17:02
22	06:13 06:35-06:50/15 20:47	06:42 07:34-07:54/20 20:12	07:11 07:30-07:49/19 19:23	07:40 08:01-08:19/18 18:36	07:15 07:38-07:53/15 17:04	07:41 17:03
23	06:14 06:36-06:50/14 20:46	06:43 07:32-07:57/25 20:10	07:11 07:31-07:46/15 19:21	07:41 08:02-08:18/16 18:35	07:16 07:39-07:52/13 17:04	07:42 17:03
24	06:15 06:37-06:50/13 20:45	06:44 07:29-07:59/30 20:09	07:12 07:32-07:42/10 19:19	07:43 08:03-08:17/14 18:33	07:17 07:40-07:51/11 17:03	07:42 17:04
25	06:16 06:38-06:49/11 20:44	06:45 07:27-08:00/33 20:07	07:13 19:18	06:44 07:04-07:16/12 17:32	07:18 07:41-07:50/9 17:03	07:43 17:05
26	06:17 06:39-06:49/10 20:44	06:45 07:26-08:02/36 20:06	07:14 19:16	06:45 07:05-07:13/8 17:31	07:19 07:42-07:49/7 17:02	07:43 17:05
27	06:18 06:39-06:48/9 20:43	06:46 07:24-08:03/39 20:04	07:15 19:14	06:46 07:08-07:10/2 17:29	07:21 07:43-07:48/5 17:02	07:43 17:06
28	06:19 06:40-06:47/7 20:42	06:47 07:21-08:04/43 20:03	07:16 19:13	06:47 07:19-07:50/31 17:28	07:22 07:44-07:46/2 17:01	07:44 17:07
29	06:19 06:41-06:46/5 20:41	06:48 07:18-08:05/47 20:01	07:17 19:11	06:48 07:18-07:50/32 17:27	07:23 07:01 17:01	07:44 17:07
30	06:20 06:42-06:45/3 20:40	06:49 07:16-08:05/49 20:00	07:18 19:10	06:49 07:17-07:51/34 17:26	07:24 17:01 17:01	07:44 17:08
31	06:21 20:39	06:50 07:15-08:06/51 19:58		06:50 07:16-07:51/35 17:24		07:45 17:09
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	530	384	930	461	678	0

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

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

## SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG13 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90)  
 Assumptions for shadow calculations

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

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

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

The WTG is always operating

	January	February	March	April	May	June
1	07:45 17:10	07:33 07:52-08:33/41 17:43	06:59 18:15	07:10 07:28-08:01/33 19:47	06:26 06:59-07:55/56 20:17	05:59 20:45
2	07:45 17:11	07:32 07:51-08:33/42 17:44	06:57 18:16	07:08 07:26-08:02/36 19:48	06:25 07:00-07:53/53 20:18	05:58 20:46
3	07:45 17:11	07:31 07:51-08:33/42 17:45	06:56 18:17	07:07 07:25-08:04/39 19:49	06:23 07:00-07:51/51 20:19	05:58 20:46
4	07:45 17:12	07:30 07:52-08:32/40 17:46	06:54 18:18	07:05 07:23-08:05/42 19:50	06:22 07:01-07:49/48 20:20	05:57 20:47
5	07:45 17:13	07:29 07:52-08:32/40 17:48	06:53 18:19	07:03 07:22-08:06/44 19:51	06:21 07:02-07:47/45 20:21	05:57 20:48
6	07:45 17:14	07:28 07:53-08:32/39 17:49	06:51 18:20	07:02 07:20-08:06/46 19:52	06:20 07:04-07:45/41 20:22	05:57 20:48
7	07:45 17:15	07:27 07:53-08:32/39 17:50	06:50 18:22	07:00 07:18-08:06/48 19:53	06:19 07:05-07:42/37 20:23	05:57 20:49
8	07:45 17:16	07:26 07:54-08:31/37 17:51	06:48 18:23	06:59 07:17-08:07/50 19:54	06:18 07:07-07:30/23 20:24	05:56 20:50
9	07:45 08:06-08:09/3 17:17	07:25 07:55-08:31/36 17:52	06:46 18:24	06:57 07:15-08:07/52 19:55	06:17 07:09-07:27/18 20:25	05:56 20:50
10	07:45 08:06-08:12/6 17:18	07:24 07:56-08:30/34 17:53	06:45 18:25	06:56 07:14-08:08/54 19:56	06:15 07:13-07:24/11 20:26	05:56 20:51
11	07:45 08:06-08:14/8 17:19	07:22 07:57-08:29/32 17:55	06:43 18:26	06:54 07:12-08:07/55 19:57	06:14 20:27	05:56 20:51
12	07:44 08:05-08:16/11 17:20	07:21 07:58-08:27/29 17:56	06:42 18:27	06:53 07:11-08:08/57 19:58	06:13 20:28	05:56 20:52
13	07:44 08:05-08:18/13 17:21	07:20 08:00-08:26/26 17:57	06:40 18:28	06:51 07:09-08:07/58 19:59	06:12 20:29	05:56 20:52
14	07:44 08:05-08:19/14 17:22	07:19 08:02-08:24/22 17:58	06:39 18:29	06:50 07:08-08:08/60 20:00	06:11 20:30	05:56 20:53
15	07:44 08:04-08:20/16 17:23	07:18 08:05-08:22/17 17:59	06:37 18:30	06:48 07:06-08:07/61 20:01	06:10 20:31	05:56 20:53
16	07:43 08:04-08:22/18 17:24	07:16 08:08-08:17/9 18:00	06:35 18:31	06:47 07:05-08:07/62 20:02	06:10 20:32	05:56 20:53
17	07:43 08:03-08:23/20 17:25	07:15 18:02	06:34 18:32	06:45 07:03-08:06/63 20:03	06:09 20:33	05:56 20:54
18	07:42 08:03-08:24/21 17:26	07:14 18:03	06:32 18:33	06:44 07:02-08:06/64 20:04	06:08 20:33	05:56 20:54
19	07:42 08:02-08:25/23 17:28	07:12 18:04	06:31 18:34	06:42 07:01-08:06/65 20:05	06:07 20:34	05:56 20:54
20	07:41 08:02-08:27/25 17:29	07:11 18:05	06:29 18:35	06:41 06:59-08:05/66 20:06	06:06 20:35	05:56 20:55
21	07:41 08:01-08:27/26 17:30	07:10 18:06	06:27 18:36	06:39 06:58-08:05/67 20:07	06:05 20:36	05:56 20:55
22	07:40 08:00-08:28/28 17:31	07:08 18:07	06:26 18:37	06:38 06:57-08:03/66 20:08	06:05 20:37	05:56 20:55
23	07:40 08:00-08:29/29 17:32	07:07 18:08	06:24 18:38	06:36 06:57-08:03/66 20:09	06:04 20:38	05:57 20:55
24	07:39 07:59-08:30/31 17:33	07:06 18:10	06:23 18:39	06:35 06:57-08:03/66 20:10	06:03 20:39	05:57 20:55
25	07:38 07:58-08:30/32 17:34	07:04 18:11	06:21 06:39-06:48/9 18:40	06:34 06:57-08:01/64 20:11	06:02 20:40	05:57 20:56
26	07:38 07:58-08:31/33 17:36	07:03 18:12	06:19 06:38-06:52/14 18:41	06:32 06:57-08:00/63 20:12	06:02 20:40	05:57 20:56
27	07:37 07:57-08:32/35 17:37	07:01 18:13	06:18 06:36-06:54/18 18:42	06:31 06:58-08:00/62 20:13	06:01 20:41	05:58 20:56
28	07:36 07:56-08:32/36 17:38	07:00 18:14	06:16 06:34-06:55/21 18:43	06:30 06:57-07:58/61 20:14	06:01 20:42	05:58 20:56
29	07:35 07:55-08:32/37 17:39		07:15 07:33-07:57/24 19:44	06:28 06:58-07:57/59 20:15	06:00 20:43	05:59 20:56
30	07:34 07:54-08:32/38 17:40		07:13 07:31-07:58/27 19:45	06:27 06:59-07:56/57 20:16	06:00 20:44	05:59 20:56
31	07:34 07:53-08:32/39 17:42		07:11 07:30-08:00/30 19:46		05:59 20:44	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	542	525	143	1686	387	0

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

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

## SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG13 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (90)

### Assumptions for shadow calculations

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

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

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

The WTG is always operating

	July	August	September	October	November	December
1	05:59 20:56	06:22 20:38	06:51 07:11-08:06/55 19:57	07:19 19:08	06:51 07:25-07:59/34 17:23	07:25 07:48-07:57/9 17:00
2	06:00 20:56	06:23 07:27-07:30/3 20:37	06:52 07:12-08:06/54 19:55	07:20 19:06	06:52 07:25-08:01/36 17:22	07:26 07:49-07:55/6 17:00
3	06:00 20:55	06:24 07:21-07:35/14 20:36	06:53 07:13-08:05/52 19:53	07:21 19:05	06:54 07:24-08:01/37 17:21	07:27 07:50-07:53/3 17:00
4	06:01 20:55	06:25 07:18-07:38/20 20:35	06:54 07:14-08:04/50 19:52	07:22 19:03	06:55 07:23-08:02/39 17:20	07:28 17:00
5	06:01 20:55	06:26 07:16-07:49/33 20:34	06:55 07:15-08:03/48 19:50	07:23 19:02	06:56 07:22-08:02/40 17:19	07:29 17:00
6	06:02 20:55	06:27 07:14-07:53/39 20:32	06:56 07:16-08:02/46 19:49	07:24 19:00	06:57 07:22-08:02/40 17:18	07:30 17:00
7	06:03 20:55	06:28 07:13-07:56/43 20:31	06:57 07:17-08:01/44 19:47	07:25 18:58	06:58 07:22-08:03/41 17:17	07:30 17:00
8	06:03 20:54	06:29 07:12-07:58/46 20:30	06:58 07:18-08:00/42 19:46	07:26 18:57	06:59 07:22-08:03/41 17:16	07:31 17:00
9	06:04 20:54	06:30 07:11-08:00/49 20:29	06:59 07:19-07:58/39 19:44	07:27 18:55	07:00 07:22-08:03/41 17:15	07:32 17:00
10	06:04 20:54	06:30 07:10-08:01/51 20:28	06:59 07:19-07:56/37 19:42	07:28 18:54	07:02 07:23-08:03/40 17:14	07:33 17:00
11	06:05 20:53	06:31 07:09-08:03/54 20:26	07:00 07:20-07:54/34 19:41	07:29 18:52	07:03 07:25-08:04/39 17:13	07:34 17:00
12	06:06 20:53	06:32 07:08-08:04/56 20:25	07:01 07:21-07:51/30 19:39	07:30 18:51	07:04 07:26-08:04/38 17:12	07:35 17:00
13	06:06 20:52	06:33 07:06-08:04/58 20:24	07:02 07:22-07:49/27 19:37	07:31 18:49	07:05 07:27-08:04/37 17:11	07:35 17:00
14	06:07 20:52	06:34 07:05-08:05/60 20:23	07:03 07:23-07:48/25 19:36	07:32 18:48	07:06 07:28-08:04/36 17:10	07:36 17:00
15	06:08 20:51	06:35 07:05-08:06/61 20:21	07:04 07:24-07:46/22 19:34	07:33 18:46	07:07 07:29-08:04/35 17:09	07:37 17:00
16	06:09 20:51	06:36 07:04-08:07/63 20:20	07:05 07:25-07:44/19 19:32	07:34 18:45	07:08 07:31-08:04/33 17:08	07:38 17:01
17	06:09 20:50	06:37 07:04-08:07/63 20:19	07:06 07:26-07:41/15 19:31	07:35 18:43	07:10 07:32-08:04/32 17:08	07:38 17:01
18	06:10 20:50	06:38 07:03-08:08/65 20:17	07:07 07:27-07:37/10 19:29	07:36 18:42	07:11 07:33-08:03/30 17:07	07:39 17:01
19	06:11 20:49	06:39 07:03-08:08/65 20:16	07:08 19:28	07:37 18:40	07:12 07:34-08:03/29 17:06	07:40 17:02
20	06:12 20:48	06:40 07:03-08:09/66 20:14	07:09 19:26	07:38 18:39	07:13 07:35-08:03/28 17:06	07:40 17:02
21	06:13 20:48	06:41 07:03-08:09/66 20:13	07:10 19:24	07:39 18:38	07:14 07:37-08:03/26 17:05	07:41 17:03
22	06:13 20:47	06:42 07:03-08:10/67 20:12	07:11 19:23	07:40 18:36	07:15 07:38-08:03/25 17:04	07:41 17:03
23	06:14 20:46	06:43 07:03-08:09/66 20:10	07:12 19:21	07:41 18:35	07:16 07:39-08:02/23 17:04	07:42 17:04
24	06:15 20:45	06:44 07:04-08:09/65 20:09	07:12 19:19	07:43 18:33	07:17 07:40-08:01/21 17:03	07:42 17:04
25	06:16 20:44	06:45 07:05-08:09/64 20:07	07:13 19:18	06:44 17:32	07:18 07:41-08:01/20 17:03	07:43 17:05
26	06:17 20:44	06:45 07:06-08:09/63 20:06	07:14 19:16	06:45 07:36-07:48/12 17:31	07:19 07:42-08:00/18 17:02	07:43 17:05
27	06:18 20:43	06:46 07:07-08:09/62 20:04	07:15 19:14	06:46 07:34-07:52/18 17:29	07:21 07:43-07:59/16 17:02	07:43 17:06
28	06:19 20:42	06:47 07:08-08:09/61 20:03	07:16 19:13	06:47 07:31-07:54/23 17:28	07:22 07:44-07:59/15 17:01	07:44 17:07
29	06:19 20:41	06:48 07:09-08:08/59 20:01	07:17 19:11	06:48 07:29-07:56/27 17:27	07:23 07:46-07:59/13 17:01	07:44 17:07
30	06:20 20:40	06:49 07:10-08:08/58 20:00	07:18 19:10	06:49 07:27-07:57/30 17:26	07:24 07:47-07:58/11 17:01	07:44 17:08
31	06:21 20:39	06:50 07:11-08:08/57 19:58		06:50 07:26-07:58/32 17:24		07:45 17:09
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	0	1597	649	142	914	18

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

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

Project:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.

Via Santa Margherita 4

IT-09124 Cagliari

+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

21/12/2023 17:58/3.4.415

### SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG2 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (80)

#### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	07:39-07:45/6 17:23	06:51 17:00
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:24 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	07:40-07:44/4 17:22	06:53 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	17:25 17:00	06:54 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 16:59
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:50 18:21	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:16	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:17 20:24	05:56 20:50	06:03 20:54	06:28 20:30	06:58 19:46	07:26 18:57	06:59 17:15	07:32 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:01 17:14	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:13	07:33 16:59
11	07:45 17:19	07:22 17:54	06:43 18:26	07:02-07:04/2 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 16:59
12	07:45 17:20	07:21 17:56	06:42 18:27	07:00-07:05/5 19:58	06:13 20:28	05:55 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:59-07:07/8 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:57-07:06/9 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:55-07:06/11 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:54-07:06/12 20:02	06:09 20:32	05:55 20:54	06:08 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:09 17:08	07:38 17:00
17	07:43 17:25	07:15 18:01	06:34 18:32	06:52-07:06/14 20:03	06:08 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:07	07:39 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:51-07:06/15 20:04	06:08 20:34	05:55 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:06	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:49-07:05/16 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:01
20	07:41 17:29	07:11 18:05	06:29 18:35	06:47-07:04/17 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:36-07:44/8 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:46-07:03/17 20:07	06:39 20:36	05:56 20:55	06:12 20:48	06:41 20:13	07:33-07:46/13 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:47-07:01/14 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:31-07:47/16 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:48-06:59/11 20:09	06:04 20:38	05:56 20:56	06:14 20:46	06:43 20:10	07:31-07:48/17 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:09	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:43 20:09	07:32-07:49/17 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:44 20:07	07:13 19:18	07:33-07:49/16 17:32	07:19 17:02	07:43 17:04
26	07:38 17:35	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	07:34-07:48/14 17:31	06:45 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:57 20:56	06:17 20:43	06:46 20:04	07:15 19:14	07:35-07:48/13 17:29	06:46 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	07:36-07:48/12 17:28	06:47 17:01	07:44 17:06
29	07:35 17:39	07:00 19:44	06:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	07:37-07:47/10 17:27	06:48 17:01	07:44 17:07
30	07:35 17:40	07:00 19:45	06:14 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	07:38-07:46/8 17:26	06:49 17:01	07:45 17:08
31	07:34 17:41	07:00 19:46	06:13 19:46	06:26 20:17	05:59 20:44	05:59 20:56	06:21 20:39	06:50 19:58	07:19 19:11	06:50 17:24	06:50 17:02	07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Sum of minutes with flicker	0	0	151	0	0	0	0	0	144	10	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: Progetto\_layout\_20231108WTG: WTG3 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (81)  
 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:52 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:56	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 17:00
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:32	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	06:03 20:55	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:32 16:59
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:30 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:52	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:53	06:33 20:24	07:02 19:38	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:37 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:52	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:17 18:00	06:36 18:31	06:47 20:02	06:09 20:32	05:55 20:54	06:09 20:51	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:39 17:01
18	07:43 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:28	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:35	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:42 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:28 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:13 20:48	06:41 20:13	07:10 19:24	07:40 18:38	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:42 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:56	06:14 20:46	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:44 20:09	07:13 19:19	07:43 18:33	07:18 17:03	07:43 17:04
25	07:39 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:45	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:18 20:43	06:46 20:04	07:15 19:15	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:15 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:45 17:08
31	07:34 17:42		07:11 19:46		05:59 20:45		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
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: Progetto\_layout\_20231108WTG: WTG4 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (82)

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 19:17	05:58 20:45	05:59 20:56	06:22 20:38	06:51 19:57	07:19 19:08	06:51 17:23	07:25 17:00
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:24 20:18	05:58 20:46	06:00 20:56	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:00 20:56	06:24 20:36	06:53 19:53	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:01 20:55	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:01 20:55	06:26 20:34	06:55 19:50	07:23 19:01	06:56 17:19	07:29 16:59
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:49	06:02 20:55	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:49 18:21	07:00 19:53	06:19 20:23	05:56 20:49	06:02 20:55	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:16	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:17 20:24	05:56 20:50	06:03 20:54	06:28 20:30	06:57 19:46	07:26 18:57	06:59 17:15	07:31 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:04 20:54	06:29 20:29	06:58 19:44	07:27 18:55	07:00 17:14	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:04 20:54	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:13	07:33 16:59
11	07:45 17:19	07:22 17:54	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:05 20:53	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 16:59
12	07:44 17:20	07:21 17:56	06:42 18:27	06:52 19:58	06:13 20:28	05:55 20:52	06:06 20:53	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:06 20:52	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:49 20:00	06:11 20:30	05:55 20:53	06:07 20:52	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:08 20:51	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	06:09 20:32	05:55 20:54	06:08 20:51	06:36 20:20	07:05 19:32	07:34 18:45	07:08 17:08	07:38 17:00
17	07:43 17:25	07:15 18:01	06:34 18:32	06:45 20:03	06:08 20:33	05:55 20:54	06:09 20:50	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:07	07:38 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:43 20:04	06:08 20:34	05:55 20:54	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:01
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:12 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:14 20:46	06:43 20:10	07:11 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:09	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:15 20:45	06:43 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:16 20:44	06:44 20:07	07:13 19:18	06:44 17:32	07:18 17:02	07:43 17:04
26	07:38 17:35	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:17 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:14 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:35 17:40		07:13 19:45	06:27 20:16	05:59 20:44	05:59 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46		05:59 20:44		06:21 20:39	06:50 19:58		06:50 17:24		07:45 17:09
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
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: Progetto\_layout\_20231108WTG: WTG5 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (83)

### 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	07:45 17:10	07:33 17:43	06:59 18:15	07:10 19:47	06:26 20:17	05:58 20:45	19:59-20:20/21 20:56	05:59 20:05-20:31/26 20:38	06:22 20:38	06:51 19:57	07:19 19:08	06:52 17:23	07:25 17:00
2	07:45 17:11	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	19:59-20:21/22 20:56	06:00 20:05-20:31/26 20:37	06:23 20:37	06:52 19:55	07:20 19:06	06:53 17:22	07:26 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	19:59-20:22/23 20:56	06:00 20:05-20:31/26 20:36	06:24 20:36	06:53 19:54	07:21 19:05	06:54 17:21	07:27 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	19:59-20:22/23 20:55	06:01 20:06-20:31/25 20:35	06:25 20:35	06:54 19:52	07:22 19:03	06:55 17:20	07:28 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	19:59-20:23/24 20:55	06:01 20:05-20:30/25 20:34	06:26 20:34	06:55 19:50	07:23 19:02	06:56 17:19	07:29 17:00
6	07:45 17:14	07:28 17:49	06:51 18:21	07:02 19:52	06:20 20:22	05:57 20:49	20:00-20:24/24 20:55	06:02 20:06-20:30/24 20:33	06:27 20:33	06:56 19:49	07:24 19:00	06:57 17:18	07:30 16:59
7	07:45 17:15	07:27 17:50	06:50 18:22	07:00 19:53	06:19 20:23	05:56 20:49	20:00-20:25/25 20:55	06:02 20:05-20:30/25 20:31	06:28 20:31	06:57 19:47	07:25 18:58	06:58 17:17	07:31 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:18 20:24	05:56 20:50	20:00-20:25/25 20:54	06:03 20:06-20:30/24 20:30	06:29 20:30	06:58 19:46	07:26 18:57	06:59 17:16	07:32 16:59
9	07:45 17:17	07:25 17:52	06:47 18:24	06:57 19:55	06:16 20:25	05:56 20:50	20:00-20:25/25 20:54	06:04 20:07-20:30/23 20:29	06:29 20:29	06:59 19:44	07:27 18:55	07:01 17:15	07:32 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	20:00-20:26/26 20:54	06:04 20:06-20:29/23 20:28	06:30 20:28	06:59 19:42	07:28 18:54	07:02 17:14	07:33 16:59
11	07:45 17:19	07:23 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	20:01-20:27/26 20:53	06:05 20:07-20:29/22 20:27	06:31 20:27	07:00 19:41	07:29 18:52	07:03 17:13	07:34 17:00
12	07:45 17:20	07:21 17:56	06:42 18:27	06:53 19:58	06:13 20:28	05:56 20:52	20:01-20:27/26 20:53	06:06 20:07-20:29/22 20:25	06:32 20:25	07:01 19:39	07:30 18:51	07:04 17:12	07:35 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	20:01-20:28/27 20:53	06:06 20:07-20:28/21 20:24	06:33 20:24	07:02 19:37	07:31 18:49	07:05 17:11	07:36 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:50 20:00	06:11 20:30	05:55 20:53	20:01-20:28/27 20:52	06:07 20:07-20:28/21 20:23	06:34 20:23	07:03 19:36	07:32 18:48	07:06 17:10	07:36 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	20:02-20:28/26 20:51	06:08 20:08-20:27/19 20:21	06:35 20:21	07:04 19:34	07:33 18:46	07:07 17:09	07:37 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:47 20:02	06:09 20:32	05:55 20:54	20:02-20:29/27 20:51	06:09 20:08-20:26/18 20:20	06:36 20:20	07:05 19:33	07:34 18:45	07:09 17:08	07:38 17:01
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:09 20:33	05:55 20:54	20:02-20:29/27 20:50	06:09 20:08-20:26/18 20:19	06:37 20:19	07:06 19:31	07:35 18:43	07:10 17:08	07:39 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:56 20:54	20:02-20:29/27 20:50	06:10 20:09-20:26/17 20:17	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:13 18:04	06:31 18:34	06:42 20:05	06:07 20:35	05:56 20:55	20:02-20:29/27 20:49	06:11 20:10-20:25/15 20:16	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:02
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	20:03-20:30/27 20:48	06:12 20:09-20:24/15 20:15	06:40 20:15	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	20:03-20:30/27 20:48	06:13 20:10-20:23/13 20:13	06:41 20:13	07:10 19:24	07:39 18:38	07:14 17:05	07:41 17:02
22	07:40 17:31	07:09 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	20:03-20:30/27 20:47	06:13 20:11-20:23/12 20:12	06:42 20:12	07:11 19:23	07:41 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:56	20:03-20:30/27 20:46	06:14 20:12-20:22/10 20:10	06:43 20:10	07:12 19:21	07:42 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:10	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	20:04-20:31/27 20:45	06:15 20:13-20:22/9 20:09	06:44 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	20:04-20:31/27 20:45	06:16 20:14-20:21/7 20:07	06:45 20:07	07:13 19:18	06:44 17:32	07:19 17:03	07:43 17:05
26	07:38 17:36	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:41	05:57 20:56	20:04-20:31/27 20:44	06:17 20:15-20:20/5 20:06	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:02 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	20:05-20:31/26 20:43	06:18 20:16-20:19/3 20:04	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:01 20:42	05:58 20:56	20:05-20:31/26 20:42	06:18 20:03 20:03	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39	07:00 19:44	06:16 19:44	06:30 20:15	06:01 20:43	05:58 20:56	20:05-20:31/26 20:41	06:18 20:04 20:04	06:47 20:01	07:16 19:11	06:47 17:27	07:22 17:01	07:44 17:07
30	07:35 17:40	07:00 19:45	06:16 19:45	06:30 20:16	06:01 20:44	05:59 20:56	20:05-20:31/26 20:40	06:19 20:04 20:04	06:48 20:00	07:17 19:10	06:48 17:26	07:23 17:01	07:44 17:08
31	07:34 17:41	07:00 19:46	06:16 19:46	06:30 20:16	06:01 20:44	05:59 20:56	20:05-20:31/26 20:39	06:20 20:00 20:00	06:49 20:00	07:18 19:10	06:49 17:24	07:24 17:01	07:45 17:09
Potential sun hours	301	299	370	397	445	448	772	455	425	374	347	301	292
Sum of minutes with flicker	0	0	0	0	215	448	772	494	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: Progetto\_layout\_20231108WTG: WTG6 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (84)

### 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	07:45 17:10	07:33 17:43	06:58 18:15	07:10 19:47	06:26 20:17	05:58 20:45	06:19-06:21/2 20:56	05:59 20:38	06:21-06:28/7 20:38	06:22 19:57	06:51 19:08	07:19 17:23	06:51 17:00
2	07:45 17:10	07:32 17:44	06:57 18:16	07:08 19:48	06:25 20:18	05:58 20:46	06:19-06:22/3 20:56	06:00 20:37	06:22-06:29/7 20:37	06:23 19:55	06:52 19:06	07:20 17:22	06:53 17:00
3	07:45 17:11	07:31 17:45	06:56 18:17	07:07 19:49	06:23 20:19	05:58 20:47	06:19-06:23/4 20:56	06:00 20:36	06:22-06:28/6 20:36	06:24 19:53	06:53 19:05	07:21 17:21	06:54 17:00
4	07:45 17:12	07:30 17:46	06:54 18:18	07:05 19:50	06:22 20:20	05:57 20:47	06:18-06:22/4 20:55	06:01 20:35	06:23-06:29/6 20:35	06:25 19:52	06:54 19:03	07:22 17:20	06:55 17:00
5	07:45 17:13	07:29 17:47	06:53 18:19	07:03 19:51	06:21 20:21	05:57 20:48	06:18-06:23/5 20:55	06:01 20:34	06:23-06:29/6 20:34	06:26 19:50	06:55 19:02	07:23 17:19	06:56 17:00
6	07:45 17:14	07:28 17:49	06:51 18:20	07:02 19:52	06:20 20:22	05:57 20:48	06:18-06:23/5 20:55	06:02 20:32	06:24-06:29/5 20:32	06:27 19:49	06:56 19:00	07:24 17:18	06:57 16:59
7	07:45 17:15	07:27 17:50	06:49 18:21	07:00 19:53	06:19 20:23	05:56 20:49	06:18-06:24/6 20:55	06:02 20:31	06:24-06:29/5 20:31	06:28 19:47	06:57 18:58	07:25 17:16	06:58 16:59
8	07:45 17:16	07:26 17:51	06:48 18:23	06:59 19:54	06:17 20:24	05:56 20:50	06:17-06:23/6 20:54	06:03 20:30	06:25-06:29/4 20:30	06:28 19:45	06:57 18:57	07:26 17:15	06:59 16:59
9	07:45 17:17	07:25 17:52	06:46 18:24	06:57 19:55	06:16 20:25	05:56 20:50	06:17-06:23/6 20:54	06:04 20:29	06:26-06:30/4 20:29	06:29 19:44	06:58 18:55	07:27 17:14	07:00 16:59
10	07:45 17:18	07:24 17:53	06:45 18:25	06:56 19:56	06:15 20:26	05:56 20:51	06:17-06:24/7 20:54	06:04 20:28	06:26-06:29/3 20:28	06:30 19:42	06:59 18:54	07:28 17:13	07:02 16:59
11	07:45 17:19	07:22 17:55	06:43 18:26	06:54 19:57	06:14 20:27	05:56 20:51	06:17-06:24/7 20:53	06:05 20:26	06:27-06:30/3 20:26	06:31 19:41	07:00 18:52	07:29 17:13	07:03 16:59
12	07:44 17:20	07:21 17:56	06:42 18:27	06:52 19:58	06:13 20:28	05:55 20:52	06:17-06:24/7 20:53	06:06 20:25	06:28-06:30/2 20:25	06:32 19:39	07:01 18:51	07:30 17:12	07:04 17:00
13	07:44 17:21	07:20 17:57	06:40 18:28	06:51 19:59	06:12 20:29	05:55 20:52	06:17-06:24/7 20:52	06:06 20:24	06:28-06:29/1 20:24	06:33 19:37	07:02 18:49	07:31 17:11	07:05 17:00
14	07:44 17:22	07:19 17:58	06:39 18:29	06:49 20:00	06:11 20:30	05:55 20:53	06:17-06:25/8 20:52	06:07 20:23	06:29-06:30/1 20:23	06:34 19:36	07:03 18:48	07:32 17:10	07:06 17:00
15	07:44 17:23	07:18 17:59	06:37 18:30	06:48 20:01	06:10 20:31	05:55 20:53	06:17-06:25/8 20:51	06:08 20:21	06:30 20:21	06:35 19:34	07:04 18:46	07:33 17:09	07:07 17:00
16	07:43 17:24	07:16 18:00	06:35 18:31	06:46 20:02	06:09 20:32	05:55 20:54	06:17-06:25/8 20:51	06:08 20:20	06:36 20:20	06:36 19:32	07:05 18:45	07:34 17:08	07:08 17:00
17	07:43 17:25	07:15 18:02	06:34 18:32	06:45 20:03	06:08 20:33	05:55 20:54	06:17-06:25/8 20:50	06:09 20:19	06:37 20:19	06:37 19:31	07:06 18:43	07:35 17:07	07:10 17:01
18	07:42 17:26	07:14 18:03	06:32 18:33	06:44 20:04	06:08 20:34	05:55 20:54	06:17-06:25/8 20:50	06:10 20:50	06:38 20:17	07:07 19:29	07:36 18:42	07:11 17:07	07:39 17:01
19	07:42 17:27	07:12 18:04	06:31 18:34	06:42 20:05	06:07 20:34	05:56 20:55	06:17-06:25/8 20:49	06:11 20:49	06:39 20:16	07:08 19:28	07:37 18:40	07:12 17:06	07:40 17:01
20	07:41 17:29	07:11 18:05	06:29 18:35	06:41 20:06	06:06 20:35	05:56 20:55	06:18-06:26/8 20:48	06:12 20:48	06:40 20:14	07:09 19:26	07:38 18:39	07:13 17:05	07:40 17:02
21	07:41 17:30	07:10 18:06	06:27 18:36	06:39 20:07	06:05 20:36	05:56 20:55	06:18-06:26/8 20:48	06:12 20:48	06:41 20:13	07:10 19:24	07:39 18:37	07:14 17:05	07:41 17:02
22	07:40 17:31	07:08 18:07	06:26 18:37	06:38 20:08	06:04 20:37	05:56 20:55	06:18-06:26/8 20:47	06:13 20:47	06:42 20:12	07:11 19:23	07:40 18:36	07:15 17:04	07:41 17:03
23	07:40 17:32	07:07 18:08	06:24 18:38	06:36 20:09	06:04 20:38	05:56 20:55	06:18-06:26/8 20:46	06:14 20:46	06:43 20:10	07:11 19:21	07:41 18:35	07:16 17:04	07:42 17:03
24	07:39 17:33	07:06 18:09	06:23 18:39	06:35 20:10	06:03 20:39	05:57 20:56	06:19-06:27/8 20:45	06:15 20:45	06:43 20:09	07:12 19:19	07:43 18:33	07:17 17:03	07:42 17:04
25	07:38 17:34	07:04 18:11	06:21 18:40	06:34 20:11	06:02 20:40	05:57 20:56	06:19-06:27/8 20:44	06:16 20:44	06:44 20:07	07:13 19:18	06:44 17:32	07:18 17:03	07:43 17:04
26	07:38 17:35	07:03 18:12	06:19 18:41	06:32 20:12	06:02 20:40	05:57 20:56	06:19-06:27/8 20:44	06:17 20:44	06:45 20:06	07:14 19:16	06:45 17:31	07:20 17:02	07:43 17:05
27	07:37 17:37	07:01 18:13	06:18 18:42	06:31 20:13	06:01 20:41	05:58 20:56	06:20-06:28/8 20:43	06:18 20:43	06:46 20:04	07:15 19:14	06:46 17:29	07:21 17:02	07:44 17:06
28	07:36 17:38	07:00 18:14	06:16 18:43	06:30 20:14	06:00 20:42	05:58 20:56	06:20-06:28/8 20:42	06:18 20:42	06:47 20:03	07:16 19:13	06:47 17:28	07:22 17:01	07:44 17:06
29	07:35 17:39		07:14 19:44	06:28 20:15	06:00 20:43	05:58 20:56	06:20-06:28/8 20:41	06:19 20:41	06:48 20:01	07:17 19:11	06:48 17:27	07:23 17:01	07:44 17:07
30	07:34 17:40	07:34 19:45	07:13 19:45	06:27 20:16	05:59 20:44	06:20-06:21/1 20:56	06:21-06:28/7 20:56	06:20 20:40	06:49 20:00	07:18 19:10	06:49 17:26	07:24 17:01	07:44 17:08
31	07:34 17:41		07:11 19:46	05:59 20:44	06:20-06:22/2 20:44			06:21 20:39	06:50 19:58	19:10	17:26	06:50 17:24	07:45 17:09
Potential sun hours	301	299	370	397	445	448	204	60	425	374	347	301	292
Sum of minutes with flicker	0	0	0	0	3	204	60	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: Progetto\_layout\_20231108WTG: WTG8 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)

### 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	07:45 16:32-16:45/13 17:10	07:33 17:43 06:59 18:15		07:10 18:50-19:26/36 19:47	06:26 20:17	05:59 20:00-20:20/20 20:45
2	07:45 16:32-16:45/13 17:11	07:32 17:44 06:57 18:16		07:08 18:50-19:27/37 19:48	06:25 20:18	05:58 20:01-20:21/20 20:46
3	07:45 16:33-16:46/13 17:11	07:31 17:45 06:56 18:17		07:07 18:51-19:28/37 19:49	06:23 20:19	05:58 20:01-20:22/21 20:47
4	07:45 16:33-16:47/14 17:12	07:30 17:46 06:54 18:18		07:05 18:50-19:29/39 19:50	06:22 20:20	05:57 20:01-20:22/21 20:47
5	07:45 16:34-16:48/14 17:13	07:29 17:47 06:53 18:19		07:03 18:51-19:31/40 19:51	06:21 20:21	05:57 20:02-20:23/21 20:48
6	07:45 16:35-16:49/14 17:14	07:28 17:49 06:51 18:20		07:02 18:51-19:31/40 19:52	06:20 20:22	05:57 20:02-20:24/22 20:49
7	07:45 16:36-16:50/14 17:15	07:27 17:50 06:50 18:22		07:00 18:51-19:32/41 19:53	06:19 20:23	05:56 20:03-20:25/22 20:49
8	07:45 16:35-16:50/15 17:16	07:26 17:51 06:48 18:23		06:59 18:52-19:33/41 19:54	06:18 20:24	05:56 20:03-20:25/22 20:50
9	07:45 16:36-16:52/16 17:17	07:25 17:52 06:46 18:24		06:57 18:52-19:34/42 19:55	06:16 20:25	05:56 20:03-20:25/22 20:50
10	07:45 16:37-16:53/16 17:18	07:24 17:53 06:45 18:25		06:56 18:54-19:35/41 19:56	06:15 20:02-20:03/1 20:26	05:56 20:04-20:26/22 20:51
11	07:45 16:38-16:54/16 17:19	07:22 17:55 06:43 18:26		06:54 18:54-19:36/42 19:57	06:14 20:01-20:04/3 20:27	05:56 20:04-20:26/22 20:51
12	07:45 16:38-16:55/17 17:20	07:21 17:56 06:42 18:27		06:53 18:55-19:37/42 19:58	06:13 20:00-20:05/5 20:28	05:56 20:05-20:27/22 20:52
13	07:44 16:40-16:56/16 17:21	07:20 17:57 06:40 18:28		06:51 18:56-19:37/41 19:59	06:12 20:00-20:06/6 20:29	05:56 20:05-20:27/22 20:52
14	07:44 16:41-16:57/16 17:22	07:19 17:58 06:39 18:29	18:05-18:08/3	06:50 18:58-19:39/41 20:00	06:11 19:59-20:06/7 20:30	05:55 20:05-20:28/23 20:53
15	07:44 16:41-16:58/17 17:23	07:18 17:59 06:37 18:30	18:03-18:09/6	06:48 18:59-19:39/40 20:01	06:10 19:59-20:07/8 20:31	05:55 20:06-20:28/22 20:53
16	07:43 16:43-17:00/17 17:24	07:16 18:00 06:35 18:31	18:02-18:11/9	06:47 19:01-19:41/40 20:02	06:09 19:58-20:08/10 20:32	05:55 20:06-20:29/23 20:54
17	07:43 16:43-17:00/17 17:25	07:15 18:02 06:34 18:32	18:00-18:11/11	06:45 19:03-19:41/38 20:03	06:09 19:58-20:09/11 20:33	05:56 20:06-20:29/23 20:54
18	07:42 16:45-17:02/17 17:26	07:14 18:03 06:32 18:33	17:59-18:13/14	06:44 19:06-19:42/36 20:04	06:08 19:58-20:10/12 20:34	05:56 20:06-20:29/23 20:54
19	07:42 16:46-17:03/17 17:28	07:13 18:04 06:31 18:34	17:58-18:14/16	06:42 19:10-19:43/33 20:05	06:07 19:58-20:11/13 20:34	05:56 20:07-20:29/22 20:55
20	07:41 16:48-17:04/16 17:29	07:11 18:05 06:29 18:35	17:56-18:14/18	06:41 19:20-19:44/24 20:06	06:06 19:58-20:12/14 20:35	05:56 20:08-20:30/22 20:55
21	07:41 16:49-17:05/16 17:30	07:10 18:06 06:27 18:36	17:56-18:16/20	06:39 19:22-19:46/24 20:07	06:05 19:57-20:12/15 20:36	05:56 20:08-20:30/22 20:55
22	07:40 16:51-17:06/15 17:31	07:09 18:07 06:26 18:37	17:55-18:16/21	06:38 19:22-19:46/24 20:08	06:04 19:58-20:14/16 20:37	05:56 20:08-20:30/22 20:55
23	07:40 16:54-17:08/14 17:32	07:07 18:08 06:24 18:38	17:53-18:17/24	06:36 19:24-19:47/23 20:09	06:04 19:58-20:14/16 20:38	05:56 20:08-20:30/22 20:55
24	07:39 16:56-17:09/13 17:33	07:06 18:10 06:23 18:39	17:53-18:19/26	06:35 19:26-19:48/22 20:10	06:03 19:58-20:14/16 20:39	05:57 20:08-20:31/23 20:56
25	07:38 17:01-17:08/7 17:34	07:04 18:11 06:21 18:40	17:52-18:19/27	06:34 19:28-19:49/21 20:11	06:02 19:59-20:16/17 20:40	05:57 20:08-20:31/23 20:56
26	07:38 17:36 17:36	07:03 18:12 06:19 18:41	17:52-18:21/29	06:32 19:31-19:46/15 20:12	06:02 19:58-20:16/18 20:40	05:57 20:08-20:31/23 20:56
27	07:37 17:37 17:37	07:01 18:13 06:18 18:42	17:51-18:21/30	06:31 20:13	06:01 19:59-20:18/19 20:41	05:58 20:09-20:31/22 20:56
28	07:36 17:38 17:38	07:00 18:14 06:16 18:43	17:51-18:22/31	06:30 20:14	06:01 19:59-20:18/19 20:42	05:58 20:09-20:31/22 20:56
29	07:35 17:39 17:39	07:00 18:15 06:15 18:44	18:51-19:24/33	06:28 20:15	06:00 20:00-20:19/19 20:43	05:58 20:08-20:31/23 20:56
30	07:35 17:40 17:40	07:00 18:16 06:15 18:45	18:50-19:24/34	06:27 20:16	05:59 19:59-20:19/20 20:44	05:59 20:09-20:31/22 20:56
31	07:34 17:42 17:42	07:00 18:17 06:15 18:46	18:50-19:25/35		05:59 20:00-20:20/20 20:44	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	373	0	387	900	285	661

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: Progetto\_layout\_20231108WTG: WTG8 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (85)

### 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	05:59 20:08-20:31/23 20:56	06:22 20:11-20:15/4 20:38	06:51 18:53-19:34/41 19:57	07:19 19:08	06:51 17:23	07:25 16:20-16:36/16 17:00
2	06:00 20:09-20:31/22 20:56	06:23 20:11-20:13/2 20:37	06:52 18:51-19:33/42 19:55	07:20 19:06	06:53 17:22	07:26 16:20-16:36/16 17:00
3	06:00 20:08-20:31/23 20:56	06:24 20:36	06:53 18:50-19:32/42 19:54	07:21 19:05	06:54 17:21	07:27 16:20-16:36/16 17:00
4	06:01 20:09-20:31/22 20:55	06:25 20:35	06:54 18:49-19:30/41 19:52	07:22 19:03	06:55 17:20	07:28 16:20-16:35/15 17:00
5	06:01 20:08-20:30/22 20:55	06:26 20:34	06:55 18:48-19:29/41 19:50	07:23 19:02	06:56 17:19	07:29 16:21-16:35/14 17:00
6	06:02 20:09-20:30/21 20:55	06:27 20:33	06:56 18:47-19:27/40 19:49	07:24 19:00	06:57 17:18	07:30 16:21-16:35/14 17:00
7	06:02 20:08-20:30/22 20:55	06:28 20:31	06:57 18:46-19:26/40 19:47	07:25 18:58	06:58 17:17	07:31 16:21-16:35/14 16:59
8	06:03 20:08-20:30/22 20:54	06:29 20:30	06:58 18:45-19:24/39 19:46	07:26 18:57	06:59 17:16	07:31 16:20-16:34/14 16:59
9	06:04 20:09-20:30/21 20:54	06:30 20:29	06:59 18:44-19:22/38 19:44	07:27 18:55	07:01 17:15	07:32 16:21-16:34/13 16:59
10	06:04 20:08-20:29/21 20:54	06:30 20:28	06:59 18:43-19:20/37 19:42	07:28 18:54	07:02 17:14	07:33 16:21-16:34/13 16:59
11	06:05 20:08-20:29/21 20:53	06:31 20:27	07:00 18:42-19:19/37 19:41	07:29 18:52	07:03 17:13	07:34 16:22-16:35/13 17:00
12	06:06 20:08-20:29/21 20:53	06:32 20:25	07:01 18:42-19:17/35 19:39	07:30 18:51	07:04 17:12	07:35 16:22-16:35/13 17:00
13	06:06 20:08-20:28/20 20:52	06:33 20:24	07:02 18:42-19:16/34 19:37	07:31 18:49	07:05 17:11	07:36 16:23-16:35/12 17:00
14	06:07 20:08-20:28/20 20:52	06:34 20:23	07:03 18:41-19:14/33 19:36	07:32 18:48	07:06 17:10	07:36 16:22-16:35/13 17:00
15	06:08 20:08-20:27/19 20:51	06:35 20:21	07:04 18:41-19:13/32 19:34	07:33 18:46	07:07 17:09	07:37 16:23-16:35/12 17:00
16	06:09 20:07-20:26/19 20:51	06:36 19:43-19:48/5 20:20	07:05 18:41-19:11/30 19:33	07:34 18:45	07:08 17:08	07:38 16:24-16:36/12 17:01
17	06:09 20:08-20:26/18 20:50	06:37 19:37-19:54/17 20:19	07:06 18:41-19:09/28 19:31	07:35 18:43	07:10 16:34-16:42/8 17:08	07:38 16:24-16:35/11 17:01
18	06:10 20:08-20:26/18 20:50	06:38 19:34-19:55/21 20:17	07:07 18:40-19:08/28 19:29	07:36 18:42	07:11 16:30-16:43/13 17:07	07:39 16:24-16:36/12 17:01
19	06:11 20:08-20:25/17 20:49	06:39 19:31-19:54/23 20:16	07:08 18:40-19:05/25 19:28	07:37 18:40	07:12 16:28-16:42/14 17:06	07:40 16:24-16:36/12 17:02
20	06:12 20:08-20:25/17 20:48	06:40 19:29-19:53/24 20:15	07:09 18:40-19:04/24 19:26	07:38 18:39	07:13 16:26-16:41/15 17:05	07:40 16:25-16:37/12 17:02
21	06:13 20:08-20:23/15 20:48	06:41 19:28-19:51/23 20:13	07:10 18:40-19:02/22 19:24	07:39 18:38	07:14 16:25-16:41/16 17:05	07:41 16:26-16:38/12 17:02
22	06:13 20:08-20:23/15 20:47	06:42 19:25-19:49/24 20:12	07:11 18:40-19:01/21 19:23	07:40 18:36	07:15 16:24-16:41/17 17:04	07:41 16:26-16:38/12 17:03
23	06:14 20:08-20:22/14 20:46	06:43 19:24-19:48/24 20:10	07:12 18:40-18:59/19 19:21	07:42 18:35	07:16 16:23-16:40/17 17:04	07:42 16:26-16:38/12 17:03
24	06:15 20:08-20:22/14 20:45	06:44 19:13-19:47/34 20:09	07:12 18:41-18:57/16 19:19	07:43 18:33	07:17 16:22-16:39/17 17:03	07:42 16:27-16:39/12 17:04
25	06:16 20:09-20:21/12 20:44	06:45 19:09-19:45/36 20:07	07:13 18:41-18:56/15 19:18	06:44 17:32	07:19 16:22-16:38/16 17:03	07:43 16:27-16:39/12 17:05
26	06:17 20:08-20:20/12 20:44	06:45 19:05-19:44/39 20:06	07:14 18:42-18:54/12 19:16	06:45 17:31	07:20 16:21-16:38/17 17:02	07:43 16:29-16:40/11 17:05
27	06:18 20:08-20:19/11 20:43	06:46 19:03-19:43/40 20:04	07:15 18:43-18:53/10 19:14	06:46 17:29	07:21 16:20-16:37/17 17:02	07:44 16:29-16:41/12 17:06
28	06:19 20:09-20:18/9 20:42	06:47 19:01-19:41/40 20:03	07:16 18:44-18:51/7 19:13	06:47 17:28	07:22 16:21-16:38/17 17:01	07:44 16:29-16:41/12 17:06
29	06:19 20:09-20:18/9 20:41	06:48 18:59-19:40/41 20:01	07:17 18:45-18:49/4 19:11	06:48 17:27	07:23 16:21-16:37/16 17:01	07:44 16:29-16:42/13 17:07
30	06:20 20:10-20:17/7 20:40	06:49 18:57-19:38/41 20:00	07:18 18:47-18:48/1 19:10	06:49 17:26	07:24 16:21-16:37/16 17:01	07:44 16:30-16:42/12 17:08
31	06:21 20:10-20:16/6 20:39	06:50 18:54-19:36/42 19:58		06:50 17:24		07:45 16:31-16:44/13 17:09
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	533	480	834	0	216	400

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:

Progetto\_RWE\_Serri\_Mandas

Licensed user:

I.A.T. Consulenza e progetti S.r.l.  
 Via Santa Margherita 4  
 IT-09124 Cagliari  
 +39 070 658297  
 Giuseppe Frongia / direttore@iatprogetti.it  
 Calculated:  
 21/12/2023 17:58/3.4.415

### SHADOW - Calendar per WTG

Calculation: Progetto\_layout\_20231108WTG: WTG9 - VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m) (86)  
 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	07:45 16:30-16:45/15	07:33 06:59	07:10 06:26	05:59 05:59	06:22 06:51	07:19 06:51	07:25 16:19-16:36/17					
	17:10	17:43	18:15	19:47	20:17	20:45	17:00					
2	07:45 16:30-16:45/15	07:32 06:57	07:08 06:25	05:58 06:00	06:23 06:52	07:20 06:53	07:26 16:19-16:36/17					
	17:11	17:44	18:16	19:48	20:18	20:46	17:00					
3	07:45 16:31-16:46/15	07:31 06:56	07:07 06:23	05:58 06:00	06:24 06:53	07:21 06:54	07:27 16:19-16:36/17					
	17:11	17:45	18:17	19:49	20:19	20:47	17:00					
4	07:45 16:32-16:47/15	07:30 06:54	07:05 06:22	05:57 06:01	06:25 06:54	07:22 06:55	07:28 16:19-16:35/16					
	17:12	17:46	18:18	19:50	20:20	20:47	17:00					
5	07:45 16:32-16:48/16	07:29 06:53	07:03 06:21	05:57 06:01	06:26 06:55	07:23 06:56	07:29 16:19-16:35/16					
	17:13	17:48	18:19	19:51	20:21	20:48	17:00					
6	07:45 16:33-16:49/16	07:28 06:51	07:02 06:20	05:57 06:02	06:27 06:56	07:24 06:57	07:30 16:19-16:35/16					
	17:14	17:49	18:21	19:52	20:22	20:48	17:00					
7	07:45 16:34-16:50/16	07:27 06:50	07:00 06:19	05:56 06:03	06:28 06:57	07:25 06:58	07:31 16:19-16:35/16					
	17:15	17:50	18:22	19:53	20:23	20:49	16:59					
8	07:45 16:34-16:50/16	07:26 06:48	06:59 06:18	05:56 06:03	06:29 06:58	07:26 06:59	07:31 16:19-16:34/15					
	17:16	17:51	18:23	19:54	20:24	20:50	16:59					
9	07:45 16:35-16:52/17	07:25 06:46	06:57 06:17	05:56 06:04	06:30 06:59	07:27 07:00	07:32 16:19-16:34/15					
	17:17	17:52	18:24	19:55	20:25	20:50	16:59					
10	07:45 16:36-16:53/17	07:24 06:45	06:56 06:15	05:56 06:04	06:30 06:59	07:28 07:02	07:33 16:19-16:35/16					
	17:18	17:53	18:25	19:56	20:26	20:51	17:00					
11	07:45 16:37-16:54/17	07:22 06:43	06:54 06:14	05:56 06:05	06:31 07:00	07:29 07:03	07:34 16:20-16:35/15					
	17:19	17:55	18:26	19:57	20:27	20:51	17:00					
12	07:44 16:38-16:55/17	07:21 06:42	06:53 06:13	05:56 06:06	06:32 07:01	07:30 07:04	07:35 16:20-16:35/15					
	17:20	17:56	18:27	19:58	20:28	20:52	17:00					
13	07:44 16:39-16:56/17	07:20 06:40	06:51 06:12	05:56 06:06	06:33 07:02	07:31 07:05	07:36 16:21-16:35/14					
	17:21	17:57	18:28	19:59	20:29	20:52	17:00					
14	07:44 16:41-16:58/17	07:19 06:39	06:50 06:11	05:56 06:07	06:34 07:03	07:32 07:06	07:36 16:21-16:35/14					
	17:22	17:58	18:29	20:00	20:30	20:53	17:00					
15	07:44 16:42-16:58/16	07:18 06:37	06:48 06:10	05:55 06:08	06:35 07:04	07:33 07:07	07:37 16:21-16:35/14					
	17:23	17:59	18:30	20:01	20:31	20:53	17:00					
16	07:43 16:44-17:00/16	07:16 06:35	06:47 06:10	05:56 06:09	06:36 07:05	07:34 07:08	07:38 16:22-16:36/14					
	17:24	18:00	18:31	20:02	20:32	20:54	17:00					
17	07:43 16:45-17:00/15	07:15 06:34	06:45 06:09	05:56 06:09	06:37 07:06	07:35 07:10	07:38 16:22-16:36/14					
	17:25	18:02	18:32	20:03	20:33	20:54	17:01					
18	07:42 16:48-16:59/11	07:14 06:32	06:44 06:08	05:56 06:10	06:38 07:07	07:36 07:11	07:39 16:22-16:36/14					
	17:26	18:03	18:33	20:04	20:34	20:54	17:01					
19	07:42	07:13 06:31	06:42 06:07	05:56 06:11	06:39 07:08	07:37 07:12	07:40 16:22-16:36/14					
	17:28	18:04	18:34	20:05	20:34	20:55	17:02					
20	07:41	07:11 06:29	06:41 06:06	05:56 06:12	06:40 07:09	07:38 07:13	07:40 16:23-16:37/14					
	17:29	18:05	18:35	20:06	20:35	20:55	17:02					
21	07:41	07:10 06:27	06:39 06:05	05:56 06:13	06:41 07:10	07:39 07:14	07:41 16:23-16:37/14					
	17:30	18:06	18:36	20:07	20:36	20:55	17:02					
22	07:40	07:09 06:26	06:38 06:05	05:56 06:13	06:42 07:11	07:40 07:15	07:41 16:24-16:38/14					
	17:31	18:07	18:37	20:08	20:37	20:55	17:03					
23	07:40	07:07 06:24	06:36 06:04	05:56 06:14	06:43 07:12	07:42 07:16	07:42 16:24-16:38/14					
	17:32	18:08	18:38	20:09	20:38	20:55	17:03					
24	07:39	07:06 06:23	06:35 06:03	05:57 06:15	06:44 07:12	07:43 07:17	07:42 16:25-16:39/14					
	17:33	18:10	18:39	20:10	20:39	20:56	17:04					
25	07:38	07:04 06:21	06:34 06:02	05:57 06:16	06:45 07:13	07:44 07:18	07:43 16:25-16:39/14					
	17:34	18:11	18:40	20:11	20:40	20:56	17:05					
26	07:38	07:03 06:19	06:32 06:02	05:57 06:17	06:45 07:14	07:45 07:20	07:43 16:26-16:39/13					
	17:36	18:12	18:41	20:12	20:40	20:56	17:05					
27	07:37	07:01 06:18	06:31 06:01	05:58 06:18	06:46 07:15	07:46 07:21	07:44 16:27-16:41/14					
	17:37	18:13	18:42	20:13	20:41	20:56	17:06					
28	07:36	07:00 06:16	06:30 06:01	05:58 06:19	06:47 07:16	07:47 07:22	07:44 16:27-16:41/14					
	17:38	18:14	18:43	20:14	20:42	20:56	17:07					
29	07:35	07:15 06:28	06:00 06:00	05:58 06:19	06:48 07:17	07:48 07:23	07:44 16:27-16:42/15					
	17:39	19:44	20:15	20:43	20:56	20:41	17:07					
30	07:35	07:13 06:27	06:00 06:00	05:59 06:20	06:49 07:18	07:49 07:24	07:44 16:28-16:42/14					
	17:40	19:45	20:16	20:44	20:56	20:40	17:08					
31	07:34	07:11	06:00 06:00	05:59 06:21	06:50 07:19	07:50 07:25	07:45 16:29-16:44/15					
	17:42	19:46	20:17	20:44	20:56	20:39	17:09					
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Sum of minutes with flicker	284	0	0	0	0	0	0	0	0	0	109	458

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

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

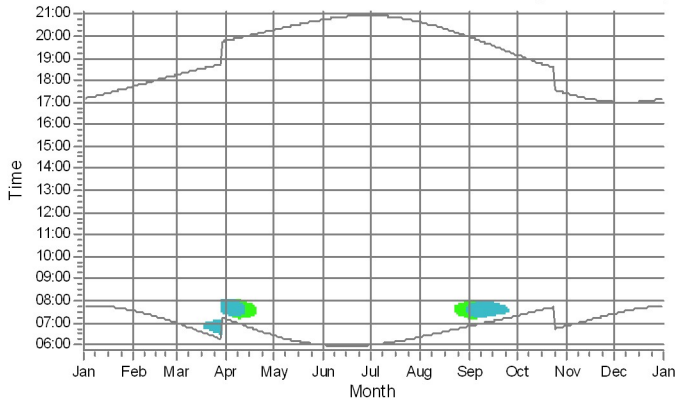




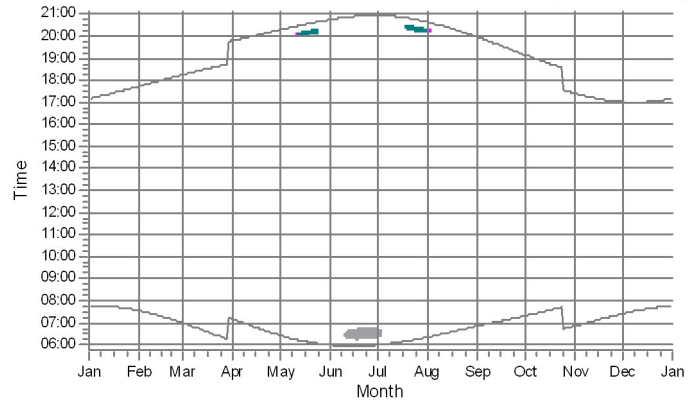
## SHADOW - Calendar per WTG, graphical

Calculation: Progetto\_layout\_20231108

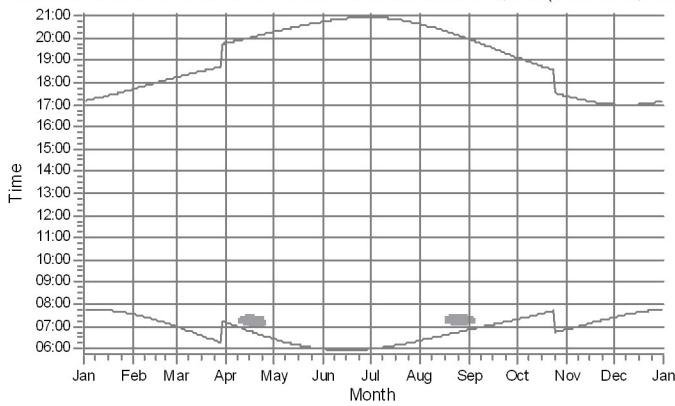
WTG1: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



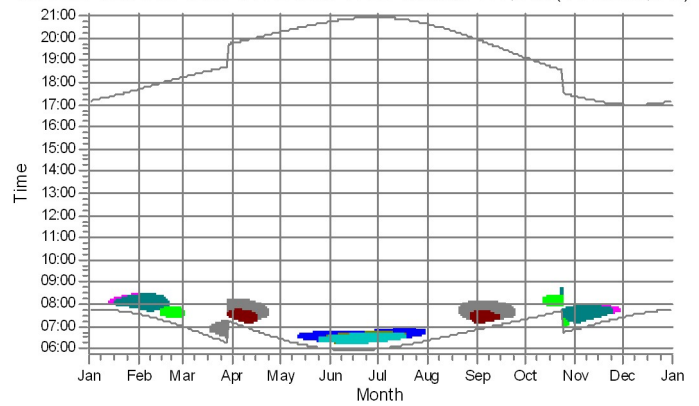
WTG10: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



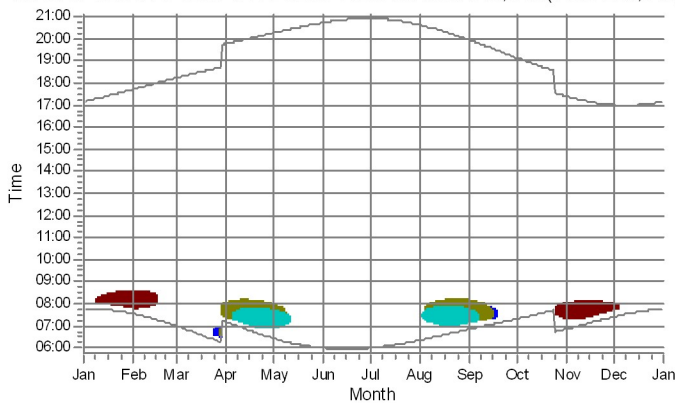
WTG11: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



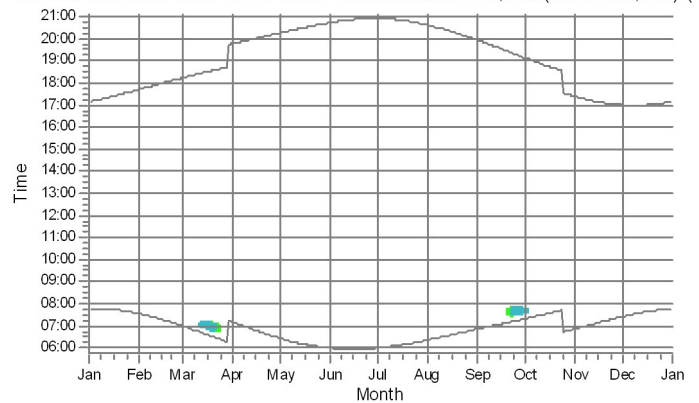
WTG12: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)




WTG13: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



WTG2: VESTAS-7200 V172 7200 172.0 !O! hub: 117,0 m (TOT: 203,0 m)



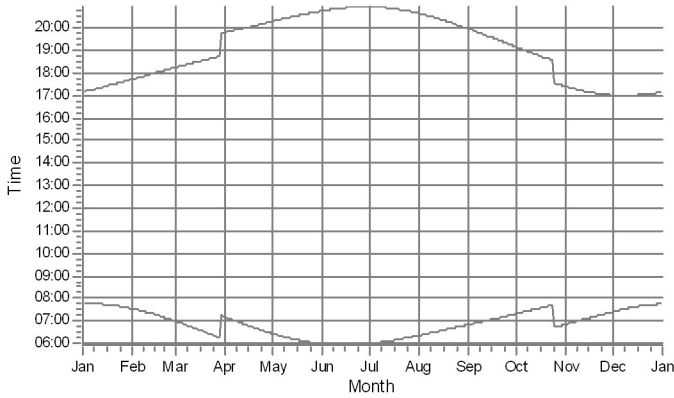
### Shadow receptors

	F015: A07		F018: A04		F047: D08		F269: A07
	F016: A04		F024: A02		F208: C02		F304: D06 - D01
	F017: A04		F030: A10		F267: A02		

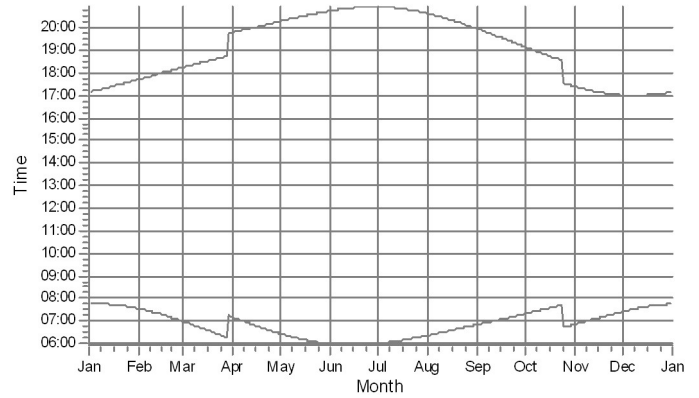
## SHADOW - Calendar per WTG, graphical

Calculation: Progetto\_layout\_20231108

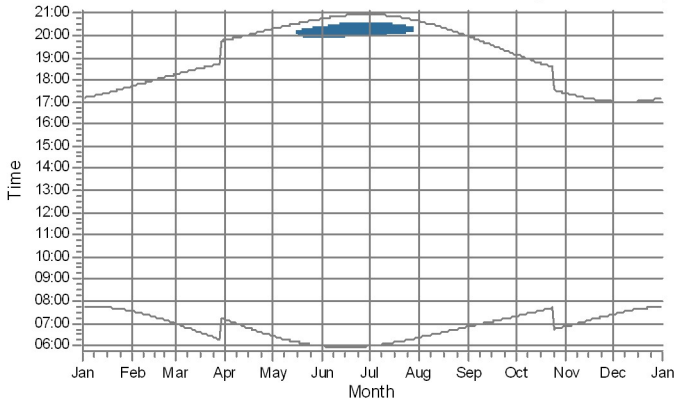
WTG3: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



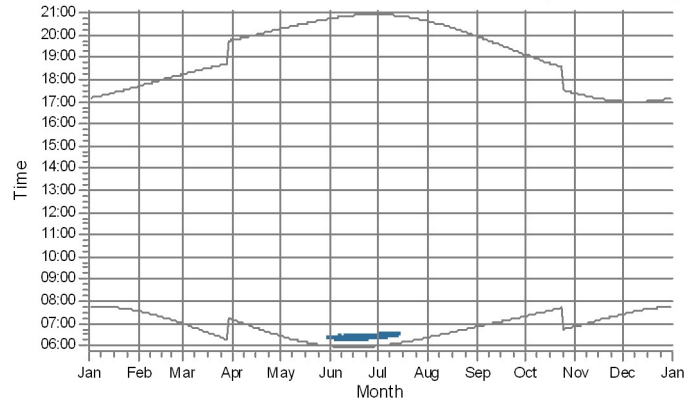
WTG4: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



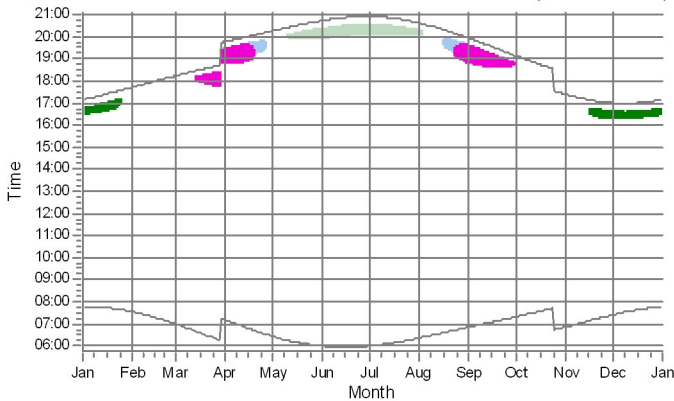
WTG5: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



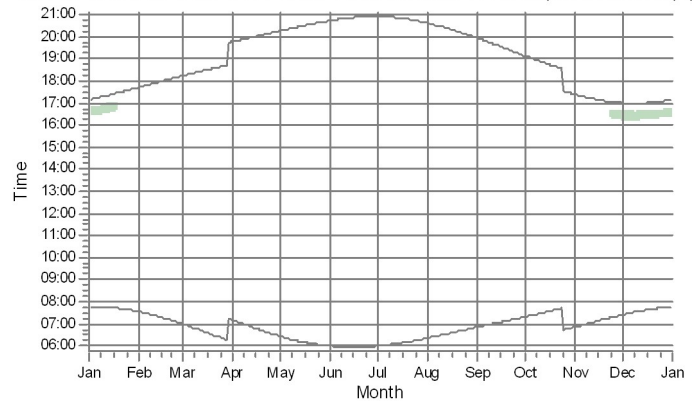
WTG6: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



WTG8: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



WTG9: VESTAS-7200 V172 7200 172.0 IO! hub: 117,0 m (TOT: 203,0 m)



### Shadow receptors

- |   |  |   |
|---|--|---|
| <span style="display: inline-block; width: 15px; height: 10px; background-color: #008000; margin-right: 5px;"></span> F007: A02 | <span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; margin-right: 5px;"></span> F200: C03        | <span style="display: inline-block; width: 15px; height: 10px; background-color: #FF00FF; margin-right: 5px;"></span> F347: Pascolo |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; margin-right: 5px;"></span> F196: C02 | <span style="display: inline-block; width: 15px; height: 10px; background-color: #00008B; margin-right: 5px;"></span> F322: Seminativo |   |