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REGIONE SARDEGNA

PROVINCIA DEL SUD SARDEGNA

- COMUNI DI SAN NICOLÒ GERREI, ARMUNGIA, BALLAO, ESCALAPLANO, ESTERZILI, SEUI E SILIUS -

IMPIANTO EOLICO DENOMINATO “ENERGIA MONTE TACCU”



OGGETTO			TITOLO								
STUDIO DI IMPATTO AMBIENTALE			ANALISI DEGLI EFFETTI DI SHADOW FLICKERING								
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1 CRITERI GENERALI DI ANALISI E VALUTAZIONE

Il presente elaborato, facente parte integrante dello Studio di impatto ambientale allegato al progetto del parco eolico denominato "Energia Monte Taccu", nei territori di San Nicolò Gerrei e Armungia (SU), esamina compiutamente il potenziale disturbo da ombreggiamento intermittente (*shadow flickering* - *SF*) sui potenziali ricettori individuati nell'area interessata dal proposto impianto, 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 e siti sensibili" all'interno di apposito report allegato allo SIA (FORI-SNG-RA11_Report fabbricati e siti sensibili).

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. Poiché il modello di calcolo si basa sull'assunzione di ipotesi estremamente conservative, come più sotto esplicitato, si è proceduto successivamente ad affinare la stima introducendo ulteriori elementi di analisi e valutazione condizionanti sensibilmente l'entità del fenomeno, quali la durata del soleggiamento nell'area di intervento, ossia la durata effettiva dell'illuminazione solare senza l'interposizione delle nuvole.

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2 DESCRIZIONE DEL FENOMENO

Un ostacolo solido 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, allorquando 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;

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- situazioni di precaria visibilità determineranno modeste intensità di *S. flickering*;
- 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 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 12 RPM si avrà una frequenza di passo pari a circa 0,6 Hz. Tali frequenze di oscillazione luminosa sono prive di rischi significativi per la salute.

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

Per analizzare i risultati e quindi definire l'effettiva portata del disturbo, è dunque fondamentale conoscere l'esatta destinazione del fabbricato ricettore. Nel seguito, tra i fabbricati, saranno considerati potenziali ricettori i soli edifici che, sulla base delle informazioni disponibili e delle verifiche condotte in sito, possono ricondursi alla fattispecie di civili abitazioni.

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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 e interviste ai fruitori dell'area. 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 ambienti abitativi (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 FORI-SNG-RA11-1 (*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 FORI-SNG-RA11 allegato alla documentazione progettuale.

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

- n. 2 fabbricati ubicati in agro di Ballao (F21 e F23, a nord del parco eolico), con destinazione abitativa accertata (edifici con categoria catastale "A");
- n. 1 edificio riferibile a luoghi di culto (F08 - Chiesa di S. Lucia in territorio di San Nicolò Gerrei);
- n. 1 edificio abitativo (F50, edificio con categoria catastale "A") rappresentativo dell'edificio del centro abitato di San Nicolò Gerrei, trattandosi del fabbricato urbano posto in posizione più sfavorevole rispetto agli aerogeneratori in progetto.

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 3.1 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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Tabella 3.1: Fabbricati con destinazione abitativa 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
F08	San Nicolò Gerrei	1527071	4372601	723	T3	E7 – Luoghi di culto
F21	Ballao	1530533	4377307	953	T10	A7 – Abitazioni in villini
F23	Ballao	1530628	4377323	989	T10	A3 – Abitazioni di tipo economico
F50	San Nicolò Gerrei	1526712	4372083	779	T12	A3 – Abitazioni di tipo economico

Lo stralcio della ripresa aerea, la categoria catastale di appartenenza (laddove disponibile) ed una fotografia dei fabbricati censiti sono riportati nell'Elaborato FORI-SNG-RA11 allegato allo SIA.

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4 IPOTESI ALLA BASE DEL CALCOLO E SOGLIE DI RIFERIMENTO

Il software specialistico utilizzato per la stima dell'entità del fenomeno, nello scenario c.d. *worst case* impiega un modello estremamente conservativo per il calcolo del *shadow flickering*. 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*. Inoltre, per ovvie ragioni, la simulazione contempla il solo effetto dell'orografia sulla propagazione dell'ombra, ignorando l'azione schermante "sito-specifica" esercitata dai manufatti e dalle alberature. In altre parole, il calcolo descrive lo scenario peggiore possibile, e rappresenta quindi il massimo rischio potenziale di disturbo.

Conseguentemente è altamente verosimile che presso tutti i ricettori considerati nelle simulazioni si manifesti un effetto di *shadow flickering* significativamente inferiore a quello ipotizzato dal modello. È molto probabile, inoltre, che alcuni ricettori non saranno soggetti ad alcun effetto da *shadow flickering*.

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

- il vento deve soffiare ad una velocità superiore a 3 m/s (velocità di *cut-in* del rotore);
- presenza di luminosità solare diretta;
- l'osservatore deve risultare sufficientemente vicino alla sorgente di *shadow flickering*;
- il ricettore deve essere effettivamente esposto al campo di luce tremolante;
- l'illuminazione dell'ambiente residenziale deve essere bassa;
- il contrasto tra luci ed ombre deve essere alto;
- non devono essere presenti schermature che ostacolino la propagazione dell'ombra (come tendaggi o alberature);
- gli individui potenzialmente soggetti ad un impatto da *shadow flickering* dovrebbero permanere esposti alla luce tremolante per un tempo sufficiente ad avvertire fastidio.

Per le finalità del presente studio, in assenza di una specifica disciplina normativa nazionale o regionale sull'argomento, 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

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- 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 oltremodo prudentiale dell'impatto.

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

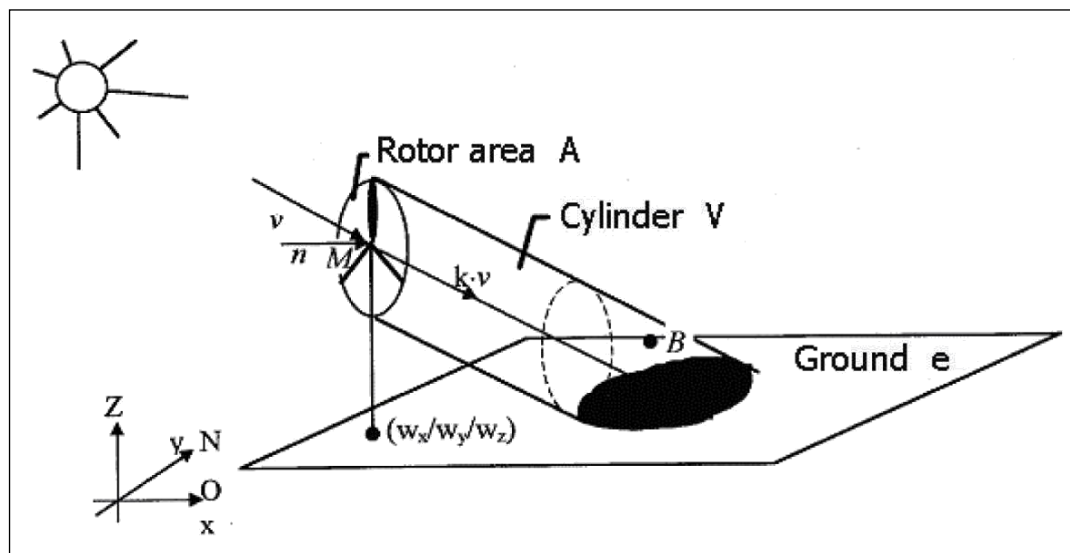


Figura 4.1: Rappresentazione schematica della proiezione dell'ombra del rotore.

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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 specifico elaborato grafico, in scala adeguata alla dimensione territoriale da rappresentare, per facilitarne la lettura. L'elaborato è stato realizzato, pertanto, su base cartografica in scala 1:10.000 (Elaborato FORI-SNG-RA9-1).

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 dell'allegato 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.

Come evidenziato sopra, peraltro, l'output fornito dal modello è alquanto conservativo e non realistico, giacché la simulazione non tiene in considerazione i numerosi fattori sfavorevoli al verificarsi del disturbo.

Per quanto precede, nel seguito si procederà ad esaminare le risultanze dei calcoli modellistici, introducendo nella valutazione di impatto ulteriori elementi che tengano conto delle effettive condizioni di funzionamento dell'impianto, in rapporto al quadro anemologico atteso, nonché delle condizioni meteorologiche caratteristiche del sito di progetto, con particolare riferimento alle condizioni medie di copertura del cielo.

I risultati numerici delle simulazioni modellistiche, condotti con riferimento a ciascuno scenario di calcolo, sono riportati in Appendice.

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6 ANALISI E POST-ELABORAZIONE DEI RISULTATI

Le risultanze del calcolo modellistico atto a stimare i valori totali di potenziale incidenza del fenomeno di *shadow flickering* nello scenariopiù sfavorevole (*worst case*) in corrispondenza dei ricettori abitativi individuati nell'areale di interesse sono riportate in Tabella 6.1.

Tabella 6.1: Durata massima del fenomeno di *shadow flickering* potenziale (SF_P) in corrispondenza delle abitazioni riconosciute all'interno dell'areale di interesse

ID	Ricettore	SF_P [h/anno]	SF_P [gg/anno]	SF_P [max h/giorno]
1	F08	123:49:00	171	01:03
2	F21	12:07:00	38	00:24
3	F23	26:24:00	50	00:50
4	F50	84:18:00	125	00:53

Nota: in rosso i fabbricati esposti a SF potenziale di durata superiore alle 30 ore/anno

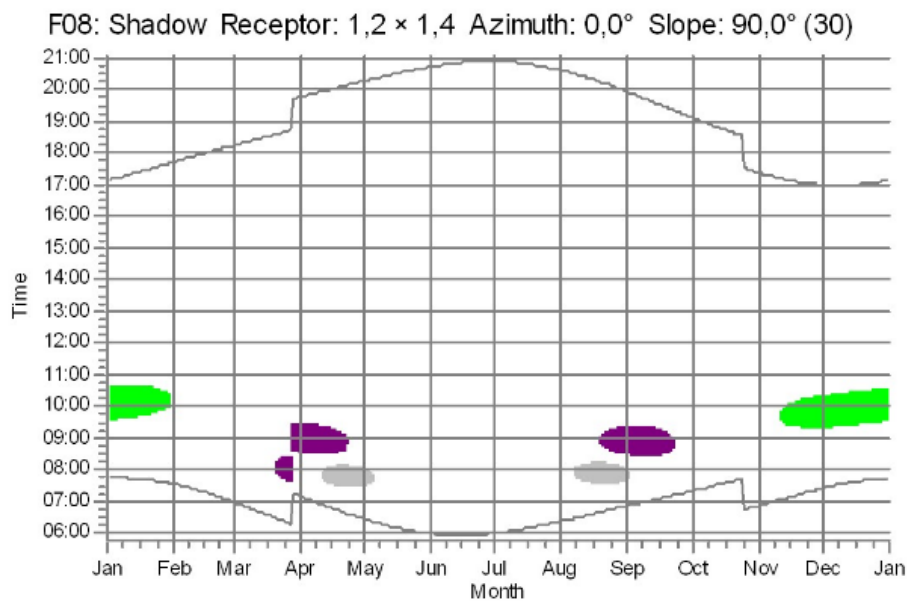
Dall'esame della Tabella 6.1 si evince quanto segue:

- tra i n. 4 edifici individuati come potenziali ricettori del fenomeno di *shadow flickering* entro l'areale di interesse, n. 2 fabbricati (F21 e F23) non risulteranno esposti ad alcun impatto potenziale da SF ;
- stanti le ipotesi estremamente cautelative alla base della simulazione modellistica, 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 abitativi (F08 – Chiesa di S. Lucia e F50 presso il centro abitato di S.N. Gerrei), riportati in Tabella 6.2.

Tabella 6.2: Durata massima potenziale del fenomeno di *shadow flickering* restituita dal software di calcolo in corrispondenza dei ricettori più esposti ($SF_P \geq 30$ h/anno) all'interno dell'areale di interesse

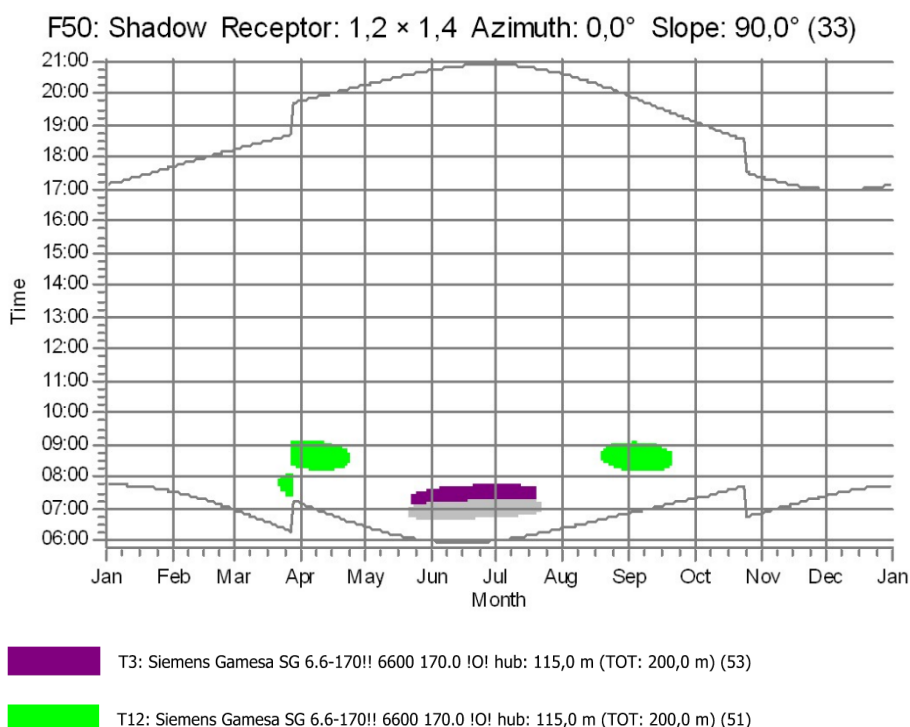
Ricettore	Scenario 1 SF_P [h/anno]	WTG interessati
F08	123:49:00	T3, T4, T12
F50	84:18:00	T3, T12

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- T3: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (53)
- T4: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (54)
- T12: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (51)

Figura 6.1 – Calendario dell'ombra per il ricettore F08



- T3: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (53)
- T12: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (51)

Figura 6.2 – Calendario dell'ombra per il ricettore F50

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Relativamente ai ricettori potenzialmente più esposti di cui alla Tabella 6.2 - individuati in base al criterio di una incidenza del $SF_P \geq 30$ h/anno - tenuto conto della rilevanza e consistenza numerica delle ipotesi conservative alla base del calcolo modellistico, si è proceduto ad affinare la stima dei valori di effettiva esposizione all'ombra intermittente introducendo un opportuno coefficiente di riduzione.

Il principale coefficiente di riduzione – di seguito indicato come R_N - tiene conto dell'incidenza media delle condizioni meteo di “cielo coperto” che caratterizzano il territorio di interesse, in concomitanza con le quali il fenomeno del *shadow flickering* non sarebbe avvertibile. Per la determinazione di R_N si è fatto riferimento ai dati di copertura nuvolosa pubblicati nell'Atlante Climatologico elaborato dai dati delle Stazioni della Rete Operativa del Servizio Meteorologico dell'Aeronautica Militare Italiana nel periodo 1971÷2000.

La nuvolosità, o copertura del cielo, rappresenta la frazione della volta celeste coperta da nubi, esprimendo il rapporto tra la parte di cielo coperta e la superficie totale del cielo.

La copertura del cielo viene valutata a vista durante le osservazioni da terra effettuate dalle stazioni meteorologiche e la frazione che la rappresenta viene espressa in ottavi, da 0 a 8.

Quando il cielo è coperto per più della metà da nubi con la base sotto i 20.000 piedi si dice che le nubi formano un soffitto (*ceiling*). Quando non esistono nubi si dice che il cielo è sereno (*clear sky*). Di seguito si riporta la scala convenzionale di nuvolosità in ottavi:

Copertura tra 1 e 2 ottavi – poche nubi (*few*);

Copertura tra 3 e 4 ottavi – nubi sparse (*scattered*);

Copertura tra 5 e 7 ottavi – copertura con squarci (*broken*);

Copertura totale >7 ottavi (*overcast*).

La Tabella 6.3 riporta, per la stazione A.M. più prossima al sito in esame (Cagliari-Elmas - CA), il numero medio di giorni al mese con copertura nuvolosa > 4/8 alle ore 06:00 ed alle ore 18:00, ossia con presenza di cielo “coperto” ($Ng_{h6} Nuv > 4$ e $Ngh_{18} Nuv > 4$ rispettivamente).

Sulla base dei mensili di SF_P calcolati per ciascun ricettore nello Scenario 1 è stato possibile pervenire alla stima dei valori di SF al netto delle giornate con presenza di cielo coperto (SF_{NC}) attraverso la seguente espressione:

$$SF_{NC}[h/anno] = \sum_{i=1}^{12} SF_{Pi} \cdot (1 - R_{Ni})$$

Dove:

SF_{NC} = h/anno di *shadow flickering* potenziale al netto delle giornate con presenza di cielo coperto;

SF_{Pi} = ore di *shadow flickering* teorico da modello di calcolo per il mese i-esimo;

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R_{Ni} = frequenza dei giorni con copertura del cielo $>4/8$ per il mese i -esimo.

Con riferimento ai ricettori di interesse, i dati di SF_{NC} sono riportati in Tabella 6.4.

Tabella 6.3: Aeronautica Militare – Stazione di Cagliari - Elmas (CA). Dati medi di copertura nuvolosa $>4/8$ registrati nel periodo 1971÷2000 (Fonte, Aeronautica Militare Italiana)

	Ng h6 Nuv>4	Ngh18 Nuv>4	Media Nuv>4	Media Nuv>4 (%)
gen	13,7	15,1	15,4	50%
feb	13,8	12,3	15,5	55%
mar	15,3	13,2	17,2	55%
apr	16,1	13	17,5	58%
mag	12,9	15,8	14,6	47%
giu	7,9	20,7	8,7	29%
lug	4,1	26,4	4,1	13%
ago	5,1	25,7	5,7	18%
set	10,2	19,2	11,3	38%
ott	14,9	16,4	15,1	49%
nov	15	16	14,4	48%
dic	13,6	16,6	15,0	48%

Ng h6Nuv>4: Numero medio di giorni al mese con copertura nuvolosa $> 4/8$ alle ore 6

Ngh18Nuv>4: Numero medio di giorni al mese con copertura nuvolosa $> 4/8$ alle ore 18

MediaNuv>4: Media del numero medio di giorni al mese con copertura nuvolosa $> 4/8$ registrata alle ore 6 ed alle 18

L'esame della Tabella 6.4 mostra come l'incidenza del fenomeno del *shadow flickering*, al netto delle giornate con cielo coperto (SF_{NC}), risulti abbattuta di circa il 50% in corrispondenza dei ricettori individuati.

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Tabella 6.4: Incidenza del fenomeno del shadow flickering al netto delle giornate con cielo coperto in corrispondenza dei ricettori più esposti ($SF_P \geq 30$ h/anno) all'interno dell'areale di interesse

Ricettore	SF_P [h/anno]	SF_{NC} [h/anno]	WTG interessati
F08	123:49:00	67:23:59	T3, T4, T12
F50	84:18:00	55:19:04	T3, T12

Per quanto riguarda il caso peggiore tra i ricettori considerati (**fabbricato F08**), rappresentato dalla Chiesa campestre di Santa Lucia, il potenziale ombreggiamento interesserà la fascia oraria mattutina, indicativamente dalle h 7:30 alle h 10.30 nei mesi invernali (da novembre a febbraio) e primaverili/autunnali (Figura 6.1). Poiché si tratta di un edificio di culto frequentato solo saltuariamente da fedeli e occasionali visitatori, soprattutto in occasione di speciali ricorrenze religiose (quali la sagra settembrina di Santa Lucia), 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 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.

Con riferimento al **fabbricato F50** - rappresentativo del caso più sfavorevole riscontrabile nell'edificato urbano di San Nicolò Gerrei in relazione al fenomeno in esame – lo stesso risulta potenzialmente esposto al fenomeno del SF per un'incidenza stimata in circa 55:19 h/anno ad opera degli aerogeneratori T12 e T3 (ad est-nordest del fabbricato), con preponderante contributo dell'aerogeneratore T12, posizionato a circa 780 metri a est dell'edificio.

Il calendario dell'ombra (Figura 6.2) mostra che il fenomeno dello SF è atteso principalmente nel periodo primaverile-estivo (indicativamente da aprile a settembre) nella fascia oraria compresa tra le h 7.00 e le h 9.00 del mattino.

La ripresa aerea evidenzia che trattasi di un edificio a due piani con alcune aperture fenestrate sul lato est, potenzialmente esposte allo SF dell'aerogeneratore T12.

D'altro canto, il prospettato superamento della soglia di riferimento di 30 h/anno, sebbene non trascurabile, non si traduce necessariamente in un effettivo disturbo per gli occupanti l'edificio. Considerata, infatti, la transitorietà del fenomeno, l'aleatorietà circa la presenza di persone all'interno degli ambienti potenzialmente esposti, l'eventuale presenza di elementi schermanti nelle aperture (tende, persiane), è verosimile che lo *shadow-flickering* non costituirà un effettivo disturbo a carico degli occupanti.

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In definitiva, considerate le ipotesi oltremodo conservative alla base del modello di calcolo (cielo sereno, rotore ortogonale alla congiungente sole-ricettore, rotori in movimento e dunque velocità del vento superiore a 3m/s, effettiva presenza degli occupanti l'edificio, sufficiente contrasto luci-ombre, assenza di elementi schermanti) è altamente verosimile che gli effettivi 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 gli edifici.

Relativamente al ricettore abitativo potenzialmente più esposto (F50), laddove in fase di esercizio dell'impianto dovesse manifestarsi un effettivo disturbo sugli occupanti l'edificio, l'aspetto in esame sarebbe efficacemente mitigabile predisponendo una cortina arborea al perimetro est del fabbricato. Di tali interventi di mitigazione, ove richiesti, si farà carico la società proponente.

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7 CONCLUSIONI

Il documento ha esaminato compiutamente il potenziale disturbo da ombreggiamento intermittente (shadow flickering) in corrispondenza dei più prossimi fabbricati presenti nell'area interessata dal proposto parco eolico "Energia Monte Taccu" proposto da Fred. Olsen Renewables Italy S.r.l. 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. 4 fabbricati con destinazione abitativa accertata (edifici con categoria catastale "A") ubicati entro una distanza di 1000 m dalle postazioni eoliche.

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 abitativi (F08 – Chiesa di S. Lucia e F50 presso il centro abitato di S.N. Gerrei).

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.

Pertanto, 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 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.

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APPENDICE - REPORT DEI RISULTATI DEL CALCOLO MODELLISTICO – SCENARIO DI PROGETTO PRESSO I RICETTORI INDIVIDUATI

Project:

Progetto_San Nicolò Gerrei

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:

23/11/2022 09:38/3.4.415

SHADOW - Main Result

Calculation: Progetto_layout_20221101

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_San Nicolò

Obstacles used in calculation

Eye height for map: 1,5 m

Grid resolution: 1,0 m

All coordinates are in

Italian Gauss-Boaga west-ROMA40 (IT-peninsular < ±4m)

WTGs

	Easting	Northing	Z	Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.					Calculation distance [m]	RPM [RPM]
			[m]									
T1	1.529.221	4.372.443	560,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T10	1.530.358	4.376.371	400,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T11	1.529.706	4.376.193	399,1	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T12	1.527.486	4.371.993	530,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T2	1.528.716	4.372.112	560,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T3	1.527.783	4.372.476	570,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T4	1.528.296	4.372.726	560,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T5	1.527.786	4.373.368	521,6	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T6	1.528.695	4.373.788	520,0	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T7	1.529.278	4.373.966	517,5	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T8	1.529.372	4.374.505	503,6	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8
T9	1.530.089	4.375.474	359,5	Siemens Gamesa SG ...Yes	Yes	Siemens Gamesa	SG 6.6-170!!-6.600	6.600	170,0	115,0	2.041	8,8

Shadow receptor-Input

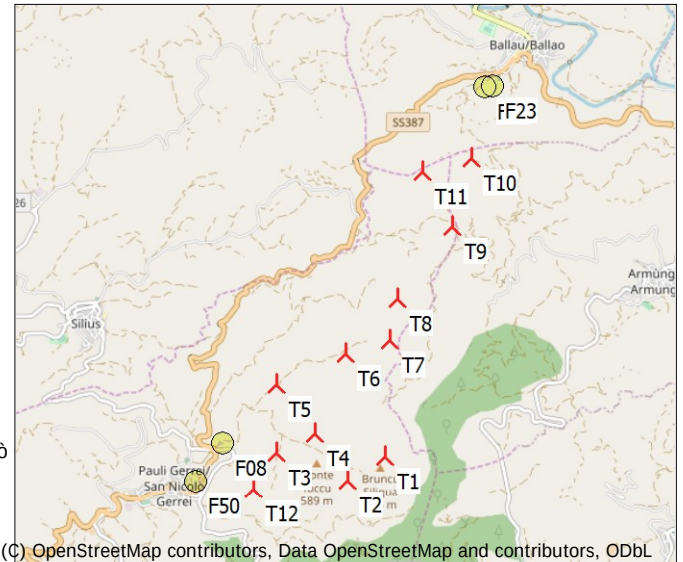
No.	Easting	Northing	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
			[m]	[m]	[m]	[m]	[°]		[m]
F08	1.527.071	4.372.601	391,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F21	1.530.533	4.377.307	134,3	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F23	1.530.628	4.377.323	120,4	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F50	1.526.712	4.372.083	375,6	1,2	1,4	1,2	90,0	"Green house mode"	2,6

Calculation Results

Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
F08	123:49	171	1:03
F21	12:07	38	0:24
F23	26:24	50	0:50
F50	84:18	125	0:53



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

Scale 1:100.000

New WTG

Shadow receptor

Project:

Progetto_San Nicolò Gerrei

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Calculated:

23/11/2022 09:38/3.4.415

SHADOW - Main Result

Calculation: Progetto_layout_20221101

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

No.	Name	Worst case [h/year]
T1	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (49)	0:00
T10	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (43)	7:25
T11	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (44)	23:08
T12	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (51)	100:52
T2	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (50)	0:00
T3	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (53)	68:50
T4	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (54)	41:38
T5	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (48)	0:00
T6	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (47)	0:00
T7	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (52)	0:00
T8	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (46)	0:00
T9	Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (45)	0:00

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

Project:

Progetto_San Nicolò Gerrei

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:
23/11/2022 09:38/3.4.415

SHADOW - Calendar

Calculation: Progetto_layout_20221101Shadow receptor: F08 - Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (30)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

January		February		March		April		May		June	
1	07:44	09:36 (T12)	07:32	06:58		07:09	08:36 (T3)	06:26	07:33 (T4)	05:58	
	17:10	54	10:30 (T12)	17:42	18:15		19:46	47	09:23 (T3)	20:16	23
2	07:44	09:36 (T12)	07:31	06:56		07:08	08:36 (T3)	06:24	07:35 (T4)	05:58	
	17:10	55	10:31 (T12)	17:44	18:16		19:47	48	09:24 (T3)	20:17	20
3	07:44	09:38 (T12)	07:30	06:55		07:06	08:35 (T3)	06:23	07:36 (T4)	05:58	
	17:11	54	10:32 (T12)	17:45	18:17		19:48	48	09:23 (T3)	20:18	17
4	07:44	09:38 (T12)	07:29	06:53		07:04	08:35 (T3)	06:22	07:38 (T4)	05:57	
	17:12	54	10:32 (T12)	17:46	18:18		19:49	48	09:23 (T3)	20:19	13
5	07:44	09:38 (T12)	07:28	06:52		07:03	08:34 (T3)	06:21	07:42 (T4)	05:57	
	17:13	54	10:32 (T12)	17:47	18:19		19:50	49	09:23 (T3)	20:20	5
6	07:44	09:39 (T12)	07:27	06:50		07:01	08:33 (T3)	06:20	07:47 (T4)	05:57	
	17:14	53	10:32 (T12)	17:48	18:20		19:51	49	09:22 (T3)	20:21	
7	07:44	09:39 (T12)	07:26	06:49		07:00	08:33 (T3)	06:18		05:56	
	17:15	53	10:32 (T12)	17:50	18:21		19:52	49	09:22 (T3)	20:22	
8	07:44	09:40 (T12)	07:25	06:47		06:58	08:33 (T3)	06:17		05:56	
	17:16	53	10:33 (T12)	17:51	18:22		19:53	48	09:21 (T3)	20:23	
9	07:44	09:41 (T12)	07:24	06:46		06:57	08:33 (T3)	06:16		05:56	
	17:17	52	10:33 (T12)	17:52	18:23		19:54	47	09:20 (T3)	20:24	
10	07:44	09:41 (T12)	07:23	06:44		06:55	08:33 (T3)	06:15		05:56	
	17:18	53	10:34 (T12)	17:53	18:24		19:55	46	09:19 (T3)	20:25	
11	07:43	09:41 (T12)	07:21	06:43		06:54	08:33 (T3)	06:14		05:56	
	17:19	52	10:33 (T12)	17:54	18:25		19:56	46	09:19 (T3)	20:26	
12	07:43	09:42 (T12)	07:20	06:41		06:52	07:46 (T4)	06:13		05:55	
	17:20	51	10:33 (T12)	17:55	18:26		19:57	51	09:17 (T3)	20:27	
13	07:43	09:43 (T12)	07:19	06:39		06:51	07:42 (T4)	06:12		05:55	
	17:21	51	10:34 (T12)	17:57	18:27		19:58	58	09:17 (T3)	20:28	
14	07:43	09:43 (T12)	07:18	06:38		06:49	07:39 (T4)	06:11		05:55	
	17:22	50	10:33 (T12)	17:58	18:28		19:59	61	09:15 (T3)	20:29	
15	07:42	09:44 (T12)	07:17	06:36		06:48	07:38 (T4)	06:10		05:55	
	17:23	49	10:33 (T12)	17:59	18:29		20:00	62	09:14 (T3)	20:30	
16	07:42	09:45 (T12)	07:15	06:35		06:46	07:36 (T4)	06:09		05:55	
	17:24	49	10:34 (T12)	18:00	18:30		20:01	63	09:12 (T3)	20:31	
17	07:42	09:45 (T12)	07:14	06:33		06:45	07:35 (T4)	06:08		05:55	
	17:25	48	10:33 (T12)	18:01	18:31		20:02	62	09:11 (T3)	20:31	
18	07:41	09:47 (T12)	07:13	06:32		06:43	07:33 (T4)	06:07		05:56	
	17:26	46	10:33 (T12)	18:02	18:32		20:03	62	09:09 (T3)	20:32	
19	07:41	09:47 (T12)	07:12	06:30		06:42	07:33 (T4)	06:07		05:56	
	17:27	45	10:32 (T12)	18:03	18:33		20:04	59	09:07 (T3)	20:33	
20	07:40	09:48 (T12)	07:10	06:28		06:40	07:33 (T4)	06:06		05:56	
	17:28	44	10:32 (T12)	18:05	18:34		20:05	55	09:05 (T3)	20:34	
21	07:40	09:49 (T12)	07:09	06:27		06:39	07:31 (T4)	06:05		05:56	
	17:30	43	10:32 (T12)	18:06	18:35		20:06	52	09:02 (T3)	20:35	
22	07:39	09:50 (T12)	07:08	06:25		06:37	07:31 (T4)	06:04		05:56	
	17:31	41	10:31 (T12)	18:07	18:36	17	08:12 (T3)	20:07	47	08:59 (T3)	20:36
23	07:39	09:52 (T12)	07:06	06:24		06:36	07:52 (T3)	06:04		05:56	
	17:32	38	10:30 (T12)	18:08	18:37	24	08:16 (T3)	20:08	33	08:52 (T3)	20:37
24	07:38	09:52 (T12)	07:05	06:22		06:35	07:48 (T3)	06:03		05:57	
	17:33	37	10:29 (T12)	18:09	18:38	30	08:18 (T3)	20:09	31	08:02 (T4)	20:38
25	07:37	09:54 (T12)	07:03	06:20		06:33	07:46 (T3)	06:02		05:57	
	17:34	34	10:28 (T12)	18:10	18:39	33	08:19 (T3)	20:10	31	08:02 (T4)	20:38
26	07:37	09:55 (T12)	07:02	06:19		06:32	07:44 (T3)	06:02		05:57	
	17:35	31	10:26 (T12)	18:11	18:40	37	08:21 (T3)	20:11	30	08:01 (T4)	20:39
27	07:36	09:57 (T12)	07:01	06:17		06:31	07:42 (T3)	06:01		05:58	
	17:37	28	10:25 (T12)	18:12	18:41	39	08:21 (T3)	20:12	29	08:00 (T4)	20:40
28	07:35	09:59 (T12)	06:59	06:16		06:29	07:41 (T3)	06:00		05:58	
	17:38	24	10:23 (T12)	18:13	18:42	41	08:22 (T3)	20:13	29	08:00 (T4)	20:41
29	07:34	10:02 (T12)			07:14		08:40 (T3)	06:28		05:58	
	17:39	18	10:20 (T12)		19:43	43	09:23 (T3)	20:14	27	07:59 (T4)	20:42
30	07:33	10:06 (T12)			07:12		08:38 (T3)	06:27		05:59	
	17:40	10	10:16 (T12)		19:44	45	09:23 (T3)	20:15	25	07:58 (T4)	20:42
31	07:33				07:11		08:38 (T3)			05:59	
	17:41				19:45	45	09:23 (T3)			20:43	
Potential sun hours	302		299	370		397		444		447	
Total, worst case	1324			354		1392		78			

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

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

SHADOW - Calendar

Calculation: Progetto_layout_20221101Shadow receptor: F08 - Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (30)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

	July	August	September	October	November	December
1	05:59 20:54	06:22 20:37	06:51 19:56	08:32 (T3) 19:07	06:50 17:23	07:24 17:00
2	06:00 20:54	06:23 20:36	06:52 19:54	08:32 (T3) 19:06	06:52 17:22	07:25 17:00
3	06:00 20:54	06:24 20:35	06:52 19:53	08:31 (T3) 19:04	06:53 17:21	07:26 17:00
4	06:01 20:54	06:25 20:34	06:53 19:51	08:30 (T3) 19:03	06:54 17:19	07:27 17:00
5	06:01 20:54	06:26 20:33	06:54 19:49	08:29 (T3) 19:01	06:55 17:18	07:27 16:59
6	06:02 20:54	06:26 20:31	06:55 19:48	08:29 (T3) 18:59	06:56 17:17	07:28 16:59
7	06:02 20:53	06:27 20:30	06:56 19:46	08:29 (T3) 18:58	06:57 17:16	07:29 16:59
8	06:03 20:53	06:28 20:29	07:49 (T4) 19:45	08:29 (T3) 18:56	06:58 17:15	07:30 16:59
9	06:04 20:53	06:29 20:28	07:46 (T4) 19:43	08:29 (T3) 18:55	06:59 17:14	07:31 16:59
10	06:04 20:52	06:30 20:27	07:44 (T4) 19:42	08:29 (T3) 18:53	07:01 17:13	07:32 16:59
11	06:05 20:52	06:31 20:25	07:43 (T4) 19:40	08:29 (T3) 18:52	07:02 17:12	07:33 16:59
12	06:06 20:52	06:32 20:24	07:42 (T4) 19:38	08:30 (T3) 18:50	07:03 17:11	07:34 17:00
13	06:06 20:51	06:33 20:23	07:41 (T4) 19:37	08:29 (T3) 18:49	07:04 17:11	07:34 17:00
14	06:07 20:51	06:34 20:22	07:40 (T4) 19:35	08:30 (T3) 18:47	07:05 17:10	07:35 17:00
15	06:08 20:50	06:35 20:20	07:39 (T4) 19:33	08:30 (T3) 18:46	07:06 17:09	07:36 17:00
16	06:08 20:50	06:36 20:19	07:38 (T4) 19:32	08:31 (T3) 18:44	07:07 17:08	07:37 17:00
17	06:09 20:49	06:37 20:18	07:38 (T4) 19:30	08:32 (T3) 18:43	07:08 17:07	07:37 17:01
18	06:10 20:48	06:38 20:16	07:37 (T4) 19:28	08:34 (T3) 18:41	07:10 17:07	07:38 17:01
19	06:11 20:48	06:39 20:15	07:36 (T4) 19:27	08:35 (T3) 18:40	07:11 17:06	07:38 17:01
20	06:12 20:47	06:39 20:14	07:36 (T4) 19:25	08:37 (T3) 18:38	07:12 17:05	07:39 17:02
21	06:12 20:46	06:40 20:12	07:36 (T4) 19:24	08:40 (T3) 18:37	07:13 17:05	07:40 17:02
22	06:13 20:46	06:41 20:11	07:36 (T4) 19:22	08:44 (T3) 18:36	07:14 17:04	07:40 17:03
23	06:14 20:45	06:42 20:09	07:36 (T4) 19:20	08:53 (T3) 18:34	07:15 17:03	07:41 17:03
24	06:15 20:44	06:43 20:08	07:37 (T4) 19:19	08:44 (T3) 18:33	07:16 17:03	07:41 17:04
25	06:16 20:43	06:44 20:06	07:37 (T4) 19:17	08:44 (T3) 18:32	07:17 17:02	07:42 17:04
26	06:17 20:42	06:45 20:05	07:38 (T4) 19:15	08:44 (T3) 18:31	07:18 17:02	07:42 17:05
27	06:17 20:42	06:46 20:03	07:38 (T4) 19:14	08:44 (T3) 18:30	07:19 17:02	07:42 17:06
28	06:18 20:41	06:47 20:02	07:39 (T4) 19:12	08:44 (T3) 18:29	07:21 17:01	07:43 17:06
29	06:19 20:40	06:48 20:00	07:40 (T4) 19:11	08:44 (T3) 18:28	07:22 17:01	07:43 17:07
30	06:20 20:39	06:49 19:59	07:42 (T4) 19:09	08:44 (T3) 18:27	07:23 17:01	07:43 17:08
31	06:21 20:38	06:50 19:57	07:46 (T4) 19:07	08:44 (T3) 18:26	07:24 17:00	07:43 17:09
Potential sun hours	454	425	374	347	301	293
Total, worst case		968	896		736	1681

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

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

Project:

Progetto_San Nicolò Gerrei

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:

23/11/2022 09:38/3.4.415

SHADOW - Calendar

Calculation: Progetto_layout_20221101Shadow receptor: F21 - Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (31)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

		January		February	March	April	May	June	July	August	September	October	November	December
1	07:44		14:54 (T11)	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50	07:24
	17:09	21	15:15 (T11)	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44		14:55 (T11)	07:31	06:56	07:07	06:24	05:58	05:59	06:23	06:51	07:19	06:51	07:25
	17:10	20	15:15 (T11)	17:43	18:15	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:21	17:00
3	07:44		14:56 (T11)	07:30	06:55	07:06	06:23	05:57	06:00	06:23	06:52	07:20	06:53	07:26
	17:11	18	15:14 (T11)	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	16:59
4	07:44		14:57 (T11)	07:29	06:53	07:04	06:22	05:57	06:00	06:24	06:53	07:21	06:54	07:26
	17:12	17	15:14 (T11)	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	16:59
5	07:44		14:58 (T11)	07:28	06:52	07:03	06:20	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	16	15:14 (T11)	17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44		14:59 (T11)	07:27	06:50	07:01	06:19	05:56	06:01	06:26	06:55	07:23	06:56	07:28
	17:14	15	15:14 (T11)	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44		15:01 (T11)	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	12	15:13 (T11)	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44		15:03 (T11)	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:15	10	15:13 (T11)	17:50	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44		15:06 (T11)	07:24	06:46	06:56	06:16	05:56	06:03	06:29	06:58	07:26	06:59	07:31
	17:16	5	15:11 (T11)	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44			07:22	06:44	06:55	06:15	05:55	06:04	06:30	06:59	07:27	07:00	07:32
	17:17			17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43			07:21	06:42	06:53	06:14	05:55	06:05	06:31	07:00	07:28	07:02	07:33
	17:18			17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:51	17:12	16:59
12	07:43			07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03	07:34
	17:19			17:55	18:26	19:57	20:27	20:51	20:52	20:24	19:38	18:50	17:11	16:59
13	07:43			07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:01	07:30	07:04	07:34
	17:21			17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:48	17:10	16:59
14	07:43			07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
	17:22			17:57	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:09	17:00
15	07:42			07:17	06:36	06:47	06:10	05:55	06:07	06:35	07:03	07:32	07:06	07:36
	17:23			17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:45	17:09	17:00
16	07:42			07:15	06:35	06:46	06:09	05:55	06:08	06:35	07:04	07:33	07:07	07:36
	17:24			18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42			07:14	06:33	06:44	06:08	05:55	06:09	06:36	07:05	07:34	07:08	07:37
	17:25			18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:00
18	07:41			07:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:10	07:38
	17:26			18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:06	17:01
19	07:41			07:11	06:30	06:41	06:06	05:55	06:10	06:38	07:07	07:36	07:11	07:38
	17:27			18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40			07:10	06:28	06:40	06:06	05:55	06:11	06:39	07:08	07:37	07:12	07:39
	17:28			18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40			07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:29			18:05	18:35	20:06	20:35	20:54	20:46	20:12	19:23	18:37	17:04	17:02
22	07:39			07:07	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:30			18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:35	17:04	17:03
23	07:38			07:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:40	07:15	07:41
	17:32			18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38			07:05	06:22	06:34	06:03	05:56	06:15	06:43	07:12	07:42	07:16	07:41
	17:33			18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37			07:03	06:20	06:33	06:02	05:57	06:15	06:44	07:13	06:43	07:17	07:41
	17:34			18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:31	17:02	17:04
26	07:36			07:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35			18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36			07:00	06:17	06:30	06:01	05:57	06:17	06:46	07:14	06:45	07:19	07:42
	17:36			18:12	18:41	20:12	20:40	20:55	20:42	20:03	19:14	17:29	17:01	17:05
28	07:35			06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:37			18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34				07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39				19:43	20:14	20:42	20:55	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33				07:12	06:27	05:59	05:58	06:20	06:49	07:17	06:48	07:23	07:43
	17:40				19:44	20:15	20:42	20:55	20:39	19:59	19:09	17:25	17:00	17:08
31	07:32				07:11		05:59		06:21	06:49		06:49		07:43
	17:41				19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302			299	370	397	444	447	454	425	374	347	301	293
Total, worst case	134													593

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

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

Project:

Progetto_San Nicolò Gerrei

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
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+39 070 658297
Giuseppe Frongia | direttore@iatprogetti.it
Calculated:
23/11/2022 09:38/3.4.415

SHADOW - Calendar

Calculation: Progetto_layout_20221101Shadow receptor: F23 - Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (32)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1 07:44	13:27 (T10) 07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50		07:24
2 07:44	15:27 (T11) 17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23		18:18
3 07:44	13:28 (T10) 07:31	06:56	07:07	06:24	05:58	05:59	06:22	06:51	07:19	06:51		15:09 (T11)
4 07:44	15:27 (T11) 17:43	18:15	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:21		17:00
5 07:44	13:31 (T10) 07:30	06:55	07:06	06:23	05:57	06:00	06:23	06:52	07:20	06:53		17:00
6 07:44	15:27 (T11) 17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20		17:00
7 07:44	15:03 (T11) 07:29	06:53	07:04	06:22	05:57	06:00	06:24	06:53	07:21	06:54		17:00
8 07:44	15:28 (T11) 17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19		17:00
9 07:44	15:04 (T11) 07:28	06:52	07:03	06:20	05:57	06:01	06:25	06:54	07:22	06:55		17:00
10 07:44	15:28 (T11) 17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18		17:00
11 07:44	15:04 (T11) 07:27	06:50	07:01	06:19	05:56	06:01	06:26	06:55	07:23	06:56		17:00
12 07:44	15:28 (T11) 17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17		17:00
13 07:44	15:05 (T11) 07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57		17:00
14 07:44	15:28 (T11) 17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16		17:00
15 07:44	15:06 (T11) 07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58		17:00
16 07:44	15:28 (T11) 17:50	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15		17:00
17 07:44	15:08 (T11) 07:24	06:46	06:56	06:16	05:56	06:03	06:29	06:58	07:26	06:59		17:00
18 07:44	15:28 (T11) 17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14		17:00
19 07:44	15:09 (T11) 07:22	06:44	06:55	06:15	05:55	06:04	06:30	06:59	07:27	07:00		17:00
20 07:44	15:28 (T11) 17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13		17:00
21 07:44	15:09 (T11) 07:21	06:42	06:53	06:14	05:55	06:05	06:31	07:00	07:28	07:02		17:00
22 07:44	15:27 (T11) 17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:51	17:12		17:00
23 07:44	15:11 (T11) 07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03		17:00
24 07:44	15:27 (T11) 17:55	18:26	19:57	20:27	20:51	20:52	20:24	19:38	18:50	17:11		17:00
25 07:44	15:13 (T11) 07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:01	07:30	07:04		17:00
26 07:44	15:27 (T11) 17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:48	17:10		17:00
27 07:44	15:14 (T11) 07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05		17:00
28 07:44	15:25 (T11) 17:57	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:09		17:00
29 07:44	15:17 (T11) 07:17	06:36	06:47	06:10	05:55	06:07	06:35	07:03	07:32	07:06		17:00
30 07:44	15:24 (T11) 17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:45	17:09		17:00
31 07:44	17:15	06:35	06:46	06:09	05:55	06:08	06:35	07:04	07:33	07:07		17:00
1 07:44	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08		17:00
2 07:44	17:14	06:33	06:44	06:08	05:55	06:09	06:36	07:05	07:34	07:08		17:00
3 07:44	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07		17:00
4 07:44	17:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:10		17:00
5 07:44	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:06		17:00
6 07:44	17:11	06:30	06:41	06:06	05:55	06:10	06:38	07:07	07:36	07:11		17:00
7 07:44	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06		17:00
8 07:44	17:10	06:28	06:40	06:06	05:55	06:11	06:39	07:08	07:37	07:12		17:00
9 07:44	18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05		17:00
10 07:44	17:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13		17:00
11 07:44	18:05	18:35	20:06	20:35	20:54	20:46	20:12	19:23	18:37	17:04		17:00
12 07:44	17:07	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14		17:00
13 07:44	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:35	17:04		17:00
14 07:44	17:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:40	07:15		17:00
15 07:44	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03		17:00
16 07:44	17:05	06:22	06:34	06:03	05:56	06:15	06:43	07:12	07:42	07:16		17:00
17 07:44	18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03		17:00
18 07:44	17:03	06:20	06:33	06:02	05:57	06:15	06:44	07:13	07:43	07:17		17:00
19 07:44	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	18:31	17:02		17:00
20 07:44	17:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	07:44	07:18		17:00
21 07:44	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	18:30	17:02		17:00
22 07:44	17:00	06:17	06:30	06:01	05:57	06:17	06:46	07:14	07:45	07:19		17:00
23 07:44	18:12	18:41	20:12	20:40	20:55	20:42	20:03	19:14	18:29	17:01	14:57 (T11)	17:00
24 07:44	17:01	06:15	06:29	06:00	05:58	06:18	06:47	07:15	07:46	07:20	15:02 (T11)	17:00
25 07:44	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	18:28	17:01	15:05 (T11)	17:00
26 07:44	17:04	06:14	06:28	06:00	05:58	06:19	06:48	07:16	07:47	07:21	14:53 (T11)	17:00
27 07:44	17:39	19:43	20:14	20:42	20:55	20:40	20:00	19:10	18:26	17:01	15:07 (T11)	17:00
28 07:44	17:33	17:12	06:27	05:59	05:58	06:20	06:49	07:17	07:48	07:23	14:52 (T11)	17:00
29 07:44	17:40	19:44	20:15	20:42	20:55	20:39	19:59	19:09	17:25	17:00	15:08 (T11)	17:00
30 07:44	17:32	17:11	17:01	05:59	05:59	06:21	06:49	07:18	07:49	07:24		17:00
31 07:44	17:41	19:45	20:16	20:43	20:56	20:38	19:57	19:07	17:24	17:00		17:00
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Total, worst case	327									46		1211

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_San Nicolò Gerrei

Licensed user:

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

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+39 070 658297

Giuseppe Frongia / direttore@iatprogetti.it

Calculated:

23/11/2022 09:38/3.4.415

SHADOW - Calendar

Calculation: Progetto_layout_20221101Shadow receptor: F50 - Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (33)
Assumptions for shadow calculations

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

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

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

The WTG is always operating

	January	February	March	April	May	June				
1	07:44	07:32	06:58	07:09	08:21 (T12)	06:26	05:58	06:43 (T4)		
	17:10	17:42	18:15	19:46	43 09:04 (T12)	20:16	20:44	48 07:31 (T3)		
2	07:44	07:31	06:56	07:08	08:20 (T12)	06:24	05:58	06:43 (T4)		
	17:10	17:44	18:16	19:47	45 09:05 (T12)	20:17	20:45	49 07:32 (T3)		
3	07:44	07:30	06:55	07:06	08:19 (T12)	06:23	05:58	06:43 (T4)		
	17:11	17:45	18:17	19:48	45 09:04 (T12)	20:18	20:45	50 07:33 (T3)		
4	07:44	07:29	06:53	07:04	08:19 (T12)	06:22	05:57	06:43 (T4)		
	17:12	17:46	18:18	19:49	46 09:05 (T12)	20:19	20:46	49 07:32 (T3)		
5	07:44	07:28	06:52	07:03	08:18 (T12)	06:21	05:57	06:43 (T4)		
	17:13	17:47	18:19	19:50	46 09:04 (T12)	20:20	20:47	50 07:33 (T3)		
6	07:44	07:27	06:50	07:01	08:17 (T12)	06:20	05:57	06:43 (T4)		
	17:14	17:48	18:20	19:51	46 09:03 (T12)	20:21	20:47	51 07:34 (T3)		
7	07:44	07:26	06:49	07:00	08:17 (T12)	06:18	05:56	06:44 (T4)		
	17:15	17:50	18:21	19:52	47 09:04 (T12)	20:22	20:48	51 07:35 (T3)		
8	07:44	07:25	06:47	06:58	08:16 (T12)	06:17	05:56	06:43 (T4)		
	17:16	17:51	18:22	19:53	47 09:03 (T12)	20:23	20:48	51 07:34 (T3)		
9	07:44	07:24	06:46	06:57	08:17 (T12)	06:16	05:56	06:43 (T4)		
	17:17	17:52	18:23	19:54	46 09:03 (T12)	20:24	20:49	52 07:35 (T3)		
10	07:44	07:23	06:44	06:55	08:16 (T12)	06:15	05:56	06:44 (T4)		
	17:18	17:53	18:24	19:55	45 09:01 (T12)	20:25	20:50	51 07:35 (T3)		
11	07:43	07:21	06:43	06:54	08:16 (T12)	06:14	05:56	06:44 (T4)		
	17:19	17:54	18:25	19:56	45 09:01 (T12)	20:26	20:50	52 07:36 (T3)		
12	07:43	07:20	06:41	06:52	08:16 (T12)	06:13	05:56	06:44 (T4)		
	17:20	17:55	18:26	19:57	44 09:00 (T12)	20:27	20:51	52 07:36 (T3)		
13	07:43	07:19	06:39	06:51	08:17 (T12)	06:12	05:55	06:44 (T4)		
	17:21	17:57	18:27	19:58	42 08:59 (T12)	20:28	20:51	52 07:36 (T3)		
14	07:43	07:18	06:38	06:49	08:17 (T12)	06:11	05:55	06:45 (T4)		
	17:22	17:58	18:28	19:59	41 08:58 (T12)	20:29	20:51	52 07:37 (T3)		
15	07:42	07:17	06:36	06:48	08:17 (T12)	06:10	05:55	06:45 (T4)		
	17:23	17:59	18:29	20:00	40 08:57 (T12)	20:30	20:52	52 07:37 (T3)		
16	07:42	07:15	06:35	06:46	08:17 (T12)	06:09	05:55	06:45 (T4)		
	17:24	18:00	18:30	20:01	38 08:55 (T12)	20:31	20:52	52 07:37 (T3)		
17	07:42	07:14	06:33	06:45	08:19 (T12)	06:08	05:55	06:45 (T4)		
	17:25	18:01	18:31	20:02	35 08:54 (T12)	20:31	20:53	52 07:37 (T3)		
18	07:41	07:13	06:32	06:43	08:19 (T12)	06:08	05:56	06:45 (T4)		
	17:26	18:02	18:32	20:03	33 08:52 (T12)	20:32	20:53	52 07:37 (T3)		
19	07:41	07:12	06:30	06:42	08:20 (T12)	06:07	05:56	06:45 (T4)		
	17:27	18:03	18:33	20:04	31 08:51 (T12)	20:33	20:53	53 07:38 (T3)		
20	07:40	07:10	06:28	06:40	08:22 (T12)	06:06	05:56	06:45 (T4)		
	17:28	18:05	18:34	20:05	27 08:49 (T12)	20:34	20:54	53 07:38 (T3)		
21	07:40	07:09	06:27	06:39	08:23 (T12)	06:05	05:56	06:46 (T4)		
	17:30	18:06	18:35	20:06	24 08:47 (T12)	20:35	20:54	53 07:39 (T3)		
22	07:39	07:08	06:25	06:37	08:26 (T12)	06:04	06:50 (T4)	05:56	06:46 (T4)	
	17:31	18:07	18:36	20:07	18 08:44 (T12)	20:36	6 06:56 (T4)	05:56	06:46 (T4)	
23	07:39	07:06	06:24	07:44 (T12)	06:36	08:29 (T12)	06:04	06:48 (T4)	05:56	06:46 (T4)
	17:32	18:08	18:37	5 07:49 (T12)	20:08	11 08:40 (T12)	20:37	11 06:59 (T4)	20:54	53 07:39 (T3)
24	07:38	07:05	06:22	07:36 (T12)	06:35		06:03	06:47 (T4)	05:57	06:46 (T4)
	17:33	18:09	18:38	18 07:54 (T12)	20:09		20:38	20 07:20 (T3)	20:54	52 07:38 (T3)
25	07:37	07:03	06:20	07:34 (T12)	06:33		06:02	06:46 (T4)	05:57	06:47 (T4)
	17:34	18:10	18:39	24 07:58 (T12)	20:10		20:38	28 07:23 (T3)	20:54	52 07:39 (T3)
26	07:37	07:02	06:19	07:30 (T12)	06:32		06:02	06:45 (T4)	05:57	06:47 (T4)
	17:35	18:11	18:40	29 07:59 (T12)	20:11		20:39	33 07:25 (T3)	20:55	52 07:39 (T3)
27	07:36	07:01	06:17	07:28 (T12)	06:31		06:01	06:44 (T4)	05:58	06:47 (T4)
	17:37	18:12	18:41	32 08:00 (T12)	20:12		20:40	38 07:26 (T3)	20:55	52 07:39 (T3)
28	07:35	06:59	06:16	07:27 (T12)	06:29		06:00	06:44 (T4)	05:58	06:48 (T4)
	17:38	18:13	18:42	35 08:02 (T12)	20:13		20:41	41 07:28 (T3)	20:55	52 07:40 (T3)
29	07:34		07:14	08:25 (T12)	06:28		06:00	06:43 (T4)	05:58	06:47 (T4)
	17:39		19:43	38 09:03 (T12)	20:14		20:42	44 07:28 (T3)	20:55	52 07:39 (T3)
30	07:33		07:12	08:23 (T12)	06:27		05:59	06:43 (T4)	05:59	06:48 (T4)
	17:40		19:44	40 09:03 (T12)	20:15		20:42	46 07:29 (T3)	20:55	52 07:40 (T3)
31	07:33		07:11	08:22 (T12)			05:59	06:44 (T4)		
	17:41		19:45	42 09:04 (T12)			20:43	47 07:31 (T3)		
Potential sun hours	302	299	370	397	444	314	447	1547		
Total, worst case			263	885						

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

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

SHADOW - Calendar

Calculation: Progetto_layout_20221101Shadow receptor: F50 - Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (33)
 Assumptions for shadow calculations

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

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

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

The WTG is always operating

July		August		September		October		November		December	
1	05:59	06:48 (T4)	06:22	06:51	08:15 (T12)	07:18	06:50	07:24			
	20:55	07:40 (T3)	20:37	19:56	09:00 (T12)	19:07	17:23	17:00			
2	06:00	06:49 (T4)	06:23	06:52	08:15 (T12)	07:19	06:52	07:25			
	20:54	07:40 (T3)	20:36	19:54	09:00 (T12)	19:06	17:22	17:00			
3	06:00	06:48 (T4)	06:24	06:52	08:15 (T12)	07:20	06:53	07:26			
	20:54	07:40 (T3)	20:35	19:53	09:01 (T12)	19:04	17:21	17:00			
4	06:01	06:49 (T4)	06:25	06:53	08:13 (T12)	07:21	06:54	07:27			
	20:54	07:40 (T3)	20:34	19:51	09:00 (T12)	19:03	17:19	17:00			
5	06:01	06:49 (T4)	06:26	06:54	08:13 (T12)	07:22	06:55	07:27			
	20:54	07:40 (T3)	20:33	19:50	09:00 (T12)	19:01	17:18	17:00			
6	06:02	06:50 (T4)	06:26	06:55	08:13 (T12)	07:23	06:56	07:28			
	20:54	07:40 (T3)	20:31	19:48	08:59 (T12)	18:59	17:17	16:59			
7	06:02	06:49 (T4)	06:27	06:56	08:13 (T12)	07:24	06:57	07:29			
	20:53	07:39 (T3)	20:30	19:46	08:59 (T12)	18:58	17:16	16:59			
8	06:03	06:50 (T4)	06:28	06:57	08:13 (T12)	07:25	06:58	07:30			
	20:53	07:40 (T3)	20:29	19:45	08:59 (T12)	18:56	17:15	16:59			
9	06:04	06:51 (T4)	06:29	06:58	08:13 (T12)	07:26	06:59	07:31			
	20:53	07:40 (T3)	20:28	19:43	08:58 (T12)	18:55	17:14	16:59			
10	06:04	06:50 (T4)	06:30	06:59	08:13 (T12)	07:27	07:01	07:32			
	20:52	07:39 (T3)	20:27	19:42	08:58 (T12)	18:53	17:13	16:59			
11	06:05	06:51 (T4)	06:31	07:00	08:14 (T12)	07:28	07:02	07:33			
	20:52	07:39 (T3)	20:25	19:40	08:57 (T12)	18:52	17:12	16:59			
12	06:06	06:51 (T4)	06:32	07:01	08:14 (T12)	07:29	07:03	07:34			
	20:52	07:38 (T3)	20:24	19:38	08:56 (T12)	18:50	17:11	17:00			
13	06:06	06:51 (T4)	06:33	07:02	08:14 (T12)	07:30	07:04	07:34			
	20:51	07:38 (T3)	20:23	19:37	08:54 (T12)	18:49	17:11	17:00			
14	06:07	06:52 (T4)	06:34	07:03	08:15 (T12)	07:31	07:05	07:35			
	20:51	07:38 (T3)	20:22	19:35	08:53 (T12)	18:47	17:10	17:00			
15	06:08	06:53 (T4)	06:35	07:03	08:16 (T12)	07:32	07:06	07:36			
	20:50	07:37 (T3)	20:20	19:33	08:52 (T12)	18:46	17:09	17:00			
16	06:08	06:53 (T4)	06:36	07:04	08:17 (T12)	07:33	07:07	07:37			
	20:50	07:36 (T3)	20:19	19:32	08:50 (T12)	18:44	17:08	17:00			
17	06:09	06:54 (T4)	06:37	07:05	08:18 (T12)	07:34	07:08	07:37			
	20:49	07:35 (T3)	20:18	19:30	08:48 (T12)	18:43	17:07	17:01			
18	06:10	06:55 (T4)	06:38	07:06	08:20 (T12)	07:35	07:10	07:38			
	20:48	07:34 (T3)	20:16	19:29	08:45 (T12)	18:41	17:07	17:01			
19	06:11	06:56 (T4)	06:39	07:07	08:23 (T12)	07:36	07:11	07:38			
	20:48	07:32 (T3)	20:15	19:27	08:42 (T12)	18:40	17:06	17:02			
20	06:12	06:57 (T4)	06:39	08:33 (T12)	07:08	08:27 (T12)	07:37	07:12	07:39		
	20:47	07:09 (T4)	20:14	19:25	08:37 (T12)	18:38	17:05	17:02			
21	06:12	06:59 (T4)	06:40	08:30 (T12)	07:09	07:38	07:13	07:40			
	20:46	07:08 (T4)	20:12	19:24		18:37	17:05	17:02			
22	06:13		06:41	08:28 (T12)	07:10	07:40	07:14	07:40			
	20:46		20:11	19:22		18:36	17:04	17:03			
23	06:14		06:42	08:26 (T12)	07:11	07:41	07:15	07:41			
	20:45		20:09	19:20		18:34	17:03	17:03			
24	06:15		06:43	08:24 (T12)	07:12	07:42	07:16	07:41			
	20:44		20:08	19:19		18:33	17:03	17:04			
25	06:16		06:44	08:23 (T12)	07:13	06:43	07:17	07:42			
	20:43		20:06	19:17		17:32	17:02	17:04			
26	06:17		06:45	08:21 (T12)	07:14	06:44	07:18	07:42			
	20:42		20:05	19:15		17:30	17:02	17:05			
27	06:17		06:46	08:19 (T12)	07:15	06:45	07:19	07:42			
	20:42		20:03	19:14		17:29	17:02	17:06			
28	06:18		06:47	08:18 (T12)	07:16	06:46	07:21	07:43			
	20:41		20:02	19:12		17:28	17:01	17:06			
29	06:19		06:48	08:17 (T12)	07:17	06:47	07:22	07:43			
	20:40		20:00	19:11		17:27	17:01	17:07			
30	06:20		06:49	08:17 (T12)	07:17	06:48	07:23	07:43			
	20:39		19:59	19:09		17:25	17:01	17:08			
31	06:21		06:50	08:16 (T12)		06:49		07:43			
	20:38		19:57	09:00 (T12)		17:24		17:09			
Potential sun hours	454		425	374		347	301	293			
Total, worst case	886		389	774							

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

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

Project:

Progetto_San Nicolò Gerrei

Licensed user:

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

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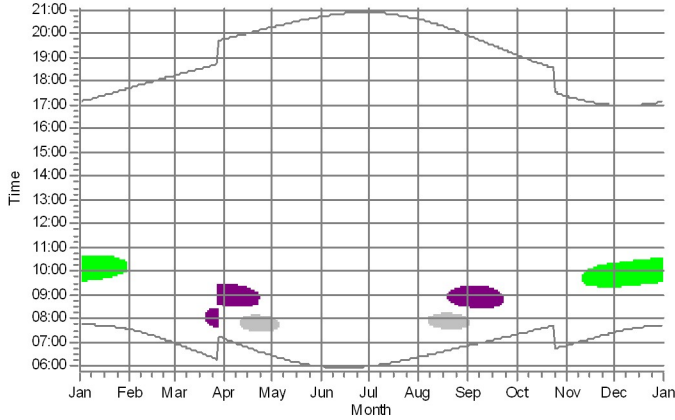
Calculated:

23/11/2022 09:38/3.4.415

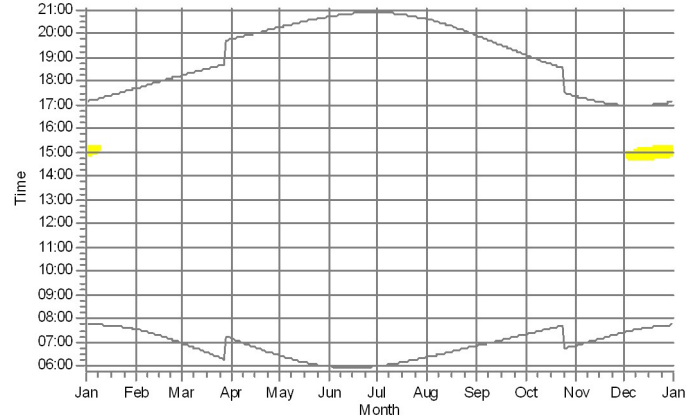
SHADOW - Calendar, graphical

Calculation: Progetto_layout_20221101

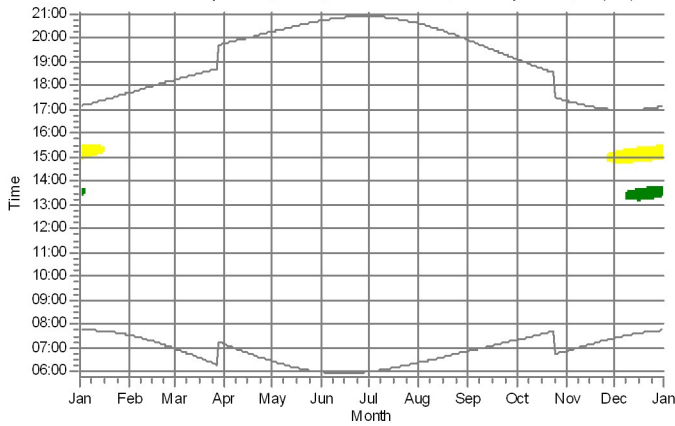
F08: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (30)



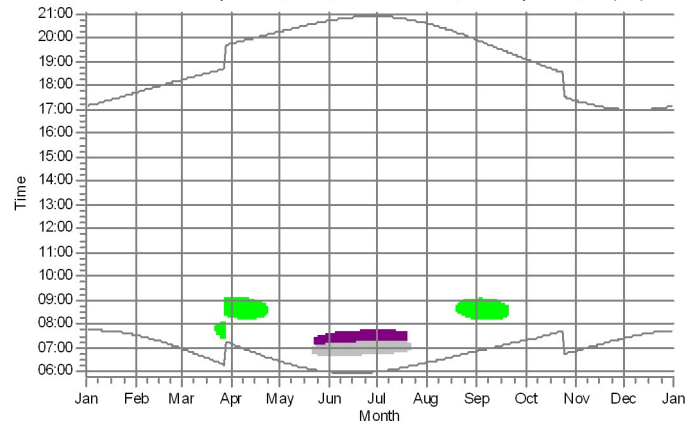
F21: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (31)



F23: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (32)



F50: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (33)



WTGs

T10: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (43)
T11: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (44)
T12: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (51)

T3: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (53)
T4: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (54)

Project:

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Calculated:

23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T1 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (49)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50	07:23
	17:09	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:08	06:24	05:58	06:00	06:23	06:51	07:19	06:51	07:24
	17:10	17:43	18:16	19:47	20:17	20:44	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:57	06:00	06:24	06:52	07:20	06:53	07:25
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:01	06:24	06:53	07:21	06:54	07:26
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	17:00
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:46	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:57	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:57	06:16	05:56	06:04	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:22	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:00	07:32
	17:18	17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:42	06:53	06:14	05:56	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:52	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03	07:33
	17:20	17:55	18:26	19:57	20:27	20:50	20:52	20:24	19:38	18:50	17:11	16:59
13	07:43	07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:02	07:30	07:04	07:34
	17:21	17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:49	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
	17:22	17:58	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:10	17:00
15	07:42	07:17	06:36	06:47	06:10	05:55	06:08	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:29	20:52	20:50	20:20	19:33	18:46	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:36
	17:24	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:45	06:08	05:55	06:09	06:37	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:52	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:09	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:07	17:01
19	07:41	07:11	06:30	06:42	06:07	05:56	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:39
	17:29	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:23	18:37	17:05	17:02
22	07:39	07:07	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:36	17:04	17:03
23	07:38	07:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:40	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:57	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:37	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:16	06:44	07:13	06:43	07:17	07:41
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:32	17:02	17:04
26	07:36	07:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:00	06:17	06:31	06:01	05:57	06:17	06:46	07:15	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:54	20:41	20:03	19:14	17:29	17:01	17:06
28	07:35	06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:38	18:13	18:42	20:13	20:41	20:54	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39		19:43	20:14	20:42	20:54	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:22	07:43
	17:40		19:44	20:15	20:42	20:54	20:39	19:59	19:09	17:25	17:00	17:08
31	07:32		07:11		05:59		06:21	06:50		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project:

Progetto_San Nicolò Gerrei

Licensed user:

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Calculated:

23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T10 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (43)

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	07:44 13:27-13:39/12	07:32 06:58	07:09 06:25	05:58 05:59	06:22 06:50	07:18 06:50	07:24 17:00					
	17:09	17:42 18:14	19:46 20:16	20:44 20:54	20:37 19:56	19:07 17:23	17:00					
2	07:44 13:28-13:38/10	07:31 06:56	07:07 06:24	05:58 05:59	06:23 06:51	07:19 06:51	07:25 17:00					
	17:10	17:43 18:15	19:47 20:17	20:45 20:54	20:36 19:54	19:06 17:21	17:00					
3	07:44 13:31-13:36/5	07:30 06:55	07:06 06:23	05:57 06:00	06:23 06:52	07:20 06:53	07:26 17:00					
	17:11	17:45 18:17	19:48 20:18	20:45 20:54	20:35 19:53	19:04 17:20	17:00					
4	07:44	07:29 06:53	07:04 06:22	05:57 06:00	06:24 06:53	07:21 06:54	07:26 17:00					
	17:12	17:46 18:18	19:49 20:19	20:46 20:54	20:34 19:51	19:02 17:19	16:59					
5	07:44	07:28 06:52	07:03 06:20	05:57 06:01	06:25 06:54	07:22 06:55	07:27 17:00					
	17:13	17:47 18:19	19:50 20:20	20:47 20:54	20:32 19:49	19:01 17:18	16:59					
6	07:44	07:27 06:50	07:01 06:19	05:56 06:02	06:26 06:55	07:23 06:56	07:28 17:00					
	17:14	17:48 18:20	19:51 20:21	20:47 20:54	20:31 19:48	18:59 17:17	16:59					
7	07:44	07:26 06:49	07:00 06:18	05:56 06:02	06:27 06:56	07:24 06:57	07:29 17:00					
	17:15	17:49 18:21	19:52 20:22	20:48 20:53	20:30 19:46	18:58 17:16	16:59					
8	07:44	07:25 06:47	06:58 06:17	05:56 06:03	06:28 06:57	07:25 06:58	07:30 17:00					
	17:16	17:50 18:22	19:53 20:23	20:48 20:53	20:29 19:45	18:56 17:15	16:59					
9	07:44	07:24 06:46	06:56 06:16	05:56 06:03	06:29 06:58	07:26 06:59	07:31 13:21-13:25/4					
	17:17	17:52 18:23	19:54 20:24	20:49 20:53	20:28 19:43	18:55 17:14	16:59					
10	07:44	07:22 06:44	06:55 06:15	05:55 06:04	06:30 06:59	07:27 07:00	07:32 13:19-13:28/9					
	17:17	17:53 18:24	19:55 20:25	20:49 20:52	20:27 19:41	18:53 17:13	16:59					
11	07:43	07:21 06:42	06:53 06:14	05:55 06:05	06:31 07:00	07:28 07:02	07:33 13:18-13:30/12					
	17:18	17:54 18:25	19:56 20:26	20:50 20:52	20:25 19:40	18:51 17:12	16:59					
12	07:43	07:20 06:41	06:52 06:13	05:55 06:05	06:32 07:01	07:29 07:03	07:34 13:16-13:31/15					
	17:20	17:55 18:26	19:57 20:27	20:50 20:52	20:24 19:38	18:50 17:11	16:59					
13	07:43	07:19 06:39	06:50 06:12	05:55 06:06	06:33 07:01	07:30 07:04	07:34 13:16-13:32/16					
	17:21	17:56 18:27	19:58 20:28	20:51 20:51	20:23 19:37	18:48 17:10	16:59					
14	07:43	07:18 06:38	06:49 06:11	05:55 06:07	06:34 07:02	07:31 07:05	07:35 13:16-13:34/18					
	17:22	17:58 18:28	19:59 20:29	20:51 20:51	20:22 19:35	18:47 17:09	17:00					
15	07:42	07:17 06:36	06:47 06:10	05:55 06:07	06:35 07:03	07:32 07:06	07:36 13:16-13:35/19					
	17:23	17:59 18:29	20:00 20:30	20:52 20:50	20:20 19:33	18:45 17:09	17:00					
16	07:42	07:15 06:35	06:46 06:09	05:55 06:08	06:36 07:04	07:33 07:07	07:36 13:15-13:35/20					
	17:24	18:00 18:30	20:01 20:30	20:52 20:50	20:19 19:32	18:44 17:08	17:00					
17	07:42	07:14 06:33	06:44 06:08	05:55 06:09	06:36 07:05	07:34 07:08	07:37 13:16-13:36/20					
	17:25	18:01 18:31	20:02 20:31	20:53 20:49	20:18 19:30	18:43 17:07	17:00					
18	07:41	07:13 06:31	06:43 06:07	05:55 06:10	06:37 07:06	07:35 07:10	07:38 13:16-13:38/22					
	17:26	18:02 18:32	20:03 20:32	20:53 20:48	20:16 19:28	18:41 17:06	17:01					
19	07:41	07:11 06:30	06:42 06:06	05:55 06:11	06:38 07:07	07:36 07:11	07:38 13:16-13:38/22					
	17:27	18:03 18:33	20:04 20:33	20:53 20:48	20:15 19:27	18:40 17:06	17:01					
20	07:40	07:10 06:28	06:40 06:06	05:56 06:11	06:39 07:08	07:37 07:12	07:39 13:17-13:39/22					
	17:28	18:04 18:34	20:05 20:34	20:53 20:47	20:13 19:25	18:38 17:05	17:02					
21	07:40	07:09 06:27	06:39 06:05	05:56 06:12	06:40 07:09	07:38 07:13	07:40 13:17-13:39/22					
	17:29	18:06 18:35	20:06 20:35	20:54 20:46	20:12 19:23	18:37 17:04	17:02					
22	07:39	07:07 06:25	06:37 06:04	05:56 06:13	06:41 07:10	07:39 07:14	07:40 13:18-13:40/22					
	17:30	18:07 18:36	20:07 20:36	20:54 20:46	20:11 19:22	18:35 17:04	17:03					
23	07:38	07:06 06:23	06:36 06:03	05:56 06:14	06:42 07:11	07:40 07:15	07:41 13:18-13:40/22					
	17:32	18:08 18:37	20:08 20:37	20:54 20:45	20:09 19:20	18:34 17:03	17:03					
24	07:38	07:05 06:22	06:34 06:03	05:56 06:15	06:43 07:12	07:42 07:16	07:41 13:18-13:40/22					
	17:33	18:09 18:38	20:09 20:38	20:54 20:44	20:08 19:19	18:33 17:03	17:04					
25	07:37	07:03 06:20	06:33 06:02	05:57 06:15	06:44 07:13	06:43 07:17	07:41 13:19-13:41/22					
	17:34	18:10 18:39	20:10 20:38	20:54 20:43	20:06 19:17	17:31 17:02	17:04					
26	07:36	07:02 06:19	06:32 06:01	05:57 06:16	06:45 07:14	06:44 07:18	07:42 13:20-13:40/20					
	17:35	18:11 18:40	20:11 20:39	20:54 20:42	20:05 19:15	17:30 17:02	17:05					
27	07:36	07:00 06:17	06:30 06:01	05:57 06:17	06:46 07:14	06:45 07:19	07:42 13:20-13:40/20					
	17:36	18:12 18:41	20:12 20:40	20:55 20:41	20:03 19:14	17:29 17:01	17:05					
28	07:35	06:59 06:15	06:29 06:00	05:58 06:18	06:47 07:15	06:46 07:20	07:43 13:22-13:41/19					
	17:37	18:13 18:42	20:13 20:41	20:55 20:41	20:02 19:12	17:28 17:01	17:06					
29	07:34		07:14 06:28	06:00 05:58	06:19 06:48	07:16 06:47	07:21 07:43 13:23-13:41/18					
	17:39		19:43 20:14	20:42 20:55	20:40 20:00	19:10 17:26	17:01 17:07					
30	07:33		07:12 06:27	05:59 05:58	06:20 06:49	07:17 06:48	07:23 07:43 13:24-13:41/17					
	17:40		19:44 20:15	20:42 20:55	20:39 19:59	19:09 17:25	17:00 17:08					
31	07:32		07:11	05:59		06:49		07:43 13:25-13:40/15				
	17:41		19:45	20:43		19:57	17:24	17:08				
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	27	0	0	0	0	0	0	0	0	0	0	418

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_San Nicolò Gerrei

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:

23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T11 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (44)

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	07:44 14:54-15:27/33 17:09	07:32 06:58 17:42 18:14	07:09 06:25 19:46 20:16	05:58 05:59 20:44 20:54	06:22 06:50 20:37 19:56	07:18 06:50 19:07 17:23	07:24 14:51-15:09/18 17:00					
2	07:44 14:55-15:27/32 17:10	07:31 06:56 17:43 18:15	07:07 06:24 19:47 20:17	05:58 05:59 20:45 20:54	06:23 06:51 20:36 19:54	07:19 06:51 19:06 17:22	07:25 14:51-15:10/19 17:00					
3	07:44 14:56-15:27/31 17:11	07:30 06:55 17:45 18:17	07:06 06:23 19:48 20:18	05:57 06:00 20:45 20:54	06:23 06:52 20:35 19:53	07:20 06:53 19:04 17:20	07:26 14:49-15:11/22 17:00					
4	07:44 14:57-15:28/31 17:12	07:29 06:53 17:46 18:18	07:04 06:22 19:49 20:19	05:57 06:00 20:46 20:54	06:24 06:53 20:34 19:51	07:21 06:54 19:02 17:19	07:27 14:47-15:12/25 16:59					
5	07:44 14:58-15:28/30 17:13	07:28 06:52 17:47 18:19	07:03 06:21 19:50 20:20	05:57 06:01 20:47 20:54	06:25 06:54 20:32 19:49	07:22 06:55 19:01 17:18	07:27 14:46-15:13/27 16:59					
6	07:44 14:59-15:28/29 17:14	07:27 06:50 17:48 18:20	07:01 06:19 19:51 20:21	05:56 06:02 20:47 20:54	06:26 06:55 20:31 19:48	07:23 06:56 18:59 17:17	07:28 14:45-15:14/29 16:59					
7	07:44 15:01-15:28/27 17:15	07:26 06:49 17:49 18:21	07:00 06:18 19:52 20:22	05:56 06:02 20:48 20:53	06:27 06:56 20:30 19:46	07:24 06:57 18:58 17:16	07:29 14:45-15:15/30 16:59					
8	07:44 15:03-15:28/25 17:16	07:25 06:47 17:51 18:22	06:58 06:17 19:53 20:23	05:56 06:03 20:48 20:53	06:28 06:57 20:29 19:45	07:25 06:58 18:56 17:15	07:30 14:45-15:16/31 16:59					
9	07:44 15:06-15:28/22 17:17	07:24 06:46 17:52 18:23	06:57 06:16 19:54 20:24	05:56 06:03 20:49 20:53	06:29 06:58 20:28 19:43	07:26 06:59 18:55 17:14	07:31 14:45-15:16/31 16:59					
10	07:44 15:09-15:28/19 17:18	07:23 06:44 17:53 18:24	06:55 06:15 19:55 20:25	05:56 06:04 20:50 20:52	06:30 06:59 20:27 19:41	07:27 07:01 18:53 17:13	07:32 14:45-15:17/32 16:59					
11	07:43 15:09-15:27/18 17:19	07:21 06:42 17:54 18:25	06:53 06:14 19:56 20:26	05:55 06:05 20:50 20:52	06:31 07:00 20:25 19:40	07:28 07:02 18:52 17:12	07:33 14:45-15:18/33 16:59					
12	07:43 15:11-15:27/16 17:20	07:20 06:41 17:55 18:26	06:52 06:13 19:57 20:27	05:55 06:05 20:51 20:52	06:32 07:01 20:24 19:38	07:29 07:03 18:50 17:11	07:34 14:44-15:18/34 16:59					
13	07:43 15:13-15:27/14 17:21	07:19 06:39 17:56 18:27	06:50 06:12 19:58 20:28	05:55 06:06 20:51 20:51	06:33 07:01 20:23 19:37	07:30 07:04 18:48 17:10	07:34 14:45-15:18/33 17:00					
14	07:43 15:14-15:25/11 17:22	07:18 06:38 17:58 18:28	06:49 06:11 19:59 20:29	05:55 06:07 20:51 20:51	06:34 07:02 20:22 19:35	07:31 07:05 18:47 17:09	07:35 14:45-15:19/34 17:00					
15	07:42 15:17-15:24/7 17:23	07:17 06:36 17:59 18:29	06:47 06:10 20:00 20:30	05:55 06:07 20:50 20:50	06:35 07:03 20:20 19:33	07:32 07:06 18:45 17:09	07:36 14:45-15:20/35 17:00					
16	07:42 17:24	07:15 06:35 18:00 18:30	06:46 06:09 20:01 20:30	05:55 06:08 20:50 20:50	06:36 07:04 20:19 19:32	07:33 07:07 18:44 17:08	07:36 14:45-15:20/35 17:00					
17	07:42 17:25	07:14 06:33 18:01 18:31	06:44 06:08 20:02 20:31	05:55 06:09 20:53 20:49	06:36 07:05 20:18 19:30	07:34 07:08 18:43 17:07	07:37 14:46-15:21/35 17:01					
18	07:41 17:26	07:13 06:31 18:02 18:32	06:43 06:07 20:03 20:32	05:55 06:10 20:53 20:48	06:37 07:06 20:16 19:28	07:35 07:10 18:41 17:06	07:38 14:46-15:22/36 17:01					
19	07:41 17:27	07:12 06:30 18:03 18:33	06:42 06:06 20:04 20:33	05:55 06:11 20:53 20:48	06:38 07:07 20:15 19:27	07:36 07:11 18:40 17:06	07:38 14:46-15:22/36 17:01					
20	07:40 17:28	07:10 06:28 18:04 18:34	06:40 06:06 20:05 20:34	05:56 06:11 20:53 20:47	06:39 07:08 20:13 19:25	07:37 07:12 18:38 17:05	07:39 14:47-15:23/36 17:02					
21	07:40 17:29	07:09 06:27 18:06 18:35	06:39 06:05 20:06 20:35	05:56 06:12 20:54 20:46	06:40 07:09 20:12 19:23	07:38 07:13 18:37 17:04	07:40 14:47-15:23/36 17:02					
22	07:39 17:31	07:07 06:25 18:07 18:36	06:37 06:04 20:07 20:36	05:56 06:13 20:54 20:46	06:41 07:10 20:11 19:22	07:39 07:14 18:35 17:04	07:40 14:48-15:23/35 17:03					
23	07:38 17:32	07:06 06:23 18:08 18:37	06:36 06:03 20:08 20:37	05:56 06:14 20:54 20:45	06:42 07:11 20:09 19:20	07:41 07:15 18:34 17:03	07:41 14:48-15:24/36 17:03					
24	07:38 17:33	07:05 06:22 18:09 18:38	06:35 06:03 20:09 20:38	05:56 06:15 20:54 20:44	06:43 07:12 20:08 19:19	07:42 07:16 18:33 17:03	07:41 14:48-15:24/36 17:04					
25	07:37 17:34	07:03 06:20 18:10 18:39	06:33 06:02 20:10 20:38	06:02 05:57 20:54 20:43	06:44 07:13 20:06 19:17	06:43 07:17 17:31 17:02	07:41 14:49-15:25/36 17:04					
26	07:36 17:35	07:02 06:19 18:11 18:40	06:32 06:01 20:11 20:39	06:01 05:57 20:54 20:42	06:45 07:14 20:05 19:15	06:44 07:18 17:30 17:02	07:42 14:50-15:25/35 17:05					
27	07:36 17:36	07:00 06:17 18:12 18:41	06:30 06:01 20:12 20:40	06:01 05:57 20:55 20:42	06:46 07:14 20:03 19:14	06:45 07:19 17:29 17:01	07:42 14:50-15:25/35 17:05					
28	07:35 17:37	06:59 06:15 18:13 18:42	06:29 06:00 20:13 20:41	06:00 05:58 20:55 20:41	06:47 07:15 20:02 19:12	06:46 07:20 17:28 17:01	07:43 14:51-15:26/35 17:06					
29	07:34 17:39	 19:43 20:14	06:28 06:00 20:14 20:42	06:00 05:58 20:55 20:40	06:48 07:16 20:00 19:10	06:47 07:22 17:26 17:01	14:53-15:07/14 17:07					
30	07:33 17:40	 19:44 20:15	06:27 05:59 20:15 20:42	05:59 05:59 20:55 20:39	07:17 06:48 19:59 19:09	06:48 07:23 17:25 17:00	14:52-15:08/16 17:08					
31	07:33 17:41	 19:45	06:26 05:59 20:43	05:59 20:43	06:50 19:57	06:49 17:24	14:53-15:27/34 17:08					
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	345	0	0	0	0	0	0	0	0	0	46	997

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_San Nicolò Gerrei

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:

23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T12 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (51)

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	07:44	09:36-10:30/54	07:32	06:58		07:09	08:21-09:04/43	06:26	05:58
	17:10		17:42	18:15		19:46		20:16	20:44
2	07:44	09:36-10:31/55	07:31	06:56		07:08	08:20-09:05/45	06:24	05:58
	17:10		17:44	18:16		19:47		20:17	20:45
3	07:44	09:38-10:32/54	07:30	06:55		07:06	08:19-09:04/45	06:23	05:58
	17:11		17:45	18:17		19:48		20:18	20:45
4	07:44	09:38-10:32/54	07:29	06:53		07:04	08:19-09:05/46	06:22	05:57
	17:12		17:46	18:18		19:49		20:19	20:46
5	07:44	09:38-10:32/54	07:28	06:52		07:03	08:18-09:04/46	06:21	05:57
	17:13		17:47	18:19		19:50		20:20	20:47
6	07:44	09:39-10:32/53	07:27	06:50		07:01	08:17-09:03/46	06:20	05:57
	17:14		17:48	18:20		19:51		20:21	20:47
7	07:44	09:39-10:32/53	07:26	06:49		07:00	08:17-09:04/47	06:18	05:56
	17:15		17:50	18:21		19:52		20:22	20:48
8	07:44	09:40-10:33/53	07:25	06:47		06:58	08:16-09:03/47	06:17	05:56
	17:16		17:51	18:22		19:53		20:23	20:48
9	07:44	09:41-10:33/52	07:24	06:46		06:57	08:17-09:03/46	06:16	05:56
	17:17		17:52	18:23		19:54		20:24	20:49
10	07:44	09:41-10:34/53	07:23	06:44		06:55	08:16-09:01/45	06:15	05:56
	17:18		17:53	18:24		19:55		20:25	20:49
11	07:43	09:41-10:33/52	07:21	06:43		06:54	08:16-09:01/45	06:14	05:56
	17:19		17:54	18:25		19:56		20:26	20:50
12	07:43	09:42-10:33/51	07:20	06:41		06:52	08:16-09:00/44	06:13	05:55
	17:20		17:55	18:26		19:57		20:27	20:50
13	07:43	09:43-10:34/51	07:19	06:39		06:51	08:17-08:59/42	06:12	05:55
	17:21		17:57	18:27		19:58		20:28	20:51
14	07:43	09:43-10:33/50	07:18	06:38		06:49	08:17-08:58/41	06:11	05:55
	17:22		17:58	18:28		19:59		20:29	20:51
15	07:42	09:44-10:33/49	07:17	06:36		06:48	08:17-08:57/40	06:10	05:55
	17:23		17:59	18:29		20:00		20:30	20:52
16	07:42	09:45-10:34/49	07:15	06:35		06:46	08:17-08:55/38	06:09	05:55
	17:24		18:00	18:30		20:01		20:30	20:52
17	07:42	09:45-10:33/48	07:14	06:33		06:45	08:19-08:54/35	06:08	05:55
	17:25		18:01	18:31		20:02		20:31	20:53
18	07:41	09:47-10:33/46	07:13	06:32		06:43	08:19-08:52/33	06:07	05:56
	17:26		18:02	18:32		20:03		20:32	20:53
19	07:41	09:47-10:32/45	07:12	06:30		06:42	08:20-08:51/31	06:07	05:56
	17:27		18:03	18:33		20:04		20:33	20:53
20	07:40	09:48-10:32/44	07:10	06:28		06:40	08:22-08:49/27	06:06	05:56
	17:28		18:05	18:34		20:05		20:34	20:53
21	07:40	09:49-10:32/43	07:09	06:27		06:39	08:23-08:47/24	06:05	05:56
	17:30		18:06	18:35		20:06		20:35	20:54
22	07:39	09:50-10:31/41	07:08	06:25		06:37	08:26-08:44/18	06:04	05:56
	17:31		18:07	18:36		20:07		20:36	20:54
23	07:38	09:52-10:30/38	07:06	06:24	07:44-07:49/5	06:36	08:29-08:40/11	06:04	05:56
	17:32		18:08	18:37		20:08		20:37	20:54
24	07:38	09:52-10:29/37	07:05	06:22	07:36-07:54/18	06:35		06:03	05:57
	17:33		18:09	18:38		20:09		20:38	20:54
25	07:37	09:54-10:28/34	07:03	06:20	07:34-07:58/24	06:33		06:02	05:57
	17:34		18:10	18:39		20:10		20:38	20:54
26	07:36	09:55-10:26/31	07:02	06:19	07:30-07:59/29	06:32		06:02	05:57
	17:35		18:11	18:40		20:11		20:39	20:54
27	07:36	09:57-10:25/28	07:01	06:17	07:28-08:00/32	06:31		06:01	05:58
	17:36		18:12	18:41		20:12		20:40	20:55
28	07:35	09:59-10:23/24	06:59	06:16	07:27-08:02/35	06:29		06:00	05:58
	17:38		18:13	18:42		20:13		20:41	20:55
29	07:34	10:02-10:20/18		07:14	08:25-09:03/38	06:28		06:00	05:58
	17:39			19:43		20:14		20:42	20:55
30	07:33	10:06-10:16/10		07:12	08:23-09:03/40	06:27		05:59	05:59
	17:40			19:44		20:15		20:42	20:55
31	07:33			07:11	08:22-09:04/42			05:59	
	17:41			19:45				20:43	
Potential sun hours	302		299	370		397		444	447
Sum of minutes with flicker	1324		0	263		885		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_20221101WTG: T12 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (51)

Assumptions for shadow calculations

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

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

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

The WTG is always operating

	July	August	September	October	November	December
1	05:59 20:54	06:22 20:37	06:51 08:15-09:00/45 19:56	07:18 19:07	06:50 17:23	07:24 09:23-10:15/52 17:00
2	06:00 20:54	06:23 20:36	06:51 08:15-09:00/45 19:54	07:19 19:06	06:52 17:22	07:25 09:23-10:16/53 17:00
3	06:00 20:54	06:24 20:35	06:52 08:15-09:01/46 19:53	07:20 19:04	06:53 17:21	07:26 09:24-10:16/52 17:00
4	06:01 20:54	06:25 20:34	06:53 08:13-09:00/47 19:51	07:21 19:03	06:54 17:19	07:26 09:24-10:17/53 17:00
5	06:01 20:54	06:25 20:33	06:54 08:13-09:00/47 19:49	07:22 19:01	06:55 17:18	07:27 09:24-10:17/53 16:59
6	06:02 20:54	06:26 20:31	06:55 08:13-08:59/46 19:48	07:23 18:59	06:56 17:17	07:28 09:25-10:18/53 16:59
7	06:02 20:53	06:27 20:30	06:56 08:13-08:59/46 19:46	07:24 18:58	06:57 17:16	07:29 09:25-10:19/54 16:59
8	06:03 20:53	06:28 20:29	06:57 08:13-08:59/46 19:45	07:25 18:56	06:58 17:15	07:30 09:25-10:19/54 16:59
9	06:04 20:53	06:29 20:28	06:58 08:13-08:58/45 19:43	07:26 18:55	06:59 17:14	07:31 09:26-10:20/54 16:59
10	06:04 20:52	06:30 20:27	06:59 08:13-08:58/45 19:41	07:27 18:53	07:01 17:13	07:32 09:26-10:21/55 16:59
11	06:05 20:52	06:31 20:25	07:00 08:14-08:57/43 19:40	07:28 18:52	07:02 17:12	07:33 09:27-10:21/54 16:59
12	06:06 20:52	06:32 20:24	07:01 08:14-08:56/42 19:38	07:29 18:50	07:03 09:38-09:48/10 17:11	07:34 09:27-10:21/54 17:00
13	06:06 20:51	06:33 20:23	07:02 08:14-08:54/40 19:37	07:30 18:49	07:04 09:34-09:52/18 17:11	07:34 09:27-10:22/55 17:00
14	06:07 20:51	06:34 20:22	07:03 08:15-08:53/38 19:35	07:31 18:47	07:05 09:31-09:55/24 17:10	07:35 09:28-10:23/55 17:00
15	06:08 20:50	06:35 20:20	07:03 08:16-08:52/36 19:33	07:32 18:46	07:06 09:29-09:57/28 17:09	07:36 09:29-10:23/54 17:00
16	06:08 20:50	06:36 20:19	07:04 08:17-08:50/33 19:32	07:33 18:44	07:07 09:28-09:59/31 17:08	07:36 09:29-10:23/54 17:00
17	06:09 20:49	06:37 20:18	07:05 08:18-08:48/30 19:30	07:34 18:43	07:08 09:28-10:02/34 17:07	07:37 09:29-10:24/55 17:01
18	06:10 20:48	06:38 20:16	07:06 08:20-08:45/25 19:28	07:35 18:41	07:10 09:26-10:03/37 17:07	07:38 09:30-10:25/55 17:01
19	06:11 20:48	06:39 20:15	07:07 08:23-08:42/19 19:27	07:36 18:40	07:11 09:26-10:04/38 17:06	07:38 09:30-10:25/55 17:01
20	06:12 20:47	06:39 08:33-08:46/13 20:13	07:08 08:27-08:37/10 19:25	07:37 18:38	07:12 09:25-10:06/41 17:05	07:39 09:31-10:26/55 17:02
21	06:12 20:46	06:40 08:30-08:49/19 20:12	07:09 19:24	07:38 18:37	07:13 09:24-10:07/43 17:05	07:40 09:31-10:26/55 17:02
22	06:13 20:46	06:41 08:28-08:52/24 20:11	07:10 19:22	07:40 18:36	07:14 09:25-10:09/44 17:04	07:40 09:32-10:27/55 17:03
23	06:14 20:45	06:42 08:26-08:53/27 20:09	07:11 19:20	07:41 18:34	07:15 09:24-10:09/45 17:03	07:41 09:32-10:27/55 17:03
24	06:15 20:44	06:43 08:24-08:55/31 20:08	07:12 19:19	07:42 18:33	07:16 09:24-10:10/46 17:03	07:41 09:32-10:27/55 17:04
25	06:16 20:43	06:44 08:23-08:56/33 20:06	07:13 19:17	06:43 17:32	07:17 09:24-10:11/47 17:02	07:41 09:33-10:28/55 17:04
26	06:17 20:42	06:45 08:21-08:57/36 20:05	07:14 19:15	06:44 17:30	07:18 09:23-10:12/49 17:02	07:42 09:33-10:28/55 17:05
27	06:17 20:42	06:46 08:19-08:57/38 20:03	07:15 19:14	06:45 17:29	07:19 09:23-10:12/49 17:02	07:42 09:33-10:28/55 17:06
28	06:18 20:41	06:47 08:18-08:58/40 20:02	07:16 19:12	06:46 17:28	07:20 09:23-10:13/50 17:01	07:43 09:35-10:29/54 17:06
29	06:19 20:40	06:48 08:17-08:59/42 20:00	07:16 19:11	06:47 17:26	07:22 09:23-10:14/51 17:01	07:43 09:35-10:29/54 17:07
30	06:20 20:39	06:49 08:17-08:59/42 19:59	07:17 19:09	06:48 17:25	07:23 09:23-10:14/51 17:00	07:43 09:35-10:30/55 17:08
31	06:21 20:38	06:50 08:16-09:00/44 19:57		06:49 17:24		07:43 09:36-10:30/54 17:09
Potential sun hours	454	425	374	347	301	293
Sum of minutes with flicker	0	389	774	0	736	1681

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_San Nicolò Gerrei

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:

23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T2 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (50)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:51	07:18	06:50	07:23
	17:10	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:08	06:24	05:58	06:00	06:23	06:51	07:19	06:51	07:24
	17:10	17:44	18:16	19:47	20:17	20:44	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:58	06:00	06:24	06:52	07:20	06:53	07:25
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:01	06:25	06:53	07:21	06:54	07:26
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	17:00
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:57	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:57	06:16	05:56	06:04	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:22	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:00	07:32
	17:18	17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:43	06:54	06:14	05:56	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:52	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:06	06:32	07:01	07:29	07:03	07:33
	17:20	17:55	18:26	19:57	20:27	20:50	20:52	20:24	19:38	18:50	17:11	17:00
13	07:43	07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:02	07:30	07:04	07:34
	17:21	17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:49	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
	17:22	17:58	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:10	17:00
15	07:42	07:17	06:36	06:47	06:10	05:55	06:08	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:46	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:36
	17:24	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:45	06:08	05:55	06:09	06:37	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:31	06:43	06:07	05:55	06:10	06:38	07:06	07:35	07:10	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:07	17:01
19	07:41	07:12	06:30	06:42	06:07	05:56	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:05	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:29	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:24	18:37	17:05	17:02
22	07:39	07:08	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:36	17:04	17:03
23	07:38	07:06	06:23	06:36	06:04	05:56	06:14	06:42	07:11	07:41	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:57	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:37	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:16	06:44	07:13	06:43	07:17	07:41
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:32	17:02	17:04
26	07:36	07:02	06:19	06:32	06:02	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:01	06:17	06:31	06:01	05:58	06:17	06:46	07:15	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:54	20:41	20:03	19:14	17:29	17:01	17:06
28	07:35	06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:38	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39		19:43	20:14	20:42	20:55	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:22	07:43
	17:40		19:44	20:15	20:42	20:54	20:39	19:59	19:09	17:25	17:00	17:08
31	07:32		07:11		05:59		06:21	06:50		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
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_20221101WTG: T3 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (53)

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	07:44 17:10	07:32 17:42	06:58 18:15	07:09 19:46	08:36-09:23/47 06:25 20:16	05:58 20:44
2	07:44 17:10	07:31 17:44	06:56 18:16	07:08 19:47	08:36-09:24/48 06:24 20:17	05:58 20:45
3	07:44 17:11	07:30 17:45	06:55 18:17	07:06 19:48	08:35-09:23/48 06:23 20:18	05:58 20:45
4	07:44 17:12	07:29 17:46	06:53 18:18	07:04 19:49	08:35-09:23/48 06:22 20:19	05:57 20:46
5	07:44 17:13	07:28 17:47	06:52 18:19	07:03 19:50	08:34-09:23/49 06:21 20:20	05:57 20:47
6	07:44 17:14	07:27 17:48	06:50 18:20	07:01 19:51	08:33-09:22/49 06:20 20:21	05:57 20:47
7	07:44 17:15	07:26 17:49	06:49 18:21	07:00 19:52	08:33-09:22/49 06:18 20:22	05:56 20:48
8	07:44 17:16	07:25 17:51	06:47 18:22	06:58 19:53	08:33-09:21/48 06:17 20:23	05:56 20:48
9	07:44 17:17	07:24 17:52	06:46 18:23	06:57 19:54	08:33-09:20/47 06:16 20:24	05:56 20:49
10	07:44 17:18	07:23 17:53	06:44 18:24	06:55 19:55	08:33-09:19/46 06:15 20:25	05:56 20:49
11	07:43 17:19	07:21 17:54	06:43 18:25	06:54 19:56	08:33-09:19/46 06:14 20:26	05:56 20:50
12	07:43 17:20	07:20 17:55	06:41 18:26	06:52 19:57	08:33-09:17/44 06:13 20:27	05:55 20:50
13	07:43 17:21	07:19 17:57	06:39 18:27	06:51 19:58	08:34-09:17/43 06:12 20:28	05:55 20:51
14	07:43 17:22	07:18 17:58	06:38 18:28	06:49 19:59	08:33-09:15/42 06:11 20:29	05:55 20:51
15	07:42 17:23	07:17 17:59	06:36 18:29	06:48 20:00	08:34-09:14/40 06:10 20:30	05:55 20:52
16	07:42 17:24	07:15 18:00	06:35 18:30	06:46 20:01	08:34-09:12/38 06:09 20:30	05:55 20:52
17	07:42 17:25	07:14 18:01	06:33 18:31	06:45 20:02	08:36-09:11/35 06:08 20:31	05:55 20:53
18	07:41 17:26	07:13 18:02	06:32 18:32	06:43 20:03	08:36-09:09/33 06:07 20:32	05:55 20:53
19	07:41 17:27	07:12 18:03	06:30 18:33	06:42 20:04	08:38-09:07/29 06:07 20:33	05:56 20:53
20	07:40 17:28	07:10 18:05	06:28 18:34	06:40 20:05	08:40-09:05/25 06:06 20:34	05:56 20:53
21	07:40 17:30	07:09 18:06	06:27 18:35	06:39 20:06	08:41-09:02/21 06:05 20:35	05:56 20:54
22	07:39 17:31	07:08 18:07	06:25 18:36	06:37 20:07	08:44-08:59/15 06:04 20:36	05:56 20:54
23	07:38 17:32	07:06 18:08	06:24 18:37	06:36 20:08	08:51-08:52/1 06:04 20:37	05:56 20:54
24	07:38 17:33	07:05 18:09	06:22 18:38	06:35 20:09	07:13-07:20/7 06:03 20:38	05:57 20:54
25	07:37 17:34	07:03 18:10	06:20 18:39	06:33 20:10	07:11-07:23/12 06:02 20:38	05:57 20:54
26	07:36 17:35	07:02 18:11	06:19 18:40	06:32 20:11	07:09-07:25/16 06:02 20:39	05:57 20:54
27	07:36 17:36	07:01 18:12	06:17 18:41	06:31 20:12	07:07-07:26/19 06:01 20:40	05:58 20:55
28	07:35 17:38	06:59 18:13	06:16 18:42	06:29 20:13	07:07-07:28/21 06:00 20:41	05:58 20:55
29	07:34 17:39		07:14 19:43	06:28 20:14	07:05-07:28/23 06:00 20:42	05:58 20:55
30	07:33 17:40		07:12 19:44	06:27 20:15	07:05-07:29/24 05:59 20:42	05:59 20:55
31	07:33 17:41		07:11 19:45		07:05-07:31/26 05:59 20:43	
Potential sun hours	302	299	370	397	444	447
Sum of minutes with flicker	0	0	354	891	148	968

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_20221101WTG: T3 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (53)

Assumptions for shadow calculations

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

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

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

The WTG is always operating

	July	August	September	October	November	December
1	05:59 07:07-07:40/33 20:54	06:22 20:37	06:51 08:32-09:18/46 19:56	07:18 19:07	06:50 17:23	07:24 17:00
2	06:00 07:08-07:40/32 20:54	06:23 20:36	06:51 08:32-09:18/46 19:54	07:19 19:06	06:52 17:22	07:25 17:00
3	06:00 07:08-07:40/32 20:54	06:24 20:35	06:52 08:31-09:18/47 19:53	07:20 19:04	06:53 17:21	07:26 17:00
4	06:01 07:09-07:40/31 20:54	06:25 20:34	06:53 08:30-09:18/48 19:51	07:21 19:03	06:54 17:19	07:26 17:00
5	06:01 07:09-07:40/31 20:54	06:25 20:33	06:54 08:29-09:18/49 19:49	07:22 19:01	06:55 17:18	07:27 16:59
6	06:02 07:09-07:40/31 20:54	06:26 20:31	06:55 08:29-09:18/49 19:48	07:23 18:59	06:56 17:17	07:28 16:59
7	06:02 07:09-07:40/31 20:53	06:27 20:30	06:56 08:29-09:18/49 19:46	07:24 18:58	06:57 17:16	07:29 16:59
8	06:03 07:10-07:40/30 20:53	06:28 20:29	06:57 08:29-09:17/48 19:45	07:25 18:56	06:58 17:15	07:30 16:59
9	06:04 07:11-07:40/29 20:53	06:29 20:28	06:58 08:29-09:17/48 19:43	07:26 18:55	06:59 17:14	07:31 16:59
10	06:04 07:11-07:39/28 20:52	06:30 20:27	06:59 08:29-09:17/48 19:41	07:27 18:53	07:01 17:13	07:32 16:59
11	06:05 07:12-07:39/27 20:52	06:31 20:25	07:00 08:29-09:16/47 19:40	07:28 18:52	07:02 17:12	07:33 16:59
12	06:06 07:12-07:38/26 20:52	06:32 20:24	07:01 08:30-09:16/46 19:38	07:29 18:50	07:03 17:11	07:34 17:00
13	06:06 07:13-07:38/25 20:51	06:33 20:23	07:02 08:29-09:14/45 19:37	07:30 18:49	07:04 17:11	07:34 17:00
14	06:07 07:14-07:38/24 20:51	06:34 20:22	07:03 08:30-09:13/43 19:35	07:31 18:47	07:05 17:10	07:35 17:00
15	06:08 07:16-07:37/21 20:50	06:35 20:20	07:03 08:30-09:12/42 19:33	07:32 18:46	07:06 17:09	07:36 17:00
16	06:08 07:16-07:36/20 20:50	06:36 20:19	07:04 08:31-09:11/40 19:32	07:33 18:44	07:07 17:08	07:36 17:00
17	06:09 07:18-07:35/17 20:49	06:37 20:18	07:05 08:32-09:09/37 19:30	07:34 18:43	07:08 17:07	07:37 17:01
18	06:10 07:19-07:34/15 20:48	06:38 20:16	07:06 08:34-09:07/33 19:28	07:35 18:41	07:10 17:07	07:38 17:01
19	06:11 07:22-07:32/10 20:48	06:38 20:15	07:07 08:35-09:05/30 19:27	07:36 18:40	07:11 17:06	07:38 17:01
20	06:12 20:47	06:39 08:53-09:00/7 20:13	07:08 08:37-09:03/26 19:25	07:37 18:38	07:12 17:05	07:39 17:02
21	06:12 20:46	06:40 08:48-09:05/17 20:12	07:09 08:40-09:00/20 19:24	07:38 18:37	07:13 17:05	07:40 17:02
22	06:13 20:46	06:41 08:45-09:07/22 20:11	07:10 08:44-08:53/9 19:22	07:40 18:36	07:14 17:04	07:40 17:03
23	06:14 20:45	06:42 08:43-09:10/27 20:09	07:11 19:20	07:41 18:34	07:15 17:03	07:41 17:03
24	06:15 20:44	06:43 08:41-09:11/30 20:08	07:12 19:19	07:42 18:33	07:16 17:03	07:41 17:04
25	06:16 20:43	06:44 08:40-09:13/33 20:06	07:13 19:17	06:43 17:32	07:17 17:02	07:41 17:04
26	06:17 20:42	06:45 08:38-09:14/36 20:05	07:14 19:15	06:44 17:30	07:18 17:02	07:42 17:05
27	06:17 20:42	06:46 08:36-09:14/38 20:03	07:15 19:14	06:45 17:29	07:19 17:02	07:42 17:06
28	06:18 20:41	06:47 08:35-09:15/40 20:02	07:16 19:12	06:46 17:28	07:20 17:01	07:43 17:06
29	06:19 20:40	06:48 08:34-09:16/42 20:00	07:16 19:11	06:47 17:26	07:22 17:01	07:43 17:07
30	06:20 20:39	06:49 08:33-09:17/44 19:59	07:17 19:09	06:48 17:25	07:23 17:00	07:43 17:08
31	06:21 20:38	06:50 08:33-09:17/44 19:57		06:49 17:24		07:43 17:09
Potential sun hours	454	425	374	347	301	293
Sum of minutes with flicker	493	380	896	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_San Nicolò Gerrei

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
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+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T4 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (54)
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	07:44	07:32	06:58	07:09	06:25 07:33-07:56/23	05:58 06:43-07:05/22	05:59 06:48-07:12/24	06:22	06:51	07:18	06:50	07:24
2	07:44	07:31	06:56	07:08	06:24 07:35-07:55/20	05:58 06:43-07:06/23	06:00 06:49-07:13/24	06:23	06:51	07:19	06:51	07:25
3	07:44	07:30	06:55	07:06	06:23 07:36-07:53/17	05:58 06:43-07:07/24	06:00 06:48-07:13/25	06:24	06:52	07:20	06:53	07:26
4	07:44	07:29	06:53	07:04	06:22 07:38-07:51/13	05:57 06:43-07:06/23	06:01 06:49-07:13/24	06:25	06:53	07:21	06:54	07:26
5	07:44	07:28	06:52	07:03	06:21 07:42-07:47/5	05:57 06:43-07:07/24	06:01 06:49-07:13/24	06:25	06:54	07:22	06:55	07:27
6	07:44	07:27	06:50	07:01	06:19	05:57 06:43-07:07/24	06:02 06:50-07:14/24	06:26	06:55	07:23	06:56	07:28
7	07:44	07:26	06:49	07:00	06:18	05:56 06:44-07:08/24	06:02 06:49-07:13/24	06:27	06:56	07:24	06:57	07:29
8	07:44	07:25	06:47	06:58	06:17	05:56 06:43-07:07/24	06:03 06:50-07:14/24	06:28 07:49-07:58/9	06:57	07:25	06:58	07:30
9	07:44	07:24	06:46	06:57	06:16	05:56 06:43-07:08/25	06:04 06:51-07:14/23	06:29 07:46-08:01/15	06:58	07:26	06:59	07:31
10	07:44	07:23	06:44	06:55	06:15	05:56 06:44-07:08/24	06:04 06:50-07:13/23	06:30 07:44-08:02/18	06:59	07:27	07:01	07:32
11	07:43	07:21	06:43	06:54	06:14	05:56 06:44-07:08/24	06:05 06:51-07:14/23	06:31 07:43-08:04/21	07:00	07:28	07:02	07:33
12	07:43	07:20	06:41	06:52 07:46-07:53/7	06:13	05:55 06:44-07:09/25	06:06 06:51-07:13/22	06:32 07:42-08:05/23	07:01	07:29	07:03	07:34
13	07:43	07:19	06:39	06:51 07:42-07:57/15	06:12	05:55 06:44-07:09/25	06:06 06:51-07:13/22	06:33 07:41-08:06/25	07:02	07:30	07:04	07:34
14	07:43	07:18	06:38	06:49 07:39-07:58/19	06:11	05:55 06:45-07:09/24	06:07 06:52-07:13/21	06:34 07:40-08:07/27	07:02	07:31	07:05	07:35
15	07:42	07:17	06:36	06:48 07:38-08:00/22	06:10	05:55 06:45-07:09/24	06:08 06:53-07:13/20	06:35 07:39-08:07/28	07:03	07:32	07:06	07:36
16	07:42	07:15	06:35	06:46 07:36-08:01/25	06:09	05:55 06:45-07:09/24	06:08 06:53-07:12/19	06:36 07:38-08:08/30	07:04	07:33	07:07	07:36
17	07:42	07:14	06:33	06:45 07:35-08:02/27	06:08	05:55 06:45-07:09/24	06:09 06:54-07:12/18	06:37 07:38-08:08/30	07:05	07:34	07:08	07:37
18	07:41	07:13	06:31	06:43 07:33-08:02/29	06:07	05:55 06:45-07:09/24	06:10 06:55-07:12/17	06:38 07:37-08:08/31	07:06	07:35	07:10	07:38
19	07:41	07:12	06:30	06:42 07:33-08:03/30	06:07	05:56 06:45-07:10/25	06:11 06:56-07:11/15	06:38 07:36-08:08/32	07:07	07:36	07:11	07:38
20	07:40	07:10	06:28	06:40 07:33-08:03/30	06:06	05:56 06:45-07:10/25	06:11 06:57-07:09/12	06:39 07:36-08:08/32	07:08	07:37	07:12	07:39
21	07:40	07:09	06:27	06:39 07:31-08:02/31	06:05	05:56 06:46-07:11/25	06:12 06:59-07:08/9	06:40 07:36-08:08/32	07:09	07:38	07:13	07:40
22	07:39	07:08	06:25	06:37 07:31-08:03/32	06:04 06:50-06:56/6	05:56 06:46-07:11/25	06:13	06:41 07:36-08:07/31	07:10	07:39	07:14	07:40
23	07:38	07:06	06:24	06:36 07:31-08:03/32	06:04 06:48-06:59/11	05:56 06:46-07:11/25	06:14	06:42 07:36-08:07/31	07:11	07:41	07:15	07:41
24	07:38	07:05	06:22	06:35 07:31-08:02/31	06:03 06:47-07:00/13	05:57 06:46-07:11/25	06:15	06:43 07:37-08:06/29	07:12	07:42	07:16	07:41
25	07:37	07:03	06:20	06:33 07:31-08:02/31	06:02 06:46-07:02/16	05:57 06:47-07:11/24	06:16	06:44 07:37-08:06/29	07:13	07:43	07:17	07:41
26	07:36	07:02	06:19	06:32 07:31-08:01/30	06:02 06:45-07:02/17	05:57 06:47-07:11/24	06:16	06:45 07:38-08:05/27	07:14	07:44	07:18	07:42
27	07:36	07:01	06:17	06:31 07:31-08:00/29	06:01 06:44-07:03/19	05:58 06:47-07:11/24	06:17	06:46 07:38-08:03/25	07:15	07:45	07:19	07:42
28	07:35	06:59	06:16	06:29 07:31-08:00/29	06:00 06:44-07:04/20	05:58 06:48-07:12/24	06:18	06:47 07:39-08:01/22	07:15	07:46	07:20	07:43
29	07:34	07:14	06:14	06:28 07:32-07:59/27	06:00 06:43-07:04/21	05:58 06:47-07:12/25	06:19	06:48 07:40-07:59/19	07:16	07:47	07:21	07:43
30	07:33	07:12	06:12	06:27 07:33-07:58/25	05:59 06:43-07:05/22	05:59 06:48-07:13/25	06:20	06:49 07:42-07:57/15	07:17	07:48	07:23	07:43
31	07:33	07:11	06:10	06:25 06:44-07:06/22	05:59 06:44-07:06/22	05:59 06:44-07:06/22	06:21	06:50 07:46-07:53/7	07:19	07:49	07:25	07:48
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	0	0	0	501	245	727	437	588	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_San Nicolò Gerrei

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
Via Santa Margherita 4
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+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T5 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (48)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:51	07:18	06:50	07:24
	17:10	17:42	18:15	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:08	06:24	05:58	06:00	06:23	06:51	07:19	06:52	07:25
	17:10	17:44	18:16	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:58	06:00	06:24	06:52	07:20	06:53	07:26
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:21	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:01	06:25	06:53	07:21	06:54	07:27
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:03	17:19	17:00
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:47	20:54	20:33	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:57	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:57	06:16	05:56	06:04	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:23	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:01	07:32
	17:18	17:53	18:24	19:55	20:25	20:50	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:43	06:54	06:14	05:56	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:52	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:06	06:32	07:01	07:29	07:03	07:34
	17:20	17:55	18:26	19:57	20:27	20:51	20:52	20:24	19:38	18:50	17:11	17:00
13	07:43	07:19	06:39	06:51	06:12	05:55	06:06	06:33	07:02	07:30	07:04	07:34
	17:21	17:57	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:49	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:03	07:31	07:05	07:35
	17:22	17:58	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:10	17:00
15	07:42	07:17	06:36	06:48	06:10	05:55	06:08	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:46	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:37
	17:24	18:00	18:30	20:01	20:31	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:45	06:08	05:55	06:09	06:37	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:32	06:43	06:07	05:55	06:10	06:38	07:06	07:35	07:10	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:07	17:01
19	07:41	07:12	06:30	06:42	06:07	05:56	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:05	18:34	20:05	20:34	20:53	20:47	20:14	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:30	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:24	18:37	17:05	17:02
22	07:39	07:08	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:40	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:36	17:04	17:03
23	07:39	07:06	06:24	06:36	06:04	05:56	06:14	06:42	07:11	07:41	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:57	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:16	06:44	07:13	06:43	07:17	07:42
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:32	17:02	17:04
26	07:37	07:02	06:19	06:32	06:02	05:57	06:17	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:01	06:17	06:31	06:01	05:58	06:17	06:46	07:15	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:55	20:42	20:03	19:14	17:29	17:02	17:06
28	07:35	06:59	06:16	06:29	06:00	05:58	06:18	06:47	07:16	06:46	07:20	07:43
	17:38	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:22	07:43
	17:39		19:43	20:14	20:42	20:55	20:40	20:00	19:11	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:23	07:43
	17:40		19:44	20:15	20:42	20:55	20:39	19:59	19:09	17:25	17:00	17:08
31	07:33		07:11		05:59		06:21	06:50		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:09
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project:

Progetto_San Nicolò Gerrei

Licensed user:

I.A.T. Consulenza e progetti S.r.l.
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+39 070 658297
Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T6 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (47)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50	07:24
	17:09	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:08	06:24	05:58	06:00	06:23	06:51	07:19	06:51	07:25
	17:10	17:43	18:16	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:57	06:00	06:24	06:52	07:20	06:53	07:26
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:01	06:24	06:53	07:21	06:54	07:26
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	16:59
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:56	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:57	06:16	05:56	06:03	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:23	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:01	07:32
	17:18	17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:43	06:54	06:14	05:55	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:52	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03	07:34
	17:20	17:55	18:26	19:57	20:27	20:50	20:52	20:24	19:38	18:50	17:11	16:59
13	07:43	07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:02	07:30	07:04	07:34
	17:21	17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:49	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
	17:22	17:58	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:10	17:00
15	07:42	07:17	06:36	06:47	06:10	05:55	06:08	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:46	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:36
	17:24	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:45	06:08	05:55	06:09	06:37	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:10	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:06	17:01
19	07:41	07:12	06:30	06:42	06:07	05:56	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:29	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:24	18:37	17:05	17:02
22	07:39	07:08	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:36	17:04	17:03
23	07:38	07:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:41	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:57	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:16	06:44	07:13	06:43	07:17	07:41
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:32	17:02	17:04
26	07:36	07:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:01	06:17	06:31	06:01	05:57	06:17	06:46	07:15	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:55	20:42	20:03	19:14	17:29	17:01	17:06
28	07:35	06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:38	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39		19:43	20:14	20:42	20:55	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:23	07:43
	17:40		19:44	20:15	20:42	20:55	20:39	19:59	19:09	17:25	17:00	17:08
31	07:33		07:11		05:59		06:21	06:50		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project:

Progetto_San Nicolò Gerrei

Licensed user:

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Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T7 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (52)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50	07:24
	17:09	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:07	06:24	05:58	06:00	06:23	06:51	07:19	06:51	07:25
	17:10	17:43	18:16	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:57	06:00	06:24	06:52	07:20	06:53	07:25
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:01	06:24	06:53	07:21	06:54	07:26
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	16:59
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:56	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:57	06:16	05:56	06:03	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:23	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:00	07:32
	17:18	17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:42	06:53	06:14	05:55	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:52	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03	07:33
	17:20	17:55	18:26	19:57	20:27	20:50	20:52	20:24	19:38	18:50	17:11	16:59
13	07:43	07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:02	07:30	07:04	07:34
	17:21	17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:49	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
	17:22	17:58	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:10	17:00
15	07:42	07:17	06:36	06:47	06:10	05:55	06:08	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:46	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:36
	17:24	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:44	06:08	05:55	06:09	06:37	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:10	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:06	17:01
19	07:41	07:12	06:30	06:42	06:07	05:55	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:29	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:23	18:37	17:04	17:02
22	07:39	07:07	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:36	17:04	17:03
23	07:38	07:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:41	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:56	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:16	06:44	07:13	06:43	07:17	07:41
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:32	17:02	17:04
26	07:36	07:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:00	06:17	06:31	06:01	05:57	06:17	06:46	07:15	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:55	20:41	20:03	19:14	17:29	17:01	17:06
28	07:35	06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:38	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39		19:43	20:14	20:42	20:55	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:22	07:43
	17:40		19:44	20:15	20:42	20:54	20:39	19:59	19:09	17:25	17:00	17:08
31	07:32		07:11		05:59		06:21	06:50		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project:

Progetto_San Nicolò Gerrei

Licensed user:

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Giuseppe Frongia / direttore@iatprogetti.it
Calculated:
23/11/2022 09:38/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_layout_20221101WTG: T8 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (46)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50	07:24
	17:09	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:07	06:24	05:58	06:00	06:23	06:51	07:19	06:51	07:25
	17:10	17:43	18:16	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:57	06:00	06:24	06:52	07:20	06:53	07:26
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:01	06:24	06:53	07:21	06:54	07:26
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	16:59
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:56	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:57	06:16	05:56	06:03	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:23	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:00	07:32
	17:18	17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:42	06:53	06:14	05:55	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:52	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03	07:34
	17:20	17:55	18:26	19:57	20:27	20:50	20:52	20:24	19:38	18:50	17:11	16:59
13	07:43	07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:02	07:30	07:04	07:34
	17:21	17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:49	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
	17:22	17:58	18:28	19:59	20:29	20:51	20:51	20:22	19:35	18:47	17:10	17:00
15	07:42	07:17	06:36	06:47	06:10	05:55	06:08	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:46	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:36
	17:24	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:44	06:08	05:55	06:09	06:37	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:10	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:06	17:01
19	07:41	07:12	06:30	06:42	06:07	05:55	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:29	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:23	18:37	17:04	17:02
22	07:39	07:07	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:36	17:04	17:03
23	07:38	07:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:41	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:56	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:16	06:44	07:13	06:43	07:17	07:41
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:31	17:02	17:04
26	07:36	07:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:00	06:17	06:31	06:01	05:57	06:17	06:46	07:15	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:55	20:42	20:03	19:14	17:29	17:01	17:06
28	07:35	06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:38	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39		19:43	20:14	20:42	20:55	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:23	07:43
	17:40		19:44	20:15	20:42	20:55	20:39	19:59	19:09	17:25	17:00	17:08
31	07:32		07:11		05:59		06:21	06:50		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
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_20221101WTG: T9 - Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,0 m) (45)

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	07:44	07:32	06:58	07:09	06:25	05:58	05:59	06:22	06:50	07:18	06:50	07:24
	17:09	17:42	18:14	19:46	20:16	20:44	20:54	20:37	19:56	19:07	17:23	17:00
2	07:44	07:31	06:56	07:07	06:24	05:58	05:59	06:23	06:51	07:19	06:51	07:25
	17:10	17:43	18:15	19:47	20:17	20:45	20:54	20:36	19:54	19:06	17:22	17:00
3	07:44	07:30	06:55	07:06	06:23	05:57	06:00	06:23	06:52	07:20	06:53	07:25
	17:11	17:45	18:17	19:48	20:18	20:45	20:54	20:35	19:53	19:04	17:20	17:00
4	07:44	07:29	06:53	07:04	06:22	05:57	06:00	06:24	06:53	07:21	06:54	07:26
	17:12	17:46	18:18	19:49	20:19	20:46	20:54	20:34	19:51	19:02	17:19	16:59
5	07:44	07:28	06:52	07:03	06:21	05:57	06:01	06:25	06:54	07:22	06:55	07:27
	17:13	17:47	18:19	19:50	20:20	20:47	20:54	20:32	19:49	19:01	17:18	16:59
6	07:44	07:27	06:50	07:01	06:19	05:56	06:02	06:26	06:55	07:23	06:56	07:28
	17:14	17:48	18:20	19:51	20:21	20:47	20:54	20:31	19:48	18:59	17:17	16:59
7	07:44	07:26	06:49	07:00	06:18	05:56	06:02	06:27	06:56	07:24	06:57	07:29
	17:15	17:49	18:21	19:52	20:22	20:48	20:53	20:30	19:46	18:58	17:16	16:59
8	07:44	07:25	06:47	06:58	06:17	05:56	06:03	06:28	06:57	07:25	06:58	07:30
	17:16	17:51	18:22	19:53	20:23	20:48	20:53	20:29	19:45	18:56	17:15	16:59
9	07:44	07:24	06:46	06:56	06:16	05:56	06:03	06:29	06:58	07:26	06:59	07:31
	17:17	17:52	18:23	19:54	20:24	20:49	20:53	20:28	19:43	18:55	17:14	16:59
10	07:44	07:22	06:44	06:55	06:15	05:56	06:04	06:30	06:59	07:27	07:00	07:32
	17:18	17:53	18:24	19:55	20:25	20:49	20:52	20:27	19:41	18:53	17:13	16:59
11	07:43	07:21	06:42	06:53	06:14	05:55	06:05	06:31	07:00	07:28	07:02	07:33
	17:19	17:54	18:25	19:56	20:26	20:50	20:52	20:25	19:40	18:51	17:12	16:59
12	07:43	07:20	06:41	06:52	06:13	05:55	06:05	06:32	07:01	07:29	07:03	07:33
	17:20	17:55	18:26	19:57	20:27	20:50	20:52	20:24	19:38	18:50	17:11	16:59
13	07:43	07:19	06:39	06:50	06:12	05:55	06:06	06:33	07:01	07:30	07:04	07:34
	17:21	17:56	18:27	19:58	20:28	20:51	20:51	20:23	19:37	18:48	17:10	17:00
14	07:43	07:18	06:38	06:49	06:11	05:55	06:07	06:34	07:02	07:31	07:05	07:35
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15	07:42	07:17	06:36	06:47	06:10	05:55	06:07	06:35	07:03	07:32	07:06	07:36
	17:23	17:59	18:29	20:00	20:30	20:52	20:50	20:20	19:33	18:45	17:09	17:00
16	07:42	07:15	06:35	06:46	06:09	05:55	06:08	06:36	07:04	07:33	07:07	07:36
	17:24	18:00	18:30	20:01	20:30	20:52	20:50	20:19	19:32	18:44	17:08	17:00
17	07:42	07:14	06:33	06:44	06:08	05:55	06:09	06:36	07:05	07:34	07:08	07:37
	17:25	18:01	18:31	20:02	20:31	20:53	20:49	20:18	19:30	18:43	17:07	17:01
18	07:41	07:13	06:31	06:43	06:07	05:55	06:10	06:37	07:06	07:35	07:10	07:38
	17:26	18:02	18:32	20:03	20:32	20:53	20:48	20:16	19:28	18:41	17:06	17:01
19	07:41	07:11	06:30	06:42	06:06	05:55	06:11	06:38	07:07	07:36	07:11	07:38
	17:27	18:03	18:33	20:04	20:33	20:53	20:48	20:15	19:27	18:40	17:06	17:01
20	07:40	07:10	06:28	06:40	06:06	05:56	06:11	06:39	07:08	07:37	07:12	07:39
	17:28	18:04	18:34	20:05	20:34	20:53	20:47	20:13	19:25	18:38	17:05	17:02
21	07:40	07:09	06:27	06:39	06:05	05:56	06:12	06:40	07:09	07:38	07:13	07:40
	17:29	18:06	18:35	20:06	20:35	20:54	20:46	20:12	19:23	18:37	17:04	17:02
22	07:39	07:07	06:25	06:37	06:04	05:56	06:13	06:41	07:10	07:39	07:14	07:40
	17:31	18:07	18:36	20:07	20:36	20:54	20:46	20:11	19:22	18:35	17:04	17:03
23	07:38	07:06	06:23	06:36	06:03	05:56	06:14	06:42	07:11	07:40	07:15	07:41
	17:32	18:08	18:37	20:08	20:37	20:54	20:45	20:09	19:20	18:34	17:03	17:03
24	07:38	07:05	06:22	06:35	06:03	05:56	06:15	06:43	07:12	07:42	07:16	07:41
	17:33	18:09	18:38	20:09	20:38	20:54	20:44	20:08	19:19	18:33	17:03	17:04
25	07:37	07:03	06:20	06:33	06:02	05:57	06:15	06:44	07:13	06:43	07:17	07:41
	17:34	18:10	18:39	20:10	20:38	20:54	20:43	20:06	19:17	17:31	17:02	17:04
26	07:36	07:02	06:19	06:32	06:01	05:57	06:16	06:45	07:14	06:44	07:18	07:42
	17:35	18:11	18:40	20:11	20:39	20:54	20:42	20:05	19:15	17:30	17:02	17:05
27	07:36	07:00	06:17	06:30	06:01	05:57	06:17	06:46	07:14	06:45	07:19	07:42
	17:36	18:12	18:41	20:12	20:40	20:55	20:41	20:03	19:14	17:29	17:01	17:05
28	07:35	06:59	06:15	06:29	06:00	05:58	06:18	06:47	07:15	06:46	07:20	07:43
	17:37	18:13	18:42	20:13	20:41	20:55	20:41	20:02	19:12	17:28	17:01	17:06
29	07:34		07:14	06:28	06:00	05:58	06:19	06:48	07:16	06:47	07:21	07:43
	17:39		19:43	20:14	20:42	20:55	20:40	20:00	19:10	17:26	17:01	17:07
30	07:33		07:12	06:27	05:59	05:59	06:20	06:49	07:17	06:48	07:22	07:43
	17:40		19:44	20:15	20:42	20:55	20:39	19:59	19:09	17:25	17:00	17:08
31	07:32		07:11		05:59		06:21	06:49		06:49		07:43
	17:41		19:45		20:43		20:38	19:57		17:24		17:08
Potential sun hours	302	299	370	397	444	447	454	425	374	347	301	293
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project:

Progetto_San Nicolò Gerrei

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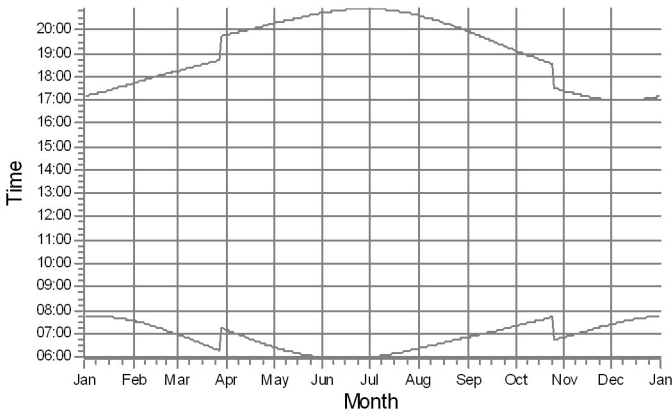
Calculated:

23/11/2022 09:38/3.4.415

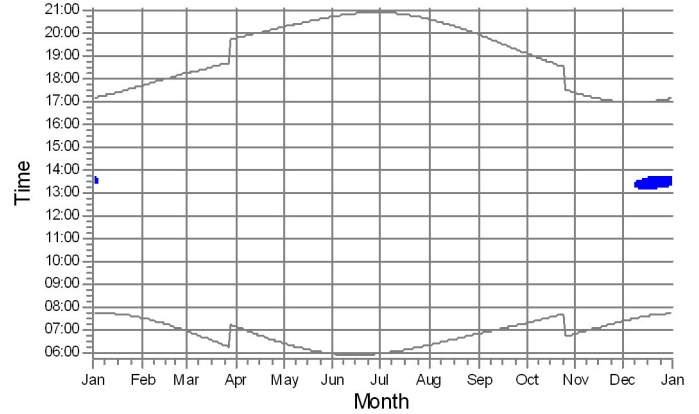
SHADOW - Calendar per WTG, graphical

Calculation: Progetto_layout_20221101

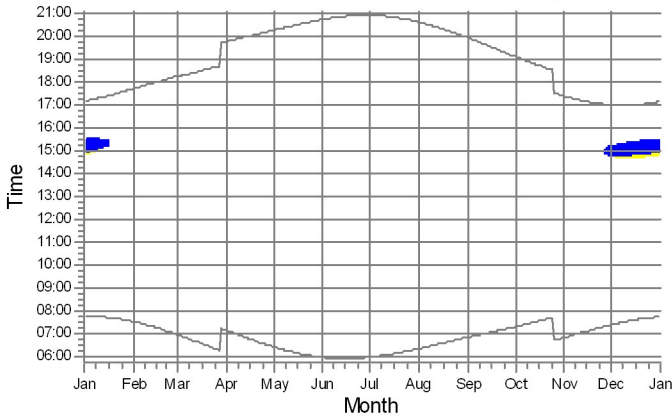
T1: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



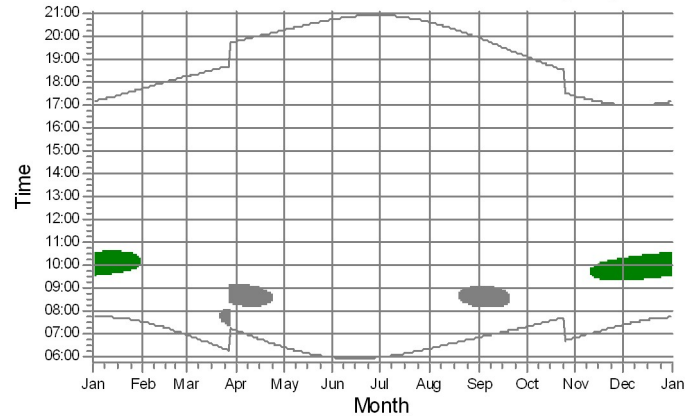
T10: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



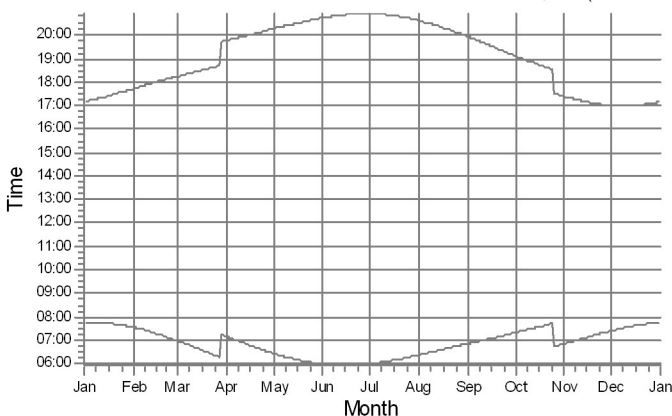
T11: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



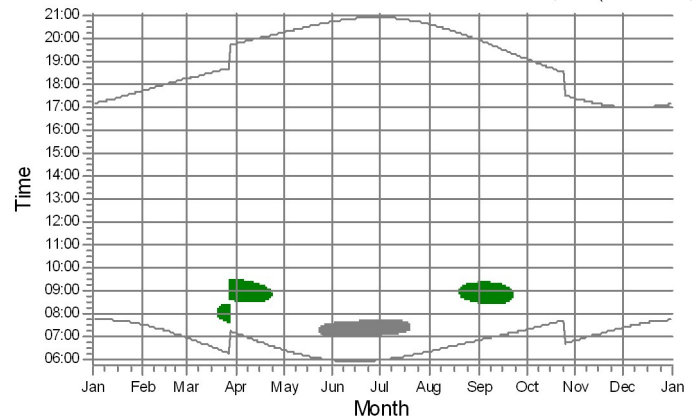
T12: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



T2: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



T3: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,



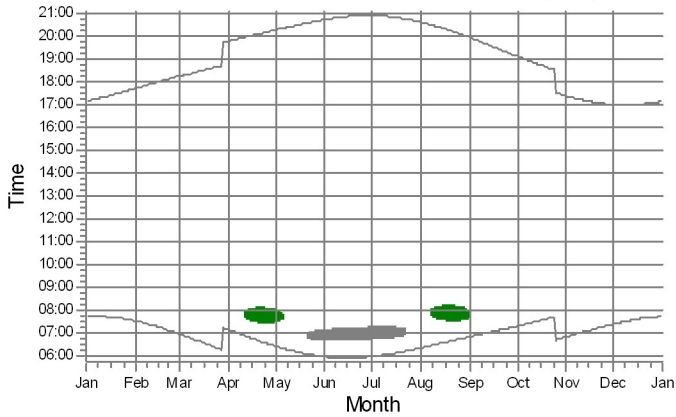
Shadow receptors

	F08: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (30)
	F21: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (31)
	F23: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (32)
	F50: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (33)

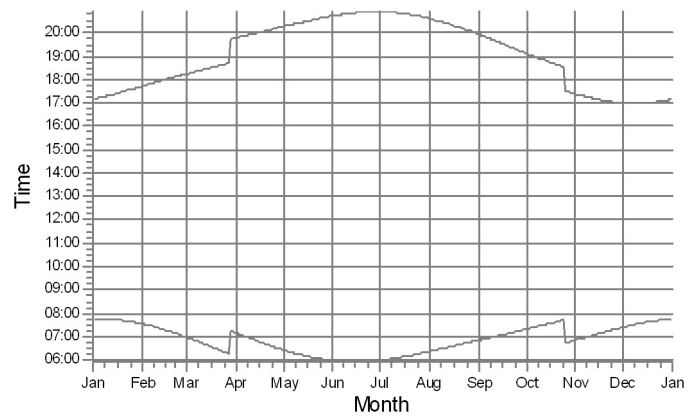
SHADOW - Calendar per WTG, graphical

Calculation: Progetto_layout_20221101

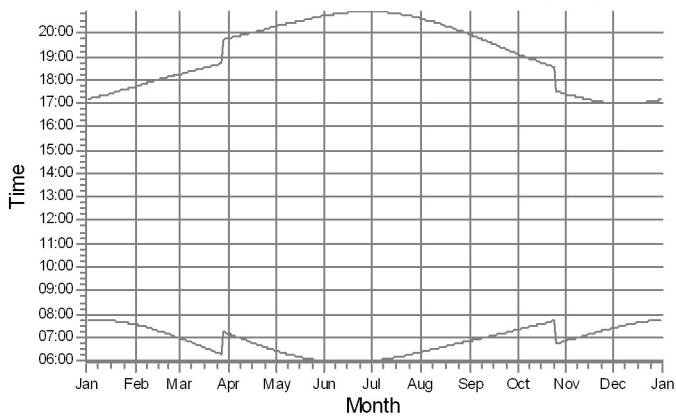
T4: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



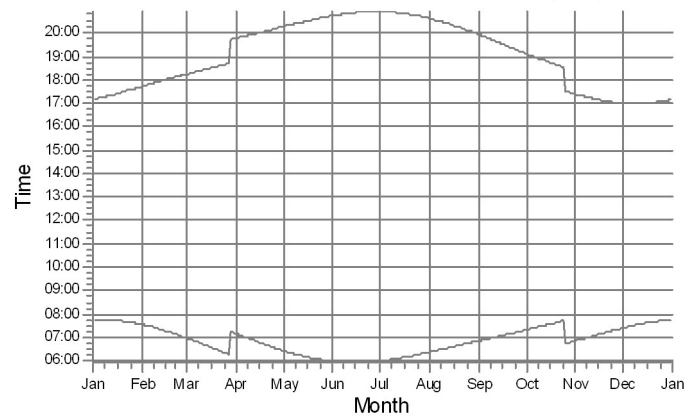
T5: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,



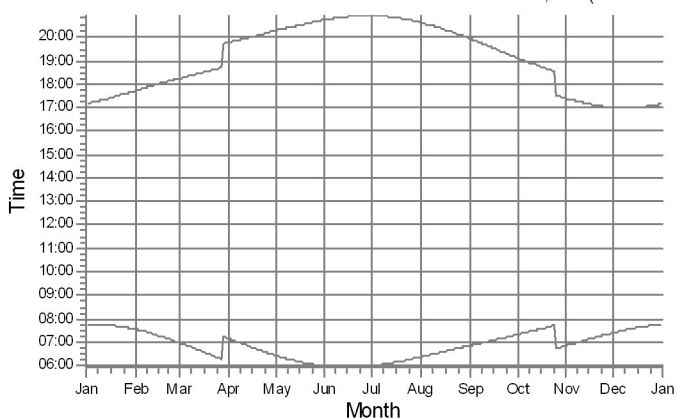
T6: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



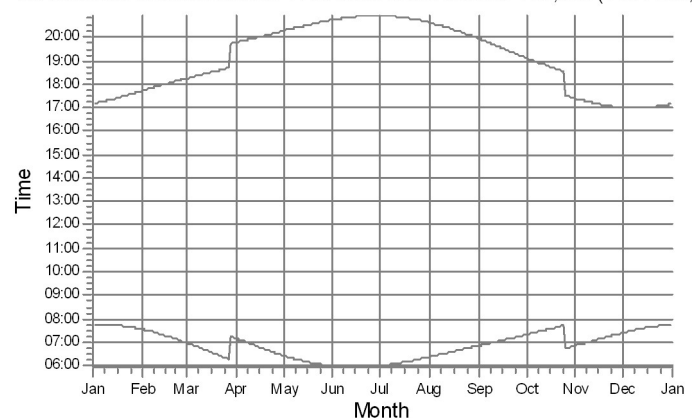
T7: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,



T8: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200



T9: Siemens Gamesa SG 6.6-170!! 6600 170.0 !O! hub: 115,0 m (TOT: 200,



Shadow receptors



F08: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (30)

F50: Shadow Receptor: 1,2 × 1,4 Azimuth: 0,0° Slope: 90,0° (33)