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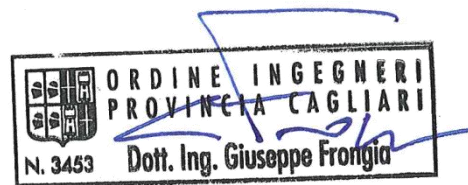
Analisi degli effetti di shadow - flickering

Progetto definitivo



Impianto eolico di "SERRAS"

Comuni di Sardara, Villanovaforru, Sanluri, Lunamatrona (SU)

Località "Serras"





N. REV.	DESCRIZIONE	ELABORATO	CONTROLLATO	APPROVATO	IT/EOL/E-SERRA/PDF/A/RT/095-a
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INDICE

1	CRITERI GENERALI DI ANALISI E VALUTAZIONE	3
2	DESCRIZIONE DEL FENOMENO	4
3	INDIVIDUAZIONE DEI RICETTORI	6
4	IPOTESI ALLA BASE DEL CALCOLO E SOGLIE DI RIFERIMENTO	8
4.1	Introduzione	8
4.2	Lo scenario peggiore (worst case)	11
4.3	Lo scenario reale (real case)	11
5	RISULTATI.....	13
6	ANALISI DEI RISULTATI	14
7	CONCLUSIONI	22
	APPENDICE: REPORT DEI RISULTATI DEL CALCOLO MODELLISTICO	24

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 3 di 24



1 CRITERI GENERALI DI ANALISI E VALUTAZIONE

La Società Asja Serra s.r.l., con sede legale a Torino in Corso Vittorio Emanuele II n. 6, intende realizzare un impianto per la produzione di energia elettrica da fonte rinnovabile eolica composto da n. 9 aerogeneratori, con potenza unitaria di 6,2 MW per una potenza complessiva di 55,8 MW, ricadente nei territori comunali di Sardara, Sanluri e Villanovaforru (Provincia del Sud Sardegna), denominato impianto eolico "Serras", in località "Serras".

Il presente elaborato, costituente parte integrante dello Studio di impatto ambientale allegato al progetto, 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 (IT/EOL/E-SERRA/PDF/A/RT/100-a_Report dei fabbricati censiti).

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.

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 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 4 di 24

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;

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 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 5 di 24



- 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 170 metri con una velocità massima nominale di rotazione di circa 11 RPM si avrà una frequenza di passo pari a circa 0,5 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".

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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 6 di 24

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 IT/EOL/E-SERRA/PDF/A/PLN/101-a (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 IT/EOL/E-SERRA/PDF/A/RT/100-a allegato alla documentazione progettuale.

Nel caso specifico, ai fini dei calcoli di esposizione all'ombra intermittente, sono stati individuati come ricettori n. 10 fabbricati ubicati entro una distanza di 1000 m dalle postazioni eoliche, così individuati:

- n. 8 fabbricati con destinazione abitativa accertata (edifici con categoria catastale "A"), identificati con i seguenti codici: F060, F061, F063 (A2 – Abitazioni di tipo civile), F001, F040 e F067 (A3 – Abitazioni di tipo economico), F072 (A4 - Abitazioni di tipo popolare), F062 (A7 - Abitazioni in villini);
- n. 1 fabbricato catastalmente classificato come F3 (Unità in corso di costruzione), identificato con la sigla F046, corrispondente alla Chiesa campestre di *Santu Antiogu Becciu* in comune di Sanluri;
- n. 1 fabbricato con destinazione catastale D10 (Fabbricati per funzioni produttive connesse alle attività agricole), identificato con la sigla F020, riferibile ad una struttura ricettiva (agriturismo).

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.





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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 7 di 24

Tabella 1 - Ricettori esposti al potenziale disturbo da shadow flickering

FABBRICATO	COMUNE	GB EST	GB NORD	DISTANZA DAL PIÙ PROSSIMO WTG [M]	WTG PIÙ PROSSIMO [M]	CATEGORIA CATASTO FABBRICATI
F001	Villanovaforru	1487824	4385335	892	SR02	A3 - Abitazioni di tipo economico
F020	Sardara	1488289	4385604	499	SR01	D10 - Fabbricati per funzioni connesse alle attività agricole
F040	Sanluri	1488927	4384730	619	SR09	A3 - Abitazioni di tipo economico
F046	Sanluri	1488557	4384352	310	SR08	F3 - Unità in corso di costruzione
F060	Sanluri	1488372	4383871	971	SR09	A2 - Abitazioni di tipo civile
F061	Sanluri	1489677	4382737	987	SR09	A2 - Abitazioni di tipo civile
F062	Sanluri	1490010	4383199	937	SR09	A7 - Abitazioni in villini
F063	Sanluri	1490355	4383866	942	SR09	A2 - Abitazioni di tipo civile
F067	Sanluri	1491104	4382687	977	SR09	A3 - Abitazioni di tipo economico
F072	Villanovaforru	1487824	4385335	965	SR08	A4 - Abitazioni di tipo popolare

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 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 8 di 24

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;

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 9 di 24

- l'illuminazione dell'ambiente residenziale deve essere bassa;
- il contrasto tra luci ed ombre deve essere alto;
- non devono essere presenti schermature che ostacolano 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.

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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 10 di 24

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.

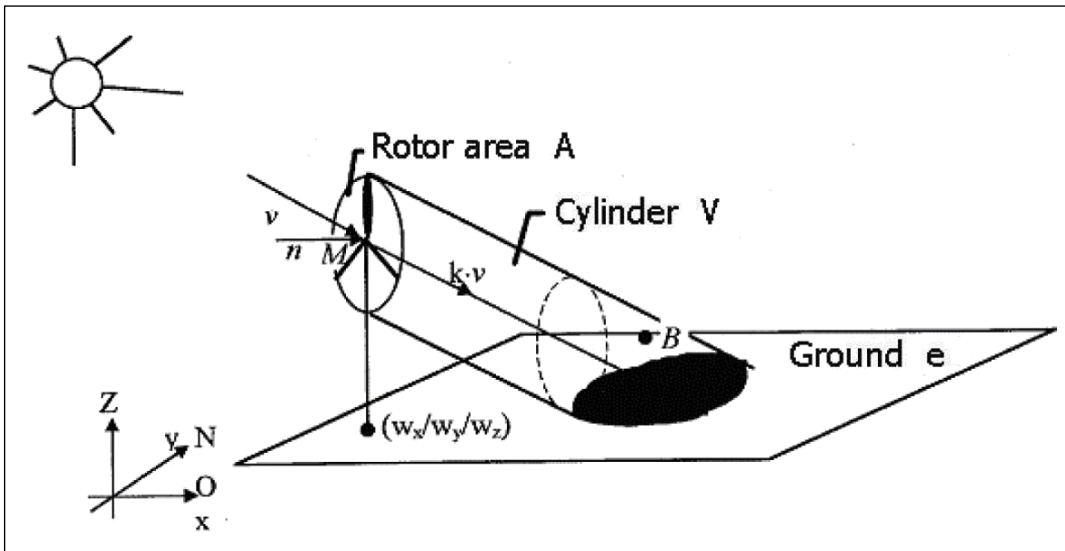


Figura 4.1: Rappresentazione schematica della proiezione dell'ombra del rotore.

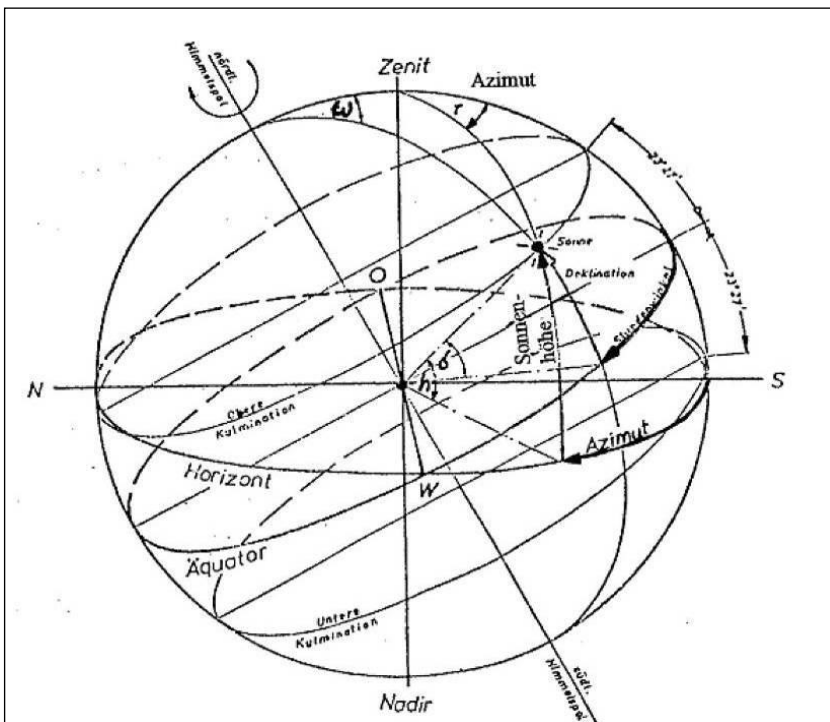




Figura 4.2: Schema dei moti terrestri e parametri di calcolo.

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 11 di 24

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 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 recettore 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;

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 12 di 24

- 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.

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 13 di 24

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 di progetto, 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 096_IT_EOL_E-SERRA_PDF_A_CT_096-a).

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.

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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 14 di 24

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



ID	RICETTORE	Cat. Catastale	WTG SF	WTG Più prossimo	Dist. Min. WTG	h/anno SF Worst Case	h/giorno SF Worst Case	h/anno SF Real Case
1	F001	A03		SR02	892	0:00	0:00	0:00
2	F020	D10	SR01, SR02, SR05, SR04	SR01	499	196:08	1:42	77:12
3	F040	A03	SR06	SR09	619	4:47	0:14	2:07
4	F046	F03	SR05, SR04, SR08	SR08	310	226:57	2:10	34:51
5	F060	A02		SR09	971	0:00	0:00	0:00
6	F061	A02		SR09	987	0:00	0:00	0:00
7	F062	A07		SR09	937	0:00	0:00	0:00
8	F063	A02	SR06	SR09	942	0:36	0:03	0:15
9	F067	A03	SR08, SR09	SR09	977	33:16	0:40	10:51
10	F072	A04	SR03, SR04, SR05, SR02	SR08	965	43:16	0:33	15:58

Nota: sono evidenziati in grigio i fabbricati presso cui è atteso il superamento della soglia guida di 30 h/anno per lo SF

Dall'esame della Tabella 6.1 si evince quanto segue:

- tra i n. 10 edifici individuati come potenziali ricettori del fenomeno di *shadow flickering* entro l'areale di interesse, n. 5 fabbricati (F001, F060, F061, F062 ed F063) non risulteranno esposti ad alcun impatto potenziale da SF;
- in corrispondenza di n. 3 edifici l'incidenza del fenomeno sarà abbondantemente al disotto della soglia guida (F040, F067 e F072);
- n. 1 edificio vedrà un'incidenza del fenomeno alquanto prossima alla soglia di riferimento ma appena superiore a questa (F046 – Chiesa campestre di *Santu Antiogu Becciu*);
- presso n. 1 edificio è atteso un più marcato superamento della soglia guida (F020 – Agriturismo), con un'incidenza del fenomeno stimata in 77:12:00 h/anno.

Nel seguito si procederà ad esaminare nel dettaglio le potenziali situazioni di maggiore incidenza del fenomeno di SF, pervenendo alla conclusione che può ragionevolmente escludersi che lo

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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 15 di 24



shadow-flickering possa rappresentare un effettivo disturbo a carico degli occupanti gli edifici considerati.

Ricettore F020

Come si evince dall'esame del calendario dell'ombra riferito al ricettore F020 (Figura 6.1), il gruppo di edifici in esame è prevalentemente esposto all'ombreggiamento degli aerogeneratori SR01 e SR02 indicativamente nella fascia oraria 7.00-9.00 a.m. nel periodo primaverile-estivo; in misura minore sarà avvertibile la proiezione dell'ombra ad opera degli aerogeneratori SR04 e SR05 nella medesima fascia oraria della stagione tardo-autunnale e invernale.

Valutato che:

- il manifestarsi di un effettivo disturbo per tutta la durata attesa dello SF (circa 77h/anno) presuppone evidentemente una assidua esposizione degli occupanti l'edificio, circostanza non verificata in particolare per gli ospiti delle strutture ricettive contraddistinte da una certa stagionalità;
- considerati gli orari in cui inizierà a manifestarsi il fenomeno, ossia alle prime ore del mattino, è ragionevolmente bassa la probabilità che gli occupanti gli edifici siano svegli o, comunque, risultino esposti all'ombreggiamento per tutta la sua durata (fascia oraria dalle 7.00 alle 9.00 a.m.);
- un blocco edificato presenta aperture fenestrate in corrispondenza lato nord, e pertanto risulta solo marginalmente interessato allo SF degli aerogeneratori SR01 e SR02 (Figura 6.5);
- il blocco edificato con aperture lungo il lato est presenta un loggiato coperto, intrinsecamente protetto dalla radiazione luminosa diretta (Figura 6.5);
- gli edifici sono circondati da alberature che, in particolare quando il sole è basso sull'orizzonte, esercitano un efficace effetto schermante nei confronti, in particolare, dell'aerogeneratore SR01, principale sorgente di ombreggiamento;
- gli edifici sono in parte schermati dall'ombreggiamento riferibile all'aerogeneratore SR02 ad opera di un fabbricato agricolo interposto tra il ricettore e la sorgente di ombreggiamento;
- l'aerogeneratore SR02 è posizionato, in ogni caso, ad una distanza considerevole dal ricettore (circa 1000 m), ed i relativi effetti di ombreggiamento possono pertanto ritenersi significativamente sfumati (cfr. par. 4.1), diminuendo il contrasto luci-ombre all'aumentare della distanza tra sorgente e ricettore.

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 16 di 24

Tutto ciò considerato può ragionevolmente escludersi che lo *shadow-flickering* possa rappresentare un effettivo disturbo a carico degli occupanti gli edifici in esame.

F020: D10 - Agriturismo Nuovi giardini

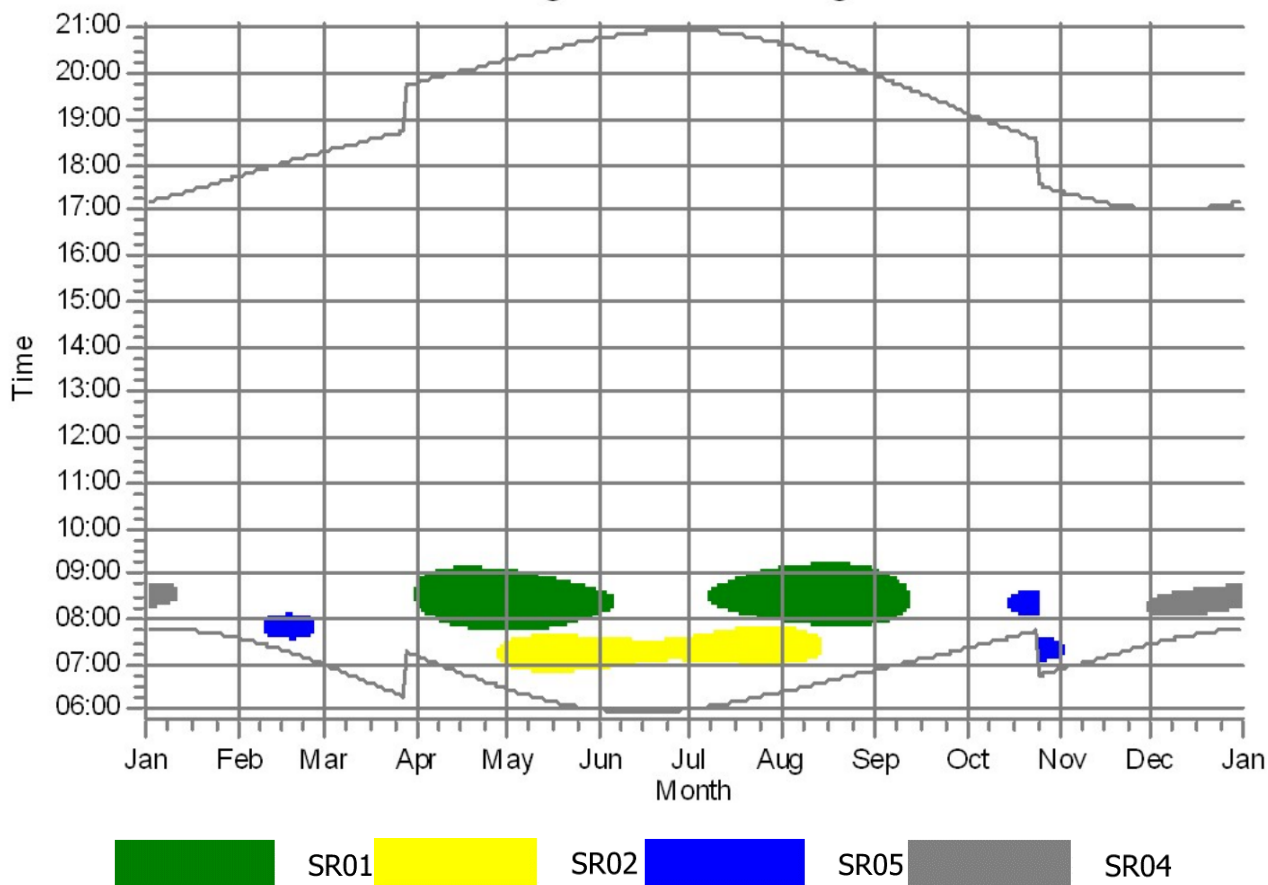




Figura 6.1 – Calendario dell'ombra relativo al ricettore F020 (Cat. catastale D1)

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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 17 di 24

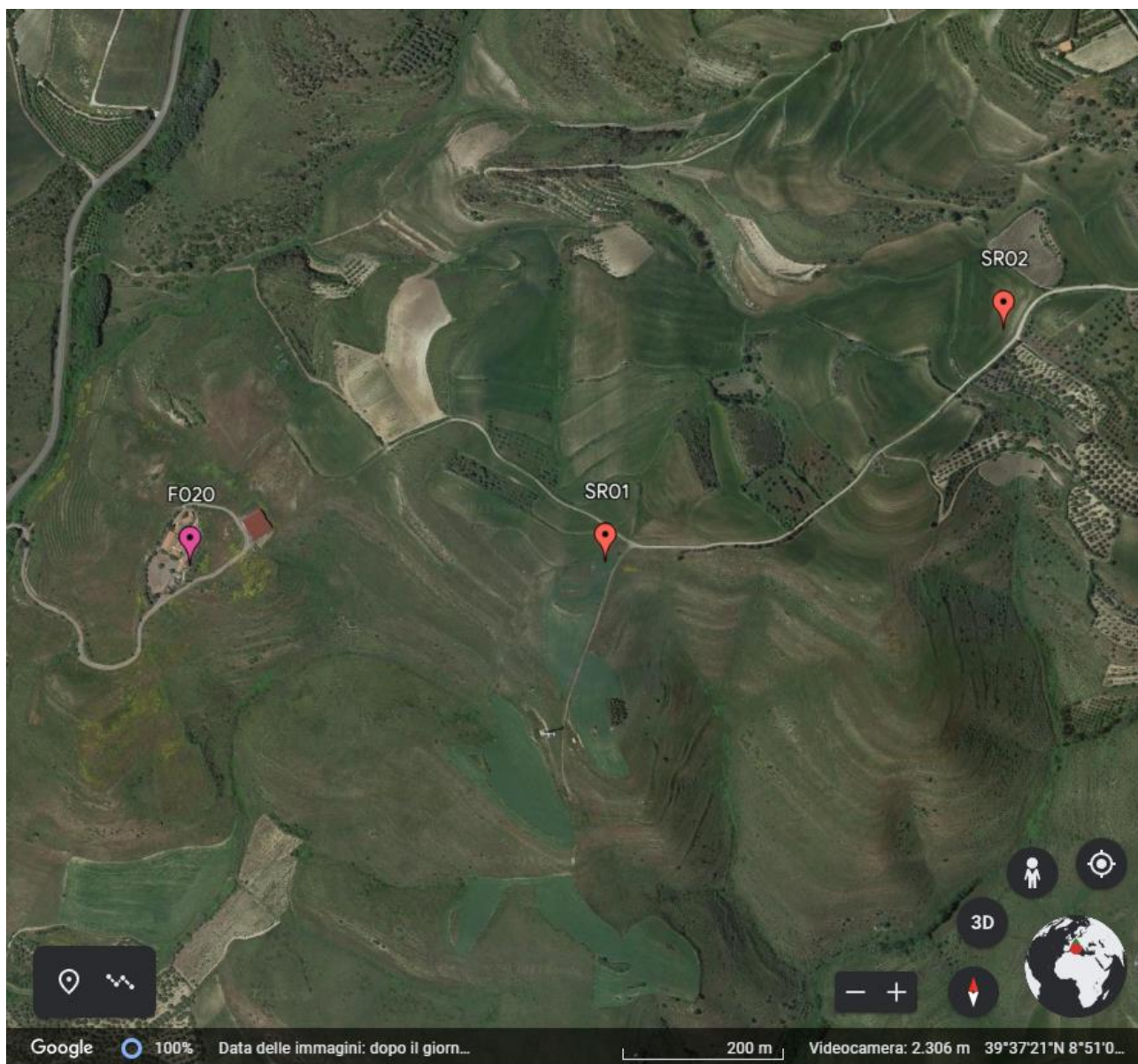




Figura 6.2 - Posizionamento del ricevitore F020 rispetto agli aerogeneratori SR01 e SR02, all'origine di un potenziale ombreggiamento intermittente sul fabbricato

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 18 di 24

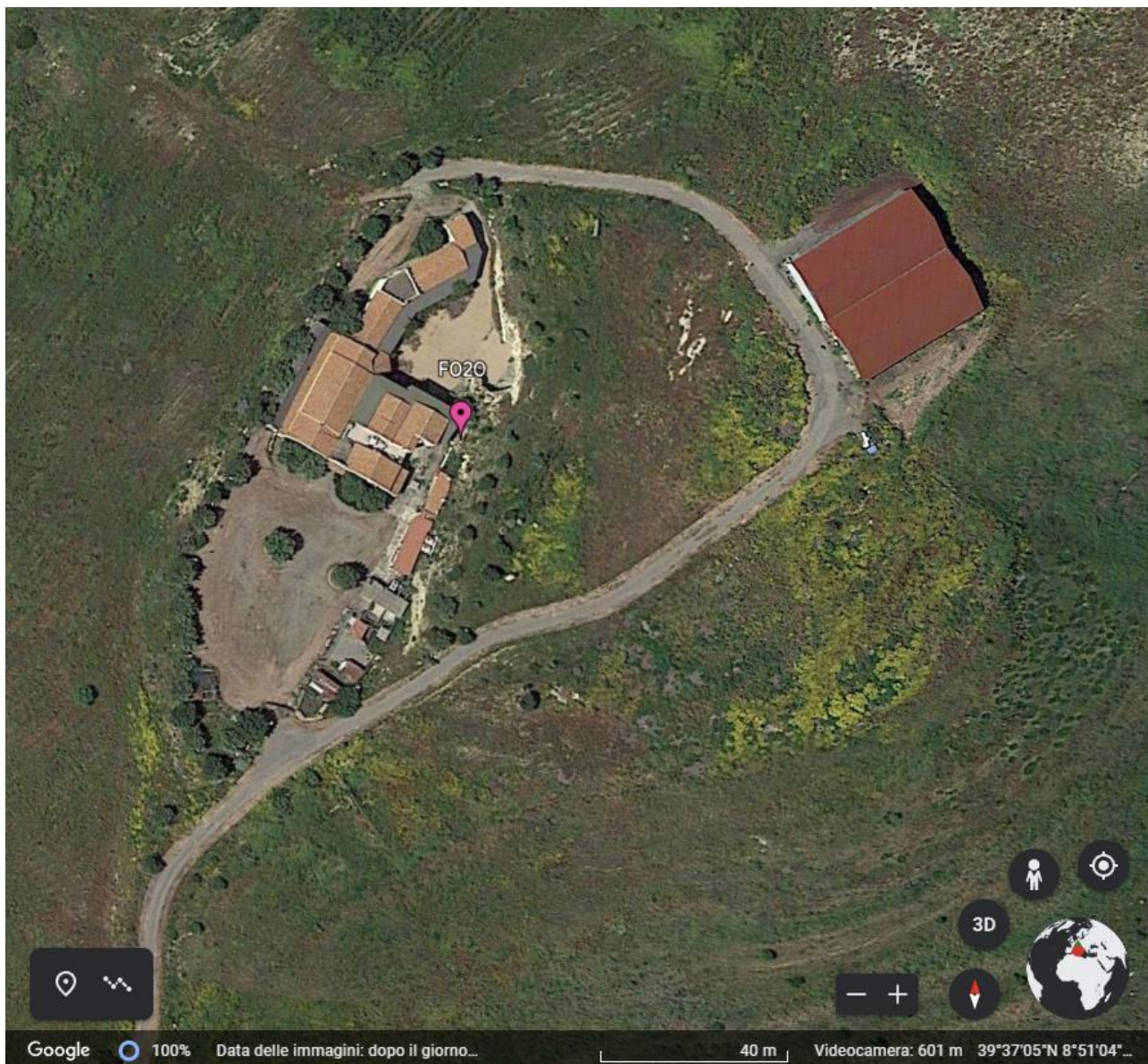


Figura 6.3 - Cortina arborea e edificio agricolo annesso posizionati a est del ricettore F020 La barriera verde ed il limitrofo edificio esercitano un efficace effetto schermante sul potenziale ombreggiamento intermittente riferibile, in particolare, agli aerogeneratori SR01 e SR02, posizionati a est e nordest rispettivamente.



COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 19 di 24





Figura 6.4 – Struttura agrituristica con identificativo F020 (prospettiva aerea)



Figura 6.5 - Struttura agrituristica con identificativo F020 (prospettiva da nord-est – Fonte: sardaturismo.it)

Ricettore F046

Per quanto attiene alla Chiesa campestre di *Santu Antiogu Becciu*, il potenziale ombreggiamento interesserà prevalentemente la fascia oraria pomeridiana, indicativamente dalle h 13:00 alle h 15.00 nei mesi invernali (da novembre a febbraio) ad opera dell'aerogeneratore SR08 (Figura 6.6). Poiché

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 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 20 di 24

si tratta di un edificio di culto frequentato solo saltuariamente da fedeli e occasionali visitatori, soprattutto in occasione di speciali ricorrenze religiose, si ritiene ragionevolmente di poter escludere che il fenomeno dell'ombreggiamento intermittente possa rappresentare un effettivo disturbo per i fruitori della Chiesa; anche in ragione degli orari interessati, poco consoni alle cerimonie religiose, nonché delle condizioni di debole illuminazione (naturale o artificiale) che caratterizzano i luoghi di culto (e dunque di modesto contrasto luci/ombre), orientate a favorire il senso di accoglienza e il raccoglimento caratteristici di questi ambienti.

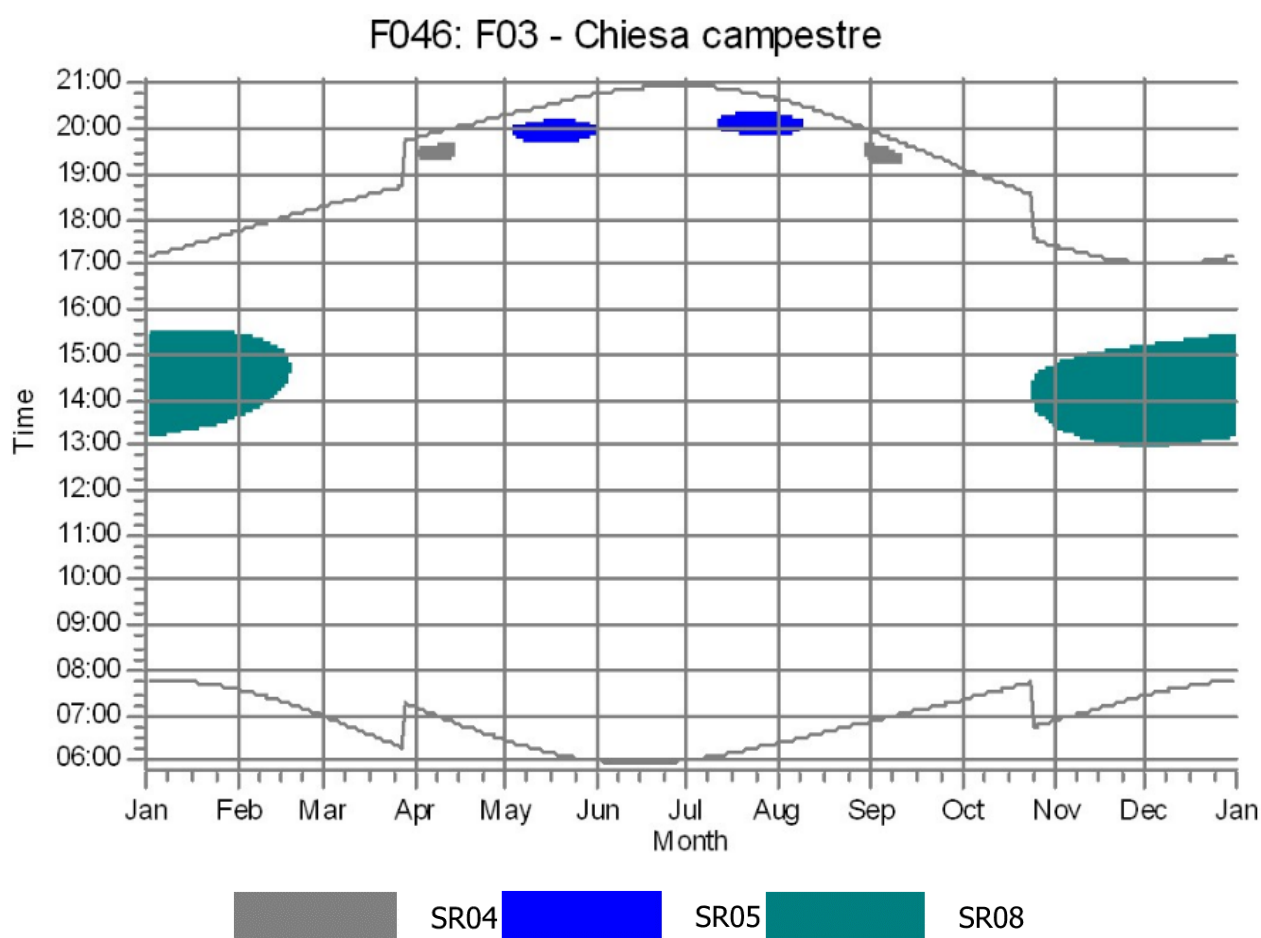


Figura 6.6 – Calendario dell'ombra relativo al ricevitore F046 (Chiesa campestre di Santu Antiogu Becciu)





COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 21 di 24



Figura 6.7: Chiesa campestre di Santu Antiogu Becciu con identificativo F046 (prospettiva da nord)

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 22 di 24

7 CONCLUSIONI

Il documento ha esaminato compiutamente il potenziale disturbo da ombreggiamento intermittente (*shadow flickering*) in corrispondenza dei più prossimi ricettori individuati nell'area interessata dal proposto parco eolico "SERRAS" proposto dalla società Asja Serra S.r.l., controllata da Asja Ambiente Italia S.p.A. 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.

Nel caso specifico, ai fini dei calcoli di esposizione all'ombra intermittente, sono stati individuati come ricettori n. 10 fabbricati ubicati entro una distanza di 1000 m dalle postazioni eoliche, così individuati:



- n. 8 fabbricati con destinazione abitativa accertata (edifici con categoria catastale "A"), identificati con i seguenti codici: F060, F061, F063 (A2 – Abitazioni di tipo civile), F001, F040 e F067 (A3 – Abitazioni di tipo economico), F072 (A4 - Abitazioni di tipo popolare), F062 (A7 - Abitazioni in villini);
- n. 1 fabbricato catastalmente classificato come F3 (Unità in corso di costruzione), identificato con la sigla F046, corrispondente alla Chiesa campestre di *Santu Antiogu Becciu* in comune di Sanluri;
- n. 1 fabbricato con destinazione catastale D10 (Fabbricati per funzioni produttive connesse alle attività agricole), identificato con la sigla F020, riferibile ad una struttura ricettiva (agriturismo).

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.

Le analisi hanno evidenziato come l'incidenza del *shadow flickering* indotto dal progetto, assunta la soglia di $SF_P=30$ h/anno come valore di riferimento per una valutazione di significatività, si manifesterà in modo potenzialmente avvertibile su n. 2 edifici (F020–Chiesa campestre e F046–Agriturismo).



Tuttavia, considerata la conservatività delle stime in rapporto all'effettivo manifestarsi di un disturbo per gli occupanti gli edifici (aleatorietà circa la presenza degli occupanti l'edificio, presenza di un sufficiente contrasto luci-ombre, assenza di elementi schermanti quali tendaggi e/o alberature) è altamente verosimile che gli effettivi potenziali impatti da *shadow flickering* risulteranno estremamente più contenuti di quelli prospettati dal software di simulazione, tali da potersi ricondurre ai predetti "valori guida" e da non arrecare apprezzabili disturbi agli occupanti.

Peraltro, laddove durante la fase operativa dell'impianto dovesse essere avvertito un effettivo disturbo, la società proponente si rende disponibile ad attuare efficaci misure di mitigazione, quali la

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 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 23 di 24

creazione di alberature schermanti prospicienti ai fabbricati esposti all'ombreggiamento, comunque definite in accordo con gli interessati.

Da quanto precede si può concludere con ragionevole approssimazione che il potenziale disturbo associato al fenomeno di *shadow-flickering* risulterà inferiore alla soglia di significatività in corrispondenza di tutti i ricettori individuati entro una distanza di 1000 metri dagli aerogeneratori in progetto.

COMMITTENTE 	OGGETTO IMPIANTO EOLICO "SERRAS" PROGETTO DEFINITIVO	COD. ELABORATO IT/EOL/E-SERRA/PDF/A/RT/095-a
 iat CONSULENZA E PROGETTI www.iatprogetti.it	TITOLO ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING	PAGINA 24 di 24

APPENDICE: REPORT DEI RISULTATI DEL CALCOLO MODELLISTICO

SHADOW - Main Result

Calculation: Progetto_layout_2022_01_31

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_Serras_Sar

Obstacles used in calculation

Eye height for map: 1,5 m

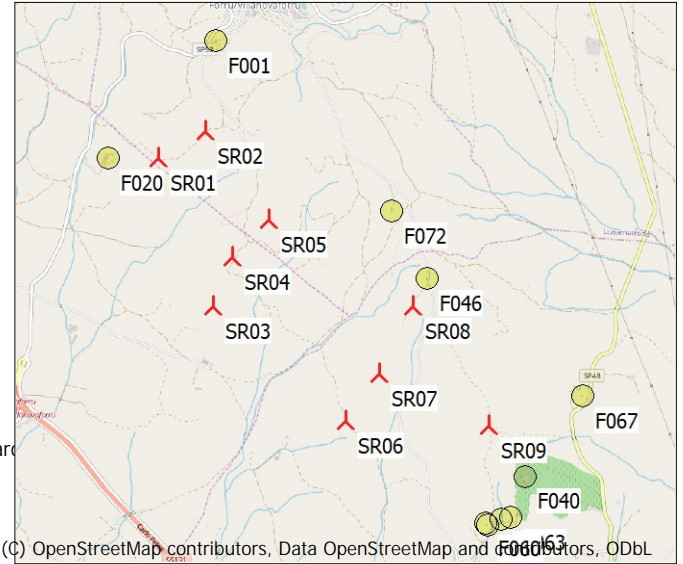
Grid resolution: 1,0 m

All coordinates are in

Italian Gauss-Boaga west-ROMA40 (IT-peninsular $\leq \pm 4m$)

WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.					Calculation distance [m]	RPM [RPM]
SR01	1.487.824	4.385.335	318,6	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR02	1.488.289	4.385.604	323,5	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR03	1.488.372	4.383.871	249,1	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR04	1.488.557	4.384.352	270,0	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR05	1.488.927	4.384.730	308,7	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR06	1.489.677	4.382.737	222,7	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR07	1.490.010	4.383.199	286,9	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR08	1.490.355	4.383.866	270,0	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8
SR09	1.491.104	4.382.687	270,0	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.2-170-6.200	6.200	170,0	135,0	2.040	8,8



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

Scale 1:75.000

▲ New WTG

● Shadow receptor

Shadow receptor-Input

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]
F001	A03	1.488.397	4.386.489	334,8	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F020	D10 - Agriturismo Nuovi giardini	1.487.325	4.385.331	260,9	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F040	A03 - D10 - D01 Cantine Su Entu	1.491.462	4.382.183	260,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F046	F03 - Chiesa campestre	1.490.495	4.384.142	290,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F060	A02	1.491.069	4.381.718	222,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F061	A02 - C02	1.491.091	4.381.701	220,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F062	A07 - C02	1.491.224	4.381.759	221,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F063	A02	1.491.324	4.381.772	228,9	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F067	A03 - C02	1.492.036	4.382.977	200,0	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F072	A04	1.490.139	4.384.806	290,0	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]
F001	A03	0:00	0	0:00
F020	D10 - Agriturismo Nuovi giardini	196:08	239	1:42
F040	A03 - D10 - D01 Cantine Su Entu	4:47	30	0:14
F046	F03 - Chiesa campestre	226:57	194	2:10
F060	A02	0:00	0	0:00

To be continued on next page...

Project:

Progetto_Serras_Sardara_Asja

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:

24/02/2023 13:00/3.4.415

SHADOW - Main Result

Calculation: Progetto_layout_2022_01_31

...continued from previous page

No.	Name	Shadow, worst case		
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
F061	A02 - C02	0:00	0	0:00
F062	A07 - C02	0:00	0	0:00
F063	A02	0:36	17	0:03
F067	A03 - C02	33:16	84	0:40
F072	A04	43:16	167	0:33

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

No.	Name	Worst case [h/year]
SR01	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (56)	117:10
SR02	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (57)	69:50
SR03	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (60)	4:04
SR04	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (59)	25:00
SR05	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (58)	43:10
SR06	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (63)	5:23
SR07	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (62)	0:00
SR08	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (61)	214:16
SR09	Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (64)	26:07

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

SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F001 - 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	07:46 17:11	07:34 17:44	07:00 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:57	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:24	07:26 17:02
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:47	06:01 20:57	06:24 20:38	06:53 19:56	07:21 19:07	06:54 17:23	07:27 17:01
3	07:46 17:13	07:32 17:46	06:57 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:55	07:22 19:06	06:55 17:22	07:28 17:01
4	07:46 17:14	07:31 17:48	06:55 18:19	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:36	06:55 19:53	07:23 19:04	06:56 17:21	07:29 17:01
5	07:46 17:14	07:30 17:49	06:54 18:21	07:05 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:35	06:56 19:51	07:24 19:03	06:57 17:20	07:30 17:01
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:31 17:01
7	07:46 17:16	07:28 17:51	06:51 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:56	06:29 20:32	06:58 19:48	07:26 19:00	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:58 20:51	06:04 20:55	06:30 20:31	06:59 19:47	07:27 18:58	07:00 17:17	07:32 17:01
9	07:46 17:18	07:26 17:53	06:48 18:25	06:58 19:56	06:18 20:26	05:57 20:51	06:05 20:55	06:31 20:30	07:00 19:45	07:28 18:56	07:01 17:16	07:33 17:01
10	07:46 17:19	07:25 17:55	06:46 18:26	06:57 19:57	06:17 20:27	05:57 20:52	06:06 20:55	06:32 20:29	07:01 19:43	07:29 18:55	07:03 17:15	07:34 17:01
11	07:46 17:20	07:23 17:56	06:44 18:27	06:55 19:58	06:16 20:28	05:57 20:52	06:06 20:54	06:33 20:28	07:02 19:42	07:30 18:53	07:04 17:14	07:35 17:01
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:59	06:15 20:29	05:57 20:53	06:07 20:54	06:34 20:26	07:02 19:40	07:31 18:52	07:05 17:13	07:36 17:01
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:34 20:25	07:03 19:39	07:32 18:50	07:06 17:12	07:37 17:01
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:54	06:08 20:53	06:35 20:24	07:04 19:37	07:33 18:49	07:07 17:11	07:37 17:01
15	07:45 17:24	07:19 18:00	06:38 18:31	06:49 20:02	06:12 20:32	05:57 20:54	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:47	07:08 17:10	07:38 17:02
16	07:44 17:25	07:17 18:02	06:37 18:32	06:48 20:03	06:11 20:33	05:57 20:54	06:10 20:52	06:37 20:21	07:06 19:34	07:35 18:46	07:09 17:10	07:39 17:02
17	07:44 17:27	07:16 18:03	06:35 18:33	06:46 20:04	06:10 20:34	05:57 20:55	06:11 20:51	06:38 20:20	07:07 19:32	07:36 18:44	07:11 17:09	07:39 17:02
18	07:43 17:28	07:15 18:04	06:33 18:34	06:45 20:05	06:09 20:34	05:57 20:55	06:11 20:51	06:39 20:18	07:08 19:30	07:37 18:43	07:12 17:08	07:40 17:03
19	07:43 17:29	07:14 18:05	06:32 18:35	06:43 20:06	06:08 20:35	05:57 20:55	06:12 20:50	06:40 20:17	07:09 19:29	07:38 18:42	07:13 17:07	07:41 17:03
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:56	06:13 20:49	06:41 20:16	07:10 19:27	07:39 18:40	07:14 17:07	07:41 17:03
21	07:42 17:31	07:11 18:07	06:29 18:37	06:40 20:08	06:07 20:37	05:57 20:56	06:14 20:49	06:42 20:14	07:11 19:25	07:40 18:39	07:15 17:06	07:42 17:04
22	07:41 17:32	07:10 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:56	06:15 20:48	06:43 20:13	07:12 19:24	07:41 18:37	07:16 17:06	07:42 17:04
23	07:41 17:33	07:08 18:10	06:25 18:39	06:38 20:10	06:05 20:39	05:58 20:56	06:15 20:47	06:44 20:11	07:13 19:22	07:43 18:36	07:17 17:05	07:43 17:05
24	07:40 17:35	07:07 18:11	06:24 18:40	06:36 20:11	06:04 20:40	05:58 20:56	06:16 20:46	06:45 20:10	07:14 19:20	07:44 18:35	07:18 17:04	07:43 17:05
25	07:39 17:36	07:05 18:12	06:22 18:41	06:35 20:12	06:04 20:41	05:58 20:57	06:17 20:45	06:46 20:08	07:15 19:19	06:45 17:33	07:19 17:04	07:44 17:06
26	07:39 17:37	07:04 18:13	06:21 18:42	06:34 20:13	06:03 20:41	05:59 20:57	06:18 20:45	06:47 20:07	07:15 19:17	06:46 17:32	07:21 17:03	07:44 17:06
27	07:38 17:38	07:03 18:14	06:19 18:43	06:32 20:14	06:02 20:42	05:59 20:57	06:19 20:44	06:48 20:05	07:16 19:16	06:47 17:31	07:22 17:03	07:44 17:07
28	07:37 17:39	07:01 18:15	06:17 18:44	06:31 20:15	06:02 20:43	05:59 20:57	06:20 20:43	06:49 20:04	07:17 19:14	06:48 17:29	07:23 17:03	07:45 17:08
29	07:36 17:40	07:00 19:15	06:16 19:45	06:30 20:16	06:01 20:44	06:00 20:57	06:21 20:42	06:49 20:02	07:18 19:12	06:49 17:28	07:24 17:02	07:45 17:08
30	07:35 17:42	07:00 19:46	06:14 20:16	06:28 20:17	06:01 20:45	06:00 20:57	06:22 20:41	06:50 20:01	07:19 19:11	06:50 17:27	07:25 17:02	07:45 17:09
31	07:35 17:43	07:00 19:47	06:13 20:17	06:28 20:18	06:01 20:46	06:00 20:58	06:22 20:40	06:51 19:59	07:20 19:10	06:51 17:26	07:26 17:01	07:46 17:10
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)
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SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F020 - D10 - Agriturismo Nuovi giardini

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	07:46	08:19 (SR04)	07:34	07:00	07:11	08:28 (SR01)	06:27	07:05 (SR02)	06:00	06:59 (SR02)
	17:11	22 08:41 (SR04)	17:44	18:16	19:48	11 08:39 (SR01)	20:18	91 08:59 (SR01)	20:46	54 08:33 (SR01)
2	07:46	08:20 (SR04)	07:33	06:58	07:09	08:21 (SR01)	06:26	07:03 (SR02)	05:59	06:59 (SR02)
	17:12	21 08:41 (SR04)	17:45	18:17	19:49	24 08:45 (SR01)	20:19	94 08:59 (SR01)	20:47	50 08:31 (SR01)
3	07:46	08:20 (SR04)	07:32	06:57	07:08	08:17 (SR01)	06:25	07:02 (SR02)	05:59	07:00 (SR02)
	17:13	21 08:41 (SR04)	17:46	18:18	19:50	32 08:49 (SR01)	20:20	97 08:59 (SR01)	20:47	45 08:29 (SR01)
4	07:46	08:21 (SR04)	07:31	06:55	07:06	08:13 (SR01)	06:23	07:00 (SR02)	05:59	07:01 (SR02)
	17:14	20 08:41 (SR04)	17:48	18:20	19:51	38 08:51 (SR01)	20:21	98 08:57 (SR01)	20:48	39 08:27 (SR01)
5	07:46	08:22 (SR04)	07:30	06:54	07:05	08:11 (SR01)	06:22	06:59 (SR02)	05:58	07:01 (SR02)
	17:15	19 08:41 (SR04)	17:49	18:21	19:52	43 08:54 (SR01)	20:22	99 08:57 (SR01)	20:49	29 07:30 (SR02)
6	07:46	08:23 (SR04)	07:29	06:52	07:03	08:08 (SR01)	06:21	06:58 (SR02)	05:58	07:02 (SR02)
	17:15	18 08:41 (SR04)	17:50	18:22	19:53	47 08:55 (SR01)	20:23	100 08:56 (SR01)	20:49	28 07:30 (SR02)
7	07:46	08:23 (SR04)	07:28	06:51	07:02	08:07 (SR01)	06:20	06:57 (SR02)	05:58	07:03 (SR02)
	17:16	17 08:40 (SR04)	17:51	18:23	19:54	50 08:57 (SR01)	20:24	102 08:56 (SR01)	20:50	27 07:30 (SR02)
8	07:46	08:24 (SR04)	07:27	06:49	07:00	08:05 (SR01)	06:19	06:56 (SR02)	05:58	07:03 (SR02)
	17:17	16 08:40 (SR04)	17:52	18:24	19:55	53 08:58 (SR01)	20:25	101 08:55 (SR01)	20:51	27 07:30 (SR02)
9	07:46	08:26 (SR04)	07:26	06:48	06:58	08:03 (SR01)	06:18	06:56 (SR02)	05:57	07:04 (SR02)
	17:18	14 08:40 (SR04)	17:54	18:25	19:56	56 08:59 (SR01)	20:26	101 08:54 (SR01)	20:51	26 07:30 (SR02)
10	07:46	08:28 (SR04)	07:25	06:46	06:57	08:01 (SR01)	06:17	06:55 (SR02)	05:57	07:05 (SR02)
	17:19	11 08:39 (SR04)	17:55	18:26	19:57	59 09:00 (SR01)	20:27	101 08:54 (SR01)	20:52	24 07:29 (SR02)
11	07:46	08:30 (SR04)	07:23	06:45	06:55	07:59 (SR01)	06:16	06:55 (SR02)	05:57	07:05 (SR02)
	17:20	8 08:38 (SR04)	17:56	18:27	19:58	61 09:00 (SR01)	20:28	101 08:53 (SR01)	20:52	23 07:28 (SR02)
12	07:45	07:22	06:43	06:54	06:54	07:59 (SR01)	06:15	06:54 (SR02)	05:57	07:05 (SR02)
	17:21	16 07:58 (SR05)	18:28	19:59	62 09:01 (SR01)	20:29	101 08:52 (SR01)	20:53	23 07:28 (SR02)	
13	07:45	07:21	06:41	06:52	06:52	07:57 (SR01)	06:14	06:54 (SR02)	05:57	07:06 (SR02)
	17:22	17:58	18:29	20:00	64 09:01 (SR01)	20:30	99 08:51 (SR01)	20:53	22 07:28 (SR02)	
14	07:45	07:20	06:40	06:51	06:51	07:56 (SR01)	06:13	06:54 (SR02)	05:57	07:06 (SR02)
	17:23	17:59	18:30	20:01	66 09:02 (SR01)	20:31	98 08:50 (SR01)	20:54	22 07:28 (SR02)	
15	07:45	07:19	06:38	06:49	06:49	07:56 (SR01)	06:12	06:54 (SR02)	05:57	07:07 (SR02)
	17:24	18:01	18:31	20:02	67 09:03 (SR01)	20:32	96 08:49 (SR01)	20:54	21 07:28 (SR02)	
16	07:44	07:17	06:37	06:48	06:48	07:54 (SR01)	06:11	06:54 (SR02)	05:57	07:07 (SR02)
	17:26	18:02	18:32	20:03	69 09:03 (SR01)	20:33	97 08:50 (SR01)	20:54	21 07:28 (SR02)	
17	07:44	07:16	06:35	06:46	06:46	07:54 (SR01)	06:10	06:54 (SR02)	05:57	07:09 (SR02)
	17:27	18:03	18:33	20:04	69 09:03 (SR01)	20:34	95 08:49 (SR01)	20:55	19 07:28 (SR02)	
18	07:43	07:15	06:33	06:45	06:45	07:53 (SR01)	06:09	06:54 (SR02)	05:57	07:09 (SR02)
	17:28	18:04	18:34	20:05	70 09:03 (SR01)	20:34	91 08:47 (SR01)	20:55	19 07:28 (SR02)	
19	07:43	07:14	06:32	06:43	06:43	07:52 (SR01)	06:08	06:54 (SR02)	05:57	07:09 (SR02)
	17:29	18:05	18:35	20:06	71 09:03 (SR01)	20:35	90 08:46 (SR01)	20:55	19 07:28 (SR02)	
20	07:42	07:12	06:30	06:42	06:42	07:51 (SR01)	06:07	06:54 (SR02)	05:57	07:09 (SR02)
	17:30	18:06	18:36	20:07	72 09:03 (SR01)	20:36	88 08:45 (SR01)	20:56	19 07:28 (SR02)	
21	07:42	07:11	06:29	06:41	06:41	07:51 (SR01)	06:07	06:55 (SR02)	05:57	07:09 (SR02)
	17:31	18:07	18:37	20:08	72 09:03 (SR01)	20:37	86 08:45 (SR01)	20:56	19 07:28 (SR02)	
22	07:41	07:10	06:27	06:39	06:39	07:51 (SR01)	06:06	06:55 (SR02)	05:58	07:09 (SR02)
	17:32	18:09	18:38	20:09	72 09:03 (SR01)	20:38	84 08:44 (SR01)	20:56	19 07:28 (SR02)	
23	07:41	07:08	06:25	06:38	06:38	07:50 (SR01)	06:05	06:55 (SR02)	05:58	07:10 (SR02)
	17:33	18:10	18:39	20:10	72 09:02 (SR01)	20:39	81 08:43 (SR01)	20:56	19 07:29 (SR02)	
24	07:40	07:07	06:24	06:36	06:36	07:50 (SR01)	06:04	06:56 (SR02)	05:58	07:10 (SR02)
	17:35	18:11	18:40	20:11	72 09:02 (SR01)	20:40	79 08:42 (SR01)	20:57	19 07:29 (SR02)	
25	07:39	07:05	06:22	06:35	06:35	07:50 (SR01)	06:04	06:56 (SR02)	05:58	07:10 (SR02)
	17:36	18:12	18:41	20:12	72 09:02 (SR01)	20:41	76 08:41 (SR01)	20:57	19 07:29 (SR02)	
26	07:39	07:04	06:21	06:34	06:34	07:49 (SR01)	06:03	06:56 (SR02)	05:59	07:10 (SR02)
	17:37	18:13	18:42	20:13	72 09:01 (SR01)	20:41	73 08:40 (SR01)	20:57	21 07:31 (SR02)	
27	07:38	07:03	06:19	06:32	06:32	07:49 (SR01)	06:02	06:56 (SR02)	05:59	07:10 (SR02)
	17:38	18:14	18:43	20:14	72 09:01 (SR01)	20:42	72 08:39 (SR01)	20:57	21 07:31 (SR02)	
28	07:37	07:01	06:17	06:31	06:31	07:49 (SR01)	06:02	06:57 (SR02)	05:59	07:10 (SR02)
	17:39	18:15	18:44	20:15	72 09:01 (SR01)	20:43	68 08:38 (SR01)	20:57	21 07:31 (SR02)	
29	07:36		06:30	06:43	06:43	07:13 (SR02)	06:01	06:57 (SR02)	06:00	07:10 (SR02)
	17:40		19:45	20:16	76 09:00 (SR01)	20:44	65 08:37 (SR01)	20:57	22 07:32 (SR02)	
30	07:36		07:14	06:28	06:28	07:08 (SR02)	06:01	06:58 (SR02)	06:00	07:09 (SR02)
	17:42		19:46	20:17	87 09:00 (SR01)	20:45	61 08:36 (SR01)	20:57	23 07:32 (SR02)	
31	07:35		07:13	07:13			06:00	06:58 (SR02)		
	17:43		19:47	20:45			20:45	58 08:34 (SR01)		
Potential sun hours	301	299	370	397	445	448				
Total, worst case	187	294		1823	2743	760				

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_2022_01_31Shadow receptor: F020 - D10 - Agriturismo Nuovi giardini

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	06:01		07:10 (SR02)	06:23	07:05 (SR02)	06:52	07:59 (SR01)	07:20	06:52	07:18 (SR05)	07:26	08:12 (SR04)	
	20:57	23	07:33 (SR02)	20:39	100	09:03 (SR01)	19:58	61	09:00 (SR01)	19:09		08:20 (SR04)	
2	06:01		07:09 (SR02)	06:24	07:06 (SR02)	06:53	07:59 (SR01)	07:21	17:25	3	07:21 (SR05)	17:02	08:11 (SR04)
	20:57	24	07:33 (SR02)	20:38	101	09:04 (SR01)	19:56	59	08:58 (SR01)	19:08		17:02	08:22 (SR04)
3	06:02		07:09 (SR02)	06:25	07:06 (SR02)	06:54	08:00 (SR01)	07:22	17:23			07:28	08:10 (SR04)
	20:56	25	07:34 (SR02)	20:37	102	09:05 (SR01)	19:55	56	08:56 (SR01)	19:06		17:01	08:24 (SR04)
4	06:02		07:09 (SR02)	06:26	07:07 (SR02)	06:55	08:01 (SR01)	07:23	17:22			07:29	08:10 (SR04)
	20:56	26	07:35 (SR02)	20:36	100	09:05 (SR01)	19:53	54	08:55 (SR01)	19:04		17:01	08:25 (SR04)
5	06:03		07:09 (SR02)	06:27	07:06 (SR02)	06:56	08:03 (SR01)	07:24	17:21			07:30	08:09 (SR04)
	20:56	27	07:36 (SR02)	20:35	102	09:05 (SR01)	19:51	50	08:53 (SR01)	19:03		17:01	08:26 (SR04)
6	06:03		07:08 (SR02)	06:28	07:07 (SR02)	06:57	08:04 (SR01)	07:25	17:20			07:31	08:09 (SR04)
	20:56	28	07:36 (SR02)	20:34	100	09:05 (SR01)	19:50	47	08:51 (SR01)	19:01		17:01	08:27 (SR04)
7	06:04		07:08 (SR02)	06:29	07:08 (SR02)	06:58	08:06 (SR01)	07:26	17:19			07:32	08:08 (SR04)
	20:56	29	07:37 (SR02)	20:32	100	09:06 (SR01)	19:48	43	08:49 (SR01)	19:00		17:01	08:27 (SR04)
8	06:04		07:07 (SR02)	06:30	07:09 (SR02)	06:59	08:08 (SR01)	07:27	17:18			07:32	08:08 (SR04)
	20:55	34	08:31 (SR01)	20:31	100	09:07 (SR01)	19:47	39	08:47 (SR01)	18:58		17:01	08:28 (SR04)
9	06:05		07:07 (SR02)	06:31	07:10 (SR02)	07:00	08:11 (SR01)	07:28	17:17			07:33	08:08 (SR04)
	20:55	42	08:35 (SR01)	20:30	97	09:07 (SR01)	19:45	32	08:43 (SR01)	18:56		17:01	08:29 (SR04)
10	06:06		07:08 (SR02)	06:32	07:11 (SR02)	07:01	08:14 (SR01)	07:29	17:16			07:34	08:09 (SR04)
	20:55	47	08:38 (SR01)	20:29	95	09:07 (SR01)	19:43	26	08:40 (SR01)	18:55		17:01	08:30 (SR04)
11	06:06		07:07 (SR02)	06:33	07:13 (SR02)	07:02	08:19 (SR01)	07:30	17:15			07:35	08:09 (SR04)
	20:54	52	08:40 (SR01)	20:28	93	09:08 (SR01)	19:42	14	08:33 (SR01)	18:53		17:01	08:31 (SR04)
12	06:07		07:07 (SR02)	06:34	07:15 (SR02)	07:02		07:31	17:14			07:36	08:09 (SR04)
	20:54	56	08:42 (SR01)	20:26	89	09:08 (SR01)	19:40		17:13			17:01	08:32 (SR04)
13	06:08		07:07 (SR02)	06:35	07:18 (SR02)	07:03		07:32	17:12			07:37	08:09 (SR04)
	20:53	59	08:44 (SR01)	20:25	83	09:08 (SR01)	19:39		17:11			17:01	08:32 (SR04)
14	06:08		07:06 (SR02)	06:35	07:18 (SR02)	07:04		07:33	17:10			07:37	08:09 (SR04)
	20:53	62	08:44 (SR01)	20:24	72	09:09 (SR01)	19:37		17:09			17:01	08:33 (SR04)
15	06:09		07:06 (SR02)	06:36	07:18 (SR02)	07:05		07:34	17:08			07:38	08:10 (SR04)
	20:52	66	08:46 (SR01)	20:22	72	09:08 (SR01)	19:35		17:07			17:02	08:34 (SR04)
16	06:10		07:06 (SR02)	06:37	07:16 (SR02)	07:06		07:35	17:06			07:39	08:11 (SR04)
	20:52	70	08:48 (SR01)	20:21	72	09:08 (SR01)	19:34		17:05	7	08:18 (SR05)	17:02	08:35 (SR04)
17	06:11		07:06 (SR02)	06:38	07:15 (SR02)	07:07		07:36	17:04			07:39	08:10 (SR04)
	20:51	72	08:49 (SR01)	20:20	73	09:08 (SR01)	19:32		17:03	13	08:25 (SR05)	17:02	08:35 (SR04)
18	06:11		07:05 (SR02)	06:39	07:15 (SR02)	07:08		07:37	17:02			07:40	08:11 (SR04)
	20:51	75	08:50 (SR01)	20:18	73	09:08 (SR01)	19:30		17:01	17	08:29 (SR05)	17:02	08:36 (SR04)
19	06:12		07:05 (SR02)	06:40	07:15 (SR02)	07:09		07:38	17:00			07:41	08:11 (SR04)
	20:50	78	08:51 (SR01)	20:17	73	09:08 (SR01)	19:29		17:00	19	08:30 (SR05)	17:02	08:36 (SR04)
20	06:13		07:05 (SR02)	06:41	07:16 (SR02)	07:10		07:39	17:00			07:41	08:12 (SR04)
	20:49	81	08:52 (SR01)	20:16	72	09:08 (SR01)	19:27		17:00	21	08:32 (SR05)	17:02	08:36 (SR04)
21	06:14		07:05 (SR02)	06:42	07:16 (SR02)	07:11		07:40	17:00			07:42	08:12 (SR04)
	20:49	83	08:54 (SR01)	20:14	72	09:08 (SR01)	19:25		17:00	22	08:32 (SR05)	17:06	08:36 (SR04)
22	06:15		07:04 (SR02)	06:43	07:16 (SR02)	07:12		07:42	17:00			07:42	08:13 (SR04)
	20:48	86	08:54 (SR01)	20:13	72	09:08 (SR01)	19:24		17:00	23	08:32 (SR05)	17:06	08:37 (SR04)
23	06:16		07:04 (SR02)	06:44	07:16 (SR02)	07:13		07:43	17:00			07:43	08:13 (SR04)
	20:47	87	08:55 (SR01)	20:11	71	09:07 (SR01)	19:22		17:00	23	08:32 (SR05)	17:05	08:37 (SR04)
24	06:16		07:04 (SR02)	06:45	07:16 (SR02)	07:14		07:44	17:00			07:43	08:14 (SR04)
	20:46	89	08:56 (SR01)	20:10	71	09:06 (SR01)	19:21		17:00	24	08:32 (SR05)	17:04	08:38 (SR04)
25	06:17		07:05 (SR02)	06:46	07:16 (SR02)	07:15		06:45	17:00			07:44	08:14 (SR04)
	20:45	91	08:57 (SR01)	20:08	71	09:06 (SR01)	19:19		17:00	23	07:31 (SR05)	17:04	08:38 (SR04)
26	06:18		07:05 (SR02)	06:47	07:16 (SR02)	07:16		06:46	17:00			07:44	08:14 (SR04)
	20:45	93	08:59 (SR01)	20:07	69	09:05 (SR01)	19:17		17:00	23	07:31 (SR05)	17:04	08:39 (SR04)
27	06:19		07:05 (SR02)	06:48	07:16 (SR02)	07:16		06:47	17:00			07:44	08:16 (SR04)
	20:44	95	09:00 (SR01)	20:05	68	09:04 (SR01)	19:16		17:00	21	07:31 (SR05)	17:03	08:40 (SR04)
28	06:20		07:04 (SR02)	06:49	07:17 (SR02)	07:17		06:48	17:00			07:45	08:16 (SR04)
	20:43	96	09:00 (SR01)	20:04	67	09:04 (SR01)	19:14		17:00	20	07:30 (SR05)	17:03	08:40 (SR04)
29	06:21		07:04 (SR02)	06:50	07:17 (SR02)	07:18		06:49	17:00			07:45	08:16 (SR04)
	20:42	97	09:00 (SR01)	20:02	66	09:03 (SR01)	19:12		17:00	18	07:29 (SR05)	17:02	08:40 (SR04)
30	06:22		07:05 (SR02)	06:50	07:18 (SR02)	07:19		06:50	17:00			07:45	08:17 (SR04)
	20:41	98	09:01 (SR01)	20:01	64	09:02 (SR01)	19:11		17:00	15	07:27 (SR05)	17:02	08:40 (SR04)
31	06:23		07:05 (SR02)	06:51	07:18 (SR02)	07:19		06:51	17:00			07:46	08:18 (SR04)
	20:40	99	09:02 (SR01)	19:59	62	09:01 (SR01)		17:26	11	07:25 (SR05)		17:10	08:41 (SR04)
Potential sun hours	455		425		374		347		301		301		292
Total, worst case	1990		2522		481		300		3		665		

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_Serras_Sardara_Asja

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:

24/02/2023 13:00/3.4.415

SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F040 - A03 - D10 - D01 Cantine Su Entu

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	07:46 17:11	07:34 17:44	06:59 18:16	07:11 19:48	06:27 20:18	19:46 (SR06) 20:46	06:01 20:56	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:24	07:25 17:02
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	19:46 (SR06) 19:57 (SR06)	05:59 20:46	06:01 20:56	06:24 20:38	06:53 19:56	07:21 19:07	06:53 17:23
3	07:46 17:13	07:32 17:46	06:56 18:18	07:08 19:50	06:25 20:20	19:45 (SR06) 19:45 (SR06)	05:59 20:47	06:02 20:56	06:25 20:37	20:02 (SR06) 20:10 (SR06)	06:54 19:54	07:22 19:06
4	07:46 17:14	07:31 17:47	06:55 18:19	07:06 19:51	06:23 20:21	19:45 (SR06) 19:46 (SR06)	05:59 20:48	06:02 20:56	06:26 20:35	19:59 (SR06) 20:11 (SR06)	06:55 19:53	07:23 19:04
5	07:46 17:14	07:30 17:49	06:53 18:20	07:04 19:52	06:22 20:22	19:46 (SR06) 19:59 (SR06)	05:58 20:49	06:03 20:56	06:27 20:34	19:58 (SR06) 20:11 (SR06)	06:56 19:51	07:24 19:03
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	19:47 (SR06) 20:00 (SR06)	05:58 20:49	06:03 20:56	06:28 20:33	19:57 (SR06) 20:10 (SR06)	06:57 19:50	07:25 19:01
7	07:46 17:16	07:28 17:51	06:50 18:23	07:01 19:54	06:20 20:24	19:47 (SR06) 20:01 (SR06)	05:58 20:50	06:04 20:55	06:29 20:32	19:56 (SR06) 20:09 (SR06)	06:58 19:48	07:26 18:59
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	19:49 (SR06) 20:02 (SR06)	05:57 20:50	06:04 20:55	06:30 20:31	19:55 (SR06) 20:08 (SR06)	06:59 19:46	07:27 18:58
9	07:46 17:18	07:26 17:53	06:47 18:25	06:58 19:56	06:18 20:26	19:50 (SR06) 20:01 (SR06)	05:57 20:51	06:05 20:55	06:31 20:30	19:55 (SR06) 20:07 (SR06)	07:00 19:45	07:28 18:56
10	07:46 17:19	07:24 17:55	06:46 18:26	06:57 19:57	06:17 20:27	19:53 (SR06) 19:58 (SR06)	05:57 20:51	06:06 20:54	06:32 20:29	19:57 (SR06) 20:06 (SR06)	07:00 19:43	07:29 18:55
11	07:45 17:20	07:23 17:56	06:44 18:27	06:55 19:58	06:16 20:28	19:58 (SR06)	05:57 20:52	06:06 20:54	06:33 20:27	19:54 (SR06) 20:05 (SR06)	07:01 19:42	07:30 18:53
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:59	06:15 20:29		05:57 20:52	06:07 20:54	06:33 20:26	19:54 (SR06) 20:04 (SR06)	07:02 19:40	07:31 18:52
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30		05:57 20:53	06:08 20:53	06:34 20:25	19:53 (SR06) 20:02 (SR06)	07:03 19:38	07:32 18:50
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31		05:57 20:53	06:08 20:53	06:35 20:23	19:54 (SR06) 20:01 (SR06)	07:04 19:37	07:33 18:49
15	07:44 17:24	07:18 18:00	06:38 18:31	06:49 20:02	06:12 20:31		05:57 20:54	06:09 20:52	06:36 20:22	19:54 (SR06) 20:00 (SR06)	07:05 19:35	07:34 18:47
16	07:44 17:25	07:17 18:02	06:36 18:32	06:48 20:03	06:11 20:32		05:57 20:54	06:10 20:52	06:37 20:21	19:54 (SR06) 19:58 (SR06)	07:06 19:33	07:35 18:46
17	07:44 17:27	07:16 18:03	06:35 18:33	06:46 20:04	06:10 20:33		05:57 20:55	06:11 20:51	06:38 20:19	19:55 (SR06) 19:57 (SR06)	07:07 19:32	07:36 18:44
18	07:43 17:28	07:15 18:04	06:33 18:34	06:45 20:05	06:09 20:34		05:57 20:55	06:11 20:50	06:39 20:18	19:57 (SR06) 20:08 (SR06)	19:32 19:30	07:37 18:43
19	07:43 17:29	07:13 18:05	06:32 18:35	06:43 20:06	06:08 20:35		05:57 20:55	06:12 20:50	06:40 20:17	20:07 (SR06) 20:17 (SR06)	19:45 19:29	07:38 18:41
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 20:07	06:07 20:36		05:57 20:55	06:13 20:49	06:41 20:15	20:18 (SR06) 20:15 (SR06)	19:44 19:27	07:39 18:40
21	07:42 17:31	07:11 18:07	06:28 18:37	06:40 20:08	06:06 20:37		05:57 20:56	06:14 20:48	06:42 20:14	20:19 (SR06) 20:14 (SR06)	19:43 19:25	07:40 18:39
22	07:41 17:32	07:09 18:08	06:27 18:38	06:39 20:09	06:06 20:38		05:58 20:56	06:15 20:48	06:43 20:12	20:20 (SR06) 20:12 (SR06)	19:42 19:24	07:41 18:37
23	07:40 17:33	07:08 18:10	06:25 18:39	06:38 20:10	06:05 20:39		05:58 20:56	06:15 20:47	06:44 20:11	20:21 (SR06) 20:11 (SR06)	19:41 19:22	07:42 18:36
24	07:40 17:34	07:07 18:11	06:24 18:40	06:36 20:11	06:04 20:39		05:58 20:56	06:16 20:46	06:45 20:10	20:22 (SR06) 20:10 (SR06)	19:40 19:20	07:43 18:34
25	07:39 17:36	07:05 18:12	06:22 18:41	06:35 20:12	06:04 20:40		05:58 20:56	06:17 20:45	06:46 20:17	20:23 (SR06) 20:08 (SR06)	19:39 19:19	07:44 17:33
26	07:38 17:37	07:04 18:13	06:20 18:42	06:33 20:13	06:03 20:41	19:48 (SR06) 19:51 (SR06)	05:59 20:56	06:18 20:44	06:47 20:07	20:09 (SR06) 20:07 (SR06)	19:38 19:17	07:45 17:32
27	07:38 17:38	07:02 18:14	06:19 18:43	06:32 20:14	06:02 20:42	19:48 (SR06) 19:52 (SR06)	05:59 20:57	06:19 20:43	06:47 20:05	20:10 (SR06) 20:05 (SR06)	19:37 19:15	07:46 17:31
28	07:37 17:39	07:01 18:15	06:17 18:44	06:31 20:15	06:02 20:43	19:47 (SR06) 19:53 (SR06)	05:59 20:57	06:20 20:43	06:48 20:04	20:11 (SR06) 20:04 (SR06)	19:36 19:14	07:47 17:29
29	07:36 17:40	07:16 19:45	06:30 20:16	06:49 20:24	06:01 20:44	19:46 (SR06) 19:53 (SR06)	06:00 20:57	06:21 20:42	06:49 20:02	20:12 (SR06) 20:02 (SR06)	19:35 19:12	07:48 17:28
30	07:35 17:42	07:14 19:46	06:28 20:17	06:58 20:31	06:01 20:44	19:46 (SR06) 19:54 (SR06)	06:00 20:56	06:22 20:41	06:50 20:01	20:13 (SR06) 20:01 (SR06)	19:34 19:11	07:49 17:27
31	07:34 17:43	07:12 19:47	06:27 20:18	06:57 20:32	06:00 20:45		06:00 20:56	06:22 20:40	06:51 19:59	20:14 (SR06) 20:01 (SR06)	19:33 19:11	07:50 17:26
Potential sun hours	301	299	370	397	445		448	455	425	374	347	301
Total, worst case				28	115				144			292

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_2022_01_31Shadow receptor: F046 - F03 - Chiesa campestre

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	07:46		13:14 (SR08)	07:34		13:42 (SR08)	06:59		07:11		06:27		06:00		
	17:11	129	15:23 (SR08)	17:44	101	15:23 (SR08)	18:16		19:48		20:18		20:46		
2	07:46		13:15 (SR08)	07:33		13:44 (SR08)	06:58		07:09		19:27 (SR04)	06:26	05:59		
	17:12	129	15:24 (SR08)	17:45	98	15:22 (SR08)	18:17		19:49	1	19:28 (SR04)	20:19	20:47		
3	07:46		13:16 (SR08)	07:32		13:46 (SR08)	06:57		07:08		19:25 (SR04)	06:25	05:59		
	17:13	129	15:25 (SR08)	17:46	95	15:21 (SR08)	18:18		19:50	4	19:29 (SR04)	20:20	20:47		
4	07:46		13:16 (SR08)	07:31		13:48 (SR08)	06:55		07:06		19:24 (SR04)	06:23	05:59		
	17:14	129	15:25 (SR08)	17:47	92	15:20 (SR08)	18:19		19:51	6	19:30 (SR04)	20:21	20:48		
5	07:46		13:17 (SR08)	07:30		13:50 (SR08)	06:54		07:04		19:23 (SR04)	06:22	19:54 (SR05)	05:58	
	17:14	128	15:25 (SR08)	17:49	89	15:19 (SR08)	18:20		19:52	8	19:31 (SR04)	20:22	5	19:59 (SR05)	20:49
6	07:46		13:17 (SR08)	07:29		13:52 (SR08)	06:52		07:03		19:22 (SR04)	06:21	19:51 (SR05)	05:58	
	17:15	128	15:25 (SR08)	17:50	86	15:18 (SR08)	18:22		19:53	10	19:32 (SR04)	20:23	9	20:00 (SR05)	20:49
7	07:46		13:17 (SR08)	07:28		13:54 (SR08)	06:51		07:01		19:21 (SR04)	06:20	19:50 (SR05)	05:58	
	17:16	128	15:25 (SR08)	17:51	83	15:17 (SR08)	18:23		19:54	11	19:32 (SR04)	20:24	11	20:01 (SR05)	20:50
8	07:46		13:18 (SR08)	07:27		13:57 (SR08)	06:49		07:00		19:22 (SR04)	06:19	19:48 (SR05)	05:57	
	17:17	127	15:25 (SR08)	17:52	79	15:16 (SR08)	18:24		19:55	12	19:34 (SR04)	20:25	14	20:02 (SR05)	20:50
9	07:46		13:19 (SR08)	07:26		14:00 (SR08)	06:47		06:58		19:21 (SR04)	06:18	19:47 (SR05)	05:57	
	17:18	127	15:26 (SR08)	17:53	75	15:15 (SR08)	18:25		19:56	13	19:34 (SR04)	20:26	16	20:03 (SR05)	20:51
10	07:46		13:20 (SR08)	07:24		14:02 (SR08)	06:46		06:57		19:22 (SR04)	06:17	19:47 (SR05)	05:57	
	17:19	126	15:26 (SR08)	17:55	71	15:13 (SR08)	18:26		19:57	14	19:36 (SR04)	20:27	17	20:04 (SR05)	20:52
11	07:45		13:20 (SR08)	07:23		14:05 (SR08)	06:44		06:55		19:22 (SR04)	06:16	19:46 (SR05)	05:57	
	17:20	126	15:26 (SR08)	17:56	66	15:11 (SR08)	18:27		19:58	14	19:36 (SR04)	20:28	19	20:05 (SR05)	20:52
12	07:45		13:21 (SR08)	07:22		14:08 (SR08)	06:43		06:54		19:24 (SR04)	06:15	19:45 (SR05)	05:57	
	17:21	125	15:26 (SR08)	17:57	61	15:09 (SR08)	18:28		19:59	13	19:37 (SR04)	20:29	21	20:06 (SR05)	20:53
13	07:45		13:22 (SR08)	07:21		14:12 (SR08)	06:41		06:52		19:25 (SR04)	06:14	19:45 (SR05)	05:57	
	17:22	125	15:27 (SR08)	17:58	54	15:06 (SR08)	18:29		20:00	10	19:35 (SR04)	20:30	21	20:06 (SR05)	20:53
14	07:45		13:22 (SR08)	07:20		14:17 (SR08)	06:40		06:51			06:13	19:45 (SR05)	05:57	
	17:23	124	15:26 (SR08)	17:59	47	15:04 (SR08)	18:30		20:01			20:31	22	20:07 (SR05)	20:53
15	07:44		13:23 (SR08)	07:19		14:22 (SR08)	06:38		06:49			06:12	19:45 (SR05)	05:57	
	17:24	124	15:27 (SR08)	18:00	39	15:01 (SR08)	18:31		20:02			20:32	23	20:08 (SR05)	20:54
16	07:44		13:25 (SR08)	07:17		14:27 (SR08)	06:36		06:48			06:11	19:44 (SR05)	05:57	
	17:25	122	15:27 (SR08)	18:02	28	14:55 (SR08)	18:32		20:03			20:32	25	20:09 (SR05)	20:54
17	07:44		13:25 (SR08)	07:16		14:38 (SR08)	06:35		06:46			06:10	19:45 (SR05)	05:57	
	17:27	122	15:27 (SR08)	18:03	8	14:46 (SR08)	18:33		20:04			20:33	25	20:10 (SR05)	20:55
18	07:43		13:26 (SR08)	07:15			06:33		06:45			06:09	19:45 (SR05)	05:57	
	17:28	121	15:27 (SR08)	18:04			18:34		20:05			20:34	25	20:10 (SR05)	20:55
19	07:43		13:27 (SR08)	07:13			06:32		06:43			06:08	19:45 (SR05)	05:57	
	17:29	120	15:27 (SR08)	18:05			18:35		20:06			20:35	24	20:09 (SR05)	20:55
20	07:42		13:27 (SR08)	07:12			06:30		06:42			06:07	19:45 (SR05)	05:57	
	17:30	119	15:26 (SR08)	18:06			18:36		20:07			20:36	24	20:09 (SR05)	20:56
21	07:42		13:29 (SR08)	07:11			06:28		06:40			06:06	19:46 (SR05)	05:57	
	17:31	118	15:27 (SR08)	18:07			18:37		20:08			20:37	23	20:09 (SR05)	20:56
22	07:41		13:29 (SR08)	07:09			06:27		06:39			06:06	19:47 (SR05)	05:58	
	17:32	118	15:27 (SR08)	18:08			18:38		20:09			20:38	22	20:09 (SR05)	20:56
23	07:40		13:31 (SR08)	07:08			06:25		06:38			06:05	19:47 (SR05)	05:58	
	17:33	116	15:27 (SR08)	18:10			18:39		20:10			20:39	21	20:08 (SR05)	20:56
24	07:40		13:32 (SR08)	07:07			06:24		06:36			06:04	19:48 (SR05)	05:58	
	17:34	114	15:26 (SR08)	18:11			18:40		20:11			20:40	20	20:08 (SR05)	20:56
25	07:39		13:33 (SR08)	07:05			06:22		06:35			06:04	19:48 (SR05)	05:58	
	17:36	113	15:26 (SR08)	18:12			18:41		20:12			20:40	19	20:07 (SR05)	20:56
26	07:38		13:34 (SR08)	07:04			06:20		06:34			06:03	19:49 (SR05)	05:59	
	17:37	111	15:25 (SR08)	18:13			18:42		20:13			20:41	17	20:06 (SR05)	20:57
27	07:38		13:36 (SR08)	07:02			06:19		06:32			06:02	19:50 (SR05)	05:59	
	17:38	110	15:26 (SR08)	18:14			18:43		20:14			20:42	16	20:06 (SR05)	20:57
28	07:37		13:37 (SR08)	07:01			06:17		06:31			06:02	19:51 (SR05)	05:59	
	17:39	108	15:25 (SR08)	18:15			18:44		20:15			20:43	14	20:05 (SR05)	20:57
29	07:36		13:38 (SR08)				07:16		06:30			06:01	19:53 (SR05)	06:00	
	17:40	107	15:25 (SR08)				19:45		20:16			20:44	11	20:04 (SR05)	20:57
30	07:35		13:39 (SR08)				07:14		06:28			06:01	19:54 (SR05)	06:00	
	17:42	105	15:24 (SR08)				19:46		20:17			20:44	8	20:02 (SR05)	20:57
31	07:34		13:41 (SR08)				07:12					06:00		19:56 (SR05)	
	17:43	102	15:23 (SR08)				19:47					20:45	5	20:01 (SR05)	
Potential sun hours		301			299			370		397		445			448
Total, worst case		3730			1172			116		477					

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

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

Calculation: Progetto_layout_2022_01_31Shadow receptor: F046 - F03 - Chiesa campestre

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	06:01 20:57	06:23 20:39	19:56 (SR05) 19:58	06:52 19:21 (SR04)	07:20 19:09	06:52 13:31 (SR08)	07:26 17:02	13:02 (SR08) 15:08 (SR08)	
2	06:01 20:56	06:24 20:38	19:57 (SR05) 19:56	06:53 19:20 (SR04)	07:21 19:07	06:53 17:23	71 14:42 (SR08)	17:02 17:01	126 13:03 (SR08) 15:09 (SR08)
3	06:02 20:56	06:25 20:37	19:57 (SR05) 19:54	06:54 19:19 (SR04)	07:22 19:06	06:55 17:22	76 14:44 (SR08)	07:28 17:01	126 13:03 (SR08) 15:10 (SR08)
4	06:02 20:56	06:26 20:36	19:57 (SR05) 19:53	06:55 19:18 (SR04)	07:23 19:04	06:56 17:21	80 14:46 (SR08)	07:29 17:01	127 13:02 (SR08) 15:10 (SR08)
5	06:03 20:56	06:27 20:34	19:58 (SR05) 19:51	06:56 19:18 (SR04)	07:24 19:03	06:57 17:20	83 14:47 (SR08)	07:29 17:01	128 13:02 (SR08) 15:10 (SR08)
6	06:03 20:56	06:28 20:33	20:00 (SR05) 19:50	06:57 19:18 (SR04)	07:25 19:01	06:58 17:19	87 14:48 (SR08)	07:30 17:01	128 13:03 (SR08) 15:11 (SR08)
7	06:04 20:55	06:29 20:32	20:01 (SR05) 19:48	06:58 19:18 (SR04)	07:26 18:59	06:59 17:18	90 14:49 (SR08)	07:31 17:01	128 13:03 (SR08) 15:11 (SR08)
8	06:04 20:55	06:30 20:31	20:05 (SR05) 19:46	06:59 19:19 (SR04)	07:27 18:58	07:00 17:17	93 14:51 (SR08)	07:32 17:01	128 13:03 (SR08) 15:11 (SR08)
9	06:05 20:55	06:31 20:30	20:08 (SR05) 19:45	07:00 19:19 (SR04)	07:28 18:56	07:01 17:16	96 13:15 (SR08)	07:33 17:01	129 13:04 (SR08) 15:13 (SR08)
10	06:06 20:54	06:32 20:29	19:43 19:43	07:01 19:19 (SR04)	07:29 18:55	07:02 17:15	98 14:53 (SR08)	07:34 17:01	129 13:04 (SR08) 15:13 (SR08)
11	06:06 20:54	06:33 20:27	19:42 19:42	07:01 19:18 (SR04)	07:30 18:53	07:04 17:14	101 14:54 (SR08)	07:35 17:01	129 13:05 (SR08) 15:14 (SR08)
12	06:07 20:54	06:33 20:26	19:40 19:40	07:02 19:18 (SR04)	07:31 18:52	07:05 17:13	102 14:56 (SR08)	07:36 17:01	130 13:05 (SR08) 15:15 (SR08)
13	06:08 20:53	20:04 (SR05) 06:34 20:25	19:38 19:38	07:03 19:18 (SR04)	07:32 18:50	07:06 17:12	105 13:10 (SR08)	07:36 17:01	130 13:05 (SR08) 15:14 (SR08)
14	06:08 20:53	20:01 (SR05) 06:35 20:24	19:37 19:37	07:04 19:17 (SR04)	07:33 18:49	07:07 17:11	107 13:09 (SR08)	07:37 17:01	130 13:05 (SR08) 15:15 (SR08)
15	06:09 20:52	20:01 (SR05) 06:36 20:22	19:35 19:35	07:05 19:16 (SR04)	07:34 18:47	07:08 17:10	108 13:08 (SR08)	07:38 17:02	130 13:06 (SR08) 15:16 (SR08)
16	06:10 20:52	20:00 (SR05) 06:37 20:21	19:34 19:33	07:06 19:15 (SR04)	07:35 18:46	07:09 17:10	110 13:07 (SR08)	07:39 17:02	130 13:06 (SR08) 15:17 (SR08)
17	06:11 20:51	19:59 (SR05) 06:38 20:20	19:33 19:32	07:07 19:14 (SR04)	07:36 18:44	07:10 17:09	111 13:07 (SR08)	07:39 17:02	130 13:07 (SR08) 15:17 (SR08)
18	06:11 20:50	19:58 (SR05) 06:39 20:18	19:32 19:30	07:08 19:13 (SR04)	07:37 18:43	07:12 17:08	113 15:00 (SR08)	07:40 17:02	130 13:07 (SR08) 15:17 (SR08)
19	06:12 20:50	19:58 (SR05) 06:40 20:17	19:30 19:29	07:09 19:12 (SR04)	07:38 18:41	07:13 17:07	114 13:05 (SR08)	07:40 17:03	130 13:07 (SR08) 15:17 (SR08)
20	06:13 20:49	19:57 (SR05) 06:41 20:15	19:29 19:27	07:10 19:11 (SR04)	07:39 18:40	07:14 17:07	116 15:01 (SR08)	07:41 17:03	130 13:08 (SR08) 15:18 (SR08)
21	06:14 20:48	19:57 (SR05) 06:42 20:14	19:27 19:25	07:11 19:12 (SR04)	07:40 18:39	07:15 17:06	118 13:04 (SR08)	07:42 17:04	130 13:08 (SR08) 15:18 (SR08)
22	06:15 20:48	19:56 (SR05) 06:43 20:13	19:25 19:24	07:12 19:13 (SR04)	07:41 18:37	07:16 17:05	118 13:04 (SR08)	07:42 17:04	130 13:09 (SR08) 15:19 (SR08)
23	06:15 20:47	19:56 (SR05) 06:44 20:11	19:24 19:22	07:13 19:14 (SR04)	07:42 18:36	07:17 17:05	119 13:04 (SR08)	07:43 17:05	130 13:09 (SR08) 15:19 (SR08)
24	06:16 20:46	19:56 (SR05) 06:45 20:10	19:23 19:20	07:14 19:15 (SR04)	07:44 18:35	07:18 17:05	120 13:03 (SR08)	07:43 17:05	130 13:10 (SR08) 15:20 (SR08)
25	06:17 20:45	19:56 (SR05) 06:46 20:08	19:24 19:19	07:15 19:16 (SR04)	07:45 18:33	07:19 17:04	121 15:04 (SR08)	07:44 17:06	130 13:10 (SR08) 15:20 (SR08)
26	06:18 20:44	20:20 (SR05) 06:47 20:07	19:19 19:17	07:16 19:17 (SR04)	07:46 18:32	07:20 17:03	122 13:03 (SR08)	07:44 17:06	130 13:11 (SR08) 15:21 (SR08)
27	06:19 20:44	19:55 (SR05) 06:48 20:05	19:17 19:15	07:16 19:16 (SR04)	07:47 18:31	07:21 17:03	122 13:02 (SR08)	07:44 17:07	130 13:12 (SR08) 15:22 (SR08)
28	06:20 20:43	20:20 (SR05) 06:48 20:04	19:15 19:14	07:17 19:14 (SR04)	07:48 18:30	07:22 17:03	124 15:06 (SR08)	07:45 17:08	130 13:12 (SR08) 15:22 (SR08)
29	06:21 20:42	19:55 (SR05) 06:49 20:02	19:14 19:12	07:18 19:13 (SR04)	07:49 18:28	07:24 17:02	124 13:02 (SR08)	07:45 17:08	130 13:12 (SR08) 15:22 (SR08)
30	06:22 20:41	19:55 (SR05) 06:50 20:01	19:12 19:11	07:19 19:14 (SR04)	07:50 18:27	07:25 17:02	125 15:07 (SR08)	07:45 17:09	130 13:13 (SR08) 15:22 (SR08)
31	06:22 20:40	19:56 (SR05) 06:51 20:00	19:11 19:09	07:20 19:14 (SR04)	07:51 18:26	07:26 17:02	125 13:02 (SR08)	07:45 17:10	129 13:13 (SR08) 15:23 (SR08)
Potential sun hours	455	425	374	347	301	292			
Total, worst case	373	127	97	321	3199	4005			

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

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

Calculation: Progetto_layout_2022_01_31Shadow receptor: F060 - 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	07:46 17:11	07:34 17:44	06:59 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:56	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:24	07:25 17:02
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:46	06:01 20:56	06:24 20:38	06:53 19:56	07:21 19:07	06:53 17:23	07:26 17:01
3	07:46 17:13	07:32 17:46	06:56 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:54	07:22 19:06	06:54 17:22	07:27 17:01
4	07:46 17:14	07:31 17:47	06:55 18:19	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:36	06:55 19:53	07:23 19:04	06:56 17:21	07:28 17:01
5	07:46 17:14	07:30 17:49	06:53 18:20	07:04 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:34	06:56 19:51	07:24 19:03	06:57 17:20	07:29 17:01
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:30 17:01
7	07:46 17:16	07:28 17:51	06:50 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:55	06:29 20:32	06:58 19:48	07:26 18:59	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:58 20:50	06:04 20:55	06:30 20:31	06:59 19:46	07:27 18:58	07:00 17:17	07:32 17:01
9	07:46 17:18	07:26 17:53	06:47 18:25	06:58 19:56	06:18 20:26	05:57 20:51	06:05 20:55	06:31 20:30	07:00 19:45	07:28 18:56	07:01 17:16	07:33 17:01
10	07:46 17:19	07:24 17:55	06:46 18:26	06:57 19:57	06:17 20:27	05:57 20:51	06:06 20:54	06:32 20:29	07:00 19:43	07:29 18:55	07:02 17:15	07:34 17:01
11	07:45 17:20	07:23 17:56	06:44 18:27	06:55 19:58	06:16 20:28	05:57 20:52	06:06 20:54	06:33 20:27	07:01 19:42	07:30 18:53	07:04 17:14	07:35 17:01
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:59	06:15 20:29	05:57 20:52	06:07 20:54	06:34 20:26	07:02 19:40	07:31 18:52	07:05 17:13	07:35 17:01
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:34 20:25	07:03 19:38	07:32 18:50	07:06 17:12	07:36 17:01
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:53	06:08 20:53	06:35 20:23	07:04 19:37	07:33 18:49	07:07 17:11	07:37 17:01
15	07:44 17:24	07:18 18:00	06:38 18:31	06:49 20:02	06:12 20:31	05:57 20:54	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:47	07:08 17:10	07:38 17:02
16	07:44 17:25	07:17 18:02	06:36 18:32	06:48 20:03	06:11 20:32	05:57 20:54	06:10 20:52	06:37 20:21	07:06 19:33	07:35 18:46	07:09 17:10	07:38 17:02
17	07:44 17:27	07:16 18:03	06:35 18:33	06:46 20:04	06:10 20:33	05:57 20:55	06:11 20:51	06:38 20:19	07:07 19:32	07:36 18:44	07:10 17:09	07:39 17:02
18	07:43 17:28	07:15 18:04	06:33 18:34	06:45 20:05	06:09 20:34	05:57 20:55	06:11 20:50	06:39 20:18	07:08 19:30	07:37 18:43	07:11 17:08	07:40 17:03
19	07:43 17:29	07:13 18:05	06:32 18:35	06:43 20:06	06:08 20:35	05:57 20:55	06:12 20:50	06:40 20:17	07:09 19:29	07:38 18:41	07:13 17:07	07:40 17:03
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:55	06:13 20:49	06:41 20:15	07:10 19:27	07:39 18:40	07:14 17:07	07:41 17:03
21	07:42 17:31	07:11 18:07	06:28 18:37	06:40 20:08	06:07 20:37	05:57 20:56	06:14 20:48	06:42 20:14	07:11 19:25	07:40 18:39	07:15 17:06	07:42 17:04
22	07:41 17:32	07:09 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:56	06:15 20:48	06:43 20:12	07:12 19:24	07:41 18:37	07:16 17:05	07:42 17:04
23	07:40 17:33	07:08 18:10	06:25 18:39	06:38 20:10	06:05 20:39	05:58 20:56	06:15 20:47	06:44 20:11	07:13 19:22	07:42 18:36	07:17 17:05	07:43 17:05
24	07:40 17:34	07:07 18:11	06:24 18:40	06:36 20:11	06:04 20:39	05:58 20:56	06:16 20:46	06:45 20:10	07:13 19:20	07:43 18:35	07:18 17:04	07:43 17:05
25	07:39 17:36	07:05 18:12	06:22 18:41	06:35 20:12	06:04 20:40	05:58 20:56	06:17 20:45	06:46 20:08	07:14 19:19	06:45 17:33	07:19 17:04	07:43 17:06
26	07:38 17:37	07:04 18:13	06:20 18:42	06:34 20:13	06:03 20:41	05:59 20:56	06:18 20:44	06:47 20:07	07:15 19:17	06:46 17:32	07:20 17:03	07:44 17:06
27	07:38 17:38	07:02 18:14	06:19 18:43	06:32 20:14	06:02 20:42	05:59 20:57	06:19 20:43	06:48 20:05	07:16 19:15	06:47 17:31	07:21 17:03	07:44 17:07
28	07:37 17:39	07:01 18:15	06:17 18:44	06:31 20:15	06:02 20:43	05:59 20:57	06:20 20:43	06:48 20:04	07:17 19:14	06:48 17:29	07:22 17:03	07:45 17:08
29	07:36 17:40		07:16 19:45	06:30 20:16	06:01 20:44	06:00 20:57	06:21 20:42	06:49 20:02	07:18 19:12	06:49 17:28	07:23 17:02	07:45 17:09
30	07:35 17:42		07:14 19:46	06:28 20:17	06:01 20:44	06:00 20:57	06:22 20:41	06:50 20:01	07:19 19:11	06:50 17:27	07:24 17:02	07:45 17:09
31	07:34 17:43		07:12 19:47		06:00 20:45		06:22 20:40	06:51 19:59		06:51 17:26		07:45 17:10
Potential sun hours	301	299	370	397	444	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)
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SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F061 - A02 - 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	July	August	September	October	November	December
1	07:46 17:11	07:34 17:44	06:59 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:56	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:24	07:25 17:02
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:46	06:01 20:56	06:24 20:38	06:53 19:56	07:21 19:07	06:53 17:23	07:26 17:01
3	07:46 17:13	07:32 17:46	06:56 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:54	07:22 19:06	06:54 17:22	07:27 17:01
4	07:46 17:14	07:31 17:47	06:55 18:19	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:36	06:55 19:53	07:23 19:04	06:56 17:21	07:28 17:01
5	07:46 17:14	07:30 17:49	06:53 18:20	07:04 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:34	06:56 19:51	07:24 19:03	06:57 17:20	07:29 17:01
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:30 17:01
7	07:46 17:16	07:28 17:51	06:50 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:55	06:29 20:32	06:58 19:48	07:26 18:59	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:58 20:50	06:04 20:55	06:30 20:31	06:59 19:46	07:27 18:58	07:00 17:17	07:32 17:01
9	07:46 17:18	07:26 17:53	06:47 18:25	06:58 19:56	06:18 20:26	05:57 20:51	06:05 20:55	06:31 20:30	07:00 19:45	07:28 18:56	07:01 17:16	07:33 17:01
10	07:46 17:19	07:24 17:55	06:46 18:26	06:57 19:57	06:17 20:27	05:57 20:51	06:06 20:54	06:32 20:29	07:00 19:43	07:29 18:55	07:02 17:15	07:34 17:01
11	07:45 17:20	07:23 17:56	06:44 18:27	06:55 19:58	06:16 20:28	05:57 20:52	06:06 20:54	06:33 20:27	07:01 19:42	07:30 18:53	07:04 17:14	07:35 17:01
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:59	06:15 20:29	05:57 20:52	06:07 20:54	06:34 20:26	07:02 19:40	07:31 18:52	07:05 17:13	07:35 17:01
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:34 20:25	07:03 19:38	07:32 18:50	07:06 17:12	07:36 17:01
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15	07:44 17:24	07:18 18:00	06:38 18:31	06:49 20:02	06:12 20:31	05:57 20:54	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:47	07:08 17:10	07:38 17:02
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18	07:43 17:28	07:15 18:04	06:33 18:34	06:45 20:05	06:09 20:34	05:57 20:55	06:11 20:50	06:39 20:18	07:08 19:30	07:37 18:43	07:11 17:08	07:40 17:03
19	07:43 17:29	07:13 18:05	06:32 18:35	06:43 20:06	06:08 20:35	05:57 20:55	06:12 20:50	06:40 20:17	07:09 19:29	07:38 18:41	07:13 17:07	07:40 17:03
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:55	06:13 20:49	06:41 20:15	07:10 19:27	07:39 18:40	07:14 17:07	07:41 17:03
21	07:42 17:31	07:11 18:07	06:28 18:37	06:40 20:08	06:07 20:37	05:57 20:56	06:14 20:48	06:42 20:14	07:11 19:25	07:40 18:39	07:15 17:06	07:42 17:04
22	07:41 17:32	07:09 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:56	06:15 20:48	06:43 20:12	07:12 19:24	07:41 18:37	07:16 17:05	07:42 17:04
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26	07:38 17:37	07:04 18:13	06:20 18:42	06:34 20:13	06:03 20:41	05:59 20:56	06:18 20:44	06:47 20:07	07:15 19:17	06:46 17:32	07:20 17:03	07:44 17:06
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31	07:34 17:43	07:00 19:47	06:12 19:47	06:26 20:18	06:00 20:45	06:00 20:58	06:22 20:40	06:51 19:59	07:20 19:10	06:51 17:26	07:25 17:01	07:45 17:10
Potential sun hours	301	299	370	397	444	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)
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SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F062 - A07 - 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	July	August	September	October	November	December
1	07:46 17:11	07:34 17:44	06:59 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:56	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:24	07:25 17:02
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:46	06:01 20:56	06:24 20:38	06:53 19:56	07:21 19:07	06:53 17:23	07:26 17:01
3	07:46 17:13	07:32 17:46	06:56 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:54	07:22 19:06	06:54 17:22	07:27 17:01
4	07:46 17:14	07:31 17:47	06:55 18:19	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:35	06:55 19:53	07:23 19:04	06:56 17:21	07:28 17:01
5	07:46 17:14	07:30 17:49	06:53 18:20	07:04 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:34	06:56 19:51	07:24 19:03	06:57 17:20	07:29 17:01
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:30 17:01
7	07:46 17:16	07:28 17:51	06:50 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:55	06:29 20:32	06:58 19:48	07:26 18:59	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:58 20:50	06:04 20:55	06:30 20:31	06:59 19:46	07:27 18:58	07:00 17:17	07:32 17:01
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13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:34 20:25	07:03 19:38	07:32 18:50	07:06 17:12	07:36 17:01
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:53	06:08 20:53	06:35 20:23	07:04 19:37	07:33 18:49	07:07 17:11	07:37 17:01
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22	07:41 17:32	07:09 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:56	06:15 20:48	06:43 20:12	07:12 19:24	07:41 18:37	07:16 17:05	07:42 17:04
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24	07:40 17:34	07:07 18:11	06:24 18:40	06:36 20:11	06:04 20:39	05:58 20:56	06:16 20:46	06:45 20:10	07:13 19:20	07:43 18:35	07:18 17:04	07:43 17:05
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26	07:38 17:37	07:04 18:13	06:20 18:42	06:34 20:13	06:03 20:41	05:59 20:56	06:18 20:44	06:47 20:07	07:15 19:17	06:46 17:32	07:20 17:03	07:44 17:06
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29	07:36 17:40		07:16 19:45	06:30 20:16	06:01 20:44	06:00 20:57	06:21 20:42	06:49 20:02	07:18 19:12	06:49 17:28	07:23 17:02	07:45 17:08
30	07:35 17:42		07:14 19:46	06:28 20:17	06:01 20:44	06:00 20:56	06:22 20:41	06:50 20:01	07:19 19:11	06:50 17:27	07:24 17:02	07:45 17:09
31	07:34 17:43		07:12 19:47	06:26 20:18	06:00 20:45		06:22 20:40	06:51 19:59		06:51 17:26		07:45 17:10
Potential sun hours	301	299	370	397	444	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)
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Project:

Progetto_Serras_Sardara_Asja

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:
 24/02/2023 13:00/3.4.415

SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F063 - 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	07:46	07:34	06:59	07:11	06:27	06:00	06:01	06:23	06:52	07:20	06:52	07:25		
	17:11	17:44	18:16	19:48	20:18	20:46	20:56	20:39	19:58	19:09	17:24	17:02		
2	07:46	07:33	06:58	07:09	06:26	05:59	06:01	06:24	06:53	07:21	06:53	07:26		
	17:12	17:45	18:17	19:49	20:19	20:46	20:56	20:38	19:56	19:07	17:23	17:01		
3	07:46	07:32	06:56	07:08	06:25	05:59	06:02	06:25	06:54	07:22	06:54	07:27		
	17:13	17:46	18:18	19:50	20:20	20:47	20:56	20:37	19:54	19:06	17:22	17:01		
4	07:46	07:31	06:55	07:06	06:23	05:59	06:02	06:26	06:55	07:23	06:56	07:28		
	17:14	17:47	18:19	19:51	20:21	20:48	20:56	20:35	19:53	19:04	17:21	17:01		
5	07:46	07:30	06:53	07:04	06:22	05:58	06:03	06:27	06:56	07:24	06:57	07:29		
	17:14	17:49	18:20	19:52	20:22	20:49	20:56	20:34	19:51	19:03	17:20	17:01		
6	07:46	07:29	06:52	07:03	06:21	05:58	06:03	06:28	06:57	07:25	06:58	07:30		
	17:15	17:50	18:22	19:53	20:23	20:49	20:56	20:33	19:50	19:01	17:19	17:01		
7	07:46	07:28	06:50	07:01	06:20	05:58	06:04	06:29	06:58	07:26	06:59	07:31		
	17:16	17:51	18:23	19:54	20:24	20:50	20:55	20:32	19:48	18:59	17:18	17:01		
8	07:46	07:27	06:49	07:00	06:19	05:58	06:04	06:30	06:59	07:27	07:00	07:32		
	17:17	17:52	18:24	19:55	20:25	20:50	20:55	20:31	19:46	18:58	17:17	17:01		
9	07:46	07:26	06:47	06:58	06:18	05:57	06:05	06:31	07:00	07:28	07:01	07:33		
	17:18	17:53	18:25	19:56	20:26	20:51	20:55	20:30	19:45	18:56	17:16	17:01		
10	07:46	07:24	06:46	06:57	06:17	05:57	06:06	06:32	07:00	07:29	07:02	07:34		
	17:19	17:55	18:26	19:57	20:27	20:51	20:54	20:29	19:43	18:55	17:15	17:01		
11	07:45	07:23	06:44	06:55	06:16	05:57	06:06	06:33	07:01	07:30	07:04	07:35		
	17:20	17:56	18:27	19:58	20:28	20:52	20:54	20:27	19:42	18:53	17:14	17:01		
12	07:45	07:22	06:43	06:54	06:15	05:57	06:07	06:33	07:02	07:31	07:05	07:35		
	17:21	17:57	18:28	19:59	20:29	20:52	20:54	20:26	19:40	18:52	17:13	17:01		
13	07:45	07:21	06:41	06:52	06:14	05:57	20:27 (SR06)	06:08	06:34	07:03	07:32	07:36		
	17:22	17:58	18:29	20:00	20:30	20:53	1	20:28 (SR06)	20:53	20:25	19:38	18:50	17:12	17:01
14	07:45	07:20	06:40	06:51	06:13	05:57	20:27 (SR06)	06:08	06:35	07:04	07:33	07:07	07:37	
	17:23	17:59	18:30	20:01	20:31	20:53	1	20:28 (SR06)	20:53	20:23	19:37	18:49	17:11	17:01
15	07:44	07:18	06:38	06:49	06:12	05:57	20:27 (SR06)	06:09	06:36	07:05	07:34	07:08	07:38	
	17:24	18:00	18:31	20:02	20:31	20:54	2	20:29 (SR06)	20:52	20:22	19:35	18:47	17:10	17:02
16	07:44	07:17	06:36	06:48	06:11	05:57	20:27 (SR06)	06:10	06:37	07:06	07:35	07:09	07:38	
	17:25	18:02	18:32	20:03	20:32	20:54	2	20:29 (SR06)	20:52	20:21	19:33	18:46	17:10	17:02
17	07:44	07:16	06:35	06:46	06:10	05:57	20:27 (SR06)	06:11	06:38	07:07	07:36	07:10	07:39	
	17:27	18:03	18:33	20:04	20:33	20:55	2	20:29 (SR06)	20:51	20:19	19:32	18:44	17:09	17:02
18	07:43	07:15	06:33	06:45	06:09	05:57	20:28 (SR06)	06:11	06:39	07:08	07:37	07:11	07:40	
	17:28	18:04	18:34	20:05	20:34	20:55	2	20:30 (SR06)	20:50	20:18	19:30	18:43	17:08	17:03
19	07:43	07:13	06:32	06:43	06:08	05:57	20:28 (SR06)	06:12	06:40	07:09	07:38	07:13	07:40	
	17:29	18:05	18:35	20:06	20:35	20:55	3	20:31 (SR06)	20:50	20:17	19:29	18:41	17:07	17:03
20	07:42	07:12	06:30	06:42	06:07	05:57	20:28 (SR06)	06:13	06:41	07:10	07:39	07:14	07:41	
	17:30	18:06	18:36	20:07	20:36	20:55	3	20:31 (SR06)	20:49	20:15	19:27	18:40	17:07	17:03
21	07:42	07:11	06:28	06:40	06:07	05:57	20:28 (SR06)	06:14	06:42	07:11	07:40	07:15	07:42	
	17:31	18:07	18:37	20:08	20:37	20:56	3	20:31 (SR06)	20:48	20:14	19:25	18:39	17:06	17:04
22	07:41	07:09	06:27	06:39	06:06	05:58	20:28 (SR06)	06:15	06:43	07:12	07:41	07:16	07:42	
	17:32	18:08	18:38	20:09	20:38	20:56	3	20:31 (SR06)	20:48	20:12	19:24	18:37	17:05	17:04
23	07:40	07:08	06:25	06:38	06:05	05:58	20:29 (SR06)	06:15	06:44	07:13	07:42	07:17	07:43	
	17:33	18:10	18:39	20:10	20:39	20:56	3	20:32 (SR06)	20:47	20:11	19:22	18:36	17:05	17:05
24	07:40	07:07	06:24	06:36	06:04	05:58	20:29 (SR06)	06:16	06:45	07:13	07:43	07:18	07:43	
	17:34	18:11	18:40	20:11	20:39	20:56	3	20:32 (SR06)	20:46	20:10	19:20	18:35	17:04	17:05
25	07:39	07:05	06:22	06:35	06:04	05:58	20:29 (SR06)	06:17	06:46	07:14	06:45	07:19	07:43	
	17:36	18:12	18:41	20:12	20:40	20:56	2	20:31 (SR06)	20:45	20:08	19:19	17:33	17:04	17:06
26	07:38	07:04	06:20	06:34	06:03	05:59	20:29 (SR06)	06:18	06:47	07:15	06:46	07:20	07:44	
	17:37	18:13	18:42	20:13	20:41	20:56	2	20:31 (SR06)	20:44	20:07	19:17	17:32	17:03	17:06
27	07:38	07:02	06:19	06:32	06:02	05:59	20:30 (SR06)	06:19	06:48	07:16	06:47	07:21	07:44	
	17:38	18:14	18:43	20:14	20:42	20:56	2	20:32 (SR06)	20:43	20:05	19:15	17:31	17:03	17:07
28	07:37	07:01	06:17	06:31	06:02	05:59	20:30 (SR06)	06:20	06:48	07:17	06:48	07:22	07:45	
	17:39	18:15	18:44	20:15	20:43	20:57	1	20:31 (SR06)	20:43	20:04	19:14	17:29	17:03	17:08
29	07:36		07:16	06:30	06:01	06:00	20:31 (SR06)	06:21	06:49	07:18	06:49	07:23	07:45	
	17:40		19:45	20:16	20:44	20:57	1	20:32 (SR06)	20:42	20:02	19:12	17:28	17:02	17:08
30	07:35		07:14	06:28	06:01	06:00		06:22	06:50	07:19	06:50	07:24	07:45	
	17:42		19:46	20:17	20:44	20:56		20:41	20:01	19:11	17:27	17:02	17:09	
31	07:34		07:12		06:00			06:22	06:51		06:51		07:45	
	17:43		19:47		20:45			20:40	19:59		17:26		17:10	
Potential sun hours	301	299	370	397	444	448	455	425	374	347	301	292		
Total, worst case						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)
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SHADOW - Calendar

Calculation: Progetto_layout_2022_01_31Shadow receptor: F067 - A03 - 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	07:46 17:11	07:34 17:44	06:59 18:16	16:58 (SR09) 17:34 (SR09)	07:11 19:48	06:27 20:18	06:00 20:46	
2	07:46 17:12	07:33 17:45	06:58 18:17	16:58 (SR09) 17:35 (SR09)	07:09 19:49	06:26 20:19	05:59 20:46	
3	07:46 17:13	07:32 17:46	06:56 18:18	16:57 (SR09) 17:35 (SR09)	07:08 19:50	06:25 20:20	05:59 20:47	
4	07:46 17:13	07:31 17:47	06:55 18:19	16:56 (SR09) 17:35 (SR09)	07:06 19:51	06:23 20:21	05:59 20:48	
5	07:46 17:14	07:30 17:49	06:53 18:20	16:56 (SR09) 17:35 (SR09)	07:04 19:52	06:22 20:22	05:58 20:49	
6	07:46 17:15	07:29 17:50	06:52 18:21	16:55 (SR09) 17:35 (SR09)	07:03 19:53	06:21 20:23	05:58 20:49	20:14 (SR08)
7	07:46 17:16	07:28 17:51	06:50 18:23	16:56 (SR09) 18:23	07:01 19:54	06:20 20:24	05:58 20:50	20:13 (SR08)
8	07:46 17:17	07:27 17:52	06:49 18:24	16:55 (SR09) 17:34 (SR09)	07:00 19:55	06:19 20:25	05:57 20:50	20:13 (SR08)
9	07:46 17:18	07:25 17:53	06:47 18:25	16:56 (SR09) 17:34 (SR09)	06:58 19:56	06:18 20:26	05:57 20:51	20:12 (SR08)
10	07:46 17:19	07:24 17:55	06:46 18:26	16:56 (SR09) 17:33 (SR09)	06:57 19:57	06:17 20:27	05:57 20:51	20:11 (SR08)
11	07:45 17:20	07:23 17:56	06:44 18:27	16:57 (SR09) 17:33 (SR09)	06:55 19:58	06:16 20:28	05:57 20:52	20:11 (SR08)
12	07:45 17:21	07:22 17:57	06:43 18:28	16:57 (SR09) 17:32 (SR09)	06:54 19:59	06:14 20:29	05:57 20:52	20:11 (SR08)
13	07:45 17:22	07:21 17:58	06:41 18:29	16:57 (SR09) 17:30 (SR09)	06:52 20:00	06:13 20:30	05:57 20:53	20:11 (SR08)
14	07:45 17:23	07:20 17:59	06:40 18:30	16:58 (SR09) 17:29 (SR09)	06:51 20:01	06:13 20:31	05:57 20:53	20:10 (SR08)
15	07:44 17:24	07:18 18:00	06:38 18:31	16:59 (SR09) 17:27 (SR09)	06:49 20:02	06:12 20:31	05:57 20:54	20:10 (SR08)
16	07:44 17:25	07:17 18:02	06:36 18:32	17:01 (SR09) 17:26 (SR09)	06:48 20:03	06:11 20:32	05:57 20:54	20:10 (SR08)
17	07:44 17:26	07:16 18:03	06:35 18:33	17:03 (SR09) 17:23 (SR09)	06:46 20:04	06:10 20:33	05:57 20:55	20:10 (SR08)
18	07:43 17:28	07:15 18:04	06:33 18:34	17:05 (SR09) 17:20 (SR09)	06:45 20:05	06:09 20:34	05:57 20:55	20:11 (SR08)
19	07:43 17:29	07:13 18:05	06:32 18:35	17:12 (SR09) 17:13 (SR09)	06:43 20:06	06:08 20:35	05:57 20:55	20:11 (SR08)
20	07:42 17:30	07:12 18:06	06:30 18:36		06:42 20:07	06:07 20:36	05:57 20:55	20:11 (SR08)
21	07:42 17:31	07:11 18:07	06:28 18:37		06:40 20:08	06:06 20:37	05:57 20:56	20:11 (SR08)
22	07:41 17:32	07:09 18:08	06:27 18:38	17:12 (SR09)	06:39 20:09	06:06 20:38	05:57 20:56	20:11 (SR08)
23	07:40 17:33	07:08 18:09	06:25 18:39	17:08 (SR09) 17:26 (SR09)	06:38 20:10	06:05 20:39	05:58 20:56	20:12 (SR08)
24	07:40 17:34	07:07 18:11	06:24 18:40	17:05 (SR09) 17:28 (SR09)	06:36 20:11	06:04 20:39	05:58 20:56	20:12 (SR08)
25	07:39 17:36	07:05 18:12	06:22 18:41	17:04 (SR09) 17:30 (SR09)	06:35 20:12	06:04 20:40	05:58 20:56	20:12 (SR08)
26	07:38 17:37	07:04 18:13	06:20 18:42	17:02 (SR09) 17:31 (SR09)	06:33 20:13	06:03 20:41	05:59 20:56	20:12 (SR08)
27	07:38 17:38	07:02 18:14	06:19 18:43	17:01 (SR09) 17:32 (SR09)	06:32 20:14	06:02 20:42	05:59 20:57	20:13 (SR08)
28	07:37 17:39	07:01 18:15	06:17 18:44	16:59 (SR09) 17:33 (SR09)	06:31 20:15	06:02 20:43	05:59 20:57	20:13 (SR08)
29	07:36 17:40		07:16 19:45		06:30 20:16	06:01 20:44	06:00 20:57	20:15 (SR08)
30	07:35 17:41		07:14 19:46		06:28 20:17	06:01 20:44	06:00 20:56	20:15 (SR08)
31	07:34 17:43		07:12 19:47			06:00 20:45		20:29 (SR08)
Potential sun hours	301	299	370	397	445	448	364	
Total, worst case		171	606					

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

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

Calculation: Progetto_layout_2022_01_31Shadow receptor: F067 - A03 - 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	06:01 20:56	20:15 (SR08) 20:28 (SR08)	06:23 20:39	06:52 19:57	07:20 19:09	17:37 (SR09) 18:11 (SR09)	06:52 17:24	07:25 17:02
2	06:01 20:56	20:16 (SR08) 20:29 (SR08)	06:24 20:38	06:53 19:56	07:21 19:07	17:35 (SR09) 18:11 (SR09)	06:53 17:23	07:26 17:01
3	06:02 20:56	20:16 (SR08) 20:28 (SR08)	06:25 20:37	06:54 19:54	07:22 19:06	17:34 (SR09) 18:12 (SR09)	06:54 17:22	07:27 17:01
4	06:02 20:56	20:17 (SR08) 20:28 (SR08)	06:26 20:35	06:55 19:53	07:23 19:04	17:34 (SR09) 18:12 (SR09)	06:56 17:21	07:28 17:01
5	06:03 20:56	20:19 (SR08) 20:28 (SR08)	06:27 20:34	06:56 19:51	07:24 19:03	17:33 (SR09) 18:12 (SR09)	06:57 17:20	07:29 17:01
6	06:03 20:56	20:20 (SR08) 20:26 (SR08)	06:28 20:33	06:57 19:50	07:25 19:01	17:32 (SR09) 18:11 (SR09)	06:58 17:19	07:30 17:01
7	06:04 20:55	20:23 (SR08) 20:24 (SR08)	06:29 20:32	06:58 19:48	07:26 18:59	17:32 (SR09) 18:11 (SR09)	06:59 17:18	07:31 17:01
8	06:04 20:55	20:24 (SR08)	06:30 20:31	06:59 19:46	07:27 18:58	17:32 (SR09) 18:11 (SR09)	07:00 17:17	07:32 17:01
9	06:05 20:55	20:25 (SR08)	06:31 20:30	07:00 19:45	07:28 18:56	17:32 (SR09) 18:10 (SR09)	07:01 17:16	07:33 17:01
10	06:06 20:54	20:26 (SR08)	06:32 20:29	07:00 19:43	07:29 18:55	17:31 (SR09) 18:10 (SR09)	07:02 17:15	07:34 17:01
11	06:06 20:54	20:27 (SR08)	06:33 20:27	07:01 19:42	07:30 18:53	17:32 (SR09) 18:09 (SR09)	07:04 17:14	07:35 17:01
12	06:07 20:54	20:28 (SR08)	06:33 20:26	07:02 19:40	07:31 18:52	17:32 (SR09) 18:08 (SR09)	07:05 17:13	07:35 17:01
13	06:08 20:53	20:29 (SR08)	06:34 20:25	07:03 19:38	07:32 18:50	17:32 (SR09) 18:07 (SR09)	07:06 17:12	07:36 17:01
14	06:08 20:53	20:30 (SR08)	06:35 20:23	07:04 19:37	07:33 18:49	17:33 (SR09) 18:06 (SR09)	07:07 17:11	07:37 17:01
15	06:09 20:52	20:31 (SR08)	06:36 20:22	07:05 19:35	07:34 18:47	17:34 (SR09) 18:05 (SR09)	07:08 17:10	07:38 17:02
16	06:10 20:52	20:32 (SR08)	06:37 20:21	07:06 19:33	07:35 18:46	17:35 (SR09) 18:03 (SR09)	07:09 17:09	07:38 17:02
17	06:11 20:51	20:33 (SR08)	06:38 20:19	07:07 19:32	07:36 18:44	17:36 (SR09) 18:01 (SR09)	07:10 17:09	07:39 17:02
18	06:11 20:50	20:34 (SR08)	06:39 20:18	07:08 19:30	07:37 18:43	17:38 (SR09) 17:59 (SR09)	07:11 17:08	07:40 17:02
19	06:12 20:50	20:35 (SR08)	06:40 20:17	07:09 19:29	07:38 18:41	17:40 (SR09) 17:56 (SR09)	07:13 17:07	07:40 17:03
20	06:13 20:49	20:36 (SR08)	06:41 20:15	07:10 19:27	07:39 18:40	17:45 (SR09) 17:50 (SR09)	07:14 17:07	07:41 17:03
21	06:14 20:48	20:37 (SR08)	06:42 20:14	07:11 19:25	07:40 18:39	17:50 (SR09)	07:15 17:06	07:42 17:04
22	06:15 20:48	20:38 (SR08)	06:43 20:12	07:12 19:24	07:41 18:37	17:50 (SR09)	07:16 17:05	07:42 17:04
23	06:15 20:47	20:39 (SR08)	06:44 20:11	07:12 19:22	07:42 18:36	17:50 (SR09)	07:17 17:05	07:43 17:05
24	06:16 20:46	20:40 (SR08)	06:45 20:10	07:13 19:20	07:43 18:34	17:50 (SR09)	07:18 17:04	07:43 17:05
25	06:17 20:45	20:41 (SR08)	06:46 20:08	07:14 19:19	07:44 18:33	17:50 (SR09) 18:02 (SR09)	07:19 17:04	07:43 17:06
26	06:18 20:44	20:42 (SR08)	06:47 20:07	07:15 19:17	07:45 18:32	18:05 (SR09)	07:20 17:03	07:44 17:06
27	06:19 20:43	20:43 (SR08)	06:47 20:05	07:16 19:15	07:46 18:31	17:43 (SR09) 18:07 (SR09)	07:21 17:03	07:44 17:07
28	06:20 20:43	20:44 (SR08)	06:48 20:04	07:17 19:14	07:47 18:30	17:41 (SR09) 18:08 (SR09)	07:22 17:03	07:45 17:08
29	06:21 20:42	20:45 (SR08)	06:49 20:02	07:18 19:12	07:48 18:29	17:39 (SR09) 18:09 (SR09)	07:23 17:02	07:45 17:08
30	06:21 20:41	20:46 (SR08)	06:50 20:01	07:19 19:11	07:49 18:28	17:38 (SR09) 18:10 (SR09)	07:24 17:02	07:45 17:09
31	06:22 20:40	20:47 (SR08)	06:51 19:59		07:50 17:26		17:02 17:01	07:45 17:10
Potential sun hours	455		425	374	347		301	292
Total, worst case	65			144	646			

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

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

Calculation: Progetto_layout_2022_01_31Shadow receptor: F072 - 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	07:46 17:11	07:34 17:44	17:10 (SR03) 17:18 (SR03)	07:00 18:16	17:35 (SR04) 17:51 (SR04)	07:11 19:48	18:46 (SR05) 19:09 (SR05)	06:27 20:18	06:00 20:46	19:59 (SR02) 20:17 (SR02)
2	07:46 17:12	07:33 17:45	06:58 18:17	16 13	17:37 (SR04) 17:50 (SR04)	07:09 19:49	18:47 (SR05) 19:06 (SR05)	06:26 20:19	05:59 20:47	19:59 (SR02) 20:16 (SR02)
3	07:46 17:13	07:32 17:46	06:57 18:18	5	17:40 (SR04) 17:45 (SR04)	07:08 19:50	18:50 (SR05) 19:04 (SR05)	06:25 20:20	05:59 20:47	20:00 (SR02) 20:16 (SR02)
4	07:46 17:14	07:31 17:47	06:55 18:19		07:06 19:51	07:06 19:51	18:53 (SR05) 18:59 (SR05)	06:23 20:21	05:59 20:48	20:01 (SR02) 20:16 (SR02)
5	07:46 17:14	07:30 17:49	06:54 18:20		07:05 19:52	07:05 19:52		06:22 20:22	05:58 20:49	20:01 (SR02) 20:15 (SR02)
6	07:46 17:15	07:29 17:50	06:52 18:22		07:03 19:53	07:03 19:53		06:21 20:23	05:58 20:49	20:01 (SR02) 20:15 (SR02)
7	07:46 17:16	07:28 17:51	06:51 18:23		07:01 19:54	07:01 19:54		06:20 20:24	05:58 20:50	20:02 (SR02) 20:15 (SR02)
8	07:46 17:17	07:27 17:52	06:49 18:24		07:00 19:55	07:00 19:55		06:19 20:25	05:57 20:50	20:03 (SR02) 20:15 (SR02)
9	07:46 17:18	07:26 17:53	06:47 18:25		06:58 19:56	06:58 19:56		06:18 20:26	05:57 20:51	20:04 (SR02) 20:15 (SR02)
10	07:46 17:19	07:24 17:55	06:46 18:26		06:57 19:57	06:57 19:57		06:17 20:27	05:57 20:52	20:04 (SR02) 20:14 (SR02)
11	07:46 17:20	07:23 17:56	06:44 18:27		06:55 19:58	06:55 19:58		06:16 20:28	05:57 20:52	20:05 (SR02) 20:13 (SR02)
12	07:45 17:21	07:22 17:57	06:43 18:28		06:54 19:59	06:54 19:59		06:15 20:29	05:57 20:53	20:06 (SR02) 20:13 (SR02)
13	07:45 17:22	07:21 17:58	06:41 18:29		06:52 20:00	06:52 20:00		06:14 20:30	05:57 20:53	20:07 (SR02) 20:12 (SR02)
14	07:45 17:23	07:20 17:59	06:40 18:30		06:51 20:01	06:51 20:01		06:13 20:31	05:57 20:54	20:09 (SR02) 20:11 (SR02)
15	07:44 17:24	07:19 18:00	06:38 18:31	8	17:58 (SR05) 18:06 (SR05)	06:49 20:02		06:12 20:32	05:57 20:54	
16	07:44 17:25	07:17 18:02	17:38 (SR04) 17:39 (SR04)	16	17:54 (SR05) 18:10 (SR05)	06:48 20:03		06:11 20:33	05:57 20:54	
17	07:44 17:27	07:16 18:03	17:37 (SR04) 17:41 (SR04)	20	17:52 (SR05) 18:12 (SR05)	06:46 20:04		06:10 20:33	05:57 20:55	
18	07:43 17:28	17:02 (SR03) 17:03 (SR03)	07:15 18:04	7	17:50 (SR05) 18:14 (SR05)	06:45 20:05		06:09 20:34	05:57 20:55	
19	07:43 17:29	17:01 (SR03) 17:04 (SR03)	07:13 18:05	9	17:48 (SR05) 18:17 (SR05)	06:43 20:06		06:08 20:35	05:57 20:55	
20	07:42 17:30	17:02 (SR03) 17:06 (SR03)	07:12 18:06	12	17:47 (SR05) 18:15 (SR05)	06:42 20:07		06:07 20:36	05:57 20:56	
21	07:42 17:31	17:02 (SR03) 17:07 (SR03)	07:11 18:07	13	17:46 (SR05) 18:16 (SR05)	06:40 20:08		06:06 20:37	05:57 20:56	
22	07:41 17:32	17:01 (SR03) 17:08 (SR03)	07:09 18:08	15	17:45 (SR05) 18:16 (SR05)	06:39 20:09		06:06 20:38	05:58 20:56	
23	07:41 17:33	17:02 (SR03) 17:10 (SR03)	07:08 18:10	16	17:44 (SR05) 18:15 (SR05)	06:38 20:10		06:05 20:39	05:58 20:56	
24	07:40 17:34	17:02 (SR03) 17:11 (SR03)	07:07 18:11	18	17:44 (SR05) 18:16 (SR05)	06:36 20:11		06:04 20:40	05:58 20:56	
25	07:39 17:36	17:02 (SR03) 17:12 (SR03)	07:05 18:12	19	17:43 (SR05) 18:15 (SR05)	06:35 20:12		06:04 20:41	05:58 20:56	
26	07:38 17:37	17:03 (SR03) 17:13 (SR03)	07:04 18:13	19	17:44 (SR05) 18:15 (SR05)	06:34 20:13		06:03 20:42	05:59 20:57	
27	07:38 17:38	17:04 (SR03) 17:15 (SR03)	07:02 18:14	20	17:43 (SR05) 18:14 (SR05)	06:32 20:14		06:02 20:43	05:59 20:57	
28	07:37 17:39	17:05 (SR03) 17:16 (SR03)	07:01 18:15	19	17:43 (SR05) 18:13 (SR05)	06:31 20:15		06:02 20:44	05:59 20:57	
29	07:36 17:40	17:05 (SR03) 17:17 (SR03)			18:44 (SR05) 19:13 (SR05)	06:30 20:16		06:01 20:45	06:00 20:57	20:12 (SR02) 20:16 (SR02)
30	07:35 17:42	17:06 (SR03) 17:18 (SR03)			18:44 (SR05) 19:12 (SR05)	06:28 20:17		06:01 20:46	06:00 20:57	20:11 (SR02) 20:16 (SR02)
31	07:35 17:43	17:08 (SR03) 17:19 (SR03)			18:45 (SR05) 19:11 (SR05)			06:00 20:45	06:00 20:57	20:16 (SR02)
Potential sun hours	301	299	370	397	445	448				
Total, worst case	114	180	487	62	290	171				

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_2022_01_31Shadow receptor: F072 - 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	06:01	20:11 (SR02)	06:23	06:52			07:20		06:52		07:26			
	20:57	7	20:18 (SR02)	20:39			19:09		17:24		17:02			
2	06:01	20:10 (SR02)	06:24	06:53			07:21		06:53		07:27			
	20:56	8	20:18 (SR02)	20:38			19:07		17:23		17:01			
3	06:02	20:09 (SR02)	06:25	06:54			07:22		06:55		07:28			
	20:56	10	20:19 (SR02)	20:37			19:06		17:22		17:01			
4	06:02	20:09 (SR02)	06:26	06:55			07:23		06:56		07:29			
	20:56	11	20:20 (SR02)	20:36			19:04		17:21		17:01			
5	06:03	20:09 (SR02)	06:27	06:56			07:24		06:57		07:30			
	20:56	12	20:21 (SR02)	20:35			19:03		17:20		17:01			
6	06:03	20:08 (SR02)	06:28	06:57			07:25		06:58		07:30			
	20:56	13	20:21 (SR02)	20:33			19:01		17:19		17:01			
7	06:04	20:08 (SR02)	06:29	06:58			07:26		06:59		07:31			
	20:55	14	20:22 (SR02)	20:32			18:59		17:18		17:01			
8	06:04	20:07 (SR02)	06:30	06:59			07:27		07:00		07:32			
	20:55	15	20:22 (SR02)	20:31		4	18:53 (SR05)	18:58	17:17		17:01			
9	06:05	20:07 (SR02)	06:31	07:00			18:44 (SR05)	07:28	07:01		07:33			
	20:55	16	20:23 (SR02)	20:30		14	18:58 (SR05)	18:56	17:16		17:01			
10	06:06	20:07 (SR02)	06:32	07:01			18:40 (SR05)	07:29	07:03		16:41 (SR03)	07:34		
	20:54	17	20:24 (SR02)	20:29		19	18:59 (SR05)	18:55	17:15	8	16:49 (SR03)	17:01		
11	06:06	20:06 (SR02)	06:33	07:01			18:38 (SR05)	07:30	07:04		16:39 (SR03)	07:35		
	20:54	18	20:24 (SR02)	20:27		23	19:01 (SR05)	18:53	10	18:22 (SR04)	17:14	11	16:50 (SR03)	17:01
12	06:07	20:07 (SR02)	06:33	07:02			18:37 (SR05)	07:31	07:05		16:38 (SR03)	07:36		
	20:54	18	20:25 (SR02)	20:26		25	19:02 (SR05)	18:52	14	18:24 (SR04)	17:13	12	16:50 (SR03)	17:01
13	06:08	20:07 (SR02)	06:34	07:03			18:35 (SR05)	07:32	07:06		16:37 (SR03)	07:36		
	20:53	19	20:26 (SR02)	20:25		28	19:03 (SR05)	18:50	17	18:25 (SR04)	17:12	12	16:49 (SR03)	17:01
14	06:08	20:06 (SR02)	06:35	07:04			18:34 (SR05)	07:33	07:07		16:36 (SR03)	07:37		
	20:53	19	20:25 (SR02)	20:24		29	19:03 (SR05)	18:49	20	18:26 (SR04)	17:11	12	16:48 (SR03)	17:01
15	06:09	20:06 (SR02)	06:36	07:05			18:33 (SR05)	07:34	07:08		16:36 (SR03)	07:38		
	20:52	20	20:26 (SR02)	20:22		30	19:03 (SR05)	18:47	20	18:25 (SR04)	17:10	11	16:47 (SR03)	17:02
16	06:10	20:06 (SR02)	06:37	07:06			18:33 (SR05)	07:35	07:09		16:36 (SR03)	07:39		
	20:52	21	20:27 (SR02)	20:21		31	19:04 (SR05)	18:46	19	18:23 (SR04)	17:10	9	16:45 (SR03)	17:02
17	06:11	20:06 (SR02)	06:38	07:07			18:32 (SR05)	07:36	07:10		16:36 (SR03)	07:39		
	20:51	20	20:26 (SR02)	20:20		32	19:04 (SR05)	18:44	19	18:22 (SR04)	17:09	9	16:45 (SR03)	17:02
18	06:11	20:06 (SR02)	06:39	07:08			18:31 (SR05)	07:37	07:12		16:36 (SR03)	07:40		
	20:50	20	20:26 (SR02)	20:18		33	19:04 (SR05)	18:43	17	18:20 (SR04)	17:08	9	16:45 (SR03)	17:02
19	06:12	20:06 (SR02)	06:40	07:09			18:30 (SR05)	07:38	07:13		16:36 (SR03)	07:41		
	20:50	20	20:26 (SR02)	20:17		32	19:02 (SR05)	18:41	15	18:18 (SR04)	17:07	8	16:44 (SR03)	17:03
20	06:13	20:06 (SR02)	06:41	07:10			18:30 (SR05)	07:39	07:14		16:36 (SR03)	07:41		
	20:49	19	20:25 (SR02)	20:15		32	19:02 (SR05)	18:40	14	18:17 (SR04)	17:07	7	16:43 (SR03)	17:03
21	06:14	20:07 (SR02)	06:42	07:11			18:30 (SR05)	07:40	07:15		16:37 (SR03)	07:42		
	20:48	18	20:25 (SR02)	20:14		31	19:01 (SR05)	18:39	12	18:16 (SR04)	17:06	5	16:42 (SR03)	17:04
22	06:15	20:06 (SR02)	06:43	07:12			18:30 (SR05)	07:41	07:16		16:38 (SR03)	07:42		
	20:48	18	20:24 (SR02)	20:13		30	19:00 (SR05)	18:37	11	18:15 (SR04)	17:05	4	16:42 (SR03)	17:04
23	06:15	20:07 (SR02)	06:44	07:13			18:31 (SR05)	07:42	07:17		16:38 (SR03)	07:43		
	20:47	16	20:23 (SR02)	20:11		28	18:59 (SR05)	18:36	8	18:13 (SR04)	17:05	3	16:41 (SR03)	17:05
24	06:16	20:07 (SR02)	06:45	07:14			18:31 (SR05)	07:44	07:18		16:39 (SR03)	07:43		
	20:46	15	20:22 (SR02)	20:10		27	18:58 (SR05)	18:35	7	18:12 (SR04)	17:04	2	16:41 (SR03)	17:05
25	06:17	20:08 (SR02)	06:46	07:14			18:32 (SR05)	06:45	07:19		17:07 (SR04)	07:44		
	20:45	14	20:22 (SR02)	20:08		25	18:57 (SR05)	17:33	3	17:10 (SR04)	17:04		17:06	
26	06:18	20:09 (SR02)	06:47	07:15			18:33 (SR05)	06:46	07:20		17:03	07:44		
	20:44	12	20:21 (SR02)	20:07		22	18:55 (SR05)	17:32	07:21		17:03	17:06		
27	06:19	20:10 (SR02)	06:48	07:16			18:35 (SR05)	06:47	07:22		17:03	17:06		
	20:44	11	20:21 (SR02)	20:05		18	18:53 (SR05)	17:31	07:23		17:03	17:07		
28	06:20	20:10 (SR02)	06:48	07:17			18:38 (SR05)	06:48	07:24		17:03	17:08		
	20:43	9	20:19 (SR02)	20:04		11	18:49 (SR05)	17:29	07:25		17:03	17:08		
29	06:21	20:11 (SR02)	06:49	07:18				06:49	07:26		17:03	17:08		
	20:42	7	20:18 (SR02)	20:02				17:28	17:02		17:02	17:08		
30	06:22	20:14 (SR02)	06:50	07:19				06:50	07:25		17:02	17:09		
	20:41	3	20:17 (SR02)	20:01				17:27	17:02			17:09		
31	06:22		06:51					06:51				17:01		
	20:40		19:59					17:26				17:10		
Potential sun hours	455		425	374	524		347	206	301	122		292		
Total, worst case		440												

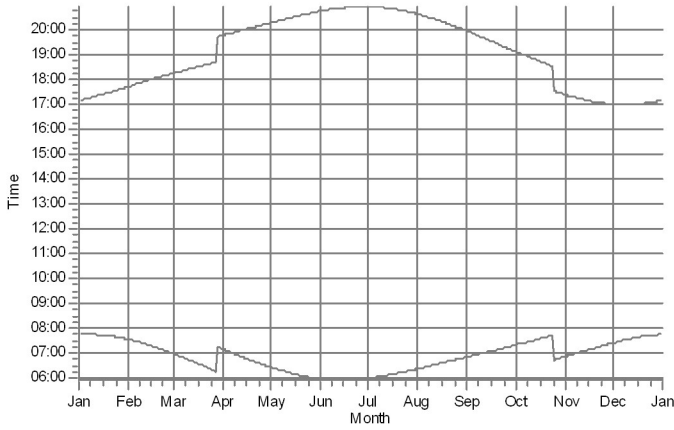
Table layout: For each day in each month the following matrix apply

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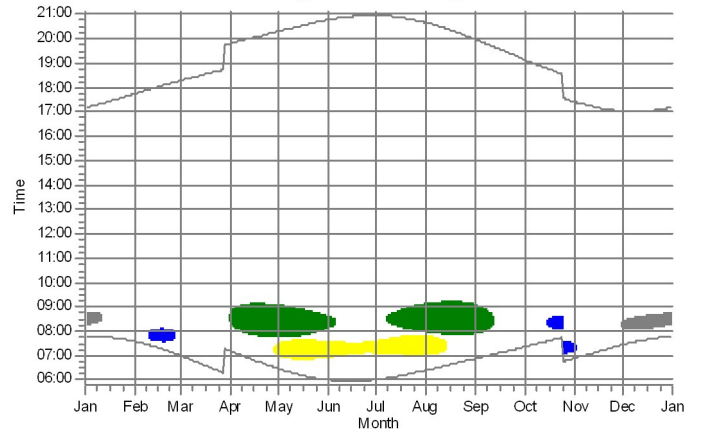
SHADOW - Calendar, graphical

Calculation: Progetto_layout_2022_01_31

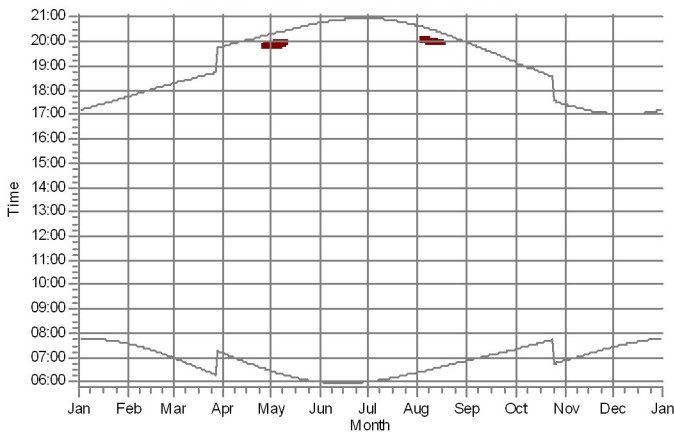
F001: A03



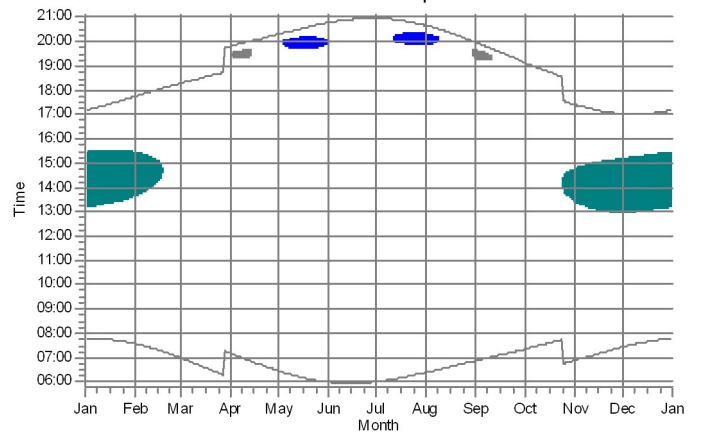
F020: D10 - Agriturismo Nuovi giardini



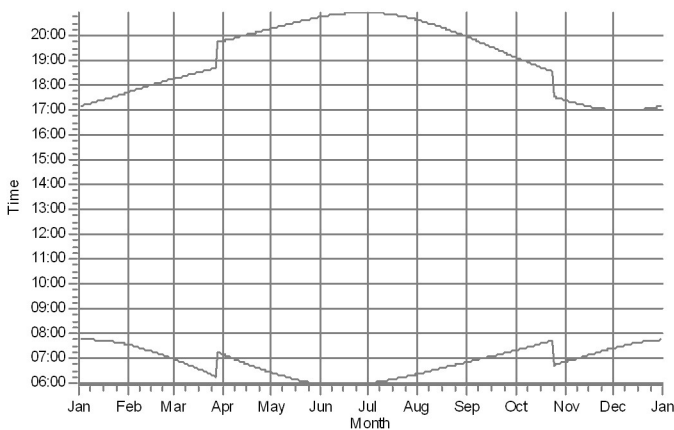
F040: A03 - D10 - D01 Cantine Su Entu



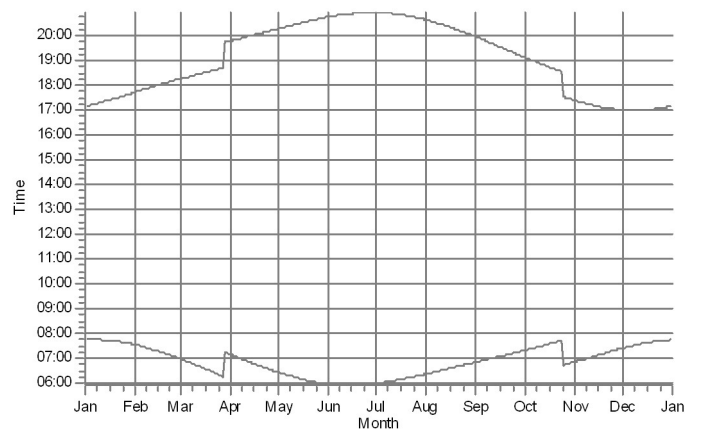
F046: F03 - Chiesa campestre



F060: A02



F061: A02 - C02



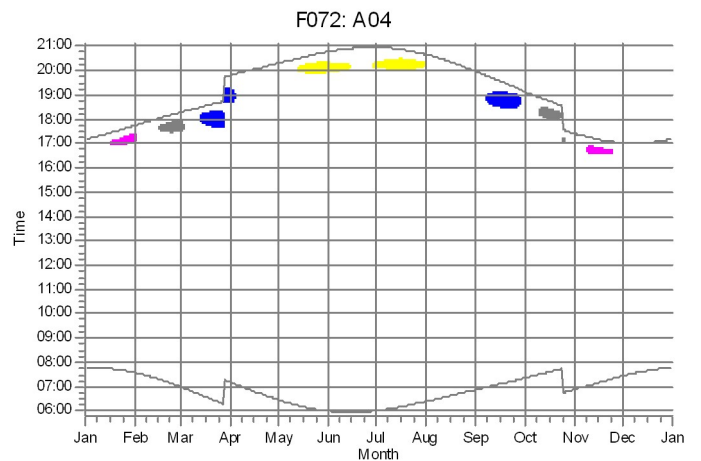
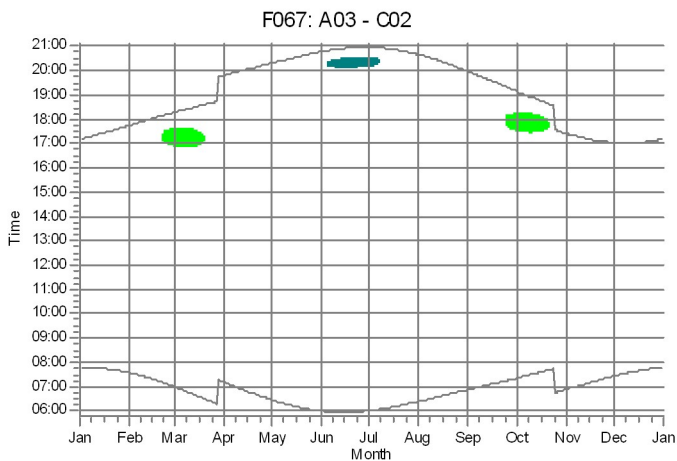
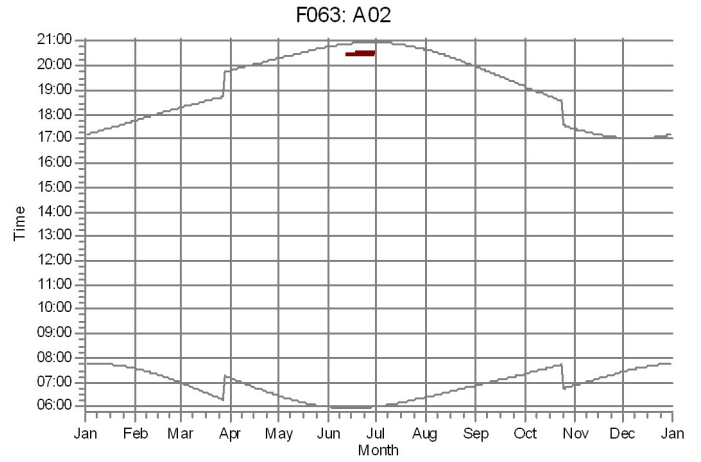
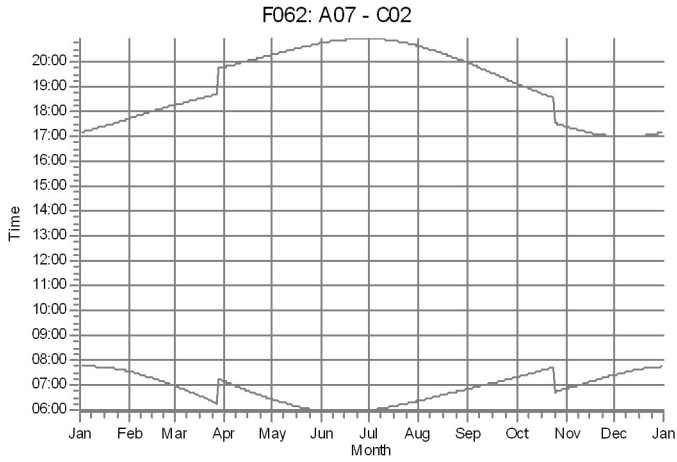
WTGs

- SR01: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (56)
- SR02: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (57)
- SR05: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (58)








- SR04: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (59)
- SR08: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (61)
- SR06: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (63)

SHADOW - Calendar, graphical

Calculation: Progetto_layout_2022_01_31



WTGs

	SR02: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (57)		SR08: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (61)
	SR05: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (58)		SR06: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (63)
	SR04: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (59)		SR09: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (64)
	SR03: Siemens Gamesa SG 6.2-170 6200 170.0 IO! hub: 135,0 m (TOT: 220,0 m) (60)		

SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR01 - Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (56)

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	07:46 17:11	07:34 17:44	07:00 18:16	07:11 08:28-08:39/11 19:48	06:27 07:48-08:59/71 20:18	06:00 08:12-08:33/21 20:46
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 08:21-08:45/24 19:49	06:26 07:49-08:59/70 20:19	05:59 08:13-08:31/18 20:47
3	07:46 17:13	07:32 17:46	06:57 18:18	07:08 08:17-08:49/32 19:50	06:25 07:49-08:59/70 20:20	05:59 08:15-08:29/14 20:47
4	07:46 17:14	07:31 17:48	06:55 18:20	07:06 08:13-08:51/38 19:51	06:23 07:48-08:57/69 20:21	05:59 08:18-08:27/9 20:48
5	07:46 17:14	07:30 17:49	06:54 18:21	07:05 08:11-08:54/43 19:52	06:22 07:49-08:57/68 20:22	05:58 20:49
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 08:08-08:55/47 19:53	06:21 07:49-08:56/67 20:23	05:58 20:49
7	07:46 17:16	07:28 17:51	06:51 18:23	07:01 08:07-08:57/50 19:54	06:20 07:49-08:56/67 20:24	05:58 20:50
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 08:05-08:58/53 19:55	06:19 07:50-08:55/65 20:25	05:58 20:51
9	07:46 17:18	07:26 17:54	06:48 18:25	06:58 08:03-08:59/56 19:56	06:18 07:50-08:54/64 20:26	05:57 20:51
10	07:46 17:19	07:25 17:55	06:46 18:26	06:57 08:01-09:00/59 19:57	06:17 07:51-08:54/63 20:27	05:57 20:52
11	07:46 17:20	07:23 17:56	06:44 18:27	06:55 07:59-09:00/61 19:58	06:16 07:51-08:53/62 20:28	05:57 20:52
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 07:59-09:01/62 19:59	06:15 07:51-08:52/61 20:29	05:57 20:53
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 07:57-09:01/64 20:00	06:14 07:52-08:51/59 20:30	05:57 20:53
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 07:56-09:02/66 20:01	06:13 07:52-08:50/58 20:31	05:57 20:54
15	07:45 17:24	07:19 18:01	06:38 18:31	06:49 07:56-09:03/67 20:02	06:12 07:53-08:49/56 20:32	05:57 20:54
16	07:44 17:26	07:17 18:02	06:37 18:32	06:48 07:54-09:03/69 20:03	06:11 07:54-08:50/56 20:33	05:57 20:54
17	07:44 17:27	07:16 18:03	06:35 18:33	06:46 07:54-09:03/69 20:04	06:10 07:55-08:49/54 20:34	05:57 20:55
18	07:43 17:28	07:15 18:04	06:33 18:34	06:45 07:53-09:03/70 20:05	06:09 07:56-08:47/51 20:34	05:57 20:55
19	07:43 17:29	07:14 18:05	06:32 18:35	06:43 07:52-09:03/71 20:06	06:08 07:56-08:46/50 20:35	05:57 20:55
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 07:51-09:03/72 20:07	06:07 07:57-08:45/48 20:36	05:57 20:56
21	07:42 17:31	07:11 18:07	06:29 18:37	06:41 07:51-09:03/72 20:08	06:07 07:58-08:45/47 20:37	05:57 20:56
22	07:41 17:32	07:10 18:09	06:27 18:38	06:39 07:51-09:03/72 20:09	06:06 07:59-08:44/45 20:38	05:58 20:56
23	07:41 17:33	07:08 18:10	06:25 18:39	06:38 07:50-09:02/72 20:10	06:05 08:00-08:43/43 20:39	05:58 20:56
24	07:40 17:35	07:07 18:11	06:24 18:40	06:36 07:50-09:02/72 20:11	06:04 08:01-08:42/41 20:40	05:58 20:56
25	07:39 17:36	07:05 18:12	06:22 18:41	06:35 07:50-09:02/72 20:12	06:04 08:02-08:41/39 20:41	05:58 20:57
26	07:39 17:37	07:04 18:13	06:21 18:42	06:34 07:49-09:01/72 20:13	06:03 08:04-08:40/36 20:41	05:59 20:57
27	07:38 17:38	07:03 18:14	06:19 18:43	06:32 07:49-09:01/72 20:14	06:02 08:04-08:39/35 20:42	05:59 20:57
28	07:37 17:39	07:01 18:15	06:17 18:44	06:31 07:49-09:01/72 20:15	06:02 08:06-08:38/32 20:43	05:59 20:57
29	07:36 17:40		07:16 19:45	06:30 07:48-09:00/72 20:16	06:01 08:07-08:37/30 20:44	06:00 20:57
30	07:35 17:42		07:14 19:46	06:28 07:48-09:00/72 20:17	06:01 08:09-08:36/27 20:45	06:00 20:57
31	07:35 17:43		07:13 19:47		06:00 08:10-08:34/24 20:45	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	0	0	0	1804	1628	62

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
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SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR01 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (56)

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	06:01 20:57	06:23 08:02-09:03/61 20:39	06:52 07:59-09:00/61 19:58	07:20 19:09	06:52 17:25	07:26 17:02
2	06:01 20:57	06:24 08:01-09:04/63 20:38	06:53 07:59-08:58/59 19:56	07:21 19:08	06:54 17:23	07:27 17:01
3	06:02 20:56	06:25 08:01-09:05/64 20:37	06:54 08:00-08:56/56 19:55	07:22 19:06	06:55 17:22	07:28 17:01
4	06:02 20:56	06:26 08:01-09:05/64 20:36	06:55 08:01-08:55/54 19:53	07:23 19:04	06:56 17:21	07:29 17:01
5	06:03 20:56	06:27 07:59-09:05/66 20:35	06:56 08:03-08:53/50 19:51	07:24 19:03	06:57 17:20	07:30 17:01
6	06:03 20:56	06:28 07:59-09:05/66 20:33	06:57 08:04-08:51/47 19:50	07:25 19:01	06:58 17:19	07:31 17:01
7	06:04 20:56	06:29 07:59-09:06/67 20:32	06:58 08:06-08:49/43 19:48	07:26 19:00	06:59 17:18	07:31 17:01
8	06:04 08:27-08:31/4 20:55	06:30 07:58-09:07/69 20:31	06:59 08:08-08:47/39 19:47	07:27 18:58	07:00 17:17	07:32 17:01
9	06:05 08:24-08:35/11 20:55	06:31 07:58-09:07/69 20:30	07:00 08:11-08:43/32 19:45	07:28 18:56	07:01 17:16	07:33 17:01
10	06:06 08:22-08:38/16 20:55	06:32 07:58-09:07/69 20:29	07:01 08:14-08:40/26 19:43	07:29 18:55	07:03 17:15	07:34 17:01
11	06:06 08:20-08:40/20 20:54	06:33 07:57-09:08/71 20:28	07:02 08:19-08:33/14 19:42	07:30 18:53	07:04 17:14	07:35 17:01
12	06:07 08:19-08:42/23 20:54	06:34 07:57-09:08/71 20:26	07:02 19:40	07:31 18:52	07:05 17:13	07:36 17:01
13	06:08 08:18-08:44/26 20:53	06:35 07:57-09:08/71 20:25	07:03 19:39	07:32 18:50	07:06 17:12	07:37 17:01
14	06:08 08:16-08:44/28 20:53	06:35 07:57-09:09/72 20:24	07:04 19:37	07:33 18:49	07:07 17:11	07:37 17:01
15	06:09 08:15-08:46/31 20:52	06:36 07:56-09:08/72 20:22	07:05 19:35	07:34 18:47	07:08 17:10	07:38 17:02
16	06:10 08:14-08:48/34 20:52	06:37 07:56-09:08/72 20:21	07:06 19:34	07:35 18:46	07:09 17:10	07:39 17:02
17	06:11 08:14-08:49/35 20:51	06:38 07:55-09:08/73 20:20	07:07 19:32	07:36 18:44	07:11 17:09	07:39 17:02
18	06:11 08:12-08:50/38 20:51	06:39 07:55-09:08/73 20:18	07:08 19:30	07:37 18:43	07:12 17:08	07:40 17:03
19	06:12 08:11-08:51/40 20:50	06:40 07:55-09:08/73 20:17	07:09 19:29	07:38 18:42	07:13 17:07	07:41 17:03
20	06:13 08:10-08:52/42 20:49	06:41 07:56-09:08/72 20:16	07:10 19:27	07:39 18:40	07:14 17:07	07:41 17:03
21	06:14 08:10-08:54/44 20:49	06:42 07:56-09:08/72 20:14	07:11 19:25	07:40 18:39	07:15 17:06	07:42 17:04
22	06:15 08:08-08:54/46 20:48	06:43 07:56-09:08/72 20:13	07:12 19:24	07:42 18:37	07:16 17:06	07:42 17:04
23	06:16 08:08-08:55/47 20:47	06:44 07:56-09:07/71 20:11	07:13 19:22	07:43 18:36	07:17 17:05	07:43 17:05
24	06:16 08:07-08:56/49 20:46	06:45 07:55-09:06/71 20:10	07:14 19:21	07:44 18:35	07:18 17:04	07:43 17:05
25	06:17 08:06-08:57/51 20:45	06:46 07:55-09:06/71 20:08	07:15 19:19	06:45 17:33	07:19 17:04	07:44 17:06
26	06:18 08:06-08:59/53 20:45	06:47 07:56-09:05/69 20:07	07:15 19:17	06:46 17:32	07:21 17:04	07:44 17:07
27	06:19 08:05-09:00/55 20:44	06:48 07:56-09:04/68 20:05	07:16 19:16	06:47 17:31	07:22 17:03	07:44 17:07
28	06:20 08:04-09:00/56 20:43	06:49 07:57-09:04/67 20:04	07:17 19:14	06:48 17:29	07:23 17:03	07:45 17:08
29	06:21 08:03-09:00/57 20:42	06:49 07:57-09:03/66 20:02	07:18 19:12	06:49 17:28	07:24 17:02	07:45 17:09
30	06:22 08:03-09:01/58 20:41	06:50 07:58-09:02/64 20:01	07:19 19:11	06:50 17:27	07:25 17:02	07:45 17:09
31	06:23 08:02-09:02/60 20:40	06:51 07:59-09:01/62 19:59		06:51 17:26		07:46 17:10
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	924	2131	481	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_Serras_Sardara_Asja

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:

24/02/2023 13:00/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR02 - Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (57)

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	07:46	07:34	07:00	07:11	06:27 07:05-07:25/20	06:00 19:59-20:17/18	06:01 20:11-20:18/7	06:23 07:05-07:44/39	06:52 07:20	06:52 07:26	06:52 07:26	07:26
2	07:46	07:33	06:58	07:09	06:26 07:03-07:27/24	05:59 19:59-20:16/17	06:01 20:10-20:18/8	06:24 07:06-07:44/38	06:53 07:21	06:54 07:27	06:54 07:27	07:27
3	07:46	07:32	06:57	07:08	06:25 07:02-07:29/27	05:59 20:00-20:16/16	06:02 20:09-20:19/10	06:25 07:06-07:44/38	06:54 07:22	06:55 07:28	06:55 07:28	07:28
4	07:46	07:31	06:55	07:06	06:23 07:00-07:29/29	05:59 20:01-20:16/15	06:02 20:09-20:20/11	06:26 07:07-07:43/36	06:55 07:23	06:56 07:29	06:56 07:29	07:29
5	07:46	07:30	06:54	07:05	06:22 06:59-07:30/31	05:58 20:01-20:15/14	06:03 20:09-20:21/12	06:27 07:06-07:42/36	06:56 07:24	06:57 07:30	06:57 07:30	07:30
6	07:46	07:29	06:52	07:03	06:21 06:58-07:31/33	05:58 20:01-20:15/14	06:03 20:08-20:21/13	06:28 07:07-07:41/34	06:57 07:25	06:58 07:31	06:58 07:31	07:31
7	07:46	07:28	06:51	07:01	06:20 06:57-07:32/35	05:58 20:02-07:30/28	06:04 20:08-20:22/14	06:29 07:08-07:41/33	06:58 07:26	06:59 07:31	06:59 07:31	07:31
8	07:46	07:27	06:49	07:00	06:19 06:56-07:32/36	05:58 20:03-20:15/12	06:04 20:07-20:22/15	06:30 07:09-07:40/31	06:59 07:27	07:00 07:32	07:00 07:32	07:32
9	07:46	07:26	06:48	06:58	06:18 06:56-07:33/37	05:57 20:04-20:15/11	06:05 20:07-20:23/16	06:31 07:10-07:38/28	07:00 07:28	07:01 07:33	07:01 07:33	07:33
10	07:46	07:25	06:46	06:57	06:17 06:55-07:33/38	05:57 20:04-20:14/10	06:06 20:07-20:24/17	06:32 07:11-07:37/26	07:01 07:29	07:03 07:34	07:03 07:34	07:34
11	07:46	07:23	06:44	06:55	06:16 06:55-07:34/39	05:57 20:05-20:13/8	06:06 20:06-20:24/18	06:33 07:13-07:35/22	07:02 07:30	07:04 07:35	07:04 07:35	07:35
12	07:45	07:22	06:43	06:54	06:15 06:54-07:34/40	05:57 20:06-20:13/7	06:07 20:07-20:25/18	06:34 07:15-07:33/18	07:02 07:31	07:05 07:36	07:05 07:36	07:36
13	07:45	07:21	06:41	06:52	06:14 06:54-07:34/40	05:57 20:07-20:12/5	06:08 20:07-20:26/19	06:35 07:18-07:30/12	07:03 07:32	07:06 07:36	07:06 07:36	07:36
14	07:45	07:20	06:40	06:51	06:13 20:02-20:07/5	05:57 20:09-20:11/2	06:08 20:06-20:25/19	06:35 07:18-07:30/12	07:03 07:32	07:06 07:36	07:06 07:36	07:36
15	07:45	07:19	06:38	06:49	06:12 20:00-20:08/8	05:57 07:07-07:28/21	06:09 20:06-20:26/20	06:36 07:19-07:31/11	07:04 07:33	07:07 07:37	07:07 07:37	07:37
16	07:44	07:17	06:37	06:48	06:11 19:59-20:09/10	05:57 07:07-07:28/21	06:10 20:06-20:27/21	06:37 07:20-07:32/14	07:05 07:34	07:08 07:38	07:08 07:38	07:38
17	07:44	07:16	06:35	06:46	06:10 19:59-20:10/11	05:57 07:09-07:28/19	06:11 20:06-20:26/20	06:38 07:21-07:33/15	07:06 07:35	07:09 07:39	07:09 07:39	07:39
18	07:43	07:15	06:33	06:45	06:09 19:58-20:11/13	05:57 07:09-07:28/19	06:11 20:06-20:26/20	06:39 07:22-07:34/16	07:07 07:36	07:10 07:40	07:10 07:40	07:40
19	07:43	07:14	06:32	06:43	06:08 19:57-20:12/15	05:57 07:09-07:28/19	06:12 20:06-20:26/20	06:40 07:23-07:35/17	07:08 07:37	07:11 07:41	07:11 07:41	07:41
20	07:42	07:12	06:30	06:42	06:07 19:56-20:12/16	05:57 07:09-07:28/19	06:13 20:06-20:25/19	06:41 07:24-07:36/18	07:09 07:38	07:12 07:42	07:12 07:42	07:42
21	07:42	07:11	06:29	06:40	06:07 19:57-20:14/17	05:57 07:09-07:28/19	06:14 20:07-20:25/18	06:42 07:25-07:37/19	07:10 07:39	07:13 07:43	07:13 07:43	07:43
22	07:41	07:10	06:27	06:39	06:06 19:56-20:14/18	05:58 07:09-07:28/19	06:15 20:06-20:24/18	06:43 07:26-07:38/20	07:11 07:40	07:14 07:44	07:14 07:44	07:44
23	07:41	07:08	06:25	06:38	06:05 19:56-20:15/19	05:58 07:10-07:29/19	06:15 20:07-20:23/16	06:44 07:27-07:39/21	07:12 07:41	07:15 07:45	07:15 07:45	07:45
24	07:40	07:07	06:24	06:36	06:04 19:57-20:16/19	05:58 07:10-07:29/19	06:16 20:07-20:22/15	06:45 07:28-07:40/22	07:13 07:42	07:16 07:46	07:16 07:46	07:46
25	07:39	07:05	06:22	06:35	06:04 19:56-20:16/20	05:58 07:10-07:29/19	06:17 20:08-20:22/14	06:46 07:29-07:41/23	07:14 07:43	07:17 07:47	07:17 07:47	07:47
26	07:39	07:04	06:21	06:34	06:03 19:56-20:17/21	05:59 07:10-07:31/21	06:18 20:09-20:21/12	06:47 07:30-07:42/24	07:15 07:44	07:18 07:48	07:18 07:48	07:48
27	07:38	07:03	06:19	06:32	06:02 19:57-20:17/20	05:59 07:10-07:31/21	06:19 20:10-20:21/11	06:48 07:31-07:43/25	07:16 07:45	07:19 07:49	07:19 07:49	07:49
28	07:37	07:01	06:17	06:31	06:02 19:57-20:17/20	05:59 07:10-07:31/21	06:20 20:10-20:19/9	06:49 07:32-07:44/26	07:17 07:46	07:20 07:50	07:20 07:50	07:50
29	07:36	07:15	06:16	06:30	06:01 19:58-20:17/19	06:00 20:12-20:16/4	06:21 20:11-20:18/7	06:49 07:33-07:45/27	07:18 07:47	07:21 07:51	07:21 07:51	07:51
30	07:35	07:14	06:28	07:08-07:23/15	06:01 19:57-20:17/20	06:00 20:11-20:16/5	06:22 20:14-20:17/3	06:50 07:34-07:46/28	07:19 07:48	07:22 07:52	07:22 07:52	07:52
31	07:35	07:13	06:27	06:41	06:00 19:58-20:17/19	06:00 20:12-20:16/4	06:22 20:14-20:17/3	06:51 07:35-07:47/29	07:20 07:49	07:23 07:53	07:23 07:53	07:53
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Sum of minutes with flicker	0	0	0	19	1405	869	1506	391	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_Serras_Sardara_Asja

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:
 24/02/2023 13:00/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR03 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (60)

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	07:46 17:11	07:34 17:44	17:10-17:18/8 18:16	07:00 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:57	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:25
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:47	06:01 20:57	06:24 20:38	06:53 19:56	07:21 19:08	06:54 17:23	07:27 17:01
3	07:46 17:13	07:32 17:46	06:57 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:55	07:22 19:06	06:55 17:22	07:28 17:01
4	07:46 17:14	07:31 17:48	06:55 18:20	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:36	06:55 19:53	07:23 19:04	06:56 17:21	07:29 17:01
5	07:46 17:14	07:30 17:49	06:54 18:21	07:05 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:35	06:56 19:51	07:24 19:03	06:57 17:20	07:30 17:01
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:31 17:01
7	07:46 17:16	07:28 17:51	06:51 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:56	06:29 20:32	06:58 19:48	07:26 19:00	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:58 20:51	06:04 20:55	06:30 20:31	06:59 19:47	07:27 18:58	07:00 17:17	07:32 17:01
9	07:46 17:18	07:26 17:54	06:48 18:25	06:58 19:56	06:18 20:26	05:57 20:51	06:05 20:55	06:31 20:30	07:00 19:45	07:28 18:56	07:01 17:16	07:33 17:01
10	07:46 17:19	07:25 17:55	06:46 18:26	06:57 19:57	06:17 20:27	05:57 20:52	06:06 20:55	06:32 20:29	07:01 19:43	07:29 18:55	07:03 17:15	16:41-16:49/8 07:34 17:01
11	07:46 17:20	07:23 17:56	06:44 18:27	06:55 19:58	06:16 20:28	05:57 20:52	06:06 20:54	06:33 20:27	07:02 19:42	07:30 18:53	07:04 17:14	16:39-16:50/11 07:35 17:01
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:59	06:15 20:29	05:57 20:53	06:07 20:54	06:34 20:26	07:02 19:40	07:31 18:52	07:05 17:13	16:38-16:50/12 07:36 17:01
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:35 20:25	07:03 19:38	07:32 18:50	07:06 17:12	16:37-16:49/12 07:36 17:01
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:54	06:08 20:53	06:35 20:24	07:04 19:37	07:33 18:49	07:07 17:11	16:36-16:48/12 07:37 17:01
15	07:44 17:24	07:19 18:01	06:38 18:31	06:49 20:02	06:12 20:32	05:57 20:54	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:47	07:08 17:10	16:36-16:47/11 07:38 17:02
16	07:44 17:26	07:17 18:02	06:37 18:32	06:48 20:03	06:11 20:33	05:57 20:54	06:10 20:52	06:37 20:21	07:06 19:34	07:35 18:46	07:09 17:10	16:36-16:45/9 07:39 17:02
17	07:44 17:27	07:16 18:03	06:35 18:33	06:46 20:04	06:10 20:33	05:57 20:55	06:11 20:51	06:38 20:20	07:07 19:32	07:36 18:44	07:11 17:09	16:36-16:45/9 07:39 17:02
18	07:43 17:28	17:02-17:03/1 18:04	07:15 18:34	06:33 20:05	06:45 20:34	06:09 20:55	05:57 20:51	06:11 20:18	07:08 19:30	07:37 18:43	07:12 17:08	16:36-16:45/9 07:40 17:03
19	07:43 17:29	17:01-17:04/3 18:05	07:14 18:35	06:32 20:06	06:43 20:06	06:08 20:35	05:57 20:50	06:12 20:17	06:40 19:29	07:38 18:42	07:13 17:07	16:36-16:44/8 07:41 17:03
20	07:42 17:30	17:02-17:06/4 18:06	07:12 18:36	06:30 20:07	06:42 20:36	06:07 20:56	05:57 20:49	06:13 20:15	06:41 19:27	07:39 18:40	07:14 17:07	16:36-16:43/7 07:41 17:03
21	07:42 17:31	17:02-17:07/5 18:07	07:11 18:37	06:29 20:08	06:41 20:37	06:07 20:56	05:57 20:48	06:14 20:14	06:42 19:25	07:40 18:39	07:15 17:06	16:37-16:42/5 07:42 17:04
22	07:41 17:32	17:01-17:08/7 18:09	07:10 18:38	06:27 20:09	06:39 20:38	06:06 20:56	05:58 20:48	06:15 20:13	06:43 19:24	07:41 18:37	07:16 17:06	16:38-16:42/4 07:42 17:04
23	07:41 17:33	17:02-17:10/8 18:10	07:08 18:39	06:25 20:10	06:38 20:39	06:05 20:56	05:58 20:47	06:16 20:11	06:44 19:22	07:43 18:36	07:17 17:05	16:38-16:41/3 07:43 17:05
24	07:40 17:35	17:02-17:11/9 18:11	07:07 18:40	06:24 20:11	06:36 20:40	06:04 20:56	05:58 20:46	06:16 20:10	06:45 19:20	07:44 18:35	07:18 17:04	16:39-16:41/2 07:43 17:05
25	07:39 17:36	17:02-17:12/10 18:12	07:05 18:41	06:22 20:12	06:35 20:41	06:04 20:57	05:58 20:45	06:17 20:08	06:46 19:19	07:15 17:33	06:45 17:04	07:19 17:06
26	07:39 17:37	17:03-17:13/10 18:13	07:04 18:42	06:21 20:13	06:34 20:41	06:03 20:57	05:59 20:45	06:18 20:07	06:47 19:17	07:15 17:32	06:46 17:04	07:20 17:07
27	07:38 17:38	17:04-17:15/11 18:14	07:02 18:43	06:19 20:14	06:32 20:42	06:02 20:57	05:59 20:44	06:19 20:05	06:48 19:16	07:16 17:31	06:47 17:03	07:22 17:07
28	07:37 17:39	17:05-17:16/11 18:15	07:01 18:44	06:17 20:15	06:31 20:43	06:02 20:57	05:59 20:43	06:20 20:04	06:49 19:14	07:17 17:29	06:48 17:03	07:23 17:08
29	07:36 17:40	17:05-17:17/12 18:16	07:00 19:45	06:16 20:16	06:30 20:44	06:01 20:57	06:00 20:42	06:21 20:02	06:49 19:12	07:18 17:28	06:49 17:02	07:24 17:09
30	07:35 17:42	17:06-17:18/12 18:17	07:00 19:46	06:15 20:17	06:29 20:44	06:00 20:57	06:00 20:41	06:22 20:01	06:50 19:11	07:19 17:27	06:50 17:02	07:25 17:09
31	07:35 17:43	17:08-17:19/11 18:18	07:00 19:47	06:15 20:18	06:29 20:45	06:00 20:57	06:00 20:40	06:23 19:59	06:51 19:59	06:51 17:26	07:23 17:02	07:46 17:10
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Sum of minutes with flicker	114	8	0	0	0	0	0	0	0	0	122	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_Serras_Sardara_Asja

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:

24/02/2023 13:00/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR04 - Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (59)

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	07:46 08:19-08:41/22 17:11	07:34 17:44	07:00 17:35-17:51/16 18:16	07:11 19:48	06:27 20:18	06:00 20:46
2	07:46 08:20-08:41/21 17:12	07:33 17:45	06:58 17:37-17:50/13 18:17	07:09 19:27-19:28/1 19:49	06:26 20:19	05:59 20:47
3	07:46 08:20-08:41/21 17:13	07:32 17:46	06:57 17:40-17:45/5 18:18	07:08 19:25-19:29/4 19:50	06:25 20:20	05:59 20:47
4	07:46 08:21-08:41/20 17:14	07:31 17:48	06:55 18:19	07:06 19:24-19:30/6 19:51	06:23 20:21	05:59 20:48
5	07:46 08:22-08:41/19 17:14	07:30 17:49	06:54 18:21	07:05 19:23-19:31/8 19:52	06:22 20:22	05:58 20:49
6	07:46 08:23-08:41/18 17:15	07:29 17:50	06:52 18:22	07:03 19:22-19:32/10 19:53	06:21 20:23	05:58 20:49
7	07:46 08:23-08:40/17 17:16	07:28 17:51	06:51 18:23	07:01 19:21-19:32/11 19:54	06:20 20:24	05:58 20:50
8	07:46 08:24-08:40/16 17:17	07:27 17:52	06:49 18:24	07:00 19:22-19:34/12 19:55	06:19 20:25	05:58 20:51
9	07:46 08:26-08:40/14 17:18	07:26 17:53	06:48 18:25	06:58 19:21-19:34/13 19:56	06:18 20:26	05:57 20:51
10	07:46 08:28-08:39/11 17:19	07:25 17:55	06:46 18:26	06:57 19:22-19:36/14 19:57	06:17 20:27	05:57 20:52
11	07:46 08:30-08:38/8 17:20	07:23 17:56	06:44 18:27	06:55 19:22-19:36/14 19:58	06:16 20:28	05:57 20:52
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:24-19:37/13 19:59	06:15 20:29	05:57 20:53
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 19:25-19:35/10 20:00	06:14 20:30	05:57 20:53
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:54
15	07:44 17:24	07:19 18:01	06:38 18:31	06:49 20:02	06:12 20:32	05:57 20:54
16	07:44 17:26	07:17 17:38-17:39/1 18:02	06:37 18:32	06:48 20:03	06:11 20:33	05:57 20:54
17	07:44 17:27	07:16 17:37-17:41/4 18:03	06:35 18:33	06:46 20:04	06:10 20:33	05:57 20:55
18	07:43 17:28	07:15 17:35-17:42/7 18:04	06:33 18:34	06:45 20:05	06:09 20:34	05:57 20:55
19	07:43 17:29	07:14 17:34-17:43/9 18:05	06:32 18:35	06:43 20:06	06:08 20:35	05:57 20:55
20	07:42 17:30	07:12 17:33-17:45/12 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:56
21	07:42 17:31	07:11 17:33-17:46/13 18:07	06:29 18:37	06:40 20:08	06:07 20:37	05:57 20:56
22	07:41 17:32	07:10 17:32-17:47/15 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:56
23	07:41 17:33	07:08 17:32-17:48/16 18:10	06:25 18:39	06:38 20:10	06:05 20:39	05:58 20:56
24	07:40 17:35	07:07 17:31-17:49/18 18:11	06:24 18:40	06:36 20:11	06:04 20:40	05:58 20:56
25	07:39 17:36	07:05 17:32-17:51/19 18:12	06:22 18:41	06:35 20:12	06:04 20:41	05:58 20:57
26	07:39 17:37	07:04 17:33-17:52/19 18:13	06:21 18:42	06:34 20:13	06:03 20:41	05:59 20:57
27	07:38 17:38	07:02 17:33-17:53/20 18:14	06:19 18:43	06:32 20:14	06:02 20:42	05:59 20:57
28	07:37 17:39	07:01 17:34-17:53/19 18:15	06:17 18:44	06:31 20:15	06:02 20:43	05:59 20:57
29	07:36 17:40		07:16 19:45	06:30 20:16	06:01 20:44	06:00 20:57
30	07:35 17:42		07:14 19:46	06:28 20:17	06:01 20:44	06:00 20:57
31	07:35 17:43		07:13 19:47		06:00 20:45	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	187	172	34	116	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_2022_01_31WTG: SR04 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (59)

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	06:01 20:57	06:23 20:39	06:52 19:21-19:35/14 19:58	07:20 19:09	06:52 17:24	07:26 08:12-08:20/8 17:02
2	06:01 20:57	06:24 20:38	06:53 19:20-19:34/14 19:56	07:21 19:07	06:54 17:23	07:27 08:11-08:22/11 17:01
3	06:02 20:56	06:25 20:37	06:54 19:19-19:32/13 19:55	07:22 19:06	06:55 17:22	07:28 08:10-08:24/14 17:01
4	06:02 20:56	06:26 20:36	06:55 19:19-19:31/12 19:53	07:23 19:04	06:56 17:21	07:29 08:10-08:25/15 17:01
5	06:03 20:56	06:27 20:35	06:56 19:18-19:30/12 19:51	07:24 19:03	06:57 17:20	07:30 08:09-08:26/17 17:01
6	06:03 20:56	06:28 20:33	06:57 19:18-19:28/10 19:50	07:25 19:01	06:58 17:19	07:31 08:09-08:27/18 17:01
7	06:04 20:56	06:29 20:32	06:58 19:18-19:27/9 19:48	07:26 19:00	06:59 17:18	07:31 08:08-08:27/19 17:01
8	06:04 20:55	06:30 20:31	06:59 19:19-19:25/6 19:47	07:27 18:58	07:00 17:17	07:32 08:08-08:28/20 17:01
9	06:05 20:55	06:31 20:30	07:00 19:19-19:24/5 19:45	07:28 18:56	07:01 17:16	07:33 08:08-08:29/21 17:01
10	06:06 20:55	06:32 20:29	07:01 19:19-19:21/2 19:43	07:29 18:55	07:03 17:15	07:34 08:09-08:30/21 17:01
11	06:06 20:54	06:33 20:27	07:02 19:42	07:30 18:12-18:22/10 18:53	07:04 17:14	07:35 08:09-08:31/22 17:01
12	06:07 20:54	06:34 20:26	07:02 19:40	07:31 18:10-18:24/14 18:52	07:05 17:13	07:36 08:09-08:32/23 17:01
13	06:08 20:53	06:35 20:25	07:03 19:38	07:32 18:08-18:25/17 18:50	07:06 17:12	07:36 08:09-08:32/23 17:01
14	06:08 20:53	06:35 20:24	07:04 19:37	07:33 18:06-18:26/20 18:49	07:07 17:11	07:37 08:09-08:33/24 17:01
15	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:05-18:25/20 18:47	07:08 17:10	07:38 08:10-08:34/24 17:02
16	06:10 20:52	06:37 20:21	07:06 19:34	07:35 18:04-18:23/19 18:46	07:09 17:10	07:39 08:11-08:35/24 17:02
17	06:11 20:51	06:38 20:20	07:07 19:32	07:36 18:03-18:22/19 18:44	07:11 17:09	07:39 08:10-08:35/25 17:02
18	06:11 20:51	06:39 20:18	07:08 19:30	07:37 18:03-18:20/17 18:43	07:12 17:08	07:40 08:11-08:36/25 17:03
19	06:12 20:50	06:40 20:17	07:09 19:29	07:38 18:03-18:18/15 18:42	07:13 17:07	07:41 08:11-08:35/24 17:03
20	06:13 20:49	06:41 20:15	07:10 19:27	07:39 18:03-18:17/14 18:40	07:14 17:07	07:41 08:12-08:36/24 17:03
21	06:14 20:48	06:42 20:14	07:11 19:25	07:40 18:04-18:16/12 18:39	07:15 17:06	07:42 08:12-08:36/24 17:04
22	06:15 20:48	06:43 20:13	07:12 19:24	07:41 18:04-18:15/11 18:37	07:16 17:06	07:42 08:13-08:37/24 17:04
23	06:16 20:47	06:44 20:11	07:13 19:22	07:43 18:05-18:13/8 18:36	07:17 17:05	07:43 08:13-08:37/24 17:05
24	06:16 20:46	06:45 20:10	07:14 19:20	07:44 18:05-18:12/7 18:35	07:18 17:04	07:43 08:14-08:38/24 17:05
25	06:17 20:45	06:46 20:08	07:15 19:19	06:45 17:07-17:10/3 17:33	07:19 17:04	07:44 08:14-08:38/24 17:06
26	06:18 20:45	06:47 20:07	07:15 19:17	06:46 17:32	07:20 17:03	07:44 08:14-08:39/25 17:07
27	06:19 20:44	06:48 20:05	07:16 19:16	06:47 17:31	07:22 17:03	07:44 08:16-08:40/24 17:07
28	06:20 20:43	06:49 20:04	07:17 19:14	06:48 17:29	07:23 17:03	07:45 08:16-08:40/24 17:08
29	06:21 20:42	06:49 20:02	07:18 19:12	06:49 17:28	07:24 17:02	07:45 08:16-08:40/24 17:09
30	06:22 20:41	06:50 19:26-19:36/10 20:01	07:19 19:11	06:50 17:27	07:25 17:02	07:45 08:17-08:40/23 17:09
31	06:22 20:40	06:51 19:24-19:37/13 19:59		06:51 17:26		07:46 08:18-08:41/23 17:10
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	0	23	97	206	0	665

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_2022_01_31WTG: SR05 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (58)

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	07:46 17:11	07:34 17:44	07:00 18:16	07:11 18:46-19:09/23 19:48	06:27 20:18	06:00 20:46
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 18:47-19:06/19 19:49	06:26 20:19	05:59 20:47
3	07:46 17:13	07:32 17:46	06:57 18:18	07:08 18:50-19:04/14 19:50	06:25 20:20	05:59 20:47
4	07:46 17:14	07:31 17:48	06:55 18:19	07:06 18:53-18:59/6 19:51	06:23 20:21	05:59 20:48
5	07:46 17:14	07:30 17:49	06:54 18:21	07:05 19:52	06:22 19:54-19:59/5 20:22	05:58 20:49
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 19:51-20:00/9 20:23	05:58 20:49
7	07:46 17:16	07:28 17:51	06:51 18:23	07:01 19:54	06:20 19:50-20:01/11 20:24	05:58 20:50
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 19:48-20:02/14 20:25	05:58 20:51
9	07:46 17:18	07:26 17:53	06:48 18:25	06:58 19:56	06:18 19:47-20:03/16 20:26	05:57 20:51
10	07:46 17:19	07:25 07:48-07:53/5 17:55	06:46 18:26	06:57 19:57	06:17 19:47-20:04/17 20:27	05:57 20:52
11	07:46 17:20	07:23 07:45-07:57/12 17:56	06:44 18:27	06:55 19:58	06:16 19:46-20:05/19 20:28	05:57 20:52
12	07:45 17:21	07:22 07:42-07:58/16 17:57	06:43 18:28	06:54 19:59	06:15 19:45-20:06/21 20:29	05:57 20:53
13	07:45 17:22	07:21 07:41-07:59/18 17:58	06:41 18:29	06:52 20:00	06:14 19:45-20:06/21 20:30	05:57 20:53
14	07:45 17:23	07:20 07:40-08:01/21 17:59	06:40 18:30	06:51 20:01	06:13 19:45-20:07/22 20:31	05:57 20:54
15	07:44 17:24	07:19 07:40-08:01/21 18:00	06:38 17:58-18:06/8 18:31	06:49 20:02	06:12 19:45-20:08/23 20:32	05:57 20:54
16	07:44 17:25	07:17 07:39-08:01/22 18:02	06:37 17:54-18:10/16 18:32	06:48 20:03	06:11 19:44-20:09/25 20:33	05:57 20:54
17	07:44 17:27	07:16 07:39-08:02/23 18:03	06:35 17:52-18:12/20 18:33	06:46 20:04	06:10 19:45-20:10/25 20:33	05:57 20:55
18	07:43 17:28	07:15 07:39-08:02/23 18:04	06:33 17:50-18:14/24 18:34	06:45 20:05	06:09 19:45-20:10/25 20:34	05:57 20:55
19	07:43 17:29	07:14 07:38-08:01/23 18:05	06:32 17:48-18:14/26 18:35	06:43 20:06	06:08 19:45-20:09/24 20:35	05:57 20:55
20	07:42 17:30	07:12 07:39-08:01/22 18:06	06:30 17:47-18:15/28 18:36	06:42 20:07	06:07 19:45-20:09/24 20:36	05:57 20:56
21	07:42 17:31	07:11 07:39-08:01/22 18:07	06:29 17:46-18:16/30 18:37	06:40 20:08	06:07 19:46-20:09/23 20:37	05:57 20:56
22	07:41 17:32	07:09 07:39-08:00/21 18:08	06:27 17:45-18:16/31 18:38	06:39 20:09	06:06 19:47-20:09/22 20:38	05:58 20:56
23	07:41 17:33	07:08 07:41-07:59/18 18:10	06:25 17:44-18:15/31 18:39	06:38 20:10	06:05 19:47-20:08/21 20:39	05:58 20:56
24	07:40 17:35	07:07 07:42-07:58/16 18:11	06:24 17:44-18:16/32 18:40	06:36 20:11	06:04 19:48-20:08/20 20:40	05:58 20:56
25	07:39 17:36	07:05 07:44-07:55/11 18:12	06:22 17:43-18:15/32 18:41	06:35 20:12	06:04 19:48-20:07/19 20:41	05:58 20:57
26	07:39 17:37	07:04 18:13	06:21 17:44-18:15/31 18:42	06:34 20:13	06:03 19:49-20:06/17 20:41	05:59 20:57
27	07:38 17:38	07:02 18:14	06:19 17:43-18:14/31 18:43	06:32 20:14	06:02 19:50-20:06/16 20:42	05:59 20:57
28	07:37 17:39	07:01 18:15	06:17 17:43-18:13/30 18:44	06:31 20:15	06:02 19:51-20:05/14 20:43	05:59 20:57
29	07:36 17:40		07:16 18:44-19:13/29 19:45	06:30 20:16	06:01 19:53-20:04/11 20:44	06:00 20:57
30	07:35 17:42		07:14 18:44-19:12/28 19:46	06:28 20:17	06:01 19:54-20:02/8 20:44	06:00 20:57
31	07:35 17:43		07:12 18:45-19:11/26 19:47		06:00 19:56-20:01/5 20:45	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	0	294	453	62	477	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_2022_01_31WTG: SR05 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (58)

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	06:01 20:57	06:23 19:56-20:16/20 20:39	06:52 19:58	07:20 19:09	06:52 07:18-07:21/3 17:24	07:26 17:02
2	06:01 20:57	06:24 19:57-20:15/18 20:38	06:53 19:56	07:21 19:07	06:54 17:23	07:27 17:01
3	06:02 20:56	06:25 19:57-20:14/17 20:37	06:54 19:55	07:22 19:06	06:55 17:22	07:28 17:01
4	06:02 20:56	06:26 19:57-20:12/15 20:36	06:55 19:53	07:23 19:04	06:56 17:21	07:29 17:01
5	06:03 20:56	06:27 19:58-20:11/13 20:35	06:56 19:51	07:24 19:03	06:57 17:20	07:30 17:01
6	06:03 20:56	06:28 20:00-20:10/10 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:31 17:01
7	06:04 20:56	06:29 20:01-20:09/8 20:32	06:58 19:48	07:26 19:00	06:59 17:18	07:31 17:01
8	06:04 20:55	06:30 20:05-20:08/3 20:31	06:59 18:49-18:53/4 19:47	07:27 18:58	07:00 17:17	07:32 17:01
9	06:05 20:55	06:31 20:30	07:00 18:44-18:58/14 19:45	07:28 18:56	07:01 17:16	07:33 17:01
10	06:06 20:55	06:32 20:29	07:01 18:40-18:59/19 19:43	07:29 18:55	07:03 17:15	07:34 17:01
11	06:06 20:54	06:33 20:27	07:01 18:38-19:01/23 19:42	07:30 18:53	07:04 17:14	07:35 17:01
12	06:07 20:54	06:34 20:26	07:02 18:37-19:02/25 19:40	07:31 18:52	07:05 17:13	07:36 17:01
13	06:08 20:04-20:11/7 20:53	06:34 20:25	07:03 18:35-19:03/28 19:38	07:32 18:50	07:06 17:12	07:36 17:01
14	06:08 20:01-20:12/11 20:53	06:35 20:24	07:04 18:34-19:03/29 19:37	07:33 18:49	07:07 17:11	07:37 17:01
15	06:09 20:01-20:13/12 20:52	06:36 20:22	07:05 18:33-19:03/30 19:35	07:34 18:47	07:08 17:10	07:38 17:02
16	06:10 20:00-20:15/15 20:52	06:37 20:21	07:06 18:33-19:04/31 19:34	07:35 08:18-08:25/7 18:46	07:09 17:10	07:39 17:02
17	06:11 19:59-20:15/16 20:51	06:38 20:20	07:07 18:32-19:04/32 19:32	07:36 08:14-08:27/13 18:44	07:11 17:09	07:39 17:02
18	06:11 19:58-20:16/18 20:50	06:39 20:18	07:08 18:31-19:04/33 19:30	07:37 08:12-08:29/17 18:43	07:12 17:08	07:40 17:03
19	06:12 19:58-20:17/19 20:50	06:40 20:17	07:09 18:30-19:02/32 19:29	07:38 08:11-08:30/19 18:42	07:13 17:07	07:41 17:03
20	06:13 19:57-20:18/21 20:49	06:41 20:15	07:10 18:30-19:02/32 19:27	07:39 08:11-08:32/21 18:40	07:14 17:07	07:41 17:03
21	06:14 19:57-20:19/22 20:48	06:42 20:14	07:11 18:30-19:01/31 19:25	07:40 08:10-08:32/22 18:39	07:15 17:06	07:42 17:04
22	06:15 19:56-20:18/22 20:48	06:43 20:13	07:12 18:30-19:00/30 19:24	07:41 08:09-08:32/23 18:37	07:16 17:06	07:42 17:04
23	06:15 19:56-20:19/23 20:47	06:44 20:11	07:13 18:31-18:59/28 19:22	07:43 08:09-08:32/23 18:36	07:17 17:05	07:43 17:05
24	06:16 19:56-20:20/24 20:46	06:45 20:10	07:14 18:31-18:58/27 19:20	07:44 08:08-08:32/24 18:35	07:18 17:04	07:43 17:05
25	06:17 19:56-20:20/24 20:45	06:46 20:08	07:15 18:32-18:57/25 19:19	06:45 07:08-07:31/23 17:33	07:19 17:04	07:44 17:06
26	06:18 19:56-20:20/24 20:44	06:47 20:07	07:15 18:33-18:55/22 19:17	06:46 07:08-07:31/23 17:32	07:20 17:03	07:44 17:07
27	06:19 19:55-20:20/25 20:44	06:48 20:05	07:16 18:35-18:53/18 19:16	06:47 07:10-07:31/21 17:31	07:22 17:03	07:44 17:07
28	06:20 19:55-20:19/24 20:43	06:49 20:04	07:17 18:38-18:49/11 19:14	06:48 07:10-07:30/20 17:29	07:23 17:03	07:45 17:08
29	06:21 19:55-20:18/23 20:42	06:49 20:02	07:18 19:12	06:49 07:11-07:29/18 17:28	07:24 17:02	07:45 17:09
30	06:22 19:55-20:17/22 20:41	06:50 20:01	07:19 19:11	06:50 07:12-07:27/15 17:27	07:25 17:02	07:45 17:09
31	06:22 19:56-20:17/21 20:40	06:51 19:59		06:51 07:14-07:25/11 17:26		07:45 17:10
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	373	104	524	300	3	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_Serras_Sardara_Asja

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:

24/02/2023 13:00/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR06 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (63)

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	07:46	07:34	07:00	07:11	06:27	19:46-19:56/10	06:00	06:01	06:23	06:52	07:20	06:52	07:26		
	17:11	17:44	18:16	19:48	20:18		20:46	20:57	20:39	19:58	19:09	17:24	17:02		
2	07:46	07:33	06:58	07:09	06:26	19:46-19:57/11	05:59	06:01	06:24	06:53	07:21	06:53	07:27		
	17:12	17:45	18:17	19:49	20:19		20:47	20:56	20:38	19:56	19:07	17:23	17:01		
3	07:46	07:32	06:57	07:08	06:25	19:45-19:57/12	05:59	06:02	06:25	20:02-20:10/8	06:54	07:22	06:55	07:28	
	17:13	17:46	18:18	19:50	20:20		20:47	20:56	20:37	19:54	19:06	17:22	17:01		
4	07:46	07:31	06:55	07:06	06:23	19:45-19:58/13	05:59	06:02	06:26	19:59-20:11/12	06:55	07:23	06:56	07:29	
	17:14	17:48	18:19	19:51	20:21		20:48	20:56	20:36	19:53	19:04	17:21	17:01		
5	07:46	07:30	06:54	07:05	06:22	19:46-19:59/13	05:58	06:03	06:27	19:58-20:11/13	06:56	07:24	06:57	07:29	
	17:14	17:49	18:21	19:52	20:22		20:49	20:56	20:34	19:51	19:03	17:20	17:01		
6	07:46	07:29	06:52	07:03	06:21	19:47-20:00/13	05:58	06:03	06:28	19:57-20:10/13	06:57	07:25	06:58	07:30	
	17:15	17:50	18:22	19:53	20:23		20:49	20:56	20:33	19:50	19:01	17:19	17:01		
7	07:46	07:28	06:51	07:01	06:20	19:47-20:01/14	05:58	06:04	06:29	19:56-20:09/13	06:58	07:26	06:59	07:31	
	17:16	17:51	18:23	19:54	20:24		20:50	20:55	20:32	19:48	19:00	17:18	17:01		
8	07:46	07:27	06:49	07:00	06:19	19:49-20:02/13	05:58	06:04	06:30	19:55-20:08/13	06:59	07:27	07:00	07:32	
	17:17	17:52	18:24	19:55	20:25		20:50	20:55	20:31	19:47	18:58	17:17	17:01		
9	07:46	07:26	06:47	06:58	06:18	19:50-20:01/11	05:57	06:05	06:31	19:55-20:07/12	07:00	07:28	07:01	07:33	
	17:18	17:53	18:25	19:56	20:26		20:51	20:55	20:30	19:45	18:56	17:16	17:01		
10	07:46	07:24	06:46	06:57	06:17	19:53-19:58/5	05:57	06:06	06:32	19:55-20:06/11	07:01	07:29	07:02	07:34	
	17:19	17:55	18:26	19:57	20:27		20:52	20:54	20:29	19:43	18:55	17:15	17:01		
11	07:45	07:23	06:44	06:55	06:16		05:57	06:06	06:33	19:54-20:05/11	07:01	07:30	07:04	07:35	
	17:20	17:56	18:27	19:58	20:28		20:52	20:54	20:27	19:42	18:53	17:14	17:01		
12	07:45	07:22	06:43	06:54	06:15		05:57	06:07	06:34	19:54-20:04/10	07:02	07:31	07:05	07:36	
	17:21	17:57	18:28	19:59	20:29		20:53	20:54	20:26	19:40	18:52	17:13	17:01		
13	07:45	07:21	06:41	06:52	06:14		05:57	20:27-20:28/1	06:08	06:34	19:53-20:02/9	07:03	07:32	07:06	07:36
	17:22	17:58	18:29	20:00	20:30		20:53	20:53	20:25	19:38	18:50	17:12	17:01		
14	07:45	07:20	06:40	06:51	06:13		05:57	20:27-20:28/1	06:08	06:35	19:54-20:01/7	07:04	07:33	07:07	07:37
	17:23	17:59	18:30	20:01	20:31		20:53	20:53	20:24	19:37	18:49	17:11	17:01		
15	07:44	07:19	06:38	06:49	06:12		05:57	20:27-20:29/2	06:09	06:36	19:54-20:00/6	07:05	07:34	07:08	07:38
	17:24	18:00	18:31	20:02	20:32		20:54	20:52	20:22	19:35	18:47	17:10	17:02		
16	07:44	07:17	06:36	06:48	06:11		05:57	20:27-20:29/2	06:10	06:37	19:54-19:58/4	07:06	07:35	07:09	07:39
	17:26	18:02	18:32	20:03	20:32		20:54	20:52	20:21	19:34	18:46	17:10	17:02		
17	07:44	07:16	06:35	06:46	06:10		05:57	20:27-20:29/2	06:11	06:38	19:55-19:57/2	07:07	07:36	07:10	07:39
	17:27	18:03	18:33	20:04	20:33		20:55	20:51	20:20	19:32	18:44	17:09	17:02		
18	07:43	07:15	06:33	06:45	06:09		05:57	20:28-20:30/2	06:11	06:39	07:08	07:37	07:12	07:40	
	17:28	18:04	18:34	20:05	20:34		20:55	20:50	20:18	19:30	18:43	17:08	17:03		
19	07:43	07:13	06:32	06:43	06:08		05:57	20:28-20:31/3	06:12	06:40	07:09	07:38	07:13	07:40	
	17:29	18:05	18:35	20:06	20:35		20:55	20:50	20:17	19:29	18:41	17:07	17:03		
20	07:42	07:12	06:30	06:42	06:07		05:57	20:28-20:31/3	06:13	06:41	07:10	07:39	07:14	07:41	
	17:30	18:06	18:36	20:07	20:36		20:56	20:49	20:15	19:27	18:40	17:07	17:03		
21	07:42	07:11	06:29	06:40	06:07		05:57	20:28-20:31/3	06:14	06:42	07:11	07:40	07:15	07:42	
	17:31	18:07	18:37	20:08	20:37		20:56	20:48	20:14	19:25	18:39	17:06	17:04		
22	07:41	07:09	06:27	06:39	06:06		05:58	20:28-20:31/3	06:15	06:43	07:12	07:41	07:16	07:42	
	17:32	18:08	18:38	20:09	20:38		20:56	20:48	20:13	19:24	18:37	17:06	17:04		
23	07:40	07:08	06:25	06:38	06:05		05:58	20:29-20:32/3	06:16	06:44	07:13	07:42	07:17	07:43	
	17:33	18:10	18:39	20:10	20:39		20:56	20:47	20:11	19:22	18:36	17:05	17:05		
24	07:40	07:07	06:24	06:36	06:04		05:58	20:29-20:32/3	06:16	06:45	07:14	07:44	07:18	07:43	
	17:35	18:11	18:40	20:11	20:40		20:56	20:46	20:10	19:20	18:35	17:04	17:05		
25	07:39	07:05	06:22	06:35	06:04		05:58	20:29-20:31/2	06:17	06:46	07:14	06:45	07:19	07:44	
	17:36	18:12	18:41	20:12	20:40		20:56	20:45	20:08	19:19	17:33	17:04	17:06		
26	07:38	07:04	06:20	06:34	19:48-19:51/3	06:03	05:59	20:29-20:31/2	06:18	06:47	07:15	06:46	07:20	07:44	
	17:37	18:13	18:42	20:13	20:41		20:57	20:44	20:07	19:17	17:32	17:03	17:07		
27	07:38	07:02	06:19	06:32	19:48-19:52/4	06:02	05:59	20:30-20:32/2	06:19	06:48	07:16	06:47	07:21	07:44	
	17:38	18:14	18:43	20:14	20:42		20:57	20:44	20:05	19:16	17:31	17:03	17:07		
28	07:37	07:01	06:17	06:31	19:47-19:53/6	06:02	05:59	20:30-20:31/1	06:20	06:49	07:17	06:48	07:22	07:45	
	17:39	18:15	18:44	20:15	20:43		20:57	20:43	20:04	19:14	17:29	17:03	17:08		
29	07:36		07:16	06:30	19:46-19:53/7	06:01	06:00	20:31-20:32/1	06:21	06:49	07:18	06:49	07:24	07:45	
	17:40		19:45	20:16	20:44		20:57	20:42	20:02	19:12	17:28	17:02	17:09		
30	07:35		07:14	06:28	19:46-19:54/8	06:01	06:00	06:22	06:50	07:19	06:50	07:25	07:45		
	17:42		19:46	20:17	20:44		20:57	20:41	20:01	19:11	17:27	17:02	17:09		
31	07:35		07:12		06:00			06:22	06:51		06:51		07:45		
	17:43		19:47		20:45			20:40	19:59		17:26		17:10		
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292	0		
Sum of minutes with flicker	0	0	0	28	115	36	0	144	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_2022_01_31WTG: SR07 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (62)

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	07:46 17:11	07:34 17:44	07:00 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:57	06:23 20:39	06:52 19:58	07:20 19:09	06:52 17:24	07:26 17:02
2	07:46 17:12	07:33 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:47	06:01 20:56	06:24 20:38	06:53 19:56	07:21 19:07	06:53 17:23	07:27 17:01
3	07:46 17:13	07:32 17:46	06:57 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:54	07:22 19:06	06:55 17:22	07:28 17:01
4	07:46 17:14	07:31 17:48	06:55 18:19	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:36	06:55 19:53	07:23 19:04	06:56 17:21	07:29 17:01
5	07:46 17:14	07:30 17:49	06:54 18:21	07:05 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:34	06:56 19:51	07:24 19:03	06:57 17:20	07:29 17:01
6	07:46 17:15	07:29 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 17:19	07:30 17:01
7	07:46 17:16	07:28 17:51	06:51 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:55	06:29 20:32	06:58 19:48	07:26 19:00	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:58 20:50	06:04 20:55	06:30 20:31	06:59 19:47	07:27 18:58	07:00 17:17	07:32 17:01
9	07:46 17:18	07:26 17:53	06:47 18:25	06:58 19:56	06:18 20:26	05:57 20:51	06:05 20:55	06:31 20:30	07:00 19:45	07:00 18:56	07:01 17:16	07:33 17:01
10	07:46 17:19	07:24 17:55	06:46 18:26	06:57 19:57	06:17 20:27	05:57 20:52	06:06 20:54	06:32 20:29	07:01 19:43	07:29 18:55	07:02 17:15	07:34 17:01
11	07:45 17:20	07:23 17:56	06:44 18:27	06:55 19:58	06:16 20:28	05:57 20:52	06:06 20:54	06:33 20:27	07:01 19:42	07:30 18:53	07:04 17:14	07:35 17:01
12	07:45 17:21	07:22 17:57	06:43 18:28	06:54 19:59	06:15 20:29	05:57 20:53	06:07 20:54	06:34 20:26	07:02 19:40	07:31 18:52	07:05 17:13	07:36 17:01
13	07:45 17:22	07:21 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:34 20:25	07:03 19:38	07:32 18:50	07:06 17:12	07:36 17:01
14	07:45 17:23	07:20 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:53	06:08 20:53	06:35 20:24	07:04 19:37	07:33 18:49	07:07 17:11	07:37 17:01
15	07:44 17:24	07:19 18:00	06:38 18:31	06:49 20:02	06:12 20:32	05:57 20:54	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:47	07:08 17:10	07:38 17:02
16	07:44 17:25	07:17 18:02	06:36 18:32	06:48 20:03	06:11 20:32	05:57 20:54	06:10 20:52	06:37 20:21	07:06 19:34	07:35 18:46	07:09 17:10	07:39 17:02
17	07:44 17:27	07:16 18:03	06:35 18:33	06:46 20:04	06:10 20:33	05:57 20:55	06:11 20:51	06:38 20:20	07:07 19:32	07:36 18:44	07:10 17:09	07:39 17:02
18	07:43 17:28	07:15 18:04	06:33 18:34	06:45 20:05	06:09 20:34	05:57 20:55	06:11 20:50	06:39 20:18	07:08 19:30	07:37 18:43	07:12 17:08	07:40 17:03
19	07:43 17:29	07:13 18:05	06:32 18:35	06:43 20:06	06:08 20:35	05:57 20:55	06:12 20:50	06:40 20:17	07:09 19:29	07:38 18:41	07:13 17:07	07:40 17:03
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:56	06:13 20:49	06:41 20:15	07:10 19:27	07:39 18:40	07:14 17:07	07:41 17:03
21	07:42 17:31	07:11 18:07	06:28 18:37	06:40 20:08	06:07 20:37	05:57 20:56	06:14 20:48	06:42 20:14	07:11 19:25	07:40 18:39	07:15 17:06	07:42 17:04
22	07:41 17:32	07:09 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:56	06:15 20:48	06:43 20:13	07:12 19:24	07:41 18:37	07:16 17:06	07:42 17:04
23	07:40 17:33	07:08 18:10	06:25 18:39	06:38 20:10	06:05 20:39	05:58 20:56	06:15 20:47	06:44 20:11	07:13 19:22	07:42 18:36	07:17 17:05	07:43 17:05
24	07:40 17:35	07:07 18:11	06:24 18:40	06:36 20:11	06:04 20:40	05:58 20:56	06:16 20:46	06:45 20:10	07:14 19:20	07:44 18:35	07:18 17:04	07:43 17:05
25	07:39 17:36	07:05 18:12	06:22 18:41	06:35 20:12	06:04 20:40	05:58 20:56	06:17 20:45	06:46 20:08	07:14 19:19	07:45 17:33	07:19 17:04	07:44 17:06
26	07:38 17:37	07:04 18:13	06:20 18:42	06:34 20:13	06:03 20:41	05:59 20:57	06:18 20:44	06:47 20:07	07:15 19:17	07:46 17:32	07:20 17:03	07:44 17:06
27	07:38 17:38	07:02 18:14	06:19 18:43	06:32 20:14	06:02 20:42	05:59 20:57	06:19 20:44	06:48 20:05	07:16 19:16	07:47 17:31	07:21 17:03	07:44 17:07
28	07:37 17:39	07:01 18:15	06:17 18:44	06:31 20:15	06:02 20:43	05:59 20:57	06:20 20:43	06:48 20:14	07:17 19:14	07:48 17:29	07:22 17:03	07:45 17:08
29	07:36 17:40	07:05 18:16	06:22 19:45	06:35 20:16	06:04 20:44	05:58 20:57	06:17 20:42	06:46 20:02	07:14 19:12	07:45 17:28	07:19 17:02	07:44 17:09
30	07:35 17:42	07:07 19:46	06:28 19:46	06:01 20:17	06:00 20:44	06:00 20:57	06:21 20:41	06:49 20:01	07:18 19:11	07:49 17:27	07:24 17:02	07:45 17:09
31	07:34 17:43	07:08 19:47	06:29 19:47	06:02 20:18	06:01 20:45	06:01 20:58	06:22 20:40	06:51 19:59	07:19 17:26	07:50 17:26	07:25 17:02	07:45 17:10
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_2022_01_31WTG: SR08 - Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (61)

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	07:46 13:14-15:23/129 17:11	07:34 13:42-15:23/101 17:44	06:59 18:16	07:11 19:48	06:27 20:18	06:00 20:46
2	07:46 13:15-15:24/129 17:12	07:33 13:44-15:22/98 17:45	06:58 18:17	07:09 19:49	06:26 20:19	05:59 20:47
3	07:46 13:16-15:25/129 17:13	07:32 13:46-15:21/95 17:46	06:57 18:18	07:08 19:50	06:25 20:20	05:59 20:47
4	07:46 13:16-15:25/129 17:14	07:31 13:48-15:20/92 17:47	06:55 18:19	07:06 19:51	06:23 20:21	05:59 20:48
5	07:46 13:17-15:25/128 17:14	07:30 13:50-15:19/89 17:49	06:54 18:20	07:05 19:52	06:22 20:22	05:58 20:49
6	07:46 13:17-15:25/128 17:15	07:29 13:52-15:18/86 17:50	06:52 18:22	07:03 19:53	06:21 20:23	05:58 20:49
7	07:46 13:17-15:25/128 17:16	07:28 13:54-15:17/83 17:51	06:51 18:23	07:01 19:54	06:20 20:24	05:58 20:13-20:21/8
8	07:46 13:18-15:25/127 17:17	07:27 13:57-15:16/79 17:52	06:49 18:24	07:00 19:55	06:19 20:25	05:57 20:13-20:22/9
9	07:46 13:19-15:26/127 17:18	07:26 14:00-15:15/75 17:53	06:47 18:25	06:58 19:56	06:18 20:26	05:57 20:12-20:23/11
10	07:46 13:20-15:26/126 17:19	07:24 14:02-15:13/71 17:55	06:46 18:26	06:57 19:57	06:17 20:27	05:57 20:11-20:23/12
11	07:45 13:20-15:26/126 17:20	07:23 14:05-15:11/66 17:56	06:44 18:27	06:55 19:58	06:16 20:28	05:57 20:11-20:24/13
12	07:45 13:21-15:26/125 17:21	07:22 14:08-15:09/61 17:57	06:43 18:28	06:54 19:59	06:15 20:29	05:57 20:11-20:25/14
13	07:45 13:22-15:27/125 17:22	07:21 14:12-15:06/54 17:58	06:41 18:29	06:52 20:00	06:14 20:30	05:57 20:11-20:25/14
14	07:45 13:22-15:26/124 17:23	07:20 14:17-15:04/47 17:59	06:40 18:30	06:51 20:01	06:13 20:31	05:57 20:10-20:26/16
15	07:44 13:23-15:27/124 17:24	07:19 14:22-15:01/39 18:00	06:38 18:31	06:49 20:02	06:12 20:32	05:57 20:10-20:26/16
16	07:44 13:25-15:27/122 17:25	07:17 14:27-14:55/28 18:02	06:36 18:32	06:48 20:03	06:11 20:32	05:57 20:10-20:26/16
17	07:44 13:25-15:27/122 17:27	07:16 14:38-14:46/8 18:03	06:35 18:33	06:46 20:04	06:10 20:33	05:57 20:10-20:27/17
18	07:43 13:26-15:27/121 17:28	07:15 18:04 18:04	06:33 18:34	06:45 20:05	06:09 20:34	05:57 20:11-20:28/17
19	07:43 13:27-15:27/120 17:29	07:13 18:05 18:05	06:32 18:35	06:43 20:06	06:08 20:35	05:57 20:11-20:28/17
20	07:42 13:27-15:26/119 17:30	07:12 18:06 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:11-20:28/17
21	07:42 13:29-15:27/118 17:31	07:11 18:07 18:07	06:28 18:37	06:40 20:08	06:06 20:37	05:57 20:11-20:28/17
22	07:41 13:29-15:27/118 17:32	07:09 18:08 18:08	06:27 18:38	06:39 20:09	06:06 20:38	05:58 20:11-20:28/17
23	07:40 13:31-15:27/116 17:33	07:08 18:10 18:10	06:25 18:39	06:38 20:10	06:05 20:39	05:58 20:12-20:29/17
24	07:40 13:32-15:26/114 17:34	07:07 18:11 18:11	06:24 18:40	06:36 20:11	06:04 20:40	05:58 20:12-20:29/17
25	07:39 13:33-15:26/113 17:36	07:05 18:12 18:12	06:22 18:41	06:35 20:12	06:04 20:40	05:58 20:12-20:29/17
26	07:38 13:34-15:25/111 17:37	07:04 18:13 18:13	06:20 18:42	06:34 20:13	06:03 20:41	05:59 20:12-20:29/17
27	07:38 13:36-15:26/110 17:38	07:02 18:14 18:14	06:19 18:43	06:32 20:14	06:02 20:42	05:59 20:13-20:29/16
28	07:37 13:37-15:25/108 17:39	07:01 18:15 18:15	06:17 18:44	06:31 20:15	06:02 20:43	05:59 20:13-20:29/16
29	07:36 13:38-15:25/107 17:40		07:16 19:45	06:30 20:16	06:01 20:44	06:00 20:15-20:29/14
30	07:35 13:39-15:24/105 17:42		07:14 19:46	06:28 20:17	06:01 20:44	06:00 20:15-20:29/14
31	07:34 13:41-15:23/102 17:43		07:12 19:47		06:00 20:45	
Potential sun hours	301	299	370	397	445	448
Sum of minutes with flicker	3730	1172	0	0	0	364

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_2022_01_31WTG: SR08 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (61)

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	06:01 20:15-20:28/13 20:57	06:23 20:39	06:52 19:58	07:20 19:09	06:52 13:31-14:42/71 17:24	07:26 13:02-15:08/126 17:02
2	06:01 20:16-20:29/13 20:56	06:24 20:38	06:53 19:56	07:21 19:07	06:53 13:28-14:44/76 17:23	07:27 13:03-15:09/126 17:01
3	06:02 20:16-20:28/12 20:56	06:25 20:37	06:54 19:54	07:22 19:06	06:55 13:26-14:46/80 17:22	07:28 13:03-15:10/127 17:01
4	06:02 20:17-20:28/11 20:56	06:26 20:36	06:55 19:53	07:23 19:04	06:56 13:24-14:47/83 17:21	07:29 13:02-15:10/128 17:01
5	06:03 20:19-20:28/9 20:56	06:27 20:34	06:56 19:51	07:24 19:03	06:57 13:21-14:48/87 17:20	07:29 13:02-15:10/128 17:01
6	06:03 20:20-20:26/6 20:56	06:28 20:33	06:57 19:50	07:25 19:01	06:58 13:19-14:49/90 17:19	07:30 13:03-15:11/128 17:01
7	06:04 20:23-20:24/1 20:55	06:29 20:32	06:58 19:48	07:26 18:59	06:59 13:18-14:51/93 17:18	07:31 13:03-15:11/128 17:01
8	06:04 20:55	06:30 20:31	06:59 19:47	07:27 18:58	07:00 13:16-14:52/96 17:17	07:32 13:03-15:12/129 17:01
9	06:05 20:55	06:31 20:30	07:00 19:45	07:28 18:56	07:01 13:15-14:53/98 17:16	07:33 13:04-15:13/129 17:01
10	06:06 20:54	06:32 20:29	07:01 19:43	07:29 18:55	07:02 13:13-14:54/101 17:15	07:34 13:04-15:13/129 17:01
11	06:06 20:54	06:33 20:27	07:01 19:42	07:30 18:53	07:04 13:12-14:54/102 17:14	07:35 13:05-15:14/129 17:01
12	06:07 20:54	06:33 20:26	07:02 19:40	07:31 18:52	07:05 13:11-14:56/105 17:13	07:36 13:05-15:15/130 17:01
13	06:08 20:53	06:34 20:25	07:03 19:38	07:32 18:50	07:06 13:10-14:57/107 17:12	07:36 13:05-15:14/129 17:01
14	06:08 20:53	06:35 20:24	07:04 19:37	07:33 18:49	07:07 13:09-14:57/108 17:11	07:37 13:05-15:15/130 17:01
15	06:09 20:52	06:36 20:22	07:05 19:35	07:34 18:47	07:08 13:08-14:58/110 17:10	07:38 13:06-15:16/130 17:02
16	06:10 20:52	06:37 20:21	07:06 19:34	07:35 18:46	07:09 13:07-14:58/111 17:10	07:39 13:06-15:16/130 17:02
17	06:11 20:51	06:38 20:20	07:07 19:32	07:36 18:44	07:10 13:07-15:00/113 17:09	07:39 13:07-15:17/130 17:02
18	06:11 20:50	06:39 20:18	07:08 19:30	07:37 18:43	07:12 13:06-15:00/114 17:08	07:40 13:07-15:17/130 17:02
19	06:12 20:50	06:40 20:17	07:09 19:29	07:38 18:41	07:13 13:05-15:01/116 17:07	07:40 13:07-15:17/130 17:03
20	06:13 20:49	06:41 20:15	07:10 19:27	07:39 18:40	07:14 13:04-15:02/118 17:07	07:41 13:08-15:18/130 17:03
21	06:14 20:48	06:42 20:14	07:11 19:25	07:40 18:39	07:15 13:04-15:02/118 17:06	07:42 13:08-15:18/130 17:04
22	06:15 20:48	06:43 20:13	07:12 19:24	07:41 18:37	07:16 13:04-15:03/119 17:05	07:42 13:09-15:19/130 17:04
23	06:15 20:47	06:44 20:11	07:13 19:22	07:42 18:36	07:17 13:04-15:04/120 17:05	07:43 13:09-15:19/130 17:05
24	06:16 20:46	06:45 20:10	07:13 19:20	07:44 18:35	07:18 13:03-15:04/121 17:04	07:43 13:10-15:20/130 17:05
25	06:17 20:45	06:46 20:08	07:14 19:19	06:45 14:04-14:19/15 17:33	07:19 13:03-15:05/122 17:04	07:44 13:10-15:20/130 17:06
26	06:18 20:44	06:47 20:07	07:15 19:17	06:46 13:55-14:26/31 17:32	07:20 13:03-15:05/122 17:03	07:44 13:11-15:21/130 17:06
27	06:19 20:44	06:48 20:05	07:16 19:15	06:47 13:49-14:30/41 17:31	07:21 13:02-15:06/124 17:03	07:44 13:12-15:22/130 17:07
28	06:20 20:43	06:48 20:04	07:17 19:14	06:48 13:45-14:34/49 17:29	07:22 13:02-15:06/124 17:03	07:45 13:12-15:22/130 17:08
29	06:21 20:42	06:49 20:02	07:18 19:12	06:49 13:41-14:37/56 17:28	07:24 13:02-15:07/125 17:02	07:45 13:12-15:22/130 17:08
30	06:22 20:41	06:50 20:01	07:19 19:11	06:50 13:37-14:39/62 17:27	07:25 13:02-15:07/125 17:02	07:45 13:13-15:22/129 17:09
31	06:22 20:40	06:51 19:59		06:51 13:34-14:41/67 17:26		07:45 13:13-15:23/130 17:10
Potential sun hours	455	425	374	347	301	292
Sum of minutes with flicker	65	0	0	321	3199	4005

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_Serras_Sardara_Asja

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:

24/02/2023 13:00/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_2022_01_31WTG: SR09 - Siemens Gamesa SG 6.2-170 6200 170.0 !0! hub: 135,0 m (TOT: 220,0 m) (64)

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	07:46 17:11	07:34 17:44	06:59 16:58-17:34/36 18:16	07:11 19:48	06:27 20:18	06:00 20:46	06:01 20:56	06:23 20:39	06:52 19:58	07:20 17:37-18:11/34 19:09	06:52 17:24	07:26 17:02
2	07:46 17:12	07:33 17:45	06:58 16:58-17:35/37 18:17	07:09 19:49	06:26 20:19	05:59 20:47	06:01 20:56	06:24 20:38	06:53 19:56	07:21 17:35-18:11/36 19:07	06:53 17:23	07:27 17:01
3	07:46 17:13	07:32 17:46	06:56 16:57-17:35/38 18:18	07:08 19:50	06:25 20:20	05:59 20:47	06:02 20:56	06:25 20:37	06:54 19:54	07:22 17:34-18:12/38 19:06	06:55 17:22	07:27 17:01
4	07:46 17:14	07:31 17:47	06:55 16:56-17:35/39 18:19	07:06 19:51	06:23 20:21	05:59 20:48	06:02 20:56	06:26 20:36	06:55 19:53	07:23 17:34-18:12/38 19:04	06:56 17:21	07:28 17:01
5	07:46 17:14	07:30 17:49	06:54 16:56-17:35/39 18:20	07:04 19:52	06:22 20:22	05:58 20:49	06:03 20:56	06:27 20:34	06:56 19:51	07:24 17:33-18:12/39 19:03	06:57 17:20	07:29 17:01
6	07:46 17:15	07:29 17:50	06:52 16:55-17:35/40 18:22	07:03 19:53	06:21 20:23	05:58 20:49	06:03 20:56	06:28 20:33	06:57 19:50	07:25 17:32-18-11/39 19:01	06:58 17:19	07:30 17:01
7	07:46 17:16	07:28 17:51	06:50 16:56-17:35/39 18:23	07:01 19:54	06:20 20:24	05:58 20:50	06:04 20:55	06:29 20:32	06:58 19:48	07:26 17:32-18-11/39 18:59	06:59 17:18	07:31 17:01
8	07:46 17:17	07:27 17:52	06:49 16:55-17:34/39 18:24	07:00 19:55	06:19 20:25	05:57 20:50	06:04 20:55	06:30 20:31	06:59 19:46	07:27 17:32-18-11/39 18:58	07:00 17:17	07:32 17:01
9	07:46 17:18	07:26 17:53	06:47 16:56-17:34/38 18:25	06:58 19:56	06:18 20:26	05:57 20:51	06:05 20:55	06:31 20:30	07:00 19:45	07:28 17:32-18:10/38 18:56	07:01 17:16	07:33 17:01
10	07:46 17:19	07:24 17:55	06:46 16:56-17:33/37 18:26	06:57 19:57	06:17 20:27	05:57 20:51	06:06 20:54	06:32 20:29	07:00 19:43	07:29 17:31-18:10/39 18:55	07:02 17:15	07:34 17:01
11	07:45 17:20	07:23 17:56	06:44 16:57-17:33/36 18:27	06:55 19:58	06:16 20:28	05:57 20:52	06:06 20:54	06:33 20:27	07:01 19:42	07:30 17:32-18:09/37 18:53	07:04 17:14	07:35 17:01
12	07:45 17:21	07:22 17:57	06:43 16:57-17:32/35 18:28	06:54 19:59	06:15 20:29	05:57 20:52	06:07 20:54	06:33 20:26	07:02 19:40	07:31 17:32-18:08/36 18:52	07:05 17:13	07:36 17:01
13	07:45 17:22	07:21 17:58	06:41 16:57-17:30/33 18:29	06:52 20:00	06:14 20:30	05:57 20:53	06:08 20:53	06:34 20:25	07:03 19:38	07:32 17:32-18:07/35 18:50	07:06 17:12	07:36 17:01
14	07:45 17:23	07:20 17:59	06:40 16:58-17:29/31 18:30	06:51 20:01	06:13 20:31	05:57 20:53	06:08 20:53	06:35 20:23	07:04 19:37	07:33 17:33-18:06/33 18:49	07:07 17:11	07:37 17:01
15	07:44 17:24	07:18 18:00	06:38 16:59-17:27/28 18:31	06:49 20:02	06:12 20:31	05:57 20:54	06:09 20:52	06:36 20:22	07:05 19:35	07:34 17:34-18:05/31 18:47	07:08 17:10	07:38 17:02
16	07:44 17:25	07:17 18:02	06:36 17:01-17:26/25 18:32	06:48 20:03	06:11 20:32	05:57 20:54	06:10 20:52	06:37 20:21	07:06 19:33	07:35 17:35-18:03/28 18:46	07:09 17:10	07:38 17:02
17	07:44 17:27	07:16 18:03	06:35 17:03-17:23/20 18:33	06:46 20:04	06:10 20:33	05:57 20:55	06:11 20:51	06:38 20:19	07:07 19:32	07:36 17:36-18:01/25 18:44	07:10 17:09	07:39 17:02
18	07:43 17:28	07:15 18:04	06:33 17:05-17:20/15 18:34	06:45 20:05	06:09 20:34	05:57 20:55	06:11 20:50	06:39 20:18	07:08 19:30	07:37 17:38-17:59/21 18:43	07:11 17:08	07:40 17:02
19	07:43 17:29	07:13 18:05	06:32 17:12-17:13/1 18:35	06:43 20:06	06:08 20:35	05:57 20:55	06:12 20:50	06:40 20:17	07:09 19:29	07:38 17:40-17:56/16 18:41	07:13 17:07	07:40 17:03
20	07:42 17:30	07:12 18:06	06:30 18:36	06:42 20:07	06:07 20:36	05:57 20:55	06:13 20:49	06:41 20:15	07:10 19:27	07:39 17:45-17:50/5 18:40	07:14 17:07	07:41 17:03
21	07:42 17:31	07:11 18:07	06:28 18:37	06:40 20:08	06:06 20:37	05:57 20:56	06:14 20:48	06:42 20:14	07:11 19:25	07:40 18:39	07:15 17:06	07:42 17:04
22	07:41 17:32	07:09 18:08	17:12-17:22/10 18:38	06:27 20:09	06:39 20:38	06:06 20:56	06:15 20:48	06:43 20:13	07:12 19:24	07:41 18:37	07:16 17:05	07:42 17:04
23	07:40 17:33	07:08 18:10	17:08-17:26/18 18:39	06:25 20:10	06:38 20:39	06:05 20:56	06:15 20:47	06:44 20:11	07:13 19:22	07:42 18:36	07:17 17:05	07:43 17:05
24	07:40 17:34	07:07 18:11	17:05-17:28/23 18:40	06:24 20:11	06:36 20:40	06:04 20:56	06:16 20:46	06:45 20:10	07:13 19:20	07:43 18:34	07:18 17:04	07:43 17:05
25	07:39 17:36	07:05 18:12	17:04-17:30/26 18:41	06:22 20:12	06:35 20:40	06:04 20:56	06:17 20:45	06:46 20:08	07:14 19:19	17:50-18:02/12 17:33	06:45 17:04	07:43 17:06
26	07:38 17:37	07:04 18:13	17:02-17:31/29 18:42	06:20 20:13	06:34 20:41	06:03 20:56	06:18 20:44	06:47 20:07	07:15 19:17	17:46-18:05/19 17:32	06:46 17:03	07:44 17:06
27	07:38 17:38	07:02 18:14	17:01-17:32/31 18:43	06:19 20:14	06:32 20:42	06:02 20:57	06:19 20:43	06:48 20:05	07:16 19:15	17:43-18:07/24 17:31	06:47 17:03	07:44 17:07
28	07:37 17:39	07:01 18:15	16:59-17:33/34 18:44	06:17 20:15	06:31 20:43	06:02 20:57	06:20 20:43	06:48 20:04	07:17 19:14	17:41-18:08/27 17:29	06:48 17:03	07:45 17:08
29	07:36 17:40	07:16 19:45	07:16 19:45	06:30 20:16	06:01 20:44	06:00 20:57	06:21 20:42	06:49 20:02	07:18 19:12	17:39-18:09/30 17:28	06:49 17:02	07:45 17:08
30	07:35 17:42	07:14 19:46	07:14 19:46	06:28 20:17	06:01 20:44	06:00 20:57	06:22 20:41	06:50 20:01	07:19 19:11	17:38-18:10/32 17:27	06:50 17:02	07:45 17:09
31	07:34 17:43	07:12 19:47	07:12 19:47	06:27 20:15	06:00 20:45	06:00 20:57	06:22 20:40	06:51 19:59	07:19 19:11	17:38-18:10/32 17:26	06:51 17:02	07:45 17:10
Potential sun hours	301	299	370	397	445	448	455	425	374	347	301	292
Sum of minutes with flicker	0	171	606	0	0	0	0	0	144	646	0	0

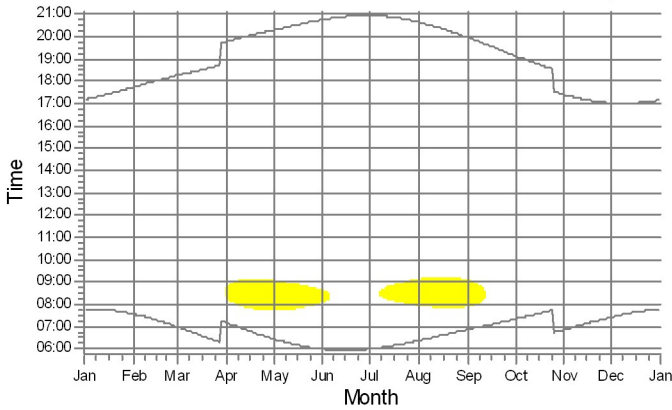
Table layout: For each day in each month the following matrix apply

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

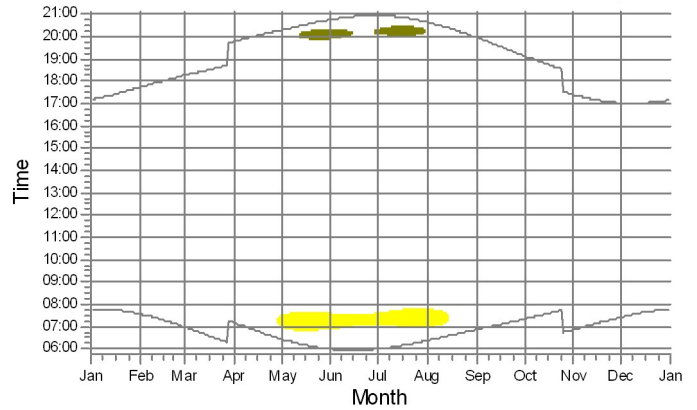
SHADOW - Calendar per WTG, graphical

Calculation: Progetto_layout_2022_01_31

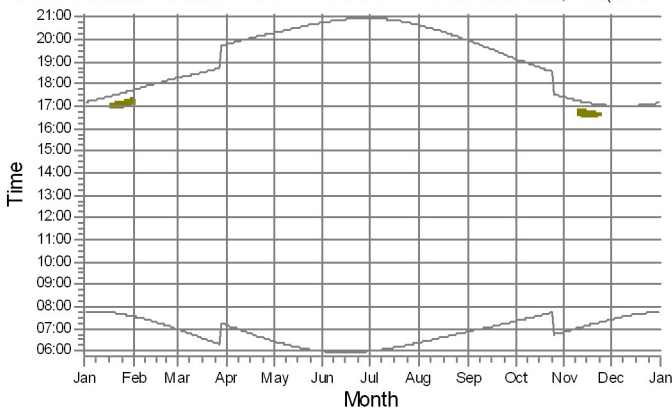
SR01: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



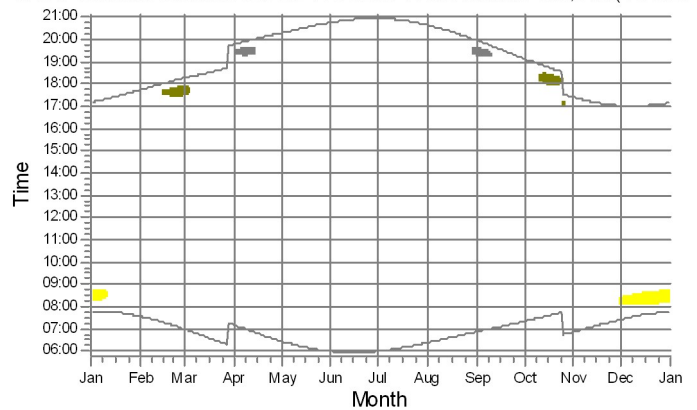
SR02: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



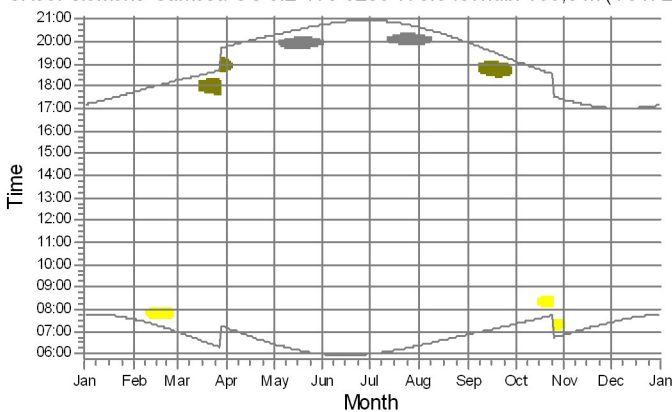
SR03: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



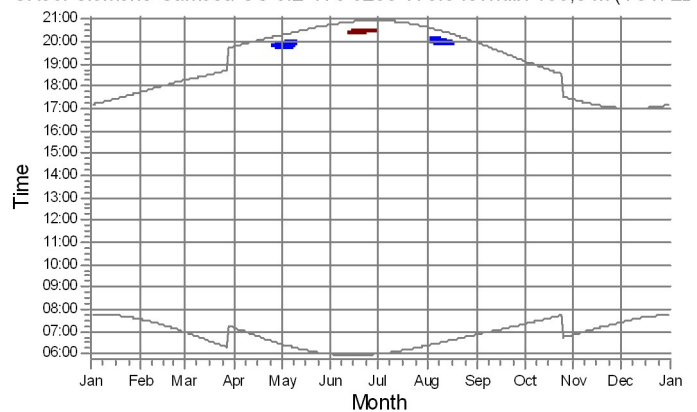
SR04: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22








SR05: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



SR06: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



Shadow receptors

	F020: D10 - Agriturismo Nuovi giardini		F063: A02
	F040: A03 - D10 - D01 Cantine Su Entu		F072: A04
	F046: F03 - Chiesa campestre		

Project:

Progetto_Serras_Sardara_Asja

Licensed user:

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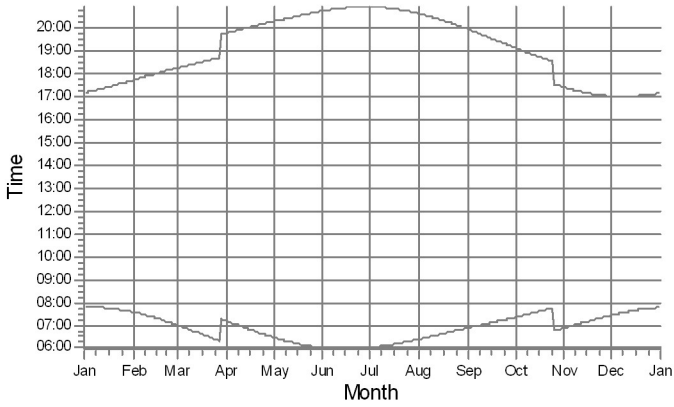
Calculated:

24/02/2023 13:00/3.4.415

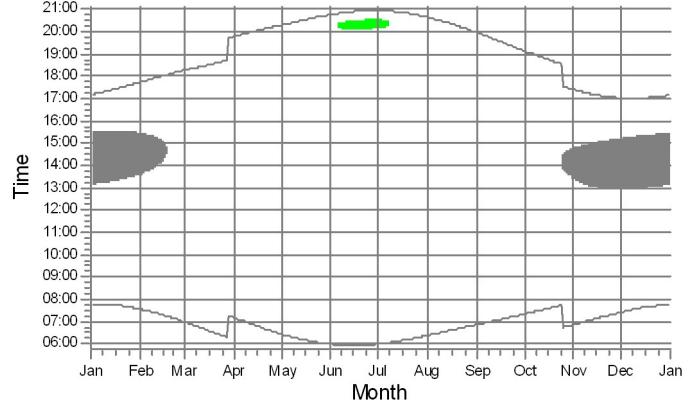
SHADOW - Calendar per WTG, graphical

Calculation: Progetto_layout_2022_01_31

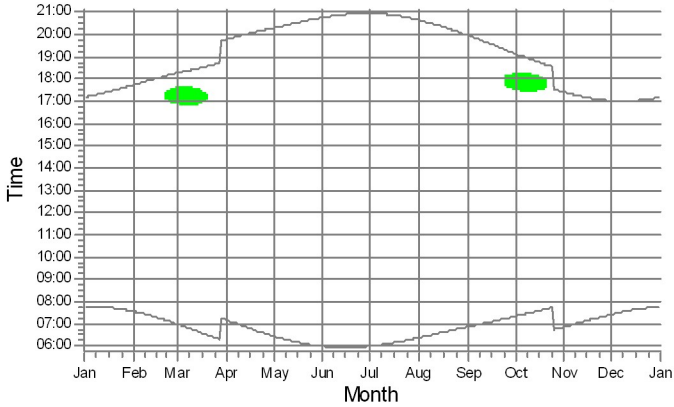
SR07: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



SR08: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



SR09: Siemens Gamesa SG 6.2-170 6200 170.0 !O! hub: 135,0 m (TOT: 22



Shadow receptors



F046: F03 - Chiesa campestre



F067: A03 - C02