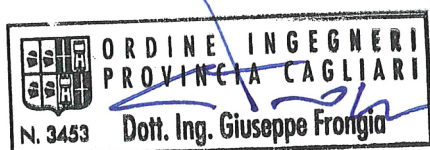PROGETTO DI COSTRUZIONE ED ESERCIZIO DI UN IMPIANTO EOLICO DELLA POTENZA DI 99 MW DENOMINATO "PERDA PINTA" DA REALIZZARSI NEL COMUNE DI NUORO (NU) CON LE RELATIVE OPERE DI CONNESSIONE ELETTRICHE.

ANALISI DEGLI EFFETTI DI SHADOW - FLICKERING

Rev. 0.0   Data: Novembre 2022

WIND008-RA12

Committente:

Nuoro Wind S.r.l.
Corso di Porta Vittoria n. 9
20122 Milano (MI)
C. F. e P. IVA: 12332370969
PEC: nuorosrl@mailcertificata.net

Incaricato:

Queequeg Renewables, ltd
Unit 3.03, 1110 Great West Road
TW80GP London (UK)
Company number: 111780524
email: mail@quenter.co.uk

Progettazione e SIA:

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

iat CONSULENZA E PROGETTI

www.iatprogetti.it

ORDINE INGEGNERI PROVINCIA CAGLIARI
N. 3453 Dott. Ing. Giuseppe Frongia

PROGETTAZIONE:

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

Ing. Giuseppe Frongia (Direttore Tecnico)

GRUPPO DI PROGETTAZIONE:

Ing. Giuseppe Frongia (Coordinatore e responsabile)

Ing. Marianna Barbarino

Ing. Enrica Batzella

Dott. Pian. Andrea Cappai

Ing. Paolo Desogus

Pian. Veronica Fais

Ing. Gianluca Melis

Ing. Andrea Onnis

Pian. Eleonora Re

Ing. Elisa Roych

COLLABORAZIONI SPECIALISTICHE:

Verifiche strutturali: Ing. Gianfranco Corda

Aspetti geologici e geotecnici: Dott. Geol. Maria Francesca Lobina e Dott. Geol. Mauro Pompei

Aspetti faunistici: Dott. Nat. Maurizio Medda

Caratterizzazione pedologica: Agr. Dott. Nat. Nicola Manis

Acustica: Ing. Antonio Dedoni

Aspetti floristico-vegetazionali: Agr. Dott. Nat. Fabio Schirru

Aspetti archeologici: Dott. Matteo Tatti

SOMMARIO

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 "Perda Pinta", proposto dalla Nuoro Wind S.r.l., controllata dal gruppo Yinson Holdings Berhad, nel territorio di Nuoro (NU), esamina compiutamente il potenziale disturbo da ombreggiamento intermittente (*shadow flickering*) 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" all'interno di apposito report allegato al progetto del parco eolico (Elaborato WIND008-RA14_Report fabbricati).

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.

2   Descrizione del fenomeno

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

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

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

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

Per le ragioni anzidette, a distanze turbine-ricettore superiori a circa 300 metri solitamente il fenomeno di *shadow flickering* si manifesta all'alba o al tramonto, 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;

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 11 RPM si avrà una frequenza di passo pari a circa 0,5 Hz. Tali frequenze di oscillazione luminosa sono prive di rischi significativi per la salute.

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

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

3   Individuazione dei ricettori

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

L'Elaborato WIND008-RA14-1 (*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 WIND008-RA14 allegato alla documentazione progettuale.

Nel caso specifico, ai fini dei calcoli di esposizione all'ombra intermittente, sono stati individuati come ricettori n. 3 fabbricati, con utilizzo abitativo accertato (n. 2 edifici con categoria catastale "A" e n. 1 agriturismo), ubicati entro una distanza massima di circa 1000 m dalle più prossime postazioni eoliche.

Entro tali distanze è, infatti, ragionevole che si manifestino i più avertiti 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.

Tabella 3.1: Fabbricati con utilizzo abitativo esposti al potenziale disturbo da shadow flickering

Fabbricato	Comune	GB Est	GB Nord	WTG più prossimo [m]	Distanza dal più prossimo WTG [m]	Categoria Catasto Fabbricati
F025	Nuoro	1525191	4468624	WTG013	900	A3 – Abitazioni di tipo economico
F045	Nuoro	1520707	4464736	WTG002	866	A3 – Abitazioni di tipo economico
F066	Nuoro	1524248	4470274	WTG013	1022	F6 - fabbricato in attesa di dichiarazione (Agriturismo Costiolu)

4   Ipotesi alla base del calcolo e soglie di riferimento

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

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

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

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

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

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

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

— il vento deve soffiare ad una velocità superiore a 3 m/s (velocità di *cut-in* del rotore);

— presenza di luminosità solare diretta;

— l'osservatore deve risultare sufficientemente vicino alla sorgente di *shadow flickering*;

— il ricettore deve essere effettivamente esposto al campo di luce tremolante;

— l'illuminazione dell'ambiente residenziale deve essere bassa;

— il contrasto tra luci ed ombre deve essere alto;

— non devono essere presenti schermature che ostacolino la propagazione dell'ombra (come tendaggi o alberature);

— gli individui potenzialmente soggetti ad un impatto da *shadow flickering* dovrebbero permanere esposti alla luce tremolante per un tempo sufficiente ad avvertire fastidio.

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

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

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

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

Il massimo ombreggiamento su un edificio secondo tali linee-guida è stabilito in:
- 30 ore di ombreggiamento annuale;
- 30 minuti di ombreggiamento giornaliero.

In tali archi temporali (30 ore/anno e 30 minuti/giorno), trattandosi di un disturbo effettivamente avvertito dagli occupanti l'edificio, dovrebbero risultare simultaneamente verificate le seguenti condizioni:
— gli ambienti esposti all'ombreggiamento sono occupati;
— gli occupanti sono svegli.

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

La Figura 4.1 e la Figura 4.2 mostrano i parametri necessari al modello utilizzato dal modulo SHADOW per valutare l'impatto del tremolio dell'ombra.
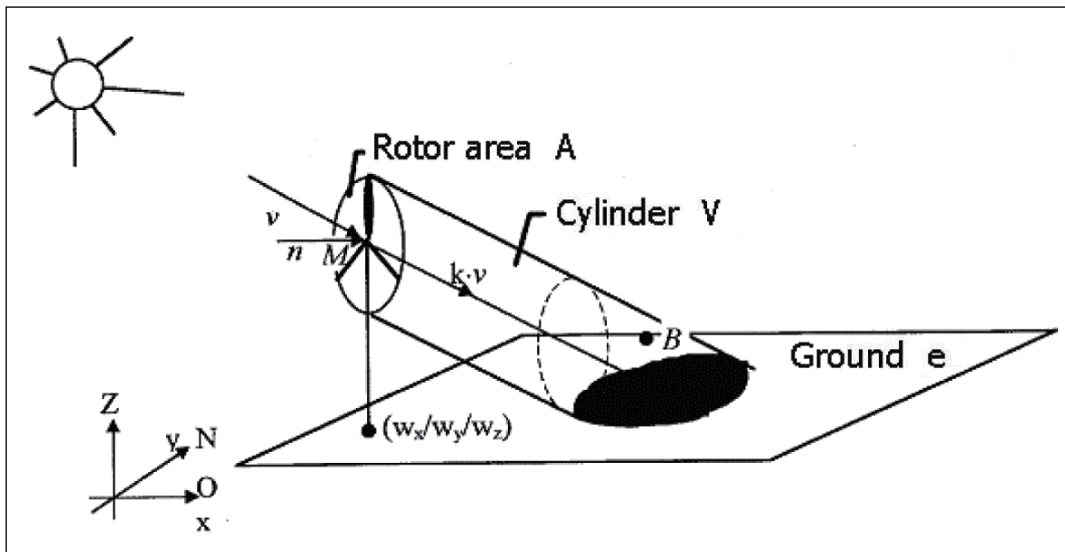
Figura 4.1: Rappresentazione schematica della proiezione dell'ombra del rotore.
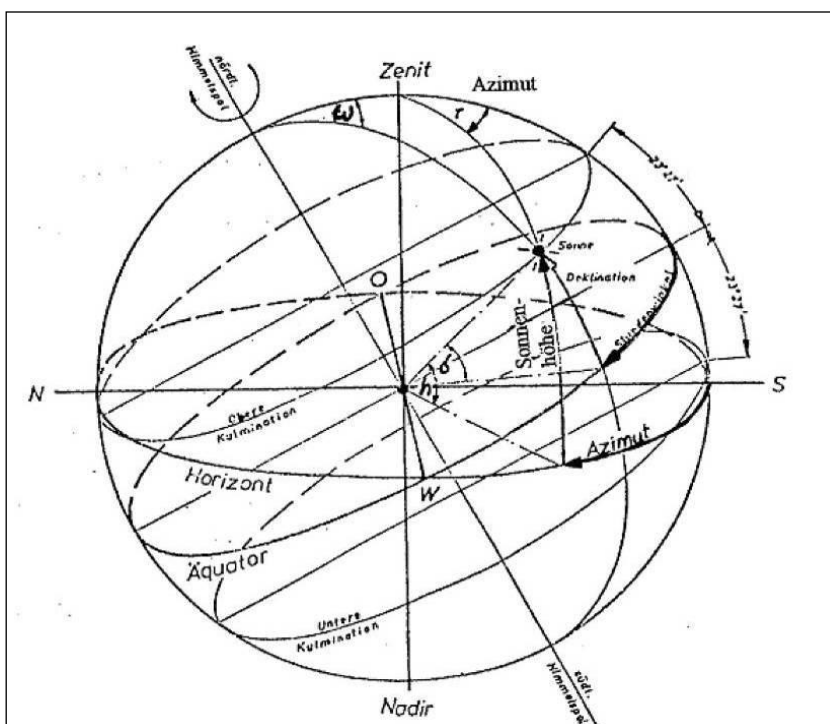
Figura 4.2: Schema dei moti terrestri e parametri di calcolo.

Questi calcoli sono basati sullo scenario più conservativo (ombra massima astronomica, ossia basata sulla posizione del sole rispetto alle WTG). Se il cielo è coperto o c'è calma di vento, o la direzione del vento è tale da porre il piano del rotore in posizione parallela rispetto alla linea sole-edificio, la WTG non produrrà ombra, ma la sua influenza apparirà comunque nei calcoli. In altre parole, il calcolo descrive lo scenario peggiore possibile, e rappresenta quindi il massimo rischio potenziale di impatto. Per ciascun ricettore il software produce un calendario che indica i giorni ed i periodi di tempo in cui l'ombra sarà presente.

Nello specifico caso in esame, come più oltre evidenziato, preso atto delle favorevoli risultanze delle simulazioni nello scenario *worst case* in corrispondenza dei 3 ricettori oggetto di analisi, in riferimento alla conformità agli standard di riferimento precedentemente indicati, non è stato ritenuto necessario procedere all'esecuzione delle verifiche nello scenario *real case*.

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 *worst case*, le isolinee d'ombra sono state rappresentate su specifica tavola grafica, in scala adeguata alla dimensione territoriale da rappresentare, per facilitarne la lettura. La tavola è stata realizzata, pertanto, su base cartografica in scala 1:10.000 (Elaborato WIND008-RA12-1).

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

I risultati numerici delle simulazioni modellistiche, condotti esclusivamente con riferimento allo scenario di calcolo *worst case*, sono riportati in Appendice.

6   Analisi dei risultati

Le risultanze del calcolo modellistico atto a stimare i valori totali di potenziale interferenza da *shadow flickering* in corrispondenza dei ricettori nello scenario di progetto sono riportate in *Tabella 6.1*.

Tabella 6.1: Risultati dei calcoli di ombreggiamento intermittente presso i ricettori considerati (Scenario worst case)

ID	RICETTORE	Cat. Catastale	WTG SF	WTG Più prossimo	Dist. Min. WTG	h/anno SF Worst Case	h/giorno SF Worst Case
1	F025	A3	-	WTG013	900	00:00:00	00:00
2	F045	A3	-	WTG002	866	00:00:00	00:00
3	F066	F6	WTG012 - WTG011	WTG013	1022	19:50:00	0:25

Come si può osservare dall'esame della Tabella 6.1, l'incidenza dell'ombreggiamento intermittente presso i ricettori considerati nello "scenario peggiore" è sempre al disotto del valore guida di 30 h/anno. Nello specifico, i ricettori F025 e F045, in ragione della loro ubicazione rispetto agli aerogeneratori in progetto, non saranno esposti al fenomeno dell'ombreggiamento intermittente. Relativamente al fabbricato F066 (Agriturismo Costiolu), lo stesso sarà interessato dalla proiezione dell'ombra intermittente per una durata stimata in appena 19:50 h/anno nello scenario *worst case*, abbondantemente al disotto della soglia di riferimento 30 h/anno.
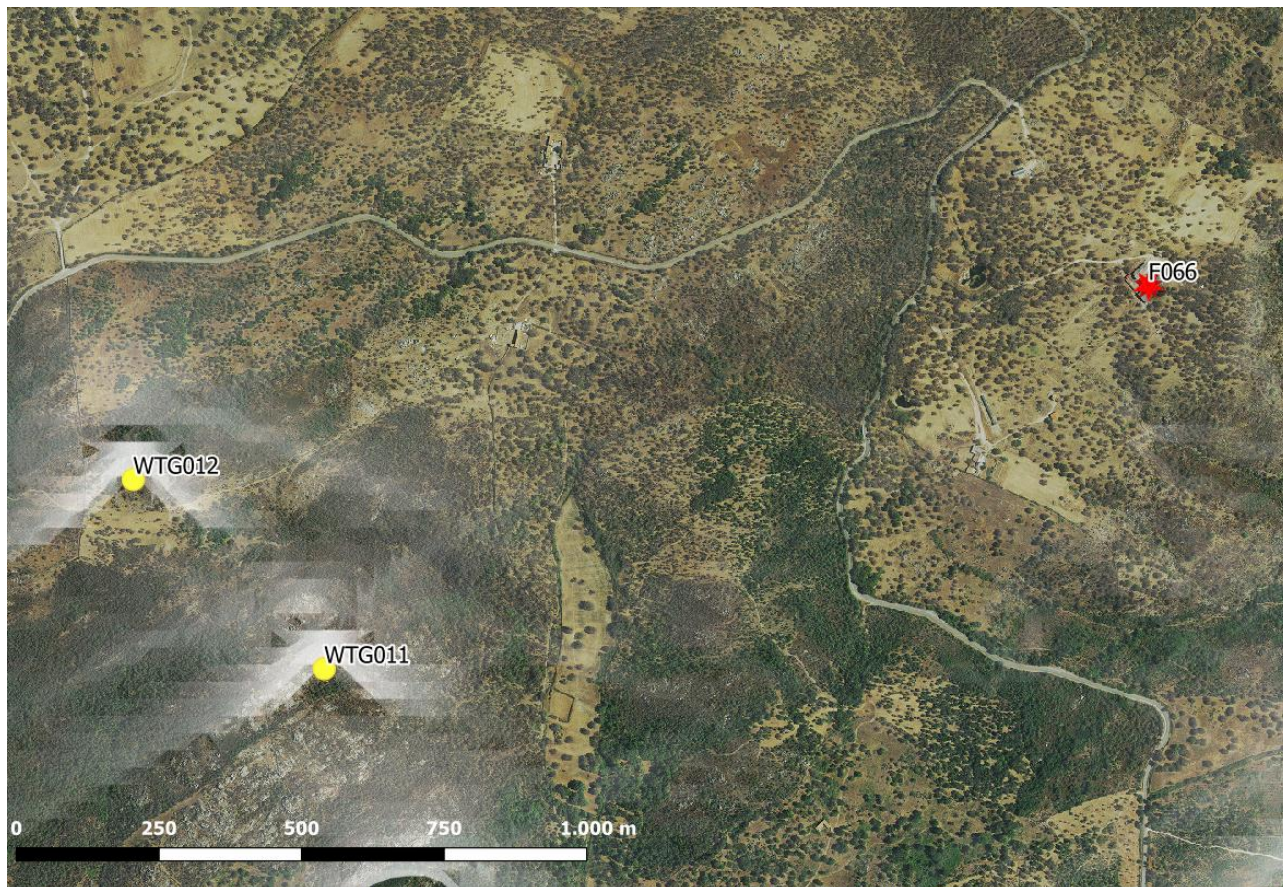
Figura 6.1 – Posizionamento del ricettore F066 rispetto agli aerogeneratori WTG011 e WTG012, all'origine di un potenziale ombreggiamento intermittente sul fabbricato, di entità comunque inferiore alla soglia di riferimento di 30 h/anno. In bianco le isolinee d'ombra.

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 "Perda Pinta". L'individuazione dei ricettori ha fatto riferimento alla ricognizione sugli edifici esistenti eseguita nell'ambito della definizione del layout di impianto e dell'analisi ambientale, i cui risultati sono riepilogati in opportune "schede fabbricati" all'interno di apposito report allegato alla documentazione progettuale.

Ai fini dei calcoli di esposizione all'ombra intermittente, sono stati individuati come ricettori n. 3 fabbricati, con utilizzo abitativo accertato (n. 2 edifici con categoria catastale "A" e n. 1 agriturismo), ubicati entro una distanza massima di circa 1000 m dalle più prossime 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.

L'incidenza dell'ombreggiamento intermittente presso i ricettori considerati nello "scenario peggiore" è sempre al disotto del valore guida di 30 h/anno. Nello specifico, i ricettori F025 e F045, in ragione della loro ubicazione rispetto agli aerogeneratori in progetto, non saranno esposti al fenomeno dell'ombreggiamento intermittente. Relativamente al fabbricato F066 (Agriturismo Costiolu), lo stesso sarà interessato dalla proiezione dell'ombra intermittente per una durata stimata in appena 19:50 h/anno nello scenario *worst case*, abbondantemente al disotto della soglia di riferimento 30 h/anno.

Tale circostanza consente di escludere con ragionevole certezza un effetto di disturbo significativo derivante dal fenomeno del shadow-flickering sugli occupanti il suddetto edificio.

SHADOW - Main Result

Calculation: Progetto_2022_10_14
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_Nuoro_1.w
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)

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

Scale 1:125.000
⅄ New WTG   🝔 Shadow receptor

WTGs

	Easting	Northing	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data Calculation distance [m]	RPM [RPM]
WTG001	1.518.181	4.465.700	679,8	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG002	1.520.178	4.465.422	660,0	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG003	1.519.931	4.465.907	679,4	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG004	1.520.355	4.466.530	707,8	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG005	1.518.292	4.467.298	685,2	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG006	1.520.331	4.467.198	740,0	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG007	1.521.838	4.468.308	738,8	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG008	1.522.560	4.468.557	746,7	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG009	1.520.592	4.468.733	763,2	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG010	1.522.972	4.469.134	757,6	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG011	1.522.803	4.469.603	807,3	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG012	1.522.468	4.469.934	811,5	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG013	1.524.625	4.469.324	677,5	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG014	1.523.742	4.471.361	760,0	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8
WTG015	1.524.579	4.471.564	741,2	Siemens Gamesa SG ...	Yes	Siemens Gamesa	SG 6.0-170-6.000	6.000	170,0	135,0	2.040	8,8

Shadow receptor-Input

No.	Name	Easting	Northing	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
F025	A03	1.525.191	4.468.624	674,6	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F045	A03	1.520.707	4.464.736	570,1	1,2	1,4	1,2	90,0	"Green house mode"	2,6
F066	F06 (agriturismo Castiolu)	1.524.248	4.470.274	731,5	1,2	1,4	1,2	90,0	"Green house mode"	2,6

Calculation Results
Shadow receptor

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
F025	A03	0:00	0	0:00
F045	A03	0:00	0	0:00
F066	F06 (agriturismo Castiolu)	19:50	63	0:25

SHADOW - Main Result

Calculation: Progetto_2022_10_14

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

No.	Name	Worst case [h/year]
WTG001	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (28)	0:00
WTG002	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (29)	0:00
WTG003	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (30)	0:00
WTG004	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (31)	0:00
WTG005	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (32)	0:00
WTG006	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (33)	0:00
WTG007	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (35)	0:00
WTG008	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (34)	0:00
WTG009	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (36)	0:00
WTG010	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (40)	0:00
WTG011	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (39)	12:03
WTG012	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (38)	7:47
WTG013	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (41)	0:00
WTG014	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (37)	0:00
WTG015	Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (42)	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.

windPRO

SHADOW - Calendar

Calculation: Progetto_2022_10_14Shadow receptor: F025 - A03
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
　The sun is shining all the day, from sunrise to sunset
　The rotor plane is always perpendicular to the line from the WTG to the sun
　The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:56	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:21	16:58
2	07:46	07:33	06:57	07:07	06:23	05:55	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:21	05:55	05:57	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:57
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:55	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:52	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:11	17:47	18:19	19:52	20:23	20:50	20:56	20:33	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:55	07:25	06:59	07:32
	17:12	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:57	17:15	16:57
8	07:46	07:26	06:48	06:58	06:15	05:53	06:00	06:26	06:56	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:45	18:56	17:14	16:57
9	07:46	07:25	06:46	06:56	06:14	05:53	06:01	06:27	06:57	07:27	07:01	07:34
	17:14	17:50	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:54	06:13	05:53	06:02	06:28	06:58	07:28	07:02	07:35
	17:15	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:35
	17:16	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:40	18:51	17:11	16:57
12	07:46	07:22	06:41	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:17	17:54	18:26	19:58	20:29	20:53	20:54	20:26	19:39	18:50	17:10	16:57
13	07:45	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:18	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:04	06:32	07:02	07:32	07:07	07:38
	17:20	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:46	17:08	16:57
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:44	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:09	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58
17	07:44	07:15	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:03	20:34	20:55	20:52	20:19	19:30	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:04	20:35	20:56	20:51	20:18	19:29	18:40	17:05	16:59
19	07:43	07:13	06:30	06:41	06:04	05:53	06:08	06:37	07:07	07:37	07:13	07:41
	17:25	18:02	18:33	20:05	20:36	20:56	20:50	20:16	19:27	18:39	17:04	16:59
20	07:43	07:11	06:28	06:39	06:04	05:53	06:09	06:38	07:08	07:38	07:14	07:42
	17:26	18:04	18:34	20:06	20:37	20:56	20:50	20:15	19:25	18:37	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:27	18:05	18:36	20:08	20:37	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:17	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:20	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:46	20:09	19:19	18:32	17:01	17:01
25	07:39	07:04	06:20	06:32	06:00	05:54	06:13	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:30	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:54	06:14	06:44	07:14	06:45	07:21	07:45
	17:33	18:10	18:41	20:13	20:42	20:57	20:45	20:06	19:15	17:29	17:00	17:02
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:57	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:47	07:23	07:45
	17:36	18:13	18:43	20:15	20:43	20:57	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:57	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:57	20:42	20:01	19:10	17:25	16:59	17:05
30	07:35		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:57	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:10		05:56		06:19	06:49		06:51		07:46
	17:39		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	300	290
Total, worst case												

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

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

windPRO

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar

Calculation: Progetto_2022_10_14Shadow receptor: F045 - A03
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
　The sun is shining all the day, from sunrise to sunset
　The rotor plane is always perpendicular to the line from the WTG to the sun
　The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:58
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:49	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:46	07:25	06:46	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:14	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:53	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:01	07:31	07:06	07:37
	17:19	17:56	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:58
14	07:45	07:19	06:38	06:48	06:09	05:53	06:05	06:33	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:06	06:34	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:34	06:44	06:07	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:59
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:56	20:50	20:15	19:26	18:38	17:03	17:00
21	07:42	07:10	06:27	06:38	06:03	05:54	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:01
23	07:41	07:07	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:39	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:10	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:57	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:16	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:56	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:26	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:39		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
Total, worst case												

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

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

windPRO

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar

Calculation: Progetto_2022_10_14Shadow receptor: F066 - F06 (agriturismo Castiolu)
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

Day	January	February	Feb min	Feb first (WTG)	Feb last (WTG)	March	Mar min	Mar first (WTG)	Mar last (WTG)	April	May	June
1	07:46 / 17:07	07:34 / 17:41				06:59 / 18:14				07:09 / 19:47	06:24 / 20:18	05:56 / 20:47
2	07:47 / 17:08	07:33 / 17:42				06:57 / 18:15				07:07 / 19:48	06:23 / 20:19	05:55 / 20:47
3	07:47 / 17:09	07:32 / 17:43				06:56 / 18:16				07:06 / 19:49	06:21 / 20:20	05:55 / 20:48
4	07:47 / 17:10	07:31 / 17:44	9	17:02 (WTG011)	17:11 (WTG011)	06:54 / 18:17				07:04 / 19:50	06:20 / 20:21	05:55 / 20:49
5	07:47 / 17:11	07:30 / 17:46	14	17:00 (WTG011)	17:14 (WTG011)	06:52 / 18:18	10	17:41 (WTG012)	17:51 (WTG012)	07:02 / 19:51	06:19 / 20:22	05:54 / 20:49
6	07:47 / 17:11	07:29 / 17:47	18	16:58 (WTG011)	17:16 (WTG011)	06:51 / 18:19	14	17:40 (WTG012)	17:54 (WTG012)	07:01 / 19:52	06:18 / 20:23	05:54 / 20:50
7	07:47 / 17:12	07:28 / 17:48	19	16:58 (WTG011)	17:17 (WTG011)	06:49 / 18:21	18	17:37 (WTG012)	17:55 (WTG012)	06:59 / 19:53	06:17 / 20:24	05:54 / 20:51
8	07:47 / 17:13	07:27 / 17:49	21	16:57 (WTG011)	17:18 (WTG011)	06:48 / 18:22	19	17:36 (WTG012)	17:55 (WTG012)	06:58 / 19:54	06:15 / 20:25	05:53 / 20:51
9	07:46 / 17:14	07:25 / 17:50	23	16:56 (WTG011)	17:19 (WTG011)	06:46 / 18:23	21	17:35 (WTG012)	17:56 (WTG012)	06:56 / 19:55	06:14 / 20:26	05:53 / 20:52
10	07:46 / 17:15	07:24 / 17:52	24	16:56 (WTG011)	17:20 (WTG011)	06:45 / 18:24	22	17:34 (WTG012)	17:56 (WTG012)	06:54 / 19:56	06:13 / 20:27	05:53 / 20:52
11	07:46 / 17:16	07:23 / 17:53	25	16:55 (WTG011)	17:20 (WTG011)	06:43 / 18:25	21	17:35 (WTG012)	17:56 (WTG012)	06:53 / 19:57	06:12 / 20:28	05:53 / 20:53
12	07:46 / 17:17	07:22 / 17:54	25	16:55 (WTG011)	17:20 (WTG011)	06:41 / 18:26	22	17:34 (WTG012)	17:56 (WTG012)	06:51 / 19:58	06:11 / 20:29	05:53 / 20:53
13	07:46 / 17:18	07:21 / 17:55	25	16:55 (WTG011)	17:20 (WTG011)	06:40 / 18:27	21	17:34 (WTG012)	17:55 (WTG012)	06:50 / 19:59	06:10 / 20:30	05:53 / 20:54
14	07:45 / 17:20	07:19 / 17:56	25	16:56 (WTG011)	17:21 (WTG011)	06:38 / 18:28	19	17:35 (WTG012)	17:54 (WTG012)	06:48 / 20:00	06:09 / 20:31	05:53 / 20:54
15	07:45 / 17:21	07:18 / 17:58	25	16:55 (WTG011)	17:20 (WTG011)	06:37 / 18:29	18	17:35 (WTG012)	17:53 (WTG012)	06:47 / 20:01	06:08 / 20:32	05:53 / 20:55
16	07:45 / 17:22	07:17 / 17:59	24	16:56 (WTG011)	17:20 (WTG011)	06:35 / 18:30	15	17:36 (WTG012)	17:51 (WTG012)	06:45 / 20:02	06:07 / 20:33	05:53 / 20:55
17	07:44 / 17:23	07:16 / 18:00	22	16:57 (WTG011)	17:19 (WTG011)	06:33 / 18:31	11	17:38 (WTG012)	17:49 (WTG012)	06:44 / 20:03	06:06 / 20:34	05:53 / 20:56
18	07:44 / 17:24	07:14 / 18:01	21	16:57 (WTG011)	17:18 (WTG011)	06:32 / 18:32				06:42 / 20:04	06:05 / 20:35	05:53 / 20:56
19	07:43 / 17:25	07:13 / 18:02	18	16:59 (WTG011)	17:17 (WTG011)	06:30 / 18:33				06:41 / 20:06	06:04 / 20:36	05:53 / 20:56
20	07:43 / 17:26	07:12 / 18:04	14	17:01 (WTG011)	17:15 (WTG011)	06:28 / 18:35				06:39 / 20:07	06:04 / 20:37	05:53 / 20:56
21	07:42 / 17:27	07:10 / 18:05	9	17:03 (WTG011)	17:12 (WTG011)	06:27 / 18:36				06:38 / 20:08	06:03 / 20:38	05:53 / 20:57
22	07:41 / 17:29	07:09 / 18:06				06:25 / 18:37				06:36 / 20:09	06:02 / 20:38	05:53 / 20:57
23	07:41 / 17:30	07:07 / 18:07				06:24 / 18:38				06:35 / 20:10	06:01 / 20:39	05:54 / 20:57
24	07:40 / 17:31	07:06 / 18:08				06:22 / 18:39				06:33 / 20:11	06:01 / 20:40	05:54 / 20:57
25	07:39 / 17:32	07:04 / 18:09				06:20 / 18:40				06:32 / 20:12	06:00 / 20:41	05:54 / 20:57
26	07:39 / 17:33	07:03 / 18:11				06:19 / 18:41				06:31 / 20:13	05:59 / 20:42	05:54 / 20:57
27	07:38 / 17:35	07:02 / 18:12				06:17 / 18:42				06:29 / 20:14	05:59 / 20:43	05:55 / 20:58
28	07:37 / 17:36	07:00 / 18:13				06:15 / 18:43				06:28 / 20:15	05:58 / 20:44	05:55 / 20:58
29	07:36 / 17:37					07:14 / 19:44				06:27 / 20:16	05:57 / 20:44	05:56 / 20:58
30	07:35 / 17:38					07:12 / 19:45				06:25 / 20:17	05:57 / 20:45	05:56 / 20:58
31	07:35 / 17:39					07:10 / 19:46					05:56 / 20:46	
Potential sun hours	299	298				370				398	447	450
Total, worst case		361				231						

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

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

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar

Calculation: Progetto_2022_10_14 Shadow receptor: F066 - F06 (agriturismo Castiolu)
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

The table below gives for each day, in each month: the sun rise, sun set, and (where applicable) minutes with flicker, first time with flicker, last time with flicker, and the WTG causing the flicker.

Day	July rise/set	August rise/set	September rise/set	Sep first / min / last	October rise/set	Oct first / min / last	November rise/set	Nov first / min / last	December rise/set
1	05:56 / 20:57	06:20 / 20:39	06:50 / 19:57		07:19 / 19:07	18:14 (WTG012) / 21 / 18:35 (WTG012)	06:52 / 17:21	16:25 (WTG011) / 24 / 16:49 (WTG011)	07:26 / 16:58
2	05:57 / 20:57	06:21 / 20:38	06:51 / 19:55		07:20 / 19:06	18:13 (WTG012) / 22 / 18:35 (WTG012)	06:53 / 17:20	16:26 (WTG011) / 23 / 16:49 (WTG011)	07:27 / 16:58
3	05:57 / 20:57	06:22 / 20:37	06:52 / 19:54		07:21 / 19:04	18:13 (WTG012) / 21 / 18:34 (WTG012)	06:54 / 17:19	16:27 (WTG011) / 21 / 16:48 (WTG011)	07:28 / 16:57
4	05:58 / 20:57	06:23 / 20:36	06:53 / 19:52		07:22 / 19:02	18:13 (WTG012) / 21 / 18:34 (WTG012)	06:56 / 17:18	16:27 (WTG011) / 20 / 16:47 (WTG011)	07:29 / 16:57
5	05:59 / 20:57	06:24 / 20:35	06:54 / 19:50		07:23 / 19:01	18:13 (WTG012) / 20 / 18:33 (WTG012)	06:57 / 17:17	16:29 (WTG011) / 16 / 16:45 (WTG011)	07:30 / 16:57
6	05:59 / 20:57	06:25 / 20:33	06:55 / 19:49		07:24 / 18:59	18:14 (WTG012) / 18 / 18:32 (WTG012)	06:58 / 17:16	16:31 (WTG011) / 14 / 16:45 (WTG011)	07:31 / 16:57
7	06:00 / 20:56	06:26 / 20:32	06:56 / 19:47		07:25 / 18:57	18:14 (WTG012) / 16 / 18:30 (WTG012)	06:59 / 17:15	16:33 (WTG011) / 9 / 16:42 (WTG011)	07:32 / 16:57
8	06:00 / 20:56	06:27 / 20:31	06:56 / 19:46		07:26 / 18:56	18:16 (WTG012) / 12 / 18:28 (WTG012)	07:00 / 17:14		07:33 / 16:57
9	06:01 / 20:56	06:27 / 20:30	06:57 / 19:44		07:27 / 18:54	18:19 (WTG012) / 6 / 18:25 (WTG012)	07:01 / 17:13		07:34 / 16:57
10	06:02 / 20:55	06:28 / 20:29	06:58 / 19:42		07:28 / 18:53		07:02 / 17:12		07:35 / 16:57
11	06:02 / 20:55	06:29 / 20:27	06:59 / 19:41		07:29 / 18:51		07:04 / 17:11		07:36 / 16:57
12	06:03 / 20:54	06:30 / 20:26	07:00 / 19:39		07:30 / 18:50		07:05 / 17:10		07:36 / 16:57
13	06:04 / 20:54	06:31 / 20:25	07:01 / 19:37		07:31 / 18:48		07:06 / 17:09		07:37 / 16:57
14	06:04 / 20:53	06:32 / 20:23	07:02 / 19:36		07:32 / 18:46		07:07 / 17:08		07:38 / 16:57
15	06:05 / 20:53	06:33 / 20:22	07:03 / 19:34		07:33 / 18:45		07:08 / 17:07		07:39 / 16:58
16	06:06 / 20:52	06:34 / 20:21	07:04 / 19:32		07:34 / 18:43		07:09 / 17:06		07:39 / 16:58
17	06:07 / 20:52	06:35 / 20:19	07:05 / 19:31		07:35 / 18:42		07:11 / 17:05		07:40 / 16:58
18	06:08 / 20:51	06:36 / 20:18	07:06 / 19:29		07:36 / 18:40		07:12 / 17:05		07:41 / 16:59
19	06:08 / 20:50	06:37 / 20:16	07:07 / 19:27		07:37 / 18:39		07:13 / 17:04		07:41 / 16:59
20	06:09 / 20:50	06:38 / 20:15	07:08 / 19:26		07:39 / 18:38		07:14 / 17:03		07:42 / 16:59
21	06:10 / 20:49	06:39 / 20:14	07:09 / 19:24		07:40 / 18:36	17:33 (WTG011) / 11 / 17:44 (WTG011)	07:15 / 17:03		07:42 / 17:00
22	06:11 / 20:48	06:40 / 20:12	07:10 / 19:22		07:41 / 18:35	17:30 (WTG011) / 16 / 17:46 (WTG011)	07:16 / 17:02		07:43 / 17:00
23	06:12 / 20:47	06:41 / 20:11	07:11 / 19:20		07:42 / 18:33	17:28 (WTG011) / 19 / 17:47 (WTG011)	07:17 / 17:01		07:43 / 17:01
24	06:13 / 20:47	06:42 / 20:09	07:12 / 19:19		07:43 / 18:32	17:28 (WTG011) / 21 / 17:49 (WTG011)	07:19 / 17:01		07:44 / 17:01
25	06:13 / 20:46	06:43 / 20:08	07:13 / 19:17		06:44 / 17:31	16:27 (WTG011) / 22 / 16:49 (WTG011)	07:20 / 17:00		07:44 / 17:02
26	06:14 / 20:45	06:44 / 20:06	07:14 / 19:15	18:22 (WTG012) / 9 / 18:31 (WTG012)	06:45 / 17:29	16:26 (WTG011) / 23 / 16:49 (WTG011)	07:21 / 17:00		07:45 / 17:02
27	06:15 / 20:44	06:45 / 20:05	07:15 / 19:14	18:19 (WTG012) / 14 / 18:33 (WTG012)	06:46 / 17:28	16:25 (WTG011) / 24 / 16:49 (WTG011)	07:22 / 16:59		07:45 / 17:03
28	06:16 / 20:43	06:46 / 20:03	07:16 / 19:12	18:17 (WTG012) / 17 / 18:34 (WTG012)	06:47 / 17:27	16:24 (WTG011) / 25 / 16:49 (WTG011)	07:23 / 16:59		07:45 / 17:04
29	06:17 / 20:42	06:47 / 20:02	07:17 / 19:10	18:16 (WTG012) / 19 / 18:35 (WTG012)	06:49 / 17:25	16:25 (WTG011) / 25 / 16:50 (WTG011)	07:24 / 16:59		07:46 / 17:05
30	06:18 / 20:41	06:48 / 20:00	07:18 / 19:09	18:15 (WTG012) / 20 / 18:35 (WTG012)	06:50 / 17:24	16:25 (WTG011) / 25 / 16:50 (WTG011)	07:25 / 16:58		07:46 / 17:05
31	06:19 / 20:40	06:49 / 19:58			06:51 / 17:23	16:25 (WTG011) / 24 / 16:49 (WTG011)			07:46 / 17:06
Potential sun hours	457	427	375		346		299		290
Total, worst case				79		392		127	

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

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

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar, graphical
Calculation: Progetto_2022_10_14

F025: A03

F045: A03

F066: F06 (agriturismo Castiolu)
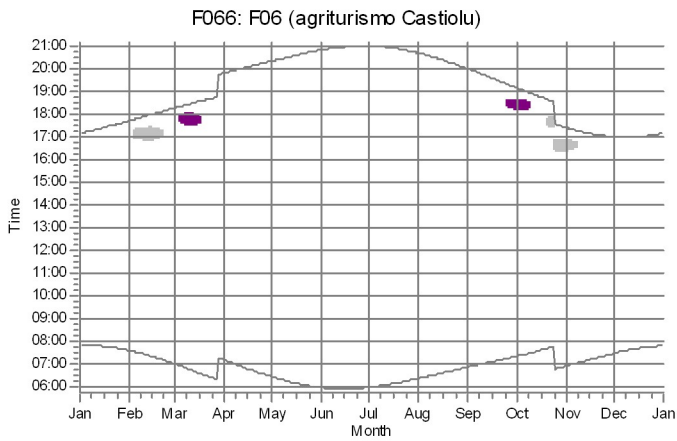
WTGs

WTG012: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (38)

WTG011: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (39)

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG001 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (28)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
   The sun is shining all the day, from sunrise to sunset
   The rotor plane is always perpendicular to the line from the WTG to the sun
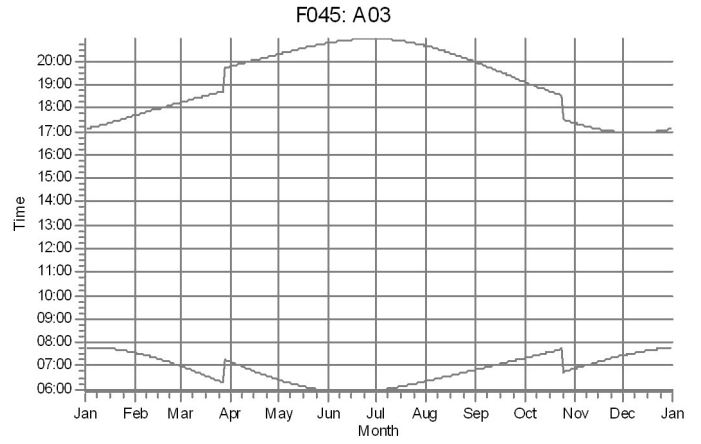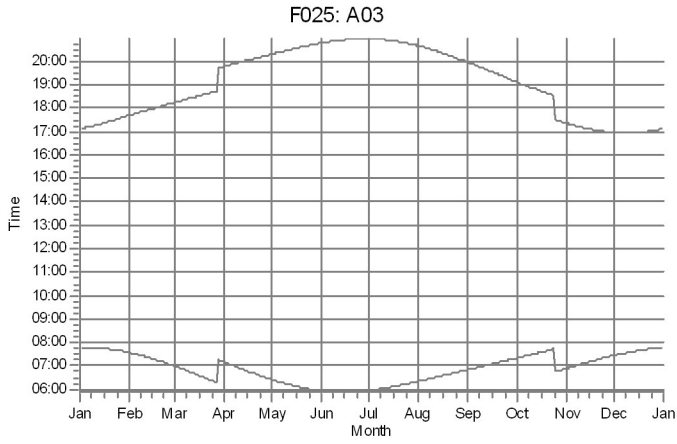   The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:48	20:57	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:55	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:21	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:18	19:50	20:21	20:49	20:57	20:36	19:52	19:03	17:18	16:58
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	06:00	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:50	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:26	06:47	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:02	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:55	17:13	16:57
10	07:46	07:24	06:45	06:55	06:14	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:13	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:58	20:28	20:53	20:55	20:28	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:52	06:11	05:53	06:03	06:31	07:01	07:30	07:05	07:36
	17:18	17:54	18:26	19:59	20:29	20:54	20:55	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:02	07:31	07:06	07:37
	17:19	17:56	18:27	20:00	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:58
14	07:45	07:20	06:39	06:48	06:09	05:53	06:05	06:33	07:03	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:55	20:54	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:06	06:34	07:03	07:33	07:09	07:39
	17:21	17:58	18:30	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:08	05:53	06:06	06:35	07:04	07:34	07:10	07:39
	17:22	17:59	18:31	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:07	16:58
17	07:44	07:16	06:34	06:44	06:07	05:53	06:07	06:36	07:05	07:36	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:20	19:31	18:42	17:06	16:59
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:37	07:06	07:37	07:12	07:41
	17:24	18:02	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:38	07:07	07:38	07:13	07:41
	17:26	18:03	18:34	20:06	20:36	20:56	20:51	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:10	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:04	17:00
21	07:42	07:10	06:27	06:38	06:03	05:54	06:10	06:39	07:09	07:40	07:15	07:43
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:37	06:02	05:54	06:11	06:40	07:10	07:41	07:17	07:43
	17:29	18:06	18:37	20:09	20:39	20:57	20:48	20:12	19:22	18:35	17:02	17:01
23	07:41	07:08	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:44
	17:30	18:07	18:38	20:10	20:39	20:57	20:48	20:11	19:21	18:34	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:09	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:21	06:32	06:00	05:55	06:14	06:43	07:13	06:44	07:20	07:44
	17:33	18:10	18:40	20:12	20:41	20:58	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	06:00	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:30	17:00	17:03
27	07:38	07:02	06:17	06:30	05:59	05:55	06:16	06:45	07:15	06:47	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:04
28	07:37	07:00	06:16	06:28	05:58	05:56	06:17	06:46	07:16	06:48	07:23	07:46
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:37		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:45	20:58	20:42	20:02	19:11	17:26	16:59	17:05
30	07:36		07:12	06:26	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:39		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:59	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
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

windPRO

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG002 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (29)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:03	17:18	16:58
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:25	06:46	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:14	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:01	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:01	07:31	07:06	07:37
	17:19	17:56	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:58
14	07:45	07:20	06:38	06:48	06:09	05:53	06:05	06:33	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:54	20:53	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:06	06:34	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:35	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:34	06:44	06:07	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:59
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:36	07:06	07:37	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:10	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:04	17:00
21	07:42	07:10	06:27	06:38	06:03	05:54	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:01
23	07:41	07:07	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:34	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:10	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	06:00	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:30	05:59	05:55	06:16	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:56	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:26	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:39		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:59	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
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_2022_10_14WTG: WTG003 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (30)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
  The sun is shining all the day, from sunrise to sunset
  The rotor plane is always perpendicular to the line from the WTG to the sun
  The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:03	17:18	16:58
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:26	06:46	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:14	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:01	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:01	07:31	07:06	07:37
	17:19	17:56	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:58
14	07:45	07:20	06:38	06:48	06:09	05:53	06:05	06:33	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:54	20:53	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:06	06:34	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:35	07:04	07:34	07:10	07:39
	17:22	17:59	18:31	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:34	06:44	06:07	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:59
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:36	07:06	07:37	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:04	17:00
21	07:42	07:10	06:27	06:38	06:03	05:54	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:39	20:57	20:48	20:12	19:22	18:35	17:02	17:01
23	07:41	07:08	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:44
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:34	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:10	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	06:00	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:30	05:59	05:55	06:16	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:56	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:26	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:39		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:59	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
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_Queequeg Nuoro

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG004 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (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	07:47	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:26	06:46	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:14	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:01	07:31	07:06	07:37
	17:19	17:56	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:20	06:38	06:48	06:09	05:53	06:05	06:33	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:54	20:53	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:06	06:34	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:34	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:58
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:36	07:06	07:37	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	17:00
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:39	20:57	20:48	20:12	19:22	18:35	17:02	17:01
23	07:41	07:07	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:44
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:10	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:16	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:55	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
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_2022_10_14WTG: WTG005 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (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	07:47	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:48	20:58	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:55	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:21	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:18	19:50	20:21	20:49	20:57	20:36	19:52	19:03	17:18	16:58
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:33	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:50	18:22	19:54	20:25	20:52	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:26	06:47	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:02	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:55	17:13	16:57
10	07:46	07:24	06:45	06:55	06:14	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:13	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:58	20:28	20:53	20:55	20:28	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:52	06:11	05:53	06:03	06:31	07:01	07:30	07:05	07:37
	17:18	17:54	18:26	19:59	20:29	20:54	20:55	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:02	07:31	07:06	07:37
	17:19	17:56	18:27	20:00	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:58
14	07:45	07:20	06:39	06:48	06:09	05:53	06:05	06:33	07:03	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:55	20:54	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:06	06:34	07:03	07:33	07:09	07:39
	17:21	17:58	18:30	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:08	05:53	06:06	06:35	07:04	07:34	07:10	07:40
	17:22	17:59	18:31	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:07	16:58
17	07:44	07:16	06:34	06:44	06:07	05:53	06:07	06:36	07:05	07:36	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:20	19:31	18:42	17:06	16:59
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:37	07:06	07:37	07:12	07:41
	17:24	18:02	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:26	18:03	18:34	20:06	20:36	20:56	20:51	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:10	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:04	17:00
21	07:42	07:10	06:27	06:38	06:03	05:54	06:10	06:39	07:09	07:40	07:15	07:43
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:37	06:02	05:54	06:11	06:40	07:10	07:41	07:17	07:43
	17:29	18:06	18:37	20:09	20:39	20:57	20:48	20:12	19:22	18:35	17:02	17:01
23	07:41	07:08	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:44
	17:30	18:07	18:38	20:10	20:40	20:57	20:48	20:11	19:21	18:34	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:09	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:21	06:32	06:00	05:55	06:14	06:43	07:13	06:44	07:20	07:45
	17:33	18:10	18:40	20:12	20:41	20:58	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	06:00	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:30	05:59	05:55	06:16	06:45	07:15	06:47	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:56	06:17	06:46	07:16	06:48	07:23	07:46
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:37		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:45	20:58	20:42	20:02	19:11	17:26	16:59	17:05
30	07:36		07:12	06:26	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:39		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:59	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
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

windPRO

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG006 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (33)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
  The sun is shining all the day, from sunrise to sunset
  The rotor plane is always perpendicular to the line from the WTG to the sun
  The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:47	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:21	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:26	06:46	06:56	06:15	05:54	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:13	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:55	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:01	07:31	07:06	07:37
	17:19	17:56	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:20	06:38	06:48	06:09	05:53	06:05	06:33	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:55	20:54	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:34	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:34	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:58
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:36	07:06	07:37	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	17:00
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:43
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:39	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:08	06:24	06:35	06:02	05:54	06:12	06:41	07:11	07:42	07:18	07:44
	17:30	18:07	18:38	20:10	20:39	20:57	20:48	20:11	19:21	18:33	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:10	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:01	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:16	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:55	06:16	06:46	07:16	06:48	07:23	07:46
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:06
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	446	450	457	427	375	346	300	290
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_Queequeg Nuoro

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG007 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (35)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
   The sun is shining all the day, from sunrise to sunset
   The rotor plane is always perpendicular to the line from the WTG to the sun
   The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:18	19:51	20:22	20:50	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:25	06:46	06:56	06:14	05:53	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:13	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:30	06:59	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:19	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:05	06:32	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:01	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:40	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	300	290
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_Queequeg Nuoro

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG008 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (34)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
   The sun is shining all the day, from sunrise to sunset
   The rotor plane is always perpendicular to the line from the WTG to the sun
   The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:00	06:27	06:57	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:46	07:25	06:46	06:56	06:14	05:53	06:01	06:28	06:58	07:27	07:01	07:34
	17:14	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:54	06:13	05:53	06:02	06:29	06:58	07:28	07:03	07:35
	17:15	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:30	06:59	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:19	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:05	06:32	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:08	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:39	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:14	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:11		05:56		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	300	290
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

windPRO

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG009 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (36)
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	07:47	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:58	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:48	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:58
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:45	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:03	06:19	05:55	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:19	19:51	20:22	20:50	20:57	20:35	19:51	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:50	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:13	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:01	06:27	06:57	07:26	07:00	07:33
	17:14	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:26	06:46	06:56	06:15	05:53	06:01	06:28	06:58	07:27	07:01	07:34
	17:15	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:55	06:13	05:53	06:02	06:29	06:59	07:28	07:03	07:35
	17:16	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:03	06:30	07:00	07:29	07:04	07:36
	17:17	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:31	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:55	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:32	07:01	07:31	07:06	07:37
	17:19	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:20	06:38	06:48	06:09	05:53	06:05	06:32	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:01	20:31	20:55	20:54	20:24	19:36	18:47	17:08	16:58
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:02	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:03	20:33	20:55	20:52	20:21	19:32	18:44	17:06	16:58
17	07:44	07:16	06:34	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:32	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:06	16:58
18	07:44	07:14	06:32	06:42	06:06	05:53	06:08	06:36	07:06	07:37	07:12	07:41
	17:24	18:01	18:33	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:09	06:37	07:07	07:38	07:13	07:41
	17:25	18:03	18:34	20:06	20:36	20:56	20:51	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:27	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	17:00
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:43
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:42	07:09	06:25	06:36	06:02	05:54	06:11	06:40	07:10	07:41	07:17	07:43
	17:29	18:06	18:37	20:09	20:39	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:08	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:18	07:44
	17:30	18:07	18:38	20:10	20:39	20:57	20:48	20:11	19:21	18:33	17:02	17:01
24	07:40	07:06	06:22	06:34	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:02
25	07:40	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:10	18:40	20:12	20:41	20:58	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:15	06:44	07:14	06:45	07:21	07:45
	17:34	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	17:00	17:03
28	07:37	07:00	06:16	06:28	05:58	05:55	06:16	06:46	07:16	06:48	07:23	07:46
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:58	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:11		05:57		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:59		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	300	290
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_2022_10_14WTG: WTG010 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (40)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:57
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:12	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27	06:48	06:58	06:16	05:54	06:00	06:27	06:57	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:46	07:25	06:46	06:56	06:14	05:53	06:01	06:28	06:57	07:27	07:01	07:34
	17:14	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:54	06:13	05:53	06:02	06:29	06:58	07:28	07:03	07:35
	17:15	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:36
	17:16	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:42	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:19	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:05	06:32	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:47	17:08	16:57
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58
17	07:44	07:16	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13	06:30	06:41	06:05	05:53	06:08	06:37	07:07	07:38	07:13	07:41
	17:25	18:02	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:39	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:14	06:44	07:14	06:45	07:21	07:45
	17:33	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:48	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:57	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		17:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:10		05:56		06:19	06:49		06:51		07:46
	17:40		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	300	290
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

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG011 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (39)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
  The sun is shining all the day, from sunrise to sunset
  The rotor plane is always perpendicular to the line from the WTG to the sun
  The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:57	06:20	06:50	07:19	06:52 16:25-16:49/24	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:22	16:58
2	07:47	07:33	06:57	07:07	06:23	05:56	05:57	06:21	06:51	07:20	06:53 16:26-16:49/23	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:22	05:55	05:58	06:22	06:52	07:21	06:54 16:27-16:48/21	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:57
4	07:47	07:31 17:02-17:11/9	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56 16:27-16:47/20	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30 17:00-17:14/14	06:53	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57 16:29-16:45/16	07:30
	17:11	17:46	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29 16:58-17:16/18	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58 16:31-16:45/14	07:31
	17:12	17:47	18:20	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28 16:58-17:17/19	06:49	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59 16:33-16:42/9	07:32
	17:12	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:58	17:15	16:57
8	07:47	07:27 16:57-17:18/21	06:48	06:58	06:16	05:54	06:00	06:27	06:57	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:25 16:56-17:19/23	06:46	06:56	06:14	05:53	06:01	06:28	06:57	07:27	07:01	07:34
	17:14	17:51	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24 16:56-17:20/24	06:45	06:54	06:13	05:53	06:02	06:29	06:58	07:28	07:03	07:35
	17:15	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23 16:55-17:20/25	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:36
	17:16	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22 16:55-17:20/25	06:42	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:18	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21 16:55-17:20/25	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:19	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19 16:56-17:21/25	06:38	06:48	06:09	05:53	06:05	06:32	07:02	07:32	07:07	07:38
	17:20	17:57	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:47	17:08	16:57
15	07:45	07:18 16:55-17:20/25	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17 16:56-17:20/24	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58
17	07:44	07:16 16:57-17:19/22	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:04	20:34	20:56	20:52	20:19	19:31	18:42	17:05	16:58
18	07:44	07:14 16:57-17:18/21	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:05	20:35	20:56	20:51	20:18	19:29	18:41	17:05	16:59
19	07:43	07:13 16:59-17:17/18	06:30	06:41	06:05	05:53	06:08	06:37	07:07	07:38	07:13	07:42
	17:25	18:02	18:34	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12 17:01-17:15/14	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	16:59
21	07:42	07:10 17:03-17:12/9	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40 17:33-17:44/11	07:15	07:42
	17:28	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41 17:30-17:46/16	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42 17:28-17:47/19	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:01	05:54	06:13	06:42	07:12	07:43 17:28-17:49/21	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:39	07:05	06:20	06:32	06:00	05:54	06:14	06:43	07:13	07:44 16:27-16:49/22	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:55	06:14	06:44	07:14	07:45 16:26-16:49/23	07:21	07:45
	17:33	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:03
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	07:46 16:25-16:49/24	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	07:48 16:24-16:49/25	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:57	05:56	06:17	06:47	07:17	06:49 16:25-16:50/25	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50 16:25-16:50/25	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:11		05:56		06:19	06:49		06:51 16:25-16:49/24		07:46
	17:40		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290
Sum of minutes with flicker	0	361	0	0	0	0	0	0	0	235	127	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_2022_10_14WTG: WTG012 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (38)
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	07:47	07:34	06:59		07:09	06:24	05:56	05:57	06:20	06:50		07:19	18:14-18:35/21	06:52	07:26
	17:07	17:41	18:14		19:47	20:18	20:47	20:58	20:39	19:57		19:07		17:22	16:58
2	07:47	07:33	06:57		07:07	06:23	05:56	05:57	06:21	06:51		07:20	18:13-18:35/22	06:53	07:27
	17:08	17:42	18:15		19:48	20:19	20:47	20:57	20:38	19:55		19:06		17:20	16:58
3	07:47	07:32	06:56		07:06	06:22	05:55	05:58	06:22	06:52		07:21	18:13-18:34/21	06:54	07:28
	17:09	17:43	18:16		19:49	20:20	20:48	20:57	20:37	19:54		19:04		17:19	16:57
4	07:47	07:31	06:54		07:04	06:20	05:55	05:58	06:23	06:53		07:22	18:13-18:34/21	06:56	07:29
	17:10	17:44	18:17		19:50	20:21	20:49	20:57	20:36	19:52		19:02		17:18	16:57
5	07:47	07:30	06:53	17:41-17:51/10	07:02	06:19	05:54	05:59	06:24	06:54		07:23	18:13-18:33/20	06:57	07:30
	17:11	17:46	18:18		19:51	20:22	20:50	20:57	20:35	19:50		19:01		17:17	16:57
6	07:47	07:29	06:51	17:40-17:54/14	07:01	06:18	05:54	05:59	06:25	06:55		07:24	18:14-18:32/18	06:58	07:31
	17:12	17:47	18:20		19:52	20:23	20:50	20:57	20:34	19:49		18:59		17:16	16:57
7	07:47	07:28	06:49	17:37-17:55/18	06:59	06:17	05:54	06:00	06:26	06:56		07:25	18:14-18:30/16	06:59	07:32
	17:12	17:48	18:21		19:53	20:24	20:51	20:56	20:32	19:47		18:58		17:15	16:57
8	07:47	07:27	06:48	17:36-17:55/19	06:58	06:16	05:54	06:00	06:27	06:57		07:26	18:16-18:28/12	07:00	07:33
	17:13	17:49	18:22		19:54	20:25	20:51	20:56	20:31	19:46		18:56		17:14	16:57
9	07:47	07:25	06:46	17:35-17:56/21	06:56	06:14	05:53	06:01	06:28	06:58		07:27	18:19-18:25/6	07:01	07:34
	17:14	17:51	18:23		19:55	20:26	20:52	20:56	20:30	19:44		18:54		17:13	16:57
10	07:46	07:24	06:45	17:34-17:56/22	06:54	06:13	05:53	06:02	06:29	06:58		07:28		07:03	07:35
	17:15	17:52	18:24		19:56	20:27	20:53	20:55	20:29	19:42		18:53		17:12	16:57
11	07:46	07:23	06:43	17:35-17:56/21	06:53	06:12	05:53	06:02	06:29	06:59		07:29		07:04	07:36
	17:16	17:53	18:25		19:57	20:28	20:53	20:55	20:27	19:41		18:51		17:11	16:57
12	07:46	07:22	06:42	17:34-17:56/22	06:51	06:11	05:53	06:03	06:30	07:00		07:30		07:05	07:36
	17:18	17:54	18:26		19:58	20:29	20:54	20:54	20:26	19:39		18:50		17:10	16:57
13	07:46	07:21	06:40	17:34-17:55/21	06:50	06:10	05:53	06:04	06:31	07:01		07:31		07:06	07:37
	17:19	17:55	18:27		19:59	20:30	20:54	20:54	20:25	19:37		18:48		17:09	16:57
14	07:45	07:19	06:38	17:35-17:54/19	06:48	06:09	05:53	06:05	06:32	07:02		07:32		07:07	07:38
	17:20	17:57	18:28		20:01	20:31	20:54	20:53	20:23	19:36		18:47		17:08	16:57
15	07:45	07:18	06:37	17:35-17:53/18	06:47	06:08	05:53	06:05	06:33	07:03		07:33		07:08	07:39
	17:21	17:58	18:29		20:01	20:32	20:55	20:53	20:22	19:34		18:45		17:07	16:58
16	07:45	07:17	06:35	17:36-17:51/15	06:45	06:07	05:53	06:06	06:34	07:04		07:34		07:10	07:39
	17:22	17:59	18:30		20:03	20:33	20:55	20:52	20:21	19:32		18:44		17:06	16:58
17	07:44	07:16	06:33	17:38-17:49/11	06:44	06:06	05:53	06:07	06:35	07:05		07:35		07:11	07:40
	17:23	18:00	18:31		20:04	20:34	20:56	20:52	20:19	19:31		18:42		17:05	16:58
18	07:44	07:14	06:32		06:42	06:05	05:53	06:08	06:36	07:06		07:36		07:12	07:41
	17:24	18:02	18:32		20:05	20:35	20:56	20:51	20:18	19:29		18:41		17:05	16:59
19	07:43	07:13	06:30		06:41	06:05	05:53	06:08	06:37	07:07		07:38		07:13	07:41
	17:25	18:02	18:34		20:06	20:36	20:56	20:50	20:17	19:27		18:39		17:04	16:59
20	07:43	07:12	06:29		06:39	06:04	05:53	06:09	06:38	07:08		07:39		07:14	07:42
	17:26	18:04	18:35		20:07	20:37	20:57	20:50	20:15	19:26		18:38		17:03	16:59
21	07:42	07:10	06:27		06:38	06:03	05:53	06:10	06:39	07:09		07:40		07:15	07:42
	17:28	18:05	18:36		20:08	20:38	20:57	20:49	20:14	19:24		18:36		17:03	17:00
22	07:42	07:09	06:25		06:36	06:02	05:53	06:11	06:40	07:10		07:41		07:16	07:43
	17:29	18:06	18:37		20:09	20:38	20:57	20:48	20:12	19:22		18:35		17:02	17:00
23	07:41	07:07	06:24		06:35	06:01	05:54	06:12	06:41	07:11		07:42		07:18	07:44
	17:30	18:07	18:38		20:10	20:39	20:57	20:47	20:11	19:21		18:33		17:01	17:01
24	07:40	07:06	06:22		06:33	06:01	05:54	06:13	06:42	07:12		07:43		07:19	07:44
	17:31	18:08	18:39		20:11	20:40	20:57	20:47	20:09	19:19		18:32		17:01	17:01
25	07:40	07:05	06:20		06:32	06:00	05:54	06:14	06:43	07:13		06:44		07:20	07:44
	17:32	18:09	18:40		20:12	20:41	20:57	20:46	20:08	19:17		17:31		17:00	17:02
26	07:39	07:03	06:19		06:31	05:59	05:55	06:14	06:44	07:14	18:22-18:31/9	06:45		07:21	07:45
	17:33	18:11	18:41		20:13	20:42	20:58	20:45	20:06	19:16		17:29		17:00	17:03
27	07:38	07:02	06:17		06:29	05:59	05:55	06:15	06:45	07:15	18:19-18:33/14	06:46		07:22	07:45
	17:35	18:12	18:42		20:14	20:43	20:58	20:44	20:05	19:14		17:28		16:59	17:03
28	07:37	07:00	06:15		06:28	05:58	05:55	06:16	06:46	07:16	18:17-18:34/17	06:48		07:23	07:45
	17:36	18:13	18:43		20:15	20:44	20:58	20:43	20:03	19:12		17:27		16:59	17:04
29	07:36		07:14		06:27	05:57	05:56	06:17	06:47	07:17	18:16-18:35/19	06:49		07:24	07:46
	17:37		19:44		20:16	20:44	20:58	20:42	20:02	19:11		17:25		16:59	17:05
30	07:36		07:12		06:25	05:57	05:56	06:18	06:48	07:18	18:15-18:35/20	06:50		07:25	07:46
	17:38		19:45		20:17	20:45	20:58	20:41	20:00	19:09		17:24		16:58	17:05
31	07:35		07:11			05:56		06:19	06:49			06:51			07:46
	17:40		19:46			20:46		20:40	19:58			17:23			17:06
Potential sun hours	299	298	370		398	447	450	457	427	375		346		299	290
Sum of minutes with flicker	0	0	231		0	0	0	0	0	79		157		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

windPRO

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG013 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (41)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
    The sun is shining all the day, from sunrise to sunset
    The rotor plane is always perpendicular to the line from the WTG to the sun
    The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:56	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:21	16:58
2	07:47	07:33	06:57	07:07	06:23	05:55	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:21	05:55	05:57	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:57
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:55	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:52	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:11	17:47	18:19	19:52	20:23	20:50	20:57	20:33	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:55	07:25	06:59	07:32
	17:12	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:57	17:15	16:57
8	07:47	07:26	06:48	06:58	06:15	05:53	06:00	06:27	06:56	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:45	18:56	17:14	16:57
9	07:46	07:25	06:46	06:56	06:14	05:53	06:01	06:27	06:57	07:27	07:01	07:34
	17:14	17:50	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:54	06:13	05:53	06:02	06:28	06:58	07:28	07:02	07:35
	17:15	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:35
	17:16	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:41	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:17	17:54	18:26	19:58	20:29	20:53	20:54	20:26	19:39	18:50	17:10	16:57
13	07:45	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:19	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:04	06:32	07:02	07:32	07:07	07:38
	17:20	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:46	17:08	16:57
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:44	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:09	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58
17	07:44	07:16	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:03	20:34	20:56	20:52	20:19	19:31	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:04	20:35	20:56	20:51	20:18	19:29	18:40	17:05	16:59
19	07:43	07:13	06:30	06:41	06:04	05:53	06:08	06:37	07:07	07:37	07:13	07:41
	17:25	18:02	18:33	20:05	20:36	20:56	20:50	20:16	19:27	18:39	17:04	16:59
20	07:43	07:11	06:28	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:34	20:07	20:37	20:56	20:50	20:15	19:25	18:38	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:27	18:05	18:36	20:08	20:37	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:17	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:20	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:39	07:04	06:20	06:32	06:00	05:54	06:13	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:54	06:14	06:44	07:14	06:45	07:21	07:45
	17:33	18:10	18:41	20:13	20:42	20:57	20:45	20:06	19:15	17:29	17:00	17:02
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:47	07:23	07:45
	17:36	18:13	18:43	20:15	20:43	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:57	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:10	17:25	16:59	17:05
30	07:35		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:57	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:10		05:56		06:19	06:49		06:51		07:46
	17:39		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290
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_Queequeg Nuoro

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:
14/10/2022 16:47/3.4.415

SHADOW - Calendar per WTG

Calculation: Progetto_2022_10_14WTG: WTG014 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (37)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
   The sun is shining all the day, from sunrise to sunset
   The rotor plane is always perpendicular to the line from the WTG to the sun
   The WTG is always operating

|	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:56	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:21	16:58
2	07:47	07:33	06:57	07:07	06:23	05:55	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:21	05:55	05:57	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:57
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:53	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:11	17:46	18:18	19:51	20:22	20:50	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:11	17:47	18:19	19:52	20:23	20:50	20:57	20:34	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:56	07:25	06:59	07:32
	17:12	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:57	17:15	16:57
8	07:47	07:27	06:48	06:58	06:15	05:53	06:00	06:27	06:56	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:46	18:56	17:14	16:57
9	07:47	07:25	06:46	06:56	06:14	05:53	06:01	06:27	06:57	07:27	07:01	07:34
	17:14	17:50	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:54	06:13	05:53	06:02	06:28	06:58	07:28	07:03	07:35
	17:15	17:52	18:24	19:56	20:27	20:53	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:36
	17:16	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:41	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:17	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:18	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:04	06:32	07:02	07:32	07:07	07:38
	17:20	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:46	17:08	16:57
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:10	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58
17	07:44	07:16	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:03	20:34	20:56	20:52	20:19	19:31	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:05	20:35	20:56	20:51	20:18	19:29	18:40	17:05	16:59
19	07:43	07:13	06:30	06:41	06:04	05:53	06:08	06:37	07:07	07:38	07:13	07:41
	17:25	18:02	18:33	20:06	20:36	20:56	20:50	20:17	19:27	18:39	17:04	16:59
20	07:43	07:12	06:29	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:35	20:07	20:37	20:57	20:50	20:15	19:26	18:38	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:27	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:03	17:00
22	07:41	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:21	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:01	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:39	07:05	06:20	06:32	06:00	05:54	06:13	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:31	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:54	06:14	06:44	07:14	06:45	07:21	07:45
	17:33	18:11	18:41	20:13	20:42	20:58	20:45	20:06	19:16	17:29	17:00	17:02
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:47	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:27	16:59	17:04
29	07:36		07:14	06:27	05:57	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:11	17:25	16:59	17:05
30	07:36		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:10		05:56		06:19	06:49		06:51		07:46
	17:39		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290
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_2022_10_14WTG: WTG015 - Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT: 220,0 m) (42)
Assumptions for shadow calculations
The calculated times are "worst case" given by the following assumptions:
 The sun is shining all the day, from sunrise to sunset
 The rotor plane is always perpendicular to the line from the WTG to the sun
 The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46	07:34	06:59	07:09	06:24	05:56	05:56	06:20	06:50	07:19	06:52	07:26
	17:07	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	17:21	16:58
2	07:47	07:33	06:57	07:07	06:23	05:55	05:57	06:21	06:51	07:20	06:53	07:27
	17:08	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:06	17:20	16:58
3	07:47	07:32	06:56	07:06	06:21	05:55	05:57	06:22	06:52	07:21	06:54	07:28
	17:09	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	17:19	16:57
4	07:47	07:31	06:54	07:04	06:20	05:55	05:58	06:23	06:53	07:22	06:56	07:29
	17:10	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	17:18	16:57
5	07:47	07:30	06:52	07:02	06:19	05:54	05:59	06:24	06:54	07:23	06:57	07:30
	17:10	17:46	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	17:17	16:57
6	07:47	07:29	06:51	07:01	06:18	05:54	05:59	06:25	06:55	07:24	06:58	07:31
	17:11	17:47	18:19	19:52	20:23	20:50	20:57	20:33	19:49	18:59	17:16	16:57
7	07:47	07:28	06:49	06:59	06:17	05:54	06:00	06:26	06:55	07:25	06:59	07:32
	17:12	17:48	18:21	19:53	20:24	20:51	20:56	20:32	19:47	18:57	17:15	16:57
8	07:47	07:27	06:48	06:58	06:15	05:53	06:00	06:26	06:56	07:26	07:00	07:33
	17:13	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:45	18:56	17:14	16:57
9	07:46	07:25	06:46	06:56	06:14	05:53	06:01	06:27	06:57	07:27	07:01	07:34
	17:14	17:50	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:13	16:57
10	07:46	07:24	06:45	06:54	06:13	05:53	06:02	06:28	06:58	07:28	07:03	07:35
	17:15	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	17:12	16:57
11	07:46	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:36
	17:16	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:41	18:51	17:11	16:57
12	07:46	07:22	06:41	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36
	17:17	17:54	18:26	19:58	20:29	20:54	20:54	20:26	19:39	18:50	17:10	16:57
13	07:46	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37
	17:18	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:09	16:57
14	07:45	07:19	06:38	06:48	06:09	05:53	06:04	06:32	07:02	07:32	07:07	07:38
	17:20	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:36	18:46	17:08	16:57
15	07:45	07:18	06:37	06:47	06:08	05:53	06:05	06:33	07:03	07:33	07:08	07:39
	17:21	17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:58
16	07:45	07:17	06:35	06:45	06:07	05:53	06:06	06:34	07:04	07:34	07:09	07:39
	17:22	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58
17	07:44	07:16	06:33	06:44	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40
	17:23	18:00	18:31	20:03	20:34	20:56	20:52	20:19	19:31	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:08	06:36	07:06	07:36	07:12	07:41
	17:24	18:01	18:32	20:04	20:35	20:56	20:51	20:18	19:29	18:40	17:05	16:58
19	07:43	07:13	06:30	06:41	06:04	05:53	06:08	06:37	07:07	07:37	07:13	07:41
	17:25	18:02	18:33	20:06	20:36	20:56	20:50	20:16	19:27	18:39	17:04	16:59
20	07:43	07:12	06:28	06:39	06:04	05:53	06:09	06:38	07:08	07:39	07:14	07:42
	17:26	18:04	18:34	20:07	20:37	20:57	20:50	20:15	19:26	18:37	17:03	16:59
21	07:42	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42
	17:27	18:05	18:36	20:08	20:38	20:57	20:49	20:14	19:24	18:36	17:02	17:00
22	07:41	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43
	17:29	18:06	18:37	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00
23	07:41	07:07	06:24	06:35	06:01	05:54	06:12	06:41	07:11	07:42	07:18	07:43
	17:30	18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:20	18:33	17:01	17:01
24	07:40	07:06	06:22	06:33	06:00	05:54	06:13	06:42	07:12	07:43	07:19	07:44
	17:31	18:08	18:39	20:11	20:40	20:57	20:47	20:09	19:19	18:32	17:01	17:01
25	07:39	07:04	06:20	06:32	06:00	05:54	06:13	06:43	07:13	06:44	07:20	07:44
	17:32	18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:30	17:00	17:02
26	07:39	07:03	06:19	06:31	05:59	05:54	06:14	06:44	07:14	06:45	07:21	07:45
	17:33	18:10	18:41	20:13	20:42	20:58	20:45	20:06	19:15	17:29	17:00	17:02
27	07:38	07:02	06:17	06:29	05:59	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:35	18:12	18:42	20:14	20:43	20:58	20:44	20:05	19:14	17:28	16:59	17:03
28	07:37	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	06:47	07:23	07:45
	17:36	18:13	18:43	20:15	20:44	20:58	20:43	20:03	19:12	17:26	16:59	17:04
29	07:36		07:14	06:27	05:57	05:56	06:17	06:47	07:17	06:49	07:24	07:46
	17:37		19:44	20:16	20:44	20:58	20:42	20:02	19:10	17:25	16:58	17:04
30	07:35		07:12	06:25	05:57	05:56	06:18	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	20:45	20:58	20:41	20:00	19:09	17:24	16:58	17:05
31	07:35		07:10		05:56		06:19	06:49		06:51		07:46
	17:39		19:46		20:46		20:40	19:58		17:23		17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290
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, graphical
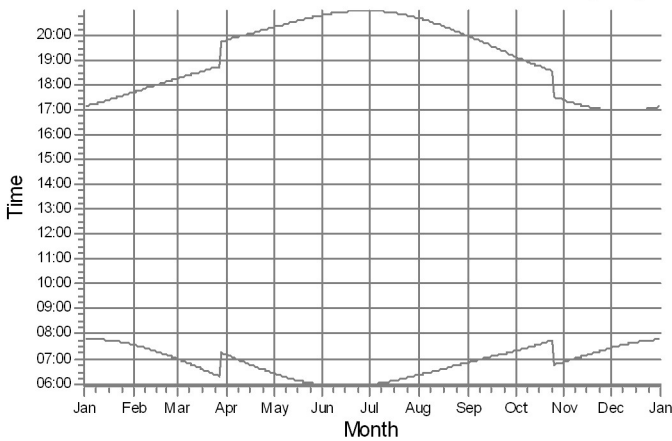Calculation: Progetto_2022_10_14

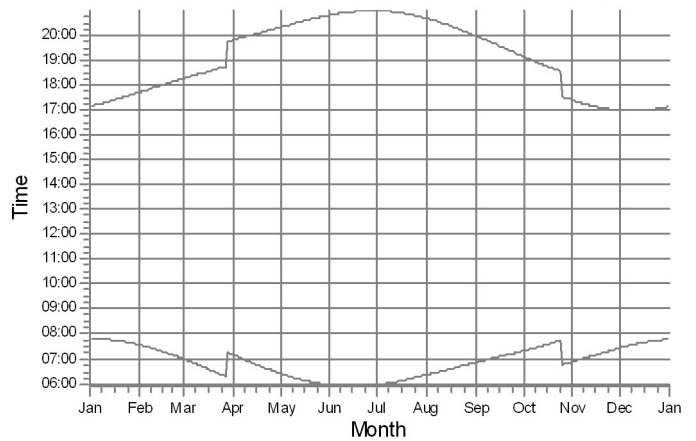WTG001: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT
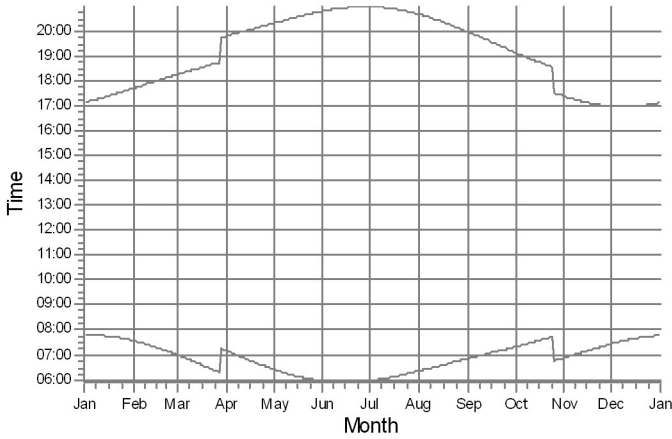
WTG002: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT
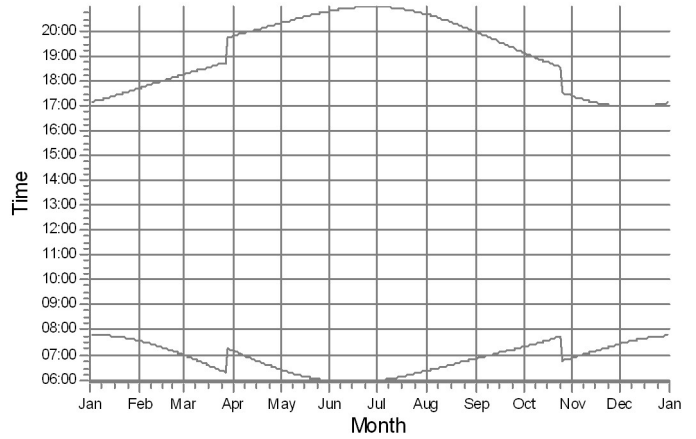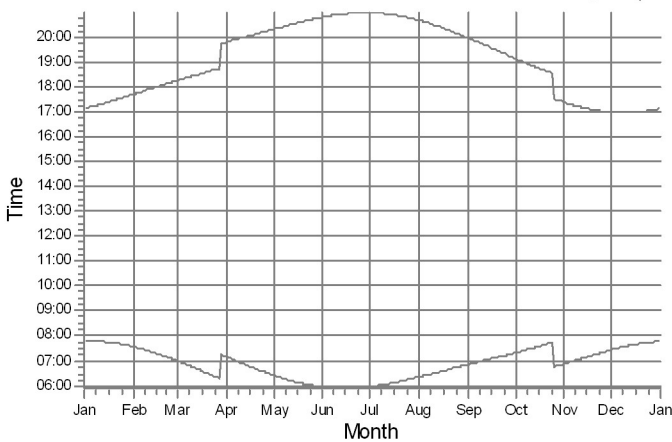
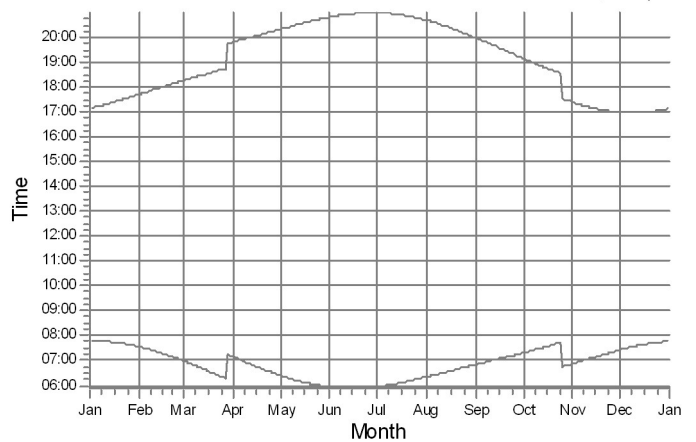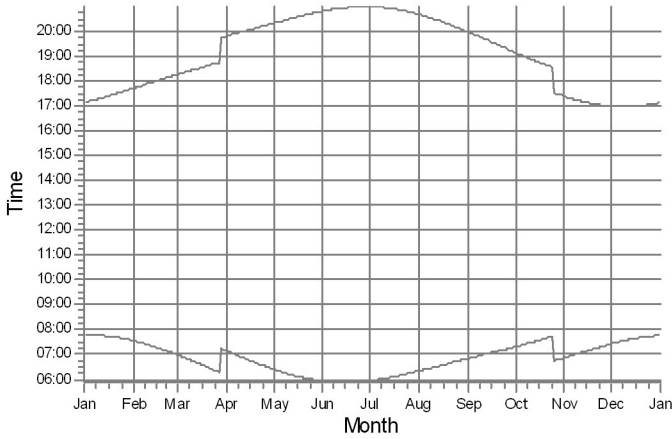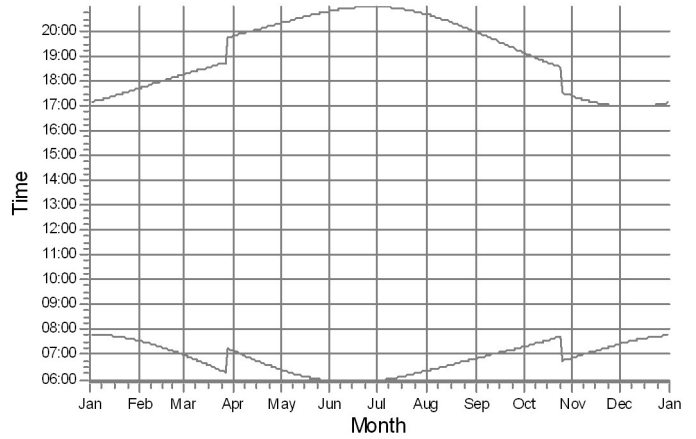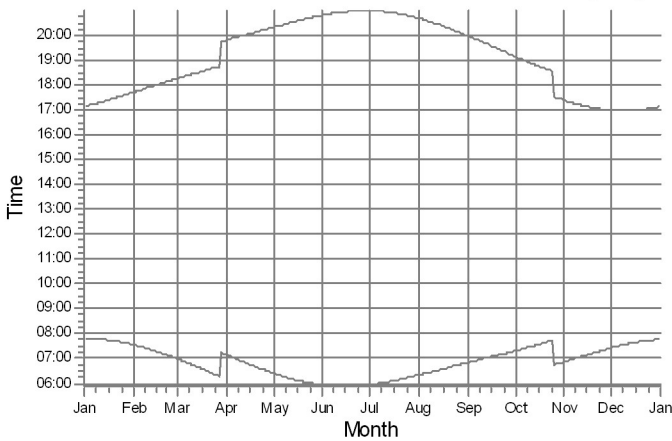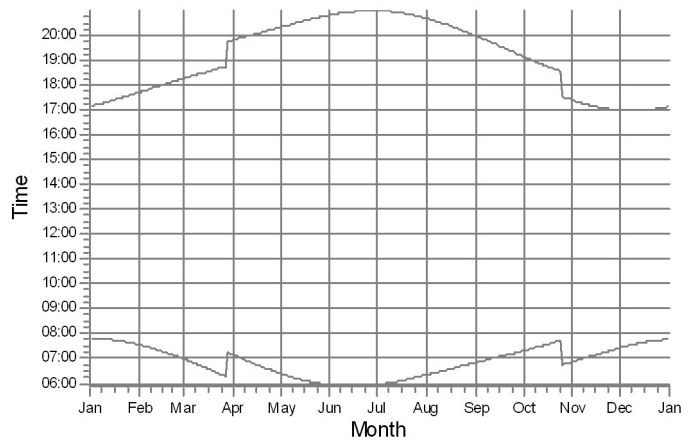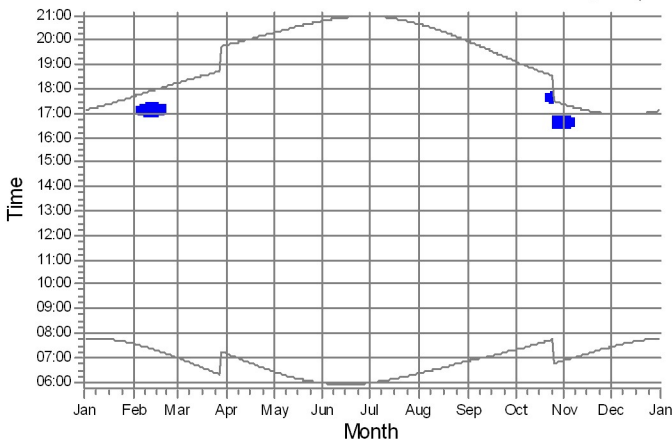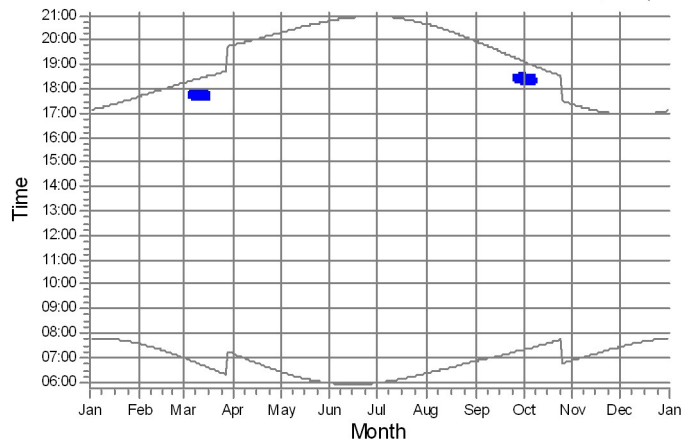WTG003: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG004: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG005: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

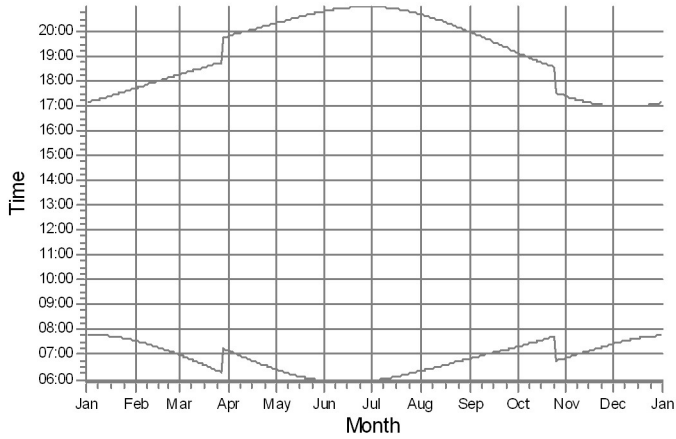WTG006: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

Shadow receptors

SHADOW - Calendar per WTG, graphical

Calculation: Progetto_2022_10_14

WTG007: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG008: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG009: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG010: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG011: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG012: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

Shadow receptors
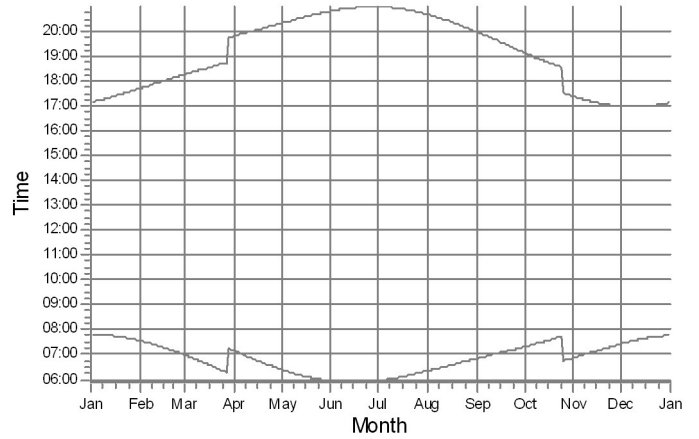
F066: F06 (agriturismo Castiolu)

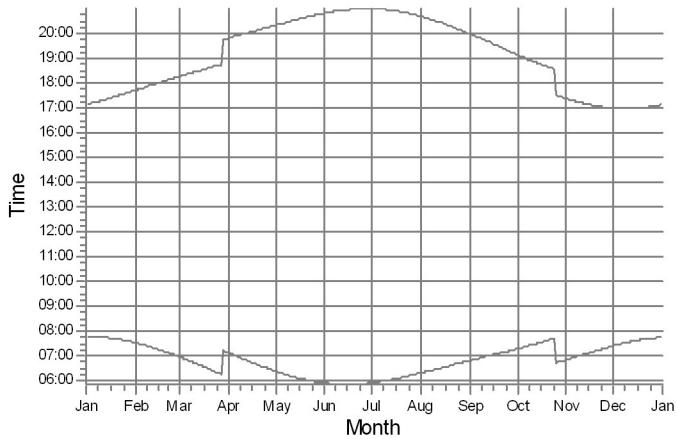## SHADOW - Calendar per WTG, graphical
Calculation: Progetto_2022_10_14

WTG013: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG014: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

WTG015: Siemens Gamesa SG 6.0-170 6000 170.0 !O! hub: 135,0 m (TOT

Shadow receptors