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PROVINCIA DI
NUORO



COMUNE DI
NUORO



COMUNE DI
ORUNE



REGIONE SARDEGNA

OGGETTO:

PROGETTO DEFINITIVO DI UN IMPIANTO EOLICO COMPOSTO DA 7 AEROGENERATORI CON POTENZA COMPLESSIVA DI 46,2 MW, DENOMINATO "CE NUORO NORD", NEL COMUNE DI ORUNE (NU) E OPERE CONNESSE NEI COMUNI DI ORUNE (NU) E NUORO (NU)

NOME ELABORATO:

RELAZIONE IMPATTO SHADOW FLICKERING

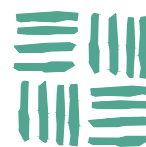
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SCALA:	CODICE ELABORATO	TIPOLOGIA	FASE PROGETTUALE		
-	REL24	IMPIANTO EOLICO	DEFINITIVO		
FORMATO: -					
3					
2					
1					
0	Prima emissione	Dicembre 2023	BIA	Agreenpower	Agreenpower
REV.	DESCRIZIONE	DATA	REDATTO	CONTROLLATO	APPROVATO

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INTRODUZIONE PARCO EOLICO CE NUORO NORD

La presente relazione è relativa al progetto definitivo per la realizzazione di un impianto di produzione di energia elettrica da fonte rinnovabile eolica mediante aerogeneratori, di tipo *grid-connected*. L'impianto, denominato "**CE Nuoro Nord**", verrà realizzato su terreni pubblici ubicati nella parte orientale e meridionale del Comune di Orune (NU), nelle località denominate "Su Vacchile Nou", "Burbàrisi", "Funtana Sos Jàccanos", "Schina Sas Pauleddas", "Sa 'e Magneri", "Corjos". Il percorso dell'elettrodotto di connessione alla Stazione Elettrica della RTN interesserà terreni ubicati in parte nel Comune di Nuoro (NU) e in parte nel Comune di Orune (NU).

Il progetto prevede l'installazione di nr.7 aerogeneratori di potenza pari a 6,6 MW ciascuno, per complessivi 46,2 MW di potenza ai fini dell'immissione in rete, e relative opere connesse. L'impianto eolico sarà connesso alla Rete di Trasmissione Nazionale (RTN) tramite elettrodotto interrato, necessario al convogliamento dell'energia elettrica prodotta dall'impianto alla nuova Stazione Elettrica (SE) della RTN 150/36 kV. L'impianto eolico sarà connesso alla rete elettrica in Alta Tensione per mezzo di un collegamento in antenna a 36 kV sulla nuova SE di smistamento della RTN a 150 kV, in località Pratosardo, come da STMG allegata al preventivo di connessione ricevuto da Terna S.p.A.

Il progetto, che ricade nella zona agricola dei comuni di Orune e Nuoro, ad eccezione della Sottostazione Elettrica Utente, prevista nel P.I.P. del Comune di Nuoro in località Pratosardo, è a favore dello sviluppo sostenibile del territorio in cui si inserisce, in modo coerente con l'impegno dell'Italia in ambito internazionale di riduzione delle emissioni di CO₂ nell'atmosfera e anche, nella contingenza dell'emergenza energetica, nell'ambito della gestione razionale dell'energia e della riduzione della dipendenza dall'Estero per l'approvvigionamento di materie prime di tipo tradizionale (olio e gas) o direttamente di energia elettrica.

Le fondazioni degli aerogeneratori sono di tipo circolare tronco conica con base molto larga, avente diametro pari a 24,00 m. La superficie occupata è circa 450 m² e l'altezza della fondazione è 3,45 m dal bordo superiore della base al piano di fondazione della base, con la fossa sfalsata di 30 cm al di sotto della fondazione. La sommità della fondazione, di larghezza 6 m farà da collegamento alla prima sezione della torre.

Le nr. 7 piazzole di esercizio, che durante la vita dell'impianto rimarranno a disposizione per la gestione e l'eventuale manutenzione straordinaria dell'aerogeneratore, occupano una superficie media pari a 1.750 m².

Tutti i cavi elettrici di collegamento tra gli aerogeneratori e la Sottostazione Elettrica Utente (SSEU) sono posati sotto il manto stradale esistente o lungo i tratti delle strade di nuova realizzazione che collegano le strade esistenti alle aree di servizio degli aerogeneratori. Il cavidotto in Media Tensione di collegamento tra gli aerogeneratori e la Sottostazione Utente, come riportato negli elaborati di

progetto, è totalmente interrato in trincee di profondità pari a 1,5 m rispetto al piano di campagna; pertanto, la posa dei cavi sarà a circa 1,3 m di profondità dal piano di campagna.

1. PREMESSA

La presente relazione espone l'analisi dell'evoluzione dell'ombra giornaliera generata dalla presenza degli aerogeneratori del parco eolico proposto, così come richiesto nell'allegato alla D.G.R n.3/17 del 16/01/09, "Studio per l'individuazione delle aree in cui ubicare gli impianti eolici. Lo studio prende in considerazione la formazione di ghiaccio sulle strade e lo sfarfallio dell'ombra (shadow flicker) sugli edifici presenti nell'ambiente circostante al parco.

La formazione di ghiaccio costituisce un pericolo per gli utilizzatori delle strade, e si presenta tipicamente in zone montane, pedemontane o appenniniche. L'analisi è limitata alle strade statali e provinciali e alle principali strade comunali che attraversano l'area vasta del parco.

Lo sfarfallio dell'ombra si presenta quando la pala di una turbina interposta tra un recettore e il sole "taglia" il fascio luminoso, producendo un alternarsi di ombra e luce. A seconda della frequenza di sfarfallio questo fenomeno può indurre attacchi epilettici su soggetti predisposti. È stato mostrato¹ che frequenze di sfarfallio inferiori a 3 Hz non pongono un rischio su soggetti fotosensibili². Pertanto in questo studio si prenderà tale valore come riferimento.

1 Harding et al doi:10.1111/j.1528-1167.2008.01563.x

2 Ovvero il rischio cumulativo di attacco epilettico è inferiore a 17 persone per milione di soggetti fotosensitivi quando la frequenza di sfarfallio è inferiore a 3 Hz.

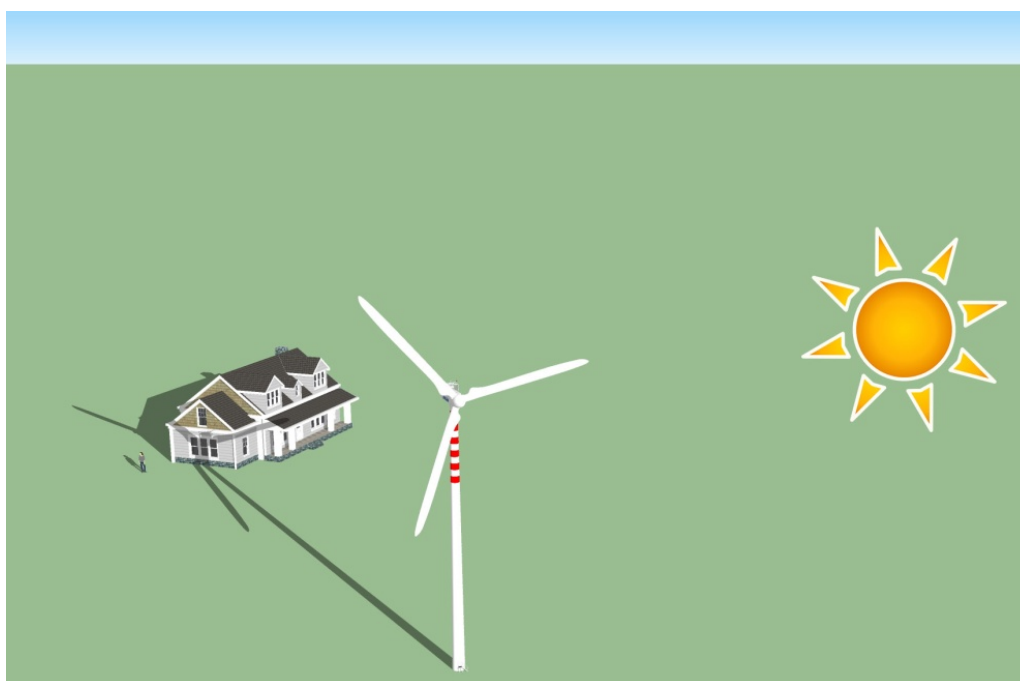


Figura 1: rappresentazione grafica del fenomeno di ombreggiamento.

Allo stato attuale solo la Germania possiede linee-guida dettagliate sui limiti e sulle condizioni per il calcolo dell'impatto dell'ombra e sono consultabili nel documento "Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen" (WEA-Shattenwurf-Hinweise).

Una condizione necessaria affinché si verifichi il fenomeno dello sfarfallio in un dato recettore è che, da quel sito, la dimensione angolare delle pale sia paragonabile alla dimensione angolare del sole, in quanto se la dimensione relativa della pala è piccola rispetto al sole, questa non produce ombra percettibile sul recettore. Seguendo le linee guida tedesche, si pone la soglia di 1/5 come rapporto minimo tra la dimensione angolare della pala e la dimensione angolare del sole perché si possa verificare lo sfarfallio in un certo sito.

I problemi sopra esposti non sussistono qualora (linee guida tedesche):

- Il recettore subisca meno di 30 ore/anno di ombra da parte degli aerogeneratori;
- per ogni giorno dell'anno, il recettore subisca meno di 30 minuti di ombra;
- la frequenza di sfarfallio (flickering) è inferiore ai 3Hz.

Inoltre le linee guida specificano che gli ombreggiamenti diventano rilevanti solamente quando si considerano i recettori comportanti attività residenziali e lavorative stabili: "è auspicabile (che l'effetto flickering) si mantenga al di sotto delle 30 ore/anno in presenza di attività lavorative statiche, tipo ufficio, scuole, ospedali, interessate direttamente da impatto".

Questa indicazione è legata al fatto che all'interno di un edificio adibito a uffici, le postazioni di lavoro sono generalmente fisse, pertanto se l'edificio con pareti finestrate risulta prospiciente l'impianto eolico, chiaramente lo sfarfallio delle ombre oltre certi limiti può costituire un problema per quei lavoratori che si trovino con le loro postazioni proprio davanti alle pareti vetrate. Viceversa, lo sfarfallio diventa irrilevante per tutti gli edifici di tipo non residenziale e dedicati ad attività che non richiedono un'assidua presenza in una stazione fissa, come ad esempio le attività agricole e agropastorali, nelle quali il personale addetto si muove in continuazione all'interno dei terreni per svolgere le proprie mansioni.

Le stesse considerazioni valgono per tutti i beni paesaggistici, manufatti, beni archeologici etc, i quali possono essere frequentati ma le persone devono, per natura dei luoghi, muoversi in continuazione e non stazionare ferme nello stesso punto per quantità considerevoli di tempo. L'unica eccezione vale per quei contesti nei quali delle persone devono svolgere dei lavori e/o passare del tempo in maniera continuativa in una certa posizione fissa rispetto alle turbine. In quel caso si procede ad uno studio approfondito esattamente come nel caso dei recettori residenziali.

2. METODOLOGIA

2.1 Specifiche aerogeneratori

Il modello proposto per gli aerogeneratori è Siemens Gamesa SG6.6-170. Questi hanno altezza al mozzo di 155 m e altezza totale all'apice di 240 m. Le pale sono lunghe 83.5 m e possiedono larghezza massima di 4.5m. La velocità massima di rotazione del rotore è pari a 8.83 rpm.

2.2 Modello digitale di elevazione (DEM)

Il modello digitale di elevazione (DEM) utilizzato per effettuare le simulazioni con il software WindPro è quello fornito dalla Regione Sardegna³, con risoluzione 10 m. Inoltre si è ipotizzata l'altezza degli occhi di un generico osservatore pari a 1.6 m. L'orografia può determinare l'occlusione della vista degli aerogeneratori da parte dei recettori (Figura 2) ed in questi casi non viene considerato il possibile effetto di ombreggiamento.

³ <http://www.sardegnaegeoportale.it/webgis2/sardegnamappe/>

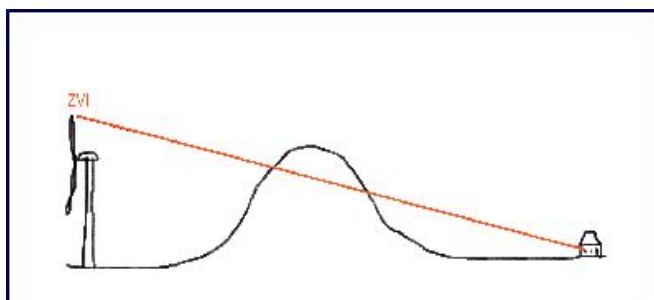


Figura 2: occlusione visiva dell'aerogeneratore rispetto al recettore, a causa dell'andamento orografico.

2.3 Recettori

Sono presenti complessivamente 52 recettori entro un buffer di 1km attorno al parco in proposta. Tutti i recettori sono classificati come recettori non residenziali (categoria catastale diversa da A o catasto terreni) e sono riportati in Tabella 1. In via conservativa è stato considerato il caso peggiore, ovvero che tutti i recettori e fabbricati siano delle serre sferiche (green house), ovvero che tutte le pareti siano trasparenti e che siano ortogonali a tutti gli aerogeneratori. In questo modo la simulazione fornisce una sovrastima degli effetti di ombra delle turbine sui recettori.

Per i recettori, se i risultati non indicano superamenti dei limiti indicati nelle linee guida, non si procede oltre, in caso contrario può essere necessario procedere a delle verifiche di dettaglio considerando le reali aperture dei ricettori (dimensioni ed orientazioni di finestre e porte).

Per gli edifici non residenziali non è necessario procedere con ulteriori analisi in quanto lo shadow flickering non è impattante per questi (capitolo 1).

Nome	Tipologia	E GB (m)	N GB (m)	Altitudine (m)	WTG più vicina	Distanza WTG più vicina (m)
R01	non residenziale	1526879	4471551	722	SG01	157
R02	non residenziale	1526682	4471732	744	SG01	376
R03	non residenziale	1526682	4471801	750	SG01	439
R04	non residenziale	1527168	4471842	744	SG01	545
R05	non residenziale	1527229	4471906	743	SG01	633
R06	non residenziale	1527347	4472224	747	SG01	964
R07	non residenziale	1527472	4471638	736	SG01	665
R08	non residenziale	1527018	4471075	687	SG01	362
R09	non residenziale	1526149	4471009	691	SG01	804
R10	non residenziale	1528060	4473306	839	SG02	416
R11	non residenziale	1528365	4473130	830	SG02	303
R12	non residenziale	1528403	4473155	830	SG02	348

Nome	Tipologia	E GB (m)	N GB (m)	Altitudine (m)	WTG più vicina	Distanza WTG più vicina (m)
R13	non residenziale	1528404	4472943	823	SG02	244
R14	non residenziale	1528999	4473012	864	SG03	492
R15	non residenziale	1529541	4473200	860	SG03	990
R16	non residenziale	1529574	4473054	842	SG03	934
R17	non residenziale	1528937	4472681	845	SG03	196
R18	non residenziale	1529851	4472817	850	SG04	872
R19	non residenziale	1530263	4472557	738	SG04	949
R20	non residenziale	1530227	4472474	736	SG04	875
R21	non residenziale	1530314	4472429	733	SG04	930
R22	non residenziale	1529720	4471859	768	SG04	300
R23	non residenziale	1529737	4471535	753	SG05	367
R24	non residenziale	1530258	4471776	645	SG04	825
R25	non residenziale	1530907	4471960	481	SG07	812
R26	non residenziale	1530970	4471914	479	SG07	776
R27	non residenziale	1530848	4471793	487	SG07	641
R28	non residenziale	1530974	4471574	527	SG07	449
R29	non residenziale	1531515	4471586	530	SG07	821
R30	non residenziale	1531500	4471520	514	SG07	775
R31	non residenziale	1531432	4471179	443	SG07	615
R32	non residenziale	1531402	4471157	459	SG07	584
R33	non residenziale	1530586	4470977	691	SG07	292
R34	non residenziale	1530714	4470879	680	SG07	293
R35	non residenziale	1530534	4470866	680	SG07	404
R36	non residenziale	1530417	4470939	680	SG07	455
R37	non residenziale	1530448	4470849	680	SG07	479
R38	non residenziale	1530217	4471245	699	SG07	609
R39	non residenziale	1530139	4471245	708	SG07	686
R40	non residenziale	1529843	4470962	706	SG05	566
R41	non residenziale	1529511	4471054	721	SG05	301
R42	non residenziale	1529547	4470799	693	SG06	274
R43	non residenziale	1529812	4470428	610	SG06	563
R44	non residenziale	1529881	4470346	601	SG06	662
R45	non residenziale	1529614	4470429	610	SG06	394
R46	non residenziale	1529664	4470365	610	SG06	472
R47	non residenziale	1529621	4470389	610	SG06	424
R48	non residenziale	1529024	4471276	741	SG05	406
R49	non residenziale	1528424	4471129	711	SG06	993
R50	non residenziale	1526959	4471488	713	SG01	139
R51	non residenziale	1528682	4472514	822	SG03	109
R52	non residenziale	1530433	4471089	672	SG07	391

Tabella 1 Recettori adiacenti al parco in proposta (1km).

2.4 Eliofania e distribuzione dei venti

I problemi dovuti all'ombra degli aerogeneratori sono presenti solamente quando è presente illuminazione diretta del sole (eliofania). I dati rilevanti nelle nostre simulazioni sono la lunghezza del dì (ovvero le ore presenti tra alba e tramonto, che non dipende dalle condizioni meteo) e le ore di illuminazione diretta. La prima varia con continuità nell'arco dell'anno, senza apprezzabili distinzioni tra le varie zone della Sardegna, mentre la seconda è variabile da zona a zona e dipende da fenomeni a grande scala che influenzano in maniera sostanzialmente uniforme l'intera superficie isolana.

Di conseguenza il valore climatologico dell'eliofania è da considerarsi lo stesso su tutta la Sardegna (fonte: ARPA Sardegna), e per questo motivo sono stati utilizzati i valori di eliofania forniti dalla stazione meteorologica di Olbia.

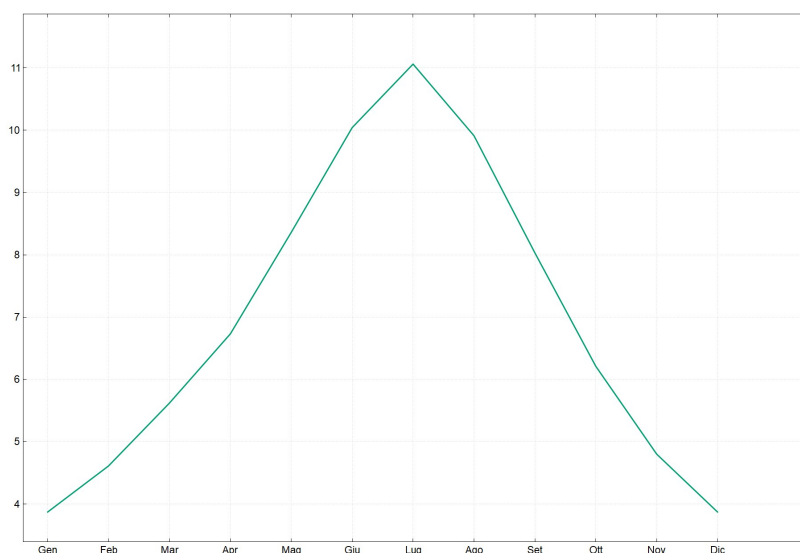


Figura 3: Eliofania media. Dati rilevati nella stazione di Olbia. Nelle ordinate le ore di eliofania giornaliere.

L'ombra che gli aerogeneratori proiettano sui recettori dipende anche dalla direzione del piano di rotazione delle pale; nello specifico, l'ombra è massima quando il piano di rotazione è perpendicolare al recettore. L'orientamento del piano di rotazione è determinato dalla direzione del vento, quindi l'orientamento segue la distribuzione dei venti:

	N	NNE	NE	ENE	E	ESE	SE	SSE
ore di attività annuali	120	150	155	163	189	206	215	185
	S	SSW	SW	WSW	W	WNW	NW	NNW
ore di attività annuali	142	146	180	335	601	438	155	103

Tabella 2 Rosa dei venti. Valori scalati su un anno equivalente di attività, ovvero su un totale di 3482 ore.

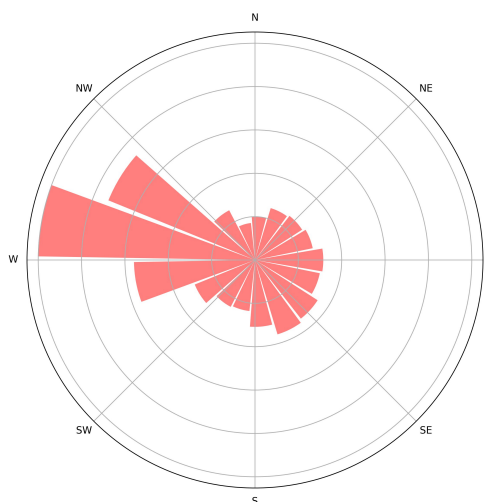


Figura 4: rosa dei venti per la località del parco in proposta in unità arbitrarie.

Nella simulazione questo fattore è preso in considerazione, in modo da diminuire o aumentare l'ombra a seconda dell'orientamento relativo tra il piano di rotazione delle pale e i recettori. In Figura 4 è riportata la rosa dei venti in unità arbitrarie e in Tabella 2. la distribuzione dei venti normalizzata rispetto ad un anno di attività, ovvero al 40% di un anno, che rappresenta il tempo medio di attività del parco. Questo quantitativo di ore è quello che viene inserito come input nella simulazione per determinare la porzione di tempo nella quale una turbina ruota in una specifica direzione.

Tutte le considerazioni espone tengono conto dei risultati delle simulazioni realistiche, ovvero simulazioni basate sull'eliofania e sulla distribuzione dei venti (a differenza della simulazione rispetto al caso peggiore in cui non se ne tiene conto).

3. RISULTATI

3.1 Recettori

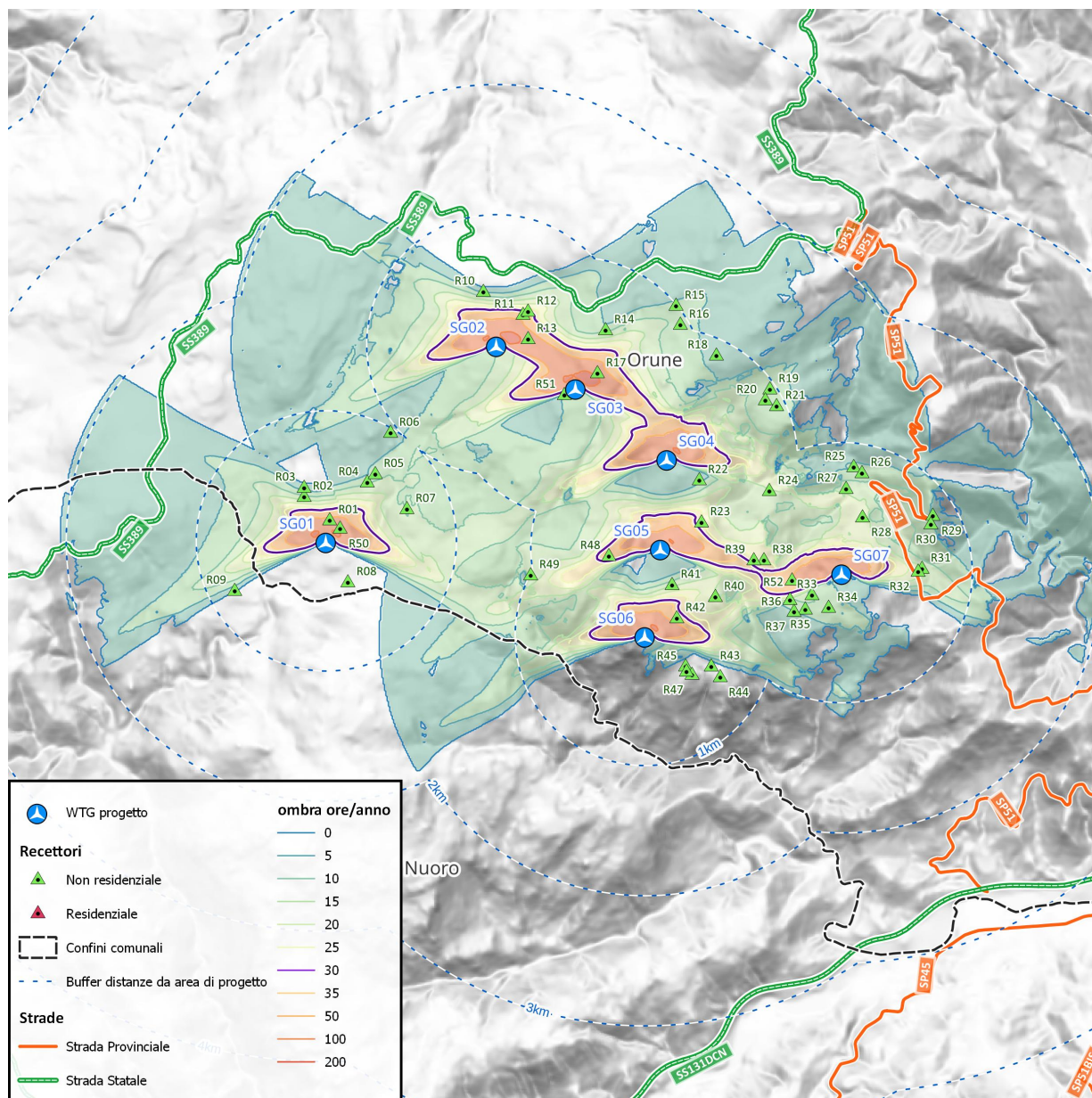


Figura 5: Ore di ombra totale all'anno, caso realistico che tiene conto dell'eliofania e della rosa dei venti. Sono presenti tutti i recettori. L'isolinea viola delimita al suo interno regioni con ombra > 30 ore/anno e al suo esterno regioni con ombra < 30 ore/anno.

In Figura 5 sono riportati i risultati della simulazione di ore totali di ombra all'anno, la zona ad alto impatto (ombra > 30 ore/anno) è delimitata dalla curva viola. I relativi valori sono tabulati in Tabella 3. Si nota che nell'area considerata nessun recettore è di tipo residenziale e pertanto non si rilevano impatti negativi ai fini dello studio sulle ombre su di essi.

Nome	ombra (ore/anno)	massimo ombra giornaliera (min/giorno)	Giornate di ombra all'anno	Nome	ombra (ore/anno)	massimo ombra giornaliera (min/giorno)	Giornate di ombra all'anno
R01	57	24	209	R27	13	6	185
R02	11	10	86	R28	16	9	198
R03	2	5	41	R29	5	7	60
R04	9	6	116	R30	5	7	60
R05	7	5	107	R31	16	11	117
R06	3	6	45	R32	17	12	111
R07	10	10	81	R33	10	7	135
R08	0	0	0	R34	9	6	117
R09	1	3	15	R35	8	7	96
R10	5	9	50	R36	12	14	105
R11	36	17	167	R37	4	6	69
R12	30	15	155	R38	24	12	231
R13	84	28	332	R39	27	11	272
R14	8	9	107	R40	15	10	150
R15	7	6	107	R41	14	9	128
R16	7	6	114	R42	40	22	180
R17	79	29	300	R43	0	0	0
R18	4	6	72	R44	0	0	0
R19	7	6	102	R45	0	0	0
R20	7	7	105	R46	0	0	0
R21	6	7	90	R47	0	0	0
R22	3	4	71	R48	36	20	159
R23	26	20	135	R49	12	11	144
R24	14	8	176	R50	92	37	267
R25	6	6	113	R51	6	5	95
R26	8	5	128	R52	48	29	177

Tabella 3 Ombra proiettata sui recettori. Caso realistico che tiene conto dell'eliofania e della rosa dei venti. In verde sono evidenziati i recettori non residenziali che subiscono ombreggiamento >30 ore/anno. Non sono presenti recettori residenziali.

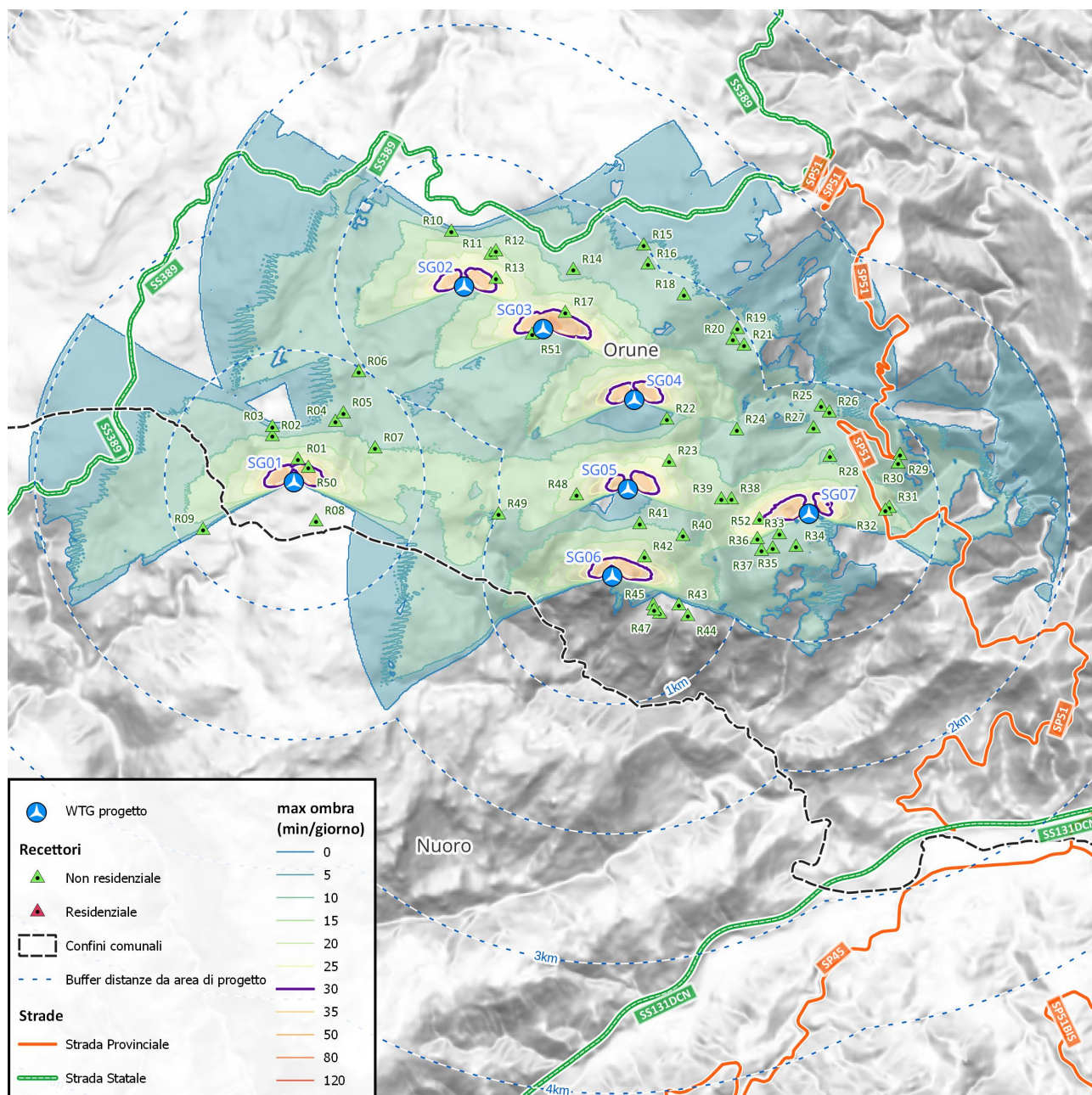


Figura 6: Massimo tempo di ombreggiatura giornaliera (minuti/giorno), caso realistico che tiene conto dell'eliofania e della rosa dei venti. L'isolinea viola delimita le zone a basso impatto (ombra < 30 min/giorno) dalle zone ad alto impatto (ombra > 30 minuti/giorno).

In Figura 6 è riportato il massimo numero di minuti di ombra percepita dai recettori e fabbricati in un singolo giorno realisticamente; solamente il recettore R50 (non residenziale) ricade nella zona con ombreggiatura massima giornaliera > 30 min/giorno (Tabella 3).

3.2 Effetti cumulativi

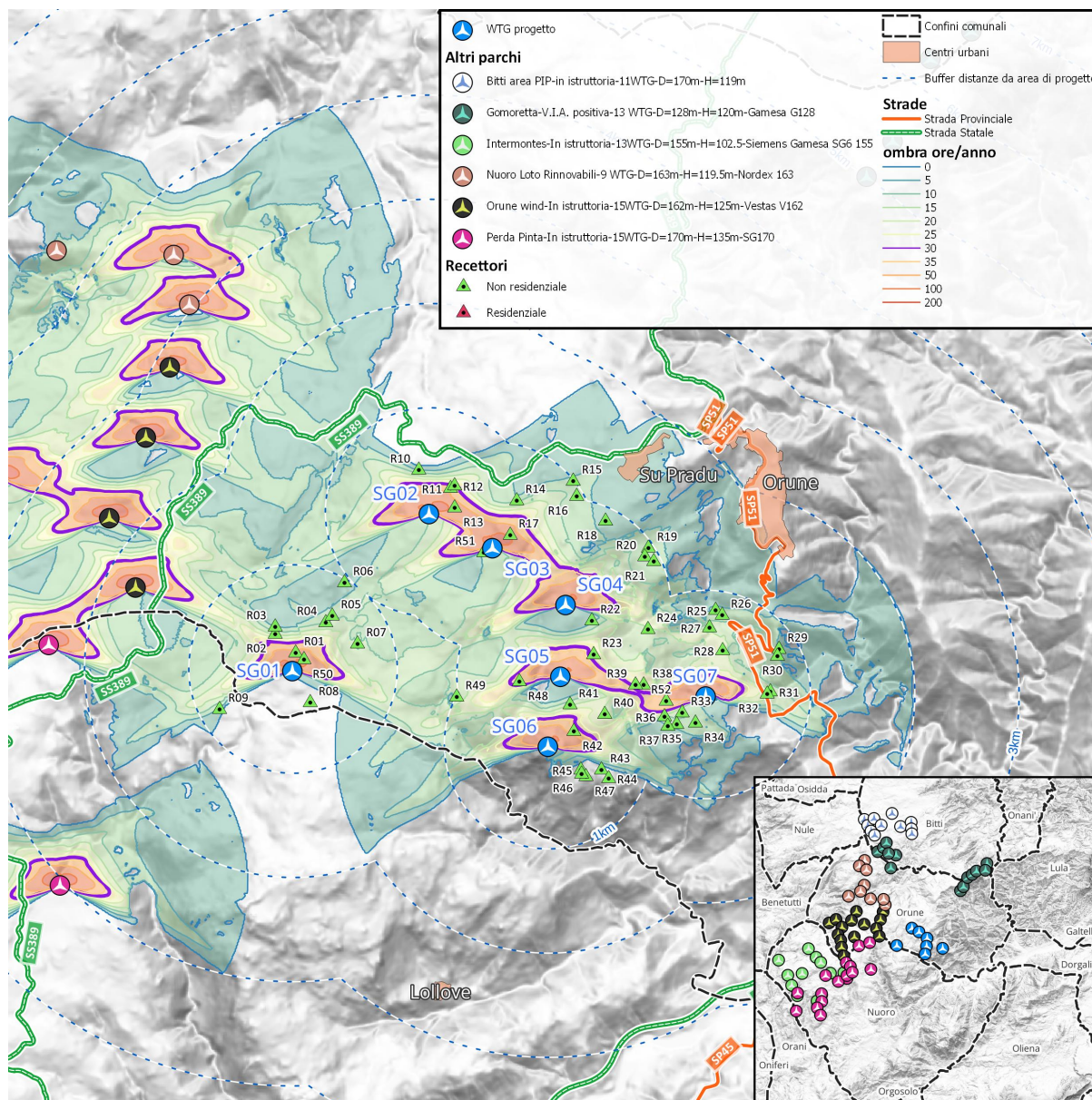


Figura 7 Ombra generata cumulativa dal parco in proposta e dai parchi limitrofi in istruttoria o esistenti.

I parchi esistenti o in istruttoria nelle vicinanze del parco in proposta sono riportati in Figura 7, mentre in Tabella 4 si riportano i dati cumulativi relativi all'ombreggiamento per i recettori soggetti maggiormente all'effetto cumulativo. Si nota che nessun recettore subisce un significativo impatto cumulativo, per cui l'effetto cumulo del parco in proposta con i parchi limitrofi esistenti o in istruttoria risulta trascurabile ai fini dello studio delle ombre.

Recettore	Tipologia	Ombra progetto (ore/anno)	Ombra cumulativa (ore/anno)	Ombra altri parchi (ore/anno)
R01	Non residenziale	56.9	60.2	3.3
R02	Non residenziale	10.9	14	3.1
R03	Non residenziale	2.4	5	2.6
R05	Non residenziale	7.1	8.0	0.9
R09	Non residenziale	0.5	3.0	2.5
R50	Non residenziale	91.8	96.0	4.2

Tabella 4 Ombra cumulativa. Recettori che subiscono maggiore effetto cumulativo.

3.3 Flickering

Le turbine in proposta (SG170) hanno una velocità massima di rotazione pari a 8.83 rpm, ossia 0.15 Hz, che poi diventa una frequenza di taglio di 0.45 Hz (ovvero la frequenza con cui le pale tagliano la luce di una sorgente luminosa) poiché la turbina è composta di 3 pale. Affinché si verifichi il fenomeno di flickering con almeno 3 Hz (soglia minima per soggetti fotosensibili, vedi il paragrafo 1) è necessario dunque che 6 o più turbine siano allineate rispetto ad un recettore; questo non avviene in nessun caso per i recettori considerati. In particolare nessun recettore considerato subisce l'ombra contemporanea di 2 o più aerogeneratori per volta (si rimanda ai calendari grafici in appendice).

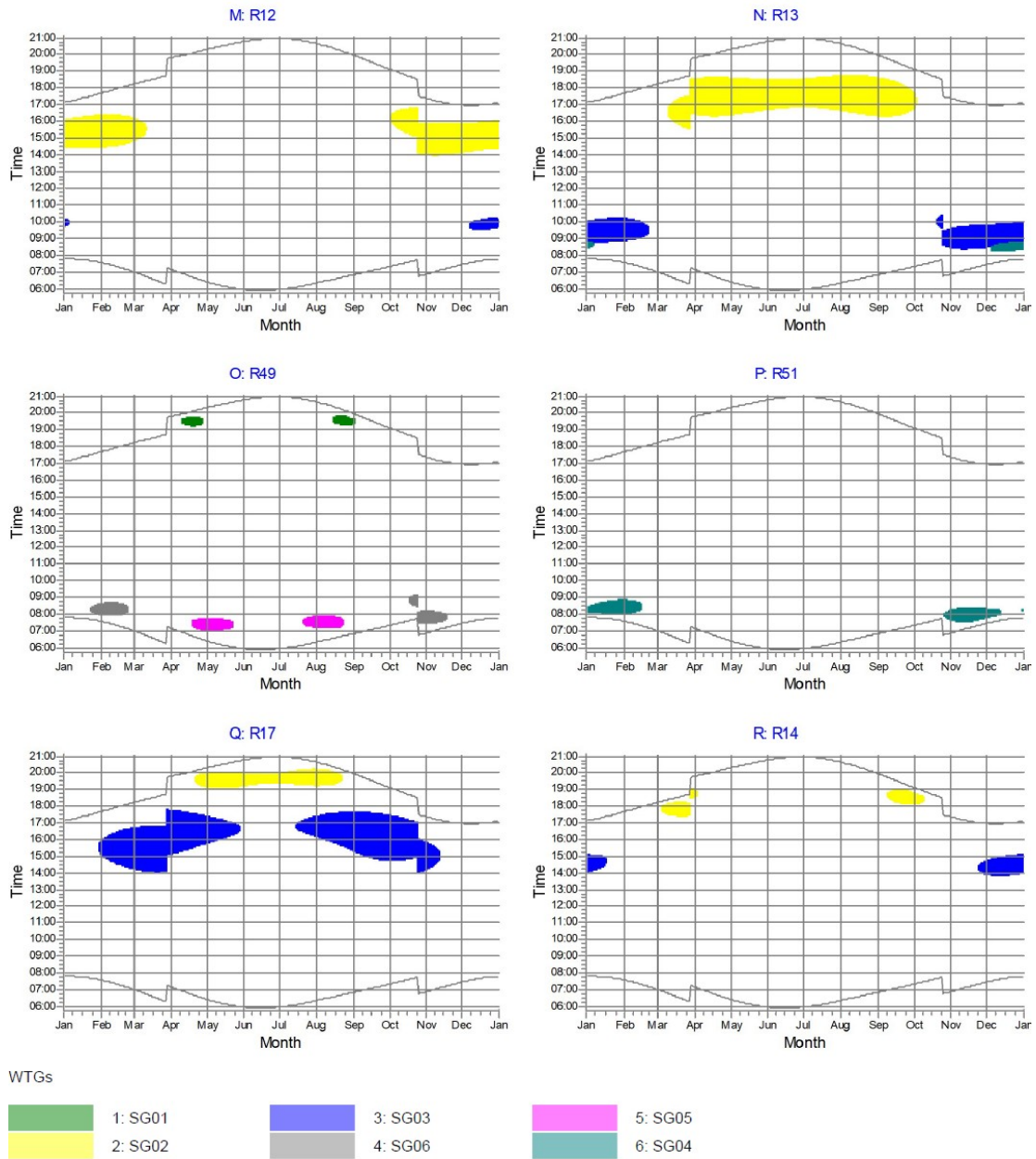


Figura 8: Calendario grafico ombre per ogni recettore nel caso peggiore, senza tenere conto di eliofania e rosa dei venti. Le linee continue indicano l'ora di alba e tramonto. Le macchie colorate indicano il periodo dell'anno e le ore nelle quali i recettori sono interessati dall'ombra di una turbina.

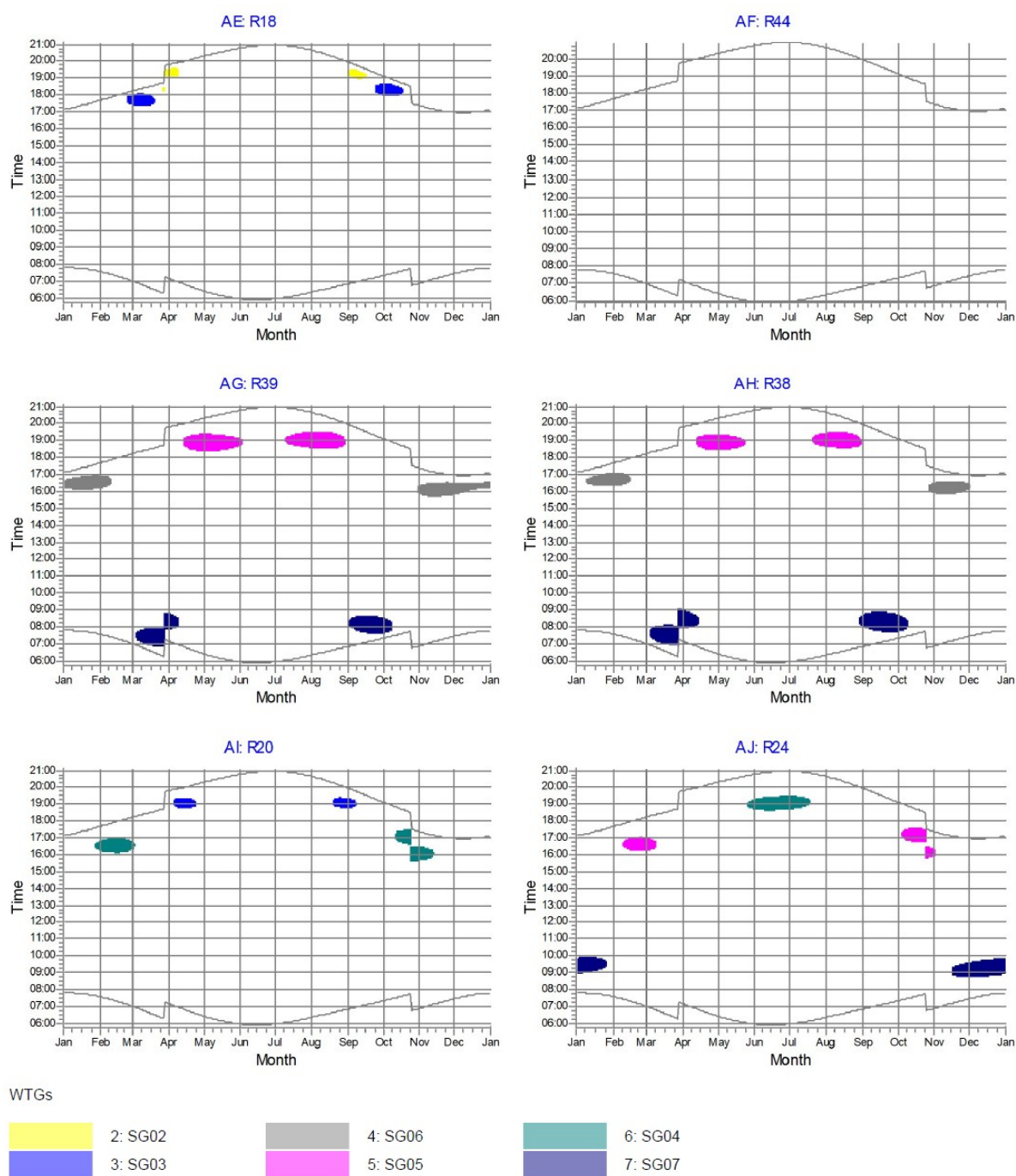


Figura 9: Calendario grafico ombre per ogni recettore nel caso peggiore, senza tenere conto di eliofania e rosa dei venti. Le linee continue indicano l'ora di alba e tramonto. Le macchie colorate indicano il periodo dell'anno e le ore nelle quali i recettori sono interessati dall'ombra di una turbina.

La Figura 8 e Figura 9 riportano i calendari grafici delle ombre subite da alcuni recettori. Da questi è possibile determinare il periodo dell'anno e della giornata nel quale il recettore è interessato dall'ombra di una turbina. Ad esempio è possibile determinare che il recettore R13 subisce l'ombra delle turbine SG01 e SG03 nei mesi di Ottobre-Febbraio durante la mattina in orari compresi tra le 08:00 e le 10:00

e dalla turbina SG02 nei pomeriggi dei mesi Marzo-Settembre. In appendice sono riportati i calendari grafici per ogni recettore e per ogni turbina.

3.4 Strade

Le strade provinciali e statali sono riportate in Figura 6. Le strade più vicine al parco in proposta sono la strada provinciale SP51 e SS389. Nessuna di esse ricade dentro l'area con ombreggiatura massima giornaliera > 30 min/giorno. Di conseguenza gli impatti delle ombre del parco in proposta sulle strade provinciali e statali limitrofe risulta trascurabile.

4. Conclusioni

Sono presenti 52 recettori nell'intorno del parco in proposta (1 km), nessun recettore è di tipologia residenziale (categoria catastale A). L'ombreggiamento di recettori di categoria non residenziale risulta non impattante per quanto esposto in premessa.

Inoltre tutti i recettori subiscono ombreggiamento da parte di una sola turbina per volta generando una frequenza di sfarfallio medio pari a 0.45 Hz (paragrafo 3.3) scongiurando il fenomeno di flickering a 3 Hz o maggiore. Di conseguenza nessun recettore subisce il fenomeno di flickering a 3 Hz o maggiore.

Nessuna strada statale o provinciale ricade dentro l'area di ombra massima giornaliera > 30 min/giorno, per cui gli impatti sulle strade statali e provinciali limitrofe al parco risulta trascurabile.

5. Appendice

Si riporta in appendice il calendario grafico e tabellare per ogni recettore e per ogni turbina. Le metodologie di lettura delle tabelle e dei grafici sono state esposte nei precedenti paragrafi.

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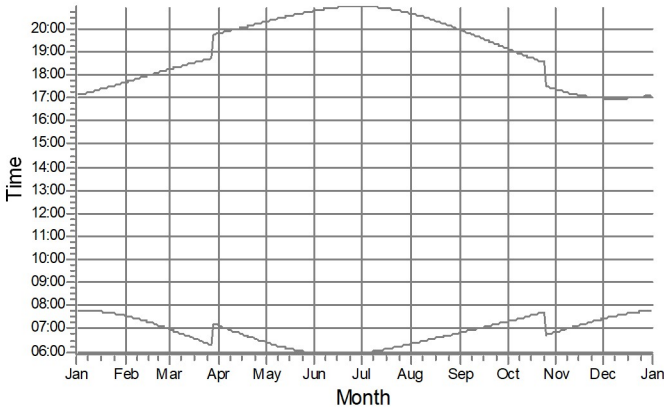
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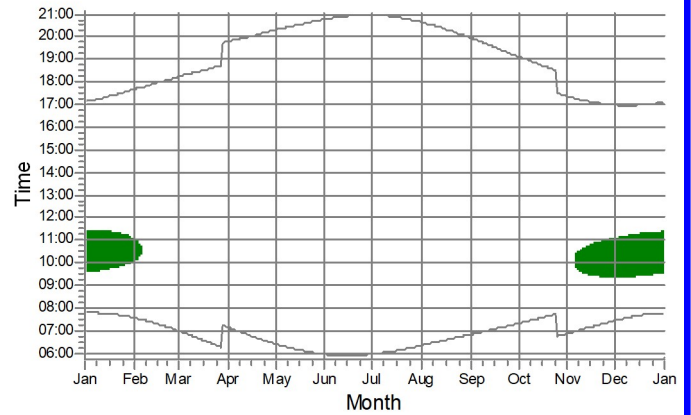
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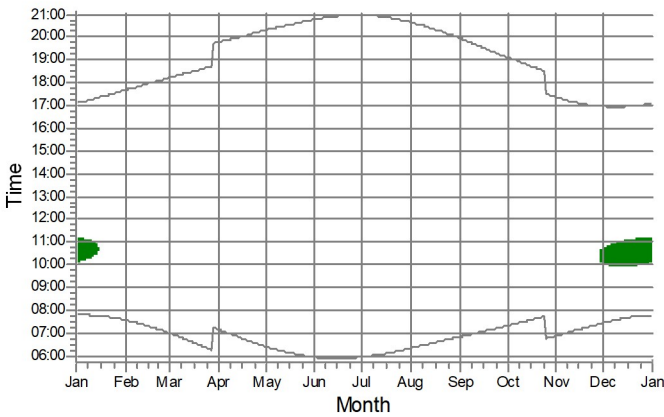
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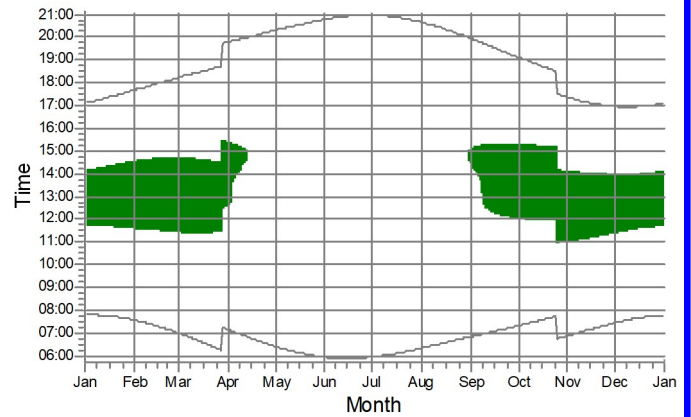
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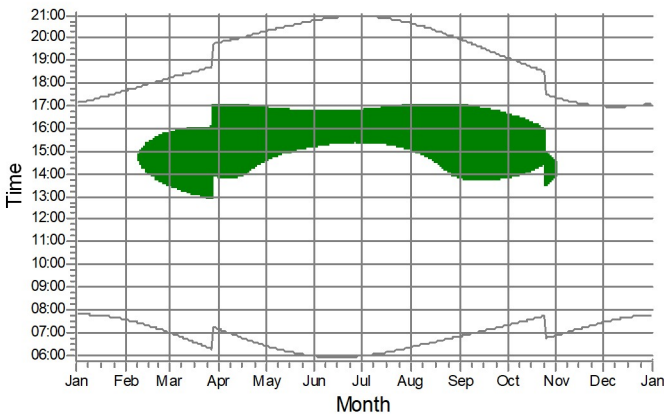
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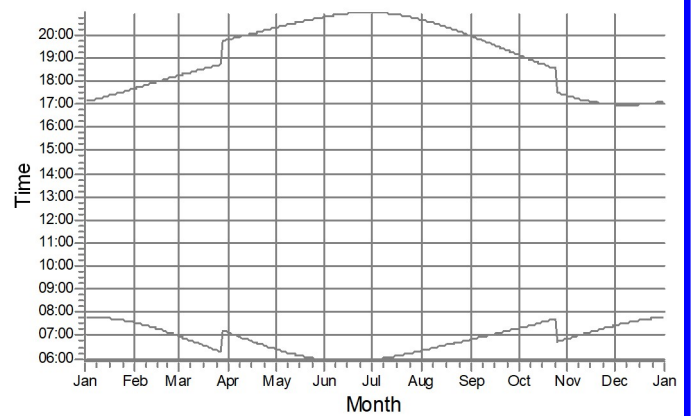
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E: R50



F: R08



WTGs

1: SG01

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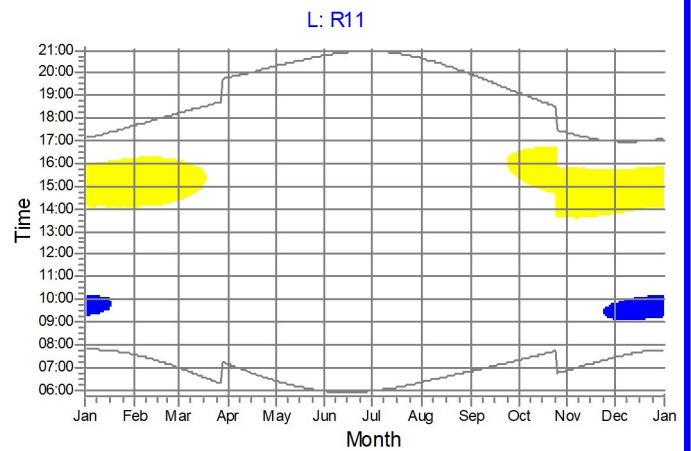
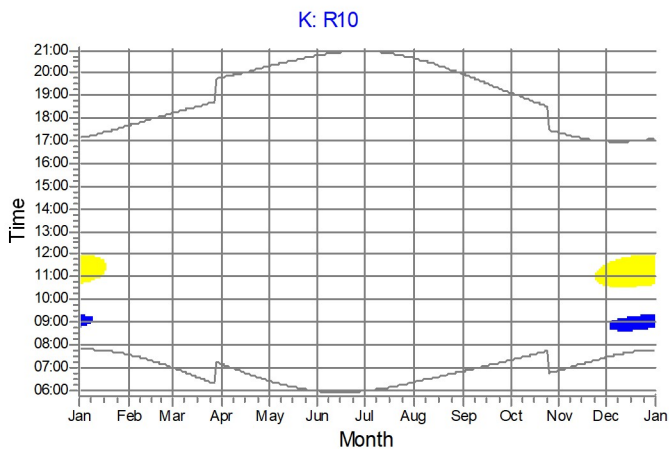
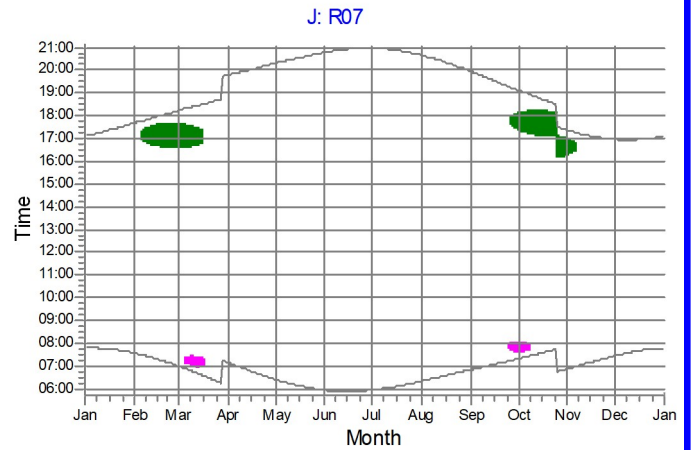
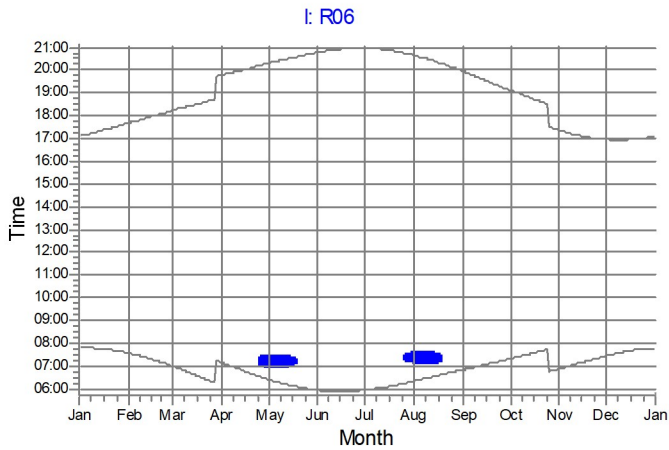
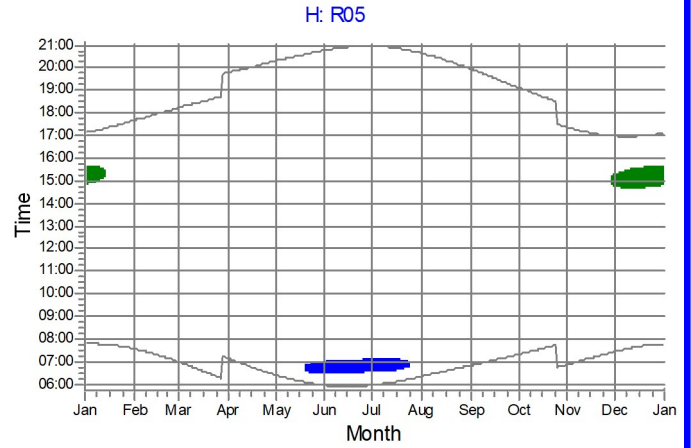
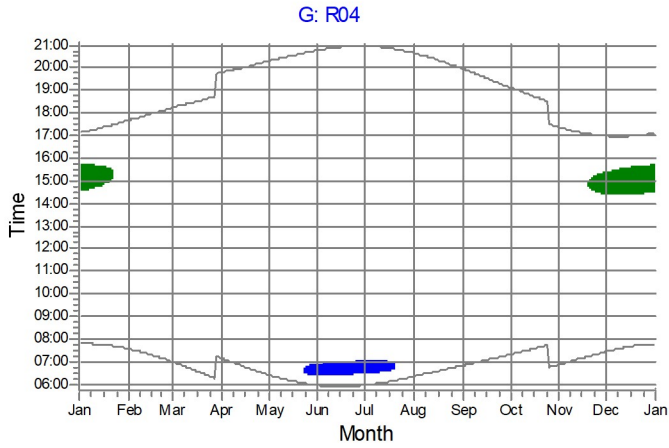
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WTGs

1: SG01

2: SG02

3: SG03

5: SG05

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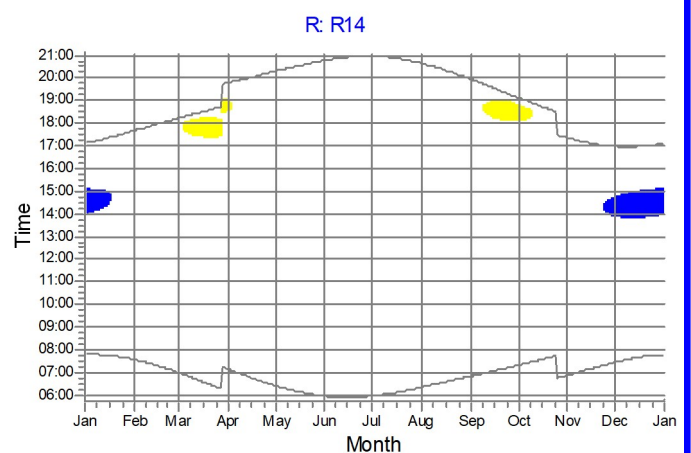
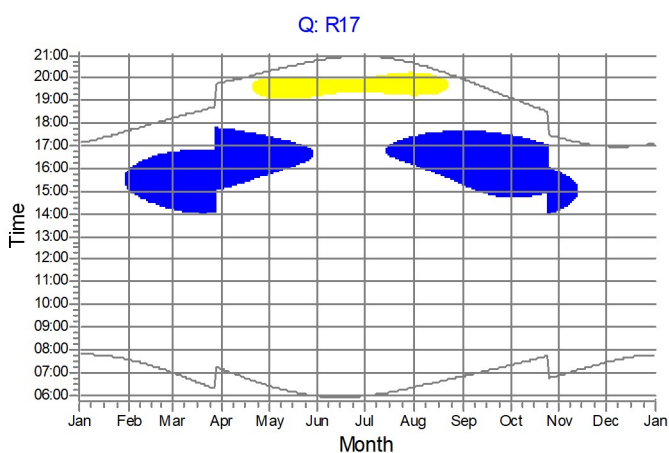
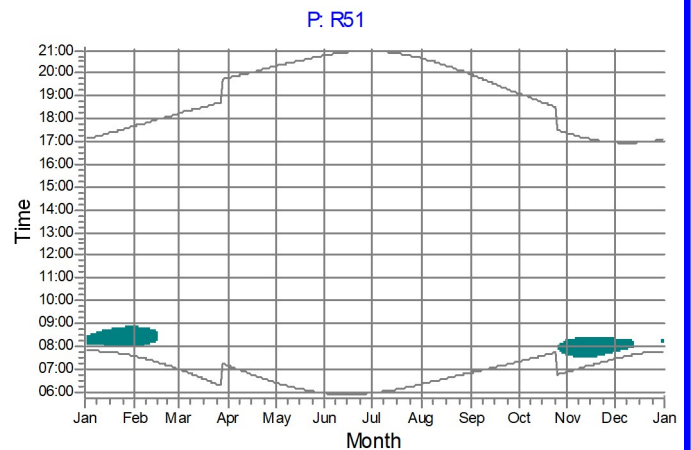
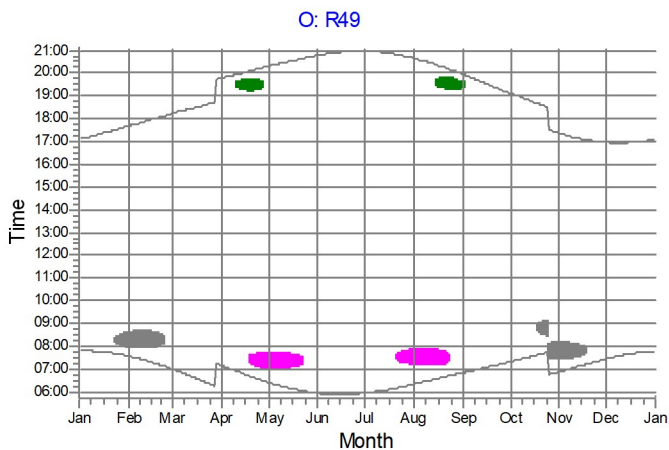
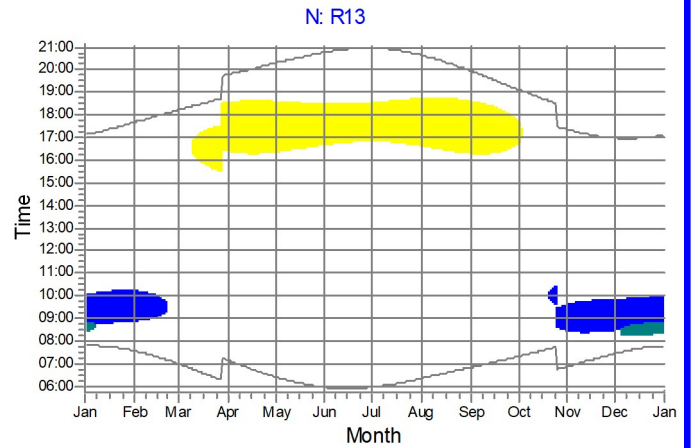
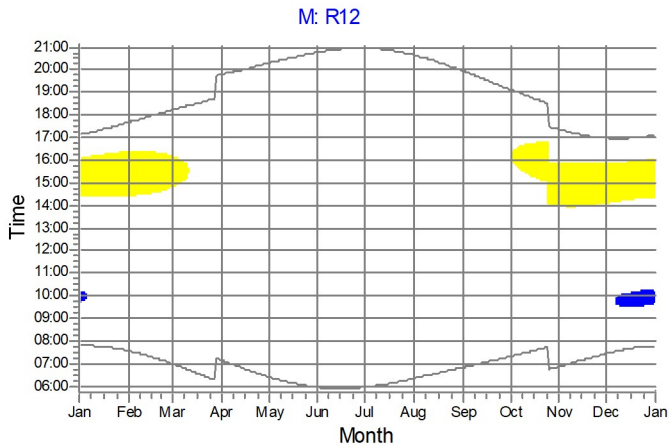
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WTGs

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|  | 2: SG02 |  | 4: SG06 |  | 6: SG04 |

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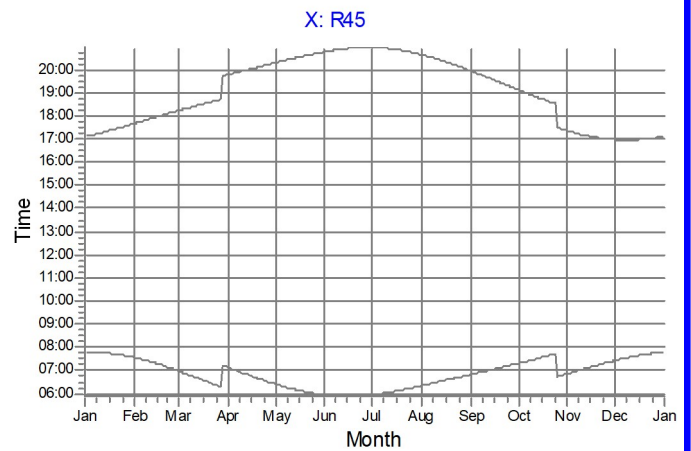
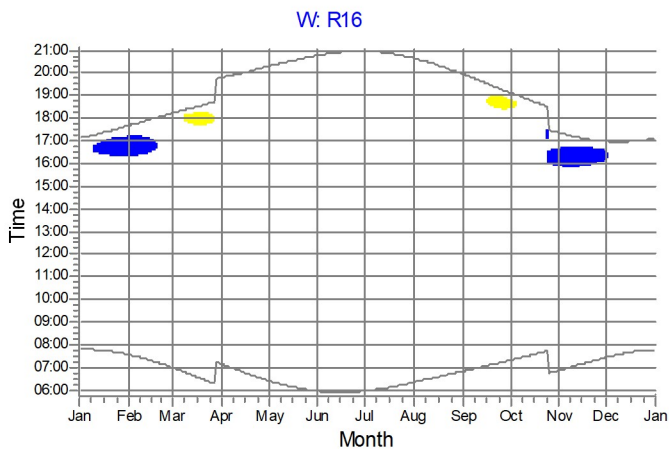
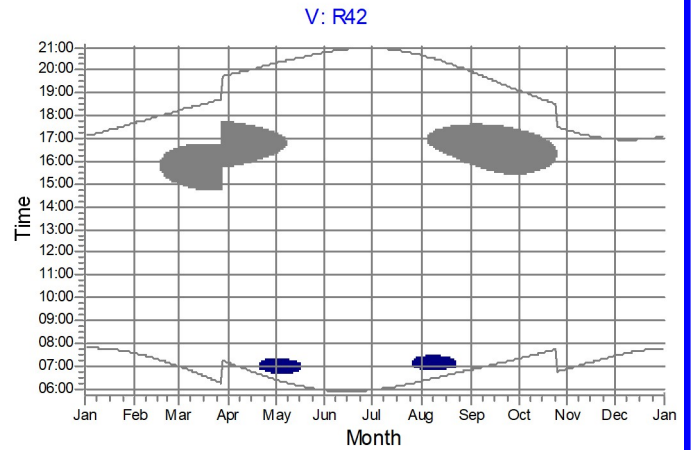
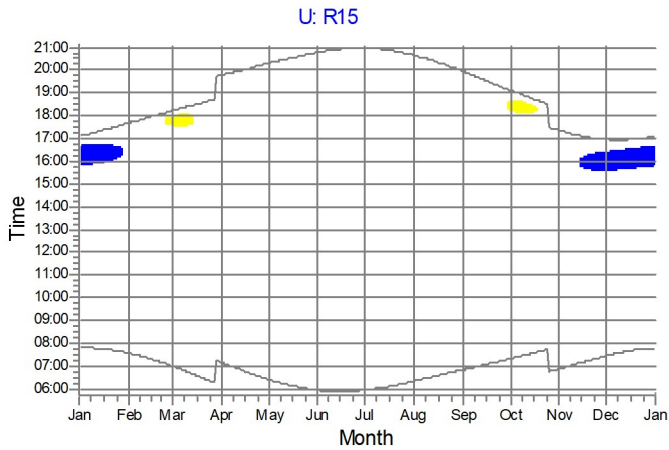
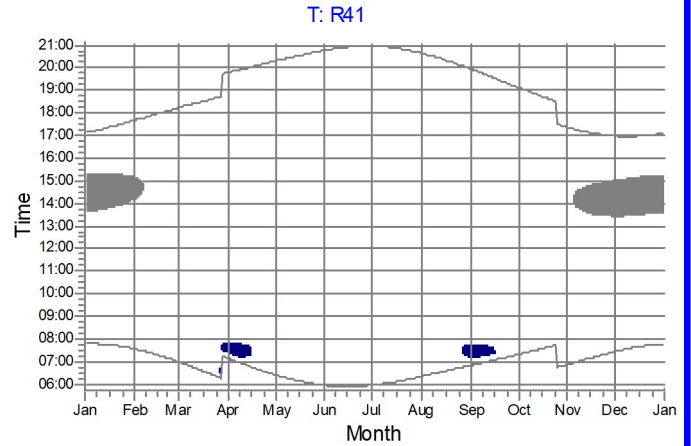
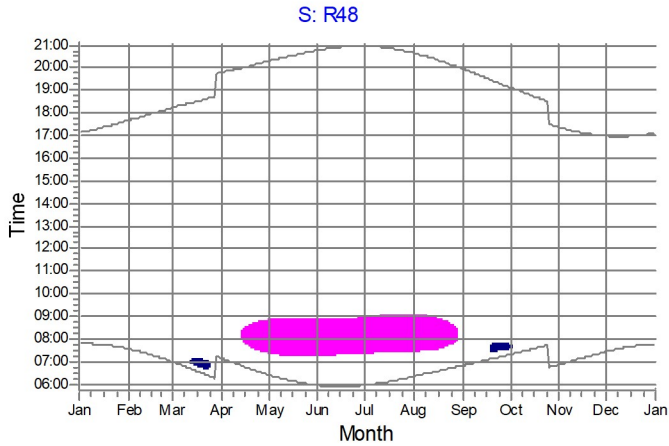
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WTGs

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|  3: SG03 |  5: SG05 | |

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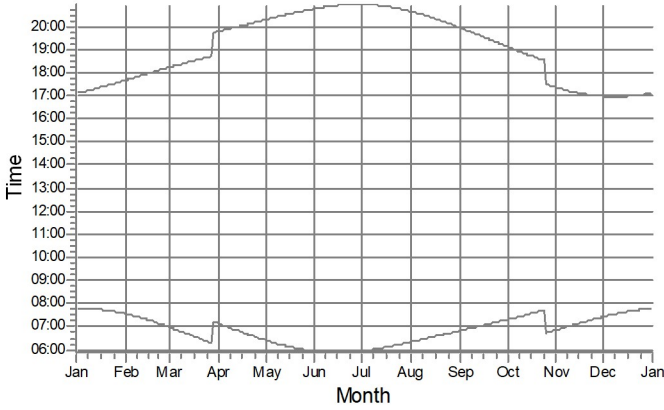
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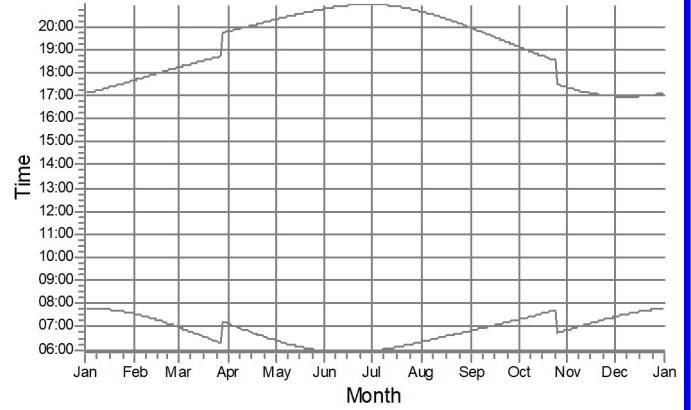
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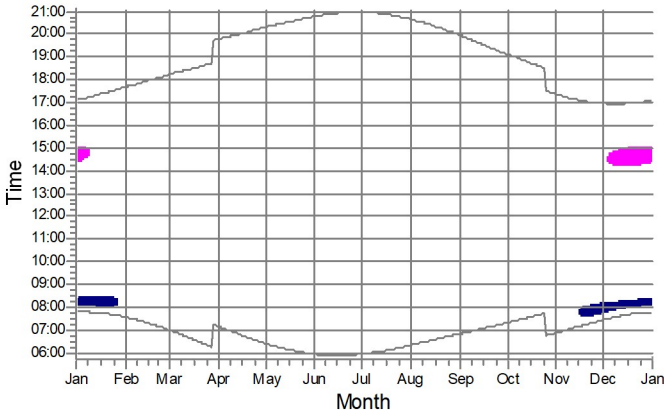
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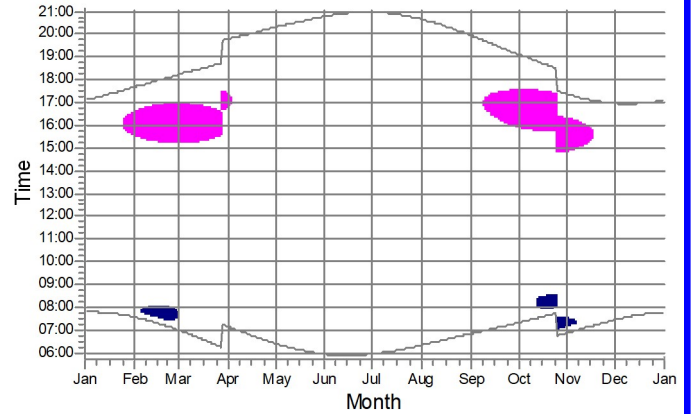
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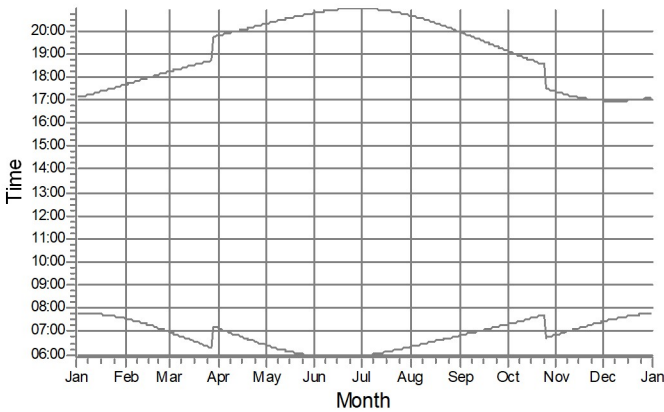
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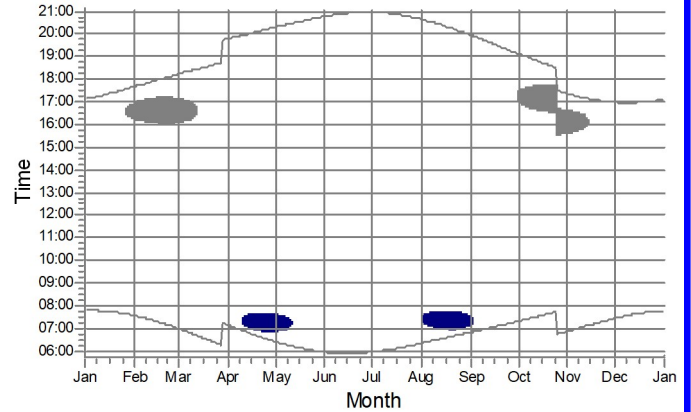
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AC: R43



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WTGs

4: SG06

5: SG05

7: SG07

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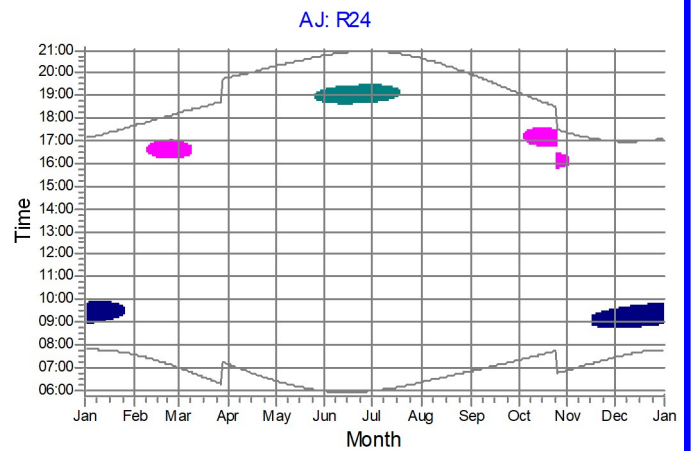
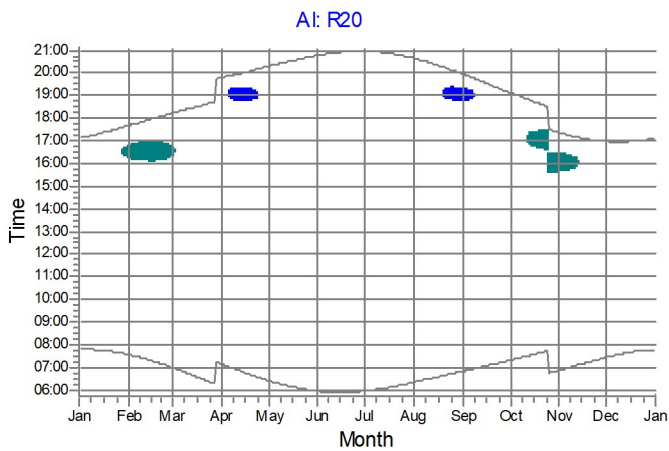
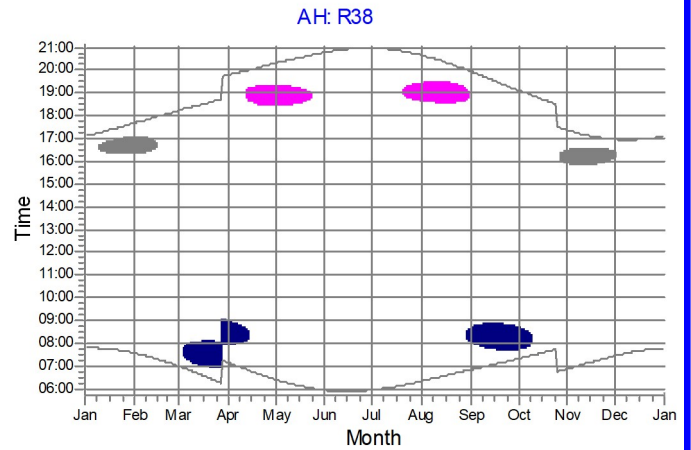
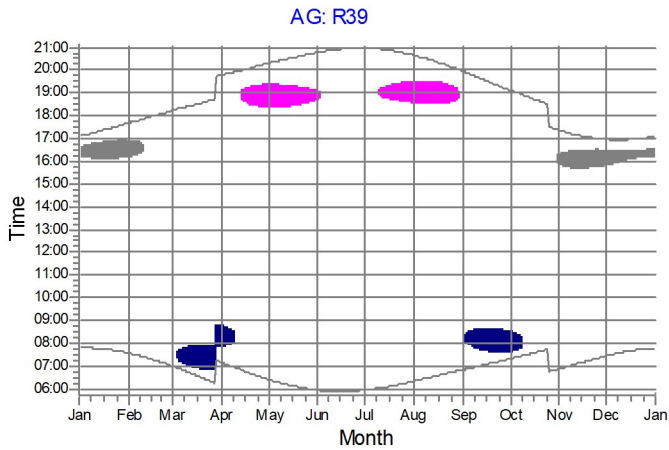
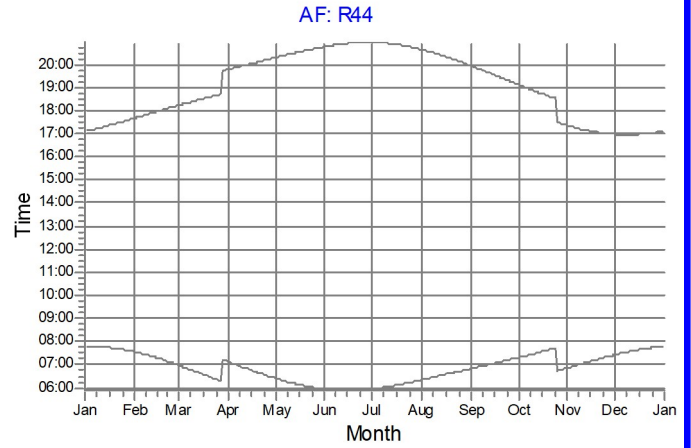
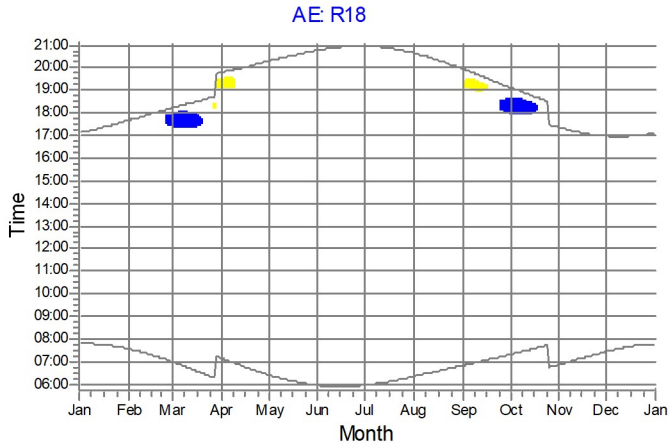
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WTGs

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|---|---------|---|---------|---|---------|
|  | 2: SG02 |  | 4: SG06 |  | 6: SG04 |
|  | 3: SG03 |  | 5: SG05 |  | 7: SG07 |

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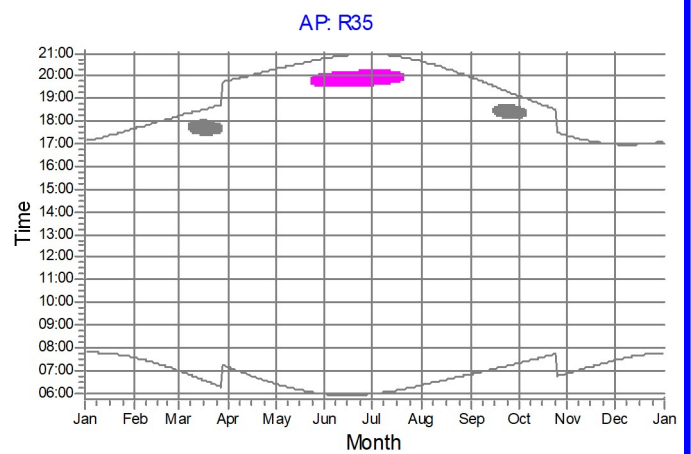
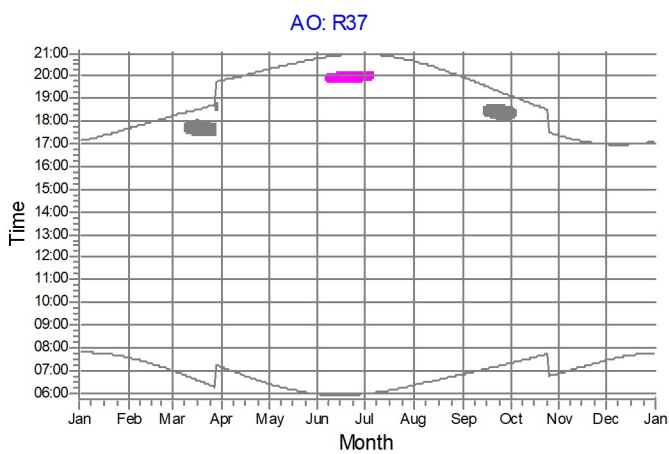
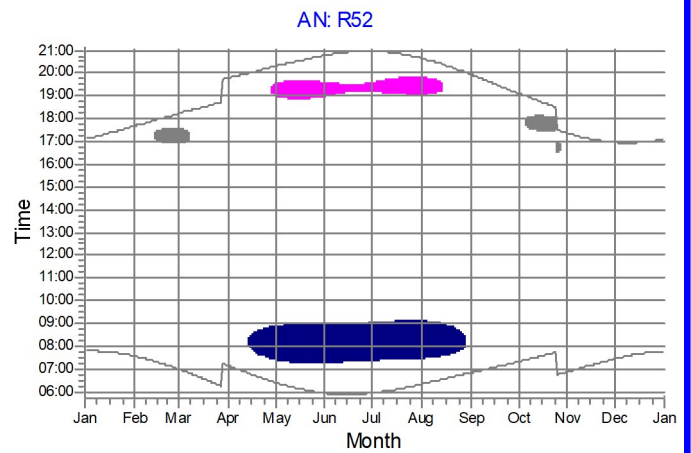
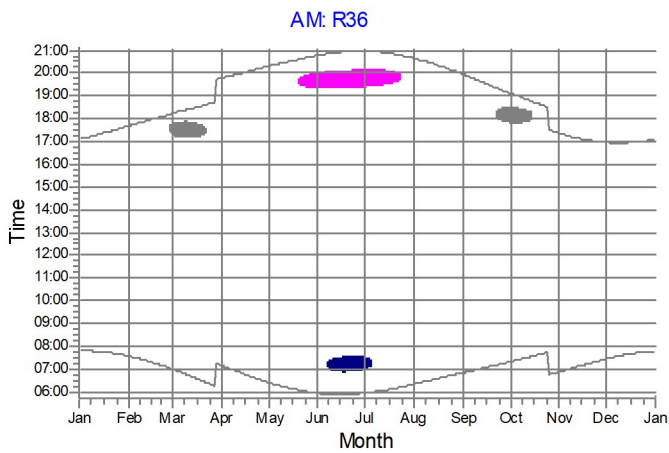
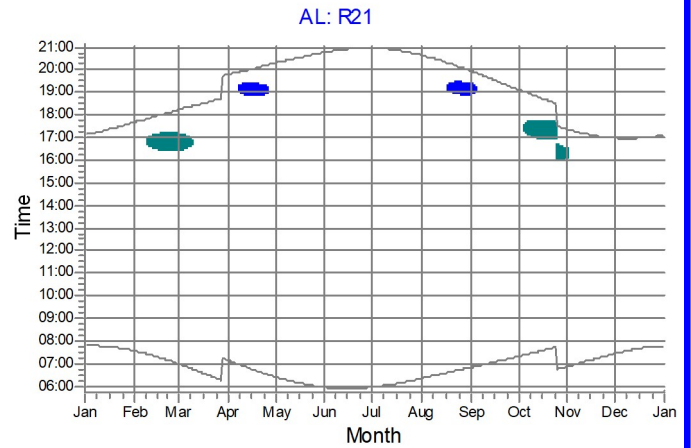
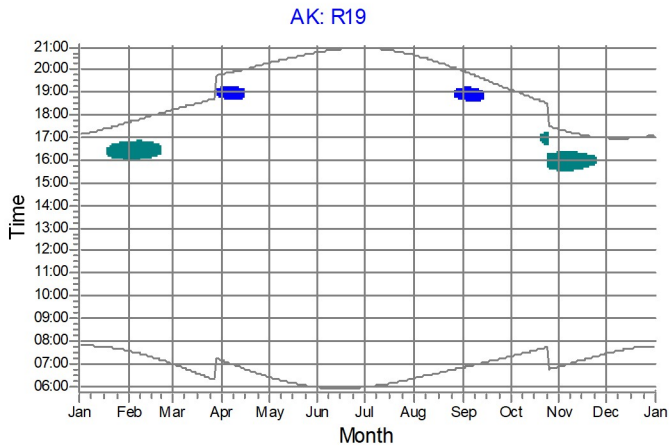
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WTGs

- | | | | | | |
|---|---------|---|---------|---|---------|
|  | 3: SG03 |  | 5: SG05 |  | 7: SG07 |
|  | 4: SG06 |  | 6: SG04 | | |

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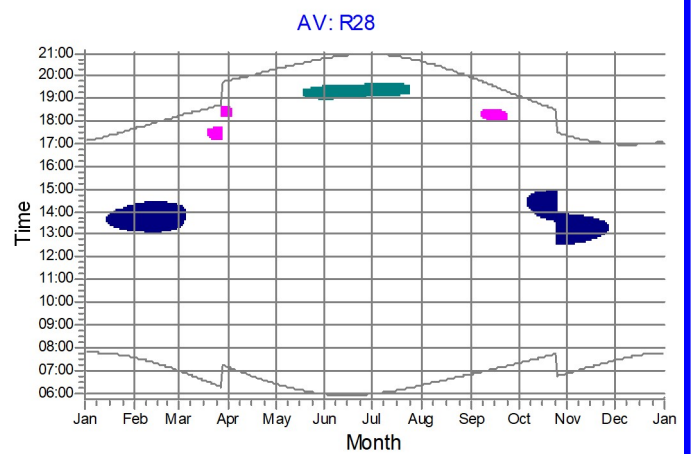
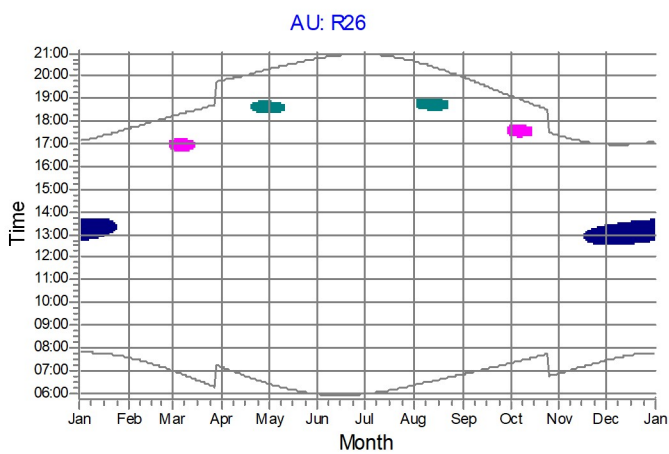
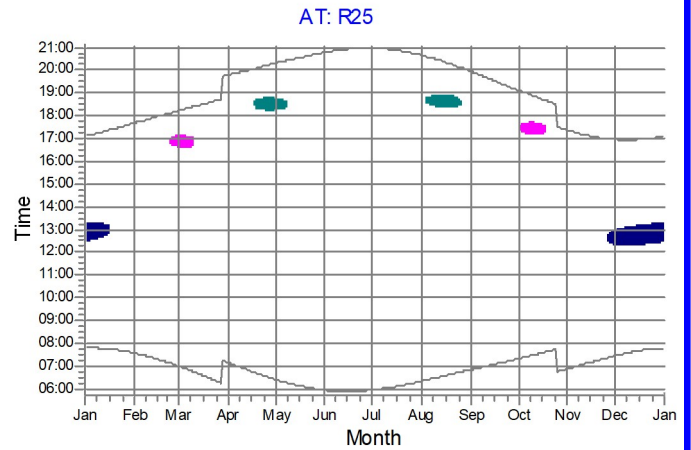
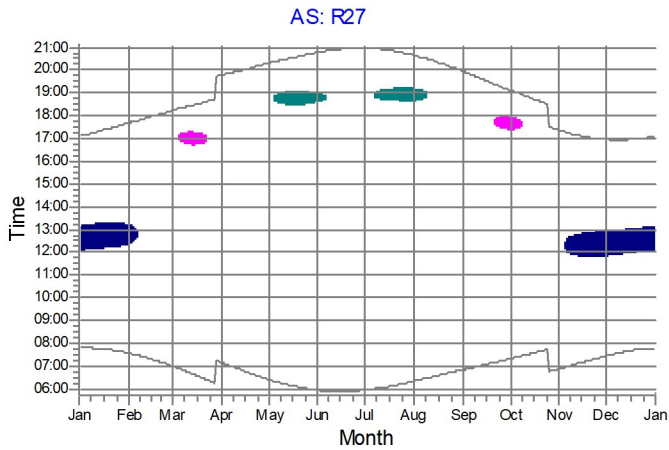
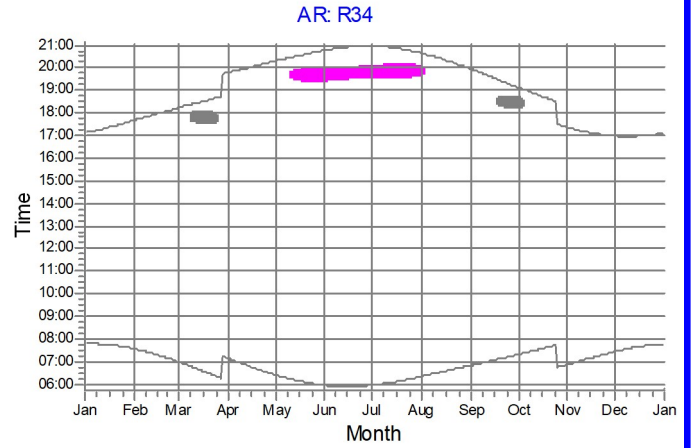
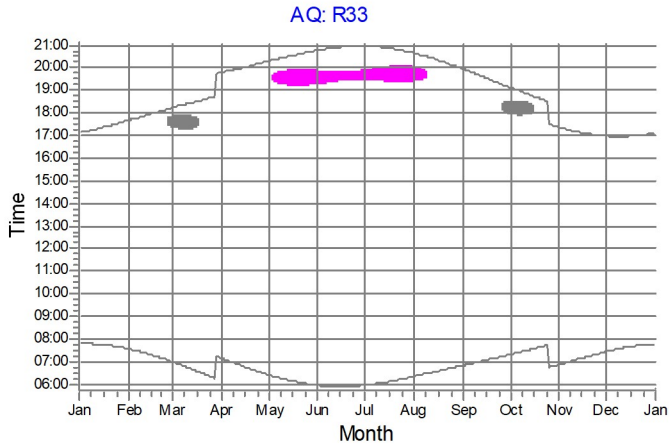
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WTGs

4: SG06

5: SG05

6: SG04

7: SG07

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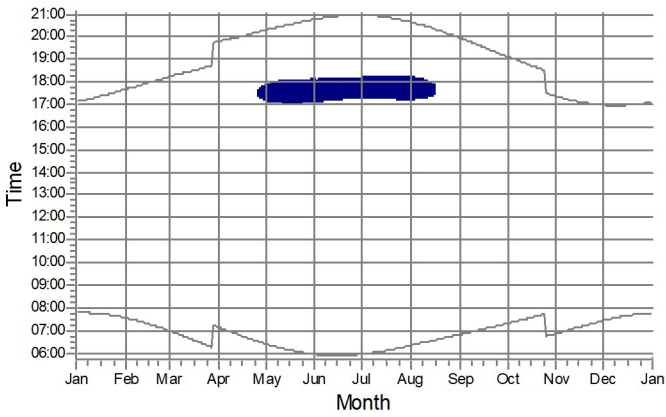
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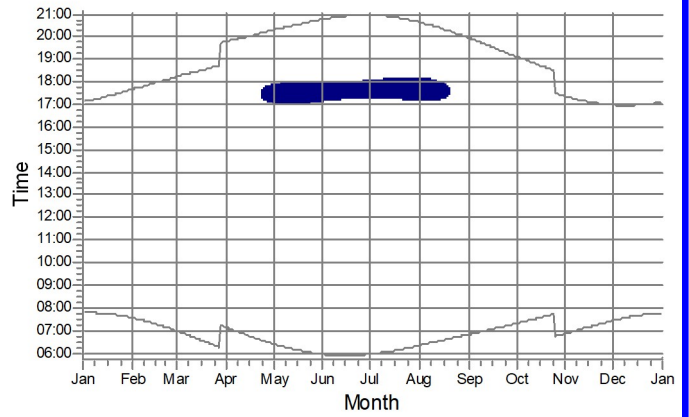
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Calculation: Nuoro Nord progetto

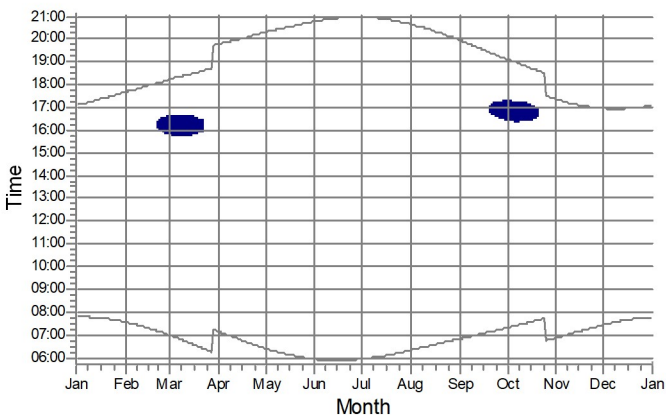
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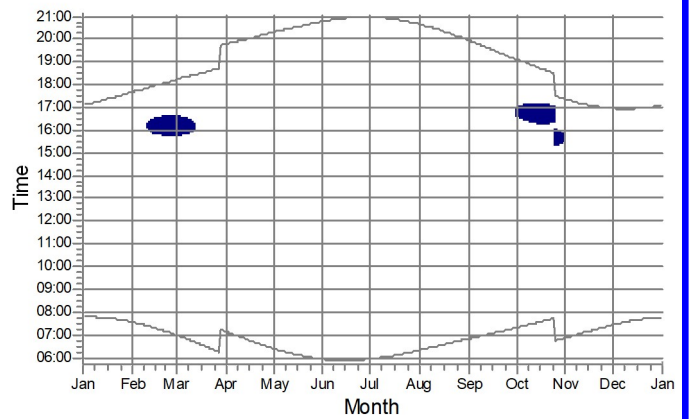
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AY: R30



AZ: R29



WTGs



7: SG07

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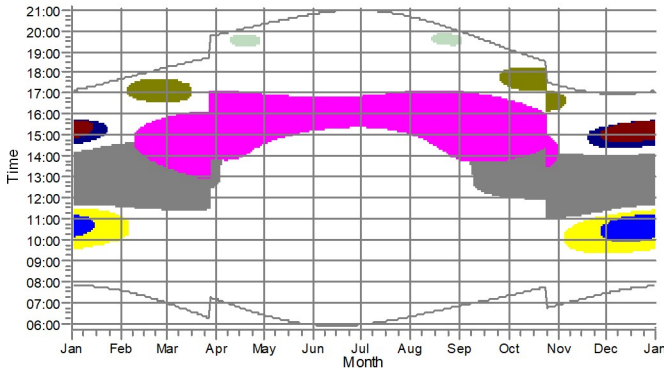
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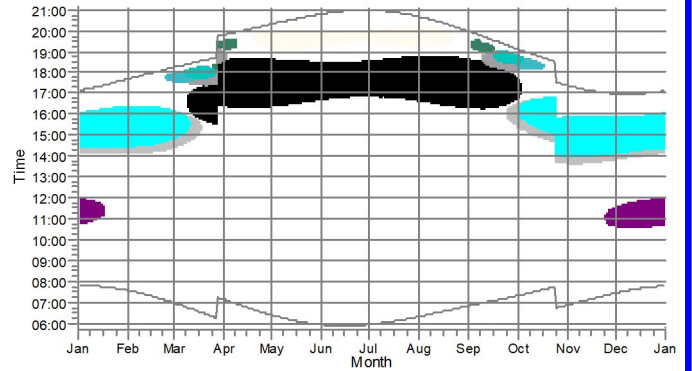
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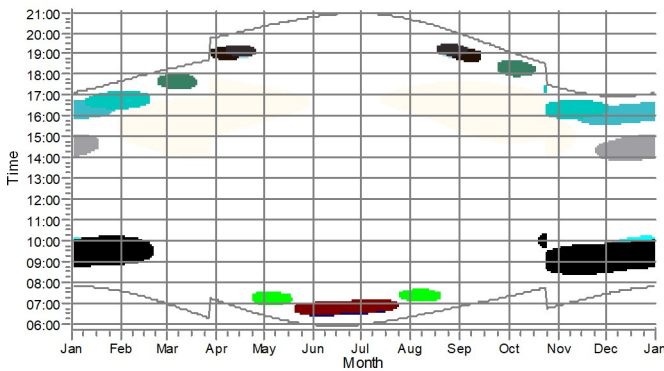
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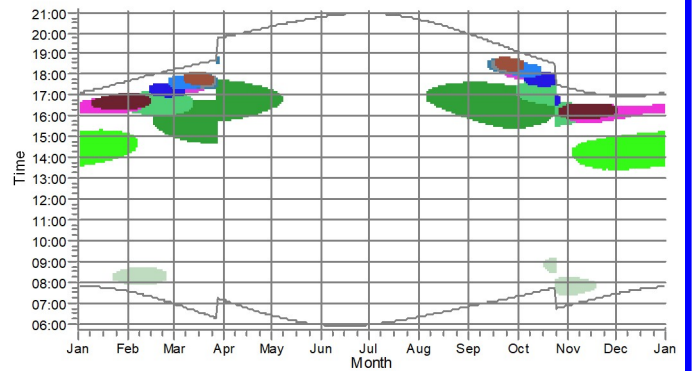
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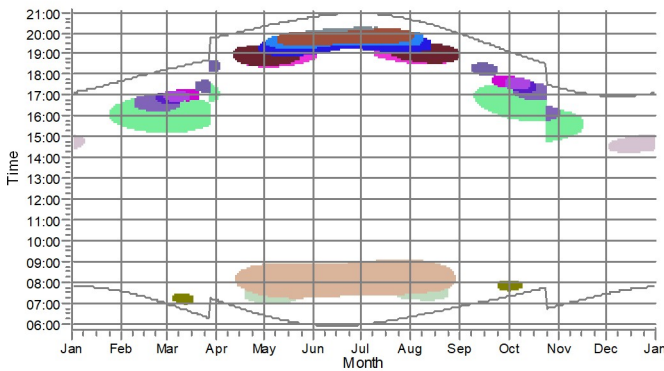
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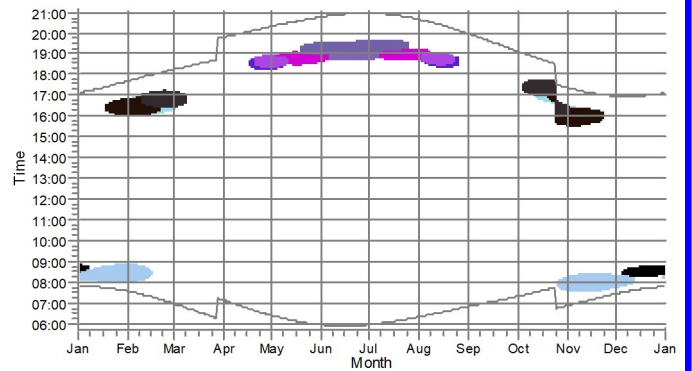
4: SG06



5: SG05



6: SG04



Shadow receptors

B: R02	I: R06	O: R49	U: R15	AE: R18	AL: R21	AR: R34
C: R03	J: R07	P: R51	V: R42	AG: R39	AM: R36	AS: R27
D: R01	K: R10	Q: R17	W: R16	AH: R38	AN: R52	AT: R25
E: R50	L: R11	R: R14	AA: R22	AI: R20	AO: R37	AU: R26
G: R04	M: R12	S: R48	AB: R23	AJ: R24	AP: R35	AV: R28
H: R05	N: R13	T: R41	AD: R40	AK: R19	AQ: R33	

Project:

windpro Nuoro nord - flickering

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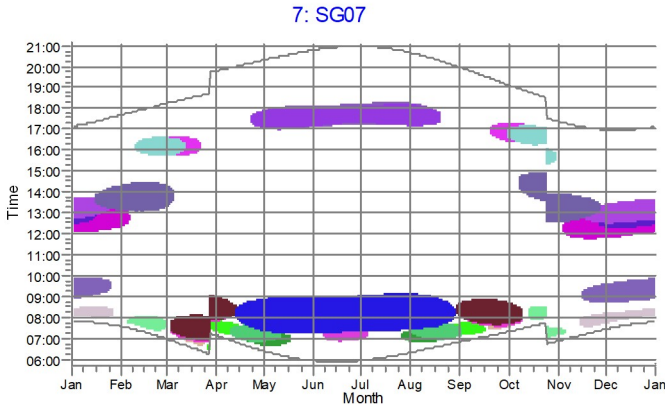
Bruno Manca / ingbrunomanca@gmail.com

Calculated:




















2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG, graphical

Calculation: Nuoro Nord progetto



Shadow receptors

 S: R48	 AA: R22	 AG: R39	 AM: R36	 AT: R25	 AW: R32	 AZ: R29
 T: R41	 AB: R23	 AH: R38	 AN: R52	 AU: R26	 AX: R31	
 V: R42	 AD: R40	 AJ: R24	 AS: R27	 AV: R28	 AY: R30	

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: A - R09

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	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	19:05	17:20	16:58
3	07:47	07:32	06:55	07:05	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	05:58	06:24	06:53	07:23	06:57	07:30
	17:10	17:45	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	06:24	06:54	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	06:25	06:55	07:25	06:59	07:32
	17:12	17:48	18:20	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	06:57	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	17:13	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	17:12	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	17:11	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	17:10	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	18:49	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
	17:19	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:35	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	06:43	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	19:30	18:42	17:05	16:58
18	07:44	07:14	06:32	06:42	06:05	05:53	06:07	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	20:05	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	18:03	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	18:35	20:08	20:37	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	06:23	06:35	06:01	05:53	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	06:00	05:54	06:12	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	06:30	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	07:01	06:17	06:29	05:58	05:55	06:15	06:45	07:15	06:46	07:22	07:45
	17:34	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	20:58	20:43	20:03	19:12	17:26	16:59	17:04
29	07:36		07:14	06:26	05:57	05:55	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	16:58	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	20:57	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
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: B - R02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:46 17:07	09:37 (1) 11:20 (1)	07:34 10:08 (1)	06:58 10:58 (1)	07:09 18:14	06:24 20:18	05:56 20:47	05:56 20:57	06:20 20:39	06:50 19:57	07:19 19:07	06:52 17:21	07:26 16:58	09:25 (1) 97
2	07:46 17:08	09:38 (1) 11:20 (1)	07:33 10:11 (1)	06:57 10:55 (1)	07:07 18:15	06:23 20:19	05:55 20:47	05:57 20:57	06:21 20:38	06:51 19:55	07:20 19:05	06:53 17:20	07:27 16:57	09:25 (1) 98
3	07:47 17:09	09:39 (1) 11:20 (1)	07:32 10:14 (1)	06:55 10:52 (1)	07:05 18:16	06:21 20:20	05:55 20:48	05:57 20:57	06:22 20:37	06:52 19:54	07:21 19:04	06:54 17:19	07:28 16:57	09:25 (1) 98
4	07:47 17:09	09:39 (1) 11:20 (1)	07:31 10:18 (1)	06:54 10:52 (1)	07:04 18:17	06:20 20:21	05:54 20:49	05:58 20:57	06:23 20:36	06:52 19:52	07:22 19:02	06:55 17:18	07:29 16:57	09:25 (1) 99
5	07:47 17:10	09:40 (1) 11:21 (1)	07:30 10:42 (1)	06:52 10:52 (1)	07:02 18:18	06:19 20:22	05:54 20:49	05:58 20:57	06:23 20:35	06:53 19:50	07:23 19:01	06:57 17:17	07:30 16:57	09:26 (1) 99
6	07:47 17:11	09:40 (1) 11:20 (1)	07:29 10:42 (1)	06:51 18:19	07:01 19:52	06:18 20:23	05:54 20:50	05:59 20:56	06:24 20:33	06:54 19:49	07:24 18:59	06:58 17:16	07:31 16:57	09:26 (1) 100
7	07:47 17:12	09:40 (1) 11:20 (1)	07:28 10:42 (1)	06:49 18:20	06:59 19:53	06:16 20:24	05:54 20:51	06:00 20:56	06:25 20:32	06:55 19:47	07:25 18:57	06:59 17:14	07:32 16:57	09:26 (1) 101
8	07:47 17:13	09:41 (1) 11:20 (1)	07:26 10:42 (1)	06:48 18:22	06:57 19:54	06:15 20:25	05:53 20:51	06:00 20:56	06:26 20:31	06:56 19:45	07:26 18:56	07:00 17:13	07:33 16:57	09:26 (1) 101
9	07:46 17:13	09:42 (1) 11:20 (1)	07:25 10:42 (1)	06:46 18:23	06:56 19:55	06:14 20:26	05:53 20:52	06:01 20:56	06:27 20:30	06:57 19:44	07:27 18:54	07:01 17:12	07:34 16:57	09:27 (1) 101
10	07:46 17:15	09:43 (1) 11:21 (1)	07:24 10:42 (1)	06:45 18:24	06:54 19:56	06:13 20:27	05:53 20:52	06:01 20:55	06:28 20:29	06:58 19:42	07:28 18:53	07:02 17:11	07:35 16:57	09:27 (1) 102
11	07:46 17:16	09:43 (1) 11:20 (1)	07:23 10:42 (1)	06:43 18:25	06:53 19:57	06:12 20:28	05:53 20:53	06:02 20:55	06:29 20:27	06:59 19:40	07:29 18:51	07:04 17:10	07:35 16:57	09:27 (1) 103
12	07:46 17:17	09:44 (1) 11:20 (1)	07:22 10:42 (1)	06:41 18:26	06:51 19:58	06:11 20:29	05:53 20:53	06:03 20:54	06:30 20:26	07:00 19:39	07:30 18:49	07:05 17:10	07:36 16:57	09:28 (1) 103
13	07:45 17:18	09:45 (1) 11:20 (1)	07:21 10:42 (1)	06:40 18:27	06:50 19:59	06:10 20:30	05:53 20:54	06:04 20:55	06:31 20:25	07:01 19:37	07:31 18:48	07:06 17:09	07:37 16:57	09:27 (1) 104
14	07:45 17:19	09:46 (1) 11:19 (1)	07:19 10:42 (1)	06:38 18:28	06:48 20:00	06:09 20:31	05:52 20:54	06:04 20:53	06:32 20:23	07:02 19:35	07:32 18:46	07:07 17:08	07:38 16:57	09:28 (1) 103
15	07:45 17:21	09:47 (1) 11:19 (1)	07:18 10:42 (1)	06:37 18:29	06:46 20:01	06:08 20:32	05:52 20:55	06:05 20:53	06:33 20:22	07:03 19:34	07:33 18:45	07:08 17:07	07:39 16:57	09:29 (1) 103
16	07:44 17:22	09:47 (1) 11:18 (1)	07:17 10:42 (1)	06:35 18:30	06:45 20:02	06:07 20:33	05:52 20:55	06:06 20:52	06:34 20:21	07:04 19:32	07:34 18:43	07:09 17:06	07:39 16:58	09:28 (1) 104
17	07:44 17:23	09:49 (1) 11:19 (1)	07:15 10:42 (1)	06:33 18:31	06:43 20:03	06:06 20:34	05:53 20:56	06:07 20:52	06:35 20:19	07:05 19:30	07:35 18:42	07:11 17:05	07:40 16:58	09:29 (1) 104
18	07:44 17:24	09:49 (1) 11:18 (1)	07:14 10:42 (1)	06:32 18:32	06:42 20:04	06:05 20:35	05:53 20:56	06:07 20:51	06:36 20:18	07:06 19:29	07:36 18:40	07:12 17:04	07:41 16:58	09:30 (1) 104
19	07:43 17:25	09:51 (1) 11:18 (1)	07:13 10:42 (1)	06:30 18:33	06:40 20:05	06:04 20:36	05:53 20:56	06:08 20:50	06:37 20:16	07:07 19:27	07:37 18:39	07:13 17:04	07:41 16:59	09:30 (1) 104
20	07:43 17:26	09:51 (1) 11:16 (1)	07:11 10:42 (1)	06:28 18:34	06:39 20:06	06:03 20:37	05:53 20:56	06:09 20:50	06:38 20:15	07:08 19:25	07:38 18:37	07:14 17:03	07:42 16:59	09:31 (1) 104
21	07:42 17:27	09:52 (1) 11:15 (1)	07:10 10:42 (1)	06:27 18:35	06:38 20:07	06:03 20:37	05:53 20:57	06:10 20:49	06:39 20:14	07:09 19:24	07:40 18:36	07:15 17:02	07:42 16:57	09:31 (1) 104
22	07:41 17:28	09:53 (1) 11:15 (1)	07:09 10:42 (1)	06:25 18:36	06:36 20:09	06:02 20:38	05:53 20:57	06:11 20:48	06:40 20:12	07:10 19:22	07:41 18:35	07:16 17:02	07:43 16:57	09:32 (1) 104
23	07:41 17:30	09:54 (1) 11:14 (1)	07:07 10:42 (1)	06:23 18:38	06:35 20:10	06:01 20:39	05:53 20:57	06:12 20:47	06:41 20:11	07:11 19:20	07:42 18:33	07:17 17:01	07:43 16:57	09:32 (1) 104
24	07:40 17:31	09:55 (1) 11:13 (1)	07:06 10:42 (1)	06:22 18:39	06:33 20:11	06:00 20:40	05:54 20:57	06:12 20:46	06:42 20:09	07:12 19:19	07:43 18:32	07:19 17:01	07:44 16:57	09:33 (1) 104
25	07:39 17:32	09:57 (1) 11:12 (1)	07:04 10:42 (1)	06:20 18:40	06:32 20:12	06:00 20:41	05:54 20:57	06:13 20:46	06:43 20:08	07:13 19:17	07:44 18:30	07:20 17:00	07:44 16:58	09:33 (1) 104
26	07:39 17:33	09:58 (1) 11:11 (1)	07:03 10:42 (1)	06:19 18:41	06:30 20:13	05:59 20:42	05:54 20:57	06:14 20:45	06:44 20:06	07:14 19:15	07:45 18:29	07:21 17:00	07:45 16:58	09:33 (1) 104
27	07:38 17:34	10:00 (1) 11:10 (1)	07:01 10:42 (1)	06:17 18:42	06:29 20:14	05:58 20:43	05:55 20:57	06:15 20:44	06:45 20:05	07:15 19:14	07:46 18:28	07:22 17:00	07:45 16:58	09:34 (1) 104
28	07:37 17:36	10:01 (1) 11:09 (1)	07:00 10:42 (1)	06:15 18:43	06:28 20:15	05:58 20:43	05:55 20:57	06:16 20:43	06:46 20:03	07:16 19:12	07:47 18:26	07:23 17:00	07:45 16:59	09:35 (1) 104
29	07:36 17:37	10:02 (1) 11:08 (1)	06:59 10:42 (1)	06:14 18:44	06:26 20:16	05:57 20:44	05:55 20:57	06:17 20:42	06:47 20:01	07:17 19:10	07:48 18:25	07:24 17:00	07:46 16:59	09:35 (1) 103
30	07:35 17:38	10:04 (1) 11:07 (1)	06:58 10:42 (1)	06:12 18:45	06:25 20:17	05:57 20:45	05:56 20:57	06:18 20:41	06:48 20:00	07:18 19:09	07:49 18:24	07:25 17:00	07:46 16:58	09:35 (1) 103
31	07:34 17:39	10:06 (1) 11:06 (1)	06:57 10:42 (1)	06:10 18:46	06:24 20:18	05:56 20:46	05:56 20:57	06:19 20:40	06:49 19:58	07:19 19:00	07:50 18:23	07:26 17:00	07:46 16:58	09:36 (1) 103
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	1788	290	3172
Total, worst case	2701	181										0.48		0.41
Sun reduction	0.40	0.43										0.40		0.40
Oper. time red.	0.40	0.40										0.55		0.55
Wind dir. red.	0.55	0.55										0.11		0.09
Total reduction	0.09	0.10										0.189		0.289
Total, real	238	17												

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: C - R03

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December					
1	07:46	10:11 (1)	07:34	06:58	07:09	06:24	05:56	05:56	06:20	06:50	07:19	06:52	07:26	10:08 (1)			
	17:07	55	11:06 (1)	17:41	18:14	19:47	20:18	20:47	20:57	20:39	19:57	19:07	16:58	30	10:38 (1)		
2	07:46	10:12 (1)	07:33	06:57	07:07	06:23	05:55	05:57	06:21	06:51	07:20	06:53	07:27	10:06 (1)			
	17:08	53	11:05 (1)	17:42	18:15	19:48	20:19	20:47	20:57	20:38	19:55	19:05	16:57	34	10:40 (1)		
3	07:47	10:13 (1)	07:32	06:55	07:05	06:21	05:55	05:57	06:22	06:52	07:21	06:54	07:28	10:05 (1)			
	17:09	52	11:05 (1)	17:43	18:16	19:49	20:20	20:48	20:57	20:37	19:54	19:04	16:57	38	10:43 (1)		
4	07:47	10:14 (1)	07:31	06:54	07:04	06:20	05:54	05:58	06:23	06:52	07:22	06:55	07:29	10:04 (1)			
	17:09	51	11:05 (1)	17:44	18:17	19:50	20:21	20:49	20:57	20:36	19:52	19:02	16:57	41	10:45 (1)		
5	07:47	10:16 (1)	07:30	06:52	07:02	06:19	05:54	05:58	06:23	06:53	07:23	06:57	07:30	10:03 (1)			
	17:10	48	11:04 (1)	17:45	18:18	19:51	20:22	20:49	20:57	20:35	19:50	19:01	16:57	44	10:47 (1)		
6	07:47	10:16 (1)	07:29	06:51	07:01	06:18	05:54	05:59	06:24	06:54	07:24	06:58	07:31	10:02 (1)			
	17:11	46	11:02 (1)	17:47	18:19	19:52	20:23	20:50	20:56	20:33	19:49	18:59	16:57	46	10:48 (1)		
7	07:47	10:18 (1)	07:28	06:49	06:59	06:16	05:54	06:00	06:25	06:55	07:25	06:59	07:32	10:02 (1)			
	17:12	44	11:02 (1)	17:48	18:20	19:53	20:24	20:51	20:56	20:32	19:47	18:57	16:57	48	10:50 (1)		
8	07:47	10:20 (1)	07:26	06:48	06:57	06:15	05:53	06:00	06:26	06:56	07:26	07:00	07:33	10:02 (1)			
	17:13	41	11:01 (1)	17:49	18:22	19:54	20:25	20:51	20:56	20:31	19:45	18:56	16:57	49	10:51 (1)		
9	07:46	10:22 (1)	07:25	06:46	06:56	06:14	05:53	06:01	06:27	06:57	07:27	07:01	07:34	10:01 (1)			
	17:14	38	11:00 (1)	17:50	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	16:57	52	10:53 (1)		
10	07:46	10:24 (1)	07:24	06:45	06:54	06:13	05:53	06:01	06:28	06:58	07:28	07:02	07:35	10:01 (1)			
	17:15	34	10:58 (1)	17:52	18:24	19:56	20:27	20:52	20:55	20:29	19:42	18:53	16:57	53	10:54 (1)		
11	07:46	10:25 (1)	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:35	10:01 (1)			
	17:16	31	10:56 (1)	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:40	18:51	16:57	55	10:56 (1)		
12	07:46	10:29 (1)	07:22	06:41	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36	10:01 (1)			
	17:17	25	10:54 (1)	17:54	18:26	19:58	20:29	20:53	20:54	20:26	19:39	18:49	16:57	56	10:57 (1)		
13	07:45	10:33 (1)	07:21	06:40	06:50	06:10	05:53	06:04	06:31	07:01	07:31	07:06	07:37	10:01 (1)			
	17:18	18	10:51 (1)	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	16:57	56	10:57 (1)		
14	07:45	10:40 (1)	07:19	06:38	06:48	06:09	05:52	06:04	06:32	07:02	07:32	07:07	07:38	10:01 (1)			
	17:19	3	10:43 (1)	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:35	18:46	16:57	57	10:58 (1)		
15	07:45	10:43 (1)	07:18	06:37	06:46	06:08	05:52	06:05	06:33	07:03	07:33	07:08	07:39	10:01 (1)			
	17:21		17:58	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	16:57	59	11:00 (1)		
16	07:44	10:43 (1)	07:17	06:35	06:45	06:07	05:52	06:06	06:34	07:04	07:34	07:09	07:39	10:01 (1)			
	17:22		17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	16:58	59	11:00 (1)		
17	07:44	10:43 (1)	07:15	06:33	06:43	06:06	05:53	06:07	06:35	07:05	07:35	07:11	07:40	10:01 (1)			
	17:23		18:00	18:31	20:03	20:34	20:56	20:52	20:19	19:30	18:42	17:05	16:58	60	11:01 (1)		
18	07:44	10:43 (1)	07:14	06:32	06:42	06:05	05:53	06:07	06:36	07:06	07:36	07:12	07:41	10:02 (1)			
	17:24		18:01	18:32	20:04	20:35	20:56	20:51	20:18	19:29	18:40	17:04	16:58	60	11:02 (1)		
19	07:43	10:43 (1)	07:13	06:30	06:40	06:04	05:53	06:08	06:37	07:07	07:37	07:13	07:41	10:02 (1)			
	17:25		18:02	18:33	20:05	20:36	20:56	20:50	20:16	19:27	18:39	17:04	16:59	60	11:02 (1)		
20	07:43	10:43 (1)	07:11	06:28	06:39	06:03	05:53	06:09	06:38	07:08	07:38	07:14	07:42	10:03 (1)			
	17:26		18:03	18:34	20:06	20:37	20:56	20:50	20:15	19:25	18:37	17:03	16:59	60	11:03 (1)		
21	07:42	10:43 (1)	07:10	06:27	06:38	06:03	05:53	06:10	06:39	07:09	07:40	07:15	07:42	10:02 (1)			
	17:27		18:05	18:35	20:07	20:37	20:57	20:49	20:14	19:24	18:36	17:02	17:00	61	11:03 (1)		
22	07:41	10:43 (1)	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43	10:03 (1)			
	17:28		18:06	18:36	20:09	20:38	20:57	20:48	20:12	19:22	18:35	17:02	17:00	61	11:04 (1)		
23	07:41	10:43 (1)	07:07	06:23	06:35	06:01	05:53	06:12	06:41	07:11	07:42	07:17	07:43	10:04 (1)			
	17:30		18:07	18:38	20:10	20:39	20:57	20:47	20:11	19:20	18:33	17:01	17:01	60	11:04 (1)		
24	07:40	10:43 (1)	07:06	06:22	06:33	06:00	05:54	06:12	06:42	07:12	07:43	07:19	07:44	10:05 (1)			
	17:31		18:08	18:39	20:11	20:40	20:57	20:46	20:09	19:19	18:32	17:01	17:01	60	11:05 (1)		
25	07:39	10:43 (1)	07:04	06:20	06:32	06:00	05:54	06:13	06:43	07:13	07:44	07:20	07:44	10:05 (1)			
	17:32		18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:30	17:00	17:02	60	11:05 (1)		
26	07:39	10:43 (1)	07:03	06:19	06:30	06:00	05:54	06:14	06:44	07:14	07:45	07:21	07:45	10:05 (1)			
	17:33		18:10	18:41	20:13	20:42	20:57	20:45	20:06	19:15	17:29	17:00	17:02	60	11:05 (1)		
27	07:38	10:43 (1)	07:01	06:17	06:29	06:00	05:55	06:15	06:45	07:15	07:46	07:22	07:45	10:07 (1)			
	17:34		18:12	18:42	20:14	20:43	20:57	20:44	20:05	19:14	17:28	16:59	17:03	59	11:06 (1)		
28	07:37	10:43 (1)	07:00	06:15	06:28	06:00	05:55	06:16	06:46	07:16	07:47	07:23	07:45	10:07 (1)			
	17:36		18:13	18:43	20:15	20:43	20:58	20:43	20:03	19:12	17:26	16:59	17:04	59	11:06 (1)		
29	07:36	10:43 (1)	06:59	06:14	06:26	06:00	05:57	06:17	06:47	07:17	07:48	07:24	07:46	10:08 (1)			
	17:37		18:14	18:44	20:16	20:44	20:57	20:42	20:01	19:10	17:25	16:58	18	10:31 (1)	17:04	57	11:05 (1)
30	07:35	10:43 (1)	06:58	06:13	06:25	06:00	05:57	06:18	06:48	07:18	07:49	07:25	10:10 (1)	07:46	10:08 (1)		
	17:38		18:15	18:45	20:17	20:45	20:57	20:41	20:00	19:09	17:24	16:58	25	10:35 (1)	17:05	57	11:05 (1)
31	07:34	10:43 (1)	06:57	06:12	06:24	06:00	05:56	06:19	06:49	07:19	07:50	07:26	07:46	10:09 (1)			
	17:39		18:16	18:46	20:18	20:46	20:59	20:40	19:58	18:07	17:23	16:58	17:06	56	11:05 (1)		
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290					
Total, worst case	539										43		1667				
Sun reduction	0.40										0.48		0.41				
Oper. time red.	0.40										0.40		0.40				
Wind dir. red.	0.54										0.54		0.54				
Total reduction	0.09										0.10		0.09				
Total, real	47										4		149				

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: D - R01

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June			
1	07:46	11:46 (1)	07:34	11:39 (1)	06:58	11:29 (1)	07:09	12:42 (1)	06:24	05:56				
	17:07	138	14:04 (1)	17:41	170	14:29 (1)	18:14	188	14:37 (1)	19:47	158	15:20 (1)	20:18	20:47
2	07:46	11:46 (1)	07:33	11:39 (1)	06:57	11:29 (1)	07:07	12:47 (1)	06:23	05:55				
	17:08	139	14:05 (1)	17:42	170	14:29 (1)	18:15	189	14:38 (1)	19:48	151	15:18 (1)	20:19	20:47
3	07:47	11:46 (1)	07:32	11:38 (1)	06:55	11:28 (1)	07:05	13:13 (1)	06:21	05:55				
	17:09	140	14:06 (1)	17:43	172	14:30 (1)	18:16	189	14:37 (1)	19:49	125	15:18 (1)	20:20	20:48
4	07:47	11:46 (1)	07:31	11:38 (1)	06:54	11:29 (1)	07:04	13:41 (1)	06:20	05:54				
	17:09	141	14:07 (1)	17:44	173	14:31 (1)	18:17	189	14:38 (1)	19:50	95	15:16 (1)	20:21	20:49
5	07:47	11:45 (1)	07:30	11:38 (1)	06:52	11:28 (1)	07:02	13:53 (1)	06:19	05:54				
	17:10	141	14:06 (1)	17:45	173	14:31 (1)	18:18	189	14:37 (1)	19:51	82	15:15 (1)	20:22	20:49
6	07:47	11:45 (1)	07:29	11:37 (1)	06:51	11:28 (1)	07:01	14:02 (1)	06:18	05:54				
	17:11	142	14:07 (1)	17:47	175	14:32 (1)	18:19	189	14:37 (1)	19:52	71	15:13 (1)	20:23	20:50
7	07:47	11:45 (1)	07:28	11:37 (1)	06:49	11:28 (1)	06:59	14:08 (1)	06:16	05:54				
	17:12	143	14:08 (1)	17:48	176	14:33 (1)	18:20	189	14:37 (1)	19:53	63	15:11 (1)	20:24	20:51
8	07:46	11:46 (1)	07:26	11:37 (1)	06:48	11:27 (1)	06:57	14:15 (1)	06:15	05:53				
	17:13	143	14:09 (1)	17:49	176	14:33 (1)	18:22	189	14:36 (1)	19:54	55	15:10 (1)	20:25	20:51
9	07:46	11:46 (1)	07:25	11:37 (1)	06:46	11:28 (1)	06:56	14:21 (1)	06:14	05:53				
	17:14	144	14:10 (1)	17:50	177	14:34 (1)	18:23	188	14:36 (1)	19:55	46	15:07 (1)	20:26	20:52
10	07:46	11:46 (1)	07:24	11:36 (1)	06:45	11:27 (1)	06:54	14:28 (1)	06:13	05:53				
	17:15	146	14:12 (1)	17:52	179	14:35 (1)	18:24	189	14:36 (1)	19:56	37	15:05 (1)	20:27	20:52
11	07:46	11:45 (1)	07:23	11:35 (1)	06:43	11:28 (1)	06:53	14:33 (1)	06:12	05:53				
	17:16	147	14:12 (1)	17:53	179	14:34 (1)	18:25	188	14:36 (1)	19:57	29	15:02 (1)	20:28	20:53
12	07:46	11:45 (1)	07:22	11:35 (1)	06:41	11:27 (1)	06:51	14:40 (1)	06:11	05:53				
	17:17	148	14:13 (1)	17:54	180	14:35 (1)	18:26	188	14:35 (1)	19:58	16	14:56 (1)	20:29	20:53
13	07:45	11:46 (1)	07:21	11:35 (1)	06:40	11:27 (1)	06:50	14:47 (1)	06:10	05:53				
	17:18	148	14:14 (1)	17:55	181	14:36 (1)	18:27	187	14:34 (1)	19:59			20:30	20:54
14	07:45	11:45 (1)	07:19	11:35 (1)	06:38	11:27 (1)	06:48	14:54 (1)	06:09	05:52				
	17:19	149	14:14 (1)	17:56	181	14:36 (1)	18:28	187	14:34 (1)	20:00			20:31	20:54
15	07:45	11:45 (1)	07:18	11:34 (1)	06:37	11:27 (1)	06:46	15:01 (1)	06:08	05:52				
	17:21	151	14:16 (1)	17:58	182	14:36 (1)	18:29	187	14:34 (1)	20:01			20:32	20:55
16	07:44	11:44 (1)	07:17	11:34 (1)	06:35	11:27 (1)	06:45	15:08 (1)	06:07	05:52				
	17:22	152	14:16 (1)	17:59	183	14:37 (1)	18:30	186	14:33 (1)	20:02			20:33	20:55
17	07:44	11:45 (1)	07:15	11:34 (1)	06:33	11:27 (1)	06:43	15:15 (1)	06:06	05:53				
	17:23	152	14:17 (1)	18:00	183	14:37 (1)	18:31	186	14:33 (1)	20:03			20:34	20:55
18	07:44	11:44 (1)	07:14	11:33 (1)	06:32	11:27 (1)	06:42	15:22 (1)	06:05	05:53				
	17:24	154	14:18 (1)	18:01	184	14:37 (1)	18:32	185	14:32 (1)	20:04			20:35	20:56
19	07:43	11:44 (1)	07:13	11:33 (1)	06:30	11:27 (1)	06:40	15:29 (1)	06:04	05:53				
	17:25	155	14:19 (1)	18:02	184	14:37 (1)	18:33	184	14:31 (1)	20:05			20:36	20:56
20	07:43	11:43 (1)	07:11	11:32 (1)	06:28	11:28 (1)	06:39	15:36 (1)	06:03	05:53				
	17:26	157	14:20 (1)	18:03	185	14:37 (1)	18:34	183	14:31 (1)	20:06			20:37	20:56
21	07:42	11:43 (1)	07:10	11:32 (1)	06:27	11:28 (1)	06:38	15:43 (1)	06:03	05:53				
	17:27	157	14:20 (1)	18:05	186	14:38 (1)	18:35	182	14:30 (1)	20:07			20:37	20:57
22	07:41	11:43 (1)	07:09	11:32 (1)	06:25	11:28 (1)	06:36	15:50 (1)	06:02	05:53				
	17:28	159	14:22 (1)	18:06	186	14:38 (1)	18:36	181	14:29 (1)	20:09			20:38	20:57
23	07:41	11:43 (1)	07:07	11:31 (1)	06:23	11:29 (1)	06:35	15:57 (1)	06:01	05:53				
	17:30	159	14:22 (1)	18:07	187	14:38 (1)	18:38	180	14:29 (1)	20:10			20:39	20:57
24	07:40	11:42 (1)	07:06	11:31 (1)	06:22	11:29 (1)	06:33	16:04 (1)	06:00	05:54				
	17:31	161	14:23 (1)	18:08	187	14:38 (1)	18:39	178	14:27 (1)	20:11			20:40	20:57
25	07:39	11:42 (1)	07:04	11:30 (1)	06:20	11:29 (1)	06:32	16:11 (1)	06:00	05:54				
	17:32	162	14:24 (1)	18:09	188	14:38 (1)	18:40	177	14:26 (1)	20:12			20:41	20:57
26	07:39	11:42 (1)	07:03	11:30 (1)	06:18	11:31 (1)	06:30	16:18 (1)	05:59	05:54				
	17:33	163	14:25 (1)	18:10	188	14:38 (1)	18:41	175	14:26 (1)	20:13			20:42	20:57
27	07:38	11:41 (1)	07:01	11:29 (1)	06:17	11:31 (1)	06:29	16:25 (1)	05:58	05:55				
	17:34	165	14:26 (1)	18:12	189	14:38 (1)	18:42	174	14:25 (1)	20:14			20:43	20:57
28	07:37	11:41 (1)	07:00	11:30 (1)	06:15	11:33 (1)	06:28	16:32 (1)	05:58	05:55				
	17:36	165	14:26 (1)	18:13	188	14:38 (1)	18:43	172	14:25 (1)	20:15			20:43	20:57
29	07:36	11:40 (1)			07:14	12:34 (1)	06:26	16:40 (1)	05:57	05:55				
	17:37	167	14:27 (1)		19:44	15:23 (1)	20:16	16:47 (1)	20:44	20:57				
30	07:35	11:40 (1)			07:12	12:35 (1)	06:25	16:54 (1)	05:57	05:56				
	17:38	168	14:28 (1)		19:45	15:22 (1)	20:17	16:59 (1)	20:45	20:57				
31	07:34	11:40 (1)			07:10	12:39 (1)		17:06 (1)	05:56					
	17:39	168	14:28 (1)		19:46	15:21 (1)		17:11 (1)	20:46					
Potential sun hours	299		298		370		398		447		450			
Total, worst case	4724		5062		5666		928							
Sun reduction	0.40		0.43		0.47		0.51							
Oper. time red.	0.40		0.40		0.40		0.40							
Wind dir. red.	0.53		0.53		0.53		0.53							
Total reduction	0.08		0.09		0.10		0.11							
Total, real	400		463		564		99							

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 5

Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: D - R01

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	06:50 19:57	14:32 (1) 15:01 (1)	07:19 19:07	12:06 (1) 14:03 (1)
2	05:57 20:57	06:21 20:38	06:51 19:55	14:25 (1) 15:03 (1)	07:20 19:05	12:05 (1) 14:03 (1)
3	05:57 20:57	06:22 20:37	06:52 19:54	14:19 (1) 15:05 (1)	07:21 19:04	12:05 (1) 14:03 (1)
4	05:58 20:57	06:23 20:36	06:52 19:52	14:13 (1) 15:07 (1)	07:22 19:02	12:05 (1) 14:03 (1)
5	05:58 20:57	06:23 20:35	06:53 19:50	14:06 (1) 15:08 (1)	07:23 19:01	12:05 (1) 14:02 (1)
6	05:59 20:56	06:24 20:33	06:54 19:49	13:58 (1) 15:09 (1)	07:24 18:59	12:04 (1) 14:01 (1)
7	06:00 20:56	06:25 20:32	06:55 19:47	13:49 (1) 15:10 (1)	07:25 18:57	12:04 (1) 14:02 (1)
8	06:00 20:56	06:26 20:31	06:56 19:45	13:37 (1) 15:11 (1)	07:26 18:56	12:04 (1) 14:01 (1)
9	06:01 20:56	06:27 20:30	06:57 19:44	13:13 (1) 15:12 (1)	07:27 18:54	12:03 (1) 14:00 (1)
10	06:01 20:55	06:28 20:29	06:58 19:42	12:41 (1) 15:11 (1)	07:28 18:53	12:03 (1) 14:00 (1)
11	06:02 20:55	06:29 20:27	06:59 19:40	12:34 (1) 15:12 (1)	07:29 18:51	12:03 (1) 14:00 (1)
12	06:03 20:54	06:30 20:26	07:00 19:39	12:30 (1) 15:12 (1)	07:30 18:49	12:02 (1) 13:59 (1)
13	06:04 20:54	06:31 20:25	07:01 19:37	12:27 (1) 15:13 (1)	07:31 18:48	12:02 (1) 13:59 (1)
14	06:04 20:53	06:32 20:23	07:02 19:35	12:25 (1) 15:13 (1)	07:32 18:46	12:02 (1) 13:58 (1)
15	06:05 20:53	06:33 20:22	07:03 19:34	12:23 (1) 15:14 (1)	07:33 18:45	12:02 (1) 13:59 (1)
16	06:06 20:52	06:34 20:21	07:04 19:32	12:21 (1) 15:14 (1)	07:34 18:43	12:02 (1) 13:58 (1)
17	06:07 20:52	06:35 20:19	07:05 19:30	12:19 (1) 15:14 (1)	07:35 18:42	12:02 (1) 13:57 (1)
18	06:07 20:51	06:36 20:18	07:06 19:29	12:18 (1) 15:14 (1)	07:36 18:40	12:03 (1) 13:57 (1)
19	06:08 20:50	06:37 20:16	07:07 19:27	12:16 (1) 15:15 (1)	07:37 18:39	12:02 (1) 13:57 (1)
20	06:09 20:50	06:38 20:15	07:08 19:25	12:15 (1) 15:15 (1)	07:38 18:37	12:02 (1) 13:57 (1)
21	06:10 20:49	06:39 20:14	07:09 19:24	12:14 (1) 15:15 (1)	07:40 18:36	12:02 (1) 13:56 (1)
22	06:11 20:48	06:40 20:12	07:10 19:22	12:13 (1) 15:15 (1)	07:41 18:35	12:02 (1) 13:56 (1)
23	06:12 20:47	06:41 20:11	07:11 19:20	12:12 (1) 15:15 (1)	07:42 18:33	12:02 (1) 13:55 (1)
24	06:12 20:46	06:42 20:09	07:12 19:19	12:11 (1) 15:15 (1)	07:43 18:32	12:03 (1) 13:55 (1)
25	06:13 20:46	06:43 20:08	07:13 19:17	12:11 (1) 15:15 (1)	07:44 18:30	11:03 (1) 13:56 (1)
26	06:14 20:45	06:44 20:06	07:14 19:15	12:10 (1) 15:15 (1)	07:45 18:29	11:03 (1) 13:55 (1)
27	06:15 20:44	06:45 20:05	07:15 19:14	12:08 (1) 15:14 (1)	07:46 18:28	11:04 (1) 13:55 (1)
28	06:16 20:43	06:46 20:03	07:16 19:12	12:07 (1) 15:14 (1)	07:47 18:26	11:04 (1) 13:54 (1)
29	06:17 20:42	06:47 20:01	07:17 19:10	12:07 (1) 15:14 (1)	07:48 18:25	11:05 (1) 13:54 (1)
30	06:18 20:41	06:48 20:00	07:18 19:09	12:06 (1) 15:14 (1)	07:49 18:24	11:05 (1) 13:54 (1)
31	06:19 20:40	06:49 19:58	14:40 (1) 14:56 (1)	06:51 17:23	11:05 (1) 14:04 (1)	10:46 (1) 17:06 (1)
Potential sun hours	457	427	375	346	299	290
Total, worst case		16	4299		5776	4288
Sun reduction		0.72	0.64		0.56	0.41
Oper. time red.		0.40	0.40		0.40	0.40
Wind dir. red.		0.53	0.53		0.53	0.53
Total reduction		0.15	0.14		0.12	0.09
Total, real		2	583		678	375

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 6

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: E - R50

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:34	06:58	13:33 (1) 07:09	13:55 (1) 06:24	14:39 (1) 05:56
	17:07	17:41	18:14	15:46 (1) 19:47	17:01 (1) 20:18	16:53 (1) 20:47
2	07:46	07:33	06:57	13:32 (1) 07:07	13:54 (1) 06:23	14:41 (1) 05:55
	17:08	17:42	18:15	15:47 (1) 19:48	17:01 (1) 20:19	16:53 (1) 20:47
3	07:47	07:32	06:55	13:29 (1) 07:05	13:54 (1) 06:21	14:42 (1) 05:55
	17:09	17:43	18:16	15:48 (1) 19:49	17:02 (1) 20:20	16:52 (1) 20:48
4	07:47	07:31	06:54	13:28 (1) 07:04	13:53 (1) 06:20	14:44 (1) 05:54
	17:09	17:44	18:17	15:50 (1) 19:50	17:01 (1) 20:21	16:52 (1) 20:49
5	07:47	07:30	06:52	13:26 (1) 07:02	13:54 (1) 06:19	14:46 (1) 05:54
	17:10	17:45	18:18	15:50 (1) 19:51	17:02 (1) 20:22	16:52 (1) 20:49
6	07:47	07:29	06:51	13:25 (1) 07:01	13:53 (1) 06:18	14:48 (1) 05:54
	17:11	17:47	18:19	15:52 (1) 19:52	17:01 (1) 20:23	16:51 (1) 20:50
7	07:47	07:28	06:49	13:23 (1) 06:59	13:52 (1) 06:16	14:50 (1) 05:54
	17:12	17:48	18:20	15:52 (1) 19:53	17:00 (1) 20:24	16:51 (1) 20:51
8	07:46	07:26	06:48	13:21 (1) 06:57	13:53 (1) 06:15	14:51 (1) 05:53
	17:13	17:49	18:22	15:53 (1) 19:54	17:01 (1) 20:25	16:51 (1) 20:51
9	07:46	07:25	06:46	13:20 (1) 06:56	13:53 (1) 06:14	14:53 (1) 05:53
	17:14	17:50	18:23	15:54 (1) 19:55	17:00 (1) 20:26	16:50 (1) 20:52
10	07:46	07:24	14:39 (1) 06:45	13:18 (1) 06:54	13:54 (1) 06:13	14:54 (1) 05:53
	17:15	17:52	9 14:48 (1) 18:24	15:55 (1) 19:56	17:01 (1) 20:27	16:50 (1) 20:52
11	07:46	07:23	14:27 (1) 06:43	13:17 (1) 06:53	13:54 (1) 06:12	14:56 (1) 05:53
	17:16	17:53	32 14:59 (1) 18:25	15:56 (1) 19:57	17:00 (1) 20:28	16:50 (1) 20:53
12	07:46	07:22	14:20 (1) 06:41	13:15 (1) 06:51	13:54 (1) 06:11	14:57 (1) 05:53
	17:17	17:54	45 15:05 (1) 18:26	15:56 (1) 19:58	16:59 (1) 20:29	16:49 (1) 20:53
13	07:45	07:21	14:16 (1) 06:40	13:14 (1) 06:50	13:56 (1) 06:10	14:58 (1) 05:53
	17:18	17:55	54 15:10 (1) 18:27	15:57 (1) 19:59	17:00 (1) 20:30	16:49 (1) 20:54
14	07:45	07:19	14:12 (1) 06:38	13:13 (1) 06:48	13:57 (1) 06:09	14:59 (1) 05:52
	17:19	17:56	63 15:15 (1) 18:28	15:58 (1) 20:00	16:59 (1) 20:31	16:48 (1) 20:54
15	07:45	07:18	14:07 (1) 06:37	13:11 (1) 06:46	13:59 (1) 06:08	15:00 (1) 05:52
	17:21	17:58	70 15:17 (1) 18:29	15:58 (1) 20:01	16:59 (1) 20:32	16:48 (1) 20:55
16	07:44	07:17	14:04 (1) 06:35	13:09 (1) 06:45	14:00 (1) 06:07	15:01 (1) 05:52
	17:22	17:59	77 15:21 (1) 18:30	15:58 (1) 20:02	16:58 (1) 20:33	16:47 (1) 20:55
17	07:44	07:15	14:01 (1) 06:33	13:09 (1) 06:43	14:03 (1) 06:06	15:02 (1) 05:53
	17:23	18:00	83 15:24 (1) 18:31	15:59 (1) 20:03	16:58 (1) 20:34	16:47 (1) 20:55
18	07:44	07:14	13:58 (1) 06:32	13:07 (1) 06:42	14:05 (1) 06:05	15:03 (1) 05:53
	17:24	18:01	88 15:26 (1) 18:32	15:59 (1) 20:04	16:58 (1) 20:35	16:46 (1) 20:56
19	07:43	07:13	13:56 (1) 06:30	13:06 (1) 06:40	14:08 (1) 06:04	15:05 (1) 05:53
	17:25	18:02	93 15:29 (1) 18:33	15:59 (1) 20:05	16:58 (1) 20:36	16:47 (1) 20:56
20	07:42	07:11	13:52 (1) 06:28	13:05 (1) 06:39	14:12 (1) 06:03	15:06 (1) 05:53
	17:26	18:03	98 15:30 (1) 18:34	16:00 (1) 20:06	16:58 (1) 20:37	16:46 (1) 20:56
21	07:42	07:10	13:50 (1) 06:27	13:04 (1) 06:38	14:14 (1) 06:03	15:07 (1) 05:53
	17:27	18:05	103 15:33 (1) 18:35	16:00 (1) 20:07	16:57 (1) 20:37	16:46 (1) 20:57
22	07:41	07:09	13:48 (1) 06:25	13:02 (1) 06:36	14:17 (1) 06:02	15:08 (1) 05:53
	17:28	18:06	107 15:35 (1) 18:36	16:00 (1) 20:09	16:57 (1) 20:38	16:45 (1) 20:57
23	07:41	07:07	13:45 (1) 06:23	13:02 (1) 06:35	14:19 (1) 06:01	15:09 (1) 05:53
	17:30	18:07	112 15:37 (1) 18:38	16:01 (1) 20:10	16:56 (1) 20:39	16:46 (1) 20:57
24	07:40	07:06	13:44 (1) 06:22	13:01 (1) 06:33	14:23 (1) 06:00	15:10 (1) 05:54
	17:31	18:08	115 15:39 (1) 18:39	16:01 (1) 20:11	16:56 (1) 20:40	16:45 (1) 20:57
25	07:39	07:04	13:41 (1) 06:20	12:59 (1) 06:32	14:26 (1) 06:00	15:10 (1) 05:54
	17:32	18:09	119 15:40 (1) 18:40	16:01 (1) 20:12	16:56 (1) 20:41	16:44 (1) 20:57
26	07:39	07:03	13:39 (1) 06:18	12:59 (1) 06:30	14:27 (1) 05:59	15:12 (1) 05:54
	17:33	18:10	123 15:42 (1) 18:41	16:01 (1) 20:13	16:55 (1) 20:42	16:45 (1) 20:57
27	07:38	07:01	13:37 (1) 06:17	12:58 (1) 06:29	14:30 (1) 05:58	15:12 (1) 05:55
	17:34	18:12	126 15:43 (1) 18:42	16:01 (1) 20:14	16:55 (1) 20:43	16:44 (1) 20:57
28	07:37	07:00	13:35 (1) 06:15	12:58 (1) 06:28	14:33 (1) 05:58	15:13 (1) 05:55
	17:36	18:13	130 15:45 (1) 18:43	16:02 (1) 20:15	16:55 (1) 20:43	16:44 (1) 20:57
29	07:36		07:14	13:57 (1) 06:26	14:34 (1) 05:57	15:14 (1) 05:55
	17:37		19:44	17:02 (1) 20:16	16:54 (1) 20:44	16:44 (1) 20:57
30	07:35		07:12	13:56 (1) 06:25	14:37 (1) 05:57	15:15 (1) 05:56
	17:38		19:45	17:01 (1) 20:17	16:53 (1) 20:45	16:44 (1) 20:57
31	07:34		07:10	13:56 (1)	05:56	15:15 (1)
	17:39		19:46	17:02 (1)	20:46	16:43 (1)
Potential sun hours	299	298	370	398	447	450
Total, worst case		1647	5126	5148	3342	2430
Sun reduction		0.43	0.47	0.51	0.58	0.67
Oper. time red.		0.40	0.40	0.40	0.40	0.40
Wind dir. red.		0.69	0.69	0.69	0.69	0.69
Total reduction		0.12	0.13	0.14	0.16	0.18
Total, real		195	661	715	531	445

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 7

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: E - R50

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:56	15:27 (1)	06:20	15:07 (1)	06:50	13:53 (1)	07:19	13:53 (1)	06:52	07:26		
	20:57	80	16:47 (1)	20:39	113	17:00 (1)	19:57	16:59 (1)	19:07	162	16:35 (1)	17:21
2	05:57	15:26 (1)	06:21	15:05 (1)	06:51	13:52 (1)	07:20	13:54 (1)	06:53	07:27		
	20:57	81	16:47 (1)	20:38	114	16:59 (1)	19:55	16:59 (1)	19:05	160	16:34 (1)	17:20
3	05:57	15:27 (1)	06:22	15:03 (1)	06:52	13:51 (1)	07:21	13:55 (1)	06:54	07:28		
	20:57	81	16:48 (1)	20:37	117	17:00 (1)	19:54	16:58 (1)	19:04	158	16:33 (1)	17:19
4	05:58	15:26 (1)	06:23	15:02 (1)	06:52	13:50 (1)	07:22	13:57 (1)	06:55	07:29		
	20:57	82	16:48 (1)	20:36	118	17:00 (1)	19:52	16:58 (1)	19:02	155	16:32 (1)	17:18
5	05:58	15:26 (1)	06:23	15:00 (1)	06:53	13:50 (1)	07:23	13:58 (1)	06:57	07:30		
	20:57	83	16:49 (1)	20:35	120	17:00 (1)	19:50	16:58 (1)	19:01	153	16:31 (1)	17:17
6	05:59	15:25 (1)	06:24	14:59 (1)	06:54	13:49 (1)	07:24	13:59 (1)	06:58	07:31		
	20:56	84	16:49 (1)	20:33	122	17:01 (1)	19:49	16:57 (1)	18:59	151	16:30 (1)	17:16
7	06:00	15:26 (1)	06:25	14:57 (1)	06:55	13:49 (1)	07:25	13:49 (1)	06:59	07:32		
	20:56	83	16:49 (1)	20:32	124	17:01 (1)	19:47	16:57 (1)	18:57	148	16:28 (1)	17:14
8	06:00	15:25 (1)	06:26	14:55 (1)	06:56	13:48 (1)	07:26	13:48 (1)	07:00	07:33		
	20:56	84	16:49 (1)	20:31	126	17:01 (1)	19:45	16:56 (1)	18:56	146	16:27 (1)	17:13
9	06:01	15:25 (1)	06:27	14:53 (1)	06:57	13:47 (1)	07:27	14:02 (1)	07:01	07:34		
	20:56	85	16:50 (1)	20:30	129	17:02 (1)	19:44	16:55 (1)	18:54	143	16:25 (1)	17:12
10	06:01	15:25 (1)	06:28	14:51 (1)	06:58	13:47 (1)	07:28	14:03 (1)	07:02	07:35		
	20:55	86	16:51 (1)	20:29	131	17:02 (1)	19:42	16:54 (1)	18:53	141	16:24 (1)	17:11
11	06:02	15:24 (1)	06:29	14:49 (1)	06:59	13:47 (1)	07:29	14:05 (1)	07:04	07:35		
	20:55	87	16:51 (1)	20:27	133	17:02 (1)	19:40	16:54 (1)	18:51	137	16:22 (1)	17:10
12	06:03	15:24 (1)	06:30	14:47 (1)	07:00	13:47 (1)	07:30	14:06 (1)	07:05	07:36		
	20:54	87	16:51 (1)	20:26	135	17:02 (1)	19:39	16:53 (1)	18:49	134	16:20 (1)	17:09
13	06:04	15:24 (1)	06:31	14:45 (1)	07:01	13:47 (1)	07:31	14:07 (1)	07:06	07:37		
	20:54	88	16:52 (1)	20:25	137	17:02 (1)	19:37	16:52 (1)	18:48	131	16:18 (1)	17:09
14	06:04	15:23 (1)	06:32	14:41 (1)	07:02	13:47 (1)	07:32	14:09 (1)	07:07	07:38		
	20:53	90	16:53 (1)	20:23	140	17:01 (1)	19:35	16:52 (1)	18:46	128	16:17 (1)	17:08
15	06:05	15:22 (1)	06:33	14:39 (1)	07:03	13:47 (1)	07:33	14:10 (1)	07:08	07:39		
	20:53	91	16:53 (1)	20:22	143	17:02 (1)	19:34	16:51 (1)	18:45	125	16:15 (1)	17:07
16	06:06	15:22 (1)	06:34	14:36 (1)	07:04	13:47 (1)	07:34	14:12 (1)	07:09	07:39		
	20:52	91	16:53 (1)	20:21	146	17:02 (1)	19:32	16:50 (1)	18:43	121	16:13 (1)	17:06
17	06:07	15:21 (1)	06:35	14:34 (1)	07:05	13:47 (1)	07:35	14:13 (1)	07:11	07:40		
	20:52	93	16:54 (1)	20:19	148	17:02 (1)	19:30	16:50 (1)	18:42	118	16:11 (1)	17:05
18	06:07	15:21 (1)	06:36	14:31 (1)	07:06	13:48 (1)	07:36	14:16 (1)	07:12	07:41		
	20:51	94	16:55 (1)	20:18	151	17:02 (1)	19:29	16:49 (1)	18:40	114	16:10 (1)	17:04
19	06:08	15:19 (1)	06:37	14:28 (1)	07:07	13:48 (1)	07:37	14:18 (1)	07:13	07:41		
	20:50	95	16:54 (1)	20:16	154	17:02 (1)	19:27	16:48 (1)	18:39	109	16:07 (1)	17:04
20	06:09	15:19 (1)	06:38	14:25 (1)	07:08	13:48 (1)	07:38	14:20 (1)	07:14	07:42		
	20:50	96	16:55 (1)	20:15	157	17:02 (1)	19:25	16:47 (1)	18:37	105	16:05 (1)	17:03
21	06:10	15:18 (1)	06:39	14:21 (1)	07:09	13:49 (1)	07:40	14:22 (1)	07:15	07:42		
	20:49	97	16:55 (1)	20:14	161	17:02 (1)	19:24	16:47 (1)	18:36	101	16:03 (1)	17:02
22	06:11	15:18 (1)	06:40	14:18 (1)	07:10	13:49 (1)	07:41	14:24 (1)	07:16	07:43		
	20:48	98	16:56 (1)	20:12	164	17:02 (1)	19:22	16:46 (1)	18:35	96	16:00 (1)	17:02
23	06:12	15:17 (1)	06:41	14:15 (1)	07:11	13:49 (1)	07:42	14:26 (1)	07:17	07:43		
	20:47	100	16:57 (1)	20:11	167	17:02 (1)	19:20	16:45 (1)	18:33	92	15:58 (1)	17:01
24	06:12	15:15 (1)	06:42	14:12 (1)	07:12	13:50 (1)	07:43	14:29 (1)	07:19	07:44		
	20:46	101	16:56 (1)	20:09	170	17:02 (1)	19:19	16:44 (1)	18:32	87	15:56 (1)	17:01
25	06:13	15:14 (1)	06:43	14:09 (1)	07:13	13:50 (1)	07:44	13:32 (1)	07:20	07:44		
	20:46	103	16:57 (1)	20:08	172	17:01 (1)	19:17	16:43 (1)	17:30	81	14:53 (1)	17:00
26	06:14	15:14 (1)	06:44	14:06 (1)	07:14	13:51 (1)	07:45	13:35 (1)	07:21	07:45		
	20:45	103	16:57 (1)	20:06	175	17:01 (1)	19:15	16:42 (1)	17:29	75	14:50 (1)	17:00
27	06:15	15:13 (1)	06:45	14:03 (1)	07:15	13:51 (1)	07:46	13:38 (1)	07:22	07:45		
	20:44	105	16:58 (1)	20:05	178	17:01 (1)	19:14	16:40 (1)	17:28	68	14:46 (1)	16:59
28	06:16	15:12 (1)	06:46	14:00 (1)	07:16	13:51 (1)	07:47	13:41 (1)	07:23	07:45		
	20:43	106	16:58 (1)	20:03	180	17:00 (1)	19:12	16:39 (1)	17:26	62	14:43 (1)	16:59
29	06:17	15:11 (1)	06:47	13:58 (1)	07:17	13:52 (1)	07:48	13:46 (1)	07:24	07:46		
	20:42	108	16:59 (1)	20:01	182	17:00 (1)	19:10	16:38 (1)	17:25	53	14:39 (1)	16:58
30	06:18	15:09 (1)	06:48	13:56 (1)	07:18	13:53 (1)	07:49	13:51 (1)	07:25	07:46		
	20:41	110	16:59 (1)	20:00	183	16:59 (1)	19:09	16:36 (1)	17:24	43	14:34 (1)	16:58
31	06:19	15:08 (1)	06:49	13:54 (1)				06:51			13:58 (1)	
	20:40	112	17:00 (1)	19:58	185	16:59 (1)		17:23	29	14:27 (1)		17:06
Potential sun hours	457		427		375		346		299		290	
Total, worst case	2884		4575		5423		3526					
Sun reduction	0.75		0.72		0.64		0.56					
Oper. time red.	0.40		0.40		0.40		0.40					
Wind dir. red.	0.69		0.69		0.69		0.69					
Total reduction	0.21		0.20		0.18		0.15					
Total, real	592		902		955		537					

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 8

Licensed user:

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IT-09028 Sestu

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: F - R08

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

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

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 9

Licensed user:

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+390702358125
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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: G - R04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	14:37 (1)	07:34	06:58	07:09	06:24
	17:07	61 15:38 (1)	17:41	18:14	19:47	20:18
2	07:46	14:37 (1)	07:33	06:57	07:07	06:23
	17:08	61 15:38 (1)	17:42	18:15	19:48	20:19
3	07:47	14:38 (1)	07:32	06:55	07:05	06:21
	17:09	60 15:38 (1)	17:43	18:16	19:49	20:20
4	07:47	14:39 (1)	07:31	06:54	07:04	06:20
	17:09	59 15:38 (1)	17:44	18:17	19:50	20:21
5	07:47	14:39 (1)	07:30	06:52	07:02	06:19
	17:10	58 15:37 (1)	17:45	18:18	19:51	20:22
6	07:47	14:40 (1)	07:29	06:51	07:01	06:18
	17:11	57 15:37 (1)	17:47	18:19	19:52	20:23
7	07:47	14:41 (1)	07:27	06:49	06:59	06:16
	17:12	56 15:37 (1)	17:48	18:20	19:53	20:24
8	07:46	14:42 (1)	07:26	06:48	06:57	06:15
	17:13	55 15:37 (1)	17:49	18:22	19:54	20:25
9	07:46	14:44 (1)	07:25	06:46	06:56	06:14
	17:14	53 15:37 (1)	17:50	18:23	19:55	20:26
10	07:46	14:45 (1)	07:24	06:45	06:54	06:13
	17:15	52 15:37 (1)	17:51	18:24	19:56	20:27
11	07:46	14:46 (1)	07:23	06:43	06:53	06:12
	17:16	50 15:36 (1)	17:53	18:25	19:57	20:28
12	07:46	14:47 (1)	07:22	06:41	06:51	06:11
	17:17	49 15:36 (1)	17:54	18:26	19:58	20:29
13	07:45	14:49 (1)	07:21	06:40	06:50	06:10
	17:18	47 15:36 (1)	17:55	18:27	19:59	20:30
14	07:45	14:50 (1)	07:19	06:38	06:48	06:09
	17:19	45 15:35 (1)	17:56	18:28	20:00	20:31
15	07:45	14:52 (1)	07:18	06:36	06:46	06:08
	17:20	43 15:35 (1)	17:58	18:29	20:01	20:32
16	07:44	14:53 (1)	07:17	06:35	06:45	06:07
	17:22	40 15:33 (1)	17:59	18:30	20:02	20:33
17	07:44	14:56 (1)	07:15	06:33	06:43	06:06
	17:23	37 15:33 (1)	18:00	18:31	20:03	20:34
18	07:44	14:58 (1)	07:14	06:32	06:42	06:05
	17:24	33 15:31 (1)	18:01	18:32	20:04	20:35
19	07:43	15:01 (1)	07:13	06:30	06:40	06:04
	17:25	29 15:30 (1)	18:02	18:33	20:05	20:36
20	07:42	15:03 (1)	07:11	06:28	06:39	06:03
	17:26	25 15:28 (1)	18:03	18:34	20:06	20:37
21	07:42	15:07 (1)	07:10	06:27	06:38	06:03
	17:27	17 15:24 (1)	18:05	18:35	20:07	20:37
22	07:41	15:14 (1)	07:09	06:25	06:36	06:02
	17:28	5 15:19 (1)	18:06	18:36	20:08	20:38
23	07:41		07:07	06:23	06:35	06:01
	17:30		18:07	18:38	20:10	20:39
24	07:40		07:06	06:22	06:33	06:00
	17:31		18:08	18:39	20:11	20:40
25	07:39		07:04	06:20	06:32	06:00
	17:32		18:09	18:40	20:12	20:41
26	07:39		07:03	06:18	06:30	05:59
	17:33		18:10	18:41	20:13	20:42
27	07:38		07:01	06:17	06:29	05:58
	17:34		18:11	18:42	20:14	20:43
28	07:37		07:00	06:15	06:28	05:58
	17:36		18:13	18:43	20:15	20:43
29	07:36			07:14	06:26	05:57
	17:37			19:44	20:16	20:44
30	07:35			07:12	06:25	05:57
	17:38			19:45	20:17	20:45
31	07:34			07:10	05:56	06:28 (3)
	17:39			19:46	20:46	20 06:48 (3)
Potential sun hours	299	298	370	398	447	450
Total, worst case	992				115	703
Sun reduction	0.40				0.58	0.67
Oper. time red.	0.40				0.40	0.40
Wind dir. red.	0.63				0.73	0.73
Total reduction	0.10				0.17	0.19
Total, real	98				19	134

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: G - R04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56	06:33 (3)	06:20	06:50	07:19	06:52
	24	06:57 (3)	20:39	19:57	19:07	17:21
						16:58
						50
						15:18 (1)
2	05:57	06:33 (3)	06:21	06:51	07:20	06:53
	24	06:57 (3)	20:38	19:55	19:05	17:20
						16:57
						52
						15:19 (1)
3	05:57	06:34 (3)	06:22	06:52	07:21	06:54
	23	06:57 (3)	20:37	19:54	19:04	17:19
						16:57
						53
						15:20 (1)
4	05:58	06:33 (3)	06:23	06:52	07:22	06:55
	24	06:57 (3)	20:36	19:52	19:02	17:18
						16:57
						54
						15:21 (1)
5	05:58	06:34 (3)	06:23	06:53	07:23	06:57
	23	06:57 (3)	20:35	19:50	19:01	17:17
						16:57
						56
						15:22 (1)
6	05:59	06:34 (3)	06:24	06:54	07:24	06:58
	23	06:57 (3)	20:33	19:49	18:59	17:16
						16:57
						57
						15:23 (1)
7	06:00	06:35 (3)	06:25	06:55	07:25	06:59
	22	06:57 (3)	20:32	19:47	18:57	17:14
						16:57
						58
						15:24 (1)
8	06:00	06:34 (3)	06:26	06:56	07:26	07:00
	23	06:57 (3)	20:31	19:45	18:56	17:13
						16:57
						59
						15:25 (1)
9	06:01	06:35 (3)	06:27	06:57	07:27	07:01
	22	06:57 (3)	20:30	19:44	18:54	17:12
						16:57
						60
						15:26 (1)
10	06:01	06:36 (3)	06:28	06:58	07:28	07:02
	21	06:57 (3)	20:28	19:42	18:53	17:11
						16:57
						61
						15:27 (1)
11	06:02	06:36 (3)	06:29	06:59	07:29	07:04
	20	06:56 (3)	20:27	19:40	18:51	17:10
						16:57
						61
						15:28 (1)
12	06:03	06:36 (3)	06:30	07:00	07:30	07:05
	21	06:57 (3)	20:26	19:39	18:49	17:09
						16:57
						62
						15:29 (1)
13	06:04	06:37 (3)	06:31	07:01	07:31	07:06
	20	06:57 (3)	20:25	19:37	18:48	17:09
						16:57
						63
						15:29 (1)
14	06:04	06:38 (3)	06:32	07:02	07:32	07:07
	18	06:56 (3)	20:23	19:35	18:46	17:08
						16:57
						63
						15:30 (1)
15	06:05	06:38 (3)	06:33	07:03	07:33	07:08
	17	06:55 (3)	20:22	19:34	18:45	17:07
						16:57
						63
						15:30 (1)
16	06:06	06:39 (3)	06:34	07:04	07:34	07:09
	16	06:55 (3)	20:21	19:32	18:43	17:06
						16:58
						63
						15:30 (1)
17	06:07	06:41 (3)	06:35	07:05	07:35	07:11
	13	06:54 (3)	20:19	19:30	18:42	17:05
						16:58
						63
						15:31 (1)
18	06:07	06:42 (3)	06:36	07:06	07:36	07:12
	11	06:53 (3)	20:18	19:29	18:40	17:04
						16:58
						64
						15:32 (1)
19	06:08	06:43 (3)	06:37	07:07	07:37	07:13
	8	06:51 (3)	20:16	19:27	18:39	17:04
						16:59
						64
						15:32 (1)
20	06:09	06:38	07:08	07:38	07:14	14:49 (1)
	20:50	20:15	19:25	18:37	17:03	5
						14:54 (1)
						16:59
						64
						15:33 (1)
21	06:10	06:39	07:09	07:40	07:15	14:43 (1)
	20:49	20:13	19:24	18:36	17:02	17
						15:00 (1)
						17:00
						64
						15:33 (1)
22	06:11	06:40	07:10	07:41	07:16	14:39 (1)
	20:48	20:12	19:22	18:35	17:02	25
						15:04 (1)
						17:00
						64
						15:34 (1)
23	06:12	06:41	07:11	07:42	07:17	14:37 (1)
	20:47	20:11	19:20	18:33	17:01	29
						15:06 (1)
						17:01
						64
						15:34 (1)
24	06:12	06:42	07:12	07:43	07:19	14:36 (1)
	20:46	20:09	19:19	18:32	17:01	33
						15:09 (1)
						17:01
						64
						15:35 (1)
25	06:13	06:43	07:13	07:44	07:20	14:34 (1)
	20:46	20:08	19:17	17:30	17:00	37
						15:11 (1)
						17:02
						64
						15:35 (1)
26	06:14	06:44	07:14	07:45	07:21	14:33 (1)
	20:45	20:06	19:15	17:29	17:00	39
						15:12 (1)
						17:02
						64
						15:35 (1)
27	06:15	06:45	07:15	07:46	07:22	14:31 (1)
	20:44	20:05	19:14	17:28	16:59	43
						15:14 (1)
						17:03
						63
						15:36 (1)
28	06:16	06:46	07:16	07:47	07:23	14:30 (1)
	20:43	20:03	19:12	17:26	16:59	45
						15:15 (1)
						17:04
						63
						15:36 (1)
29	06:17	06:47	07:17	07:48	07:24	14:29 (1)
	20:42	20:01	19:10	17:25	16:58	47
						15:16 (1)
						17:04
						62
						15:36 (1)
30	06:18	06:48	07:18	07:49	07:25	14:29 (1)
	20:41	20:00	19:09	17:24	16:58	48
						15:17 (1)
						17:05
						63
						15:37 (1)
31	06:19	06:49	07:19	07:50	07:26	14:28 (1)
	20:40	19:58	17:23	16:57	17:06	62
						15:37 (1)
Potential sun hours	457	427	375	346	299	290
Total, worst case	373				368	1887
Sun reduction	0.75				0.48	0.41
Oper. time red.	0.40				0.40	0.40
Wind dir. red.	0.73				0.63	0.63
Total reduction	0.21				0.12	0.10
Total, real	80				44	193

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: H - R05

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	14:54 (1)	07:34	06:58	07:09	06:24
	17:07	42 15:36 (1)	17:40	18:14	19:47	20:18
2	07:46	14:55 (1)	07:33	06:57	07:07	06:23
	17:08	41 15:36 (1)	17:42	18:15	19:48	20:19
3	07:47	14:56 (1)	07:32	06:55	07:05	06:21
	17:09	40 15:36 (1)	17:43	18:16	19:49	20:20
4	07:47	14:57 (1)	07:31	06:54	07:04	06:20
	17:09	39 15:36 (1)	17:44	18:17	19:50	20:21
5	07:47	14:58 (1)	07:30	06:52	07:02	06:19
	17:10	36 15:34 (1)	17:45	18:18	19:51	20:22
6	07:47	14:59 (1)	07:29	06:51	07:01	06:18
	17:11	35 15:34 (1)	17:47	18:19	19:52	20:23
7	07:47	15:01 (1)	07:27	06:49	06:59	06:16
	17:12	33 15:34 (1)	17:48	18:20	19:53	20:24
8	07:46	15:02 (1)	07:26	06:48	06:57	06:15
	17:13	31 15:33 (1)	17:49	18:22	19:54	20:25
9	07:46	15:04 (1)	07:25	06:46	06:56	06:14
	17:14	29 15:33 (1)	17:50	18:23	19:55	20:26
10	07:46	15:06 (1)	07:24	06:45	06:54	06:13
	17:15	26 15:32 (1)	17:51	18:24	19:56	20:27
11	07:46	15:08 (1)	07:23	06:43	06:53	06:12
	17:16	22 15:30 (1)	17:53	18:25	19:57	20:28
12	07:46	15:11 (1)	07:22	06:41	06:51	06:11
	17:17	18 15:29 (1)	17:54	18:26	19:58	20:29
13	07:45	15:15 (1)	07:21	06:40	06:50	06:10
	17:18	11 15:26 (1)	17:55	18:27	19:59	20:30
14	07:45	15:16 (1)	07:19	06:38	06:48	06:09
	17:19	17:56	18:28	20:00	20:31	20:54
15	07:45	17:18	18:36	19:46	20:08	20:54
	17:20	17:58	18:29	20:01	20:32	20:55
16	07:44	17:17	18:35	19:45	20:07	20:52
	17:22	17:59	18:30	20:02	20:33	20:55
17	07:44	17:15	18:33	19:43	20:06	20:53
	17:23	18:00	18:31	20:03	20:34	20:55
18	07:44	17:14	18:32	19:42	20:05	20:53
	17:24	18:01	18:32	20:04	20:35	20:56
19	07:43	17:13	18:30	19:40	20:04	20:53
	17:25	18:02	18:33	20:05	20:36	20:56
20	07:42	17:11	18:28	19:39	20:03	20:53
	17:26	18:03	18:34	20:06	20:37	20:56
21	07:42	17:10	18:27	19:38	20:03	20:53
	17:27	18:05	18:35	20:07	20:37	20:57
22	07:41	17:09	18:25	19:36	20:02	20:53
	17:28	18:06	18:36	20:08	20:38	20:57
23	07:41	17:07	18:23	19:35	20:01	20:53
	17:30	18:07	18:38	20:10	20:39	20:57
24	07:40	17:06	18:22	19:33	20:00	20:54
	17:31	18:08	18:39	20:11	20:40	20:57
25	07:39	17:04	18:20	19:32	20:00	20:54
	17:32	18:09	18:40	20:12	20:41	20:57
26	07:39	17:03	18:18	19:30	20:00	20:54
	17:33	18:10	18:41	20:13	20:42	20:57
27	07:38	17:01	18:17	19:29	20:00	20:55
	17:34	18:11	18:42	20:14	20:43	20:57
28	07:37	17:00	18:15	19:28	20:00	20:55
	17:36	18:13	18:43	20:15	20:43	20:57
29	07:36	17:00	18:14	19:29	20:01	20:55
	17:37	19:44	20:16	20:44	22 06:54 (3)	20:57
30	07:35	17:00	18:12	19:27	20:00	20:56
	17:38	19:45	20:17	20:45	23 06:55 (3)	20:57
31	07:34	17:00	18:11	19:26	20:00	20:56
	17:39	19:46	20:18	20:46	23 06:54 (3)	
Potential sun hours	299	298	370	398	447	450
Total, worst case	403				200	739
Sun reduction	0.40				0.58	0.67
Oper. time red.	0.40				0.40	0.40
Wind dir. red.	0.64				0.73	0.73
Total reduction	0.10				0.17	0.19
Total, real	40				33	141

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

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

Project:
windpro Nuoro nord - flickering

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2023-12-12 12:06 / 12
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Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: H - R05

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:56	06:37 (3)	06:20	06:50	07:19	06:52	07:26	14:50 (1)	
	20:57	25 07:02 (3)	20:39	19:57	19:07	17:21	16:58	22 15:12 (1)	
2	05:57	06:37 (3)	06:21	06:51	07:20	06:53	07:27	14:48 (1)	
	20:57	25 07:02 (3)	20:38	19:55	19:05	17:20	16:57	26 15:14 (1)	
3	05:57	06:38 (3)	06:22	06:52	07:21	06:54	07:28	14:47 (1)	
	20:57	24 07:02 (3)	20:37	19:54	19:04	17:19	16:57	29 15:16 (1)	
4	05:58	06:37 (3)	06:23	06:52	07:22	06:55	07:29	14:46 (1)	
	20:57	25 07:02 (3)	20:36	19:52	19:02	17:18	16:57	31 15:17 (1)	
5	05:58	06:38 (3)	06:23	06:53	07:23	06:57	07:30	14:46 (1)	
	20:57	25 07:03 (3)	20:35	19:50	19:01	17:17	16:57	33 15:19 (1)	
6	05:59	06:37 (3)	06:24	06:54	07:24	06:58	07:31	14:45 (1)	
	20:56	25 07:02 (3)	20:33	19:49	18:59	17:16	16:57	35 15:20 (1)	
7	06:00	06:38 (3)	06:25	06:55	07:25	06:59	07:32	14:45 (1)	
	20:56	25 07:03 (3)	20:32	19:47	18:57	17:14	16:57	36 15:21 (1)	
8	06:00	06:38 (3)	06:26	06:56	07:26	07:00	07:33	14:44 (1)	
	20:56	24 07:02 (3)	20:31	19:45	18:56	17:13	16:57	39 15:23 (1)	
9	06:01	06:38 (3)	06:27	06:57	07:27	07:01	07:34	14:44 (1)	
	20:56	25 07:03 (3)	20:30	19:44	18:54	17:12	16:57	40 15:24 (1)	
10	06:01	06:39 (3)	06:28	06:58	07:28	07:02	07:35	14:44 (1)	
	20:55	24 07:03 (3)	20:28	19:42	18:53	17:11	16:57	41 15:25 (1)	
11	06:02	06:39 (3)	06:29	06:59	07:29	07:04	07:35	14:44 (1)	
	20:55	24 07:03 (3)	20:27	19:40	18:51	17:10	16:57	42 15:26 (1)	
12	06:03	06:39 (3)	06:30	07:00	07:30	07:05	07:36	14:44 (1)	
	20:54	24 07:03 (3)	20:26	19:39	18:49	17:09	16:57	43 15:27 (1)	
13	06:04	06:40 (3)	06:31	07:01	07:31	07:06	07:37	14:44 (1)	
	20:54	23 07:03 (3)	20:25	19:37	18:48	17:09	16:57	43 15:27 (1)	
14	06:04	06:41 (3)	06:32	07:02	07:32	07:07	07:38	14:44 (1)	
	20:53	22 07:03 (3)	20:23	19:35	18:46	17:08	16:57	44 15:28 (1)	
15	06:05	06:40 (3)	06:33	07:03	07:33	07:08	07:39	14:44 (1)	
	20:53	22 07:02 (3)	20:22	19:34	18:45	17:07	16:57	45 15:29 (1)	
16	06:06	06:41 (3)	06:34	07:04	07:34	07:09	07:39	14:44 (1)	
	20:52	21 07:02 (3)	20:21	19:32	18:43	17:06	16:58	45 15:29 (1)	
17	06:07	06:42 (3)	06:35	07:05	07:35	07:11	07:40	14:44 (1)	
	20:52	20 07:02 (3)	20:19	19:30	18:42	17:05	16:58	46 15:30 (1)	
18	06:07	06:43 (3)	06:36	07:06	07:36	07:12	07:41	14:45 (1)	
	20:51	19 07:02 (3)	20:18	19:29	18:40	17:04	16:58	46 15:31 (1)	
19	06:08	06:43 (3)	06:37	07:07	07:37	07:13	07:41	14:45 (1)	
	20:50	17 07:00 (3)	20:16	19:27	18:39	17:04	16:59	46 15:31 (1)	
20	06:09	06:44 (3)	06:38	07:08	07:38	07:14	07:42	14:46 (1)	
	20:50	16 07:00 (3)	20:15	19:25	18:37	17:03	16:59	46 15:32 (1)	
21	06:10	06:46 (3)	06:39	07:09	07:40	07:15	07:42	14:46 (1)	
	20:49	13 06:59 (3)	20:13	19:24	18:36	17:02	17:00	46 15:32 (1)	
22	06:11	06:47 (3)	06:40	07:10	07:41	07:16	07:43	14:47 (1)	
	20:48	11 06:58 (3)	20:12	19:22	18:35	17:02	17:00	46 15:33 (1)	
23	06:12	06:50 (3)	06:41	07:11	07:42	07:17	07:43	14:47 (1)	
	20:47	5 06:55 (3)	20:11	19:20	18:33	17:01	17:01	46 15:33 (1)	
24	06:12		06:42	07:12	07:43	07:19	07:44	14:48 (1)	
	20:46		20:09	19:19	18:32	17:01	17:01	46 15:34 (1)	
25	06:13		06:43	07:13	06:44	07:20	07:44	14:48 (1)	
	20:46		20:08	19:17	17:30	17:00	17:02	46 15:34 (1)	
26	06:14		06:44	07:14	06:45	07:21	07:45	14:48 (1)	
	20:45		20:06	19:15	17:29	17:00	17:02	46 15:34 (1)	
27	06:15		06:45	07:15	06:46	07:22	07:45	14:50 (1)	
	20:44		20:05	19:14	17:28	16:59	17:03	45 15:35 (1)	
28	06:16		06:46	07:16	06:47	07:23	07:45	14:50 (1)	
	20:43		20:03	19:12	17:26	16:59	17:04	45 15:35 (1)	
29	06:17		06:47	07:17	06:48	07:24	14:55 (1)	07:46	14:51 (1)
	20:42		20:01	19:10	17:25	16:58	15:06 (1)	17:04	44 15:35 (1)
30	06:18		06:48	07:18	06:50	07:25	14:52 (1)	07:46	14:51 (1)
	20:41		20:00	19:09	17:24	16:58	15:09 (1)	17:05	44 15:35 (1)
31	06:19		06:49		06:51			07:46	14:52 (1)
	20:40		19:58		17:23			17:06	43 15:35 (1)
Potential sun hours	457	427	375	346	299		290		
Total, worst case	484					28			1275
Sun reduction	0.75					0.48			0.41
Oper. time red.	0.40					0.40			0.40
Wind dir. red.	0.73					0.64			0.64
Total reduction	0.21					0.12			0.10
Total, real	104					3			131

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 13

Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: I - R06

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December			
1	07:46	07:34	06:58	07:09	06:24	06:59 (3)	05:56	05:56	06:20	07:09 (3)	06:50	07:19	06:52	07:26	
	17:07	17:40	18:14	19:47	20:18	26 07:25 (3)	20:47	20:57	20:39	23 07:32 (3)	19:57	19:07	17:21	16:58	
2	07:46	07:33	06:57	07:07	06:22	06:59 (3)	05:55	05:57	06:21	07:09 (3)	06:51	07:20	06:53	07:27	
	17:08	17:42	18:15	19:48	20:19	26 07:25 (3)	20:47	20:57	20:38	24 07:33 (3)	19:55	19:05	17:20	16:57	
3	07:47	07:32	06:55	07:05	06:21	06:58 (3)	05:55	05:57	06:22	07:08 (3)	06:51	07:21	06:54	07:28	
	17:09	17:43	18:16	19:49	20:20	27 07:25 (3)	20:48	20:57	20:37	26 07:34 (3)	19:53	19:04	17:19	16:57	
4	07:47	07:31	06:54	07:04	06:20	06:58 (3)	05:54	05:58	06:22	07:08 (3)	06:52	07:22	06:55	07:29	
	17:09	17:44	18:17	19:50	20:21	27 07:25 (3)	20:49	20:57	20:36	26 07:34 (3)	19:52	19:02	17:18	16:57	
5	07:47	07:30	06:52	07:02	06:19	06:58 (3)	05:54	05:58	06:23	07:08 (3)	06:53	07:23	06:57	07:30	
	17:10	17:45	18:18	19:51	20:22	27 07:25 (3)	20:49	20:57	20:35	26 07:34 (3)	19:50	19:01	17:17	16:57	
6	07:47	07:29	06:51	07:01	06:18	06:58 (3)	05:54	05:59	06:24	07:07 (3)	06:54	07:24	06:58	07:31	
	17:11	17:47	18:19	19:52	20:23	27 07:25 (3)	20:50	20:56	20:33	27 07:34 (3)	19:49	18:59	17:16	16:57	
7	07:47	07:27	06:49	06:59	06:16	06:58 (3)	05:53	06:00	06:25	07:07 (3)	06:55	07:25	06:59	07:32	
	17:12	17:48	18:20	19:53	20:24	27 07:25 (3)	20:51	20:56	20:32	28 07:35 (3)	19:47	18:57	17:14	16:57	
8	07:46	07:26	06:48	06:57	06:15	06:58 (3)	05:53	06:00	06:26	07:07 (3)	06:56	07:26	07:00	07:33	
	17:13	17:49	18:22	19:54	20:25	27 07:25 (3)	20:51	20:56	20:31	28 07:35 (3)	19:45	18:56	17:13	16:57	
9	07:46	07:25	06:46	06:56	06:14	06:58 (3)	05:53	06:01	06:27	07:07 (3)	06:57	07:27	07:01	07:34	
	17:14	17:50	18:23	19:55	20:26	26 07:24 (3)	20:52	20:56	20:30	27 07:34 (3)	19:44	18:54	17:12	16:57	
10	07:46	07:24	06:45	06:54	06:13	06:59 (3)	05:53	06:01	06:28	07:08 (3)	06:58	07:28	07:02	07:35	
	17:15	17:51	18:24	19:56	20:27	25 07:24 (3)	20:52	20:55	20:28	26 07:34 (3)	19:42	18:53	17:11	16:57	
11	07:46	07:23	06:43	06:53	06:12	06:59 (3)	05:53	06:02	06:29	07:08 (3)	06:59	07:29	07:04	07:35	
	17:16	17:53	18:25	19:57	20:28	24 07:23 (3)	20:53	20:55	20:27	26 07:34 (3)	19:40	18:51	17:10	16:57	
12	07:46	07:22	06:41	06:51	06:11	07:00 (3)	05:53	06:03	06:30	07:08 (3)	07:00	07:30	07:05	07:36	
	17:17	17:54	18:26	19:58	20:29	22 07:22 (3)	20:53	20:54	20:26	25 07:33 (3)	19:39	18:49	17:09	16:57	
13	07:45	07:21	06:40	06:50	06:10	07:01 (3)	05:53	06:04	06:31	07:09 (3)	07:01	07:31	07:06	07:37	
	17:18	17:55	18:27	19:59	20:30	20 07:21 (3)	20:54	20:54	20:25	24 07:33 (3)	19:37	18:48	17:09	16:57	
14	07:45	07:19	06:38	06:48	06:09	07:01 (3)	05:52	06:04	06:32	07:08 (3)	07:02	07:32	07:07	07:38	
	17:19	17:56	18:28	20:00	20:31	19 07:20 (3)	20:54	20:53	20:23	23 07:31 (3)	19:35	18:46	17:08	16:57	
15	07:45	07:18	06:36	06:46	06:08	07:03 (3)	05:52	06:05	06:33	07:09 (3)	07:03	07:33	07:08	07:39	
	17:20	17:57	18:29	20:01	20:32	16 07:19 (3)	20:55	20:53	20:22	21 07:30 (3)	19:34	18:45	17:07	16:57	
16	07:44	07:17	06:35	06:45	06:07	07:04 (3)	05:52	06:06	06:34	07:11 (3)	07:04	07:34	07:09	07:39	
	17:22	17:59	18:30	20:02	20:33	14 07:18 (3)	20:55	20:52	20:21	17 07:28 (3)	19:32	18:43	17:06	16:58	
17	07:44	07:15	06:33	06:43	06:06	07:06 (3)	05:52	06:07	06:35	07:12 (3)	07:05	07:35	07:11	07:40	
	17:23	18:00	18:31	20:03	20:34	10 07:16 (3)	20:55	20:52	20:19	14 07:26 (3)	19:30	18:42	17:05	16:58	
18	07:44	07:14	06:32	06:42	06:05	07:09 (3)	05:53	06:07	06:36	07:15 (3)	07:06	07:36	07:12	07:41	
	17:24	18:01	18:32	20:04	20:35	2 07:11 (3)	20:56	20:51	20:18	8 07:23 (3)	19:29	18:40	17:04	16:58	
19	07:43	07:13	06:30	06:40	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	07:42	07:11	06:28	06:39	06:03		05:53	06:09	06:38		07:08	07:38	07:14	07:42	
	17:26	18:03	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	06:37	06:03		05:53	06:10	06:39		07:09	07:40	07:15	07:42	
	17:27	18:05	18:35	20:07	20:37		20:57	20:49	20:13		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	
	17:28	18:06	18:36	20:08	20:38		20:57	20:48	20:12		19:22	18:34	17:02	17:00	
23	07:41	07:07	06:23	06:35	06:01		05:53	06:12	06:41		07:11	07:42	07:17	07:43	
	17:30	18:07	18:37	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	06:12	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	07:09 (3)	06:00	06:13	06:43		07:13	06:44	07:20	07:44	
	17:32	18:09	18:40	20:12	9 07:18 (3)	20:41	20:57	20:46	20:08		19:17	17:30	17:00	17:02	
26	07:39	07:03	06:18	06:30	07:05 (3)	05:59		05:54	06:14	07:18 (3)	06:44	07:14	06:45	07:21	07:45
	17:33	18:10	18:41	20:13	15 07:20 (3)	20:42	20:57	20:45	6 07:24 (3)	20:06	19:15	17:29	17:00	17:02	
27	07:38	07:01	06:17	06:29	07:04 (3)	05:58		05:55	06:15	07:15 (3)	06:45	07:15	06:46	07:22	07:45
	17:34	18:11	18:42	20:14	18 07:22 (3)	20:43	20:57	20:44	12 07:27 (3)	20:05	19:14	17:28	16:59	17:03	
28	07:37	07:00	06:15	06:28	07:02 (3)	05:58		05:55	06:16	07:14 (3)	06:46	07:16	06:47	07:23	07:45
	17:36	18:13	18:43	20:15	21 07:23 (3)	20:43	20:57	20:43	15 07:29 (3)	20:03	19:12	17:26	16:59	17:04	
29	07:36		07:14	06:26	07:00 (3)	05:57		05:55	06:17	07:13 (3)	06:47	07:17	06:48	07:24	07:46
	17:37		19:44	20:16	23 07:23 (3)	20:44	20:57	20:42	17 07:30 (3)	20:01	19:10	17:25	16:58	17:04	
30	07:35		07:12	06:25	07:00 (3)	05:57		05:56	06:18	07:12 (3)	06:48	07:18	06:50	07:25	07:46
	17:38		19:45	20:17	24 07:24 (3)	20:45	20:57	20:41	19 07:31 (3)	20:00	19:09	17:24	16:58	17:05	
31	07:34		07:10			05:56		06:19	07:11 (3)	06:49		06:51		07:46	
	17:39		19:46			20:46		20:40	21 07:32 (3)	19:58		17:23		17:06	
Potential sun hours	299	298	370	398	447		450	457	427		375	346	299	290	
Total, worst case				110	392			90	419						
Sun reduction				0.51	0.58			0.75	0.72						
Oper. time red.				0.40	0.40			0.40	0.40						
Wind dir. red.				0.74	0.74			0.74	0.74						
Total reduction				0.15	0.17			0.22	0.21						
Total, real				16	67			20	89						

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

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

Printed/Page
2023-12-12 12:06 / 14

Licensed user:
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IT-09028 Sestu
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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: J - R07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:46	07:34	06:58	16:38 (1) 07:09	06:24	05:56	05:56	06:20	06:50	07:19	07:39 (5) 06:52	16:20 (1) 07:26	
	17:07	17:40	18:14	58 17:36 (1) 19:47	20:18	20:47	20:57	20:39	19:57	19:07	57 18:03 (1) 17:21	35 16:55 (1) 16:58	
2	07:46	07:33	06:57	16:39 (1) 07:07	06:22	05:55	05:57	06:21	06:51	07:20	07:39 (5) 06:53	16:22 (1) 07:27	
	17:08	17:42	18:15	57 17:36 (1) 19:48	20:19	20:47	20:57	20:38	19:55	19:05	61 18:04 (1) 17:20	31 16:53 (1) 16:57	
3	07:47	07:32	06:55	16:39 (1) 07:05	06:21	05:55	05:57	06:22	06:51	07:21	07:40 (5) 06:54	16:25 (1) 07:28	
	17:09	17:43	18:16	56 17:35 (1) 19:49	20:20	20:48	20:57	20:37	19:53	19:04	61 18:05 (1) 17:19	26 16:51 (1) 16:57	
4	07:47	07:31	06:54	16:40 (1) 07:04	06:20	05:54	05:58	06:22	06:52	07:22	07:41 (5) 06:55	16:28 (1) 07:29	
	17:09	17:44	18:17	55 17:35 (1) 19:50	20:21	20:49	20:57	20:36	19:52	19:02	62 18:06 (1) 17:18	20 16:48 (1) 16:57	
5	07:47	07:30	06:52	16:40 (1) 07:02	06:19	05:54	05:58	06:23	06:53	07:23	07:43 (5) 06:57	16:32 (1) 07:30	
	17:10	17:45	18:18	54 17:34 (1) 19:51	20:22	20:49	20:57	20:35	19:50	19:01	63 18:08 (1) 17:17	11 16:43 (1) 16:57	
6	07:47	07:29	17:02 (1) 06:51	59 07:09 (5) 07:01	06:18	05:54	05:59	06:24	06:54	07:24	07:44 (5) 06:58	16:31	
	17:11	17:47	12 17:14 (1) 18:19	59 17:32 (1) 19:52	20:23	20:50	20:56	20:33	19:49	18:59	62 18:08 (1) 17:16	16:57	
7	07:47	07:27	16:57 (1) 06:49	57 07:08 (5) 06:59	06:16	05:54	06:00	06:25	06:55	07:25	07:45 (5) 06:59	16:57	
	17:12	17:48	22 17:19 (1) 18:20	62 17:32 (1) 19:53	20:24	20:51	20:56	20:32	19:47	18:57	61 18:09 (1) 17:14	16:57	
8	07:46	07:26	16:55 (1) 06:48	60 07:06 (5) 06:57	06:15	05:53	06:00	06:26	06:56	07:26	07:46 (5) 07:00	16:57	
	17:13	17:49	27 17:22 (1) 18:22	63 17:31 (1) 19:54	20:25	20:51	20:56	20:31	19:45	18:56	58 18:09 (1) 17:13	16:57	
9	07:46	07:25	16:53 (1) 06:46	59 07:05 (5) 06:56	06:14	05:53	06:01	06:27	06:57	07:27	17:15 (1) 07:01	16:57	
	17:14	17:50	31 17:24 (1) 18:23	63 17:30 (1) 19:55	20:26	20:52	20:56	20:30	19:44	18:54	54 18:09 (1) 17:12	16:57	
10	07:46	07:24	16:50 (1) 06:45	58 07:03 (5) 06:54	06:13	05:53	06:01	06:28	06:58	07:28	17:14 (1) 07:02	16:57	
	17:15	17:51	35 17:25 (1) 18:24	63 17:28 (1) 19:56	20:27	20:52	20:55	20:28	19:42	18:53	55 18:09 (1) 17:11	16:57	
11	07:46	07:23	16:49 (1) 06:43	57 07:01 (5) 06:53	06:12	05:53	06:02	06:29	06:59	07:29	17:13 (1) 07:04	16:57	
	17:16	17:53	38 17:27 (1) 18:25	61 17:26 (1) 19:57	20:28	20:53	20:55	20:27	19:40	18:51	57 18:10 (1) 17:10	16:57	
12	07:46	07:22	16:47 (1) 06:41	56 07:01 (5) 06:51	06:11	05:53	06:03	06:30	07:00	07:30	17:12 (1) 07:05	16:57	
	17:17	17:54	42 17:29 (1) 18:26	58 17:25 (1) 19:58	20:29	20:53	20:54	20:26	19:39	18:49	57 18:09 (1) 17:09	16:57	
13	07:45	07:21	16:46 (1) 06:40	55 07:00 (5) 06:50	06:10	05:53	06:04	06:31	07:01	07:31	17:12 (1) 07:06	16:57	
	17:18	17:55	45 17:31 (1) 18:27	56 17:23 (1) 19:59	20:30	20:54	20:54	20:25	19:37	18:48	57 18:09 (1) 17:09	16:57	
14	07:45	07:19	16:46 (1) 06:38	54 07:01 (5) 06:48	06:09	05:52	06:04	06:32	07:02	07:32	17:11 (1) 07:07	16:57	
	17:19	17:56	46 17:32 (1) 18:28	49 17:21 (1) 20:00	20:31	20:54	20:53	20:23	19:35	18:46	58 18:09 (1) 17:08	16:57	
15	07:45	07:18	16:44 (1) 06:36	53 07:01 (5) 06:46	06:08	05:52	06:05	06:33	07:03	07:33	17:11 (1) 07:08	16:57	
	17:20	17:57	48 17:32 (1) 18:29	43 17:18 (1) 20:01	20:32	20:55	20:53	20:22	19:34	18:45	58 18:09 (1) 17:07	16:57	
16	07:44	07:17	16:43 (1) 06:35	52 07:02 (5) 06:45	06:07	05:52	06:06	06:34	07:04	07:34	17:10 (1) 07:09	16:57	
	17:22	17:59	51 17:34 (1) 18:30	33 17:14 (1) 20:02	20:33	20:55	20:52	20:21	19:32	18:43	59 18:08 (1) 17:06	16:58	
17	07:44	07:15	16:43 (1) 06:33	51 07:04 (5) 06:43	06:06	05:52	06:07	06:35	07:05	07:35	17:10 (1) 07:11	16:58	
	17:23	18:00	52 17:35 (1) 18:31	10 07:14 (5) 06:42	20:03	20:34	20:55	20:52	20:19	19:30	18:42	58 18:08 (1) 17:05	16:58
18	07:44	07:14	16:41 (1) 06:32	50 06:42	06:05	05:53	06:07	06:36	07:06	07:36	17:11 (1) 07:12	16:58	
	17:24	18:01	54 17:35 (1) 18:32	20:04	20:35	20:56	20:51	20:18	19:29	18:40	58 18:09 (1) 17:04	16:58	
19	07:43	07:13	16:41 (1) 06:30	49 06:40	06:04	05:53	06:08	06:37	07:07	07:37	17:11 (1) 07:13	16:58	
	17:25	18:02	55 17:36 (1) 18:33	20:05	20:36	20:56	20:50	20:16	19:27	18:39	57 18:08 (1) 17:04	16:59	
20	07:42	07:11	16:40 (1) 06:28	48 06:39	06:03	05:53	06:09	06:38	07:08	07:38	17:11 (1) 07:14	16:59	
	17:26	18:03	55 17:35 (1) 18:34	20:06	20:36	20:56	20:50	20:15	19:25	18:37	56 18:07 (1) 17:03	16:59	
21	07:42	07:10	16:40 (1) 06:27	47 06:37	06:03	05:53	06:10	06:39	07:09	07:40	17:11 (1) 07:15	16:59	
	17:27	18:05	56 17:36 (1) 18:35	20:07	20:37	20:57	20:49	20:13	19:24	18:36	56 18:07 (1) 17:02	17:00	
22	07:41	07:09	16:40 (1) 06:25	46 06:36	06:02	05:53	06:11	06:40	07:10	07:41	17:11 (1) 07:16	17:00	
	17:28	18:06	57 17:37 (1) 18:36	20:08	20:38	20:57	20:48	20:12	19:22	18:34	55 18:06 (1) 17:02	17:00	
23	07:41	07:07	16:39 (1) 06:23	45 06:35	06:01	05:53	06:12	06:41	07:11	07:42	17:11 (1) 07:17	17:00	
	17:30	18:07	58 17:37 (1) 18:37	20:10	20:39	20:57	20:47	20:11	19:20	18:33	54 18:05 (1) 17:01	17:01	
24	07:40	07:06	16:39 (1) 06:22	44 06:33	06:00	05:54	06:12	06:42	07:12	07:43	17:12 (1) 07:18	17:01	
	17:31	18:08	58 17:37 (1) 18:39	20:11	20:40	20:57	20:46	20:09	19:19	18:32	53 18:05 (1) 17:01	17:01	
25	07:39	07:04	16:38 (1) 06:20	43 06:32	06:00	05:54	06:13	06:43	07:13	07:44	16:13 (1) 07:20	17:01	
	17:32	18:09	59 17:37 (1) 18:40	20:12	20:41	20:57	20:46	20:08	19:17	18:30	51 17:04 (1) 17:00	17:02	
26	07:39	07:03	16:39 (1) 06:18	42 06:30	05:59	05:54	06:14	06:44	07:14	07:45	16:13 (1) 07:21	17:02	
	17:33	18:10	58 17:37 (1) 18:41	20:13	20:42	20:57	20:45	20:06	19:15	8 07:55 (5) 17:29	50 17:03 (1) 17:00	17:02	
27	07:38	07:01	16:38 (1) 06:17	41 06:29	05:58	05:55	06:15	06:45	07:15	07:44 (5) 06:46	16:14 (1) 07:22	17:02	
	17:34	18:11	58 17:36 (1) 18:42	20:14	20:43	20:57	20:44	20:04	19:14	27 17:53 (1) 17:28	48 17:02 (1) 16:59	17:03	
28	07:37	07:00	16:39 (1) 06:15	40 06:28	05:58	05:55	06:16	06:46	07:16	07:42 (5) 06:47	16:15 (1) 07:23	17:03	
	17:36	18:13	58 17:37 (1) 18:43	20:15	20:43	20:57	20:43	20:03	19:12	39 17:57 (1) 17:26	45 17:00 (1) 16:59	17:04	
29	07:36	17:37	17:37 (1) 18:43	39 06:26	05:57	05:55	06:17	06:47	07:17	07:41 (5) 06:48	16:16 (1) 07:24	17:04	
	17:37	18:14	57 17:36 (1) 18:42	20:16	20:44	20:57	20:42	20:01	19:10	47 18:00 (1) 17:25	44 17:00 (1) 16:58	17:04	
30	07:35	17:38	17:38 (1) 18:43	38 06:25	05:57	05:56	06:18	06:48	07:18	07:40 (5) 06:50	16:18 (1) 07:25	17:04	
	17:38	18:15	56 17:35 (1) 18:41	20:17	20:45	20:57	20:41	20:00	19:09	53 18:02 (1) 17:24	40 16:58 (1) 16:58	17:05	
31	07:34	17:39	17:39 (1) 18:43	37 06:24	05:56	05:55	06:19	06:49	07:19	07:41 (5) 06:51	16:19 (1) 17:01	17:05	
	17:39	18:16	55 17:34 (1) 18:40	20:18	20:46	20:57	20:40	19:58	19:07	17:23 38 16:57 (1) 17:01	16:19 (1) 17:01	17:06	
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290	
Total, worst case		1075	900						174	1703	123		
Sun reduction		0.43	0.47						0.64	0.56	0.48		
Oper. time red.		0.40	0.40						0.40	0.40	0.40		
Wind dir. red.		0.74	0.73						0.73	0.73	0.74		
Total reduction		0.13	0.14						0.19	0.16	0.14		
Total, real		136	124						33	277	17		

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 15

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: K - R10

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:46	08:51 (3)	07:34	06:58	07:09	06:24	05:56	05:56	06:20	06:50	07:19	06:52	07:26	10:41 (2)
	17:07	90	11:53 (2)	17:40	18:14	19:47	20:18	20:47	20:57	19:57	19:07	17:21	16:58	47
2	07:46	08:52 (3)	07:33	06:57	07:07	06:22	05:55	05:57	06:21	06:50	07:20	06:53	07:27	10:40 (2)
	17:08	87	11:53 (2)	17:42	18:15	19:48	20:19	20:47	20:57	19:55	19:05	17:20	16:57	50
3	07:47	08:53 (3)	07:32	06:55	07:05	06:21	05:55	05:57	06:21	06:51	07:21	06:54	07:28	10:39 (2)
	17:08	85	11:53 (2)	17:43	18:16	19:49	20:20	20:48	20:57	19:53	19:04	17:19	16:57	53
4	07:47	08:54 (3)	07:31	06:54	07:04	06:20	05:54	05:58	06:22	06:52	07:22	06:55	07:29	10:36 (3)
	17:09	83	11:53 (2)	17:44	18:17	19:50	20:21	20:49	20:57	19:52	19:02	17:18	16:57	63
5	07:47	08:55 (3)	07:30	06:52	07:02	06:19	05:54	05:58	06:23	06:53	07:23	06:57	07:30	10:34 (3)
	17:10	78	11:51 (2)	17:45	18:18	19:51	20:22	20:49	20:57	19:50	19:00	17:17	16:57	69
6	07:47	08:57 (3)	07:29	06:51	07:01	06:18	05:54	05:59	06:24	06:54	07:24	06:58	07:31	10:33 (2)
	17:11	75	11:51 (2)	17:47	18:19	19:52	20:23	20:50	20:56	20:33	19:49	18:59	17:15	75
7	07:47	08:59 (3)	07:27	06:49	06:59	06:16	05:53	05:59	06:25	06:55	07:25	06:59	07:32	10:32 (3)
	17:12	69	11:50 (2)	17:48	18:20	19:53	20:24	20:51	20:56	20:32	19:47	18:57	17:14	78
8	07:46	09:02 (3)	07:26	06:48	06:57	06:15	05:53	06:00	06:26	06:56	07:26	07:00	07:33	10:32 (3)
	17:13	63	11:50 (2)	17:49	18:21	19:54	20:25	20:51	20:56	20:31	19:45	18:56	17:13	82
9	07:46	10:56 (2)	07:25	06:46	06:56	06:14	05:53	06:01	06:27	06:57	07:27	07:01	07:34	10:31 (3)
	17:14	53	11:49 (2)	17:50	18:23	19:55	20:26	20:52	20:56	20:30	19:44	18:54	17:12	85
10	07:46	10:58 (2)	07:24	06:44	06:54	06:13	05:53	06:01	06:28	06:58	07:28	07:02	07:35	10:31 (3)
	17:15	50	11:48 (2)	17:51	18:24	19:56	20:27	20:52	20:55	20:28	19:42	18:52	17:11	87
11	07:46	10:59 (2)	07:23	06:43	06:53	06:12	05:53	06:02	06:29	06:59	07:29	07:04	07:35	10:31 (3)
	17:16	47	11:46 (2)	17:53	18:25	19:57	20:28	20:53	20:55	20:27	19:40	18:51	17:10	90
12	07:46	11:01 (2)	07:22	06:41	06:51	06:11	05:53	06:03	06:30	07:00	07:30	07:05	07:36	10:41 (3)
	17:17	44	11:45 (2)	17:54	18:26	19:58	20:29	20:53	20:54	20:26	19:39	18:49	17:09	93
13	07:45	11:03 (2)	07:21	06:40	06:49	06:10	05:52	06:03	06:31	07:01	07:31	07:06	07:37	10:41 (3)
	17:18	41	11:44 (2)	17:55	18:27	19:59	20:30	20:54	20:54	20:25	19:37	18:48	17:08	94
14	07:45	11:05 (2)	07:19	06:38	06:48	06:09	05:52	06:04	06:32	07:02	07:32	07:07	07:38	10:41 (3)
	17:19	36	11:41 (2)	17:56	18:28	20:00	20:31	20:54	20:53	20:23	19:35	18:46	17:08	95
15	07:45	11:09 (2)	07:18	06:36	06:46	06:08	05:52	06:05	06:33	07:03	07:33	07:08	07:39	10:41 (3)
	17:20	30	11:39 (2)	17:57	18:29	20:01	20:32	20:55	20:53	20:22	19:34	18:45	17:07	97
16	07:44	11:12 (2)	07:17	06:35	06:45	06:07	05:52	06:06	06:34	07:04	07:34	07:09	07:39	10:41 (3)
	17:22	22	11:34 (2)	17:59	18:30	20:02	20:33	20:55	20:52	20:21	19:32	18:43	17:06	97
17	07:44	11:19 (2)	07:15	06:33	06:43	06:06	05:52	06:07	06:35	07:05	07:35	07:11	07:40	10:42 (3)
	17:23	10	11:29 (2)	18:00	18:31	20:03	20:34	20:55	20:52	20:19	19:30	18:42	17:05	98
18	07:44	11:22 (2)	07:14	06:32	06:42	06:05	05:52	06:07	06:36	07:06	07:36	07:12	07:41	10:42 (3)
	17:24		18:01	18:32	20:04	20:35	20:56	20:51	20:18	19:29	18:40	17:04	16:58	99
19	07:43	11:25 (2)	07:13	06:30	06:40	06:04	05:53	06:08	06:37	07:07	07:37	07:13	07:41	10:42 (3)
	17:25		18:02	18:33	20:05	20:36	20:56	20:50	20:16	19:27	18:39	17:04	16:59	99
20	07:42	11:26 (2)	07:11	06:28	06:39	06:03	05:53	06:09	06:38	07:08	07:38	07:14	07:42	10:43 (3)
	17:26		18:03	18:34	20:06	20:37	20:56	20:50	20:15	19:25	18:37	17:03	16:59	99
21	07:42	11:27 (2)	07:10	06:27	06:37	06:03	05:53	06:10	06:39	07:09	07:39	07:15	07:42	10:43 (3)
	17:27		18:05	18:35	20:07	20:37	20:57	20:49	20:13	19:24	18:36	17:02	16:59	99
22	07:41	11:28 (2)	07:09	06:25	06:36	06:02	05:53	06:11	06:40	07:10	07:41	07:16	07:43	10:44 (3)
	17:28		18:06	18:36	20:08	20:38	20:57	20:48	20:12	19:22	18:34	17:02	17:00	99
23	07:41	11:29 (2)	07:07	06:23	06:35	06:01	05:53	06:11	06:41	07:11	07:42	07:17	07:43	10:44 (3)
	17:30		18:07	18:37	20:10	20:39	20:57	20:47	20:11	19:20	18:33	17:01	17:00	99
24	07:40	11:30 (2)	07:06	06:22	06:33	06:00	05:54	06:12	06:42	07:12	07:43	07:19	07:44	10:45 (3)
	17:31		18:08	18:39	20:11	20:40	20:57	20:46	20:09	19:19	18:32	17:01	17:01	99
25	07:39	11:31 (2)	07:04	06:20	06:32	06:00	05:54	06:13	06:43	07:13	07:44	07:20	10:58 (2)	07:44
	17:32		18:09	18:40	20:12	20:41	20:57	20:46	20:08	19:17	17:30	17:00	8	11:06 (2)
26	07:39	11:32 (2)	07:03	06:18	06:30	05:59	05:54	06:14	06:44	07:14	07:45	07:21	10:51 (2)	07:45
	17:33		18:10	18:41	20:13	20:42	20:57	20:45	20:06	19:15	17:29	17:00	22	11:13 (2)
27	07:38	11:33 (2)	07:01	06:17	06:29	05:58	05:55	06:15	06:45	07:15	07:46	07:22	10:48 (2)	07:45
	17:34		18:11	18:42	20:14	20:43	20:57	20:44	20:04	19:14	17:28	16:59	30	11:18 (2)
28	07:37	11:34 (2)	07:00	06:15	06:28	05:58	05:55	06:16	06:46	07:16	07:47	07:23	10:45 (2)	07:45
	17:36		18:13	18:43	20:15	20:43	20:57	20:43	20:03	19:12	17:26	16:59	36	11:21 (2)
29	07:36	11:35 (2)	07:00	06:14	06:26	05:57	05:55	06:17	06:47	07:17	07:48	07:24	10:44 (2)	07:46
	17:37		18:14	18:44	20:16	20:44	20:57	20:42	20:01	19:10	17:25	16:58	40	11:24 (2)
30	07:35	11:36 (2)	07:00	06:13	06:25	05:57	05:56	06:18	06:48	07:18	07:49	07:25	10:42 (2)	07:46
	17:38		18:15	18:45	20:17	20:45	20:57	20:41	20:00	19:09	17:24	16:58	44	11:26 (2)
31	07:34	11:37 (2)	07:00	06:12	06:24	05:56	05:54	06:19	06:49	07:19	07:50	07:26	10:42 (2)	07:46
	17:39		18:16	18:46	20:18	20:46	20:58	20:40	19:58	19:07	17:22	16:57	48	11:27 (2)
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290	271	2721
Total, worst case	963										180			2721
Sun reduction	0.40										0.48			0.41
Oper. time red.	0.40										0.40			0.40
Wind dir. red.	0.53													

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 16

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: L - R11

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	09:19 (3)	07:34	14:10 (2)	06:58	14:26 (2)	07:09	06:24	05:56			
	17:07	147	15:50 (2)	17:40	120	16:10 (2)	18:14	98	16:04 (2)	19:47	20:18	20:47
2	07:46	09:21 (3)	07:33	14:10 (2)	06:57	14:28 (2)	07:07	06:22	05:55			
	17:08	145	15:51 (2)	17:42	121	16:11 (2)	18:15	96	16:04 (2)	19:48	20:19	20:47
3	07:47	09:22 (3)	07:32	14:10 (2)	06:55	14:30 (2)	07:05	06:21	05:55			
	17:08	145	15:52 (2)	17:43	121	16:11 (2)	18:16	92	16:02 (2)	19:49	20:20	20:48
4	07:47	09:23 (3)	07:31	14:10 (2)	06:54	14:32 (2)	07:04	06:20	05:54			
	17:09	145	15:53 (2)	17:44	121	16:11 (2)	18:17	90	16:02 (2)	19:50	20:21	20:49
5	07:47	09:23 (3)	07:30	14:11 (2)	06:52	14:33 (2)	07:02	06:19	05:54			
	17:10	145	15:53 (2)	17:45	121	16:12 (2)	18:18	87	16:00 (2)	19:51	20:22	20:49
6	07:47	09:24 (3)	07:29	14:11 (2)	06:51	14:34 (2)	07:01	06:18	05:54			
	17:11	145	15:54 (2)	17:47	121	16:12 (2)	18:19	84	15:58 (2)	19:52	20:23	20:50
7	07:47	09:25 (3)	07:27	14:11 (2)	06:49	14:37 (2)	06:59	06:16	05:53			
	17:12	144	15:54 (2)	17:48	121	16:12 (2)	18:20	81	15:58 (2)	19:53	20:24	20:51
8	07:46	09:26 (3)	07:26	14:12 (2)	06:48	14:39 (2)	06:57	06:15	05:53			
	17:13	142	15:55 (2)	17:49	120	16:12 (2)	18:21	77	15:56 (2)	19:54	20:25	20:51
9	07:46	09:27 (3)	07:25	14:12 (2)	06:46	14:41 (2)	06:56	06:14	05:53			
	17:14	142	15:56 (2)	17:50	121	16:13 (2)	18:23	74	15:55 (2)	19:55	20:26	20:52
10	07:46	09:29 (3)	07:24	14:11 (2)	06:44	14:43 (2)	06:54	06:13	05:53			
	17:15	141	15:57 (2)	17:51	121	16:12 (2)	18:24	70	15:53 (2)	19:56	20:27	20:52
11	07:46	09:30 (3)	07:23	14:12 (2)	06:43	14:45 (2)	06:53	06:12	05:53			
	17:16	138	15:57 (2)	17:53	120	16:12 (2)	18:25	65	15:50 (2)	19:57	20:28	20:53
12	07:46	09:31 (3)	07:22	14:13 (2)	06:41	14:49 (2)	06:51	06:11	05:53			
	17:17	138	15:58 (2)	17:54	119	16:12 (2)	18:26	60	15:49 (2)	19:58	20:29	20:53
13	07:45	09:33 (3)	07:20	14:13 (2)	06:40	14:51 (2)	06:49	06:10	05:52			
	17:18	137	16:00 (2)	17:55	120	16:13 (2)	18:27	55	15:46 (2)	19:59	20:30	20:54
14	07:45	09:35 (3)	07:19	14:13 (2)	06:38	14:55 (2)	06:48	06:09	05:52			
	17:19	133	16:00 (2)	17:56	119	16:12 (2)	18:28	49	15:44 (2)	20:00	20:31	20:54
15	07:45	09:37 (3)	07:18	14:14 (2)	06:36	14:58 (2)	06:46	06:08	05:52			
	17:20	131	16:01 (2)	17:57	118	16:12 (2)	18:29	43	15:41 (2)	20:01	20:32	20:55
16	07:44	09:40 (3)	07:17	14:15 (2)	06:35	15:02 (2)	06:45	06:07	05:52			
	17:22	126	16:01 (2)	17:59	117	16:12 (2)	18:30	35	15:37 (2)	20:02	20:33	20:55
17	07:44	09:45 (3)	07:15	14:15 (2)	06:33	15:08 (2)	06:43	06:06	05:52			
	17:23	117	16:02 (2)	18:00	117	16:12 (2)	18:31	25	15:33 (2)	20:03	20:34	20:55
18	07:44	14:10 (2)	07:14	14:15 (2)	06:32	15:17 (2)	06:42	06:05	05:52			
	17:24	113	16:03 (2)	18:01	116	16:11 (2)	18:32	6	15:23 (2)	20:04	20:35	20:56
19	07:43	14:11 (2)	07:13	14:16 (2)	06:30	15:41 (2)	06:40	06:04	05:53			
	17:25	113	16:04 (2)	18:02	115	16:11 (2)	18:33	20:05	20:36	20:56		
20	07:42	14:11 (2)	07:11	14:17 (2)	06:28	15:49 (2)	06:39	06:03	05:53			
	17:26	113	16:04 (2)	18:03	113	16:10 (2)	18:34	20:06	20:36	20:56		
21	07:42	14:10 (2)	07:10	14:18 (2)	06:27	15:53 (2)	06:37	06:03	05:53			
	17:27	114	16:04 (2)	18:05	112	16:10 (2)	18:35	20:07	20:37	20:57		
22	07:41	14:11 (2)	07:09	14:19 (2)	06:25	16:02 (2)	06:36	06:02	05:53			
	17:28	115	16:06 (2)	18:06	111	16:10 (2)	18:36	20:08	20:38	20:57		
23	07:41	14:10 (2)	07:07	14:19 (2)	06:23	16:09 (2)	06:35	06:01	05:53			
	17:30	116	16:06 (2)	18:07	110	16:09 (2)	18:37	20:09	20:39	20:57		
24	07:40	14:10 (2)	07:06	14:21 (2)	06:22	16:11 (2)	06:33	06:00	05:54			
	17:31	116	16:06 (2)	18:08	108	16:09 (2)	18:38	20:11	20:40	20:57		
25	07:39	14:11 (2)	07:04	14:21 (2)	06:20	16:13 (2)	06:32	06:00	05:54			
	17:32	117	16:08 (2)	18:09	106	16:07 (2)	18:40	20:12	20:41	20:57		
26	07:39	14:11 (2)	07:03	14:23 (2)	06:18	16:15 (2)	06:30	05:59	05:54			
	17:33	117	16:08 (2)	18:10	104	16:07 (2)	18:41	20:13	20:42	20:57		
27	07:38	14:10 (2)	07:01	14:24 (2)	06:17	16:17 (2)	06:29	05:58	05:55			
	17:34	118	16:08 (2)	18:11	102	16:06 (2)	18:42	20:14	20:43	20:57		
28	07:37	14:10 (2)	07:00	14:26 (2)	06:15	16:19 (2)	06:28	05:58	05:55			
	17:36	119	16:09 (2)	18:13	100	16:06 (2)	18:43	20:15	20:43	20:57		
29	07:36	14:10 (2)		14:27 (2)	07:13	16:21 (2)	06:26	05:57	05:55			
	17:37	119	16:09 (2)		19:44	16:23 (2)	20:16	20:44	20:57			
30	07:35	14:10 (2)		14:28 (2)	07:12	16:25 (2)	06:25	05:57	05:56			
	17:38	119	16:09 (2)		19:45	16:27 (2)	20:17	20:45	20:57			
31	07:34	14:10 (2)		14:29 (2)	07:10	16:29 (2)		05:56				
	17:39	120	16:10 (2)		19:46	16:31 (2)		20:46				
Potential sun hours	299		298		370		398		447		450	
Total, worst case	3990		3235		1187							
Sun reduction	0.40		0.43		0.47							
Oper. time red.	0.40		0.40		0.40							
Wind dir. red.	0.65		0.66		0.66							
Total reduction	0.10		0.11		0.12							
Total, real	413		369		147							

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 17

Licensed user:

Ing. Bruno Manca
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IT-09028 Sestu
+390702358125
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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: L - R11

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December								
1	05:56	06:20	06:50	07:19	15:28 (2)	06:52	13:41 (2)	07:26	09:12 (3)					
	20:57	20:39	19:57	19:07	59	16:27 (2)	17:21	121	15:42 (2)	16:58	138	15:39 (2)		
2	05:57	06:21	06:50	07:20	15:25 (2)	06:53	13:41 (2)	07:27	09:11 (3)					
	20:57	20:38	19:55	19:05	63	16:28 (2)	17:20	120	15:41 (2)	16:57	141	15:39 (2)		
3	05:57	06:21	06:51	07:21	15:22 (2)	06:54	13:41 (2)	07:28	09:11 (3)					
	20:57	20:37	19:53	19:04	67	16:29 (2)	17:19	121	15:42 (2)	16:57	141	15:39 (2)		
4	05:58	06:22	06:52	07:22	15:19 (2)	06:55	13:41 (2)	07:29	09:10 (3)					
	20:57	20:36	19:52	19:02	72	16:31 (2)	17:18	121	15:42 (2)	16:57	142	15:39 (2)		
5	05:58	06:23	06:53	07:23	15:16 (2)	06:57	13:41 (2)	07:30	09:10 (3)					
	20:57	20:34	19:50	19:00	76	16:32 (2)	17:17	121	15:42 (2)	16:57	145	15:40 (2)		
6	05:59	06:24	06:54	07:24	15:15 (2)	06:58	13:40 (2)	07:31	09:10 (3)					
	20:56	20:33	19:49	18:59	79	16:34 (2)	17:15	121	15:41 (2)	16:57	145	15:40 (2)		
7	05:59	06:25	06:55	07:25	15:12 (2)	06:59	13:41 (2)	07:32	09:10 (3)					
	20:56	20:32	19:47	18:57	82	16:34 (2)	17:14	121	15:42 (2)	16:57	145	15:40 (2)		
8	06:00	06:26	06:56	07:26	15:10 (2)	07:00	13:41 (2)	07:33	09:10 (3)					
	20:56	20:31	19:45	18:56	85	16:35 (2)	17:13	121	15:42 (2)	16:57	145	15:40 (2)		
9	06:01	06:27	06:57	07:27	15:07 (2)	07:01	13:41 (2)	07:34	09:10 (3)					
	20:56	20:30	19:44	18:54	89	16:36 (2)	17:12	120	15:41 (2)	16:57	145	15:40 (2)		
10	06:01	06:28	06:58	07:28	15:05 (2)	07:02	13:41 (2)	07:35	09:10 (3)					
	20:55	20:28	19:42	18:52	92	16:37 (2)	17:11	120	15:41 (2)	16:57	146	15:41 (2)		
11	06:02	06:29	06:59	07:29	15:03 (2)	07:04	13:42 (2)	07:35	09:10 (3)					
	20:55	20:27	19:40	18:51	94	16:37 (2)	17:10	120	15:42 (2)	16:57	147	15:41 (2)		
12	06:03	06:30	07:00	07:30	15:01 (2)	07:05	13:42 (2)	07:36	09:11 (3)					
	20:54	20:26	19:39	18:49	97	16:38 (2)	17:09	119	15:41 (2)	16:57	146	15:41 (2)		
13	06:03	06:31	07:01	07:31	14:59 (2)	07:06	13:42 (2)	07:37	09:10 (3)					
	20:54	20:25	19:37	18:48	99	16:38 (2)	17:08	119	15:41 (2)	16:57	147	15:41 (2)		
14	06:04	06:32	07:02	07:32	14:57 (2)	07:07	13:42 (2)	07:38	09:11 (3)					
	20:53	20:23	19:35	18:46	101	16:38 (2)	17:08	119	15:41 (2)	16:57	146	15:41 (2)		
15	06:05	06:33	07:03	07:33	14:56 (2)	07:08	13:43 (2)	07:38	09:11 (3)					
	20:53	20:22	19:34	18:45	103	16:39 (2)	17:07	118	15:41 (2)	16:57	147	15:42 (2)		
16	06:06	06:34	07:04	07:34	14:54 (2)	07:09	13:44 (2)	07:39	09:11 (3)					
	20:52	20:21	19:32	18:43	105	16:39 (2)	17:06	117	15:41 (2)	16:58	146	15:41 (2)		
17	06:06	06:35	07:05	07:35	14:53 (2)	07:11	13:44 (2)	07:40	09:11 (3)					
	20:52	20:19	19:30	18:42	106	16:39 (2)	17:05	117	15:41 (2)	16:58	147	15:42 (2)		
18	06:07	06:36	07:06	07:36	14:52 (2)	07:12	13:44 (2)	07:41	09:12 (3)					
	20:51	20:18	19:29	18:40	108	16:40 (2)	17:04	116	15:40 (2)	16:58	147	15:43 (2)		
19	06:08	06:37	07:07	07:37	14:51 (2)	07:13	13:45 (2)	07:41	09:12 (3)					
	20:50	20:16	19:27	18:39	110	16:41 (2)	17:04	116	15:41 (2)	16:59	147	15:43 (2)		
20	06:09	06:38	07:08	07:38	14:49 (2)	07:14	13:46 (2)	07:42	09:13 (3)					
	20:50	20:15	19:25	18:37	112	16:41 (2)	17:03	115	15:41 (2)	16:59	147	15:44 (2)		
21	06:10	06:39	07:09	07:39	14:48 (2)	07:15	13:46 (2)	07:42	09:13 (3)					
	20:49	20:13	19:24	18:36	113	16:41 (2)	17:02	114	15:40 (2)	16:59	146	15:43 (2)		
22	06:11	06:40	07:10	07:41	14:47 (2)	07:16	13:47 (2)	07:43	09:14 (3)					
	20:48	20:12	19:22	18:34	114	16:41 (2)	17:02	113	15:40 (2)	17:00	146	15:44 (2)		
23	06:11	06:41	07:11	07:42	14:46 (2)	07:17	13:47 (2)	07:43	09:14 (3)					
	20:47	20:11	19:20	18:33	115	16:41 (2)	17:01	113	15:40 (2)	17:00	146	15:44 (2)		
24	06:12	06:42	07:12	07:43	14:45 (2)	07:18	13:47 (2)	07:44	09:15 (3)					
	20:46	20:09	19:19	18:32	116	16:41 (2)	17:01	113	15:40 (2)	17:01	147	15:46 (2)		
25	06:13	06:43	07:13	06:44	13:45 (2)	07:20	09:24 (3)	07:44	09:15 (3)					
	20:46	20:08	19:17	17:30	117	15:42 (2)	17:00	116	15:40 (2)	17:02	147	15:46 (2)		
26	06:14	06:44	07:14	15:52 (2)	06:45	13:44 (2)	07:21	09:19 (3)	07:45	09:15 (3)				
	20:45	20:06	19:15	20	16:12 (2)	17:29	118	15:42 (2)	17:00	125	15:40 (2)	17:02	147	15:46 (2)
27	06:15	06:45	07:15	15:45 (2)	06:46	13:43 (2)	07:22	09:17 (3)	07:45	09:17 (3)				
	20:44	20:04	19:14	32	16:17 (2)	17:28	119	15:42 (2)	16:59	130	15:40 (2)	17:03	146	15:47 (2)
28	06:16	06:46	07:16	15:40 (2)	06:47	13:43 (2)	07:23	09:15 (3)	07:45	09:17 (3)				
	20:43	20:03	19:12	40	16:20 (2)	17:26	118	15:41 (2)	16:59	133	15:40 (2)	17:04	147	15:48 (2)
29	06:17	06:47	07:17	15:36 (2)	06:48	13:42 (2)	07:24	09:14 (3)	07:46	09:17 (3)				
	20:42	20:01	19:10	47	16:23 (2)	17:25	119	15:41 (2)	16:58	136	15:40 (2)	17:04	147	15:48 (2)
30	06:18	06:48	07:18	15:32 (2)	06:50	13:42 (2)	07:25	09:13 (3)	07:46	09:18 (3)				
	20:41	20:00	19:09	53	16:25 (2)	17:24	120	15:42 (2)	16:58	138	15:40 (2)	17:05	147	15:49 (2)
31	06:19	06:49	07:19	06:51	13:42 (2)	07:26	09:14 (3)	07:46	09:18 (3)					
	20:40	19:58	19:08	17:22	120	15:42 (2)	17:06	147	15:49 (2)					
Potential sun hours	457	427	375	346	299	290								
Total, worst case			192	3088	3614	4513								
Sun reduction			0.64	0.56	0.48	0.41								
Oper. time red.			0.40	0.40	0.40	0.40								
Wind dir. red.			0.66	0.66	0.66	0.64								
Total reduction			0.17	0.15	0.13	0.10								
Total, real			32	452	455	472								

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 18

Licensed user:

Ing. Bruno Manca

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IT-09028 Sestu

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: M - R12

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June										
1	07:46	09:45 (3)	07:34	14:29 (2)	06:58	14:52 (2)	07:09	06:24	05:56							
	17:07	115	16:00 (2)	17:40	109	16:18 (2)	18:14	74	16:06 (2)	19:47	20:18	20:47				
2	07:46	09:48 (3)	07:33	14:29 (2)	06:57	14:55 (2)	07:07	06:22	05:55							
	17:08	112	16:01 (2)	17:42	109	16:18 (2)	18:15	70	16:05 (2)	19:48	20:19	20:47				
3	07:47	09:50 (3)	07:32	14:30 (2)	06:55	14:56 (2)	07:05	06:21	05:55							
	17:08	110	16:02 (2)	17:43	108	16:18 (2)	18:16	66	16:02 (2)	19:49	20:20	20:48				
4	07:47	09:52 (3)	07:31	14:30 (2)	06:54	14:59 (2)	07:04	06:20	05:54							
	17:09	108	16:03 (2)	17:44	108	16:18 (2)	18:17	62	16:01 (2)	19:50	20:21	20:49				
5	07:47	09:56 (3)	07:30	14:30 (2)	06:52	15:01 (2)	07:02	06:19	05:54							
	17:10	99	16:02 (2)	17:45	109	16:19 (2)	18:18	58	15:59 (2)	19:51	20:22	20:49				
6	07:47	14:27 (2)	07:29	14:31 (2)	06:51	15:03 (2)	07:01	06:18	05:54							
	17:11	96	16:03 (2)	17:47	108	16:19 (2)	18:19	53	15:56 (2)	19:52	20:23	20:50				
7	07:47	14:27 (2)	07:27	14:31 (2)	06:49	15:07 (2)	06:59	06:16	05:53							
	17:12	97	16:04 (2)	17:48	108	16:19 (2)	18:20	47	15:54 (2)	19:53	20:24	20:51				
8	07:46	14:27 (2)	07:26	14:32 (2)	06:48	15:10 (2)	06:57	06:15	05:53							
	17:13	98	16:05 (2)	17:49	107	16:19 (2)	18:21	41	15:51 (2)	19:54	20:25	20:51				
9	07:46	14:28 (2)	07:25	14:32 (2)	06:46	15:14 (2)	06:56	06:14	05:53							
	17:14	98	16:06 (2)	17:50	107	16:19 (2)	18:23	34	15:48 (2)	19:55	20:26	20:52				
10	07:46	14:28 (2)	07:24	14:32 (2)	06:44	15:19 (2)	06:54	06:13	05:53							
	17:15	99	16:07 (2)	17:51	106	16:18 (2)	18:24	24	15:43 (2)	19:56	20:27	20:52				
11	07:46	14:27 (2)	07:23	14:33 (2)	06:43	15:28 (2)	06:53	06:12	05:53							
	17:16	100	16:07 (2)	17:53	105	16:18 (2)	18:25	5	15:33 (2)	19:57	20:28	20:53				
12	07:46	14:28 (2)	07:22	14:34 (2)	06:41	15:33 (2)	06:51	06:11	05:53							
	17:17	100	16:08 (2)	17:54	104	16:18 (2)	18:26	19:58	20:29	20:53						
13	07:45	14:28 (2)	07:20	14:34 (2)	06:40	15:38 (2)	06:49	06:10	05:52							
	17:18	101	16:09 (2)	17:55	104	16:18 (2)	18:27	19:59	20:30	20:54						
14	07:45	14:28 (2)	07:19	14:34 (2)	06:38	15:43 (2)	06:48	06:09	05:52							
	17:19	101	16:09 (2)	17:56	103	16:17 (2)	18:28	20:00	20:31	20:54						
15	07:45	14:28 (2)	07:18	14:35 (2)	06:36	15:48 (2)	06:46	06:08	05:52							
	17:20	102	16:10 (2)	17:57	102	16:17 (2)	18:29	20:01	20:32	20:55						
16	07:44	14:28 (2)	07:17	14:36 (2)	06:35	15:53 (2)	06:45	06:07	05:52							
	17:22	102	16:10 (2)	17:59	101	16:17 (2)	18:30	20:02	20:33	20:55						
17	07:44	14:28 (2)	07:15	14:38 (2)	06:33	16:03 (2)	06:43	06:06	05:52							
	17:23	103	16:11 (2)	18:00	99	16:17 (2)	18:31	20:03	20:34	20:55						
18	07:43	14:28 (2)	07:14	14:38 (2)	06:32	16:08 (2)	06:42	06:05	05:52							
	17:24	104	16:12 (2)	18:01	98	16:16 (2)	18:32	20:04	20:35	20:56						
19	07:43	14:28 (2)	07:13	14:39 (2)	06:30	16:13 (2)	06:40	06:04	05:53							
	17:25	105	16:13 (2)	18:02	97	16:16 (2)	18:33	20:05	20:36	20:56						
20	07:42	14:28 (2)	07:11	14:40 (2)	06:28	16:18 (2)	06:39	06:03	05:53							
	17:26	105	16:13 (2)	18:03	95	16:15 (2)	18:34	20:06	20:36	20:56						
21	07:42	14:28 (2)	07:10	14:41 (2)	06:27	16:20 (2)	06:37	06:03	05:53							
	17:27	105	16:13 (2)	18:05	93	16:14 (2)	18:35	20:07	20:37	20:57						
22	07:41	14:29 (2)	07:09	14:43 (2)	06:25	16:23 (2)	06:36	06:02	05:53							
	17:28	105	16:14 (2)	18:06	91	16:14 (2)	18:36	20:08	20:38	20:57						
23	07:41	14:28 (2)	07:07	14:43 (2)	06:23	16:26 (2)	06:35	06:01	05:53							
	17:30	107	16:15 (2)	18:07	89	16:12 (2)	18:37	20:09	20:39	20:57						
24	07:40	14:28 (2)	07:06	14:45 (2)	06:22	16:28 (2)	06:33	06:00	05:54							
	17:31	107	16:15 (2)	18:08	87	16:12 (2)	18:38	20:11	20:40	20:57						
25	07:39	14:29 (2)	07:04	14:46 (2)	06:20	16:31 (2)	06:32	06:00	05:54							
	17:32	107	16:16 (2)	18:09	84	16:10 (2)	18:40	20:12	20:41	20:57						
26	07:39	14:29 (2)	07:03	14:48 (2)	06:18	16:33 (2)	06:30	05:59	05:54							
	17:33	107	16:16 (2)	18:10	82	16:10 (2)	18:41	20:13	20:42	20:57						
27	07:38	14:29 (2)	07:01	14:49 (2)	06:17	16:35 (2)	06:29	05:58	05:55							
	17:34	108	16:17 (2)	18:11	79	16:08 (2)	18:42	20:14	20:43	20:57						
28	07:37	14:29 (2)	07:00	14:51 (2)	06:15	16:38 (2)	06:28	05:58	05:55							
	17:36	108	16:17 (2)	18:13	76	16:07 (2)	18:43	20:15	20:43	20:57						
29	07:36	14:29 (2)	06:59	14:52 (2)	06:14	16:41 (2)	06:26	05:57	05:55							
	17:37	108	16:17 (2)	18:14	74	16:06 (2)	18:44	20:16	20:44	20:57						
30	07:35	14:29 (2)	06:58	14:53 (2)	06:13	16:44 (2)	06:25	05:57	05:56							
	17:38	108	16:17 (2)	18:15	72	16:05 (2)	18:45	20:17	20:45	20:57						
31	07:34	14:29 (2)	06:57	14:54 (2)	06:12	16:47 (2)	06:24	05:56	05:56							
	17:39	109	16:18 (2)	18:16	70	16:04 (2)	18:46	20:18	20:46	20:57						
Potential sun hours	299	298	370	398	447	450										
Total, worst case	3234	2768	534													
Sun reduction	0.40	0.43	0.47													
Oper. time red.	0.40	0.40	0.40													
Wind dir. red.	0.67	0.67	0.67													
Total reduction	0.11	0.12	0.13													
Total, real	344	319	67													

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 19

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: M - R12

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56	06:20	06:50	07:19	06:52	14:02 (2) 07:26
	20:57	20:39	19:57	19:07	17:21	106 15:48 (2) 16:58
2	05:57	06:21	06:50	07:20	06:53	14:01 (2) 07:27
	20:57	20:38	19:55	19:05	17:20	107 15:48 (2) 16:57
3	05:57	06:21	06:51	07:21	15:59 (2) 06:54	14:02 (2) 07:28
	20:57	20:37	19:53	19:04	19 16:18 (2) 17:19	107 15:49 (2) 16:57
4	05:58	06:22	06:52	07:22	15:53 (2) 06:55	14:01 (2) 07:29
	20:57	20:36	19:52	19:02	30 16:23 (2) 17:18	108 15:49 (2) 16:57
5	05:58	06:23	06:53	07:23	15:48 (2) 06:57	14:01 (2) 07:30
	20:57	20:34	19:50	19:00	38 16:26 (2) 17:17	108 15:49 (2) 16:57
6	05:59	06:24	06:54	07:24	15:45 (2) 06:58	14:00 (2) 07:31
	20:56	20:33	19:49	18:59	45 16:30 (2) 17:15	109 15:49 (2) 16:57
7	05:59	06:25	06:55	07:25	15:41 (2) 06:59	14:01 (2) 07:32
	20:56	20:32	19:47	18:57	51 16:32 (2) 17:14	108 15:49 (2) 16:57
8	06:00	06:26	06:56	07:26	15:38 (2) 07:00	14:00 (2) 07:33
	20:56	20:31	19:45	18:56	56 16:34 (2) 17:13	109 15:49 (2) 16:57
9	06:01	06:27	06:57	07:27	15:35 (2) 07:01	14:00 (2) 07:34
	20:56	20:30	19:44	18:54	60 16:35 (2) 17:12	109 15:49 (2) 16:57
10	06:01	06:28	06:58	07:28	15:32 (2) 07:02	14:00 (2) 07:35
	20:55	20:28	19:42	18:52	64 16:36 (2) 17:11	109 15:49 (2) 16:57
11	06:02	06:29	06:59	07:29	15:30 (2) 07:04	14:01 (2) 07:35
	20:55	20:27	19:40	18:51	68 16:38 (2) 17:10	108 15:49 (2) 16:57
12	06:03	06:30	07:00	07:30	15:27 (2) 07:05	14:01 (2) 07:36
	20:54	20:26	19:39	18:49	72 16:39 (2) 17:09	108 15:49 (2) 16:57
13	06:03	06:31	07:01	07:31	15:25 (2) 07:06	14:01 (2) 07:37
	20:54	20:25	19:37	18:48	74 16:39 (2) 17:08	108 15:49 (2) 16:57
14	06:04	06:32	07:02	07:32	15:23 (2) 07:07	14:01 (2) 07:38
	20:53	20:23	19:35	18:46	77 16:40 (2) 17:08	108 15:49 (2) 16:57
15	06:05	06:33	07:03	07:33	15:21 (2) 07:08	14:02 (2) 07:38
	20:53	20:22	19:34	18:45	80 16:41 (2) 17:07	108 15:50 (2) 16:57
16	06:06	06:34	07:04	07:34	15:19 (2) 07:09	14:02 (2) 07:39
	20:52	20:21	19:32	18:43	83 16:42 (2) 17:06	107 15:49 (2) 16:58
17	06:06	06:35	07:05	07:35	15:17 (2) 07:11	14:02 (2) 07:40
	20:52	20:19	19:30	18:42	85 16:42 (2) 17:05	107 15:49 (2) 16:58
18	06:07	06:36	07:06	07:36	15:16 (2) 07:12	14:02 (2) 07:41
	20:51	20:18	19:29	18:40	88 16:44 (2) 17:04	107 15:49 (2) 16:58
19	06:08	06:37	07:07	07:37	15:14 (2) 07:13	14:03 (2) 07:41
	20:50	20:16	19:27	18:39	90 16:44 (2) 17:04	107 15:50 (2) 16:59
20	06:09	06:38	07:08	07:38	15:13 (2) 07:14	14:04 (2) 07:42
	20:50	20:15	19:25	18:37	92 16:45 (2) 17:03	105 15:49 (2) 16:59
21	06:10	06:39	07:09	07:39	15:11 (2) 07:15	14:04 (2) 07:42
	20:49	20:13	19:24	18:36	94 16:45 (2) 17:02	105 15:49 (2) 16:59
22	06:11	06:40	07:10	07:41	15:10 (2) 07:16	14:04 (2) 07:43
	20:48	20:12	19:22	18:34	95 16:45 (2) 17:02	105 15:49 (2) 17:00
23	06:11	06:41	07:11	07:42	15:08 (2) 07:17	14:04 (2) 07:43
	20:47	20:11	19:20	18:33	98 16:46 (2) 17:01	105 15:49 (2) 17:00
24	06:12	06:42	07:12	07:43	15:07 (2) 07:18	14:05 (2) 07:44
	20:46	20:09	19:19	18:32	99 16:46 (2) 17:01	104 15:49 (2) 17:01
25	06:13	06:43	07:13	06:44	14:07 (2) 07:20	14:06 (2) 07:44
	20:46	20:08	19:17	17:30	100 15:47 (2) 17:00	103 15:49 (2) 17:02
26	06:14	06:44	07:14	06:45	14:06 (2) 07:21	14:07 (2) 07:45
	20:45	20:06	19:15	17:29	101 15:47 (2) 16:59	102 15:49 (2) 17:02
27	06:15	06:45	07:15	06:46	14:05 (2) 07:22	14:07 (2) 07:45
	20:44	20:04	19:14	17:28	102 15:47 (2) 16:59	102 15:49 (2) 17:03
28	06:16	06:46	07:16	06:47	14:04 (2) 07:23	14:08 (2) 07:45
	20:43	20:03	19:12	17:26	103 15:47 (2) 16:59	101 15:49 (2) 17:04
29	06:17	06:47	07:17	06:48	14:03 (2) 07:24	14:08 (2) 07:46
	20:42	20:01	19:10	17:25	104 15:47 (2) 16:58	101 15:49 (2) 17:04
30	06:18	06:48	07:18	06:50	14:03 (2) 07:25	14:09 (2) 07:46
	20:41	20:00	19:09	17:24	105 15:48 (2) 16:58	100 15:49 (2) 17:05
31	06:19	06:49	06:51	14:02 (2)		07:46
	20:40	19:58	17:22	106 15:48 (2)		17:06
Potential sun hours	457	427	375	346	299	290
Total, worst case				2279	3181	3520
Sun reduction				0.56	0.48	0.41
Oper. time red.				0.40	0.40	0.40
Wind dir. red.				0.67	0.67	0.65
Total reduction				0.15	0.13	0.11
Total, real				338	407	377

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 20

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: N - R13

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	08:27 (6)	07:34	08:56 (3)	06:58		07:09	16:29 (2)	06:24	16:26 (2)	05:56	16:45 (2)
	17:07	88 09:57 (3)	17:40	72 10:08 (3)	18:14		19:47	121 18:30 (2)	20:18	127 18:33 (2)	20:47	100 18:25 (2)
2	07:46	08:29 (6)	07:33	08:56 (3)	06:57		07:07	16:27 (2)	06:22	16:26 (2)	05:55	16:45 (2)
	17:08	88 09:59 (3)	17:42	72 10:08 (3)	18:15		19:48	123 18:30 (2)	20:19	127 18:33 (2)	20:47	99 18:24 (2)
3	07:47	08:31 (6)	07:32	08:57 (3)	06:55		07:05	16:27 (2)	06:21	16:26 (2)	05:55	16:46 (2)
	17:08	85 10:00 (3)	17:43	70 10:07 (3)	18:16		19:49	124 18:31 (2)	20:20	126 18:32 (2)	20:48	99 18:25 (2)
4	07:47	08:32 (6)	07:31	08:57 (3)	06:54		07:04	16:26 (2)	06:20	16:27 (2)	05:54	16:47 (2)
	17:09	84 10:00 (3)	17:44	70 10:07 (3)	18:17		19:50	126 18:32 (2)	20:21	125 18:32 (2)	20:49	98 18:25 (2)
5	07:47	08:32 (6)	07:30	08:58 (3)	06:52		07:02	16:25 (2)	06:19	16:27 (2)	05:54	16:47 (2)
	17:10	84 10:00 (3)	17:45	68 10:06 (3)	18:18		19:51	127 18:32 (2)	20:22	125 18:32 (2)	20:49	97 18:24 (2)
6	07:47	08:34 (6)	07:29	08:59 (3)	06:51		07:01	16:25 (2)	06:18	16:28 (2)	05:54	16:48 (2)
	17:11	81 10:01 (3)	17:47	67 10:06 (3)	18:19		19:52	128 18:33 (2)	20:23	123 18:31 (2)	20:50	96 18:24 (2)
7	07:47	08:38 (6)	07:27	08:59 (3)	06:49		06:59	16:24 (2)	06:16	16:29 (2)	05:53	16:48 (2)
	17:12	74 10:01 (3)	17:48	66 10:05 (3)	18:20		19:53	129 18:33 (2)	20:24	122 18:31 (2)	20:51	96 18:24 (2)
8	07:46	08:49 (3)	07:26	09:00 (3)	06:48		06:57	16:24 (2)	06:15	16:30 (2)	05:53	16:49 (2)
	17:13	73 10:02 (3)	17:49	65 10:05 (3)	18:21		19:54	129 18:33 (2)	20:25	121 18:31 (2)	20:51	96 18:25 (2)
9	07:46	08:50 (3)	07:25	09:01 (3)	06:46		06:56	16:23 (2)	06:14	16:30 (2)	05:53	16:50 (2)
	17:14	73 10:03 (3)	17:50	63 10:04 (3)	18:23		19:55	130 18:33 (2)	20:26	121 18:31 (2)	20:52	95 18:25 (2)
10	07:46	08:50 (3)	07:24	09:01 (3)	06:44		06:54	16:23 (2)	06:13	16:31 (2)	05:53	16:49 (2)
	17:15	74 10:04 (3)	17:51	61 10:02 (3)	18:24		19:56	131 18:34 (2)	20:27	120 18:31 (2)	20:52	95 18:24 (2)
11	07:46	08:50 (3)	07:23	09:03 (3)	06:43		16:21 (2)	06:53	16:22 (2)	06:12	05:53	16:50 (2)
	17:16	74 10:04 (3)	17:53	58 10:01 (3)	18:25	28	16:49 (2)	19:57	132 18:34 (2)	20:28	118 18:30 (2)	94 18:24 (2)
12	07:46	08:50 (3)	07:22	09:04 (3)	06:41		16:14 (2)	06:51	16:22 (2)	06:11	05:53	16:50 (2)
	17:17	74 10:04 (3)	17:54	56 10:00 (3)	18:26	42	16:56 (2)	19:58	132 18:34 (2)	20:29	118 18:30 (2)	94 18:24 (2)
13	07:45	08:51 (3)	07:20	09:05 (3)	06:40		16:09 (2)	06:49	16:22 (2)	06:10	05:52	16:51 (2)
	17:18	74 10:05 (3)	17:55	54 09:59 (3)	18:27	51	17:00 (2)	19:59	132 18:34 (2)	20:30	117 18:30 (2)	93 18:24 (2)
14	07:45	08:51 (3)	07:19	09:06 (3)	06:38		16:05 (2)	06:48	16:21 (2)	06:09	05:52	16:51 (2)
	17:19	74 10:05 (3)	17:56	50 09:56 (3)	18:28	59	17:04 (2)	20:00	133 18:34 (2)	20:31	116 18:29 (2)	93 18:24 (2)
15	07:45	08:51 (3)	07:18	09:08 (3)	06:36		16:01 (2)	06:46	16:22 (2)	06:08	05:52	16:52 (2)
	17:20	75 10:06 (3)	17:57	47 09:55 (3)	18:29	66	17:07 (2)	20:01	132 18:34 (2)	20:32	115 18:29 (2)	92 18:24 (2)
16	07:44	08:51 (3)	07:17	09:09 (3)	06:35		15:58 (2)	06:45	16:21 (2)	06:07	05:52	16:52 (2)
	17:22	75 10:06 (3)	17:59	44 09:53 (3)	18:30	71	17:09 (2)	20:02	133 18:34 (2)	20:33	115 18:29 (2)	92 18:24 (2)
17	07:44	08:52 (3)	07:15	09:12 (3)	06:33		15:55 (2)	06:43	16:22 (2)	06:06	05:52	16:52 (2)
	17:23	75 10:07 (3)	18:00	39 09:51 (3)	18:31	77	17:12 (2)	20:03	132 18:34 (2)	20:34	113 18:28 (2)	92 18:24 (2)
18	07:43	08:51 (3)	07:14	09:13 (3)	06:32		15:52 (2)	06:42	16:21 (2)	06:05	05:52	16:53 (2)
	17:24	76 10:07 (3)	18:01	34 09:47 (3)	18:32	82	17:14 (2)	20:04	133 18:34 (2)	20:35	113 18:28 (2)	92 18:25 (2)
19	07:43	08:52 (3)	07:13	09:16 (3)	06:30		15:49 (2)	06:40	16:22 (2)	06:04	05:53	16:54 (2)
	17:25	76 10:08 (3)	18:02	28 09:44 (3)	18:33	86	17:15 (2)	20:05	132 18:34 (2)	20:36	111 18:27 (2)	91 18:25 (2)
20	07:42	08:52 (3)	07:11	09:20 (3)	06:28		15:48 (2)	06:39	16:21 (2)	06:03	05:53	16:54 (2)
	17:26	76 10:08 (3)	18:03	19 09:39 (3)	18:34	90	17:18 (2)	20:06	133 18:34 (2)	20:36	111 18:28 (2)	91 18:25 (2)
21	07:42	08:52 (3)	07:10	06:27	18:35	94	15:45 (2)	06:37	16:22 (2)	06:03	05:53	16:54 (2)
	17:27	76 10:08 (3)	18:05		18:35	94	17:19 (2)	20:07	132 18:34 (2)	20:37	109 18:27 (2)	91 18:25 (2)
22	07:41	08:53 (3)	07:09	06:25	18:36	97	15:43 (2)	06:36	16:22 (2)	06:02	05:53	16:54 (2)
	17:28	76 10:09 (3)	18:06		18:36	97	17:20 (2)	20:08	132 18:34 (2)	20:38	109 18:27 (2)	91 18:25 (2)
23	07:41	08:53 (3)	07:07	06:23	18:37	101	15:41 (2)	06:35	16:22 (2)	06:01	05:53	16:55 (2)
	17:30	76 10:09 (3)	18:07		18:37	101	17:22 (2)	20:09	132 18:34 (2)	20:39	107 18:27 (2)	91 18:26 (2)
24	07:40	08:53 (3)	07:06	06:22	18:38	104	15:39 (2)	06:33	16:23 (2)	06:00	05:54	16:55 (2)
	17:31	76 10:09 (3)	18:08		18:38	104	17:23 (2)	20:11	131 18:34 (2)	20:40	107 18:27 (2)	91 18:26 (2)
25	07:39	08:54 (3)	07:04	06:20	18:39	107	15:37 (2)	06:32	16:23 (2)	06:00	05:54	16:54 (2)
	17:32	75 10:09 (3)	18:09		18:40	107	17:24 (2)	20:12	131 18:34 (2)	20:41	106 18:26 (2)	92 18:26 (2)
26	07:39	08:54 (3)	07:03	06:18	18:41	109	15:36 (2)	06:30	16:23 (2)	05:59	05:54	16:54 (2)
	17:33	75 10:09 (3)	18:10		18:41	109	17:25 (2)	20:13	130 18:33 (2)	20:42	105 18:26 (2)	92 18:26 (2)
27	07:38	08:54 (3)	07:01	06:17	18:42	112	15:34 (2)	06:29	16:24 (2)	05:58	05:55	16:55 (2)
	17:34	75 10:09 (3)	18:11		18:42	112	17:26 (2)	20:14	130 18:34 (2)	20:43	104 18:26 (2)	92 18:27 (2)
28	07:37	08:54 (3)	07:00	06:15	18:43	114	15:33 (2)	06:28	16:24 (2)	05:58	05:55	16:55 (2)
	17:36	75 10:09 (3)	18:13		18:43	114	17:27 (2)	20:15	130 18:34 (2)	20:43	103 18:26 (2)	92 18:27 (2)
29	07:36	08:54 (3)		07:13	18:44	116	16:32 (2)	06:26	16:24 (2)	05:57	05:55	16:55 (2)
	17:37	75 10:09 (3)			19:44	116	18:28 (2)	20:16	129 18:33 (2)	20:44	102 18:25 (2)	93 18:28 (2)
30	07:35	08:55 (3)		07:12	18:45	119	16:30 (2)	06:25	16:25 (2)	05:57	05:56	16:55 (2)
	17:38	74 10:09 (3)			19:45	119	18:29 (2)	20:17	128 18:33 (2)	20:45	102 18:26 (2)	93 18:28 (2)
31	07:34	08:55 (3)		07:10	18:46	120	16:30 (2)		05:56	16:44 (2)		
	17:39	73 10:08 (3)			19:46	120	18:30 (2)		20:46	101 18:25 (2)		
Potential sun hours	299		298		370		398		447		450	
Total, worst case	2379		1103		1845		3897		3539		2813	
Sun reduction	0.40		0.43		0.47		0.51		0.58		0.67	
Oper. time red.	0.40		0.40		0.40		0.40		0.40		0.40	
Wind dir. red.	0.62		0.62		0.74		0.74		0.74		0.74	
Total reduction	0.10		0.11		0.14		0.15		0.17		0.19	
Total, real	233		117		253		575		598		548	

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 21

Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: N - R13

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December							
1	05:56	16:55 (2)	06:20	16:42 (2)	06:50	16:21 (2)	07:19	16:51 (2)	06:52	08:31 (3)	07:26	08:32 (3)						
	20:57	94	18:29 (2)	20:39	118	18:40 (2)	19:57	132	18:33 (2)	19:07	46	17:37 (2)	17:21	61	09:32 (3)	16:58	74	09:46 (3)
2	05:57	16:55 (2)	06:21	16:41 (2)	06:50	16:21 (2)	07:20	16:56 (2)	06:53	08:30 (3)	07:27	08:32 (3)						
	20:57	94	18:29 (2)	20:38	119	18:40 (2)	19:55	131	18:32 (2)	19:05	35	17:31 (2)	17:20	63	09:33 (3)	16:57	74	09:46 (3)
3	05:57	16:55 (2)	06:21	16:40 (2)	06:51	16:21 (2)	07:21	16:54 (2)	06:54	08:30 (3)	07:28	08:33 (3)						
	20:57	95	18:30 (2)	20:37	120	18:40 (2)	19:53	130	18:31 (2)	19:04	18	17:22 (2)	17:19	64	09:34 (3)	16:57	73	09:46 (3)
4	05:58	16:54 (2)	06:22	16:40 (2)	06:52	16:21 (2)	07:22	16:55 (2)	06:55	08:29 (3)	07:29	08:33 (3)						
	20:57	96	18:30 (2)	20:36	121	18:41 (2)	19:52	129	18:30 (2)	19:02	17	17:18	66	09:35 (3)	16:57	73	09:46 (3)	
5	05:58	16:55 (2)	06:23	16:39 (2)	06:53	16:21 (2)	07:23	16:57 (2)	06:57	08:28 (3)	07:30	08:34 (3)						
	20:57	95	18:30 (2)	20:34	122	18:41 (2)	19:50	129	18:30 (2)	19:00	17	17:17	68	09:36 (3)	16:57	72	09:46 (3)	
6	05:59	16:54 (2)	06:24	16:38 (2)	06:54	16:21 (2)	07:24	16:58 (2)	06:58	08:28 (3)	07:31	08:21 (6)						
	20:56	96	18:30 (2)	20:33	123	18:41 (2)	19:49	128	18:29 (2)	18:59	17	17:15	68	09:36 (3)	16:57	79	09:47 (3)	
7	05:59	16:54 (2)	06:25	16:38 (2)	06:55	16:21 (2)	07:25	16:59 (2)	06:59	08:28 (3)	07:32	08:20 (6)						
	20:56	97	18:31 (2)	20:32	123	18:41 (2)	19:47	127	18:28 (2)	18:57	17	17:14	70	09:38 (3)	16:57	82	09:47 (3)	
8	06:00	16:53 (2)	06:26	16:37 (2)	06:56	16:21 (2)	07:26	16:58 (2)	07:00	08:27 (3)	07:33	08:19 (6)						
	20:56	98	18:31 (2)	20:31	124	18:41 (2)	19:45	126	18:27 (2)	18:56	17	17:13	71	09:38 (3)	16:57	84	09:47 (3)	
9	06:01	16:54 (2)	06:27	16:36 (2)	06:57	16:20 (2)	07:27	16:59 (2)	07:01	08:27 (3)	07:34	08:19 (6)						
	20:56	98	18:32 (2)	20:30	125	18:41 (2)	19:44	125	18:25 (2)	18:54	17	17:12	72	09:39 (3)	16:57	85	09:48 (3)	
10	06:01	16:54 (2)	06:28	16:36 (2)	06:58	16:20 (2)	07:28	16:59 (2)	07:02	08:26 (3)	07:35	08:19 (6)						
	20:55	99	18:33 (2)	20:28	125	18:41 (2)	19:42	124	18:24 (2)	18:52	17	17:11	73	09:39 (3)	16:57	87	09:48 (3)	
11	06:02	16:53 (2)	06:29	16:35 (2)	06:59	16:21 (2)	07:29	16:59 (2)	07:04	08:27 (3)	07:35	08:19 (6)						
	20:55	99	18:32 (2)	20:27	127	18:42 (2)	19:40	121	18:22 (2)	18:51	17	17:10	73	09:40 (3)	16:57	87	09:48 (3)	
12	06:03	16:53 (2)	06:30	16:34 (2)	07:00	16:21 (2)	07:30	16:59 (2)	07:05	08:27 (3)	07:36	08:19 (6)						
	20:54	100	18:33 (2)	20:26	128	18:42 (2)	19:39	120	18:21 (2)	18:49	17	17:09	74	09:41 (3)	16:57	88	09:49 (3)	
13	06:03	16:53 (2)	06:31	16:32 (2)	07:01	16:22 (2)	07:31	16:59 (2)	07:06	08:26 (3)	07:37	08:18 (6)						
	20:54	101	18:34 (2)	20:25	129	18:41 (2)	19:37	118	18:20 (2)	18:48	17	17:08	75	09:41 (3)	16:57	88	09:48 (3)	
14	06:04	16:52 (2)	06:32	16:32 (2)	07:02	16:22 (2)	07:32	16:59 (2)	07:07	08:26 (3)	07:38	08:18 (6)						
	20:53	102	18:34 (2)	20:23	128	18:40 (2)	19:35	117	18:19 (2)	18:46	17	17:08	75	09:41 (3)	16:57	89	09:49 (3)	
15	06:05	16:51 (2)	06:33	16:31 (2)	07:03	16:23 (2)	07:33	16:59 (2)	07:08	08:27 (3)	07:38	08:19 (6)						
	20:53	103	18:34 (2)	20:22	129	18:40 (2)	19:34	114	18:17 (2)	18:45	17	17:07	75	09:42 (3)	16:57	89	09:50 (3)	
16	06:06	16:51 (2)	06:34	16:30 (2)	07:04	16:23 (2)	07:34	16:59 (2)	07:09	08:27 (3)	07:39	08:18 (6)						
	20:52	104	18:35 (2)	20:21	130	18:40 (2)	19:32	113	18:16 (2)	18:43	17	17:06	75	09:42 (3)	16:58	90	09:49 (3)	
17	06:06	16:51 (2)	06:35	16:30 (2)	07:05	16:24 (2)	07:35	16:59 (2)	07:11	08:27 (3)	07:40	08:19 (6)						
	20:52	105	18:36 (2)	20:19	130	18:40 (2)	19:30	110	18:14 (2)	18:42	17	17:05	75	09:42 (3)	16:58	90	09:50 (3)	
18	06:07	16:50 (2)	06:36	16:29 (2)	07:06	16:25 (2)	07:36	16:59 (2)	07:12	08:27 (3)	07:41	08:20 (6)						
	20:51	105	18:35 (2)	20:18	131	18:40 (2)	19:29	107	18:12 (2)	18:40	17	17:04	76	09:43 (3)	16:58	90	09:51 (3)	
19	06:08	16:50 (2)	06:37	16:28 (2)	07:07	16:26 (2)	07:37	16:59 (2)	07:13	08:28 (3)	07:41	08:19 (6)						
	20:50	106	18:36 (2)	20:16	132	18:40 (2)	19:27	105	18:11 (2)	18:39	17	17:04	76	09:44 (3)	16:59	91	09:51 (3)	
20	06:09	16:49 (2)	06:38	16:28 (2)	07:08	16:27 (2)	07:38	16:59 (2)	07:14	08:28 (3)	07:42	08:20 (6)						
	20:50	107	18:36 (2)	20:15	131	18:39 (2)	19:25	102	18:09 (2)	18:37	17	17:03	76	09:44 (3)	16:59	91	09:52 (3)	
21	06:10	16:49 (2)	06:39	16:27 (2)	07:09	16:29 (2)	07:39	16:59 (2)	07:15	09:55 (3)	07:42	08:20 (6)						
	20:49	108	18:37 (2)	20:13	132	18:39 (2)	19:24	98	18:07 (2)	18:36	11	10:06 (3)	17:02	76	09:44 (3)	16:59	90	09:51 (3)
22	06:11	16:49 (2)	06:40	16:27 (2)	07:10	16:30 (2)	07:41	16:59 (2)	07:16	09:49 (3)	07:43	08:21 (6)						
	20:48	109	18:38 (2)	20:12	132	18:39 (2)	19:22	95	18:05 (2)	18:34	23	10:12 (3)	17:02	76	09:44 (3)	17:00	90	09:52 (3)
23	06:11	16:48 (2)	06:41	16:26 (2)	07:11	16:31 (2)	07:42	16:59 (2)	07:17	09:45 (3)	07:43	08:21 (6)						
	20:47	110	18:38 (2)	20:11	133	18:39 (2)	19:20	92	18:03 (2)	18:33	30	10:15 (3)	17:01	76	09:44 (3)	17:00	91	09:53 (3)
24	06:12	16:47 (2)	06:42	16:25 (2)	07:12	16:33 (2)	07:43	16:59 (2)	07:18	09:42 (3)	07:44	08:22 (6)						
	20:46	111	18:38 (2)	20:09	133	18:38 (2)	19:19	88	18:01 (2)	18:32	36	10:18 (3)	17:01	76	09:44 (3)	17:01	91	09:54 (3)
25	06:13	16:46 (2)	06:43	16:25 (2)	07:13	16:34 (2)	07:44	16:59 (2)	07:19	09:41 (3)	07:44	08:23 (6)						
	20:46	112	18:38 (2)	20:08	133	18:38 (2)	19:17	83	17:57 (2)	17:30	40	09:21 (3)	17:00	75	09:45 (3)	17:02	90	09:54 (3)
26	06:14	16:46 (2)	06:44	16:24 (2)	07:14	16:36 (2)	07:45	16:59 (2)	07:21	09:39 (3)	07:45	08:23 (6)						
	20:45	113	18:39 (2)	20:06	133	18:37 (2)	19:15	78	17:54 (2)	17:29	44	09:23 (3)	17:00	75	09:45 (3)	17:02	90	09:54 (3)
27	06:15	16:45 (2)	06:45	16:23 (2)	07:15	16:38 (2)	07:46	16:59 (2)	07:22	09:37 (3)	07:45	08:24 (6)						
	20:44	114	18:39 (2)	20:04	133	18:36 (2)	19:14	74	17:52 (2)	17:28	48	09:25 (3)	16:59	75	09:45 (3)	17:03	90	09:55 (3)
28	06:16	16:45 (2)	06:46	16:23 (2)	07:16	16:41 (2)	07:47	16:59 (2)	07:23	09:31 (3)	07:45	08:25 (6)						
	20:43	114	18:39 (2)	20:03	132	18:35 (2)	19:12	68	17:49 (2)	17:26	51	09:26 (3)	16:59	74	09:45 (3)	17:04	90	09:56 (3)
29	06:17	16:44 (2)	06:47	16:22 (2)	07:17	16:43 (2)	07:48	16:59 (2)	07:24	09:31 (3)	07:46	08:25 (6)						
	20:42	116	18:40 (2)	20:01	133	18:35 (2)	19:10	62	17:45 (2)	17:25	54	09:28 (3)	16:58	74	09:45 (3)	17:04	89	09:56 (3)
30	06:18	16:44 (2)	06:48	16:22 (2)	07:18	16:47 (2)	07:50	16:59 (2)	07:25	09:33 (3)	07:46	08:26 (6)						
	20:41	116	18:40 (2)	20:00	132	18:34 (2)	19:09	54	17:41 (2)	17:24	57	09:30 (3)	16:58	74	09:45 (3)	17:05	88	09:56 (3)
31	06:19	16:43 (2)	06:49	16:22 (2)	07:19	16:51 (2)	07:51	16:59 (2)	07:26	09:32 (3)	07:46	08:26 (6)						
	20:40	118	18:41 (2)	19:58	131	18:33 (2)	17:22	59	17:22	09:31 (3)	17:0							

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 22

Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: O - R49

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	08:00 (4)	06:58	07:09	06:24
	17:07	17:40	34 08:34 (4)	18:14	19:47	20:18
2	07:46	07:33	08:00 (4)	06:57	07:07	06:22
	17:08	17:42	35 08:35 (4)	18:15	19:48	20:19
3	07:46	07:32	07:59 (4)	06:55	07:05	06:21
	17:09	17:43	36 08:35 (4)	18:16	19:49	20:20
4	07:47	07:31	07:59 (4)	06:54	07:04	06:20
	17:09	17:44	37 08:36 (4)	18:17	19:50	20:21
5	07:47	07:30	07:58 (4)	06:52	07:02	06:19
	17:10	17:45	39 08:37 (4)	18:18	19:51	20:22
6	07:47	07:29	07:58 (4)	06:51	07:01	06:18
	17:11	17:47	39 08:37 (4)	18:19	19:52	20:23
7	07:47	07:27	07:58 (4)	06:49	06:59	06:16
	17:12	17:48	40 08:38 (4)	18:20	19:53	20:24
8	07:46	07:26	07:58 (4)	06:48	06:57	06:15
	17:13	17:49	40 08:38 (4)	18:21	19:54	20:25
9	07:46	07:25	07:58 (4)	06:46	06:56	06:14
	17:14	17:50	40 08:38 (4)	18:23	19:55	20:26
10	07:46	07:24	07:58 (4)	06:44	06:54	06:13
	17:15	17:51	40 08:38 (4)	18:24	19:56	20:27
11	07:46	07:23	07:58 (4)	06:43	06:53	06:12
	17:16	17:53	40 08:38 (4)	18:25	19:57	20:28
12	07:46	07:22	07:58 (4)	06:41	06:51	19:27 (1)
	17:17	17:54	40 08:38 (4)	18:26	19:58	20:29
13	07:45	07:20	07:59 (4)	06:40	06:49	19:24 (1)
	17:18	17:55	39 08:38 (4)	18:27	19:59	20:30
14	07:45	07:19	07:59 (4)	06:38	06:48	19:23 (1)
	17:19	17:56	38 08:37 (4)	18:28	20:00	20:31
15	07:45	07:18	07:59 (4)	06:36	06:46	19:21 (1)
	17:20	17:57	38 08:37 (4)	18:29	20:01	20:32
16	07:44	07:17	08:00 (4)	06:35	06:45	19:20 (1)
	17:22	17:59	36 08:36 (4)	18:30	20:02	20:33
17	07:44	07:15	08:01 (4)	06:33	06:43	19:19 (1)
	17:23	18:00	35 08:36 (4)	18:31	20:03	20:34
18	07:43	07:14	08:01 (4)	06:32	06:42	19:18 (1)
	17:24	18:01	33 08:34 (4)	18:32	20:04	20:35
19	07:43	07:13	08:03 (4)	06:30	06:40	19:18 (1)
	17:25	18:02	30 08:33 (4)	18:33	20:05	20:36
20	07:42	07:11	08:04 (4)	06:28	06:39	07:17 (5)
	17:26	18:03	27 08:31 (4)	18:34	20:06	20:37
21	07:42	07:10	08:05 (4)	06:27	06:37	19:43 (1)
	17:27	18:05	25 08:30 (4)	18:35	20:07	20:38
22	07:41	07:09	08:08 (4)	06:25	06:36	07:14 (5)
	17:28	18:06	20 08:28 (4)	18:36	20:08	20:39
23	07:41	07:07	08:10 (4)	06:23	06:35	07:09 (5)
	17:30	18:07	14 08:24 (4)	18:37	20:09	20:40
24	07:40	07:06	06:22	06:33	07:08 (5)	06:00
	17:31	6 08:12 (4)	18:08	18:38	20:10	20:41
25	07:39	08:09 (4)	07:04	06:20	06:32	07:07 (5)
	17:32	14 08:23 (4)	18:09	18:40	20:12	20:42
26	07:39	08:07 (4)	07:03	06:18	06:30	07:06 (5)
	17:33	19 08:26 (4)	18:10	18:41	20:13	20:43
27	07:38	08:05 (4)	07:01	06:17	06:29	07:05 (5)
	17:34	23 08:28 (4)	18:11	18:42	20:14	20:44
28	07:37	08:04 (4)	07:00	06:15	06:28	07:05 (5)
	17:36	25 08:29 (4)	18:13	18:43	20:15	20:45
29	07:36	08:03 (4)	06:14	06:26	07:03 (5)	05:57
	17:37	27 08:30 (4)	18:14	19:44	20:16	20:46
30	07:35	08:02 (4)	06:13	06:25	07:03 (5)	05:57
	17:38	30 08:32 (4)	18:15	19:45	20:17	20:47
31	07:34	08:01 (4)	06:12	06:24	07:02 (5)	05:56
	17:39	32 08:33 (4)	18:16	19:46	20:18	20:48
Potential sun hours	299	298	370	398	447	450
Total, worst case	176	795		645		683
Sun reduction	0.40	0.43		0.51		0.58
Oper. time red.	0.40	0.40		0.40		0.40
Wind dir. red.	0.68	0.68		0.73		0.74
Total reduction	0.11	0.12		0.15		0.17
Total, real	19	93		95		116

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 23

Licensed user:

Ing. Bruno Manca

Via Vittorio Veneto 231

IT-09028 Sestu

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: O - R49

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	07:13 (5) 06:50	19:26 (1) 07:19	06:52 07:27 (4)	07:26 16:58
2	05:57 20:57	06:21 20:38	07:13 (5) 06:50	19:35 (1) 19:07	06:53 07:27 (4)	07:27 16:57
3	05:57 20:57	06:22 20:37	07:13 (5) 06:51	19:04 19:04	06:54 07:28 (4)	07:28 16:57
4	05:58 20:57	06:22 20:36	07:12 (5) 06:52	19:02 19:02	06:55 07:28 (4)	07:29 16:57
5	05:58 20:57	06:23 20:34	07:12 (5) 06:53	19:00 19:00	06:56 07:28 (4)	07:30 16:57
6	05:59 20:56	06:24 20:33	07:12 (5) 06:54	18:59 18:59	06:58 07:28 (4)	07:31 16:57
7	06:00 20:56	06:25 20:32	07:12 (5) 06:55	18:57 18:57	06:59 07:30 (4)	07:32 16:57
8	06:00 20:56	06:26 20:31	07:11 (5) 06:56	18:56 18:56	07:00 07:30 (4)	07:33 16:57
9	06:01 20:55	06:27 20:30	07:11 (5) 06:57	18:54 18:54	07:01 07:30 (4)	07:34 16:57
10	06:01 20:55	06:28 20:28	07:11 (5) 06:58	18:52 18:52	07:02 07:31 (4)	07:34 16:57
11	06:02 20:55	06:29 20:27	07:11 (5) 06:59	18:51 18:51	07:03 07:31 (4)	07:35 16:57
12	06:03 20:54	06:30 20:26	07:12 (5) 07:00	18:49 18:49	07:05 07:34 (4)	07:36 16:57
13	06:04 20:54	06:31 20:25	07:11 (5) 07:01	18:48 18:48	07:06 07:35 (4)	07:37 16:57
14	06:04 20:53	06:32 20:23	07:11 (5) 07:02	18:46 18:46	07:07 07:36 (4)	07:38 16:57
15	06:05 20:53	06:33 20:22	07:11 (5) 07:03	18:45 18:45	07:08 07:38 (4)	07:39 16:57
16	06:06 20:52	06:34 20:21	07:12 (5) 07:04	18:43 18:43	07:09 07:40 (4)	07:40 16:58
17	06:07 20:52	06:35 20:19	07:13 (5) 07:05	18:42 18:42	07:10 07:42 (4)	07:41 16:58
18	06:07 20:51	06:36 20:18	07:13 (5) 07:06	18:40 18:40	07:12 07:46 (4)	07:42 16:58
19	06:08 20:50	06:37 20:16	07:14 (5) 07:07	18:39 18:39	6 08:52 (4) 07:13	6 07:52 (4) 16:58
20	06:09 20:50	06:38 20:15	07:15 (5) 07:08	18:37 18:37	16 08:57 (4) 07:14	16 07:59 (4) 16:58
21	06:10 20:49	06:39 07:27 (5) 20:13	07:17 (5) 07:09	18:36 18:36	21 08:59 (4) 07:15	21 07:42 (4) 16:59
22	06:11 20:48	06:40 07:24 (5) 20:12	07:19 (5) 07:10	18:34 18:34	25 09:01 (4) 17:02	25 07:43 (4) 17:00
23	06:12 20:47	06:41 07:23 (5) 20:10	07:22 (5) 07:11	18:33 18:33	28 09:02 (4) 17:02	28 07:44 (4) 17:01
24	06:12 20:46	06:42 07:20 (5) 20:09	07:22 (1) 07:12	18:32 18:32	31 09:03 (4) 17:01	31 07:45 (4) 17:01
25	06:13 20:46	06:43 07:19 (5) 20:07	07:22 (1) 07:13	18:30 18:30	33 09:04 (4) 17:01	33 07:46 (4) 17:01
26	06:14 20:45	06:44 07:18 (5) 20:06	07:22 (1) 07:14	18:29 18:29	35 08:06 (4) 17:00	35 07:47 (4) 17:02
27	06:15 20:44	06:45 07:17 (5) 20:04	07:21 (1) 07:15	18:28 18:28	36 08:06 (4) 17:00	36 07:48 (4) 17:02
28	06:16 20:43	06:46 07:17 (5) 20:03	07:21 (1) 07:16	18:26 18:26	37 08:06 (4) 16:59	37 07:49 (4) 17:03
29	06:17 20:42	06:47 07:16 (5) 20:01	07:22 (1) 07:17	18:25 18:25	39 08:07 (4) 16:59	39 07:50 (4) 17:04
30	06:18 20:41	06:48 07:15 (5) 20:00	07:23 (1) 07:18	18:24 18:24	39 08:07 (4) 16:58	39 07:51 (4) 17:04
31	06:19 20:40	06:49 07:15 (5) 19:58	07:24 (1) 19:09	18:23 18:23	40 08:08 (4) 16:58	40 07:52 (4) 17:05
Potential sun hours	457	427	375	346	299	290
Total, worst case	255	1089	9	426	555	448
Sun reduction	0.75	0.72	0.64	0.56	0.48	0.40
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40
Wind dir. red.	0.74	0.73	0.72	0.68	0.68	0.68
Total reduction	0.22	0.21	0.18	0.15	0.13	0.13
Total, real	56	227	2	64	72	72

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

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

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2023-12-12 12:06 / 24

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: P - R51

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46 17:07	08:10 (6) 08:19 (6)	07:34 17:40	08:04 (6) 08:47 (6)	06:58 18:14	07:09 19:47	06:24 20:18	05:56 20:46	05:56 20:57	06:20 20:39	06:50 19:57	07:19 19:07
2	07:46 17:08	08:10 (6) 08:22 (6)	07:33 17:42	08:04 (6) 08:47 (6)	06:57 18:15	07:07 19:48	06:22 20:19	05:55 20:47	05:57 20:57	06:21 20:38	06:50 19:55	07:20 19:05
3	07:47 17:08	08:09 (6) 08:24 (6)	07:32 17:43	08:04 (6) 08:47 (6)	06:55 18:16	07:05 19:49	06:21 20:20	05:55 20:48	05:57 20:57	06:21 20:37	06:51 19:53	07:21 19:04
4	07:47 17:09	08:08 (6) 08:25 (6)	07:31 17:44	08:05 (6) 08:46 (6)	06:54 18:17	07:04 19:50	06:20 20:21	05:54 20:49	05:58 20:57	06:22 20:36	06:52 19:52	07:22 19:02
5	07:47 17:10	08:08 (6) 08:26 (6)	07:30 17:45	08:06 (6) 08:46 (6)	06:52 18:18	07:02 19:51	06:19 20:22	05:54 20:49	05:58 20:57	06:23 20:54	06:53 19:50	07:23 19:00
6	07:47 17:11	08:08 (6) 08:28 (6)	07:29 17:47	08:06 (6) 08:46 (6)	06:51 18:19	07:00 19:52	06:18 20:23	05:54 20:50	05:59 20:56	06:24 20:33	06:54 19:49	07:24 18:59
7	07:47 17:12	08:08 (6) 08:29 (6)	07:27 17:48	08:07 (6) 08:45 (6)	06:49 18:20	06:59 19:53	06:16 20:24	05:53 20:51	05:59 20:56	06:25 20:32	06:55 19:47	07:25 18:57
8	07:46 17:13	08:08 (6) 08:31 (6)	07:26 17:49	08:08 (6) 08:44 (6)	06:48 18:21	06:57 19:54	06:15 20:25	05:53 20:51	06:00 20:56	06:26 20:31	06:56 19:45	07:26 18:56
9	07:46 17:14	08:08 (6) 08:32 (6)	07:25 17:50	08:10 (6) 08:44 (6)	06:46 18:23	06:56 19:55	06:14 20:26	05:53 20:52	06:01 20:55	06:27 20:30	06:57 19:44	07:27 18:54
10	07:46 17:15	08:08 (6) 08:34 (6)	07:24 17:51	08:10 (6) 08:42 (6)	06:44 18:24	06:54 19:56	06:13 20:27	05:53 20:52	06:01 20:55	06:28 20:28	06:58 19:42	07:28 18:52
11	07:46 17:16	08:07 (6) 08:34 (6)	07:23 17:53	08:12 (6) 08:40 (6)	06:43 18:25	06:53 19:57	06:12 20:28	05:53 20:53	06:02 20:55	06:29 20:27	06:59 19:49	07:29 18:51
12	07:46 17:17	08:07 (6) 08:35 (6)	07:22 17:54	08:13 (6) 08:39 (6)	06:41 18:26	06:51 19:58	06:11 20:29	05:53 20:53	06:03 20:26	07:00 20:39	07:30 19:39	07:30 18:49
13	07:45 17:18	08:07 (6) 08:37 (6)	07:20 17:55	08:16 (6) 08:37 (6)	06:40 18:27	06:49 19:59	06:10 20:30	05:52 20:54	06:03 20:54	06:31 20:25	07:01 19:37	07:31 18:48
14	07:45 17:19	08:06 (6) 08:37 (6)	07:19 17:56	08:18 (6) 08:33 (6)	06:38 18:28	06:48 20:00	06:09 20:31	05:52 20:54	06:04 20:53	06:32 20:23	07:02 19:35	07:32 18:46
15	07:45 17:20	08:06 (6) 08:39 (6)	07:18 17:57	08:24 (6) 08:27 (6)	06:36 18:29	06:46 20:01	06:08 20:32	05:52 20:55	06:05 20:53	06:33 20:22	07:03 19:34	07:33 18:45
16	07:44 17:22	08:05 (6) 08:39 (6)	07:17 17:59	06:35 18:30	06:45 20:02	06:07 20:33	05:52 20:55	06:06 20:52	06:34 20:21	07:04 19:32	07:34 18:43	07:34 17:06
17	07:44 17:23	08:05 (6) 08:41 (6)	07:15 18:00	06:33 18:31	06:43 20:03	06:06 20:34	05:52 20:55	06:06 20:52	06:35 20:19	07:05 19:30	07:35 18:42	07:40 17:05
18	07:43 17:24	08:04 (6) 08:41 (6)	07:14 18:01	06:32 18:32	06:42 20:04	06:05 20:35	05:52 20:56	06:07 20:51	06:36 20:18	07:06 19:29	07:36 18:40	07:40 17:04
19	07:43 17:25	08:04 (6) 08:42 (6)	07:13 18:02	06:30 18:33	06:40 20:05	06:04 20:36	05:53 20:56	06:08 20:50	06:37 20:16	07:07 19:27	07:37 18:39	07:41 17:04
20	07:42 17:26	08:03 (6) 08:43 (6)	07:11 18:03	06:28 18:34	06:39 20:06	06:03 20:36	05:53 20:56	06:09 20:50	06:38 20:15	07:08 19:25	07:38 18:37	07:42 17:03
21	07:42 17:27	08:02 (6) 08:43 (6)	07:10 18:05	06:27 18:35	06:37 20:07	06:03 20:37	05:53 20:57	06:10 20:49	06:39 20:13	07:09 19:24	07:39 18:36	07:42 17:02
22	07:41 17:28	08:03 (6) 08:44 (6)	07:09 18:06	06:25 18:36	06:36 20:08	06:02 20:38	05:53 20:57	06:11 20:48	06:40 20:12	07:10 19:22	07:41 18:34	07:43 17:02
23	07:41 17:30	08:02 (6) 08:45 (6)	07:07 18:07	06:23 18:37	06:35 20:09	06:01 20:39	05:53 20:57	06:11 20:47	06:41 20:10	07:11 19:20	07:42 18:33	07:43 17:01
24	07:40 17:31	08:02 (6) 08:45 (6)	07:06 18:08	06:22 18:38	06:33 20:11	06:00 20:40	05:54 20:57	06:12 20:46	06:42 20:09	07:12 19:19	07:43 18:32	07:44 17:01
25	07:39 17:32	08:03 (6) 08:46 (6)	07:04 18:09	06:20 18:40	06:32 20:12	06:00 20:41	05:54 20:57	06:13 20:46	06:43 20:07	07:13 19:17	07:44 18:30	07:44 17:00
26	07:39 17:33	08:03 (6) 08:46 (6)	07:03 18:10	06:18 18:41	06:30 20:13	05:59 20:42	05:54 20:57	06:14 20:45	06:44 20:06	07:14 19:15	07:45 18:29	07:45 17:00
27	07:38 17:34	08:03 (6) 08:47 (6)	07:01 18:11	06:17 18:42	06:29 20:14	05:58 20:43	05:55 20:57	06:15 20:44	06:45 20:04	07:15 19:14	07:46 18:28	07:46 17:00
28	07:37 17:36	08:03 (6) 08:47 (6)	07:00 18:13	06:15 18:43	06:28 20:15	05:58 20:43	05:55 20:57	06:16 20:43	06:46 20:03	07:16 19:12	07:47 (6) 17:26	07:47 (6) 17:04
29	07:36 17:37	08:03 (6) 08:47 (6)	06:59 18:14	06:13 19:44	06:26 20:16	05:57 20:44	05:55 20:57	06:17 20:42	06:47 20:01	07:17 19:10	07:48 (6) 17:25	07:48 (6) 17:04
30	07:35 17:38	08:03 (6) 08:47 (6)	06:58 18:15	06:12 19:45	06:25 20:17	05:57 20:45	05:56 20:57	06:18 20:41	06:48 20:00	07:18 19:09	07:49 (6) 17:24	07:49 (6) 17:05
31	07:34 17:39	08:03 (6) 08:47 (6)	06:57 18:16	06:11 19:46	06:24 20:18	05:56 20:46	05:55 20:57	06:19 20:40	06:49 19:58	07:19 19:09	07:50 (6) 17:22	07:50 (6) 17:06
Potential sun hours	299	298	483	370	398	447	450	457	427	375	346	299
Total, worst case	993	483	222									
Sun reduction	0.40	0.43	0.41									
Oper. time red.	0.40	0.40	0.40									
Wind dir. red.	0.67	0.67	0.67									
Total reduction	0.11	0.11	0.11									
Total, real	105	55	24									

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 25

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: Q - R17

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June					
1	07:46 17:07	07:33 17:40	15:11 (3) 15:48 (3)	06:58 18:14	14:16 (3) 16:39 (3)	07:09 19:47	15:11 (3) 17:41 (3)	06:24 20:18	15:49 (3) 19:55 (2)	05:56 20:46	19:17 (2) 19:54 (2)
2	07:46 17:08	07:33 17:42	15:07 (3) 15:53 (3)	06:57 18:15	14:16 (3) 16:40 (3)	07:07 19:48	15:12 (3) 17:41 (3)	06:22 20:19	15:51 (3) 19:56 (2)	05:55 20:47	19:17 (2) 19:53 (2)
3	07:47 17:08	07:32 17:43	15:03 (3) 15:57 (3)	06:55 18:16	14:14 (3) 16:41 (3)	07:05 19:49	15:13 (3) 17:41 (3)	06:21 20:20	15:51 (3) 19:57 (2)	05:55 20:48	19:18 (2) 19:53 (2)
4	07:47 17:09	07:31 17:44	15:00 (3) 16:00 (3)	06:54 18:17	14:14 (3) 16:42 (3)	07:04 19:50	15:14 (3) 17:40 (3)	06:20 20:21	15:53 (3) 19:57 (2)	05:54 20:49	19:19 (2) 19:53 (2)
5	07:47 17:10	07:30 17:45	14:57 (3) 16:03 (3)	06:52 18:18	14:13 (3) 16:42 (3)	07:02 19:51	15:15 (3) 17:39 (3)	06:19 20:22	15:54 (3) 19:58 (2)	05:54 20:49	19:19 (2) 19:52 (2)
6	07:47 17:11	07:29 17:47	14:54 (3) 16:06 (3)	06:51 18:19	14:11 (3) 16:42 (3)	07:00 19:52	15:16 (3) 17:39 (3)	06:18 20:23	15:56 (3) 19:58 (2)	05:54 20:50	19:20 (2) 19:52 (2)
7	07:47 17:12	07:27 17:48	14:52 (3) 16:09 (3)	06:49 18:20	14:11 (3) 16:43 (3)	06:59 19:53	15:17 (3) 17:38 (3)	06:16 20:24	15:57 (3) 19:59 (2)	05:53 20:51	19:21 (2) 19:52 (2)
8	07:46 17:13	07:26 17:49	14:50 (3) 16:11 (3)	06:48 18:21	14:10 (3) 16:43 (3)	06:57 19:54	15:19 (3) 17:38 (3)	06:15 20:25	15:59 (3) 19:59 (2)	05:53 20:51	19:22 (2) 19:52 (2)
9	07:46 17:14	07:25 17:50	14:48 (3) 16:14 (3)	06:46 18:23	14:10 (3) 16:44 (3)	06:56 19:55	15:20 (3) 17:37 (3)	06:14 20:26	16:00 (3) 19:59 (2)	05:53 20:52	19:22 (2) 19:52 (2)
10	07:46 17:15	07:24 17:51	14:45 (3) 16:15 (3)	06:44 18:24	14:09 (3) 16:44 (3)	06:54 19:56	15:21 (3) 17:36 (3)	06:13 20:27	16:02 (3) 19:59 (2)	05:53 20:52	19:22 (2) 19:51 (2)
11	07:46 17:16	07:23 17:53	14:43 (3) 16:17 (3)	06:43 18:25	14:08 (3) 16:44 (3)	06:53 19:57	15:22 (3) 17:36 (3)	06:12 20:28	16:03 (3) 19:59 (2)	05:53 20:53	19:23 (2) 19:50 (2)
12	07:46 17:17	07:22 17:54	14:41 (3) 16:19 (3)	06:41 18:26	14:08 (3) 16:44 (3)	06:51 19:58	15:23 (3) 17:35 (3)	06:11 20:29	16:04 (3) 19:59 (2)	05:52 20:53	19:24 (2) 19:50 (2)
13	07:45 17:18	07:20 17:55	14:39 (3) 16:21 (3)	06:40 18:27	14:07 (3) 16:44 (3)	06:49 19:59	15:25 (3) 17:35 (3)	06:10 20:30	16:06 (3) 19:59 (2)	05:52 20:54	19:24 (2) 19:50 (2)
14	07:45 17:19	07:19 17:56	14:37 (3) 16:22 (3)	06:38 18:28	14:07 (3) 16:45 (3)	06:48 20:00	15:26 (3) 17:34 (3)	06:09 20:31	16:07 (3) 19:59 (2)	05:52 20:54	19:25 (2) 19:50 (2)
15	07:45 17:20	07:18 17:57	14:35 (3) 16:24 (3)	06:36 18:29	14:06 (3) 16:45 (3)	06:46 20:01	15:28 (3) 17:33 (3)	06:08 20:32	16:08 (3) 19:59 (2)	05:52 20:55	19:26 (2) 19:50 (2)
16	07:44 17:21	07:17 17:59	14:34 (3) 16:26 (3)	06:35 18:30	14:06 (3) 16:44 (3)	06:45 20:02	15:29 (3) 17:32 (3)	06:07 20:33	16:10 (3) 19:58 (2)	05:52 20:55	19:26 (2) 19:50 (2)
17	07:44 17:23	07:15 18:00	14:33 (3) 16:28 (3)	06:33 18:31	14:06 (3) 16:45 (3)	06:43 20:03	15:30 (3) 17:32 (3)	06:06 20:34	16:11 (3) 19:58 (2)	05:52 20:55	19:26 (2) 19:49 (2)
18	07:43 17:24	07:14 18:01	14:31 (3) 16:28 (3)	06:32 18:32	14:06 (3) 16:45 (3)	06:42 20:04	15:31 (3) 17:31 (3)	06:05 20:35	16:12 (3) 19:58 (2)	05:52 20:56	19:27 (2) 19:49 (2)
19	07:43 17:25	07:13 18:02	14:29 (3) 16:30 (3)	06:30 18:33	14:05 (3) 16:44 (3)	06:40 20:05	15:33 (3) 17:30 (3)	06:04 20:36	16:14 (3) 19:57 (2)	05:53 20:56	19:28 (2) 19:50 (2)
20	07:42 17:26	07:11 18:03	14:27 (3) 16:31 (3)	06:28 18:34	14:06 (3) 16:45 (3)	06:39 20:06	15:34 (3) 17:29 (3)	06:03 20:36	16:16 (3) 19:58 (2)	05:53 20:56	19:28 (2) 19:50 (2)
21	07:42 17:27	07:10 18:04	14:26 (3) 16:32 (3)	06:27 18:35	14:06 (3) 16:44 (3)	06:37 20:07	15:36 (3) 17:29 (3)	06:03 20:37	16:17 (3) 19:57 (2)	05:53 20:57	19:28 (2) 19:50 (2)
22	07:41 17:28	07:09 18:06	14:25 (3) 16:34 (3)	06:25 18:36	14:05 (3) 16:44 (3)	06:36 20:08	15:37 (3) 19:42 (2)	06:02 20:38	16:19 (3) 19:57 (2)	05:53 20:57	19:28 (2) 19:50 (2)
23	07:41 17:30	07:07 18:07	14:23 (3) 16:34 (3)	06:23 18:37	14:06 (3) 16:44 (3)	06:35 20:09	15:38 (3) 19:45 (2)	06:01 20:39	16:21 (3) 19:57 (2)	05:53 20:57	19:28 (2) 19:50 (2)
24	07:40 17:31	07:06 18:08	14:23 (3) 16:36 (3)	06:22 18:38	14:06 (3) 16:44 (3)	06:33 20:10	15:40 (3) 19:48 (2)	06:00 20:40	16:23 (3) 19:57 (2)	05:54 20:57	19:29 (2) 19:51 (2)
25	07:39 17:32	07:04 18:09	14:21 (3) 16:36 (3)	06:20 18:40	14:06 (3) 16:43 (3)	06:32 20:12	15:42 (3) 19:50 (2)	06:00 20:41	16:25 (3) 19:56 (2)	05:54 20:57	19:29 (2) 19:51 (2)
26	07:39 17:33	07:03 18:10	14:20 (3) 16:37 (3)	06:18 18:41	14:07 (3) 16:44 (3)	06:30 20:13	15:42 (3) 19:50 (2)	05:59 20:42	16:27 (3) 19:56 (2)	05:54 20:57	19:28 (2) 19:52 (2)
27	07:38 17:34	07:01 18:11	14:18 (3) 16:38 (3)	06:17 18:42	14:07 (3) 16:43 (3)	06:29 20:14	15:44 (3) 19:51 (2)	05:58 20:43	16:30 (3) 19:56 (2)	05:55 20:57	19:29 (2) 19:53 (2)
28	07:37 17:36	07:00 18:13	14:18 (3) 16:39 (3)	06:15 18:43	14:08 (3) 16:42 (3)	06:28 20:15	15:45 (3) 19:53 (2)	05:58 20:43	16:34 (3) 19:56 (2)	05:55 20:57	19:28 (2) 19:53 (2)
29	07:36 17:37			07:13 19:44	15:09 (3) 17:43 (3)	06:26 20:16	15:46 (3) 19:53 (2)	05:57 20:44	19:15 (2) 20:57	05:55 20:57	19:29 (2) 19:54 (2)
30	07:35 17:38			07:12 19:45	15:09 (3) 17:42 (3)	06:25 20:17	15:48 (3) 19:54 (2)	05:57 20:45	19:16 (2) 19:55 (2)	05:56 20:57	19:28 (2) 19:54 (2)
31	07:34 17:39	15:18 (3) 15:42 (3)		07:10 19:46	15:11 (3) 17:42 (3)		05:56 20:46		19:16 (2) 19:54 (2)		
Potential sun hours	299	298	370	398	447	450					
Total, worst case	24	2838	4791	3976	3025	802					
Sun reduction	0.40	0.43	0.47	0.51	0.58	0.67					
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40					
Wind dir. red.	0.71	0.71	0.71	0.71	0.71	0.71					
Total reduction	0.11	0.12	0.13	0.14	0.16	0.19					
Total, real	3	345	634	567	495	152					

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

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

Project:

windpro Nuoro nord - flickering

Printed/Page

2023-12-12 12:06 / 26

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: Q - R17

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December					
1	05:56	19:27 (2)	06:20	16:13 (3)	06:49	15:21 (3)	07:19	14:46 (3)	06:52	14:15 (3)	07:26					
	20:57	27	19:54 (2)	20:39	117	20:09 (2)	19:57	134	17:35 (3)	19:07	157	17:23 (3)	17:21	89	15:44 (3)	16:58
2	05:57	19:28 (2)	06:21	16:12 (3)	06:50	15:20 (3)	07:20	14:46 (3)	06:53	14:17 (3)	07:27					
	20:57	27	19:55 (2)	20:38	119	20:09 (2)	19:55	135	17:35 (3)	19:05	156	17:22 (3)	17:20	85	15:42 (3)	16:57
3	05:57	19:27 (2)	06:21	16:11 (3)	06:51	15:18 (3)	07:21	14:46 (3)	06:54	14:20 (3)	07:28					
	20:57	29	19:56 (2)	20:37	120	20:09 (2)	19:53	137	17:35 (3)	19:04	155	17:21 (3)	17:19	81	15:41 (3)	16:57
4	05:58	19:27 (2)	06:22	16:09 (3)	06:52	15:16 (3)	07:22	14:46 (3)	06:55	14:22 (3)	07:29					
	20:57	30	19:57 (2)	20:36	123	20:09 (2)	19:52	139	17:35 (3)	19:02	155	17:21 (3)	17:18	76	15:38 (3)	16:57
5	05:58	19:27 (2)	06:23	16:08 (3)	06:53	15:14 (3)	07:23	14:46 (3)	06:56	14:25 (3)	07:30					
	20:57	31	19:58 (2)	20:34	124	20:08 (2)	19:50	141	17:35 (3)	19:00	154	17:20 (3)	17:17	71	15:36 (3)	16:57
6	05:59	19:26 (2)	06:24	16:06 (3)	06:54	15:13 (3)	07:24	14:46 (3)	06:58	14:27 (3)	07:31					
	20:56	32	19:58 (2)	20:33	127	20:08 (2)	19:49	142	17:35 (3)	18:59	153	17:19 (3)	17:15	66	15:33 (3)	16:57
7	05:59	19:26 (2)	06:25	16:05 (3)	06:55	15:11 (3)	07:25	14:48 (3)	06:59	14:31 (3)	07:32					
	20:56	33	19:59 (2)	20:32	129	20:08 (2)	19:47	144	17:35 (3)	18:57	151	17:19 (3)	17:14	60	15:31 (3)	16:57
8	06:00	19:25 (2)	06:26	16:04 (3)	06:56	15:08 (3)	07:26	14:48 (3)	07:00	14:34 (3)	07:33					
	20:56	34	19:59 (2)	20:31	129	20:07 (2)	19:45	146	17:34 (3)	18:56	150	17:18 (3)	17:13	53	15:27 (3)	16:57
9	06:01	19:25 (2)	06:27	16:02 (3)	06:57	15:07 (3)	07:27	14:48 (3)	07:01	14:38 (3)	07:34					
	20:55	35	20:00 (2)	20:30	132	20:07 (2)	19:44	147	17:34 (3)	18:54	149	17:17 (3)	17:12	45	15:23 (3)	16:57
10	06:01	19:25 (2)	06:28	16:01 (3)	06:58	15:05 (3)	07:28	14:49 (3)	07:02	14:43 (3)	07:35					
	20:55	36	20:01 (2)	20:28	133	20:06 (2)	19:42	149	17:34 (3)	18:52	147	17:16 (3)	17:11	35	15:18 (3)	16:57
11	06:02	19:24 (2)	06:29	15:59 (3)	06:59	15:04 (3)	07:29	14:49 (3)	07:03	14:50 (3)	07:35					
	20:55	37	20:01 (2)	20:27	133	20:05 (2)	19:40	150	17:34 (3)	18:51	146	17:15 (3)	17:10	23	15:13 (3)	16:57
12	06:03	19:24 (2)	06:30	15:58 (3)	07:00	15:02 (3)	07:30	14:50 (3)	07:05	14:50 (3)	07:36					
	20:54	38	20:02 (2)	20:26	133	20:04 (2)	19:39	151	17:33 (3)	18:49	144	17:14 (3)	17:09		16:57	
13	06:03	19:24 (2)	06:31	15:55 (3)	07:01	15:01 (3)	07:31	14:50 (3)	07:06	14:50 (3)	07:37					
	20:54	39	20:03 (2)	20:25	134	20:01 (2)	19:37	152	17:33 (3)	18:48	142	17:12 (3)	17:08		16:57	
14	06:04	19:23 (2)	06:32	15:53 (3)	07:02	14:59 (3)	07:32	14:51 (3)	07:07	14:51 (3)	07:38					
	20:53	40	20:03 (2)	20:23	134	20:00 (2)	19:35	154	17:33 (3)	18:46	140	17:11 (3)	17:08		16:57	
15	06:05	16:45 (3)	06:33	15:52 (3)	07:03	14:58 (3)	07:33	14:51 (3)	07:08	14:51 (3)	07:38					
	20:53	46	20:04 (2)	20:22	134	19:59 (2)	19:34	155	17:33 (3)	18:45	139	17:10 (3)	17:07		16:57	
16	06:06	16:41 (3)	06:34	15:50 (3)	07:04	14:57 (3)	07:34	14:52 (3)	07:09	14:52 (3)	07:39					
	20:52	56	20:05 (2)	20:21	135	19:58 (2)	19:32	155	17:32 (3)	18:43	137	17:09 (3)	17:06		16:58	
17	06:06	16:38 (3)	06:35	15:49 (3)	07:05	14:56 (3)	07:35	14:53 (3)	07:10	14:53 (3)	07:40					
	20:52	63	20:05 (2)	20:19	132	19:56 (2)	19:30	156	17:32 (3)	18:42	134	17:07 (3)	17:05		16:58	
18	06:07	16:35 (3)	06:36	15:47 (3)	07:06	14:55 (3)	07:36	14:55 (3)	07:12	14:55 (3)	07:41					
	20:51	68	20:05 (2)	20:18	133	19:55 (2)	19:29	157	17:32 (3)	18:40	132	17:07 (3)	17:04		16:58	
19	06:08	16:33 (3)	06:37	15:45 (3)	07:07	14:54 (3)	07:37	14:55 (3)	07:13	14:55 (3)	07:42					
	20:50	74	20:06 (2)	20:16	131	19:53 (2)	19:27	157	17:31 (3)	18:39	130	17:05 (3)	17:04		16:59	
20	06:09	16:32 (3)	06:38	15:44 (3)	07:08	14:53 (3)	07:38	14:56 (3)	07:14	14:56 (3)	07:43					
	20:50	78	20:07 (2)	20:15	127	19:50 (2)	19:25	158	17:31 (3)	18:37	128	17:04 (3)	17:03		16:59	
21	06:10	16:30 (3)	06:39	15:42 (3)	07:09	14:52 (3)	07:39	14:57 (3)	07:15	14:57 (3)	07:44					
	20:49	82	20:07 (2)	20:13	119	19:45 (2)	19:24	158	17:30 (3)	18:36	126	17:03 (3)	17:02		16:59	
22	06:11	16:29 (3)	06:40	15:40 (3)	07:10	14:51 (3)	07:41	14:58 (3)	07:16	14:58 (3)	07:45					
	20:48	86	20:08 (2)	20:12	113	17:33 (3)	19:22	159	17:30 (3)	18:34	123	17:01 (3)	17:02		17:00	
23	06:11	16:27 (3)	06:41	15:38 (3)	07:11	14:50 (3)	07:42	14:59 (3)	07:17	14:59 (3)	07:46					
	20:47	89	20:08 (2)	20:10	116	17:34 (3)	19:20	159	17:29 (3)	18:33	120	16:59 (3)	17:01		17:00	
24	06:12	16:25 (3)	06:42	15:37 (3)	07:12	14:49 (3)	07:43	14:59 (3)	07:18	15:01 (3)	07:47					
	20:46	93	20:08 (2)	20:09	117	17:34 (3)	19:19	159	17:28 (3)	18:32	117	16:58 (3)	17:00		17:01	
25	06:13	16:24 (3)	06:43	15:35 (3)	07:13	14:48 (3)	07:44	14:03 (3)	07:20	14:03 (3)	07:48					
	20:46	95	20:08 (2)	20:07	120	17:35 (3)	19:17	159	17:27 (3)	17:30	114	15:57 (3)	17:00		17:02	
26	06:14	16:22 (3)	06:44	15:33 (3)	07:14	14:48 (3)	07:45	14:04 (3)	07:21	14:04 (3)	07:49					
	20:45	100	20:09 (2)	20:06	122	17:35 (3)	19:15	159	17:27 (3)	17:29	111	15:55 (3)	16:59		17:02	
27	06:15	16:21 (3)	06:45	15:30 (3)	07:15	14:47 (3)	07:46	14:06 (3)	07:22	14:06 (3)	07:50					
	20:44	102	20:09 (2)	20:04	124	17:34 (3)	19:14	159	17:26 (3)	17:28	107	15:53 (3)	16:59		17:03	
28	06:16	16:20 (3)	06:46	15:29 (3)	07:16	14:47 (3)	07:47	14:07 (3)	07:23	14:07 (3)	07:51					
	20:43	106	20:09 (2)	20:03	125	17:34 (3)	19:12	158	17:25 (3)	17:26	105	15:52 (3)	16:59		17:04	
29	06:17	16:18 (3)	06:47	15:27 (3)	07:17	14:47 (3)	07:48	14:09 (3)	07:24	14:09 (3)	07:52					
	20:42	109	20:09 (2)	20:01	128	17:35 (3)	19:10	158	17:25 (3)	17:25	101	15:50 (3)	16:58		17:04	
30	06:18	16:17 (3)	06:48	15:25 (3)	07:18	14:46 (3)	07:49	14:11 (3)	07:25	14:11 (3)	07:53					
	20:41	112	20:10 (2)	20:00	130	17:35 (3)	19:09	158	17:24 (3)	17:24	98	15:49 (3)	16:58		17:05	
31	06:19	16:15 (3)	06:49	15:23 (3)				06:51		14:13 (3)						
	20:40	114	20:09 (2)	19:58	132	17:35 (3)		17:22	94	15:47 (3)			17:06			
Potential sun hours	457		427		375		346		299		290					
Total, worst case	1941		3925		4545		4115		684							
Sun reduction	0.75		0.72		0.64		0.56		0.48							
Oper. time red.	0.40		0.40		0.40		0.40		0.40							
Wind dir. red.	0.71		0.71		0.71		0.71		0.71							
Total reduction	0.21		0.20		0.18		0.16		0.14							
Total, real	412		795		821		643		92							

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 27

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: R - R14

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	14:04 (3)	07:33	06:58			07:09		18:37 (2)	06:24	05:56	
	17:07	57 15:01 (3)	17:40	18:14			19:47	19	18:56 (2)	20:18	20:46	
2	07:46	14:05 (3)	07:33	06:57			07:07		18:40 (2)	06:22	05:55	
	17:08	57 15:02 (3)	17:42	18:15			19:48	11	18:51 (2)	20:19	20:47	
3	07:47	14:06 (3)	07:32	06:55			07:05			06:21	05:55	
	17:08	56 15:02 (3)	17:43	18:16			19:49			20:20	20:48	
4	07:47	14:07 (3)	07:31	06:54			07:04			06:20	05:54	
	17:09	54 15:01 (3)	17:44	18:17			19:50			20:21	20:49	
5	07:47	14:08 (3)	07:30	06:52		17:45 (2)	07:02			06:19	05:54	
	17:10	52 15:00 (3)	17:45	18:18	12	17:57 (2)	19:51			20:22	20:49	
6	07:47	14:09 (3)	07:29	06:51			07:00			06:18	05:54	
	17:11	51 15:00 (3)	17:47	18:19	17	17:58 (2)	19:52			20:23	20:50	
7	07:47	14:11 (3)	07:27	06:49			06:59			06:16	05:53	
	17:12	49 15:00 (3)	17:48	18:20	20	17:59 (2)	19:53			20:24	20:51	
8	07:46	14:12 (3)	07:26	06:48			06:57			06:15	05:53	
	17:13	48 15:00 (3)	17:49	18:21	23	18:00 (2)	19:54			20:25	20:51	
9	07:46	14:14 (3)	07:25	06:46			06:56			06:14	05:53	
	17:14	46 15:00 (3)	17:50	18:23	26	18:02 (2)	19:55			20:26	20:52	
10	07:46	14:16 (3)	07:24	06:44			06:54			06:13	05:53	
	17:15	43 14:59 (3)	17:51	18:24	29	18:03 (2)	19:56			20:27	20:52	
11	07:46	14:17 (3)	07:23	06:43			06:53			06:12	05:53	
	17:16	41 14:58 (3)	17:53	18:25	31	18:03 (2)	19:57			20:28	20:53	
12	07:46	14:19 (3)	07:22	06:41			06:51			06:11	05:52	
	17:17	38 14:57 (3)	17:54	18:26	34	18:05 (2)	19:58			20:29	20:53	
13	07:45	14:22 (3)	07:20	06:40			06:49			06:10	05:52	
	17:18	34 14:56 (3)	17:55	18:27	36	18:06 (2)	19:59			20:30	20:54	
14	07:45	14:24 (3)	07:19	06:38			06:48			06:09	05:52	
	17:19	30 14:54 (3)	17:56	18:28	38	18:08 (2)	20:00			20:31	20:54	
15	07:45	14:27 (3)	07:18	06:36			06:46			06:08	05:52	
	17:20	26 14:53 (3)	17:57	18:29	39	18:08 (2)	20:01			20:32	20:55	
16	07:44	14:30 (3)	07:17	06:35			06:45			06:07	05:52	
	17:21	20 14:50 (3)	17:59	18:30	41	18:09 (2)	20:02			20:33	20:55	
17	07:44	14:36 (3)	07:15	06:33			06:43			06:06	05:52	
	17:23	10 14:46 (3)	18:00	18:31	43	18:11 (2)	20:03			20:34	20:55	
18	07:43		07:14	06:32			06:42			06:05	05:52	
	17:24		18:01	18:32	44	18:11 (2)	20:04			20:35	20:56	
19	07:43		07:13	06:30			06:40			06:04	05:53	
	17:25		18:02	18:33	45	18:12 (2)	20:05			20:36	20:56	
20	07:42		07:11	06:28			06:39			06:03	05:53	
	17:26		18:03	18:34	46	18:13 (2)	20:06			20:36	20:56	
21	07:42		07:10	06:27			06:37			06:03	05:53	
	17:27		18:04	18:35	45	18:12 (2)	20:07			20:37	20:57	
22	07:41		07:09	06:25			06:36			06:02	05:53	
	17:28		18:06	18:36	45	18:11 (2)	20:08			20:38	20:57	
23	07:41		07:07	06:23			06:35			06:01	05:53	
	17:30		18:07	18:37	44	18:11 (2)	20:09			20:39	20:57	
24	07:40		07:06	06:22			06:33			06:00	05:54	
	17:31		18:08	18:38	43	18:10 (2)	20:10			20:40	20:57	
25	07:39		07:04	06:20			06:32			06:00	05:54	
	17:32		18:09	18:40	41	18:08 (2)	20:12			20:41	20:57	
26	07:39		07:03	06:18			06:30			05:59	05:54	
	17:33		18:10	18:41	40	18:08 (2)	20:13			20:42	20:57	
27	07:38		07:01	06:17			06:29			05:58	05:55	
	17:34		18:11	18:42	37	18:06 (2)	20:14			20:43	20:57	
28	07:37		07:00	06:15			06:28			05:58	05:55	
	17:36		18:13	18:43	35	18:04 (2)	20:15			20:43	20:57	
29	07:36			07:13			06:26			05:57	05:55	
	17:37			19:44	32	19:03 (2)	20:16			20:44	20:57	
30	07:35			07:12			06:25			05:57	05:56	
	17:38			19:45	29	19:01 (2)	20:17			20:45	20:57	
31	07:34			07:10			06:24			05:56		
	17:39			19:46	24	18:59 (2)				20:46		
Potential sun hours	299		298	370		398			447		450	
Total, worst case	712			939		30						
Sun reduction	0.40			0.47		0.51						
Oper. time red.	0.40			0.40		0.40						
Wind dir. red.	0.61			0.74		0.74						
Total reduction	0.10			0.14		0.15						
Total, real	68			129		4						

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 28

Licensed user:

Ing. Bruno Manca

Via Vittorio Veneto 231

IT-09028 Sestu

+390702358125

Bruno Manca / ingbrunomanca@gmail.com

Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: R - R14

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56	06:20	06:49	07:19	18:10 (2)	06:52
	20:57	20:39	19:57	19:07	34 18:44 (2)	17:21
2	05:57	06:21	06:50	07:20	18:10 (2)	06:53
	20:57	20:38	19:55	19:05	33 18:43 (2)	17:20
3	05:57	06:21	06:51	07:21	18:11 (2)	06:54
	20:57	20:37	19:53	19:04	30 18:41 (2)	17:19
4	05:58	06:22	06:52	07:22	18:12 (2)	06:55
	20:57	20:36	19:52	19:02	27 18:39 (2)	17:18
5	05:58	06:23	06:53	07:23	18:13 (2)	06:56
	20:57	20:34	19:50	19:00	24 18:37 (2)	17:17
6	05:59	06:24	06:54	07:24	18:14 (2)	06:58
	20:56	20:33	19:49	18:59	22 18:36 (2)	17:15
7	05:59	06:25	06:55	07:25	18:17 (2)	06:59
	20:56	20:32	19:47	18:57	18 18:35 (2)	17:14
8	06:00	06:26	06:56	07:26	18:19 (2)	07:00
	20:56	20:31	19:45	18:56	14 18:33 (2)	17:13
9	06:01	06:27	06:57	07:27	18:23 (2)	07:01
	20:55	20:30	19:44	18:54	9 18:32 (2)	17:12
10	06:01	06:28	06:58	18:34 (2)	07:28	07:02
	20:55	20:28	19:42	18:52	10 18:44 (2)	18:52
11	06:02	06:29	06:59	18:29 (2)	07:29	07:03
	20:55	20:27	19:40	18:48 (2)	18:51	17:10
12	06:03	06:30	07:00	18:26 (2)	07:30	07:05
	20:54	20:26	19:39	18:50 (2)	18:49	17:09
13	06:03	06:31	07:01	18:24 (2)	07:31	07:06
	20:54	20:25	19:37	18:52 (2)	18:48	17:08
14	06:04	06:32	07:02	18:22 (2)	07:32	07:07
	20:53	20:23	19:35	18:53 (2)	18:46	17:08
15	06:05	06:33	07:03	18:20 (2)	07:33	07:08
	20:53	20:22	19:34	18:54 (2)	18:45	17:07
16	06:06	06:34	07:04	18:18 (2)	07:34	07:09
	20:52	20:21	19:32	18:55 (2)	18:43	17:06
17	06:06	06:35	07:05	18:17 (2)	07:35	07:10
	20:52	20:19	19:30	18:56 (2)	18:42	17:05
18	06:07	06:36	07:06	18:16 (2)	07:36	07:12
	20:51	20:18	19:29	18:57 (2)	18:40	17:04
19	06:08	06:37	07:07	18:15 (2)	07:37	07:13
	20:50	20:16	19:27	18:57 (2)	18:39	17:04
20	06:09	06:38	07:08	18:14 (2)	07:38	07:14
	20:50	20:15	19:25	18:57 (2)	18:37	17:03
21	06:10	06:39	07:09	18:13 (2)	07:39	07:15
	20:49	20:13	19:24	18:57 (2)	18:36	17:02
22	06:11	06:40	07:10	18:12 (2)	07:41	07:16
	20:48	20:12	19:22	18:57 (2)	18:34	17:02
23	06:11	06:41	07:11	18:11 (2)	07:42	07:17
	20:47	20:10	19:20	18:57 (2)	18:33	17:01
24	06:12	06:42	07:12	18:10 (2)	07:43	07:18
	20:46	20:09	19:19	18:56 (2)	18:32	17:00
25	06:13	06:43	07:13	18:10 (2)	06:44	07:20
	20:46	20:07	19:17	18:54 (2)	17:30	17:00
26	06:14	06:44	07:14	18:09 (2)	06:45	07:21
	20:45	20:06	19:15	18:53 (2)	17:29	16:59
27	06:15	06:45	07:15	18:09 (2)	06:46	07:22
	20:44	20:04	19:14	18:51 (2)	17:28	16:59
28	06:16	06:46	07:16	18:09 (2)	06:47	07:23
	20:43	20:03	19:12	18:49 (2)	17:26	16:59
29	06:17	06:47	07:17	18:09 (2)	06:48	07:24
	20:42	20:01	19:10	18:48 (2)	17:25	16:58
30	06:18	06:48	07:18	18:09 (2)	06:50	07:25
	20:41	20:00	19:09	18:46 (2)	17:24	16:58
31	06:19	06:49		06:51		07:26
	20:40	19:58		17:22		17:06
Potential sun hours	457	427	375	346	299	290
Total, worst case			775	211	156	1765
Sun reduction			0.64	0.56	0.48	0.41
Oper. time red.			0.40	0.40	0.40	0.40
Wind dir. red.			0.74	0.74	0.61	0.61
Total reduction			0.19	0.16	0.11	0.10
Total, real			145	34	18	174

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

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

Printed/Page
2023-12-12 12:06 / 29
Licensed user:
Ing. Bruno Manca
Via Vittorio Veneto 231
IT-09028 Sestu
+390702358125
Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: S - R48

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
3.87 4.61 5.62 6.73 8.36 10.04 11.06 9.91 8.03 6.21 4.80 3.87

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
120 150 155 163 189 206 215 185 142 146 180 335 601 438 155 103 3,483
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	06:58	07:09	06:24	07:19 (5)
	17:07	17:40	18:14	19:47	20:18	80 08:46 (5) 20:46 90 08:49 (5)
2	07:46	07:33	06:57	07:07	06:22	07:25 (5) 05:55 07:18 (5)
	17:08	17:42	18:15	19:48	20:19	82 08:47 (5) 20:47 90 08:48 (5)
3	07:46	07:32	06:55	07:05	06:21	07:23 (5) 05:55 07:19 (5)
	17:08	17:43	18:16	19:49	20:20	83 08:46 (5) 20:48 89 08:48 (5)
4	07:47	07:31	06:54	07:04	06:20	07:23 (5) 05:54 07:19 (5)
	17:09	17:44	18:17	19:50	20:21	84 08:47 (5) 20:49 90 08:49 (5)
5	07:47	07:30	06:52	07:02	06:19	07:22 (5) 05:54 07:19 (5)
	17:10	17:45	18:18	19:51	20:22	85 08:47 (5) 20:49 89 08:48 (5)
6	07:47	07:28	06:51	07:00	06:18	07:22 (5) 05:54 07:19 (5)
	17:11	17:47	18:19	19:52	20:23	86 08:48 (5) 20:50 89 08:48 (5)
7	07:46	07:27	06:49	06:59	06:16	07:21 (5) 05:53 07:20 (5)
	17:12	17:48	18:20	19:53	20:24	87 08:48 (5) 20:51 89 08:49 (5)
8	07:46	07:26	06:48	06:57	06:15	07:21 (5) 05:53 07:20 (5)
	17:13	17:49	18:21	19:54	20:25	87 08:48 (5) 20:51 89 08:49 (5)
9	07:46	07:25	06:46	06:56	06:14	07:20 (5) 05:53 07:21 (5)
	17:14	17:50	18:23	19:55	20:26	89 08:49 (5) 20:52 88 08:49 (5)
10	07:46	07:24	06:44	06:54	06:13	07:20 (5) 05:53 07:20 (5)
	17:15	17:51	18:24	19:56	20:27	89 08:49 (5) 20:52 88 08:48 (5)
11	07:46	07:23	06:43	06:53	06:12	07:20 (5) 05:53 07:20 (5)
	17:16	17:53	18:25	19:57	20:28	89 08:49 (5) 20:53 89 08:49 (5)
12	07:46	07:22	06:41	06:51	06:11	07:19 (5) 05:53 07:21 (5)
	17:17	17:54	18:26	19:58	20:29	90 08:49 (5) 20:53 88 08:49 (5)
13	07:45	07:20	06:40	06:58 (7) 06:49	06:10	07:19 (5) 05:52 07:21 (5)
	17:18	17:55	18:27	2 07:00 (7) 19:59	20:30	90 08:49 (5) 20:54 88 08:49 (5)
14	07:45	07:19	06:38	06:57 (7) 06:48	06:09	07:19 (5) 05:52 07:21 (5)
	17:19	17:56	18:28	5 07:02 (7) 20:00	20:31	90 08:49 (5) 20:54 88 08:49 (5)
15	07:45	07:18	06:36	06:55 (7) 06:46	08:02 (5) 06:08	07:18 (5) 05:52 07:21 (5)
	17:20	17:57	18:29	7 07:02 (7) 20:01	15 08:17 (5) 20:32	91 08:49 (5) 20:55 88 08:49 (5)
16	07:44	07:17	06:35	06:53 (7) 06:45	07:55 (5) 06:07	07:18 (5) 05:52 07:22 (5)
	17:22	17:59	18:30	9 07:02 (7) 20:02	28 08:23 (5) 20:33	91 08:49 (5) 20:55 87 08:49 (5)
17	07:44	07:15	06:33	06:52 (7) 06:43	07:51 (5) 06:06	07:18 (5) 05:52 07:22 (5)
	17:23	18:00	18:31	10 07:02 (7) 20:03	36 08:27 (5) 20:34	91 08:49 (5) 20:55 87 08:49 (5)
18	07:43	07:14	06:32	06:50 (7) 06:42	07:47 (5) 06:05	07:17 (5) 05:53 07:23 (5)
	17:24	18:01	18:32	12 07:02 (7) 20:04	42 08:29 (5) 20:35	92 08:49 (5) 20:56 87 08:50 (5)
19	07:43	07:13	06:30	06:48 (7) 06:40	07:45 (5) 06:04	07:17 (5) 05:53 07:23 (5)
	17:25	18:02	18:33	13 07:01 (7) 20:05	47 08:32 (5) 20:35	91 08:48 (5) 20:56 87 08:50 (5)
20	07:42	07:11	06:28	06:47 (7) 06:39	07:42 (5) 06:03	07:18 (5) 05:53 07:23 (5)
	17:26	18:03	18:34	13 07:00 (7) 20:06	52 08:34 (5) 20:36	91 08:49 (5) 20:56 87 08:50 (5)
21	07:42	07:10	06:27	06:45 (7) 06:37	07:40 (5) 06:03	07:17 (5) 05:53 07:23 (5)
	17:27	18:05	18:35	14 06:59 (7) 20:07	56 08:36 (5) 20:37	92 08:49 (5) 20:57 87 08:50 (5)
22	07:41	07:09	06:25	06:43 (7) 06:36	07:38 (5) 06:02	07:17 (5) 05:53 07:23 (5)
	17:28	18:06	18:36	14 06:57 (7) 20:08	60 08:38 (5) 20:38	92 08:49 (5) 20:57 87 08:50 (5)
23	07:41	07:07	06:23	06:43 (7) 06:35	07:36 (5) 06:01	07:18 (5) 05:53 07:24 (5)
	17:30	18:07	18:37	13 06:56 (7) 20:09	63 08:39 (5) 20:39	91 08:49 (5) 20:57 87 08:51 (5)
24	07:40	07:06	06:22	06:46 (7) 06:33	07:34 (5) 06:00	07:17 (5) 05:54 07:24 (5)
	17:31	18:08	18:38	6 06:52 (7) 20:10	66 08:40 (5) 20:40	92 08:49 (5) 20:57 87 08:51 (5)
25	07:39	07:04	06:20	06:32	07:33 (5) 06:00	07:17 (5) 05:54 07:24 (5)
	17:32	18:09	18:39	20:11	69 08:42 (5) 20:41	91 08:48 (5) 20:57 87 08:51 (5)
26	07:38	07:03	06:18	06:30	07:31 (5) 05:59	07:18 (5) 05:54 07:24 (5)
	17:33	18:10	18:41	20:13	71 08:42 (5) 20:42	91 08:49 (5) 20:57 87 08:51 (5)
27	07:38	07:01	06:17	06:29	07:30 (5) 05:58	07:18 (5) 05:55 07:24 (5)
	17:34	18:11	18:42	20:14	73 08:43 (5) 20:43	91 08:49 (5) 20:57 88 08:52 (5)
28	07:37	07:00	06:15	06:28	07:29 (5) 05:58	07:18 (5) 05:55 07:24 (5)
	17:36	18:13	18:43	20:15	75 08:44 (5) 20:43	91 08:49 (5) 20:57 88 08:52 (5)
29	07:36		07:13	06:26	07:27 (5) 05:57	07:18 (5) 05:55 07:25 (5)
	17:37		19:44	20:16	77 08:44 (5) 20:44	90 08:48 (5) 20:57 88 08:53 (5)
30	07:35		07:12	06:25	07:26 (5) 05:57	07:18 (5) 05:56 07:25 (5)
	17:38		19:45	20:17	79 08:45 (5) 20:45	91 08:49 (5) 20:57 88 08:53 (5)
31	07:34		07:10		05:56	07:18 (5)
	17:39		19:46		20:46	90 08:48 (5)
Potential sun hours	299	298	370	398	447	450
Total, worst case			118	909	2760	2641
Sun reduction			0.47	0.51	0.58	0.67
Oper. time red.			0.40	0.40	0.40	0.40
Wind dir. red.			0.74	0.74	0.74	0.74
Total reduction			0.14	0.15	0.17	0.20
Total, real			16	136	471	520

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 30

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: S - R48

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:56	07:25 (5)	06:20	07:29 (5)	06:49	07:19	07:38 (7)	06:52	07:26			
	20:57	89 08:54 (5)	20:39	90 08:59 (5)	19:57	19:07	2 07:39 (7)	17:21	16:58			
2	05:57	07:25 (5)	06:21	07:29 (5)	06:50	07:20		06:53	07:27			
	20:57	88 08:53 (5)	20:38	89 08:58 (5)	19:55	19:05		17:20	16:57			
3	05:57	07:26 (5)	06:21	07:30 (5)	06:51	07:21		06:54	07:28			
	20:57	88 08:54 (5)	20:37	88 08:58 (5)	19:53	19:04		17:19	16:57			
4	05:58	07:25 (5)	06:22	07:30 (5)	06:52	07:22		06:55	07:29			
	20:57	89 08:54 (5)	20:36	88 08:58 (5)	19:52	19:02		17:18	16:57			
5	05:58	07:26 (5)	06:23	07:31 (5)	06:53	07:23		06:56	07:30			
	20:57	89 08:55 (5)	20:34	87 08:58 (5)	19:50	19:00		17:17	16:57			
6	05:59	07:25 (5)	06:24	07:31 (5)	06:54	07:24		06:58	07:31			
	20:56	90 08:55 (5)	20:33	87 08:58 (5)	19:49	18:59		17:15	16:57			
7	05:59	07:26 (5)	06:25	07:32 (5)	06:55	07:25		06:59	07:32			
	20:56	89 08:55 (5)	20:32	85 08:57 (5)	19:47	18:57		17:14	16:57			
8	06:00	07:26 (5)	06:26	07:32 (5)	06:56	07:26		07:00	07:33			
	20:56	89 08:55 (5)	20:31	85 08:57 (5)	19:45	18:56		17:13	16:57			
9	06:01	07:26 (5)	06:27	07:33 (5)	06:57	07:27		07:01	07:34			
	20:55	90 08:56 (5)	20:30	83 08:56 (5)	19:44	18:54		17:12	16:57			
10	06:01	07:26 (5)	06:28	07:33 (5)	06:58	07:28		07:02	07:34			
	20:55	90 08:56 (5)	20:28	83 08:56 (5)	19:42	18:52		17:11	16:57			
11	06:02	07:26 (5)	06:29	07:34 (5)	06:59	07:29		07:03	07:35			
	20:55	90 08:56 (5)	20:27	81 08:55 (5)	19:40	18:51		17:10	16:57			
12	06:03	07:26 (5)	06:30	07:35 (5)	07:00	07:30		07:05	07:36			
	20:54	91 08:57 (5)	20:26	79 08:54 (5)	19:39	18:49		17:09	16:57			
13	06:03	07:27 (5)	06:31	07:34 (5)	07:01	07:31		07:06	07:37			
	20:54	90 08:57 (5)	20:25	79 08:53 (5)	19:37	18:48		17:08	16:57			
14	06:04	07:26 (5)	06:32	07:35 (5)	07:02	07:32		07:07	07:38			
	20:53	91 08:57 (5)	20:23	77 08:52 (5)	19:35	18:46		17:08	16:57			
15	06:05	07:26 (5)	06:33	07:36 (5)	07:03	07:33		07:08	07:38			
	20:53	91 08:57 (5)	20:22	75 08:51 (5)	19:34	18:45		17:07	16:57			
16	06:06	07:27 (5)	06:34	07:37 (5)	07:04	07:34		07:09	07:39			
	20:52	91 08:58 (5)	20:20	73 08:50 (5)	19:32	18:43		17:06	16:58			
17	06:07	07:27 (5)	06:35	07:38 (5)	07:05	07:35		07:10	07:40			
	20:51	91 08:58 (5)	20:19	71 08:49 (5)	19:30	18:42		17:05	16:58			
18	06:07	07:27 (5)	06:36	07:39 (5)	07:06	07:36		07:12	07:40			
	20:51	91 08:58 (5)	20:18	68 08:47 (5)	19:29	18:40		17:04	16:58			
19	06:08	07:27 (5)	06:37	07:40 (5)	07:07	07:37 (7)		07:13	07:41			
	20:50	91 08:58 (5)	20:16	66 08:46 (5)	19:27	2 07:37 (7)	18:39	17:04	16:59			
20	06:09	07:27 (5)	06:38	07:42 (5)	07:08	07:30 (7)	07:38	07:14	07:42			
	20:49	92 08:59 (5)	20:15	62 08:44 (5)	19:25	11 07:41 (7)	18:37	17:03	16:59			
21	06:10	07:27 (5)	06:39	07:43 (5)	07:09	07:29 (7)	07:39	07:15	07:42			
	20:49	92 08:59 (5)	20:13	59 08:42 (5)	19:24	14 07:43 (7)	18:36	17:02	16:59			
22	06:11	07:28 (5)	06:40	07:45 (5)	07:10	07:30 (7)	07:41	07:16	07:43			
	20:48	91 08:59 (5)	20:12	55 08:40 (5)	19:22	14 07:44 (7)	18:34	17:02	17:00			
23	06:11	07:28 (5)	06:41	07:47 (5)	07:11	07:31 (7)	07:42	07:17	07:43			
	20:47	92 09:00 (5)	20:10	51 08:38 (5)	19:20	14 07:45 (7)	18:33	17:01	17:00			
24	06:12	07:27 (5)	06:42	07:49 (5)	07:12	07:31 (7)	07:43	07:18	07:44			
	20:46	92 08:59 (5)	20:09	47 08:36 (5)	19:19	13 07:44 (7)	18:32	17:01	17:01			
25	06:13	07:28 (5)	06:43	07:51 (5)	07:13	07:32 (7)	06:44	07:20	07:44			
	20:46	91 08:59 (5)	20:07	42 08:33 (5)	19:17	12 07:44 (7)	17:30	17:00	17:02			
26	06:14	07:28 (5)	06:44	07:54 (5)	07:14	07:33 (7)	06:45	07:21	07:45			
	20:45	91 08:59 (5)	20:06	36 08:30 (5)	19:15	11 07:44 (7)	17:29	17:00	17:02			
27	06:15	07:28 (5)	06:45	07:57 (5)	07:15	07:34 (7)	06:46	07:22	07:45			
	20:44	91 08:59 (5)	20:04	27 08:24 (5)	19:14	9 07:43 (7)	17:28	16:59	17:03			
28	06:16	07:29 (5)	06:46	08:04 (5)	07:16	07:35 (7)	06:47	07:23	07:45			
	20:43	91 09:00 (5)	20:03	13 08:17 (5)	19:12	8 07:43 (7)	17:26	16:59	17:04			
29	06:17	07:29 (5)	06:47		07:17	07:36 (7)	06:48	07:24	07:46			
	20:42	91 09:00 (5)	20:01		19:10	6 07:42 (7)	17:25	16:58	17:04			
30	06:18	07:29 (5)	06:48		07:18	07:37 (7)	06:50	07:25	07:46			
	20:41	91 09:00 (5)	20:00		19:09	3 07:40 (7)	17:24	16:58	17:05			
31	06:19	07:30 (5)	06:49				06:51		07:46			
	20:40	90 09:00 (5)	19:58				17:22		17:06			
Potential sun hours	457		427		375		346		299			290
Total, worst case	2803		1926		117		2					
Sun reduction	0.75		0.72		0.64		0.56					
Oper. time red.	0.40		0.40		0.40		0.40					
Wind dir. red.	0.74		0.74		0.74		0.74					
Total reduction	0.22		0.21		0.19		0.16					
Total, real	619		408		22		0					

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 31

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: T - R41

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	13:40 (4)	07:33	14:15 (4)	06:58	07:09	07:27 (7)	06:24	05:56			
	17:07	91 15:11 (4)	17:40	49 15:04 (4)	18:14	19:47	17 07:44 (7)	20:18	20:46			
2	07:46	13:41 (4)	07:32	14:18 (4)	06:57	07:07	07:25 (7)	06:22	05:55			
	17:08	90 15:11 (4)	17:42	45 15:03 (4)	18:15	19:48	19 07:44 (7)	20:19	20:47			
3	07:46	13:41 (4)	07:32	14:21 (4)	06:55	07:05	07:24 (7)	06:21	05:55			
	17:08	91 15:12 (4)	17:43	39 15:00 (4)	18:16	19:49	21 07:45 (7)	20:20	20:48			
4	07:46	13:42 (4)	07:31	14:25 (4)	06:54	07:04	07:22 (7)	06:20	05:54			
	17:09	90 15:12 (4)	17:44	33 14:58 (4)	18:17	19:50	23 07:45 (7)	20:21	20:49			
5	07:47	13:43 (4)	07:30	14:29 (4)	06:52	07:02	07:20 (7)	06:19	05:54			
	17:10	89 15:12 (4)	17:45	25 14:54 (4)	18:18	19:51	24 07:44 (7)	20:22	20:49			
6	07:47	13:44 (4)	07:28	14:36 (4)	06:51	07:00	07:19 (7)	06:18	05:54			
	17:11	89 15:13 (4)	17:47	13 14:49 (4)	18:19	19:52	25 07:44 (7)	20:23	20:50			
7	07:46	13:44 (4)	07:27		06:49	06:59	07:17 (7)	06:16	05:53			
	17:12	89 15:13 (4)	17:48		18:20	19:53	27 07:44 (7)	20:24	20:50			
8	07:46	13:45 (4)	07:26		06:48	06:57	07:16 (7)	06:15	05:53			
	17:13	89 15:14 (4)	17:49		18:21	19:54	28 07:44 (7)	20:25	20:51			
9	07:46	13:46 (4)	07:25		06:46	06:56	07:14 (7)	06:14	05:53			
	17:14	88 15:14 (4)	17:50		18:23	19:55	28 07:42 (7)	20:26	20:52			
10	07:46	13:46 (4)	07:24		06:44	06:54	07:14 (7)	06:13	05:53			
	17:15	87 15:13 (4)	17:51		18:24	19:56	27 07:41 (7)	20:27	20:52			
11	07:46	13:47 (4)	07:23		06:43	06:53	07:15 (7)	06:12	05:53			
	17:16	87 15:14 (4)	17:53		18:25	19:57	25 07:40 (7)	20:28	20:53			
12	07:46	13:48 (4)	07:22		06:41	06:51	07:16 (7)	06:11	05:53			
	17:17	86 15:14 (4)	17:54		18:26	19:58	23 07:39 (7)	20:29	20:53			
13	07:45	13:49 (4)	07:20		06:40	06:49	07:17 (7)	06:10	05:52			
	17:18	85 15:14 (4)	17:55		18:27	19:59	20 07:37 (7)	20:30	20:54			
14	07:45	13:50 (4)	07:19		06:38	06:48	07:18 (7)	06:09	05:52			
	17:19	84 15:14 (4)	17:56		18:28	20:00	17 07:35 (7)	20:31	20:54			
15	07:45	13:51 (4)	07:18		06:36	06:46	07:21 (7)	06:08	05:52			
	17:20	84 15:15 (4)	17:57		18:29	20:01	11 07:32 (7)	20:32	20:55			
16	07:44	13:51 (4)	07:17		06:35	06:45		06:07	05:52			
	17:22	83 15:14 (4)	17:59		18:30	20:02		20:33	20:55			
17	07:44	13:53 (4)	07:15		06:33	06:43		06:06	05:52			
	17:23	81 15:14 (4)	18:00		18:31	20:03		20:34	20:55			
18	07:43	13:53 (4)	07:14		06:32	06:42		06:05	05:52			
	17:24	81 15:14 (4)	18:01		18:32	20:04		20:35	20:56			
19	07:43	13:55 (4)	07:13		06:30	06:40		06:04	05:53			
	17:25	79 15:14 (4)	18:02		18:33	20:05		20:35	20:56			
20	07:42	13:56 (4)	07:11		06:28	06:39		06:03	05:53			
	17:26	78 15:14 (4)	18:03		18:34	20:06		20:36	20:56			
21	07:42	13:57 (4)	07:10		06:27	06:37		06:03	05:53			
	17:27	76 15:13 (4)	18:04		18:35	20:07		20:37	20:57			
22	07:41	13:58 (4)	07:09		06:25	06:36		06:02	05:53			
	17:28	75 15:13 (4)	18:06		18:36	20:08		20:38	20:57			
23	07:41	13:59 (4)	07:07		06:23	06:35		06:01	05:53			
	17:30	74 15:13 (4)	18:07		18:37	20:09		20:39	20:57			
24	07:40	14:00 (4)	07:06		06:22	06:33		06:00	05:54			
	17:31	72 15:12 (4)	18:08		18:38	20:10		20:40	20:57			
25	07:39	14:02 (4)	07:04		06:20	06:32		06:00	05:54			
	17:32	69 15:11 (4)	18:09		18:39	20:11		20:41	20:57			
26	07:38	14:04 (4)	07:03		06:18	06:30		05:59	05:54			
	17:33	67 15:11 (4)	18:10		18:41	20:13		20:42	20:57			
27	07:38	14:05 (4)	07:01		06:17	06:29		05:58	05:55			
	17:34	65 15:10 (4)	18:11		18:42	20:14		20:42	20:57			
28	07:37	14:07 (4)	07:00		06:15	06:33 (7)	06:28	05:58	05:55			
	17:36	62 15:09 (4)	18:13		18:43	5 06:38 (7)	20:15	20:43	20:57			
29	07:36	14:09 (4)			07:13	07:32 (7)	06:26	05:57	05:55			
	17:37	59 15:08 (4)			19:44	9 07:41 (7)	20:16	20:44	20:57			
30	07:35	14:11 (4)			07:12	07:30 (7)	06:25	05:57	05:56			
	17:38	56 15:07 (4)			19:45	12 07:42 (7)	20:17	20:45	20:57			
31	07:34	14:13 (4)			07:10	07:28 (7)		05:56				
	17:39	53 15:06 (4)			19:46	15 07:43 (7)		20:46				
Potential sun hours	299		298		370		398		447		450	
Total, worst case	2449		204		41		335					
Sun reduction	0.40		0.43		0.47		0.51					
Oper. time red.	0.40		0.40		0.40		0.40					
Wind dir. red.	0.61		0.61		0.74		0.74					
Total reduction	0.10		0.10		0.14		0.15					
Total, real	236		21		6		50					

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 32

Licensed user:

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Bruno Manca / ingbrunomanca@gmail.com

Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: T - R41

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:56 20:57	06:20 20:39	06:49 19:57	07:14 (7) 07:39 (7)	07:19 19:07	06:52 17:21	13:29 (4) 14:56 (4)
2	05:57 20:57	06:21 20:38	06:50 19:55	07:13 (7) 07:40 (7)	07:20 19:05	06:53 17:20	13:29 (4) 14:56 (4)
3	05:57 20:57	06:21 20:37	06:51 19:53	07:12 (7) 07:40 (7)	07:21 19:04	06:54 17:19	13:29 (4) 14:57 (4)
4	05:58 20:57	06:22 20:36	06:52 19:52	07:13 (7) 07:41 (7)	07:22 19:02	06:55 17:18	13:29 (4) 14:58 (4)
5	05:58 20:57	06:23 20:34	06:53 19:50	07:14 (7) 07:41 (7)	07:23 19:00	06:56 17:17	13:29 (4) 14:58 (4)
6	05:59 20:56	06:24 20:33	06:54 19:49	07:15 (7) 07:40 (7)	07:24 18:59	06:58 17:15	13:30 (4) 14:59 (4)
7	05:59 20:56	06:25 20:32	06:55 19:47	07:16 (7) 07:40 (7)	07:25 18:57	06:59 17:14	13:30 (4) 14:59 (4)
8	06:00 20:56	06:26 20:31	06:56 19:45	07:16 (7) 07:39 (7)	07:26 18:56	07:00 17:13	13:30 (4) 15:00 (4)
9	06:01 20:55	06:27 20:30	06:57 19:44	07:17 (7) 07:38 (7)	07:27 18:54	07:01 17:12	13:31 (4) 15:01 (4)
10	06:01 20:55	06:28 20:28	06:58 19:42	07:18 (7) 07:37 (7)	07:28 18:52	07:02 17:11	13:31 (4) 15:01 (4)
11	06:02 20:55	06:29 20:27	06:59 19:40	07:19 (7) 07:36 (7)	07:29 18:51	07:03 17:10	13:31 (4) 15:02 (4)
12	06:03 20:54	06:30 20:26	07:00 19:39	07:20 (7) 07:35 (7)	07:30 18:49	07:05 17:09	13:31 (4) 15:02 (4)
13	06:03 20:54	06:31 20:25	07:01 19:37	07:21 (7) 07:34 (7)	07:31 18:48	07:06 17:08	13:31 (4) 15:02 (4)
14	06:04 20:53	06:32 20:23	07:02 19:35	07:22 (7) 07:32 (7)	07:32 18:46	07:07 17:08	13:32 (4) 15:03 (4)
15	06:05 20:53	06:33 20:22	07:03 19:34	07:23 (7) 07:29 (7)	07:33 18:45	07:08 17:07	13:33 (4) 15:04 (4)
16	06:06 20:52	06:34 20:20	07:04 19:32	07:24 (7) 07:25 (7)	07:34 18:43	07:09 17:06	13:32 (4) 15:04 (4)
17	06:06 20:51	06:35 20:19	07:05 19:30	07:25 (7) 07:35	07:35 18:42	07:10 17:05	13:33 (4) 15:05 (4)
18	06:07 20:51	06:36 20:18	07:06 19:29	07:26 (7) 07:36	07:36 18:40	07:12 17:04	13:34 (4) 15:06 (4)
19	06:08 20:50	06:37 20:16	07:07 19:27	07:27 (7) 07:37	07:37 18:39	07:13 17:04	13:34 (4) 15:06 (4)
20	06:09 20:49	06:38 20:15	07:08 19:25	07:28 (7) 07:38	07:38 18:37	07:14 17:03	13:35 (4) 15:06 (4)
21	06:10 20:49	06:39 20:13	07:09 19:24	07:29 (7) 07:39	07:39 18:36	07:15 17:02	13:35 (4) 15:06 (4)
22	06:11 20:48	06:40 20:12	07:10 19:22	07:30 (7) 07:41	07:41 18:34	07:16 17:02	13:36 (4) 15:07 (4)
23	06:11 20:47	06:41 20:10	07:11 19:20	07:31 (7) 07:42	07:42 18:33	07:17 17:01	13:36 (4) 15:07 (4)
24	06:12 20:46	06:42 20:09	07:12 19:19	07:32 (7) 07:43	07:43 18:32	07:18 17:01	13:37 (4) 15:08 (4)
25	06:13 20:45	06:43 20:07	07:13 19:17	07:33 (7) 07:44	07:44 18:30	07:19 17:00	13:37 (4) 15:09 (4)
26	06:14 20:45	06:44 20:06	07:14 19:15	07:34 (7) 07:45	07:45 18:29	07:21 16:59	13:37 (4) 15:09 (4)
27	06:15 20:44	06:45 20:04	07:15 19:14	07:35 (7) 07:46	07:46 18:28	07:22 16:59	13:37 (4) 15:09 (4)
28	06:16 20:43	06:46 20:03	07:16 19:12	07:36 (7) 07:47	07:47 18:26	07:23 16:59	13:39 (4) 15:10 (4)
29	06:17 20:42	06:47 20:01	07:17 (7) 19:10	07:37 (7) 07:48	07:48 18:25	07:24 16:58	13:39 (4) 15:10 (4)
30	06:18 20:41	06:48 20:00	07:18 (7) 19:09	07:38 (7) 07:49	07:49 18:24	07:25 16:58	13:39 (4) 15:10 (4)
31	06:19 20:40	06:49 19:58	07:19 (7) 07:39 (7)	07:40 (7) 07:50	07:50 18:22	07:26 17:06	13:40 (4) 15:11 (4)
Potential sun hours	457	427	375	346	299	290	
Total, worst case		73	310		1678	2806	
Sun reduction		0.72	0.64		0.48	0.41	
Oper. time red.		0.40	0.40		0.40	0.40	
Wind dir. red.		0.74	0.74		0.61	0.61	
Total reduction		0.21	0.19		0.12	0.10	
Total, real		15	59		194	279	

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: U - R15

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	15:52 (3)	07:33	06:58	17:38 (2)	07:09	06:24	05:56				
	17:07	43 16:35 (3)	17:40	18:14	14 17:52 (2)	19:47	20:18	20:46				
2	07:46	15:53 (3)	07:33	06:57	17:37 (2)	07:07	06:22	05:55				
	17:08	42 16:35 (3)	17:42	18:15	17 17:54 (2)	19:48	20:19	20:47				
3	07:46	15:54 (3)	07:32	06:55	17:36 (2)	07:05	06:21	05:55				
	17:08	43 16:37 (3)	17:43	18:16	19 17:55 (2)	19:49	20:20	20:48				
4	07:47	15:54 (3)	07:31	06:54	17:36 (2)	07:04	06:20	05:54				
	17:09	42 16:36 (3)	17:44	18:17	20 17:56 (2)	19:50	20:21	20:49				
5	07:47	15:54 (3)	07:30	06:52	17:36 (2)	07:02	06:19	05:54				
	17:10	42 16:36 (3)	17:45	18:18	21 17:57 (2)	19:51	20:22	20:49				
6	07:47	15:55 (3)	07:28	06:51	17:35 (2)	07:00	06:17	05:54				
	17:11	42 16:37 (3)	17:46	18:19	23 17:58 (2)	19:52	20:23	20:50				
7	07:47	15:55 (3)	07:27	06:49	17:36 (2)	06:59	06:16	05:53				
	17:12	42 16:37 (3)	17:48	18:20	23 17:59 (2)	19:53	20:24	20:51				
8	07:46	15:56 (3)	07:26	06:48	17:36 (2)	06:57	06:15	05:53				
	17:13	42 16:38 (3)	17:49	18:21	24 18:00 (2)	19:54	20:25	20:51				
9	07:46	15:57 (3)	07:25	06:46	17:37 (2)	06:56	06:14	05:53				
	17:14	41 16:38 (3)	17:50	18:23	24 18:01 (2)	19:55	20:26	20:52				
10	07:46	15:58 (3)	07:24	06:44	17:37 (2)	06:54	06:13	05:53				
	17:15	41 16:39 (3)	17:51	18:24	23 18:00 (2)	19:56	20:27	20:52				
11	07:46	15:58 (3)	07:23	06:43	17:38 (2)	06:53	06:12	05:53				
	17:16	40 16:38 (3)	17:53	18:25	20 17:58 (2)	19:57	20:28	20:53				
12	07:46	15:59 (3)	07:22	06:41	17:40 (2)	06:51	06:11	05:52				
	17:17	40 16:39 (3)	17:54	18:26	16 17:56 (2)	19:58	20:29	20:53				
13	07:45	16:00 (3)	07:20	06:40	17:42 (2)	06:49	06:10	05:52				
	17:18	39 16:39 (3)	17:55	18:27	11 17:53 (2)	19:59	20:30	20:54				
14	07:45	16:00 (3)	07:19	06:38	17:36 (2)	06:48	06:09	05:52				
	17:19	39 16:39 (3)	17:56	18:28	20:00	20:31	20:54					
15	07:45	16:01 (3)	07:18	06:36	17:36 (2)	06:46	06:08	05:52				
	17:20	38 16:39 (3)	17:57	18:29	20:01	20:32	20:55					
16	07:44	16:01 (3)	07:17	06:35	17:35 (2)	06:45	06:07	05:52				
	17:21	38 16:39 (3)	17:59	18:30	20:02	20:33	20:55					
17	07:44	16:02 (3)	07:15	06:33	17:34 (2)	06:43	06:06	05:52				
	17:23	37 16:39 (3)	18:00	18:31	20:03	20:34	20:55					
18	07:43	16:03 (3)	07:14	06:32	17:33 (2)	06:42	06:05	05:52				
	17:24	35 16:38 (3)	18:01	18:32	20:04	20:35	20:56					
19	07:43	16:04 (3)	07:13	06:30	17:32 (2)	06:40	06:04	05:53				
	17:25	35 16:39 (3)	18:02	18:33	20:05	20:36	20:56					
20	07:42	16:05 (3)	07:11	06:28	17:31 (2)	06:39	06:03	05:53				
	17:26	33 16:38 (3)	18:03	18:34	20:06	20:36	20:56					
21	07:42	16:06 (3)	07:10	06:27	17:30 (2)	06:37	06:02	05:53				
	17:27	31 16:37 (3)	18:04	18:35	20:07	20:37	20:57					
22	07:41	16:08 (3)	07:09	06:25	17:29 (2)	06:36	06:02	05:53				
	17:28	29 16:37 (3)	18:06	18:36	20:08	20:38	20:57					
23	07:41	16:09 (3)	07:07	06:23	17:28 (2)	06:35	06:01	05:53				
	17:30	27 16:36 (3)	18:07	18:37	20:09	20:39	20:57					
24	07:40	16:10 (3)	07:06	06:22	17:27 (2)	06:33	06:00	05:54				
	17:31	25 16:35 (3)	18:08	18:38	20:10	20:40	20:57					
25	07:39	16:13 (3)	07:04	17:44 (2)	06:20	06:32	06:00	05:54				
	17:32	21 16:34 (3)	18:09	17:47 (2)	18:39	20:12	20:41	20:57				
26	07:39	16:15 (3)	07:03	17:42 (2)	06:18	06:30	05:59	05:54				
	17:33	17 16:32 (3)	18:10	17:49 (2)	18:41	20:13	20:42	20:57				
27	07:38	16:18 (3)	07:01	17:40 (2)	06:17	06:29	05:58	05:54				
	17:34	11 16:29 (3)	18:11	17:50 (2)	18:42	20:14	20:43	20:57				
28	07:37	16:19 (3)	07:00	17:39 (2)	06:15	06:28	05:58	05:55				
	17:35	18:13	12 17:51 (2)	18:43	20:15	20:43	20:57					
29	07:36			07:13	17:38 (2)	06:26	05:57	05:55				
	17:37			19:44	20:16	20:44	20:57					
30	07:35			07:12	17:37 (2)	06:25	05:57	05:56				
	17:38			19:45	20:17	20:45	20:57					
31	07:34			07:10	17:36 (2)	06:24	05:56	05:56				
	17:39			19:46	20:18	20:46	20:57					
Potential sun hours	299	298	370	398	447	450						
Total, worst case	955	32	255									
Sun reduction	0.40	0.43	0.47									
Oper. time red.	0.40	0.40	0.40									
Wind dir. red.	0.69	0.74	0.74									
Total reduction	0.11	0.13	0.14									
Total, real	105	4	35									

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: U - R15

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56	06:20	06:49	07:19	18:19 (2)	06:52
	20:57	20:39	19:57	19:07	15	18:34 (2)
2	05:57	06:20	06:50	07:20	18:17 (2)	06:53
	20:57	20:38	19:55	19:05	19	18:36 (2)
3	05:57	06:21	06:51	07:21	18:15 (2)	06:54
	20:57	20:37	19:53	19:04	22	18:37 (2)
4	05:58	06:22	06:52	07:22	18:14 (2)	06:55
	20:57	20:36	19:52	19:02	24	18:38 (2)
5	05:58	06:23	06:53	07:23	18:13 (2)	06:56
	20:57	20:34	19:50	19:00	24	18:37 (2)
6	05:59	06:24	06:54	07:24	18:12 (2)	06:58
	20:56	20:33	19:49	18:59	24	18:36 (2)
7	05:59	06:25	06:55	07:25	18:11 (2)	06:59
	20:56	20:32	19:47	18:57	23	18:34 (2)
8	06:00	06:26	06:56	07:26	18:11 (2)	07:00
	20:56	20:31	19:45	18:56	22	18:33 (2)
9	06:01	06:27	06:57	07:27	18:11 (2)	07:01
	20:55	20:30	19:44	18:54	21	18:32 (2)
10	06:01	06:28	06:58	07:28	18:11 (2)	07:02
	20:55	20:28	19:42	18:52	19	18:30 (2)
11	06:02	06:29	06:59	07:29	18:11 (2)	07:03
	20:55	20:27	19:40	18:51	17	18:28 (2)
12	06:03	06:30	07:00	07:30	18:11 (2)	07:05
	20:54	20:26	19:39	18:49	16	18:27 (2)
13	06:03	06:31	07:01	07:31	18:11 (2)	07:06
	20:54	20:25	19:37	18:48	14	18:25 (2)
14	06:04	06:32	07:02	07:32	18:12 (2)	07:07
	20:53	20:23	19:35	18:46	11	18:23 (2)
15	06:05	06:33	07:03	07:33	18:13 (2)	07:08
	20:53	20:22	19:34	18:45	9	18:22 (2)
16	06:06	06:34	07:04	07:34	18:14 (2)	07:09
	20:52	20:20	19:32	18:43	6	18:20 (2)
17	06:06	06:35	07:05	07:35	18:16 (2)	07:10
	20:52	20:19	19:30	18:42	2	18:18 (2)
18	06:07	06:36	07:06	07:36	18:17 (2)	07:11
	20:51	20:18	19:29	18:40	17	18:17 (2)
19	06:08	06:37	07:07	07:37	18:18 (2)	07:12
	20:50	20:16	19:27	18:39	16	18:16 (2)
20	06:09	06:38	07:08	07:38	18:19 (2)	07:13
	20:50	20:15	19:25	18:37	15	18:15 (2)
21	06:10	06:39	07:09	07:39	18:20 (2)	07:14
	20:49	20:13	19:24	18:36	14	18:14 (2)
22	06:11	06:40	07:10	07:41	18:21 (2)	07:15
	20:48	20:12	19:22	18:34	13	18:13 (2)
23	06:11	06:41	07:11	07:42	18:22 (2)	07:16
	20:47	20:10	19:20	18:33	12	18:12 (2)
24	06:12	06:42	07:12	07:43	18:23 (2)	07:17
	20:46	20:09	19:19	18:32	11	18:11 (2)
25	06:13	06:43	07:13	07:44	18:24 (2)	07:18
	20:46	20:07	19:17	18:31	10	18:10 (2)
26	06:14	06:44	07:14	07:45	18:25 (2)	07:19
	20:45	20:06	19:15	18:30	9	18:09 (2)
27	06:15	06:45	07:15	07:46	18:26 (2)	07:20
	20:44	20:04	19:14	18:29	8	18:08 (2)
28	06:16	06:46	07:16	07:47	18:27 (2)	07:21
	20:43	20:03	19:12	18:28	7	18:07 (2)
29	06:17	06:47	07:17	07:48	18:28 (2)	07:22
	20:42	20:01	19:10	18:27	6	18:06 (2)
30	06:18	06:48	07:18	07:49	18:29 (2)	07:23
	20:41	20:00	19:09	18:26	5	18:05 (2)
31	06:19	06:48		07:50	18:30 (2)	07:24
	20:40	19:58		18:25	4	18:04 (2)
Potential sun hours	457	427	375	346	299	290
Total, worst case			8	288	494	1316
Sun reduction			0.64	0.56	0.48	0.41
Oper. time red.			0.40	0.40	0.40	0.40
Wind dir. red.			0.74	0.74	0.69	0.69
Total reduction			0.19	0.16	0.13	0.11
Total, real			2	47	65	150

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 35

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: V - R42

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	06:58	15:05 (4) 07:09	15:50 (4) 06:24	06:43 (7) 05:56
	17:07	17:40	18:14	85 16:30 (4) 19:47	110 17:40 (4) 20:18	74 17:10 (4) 20:46
2	07:46	07:32	06:57	15:04 (4) 07:07	15:50 (4) 06:22	06:43 (7) 05:55
	17:08	17:42	18:15	88 16:32 (4) 19:48	109 17:39 (4) 20:19	71 17:09 (4) 20:47
3	07:46	07:32	06:55	15:02 (4) 07:05	15:51 (4) 06:21	06:42 (7) 05:55
	17:08	17:43	18:16	90 16:32 (4) 19:49	108 17:39 (4) 20:20	67 17:06 (4) 20:48
4	07:46	07:31	06:54	15:01 (4) 07:04	15:51 (4) 06:20	06:42 (7) 05:54
	17:09	17:44	18:17	93 16:34 (4) 19:50	107 17:38 (4) 20:21	62 17:04 (4) 20:49
5	07:47	07:29	06:52	14:59 (4) 07:02	15:52 (4) 06:19	06:42 (7) 05:54
	17:10	17:45	18:18	96 16:35 (4) 19:51	105 17:37 (4) 20:22	56 17:01 (4) 20:49
6	07:46	07:28	06:51	14:57 (4) 07:00	15:53 (4) 06:18	06:42 (7) 05:54
	17:11	17:47	18:19	98 16:35 (4) 19:52	104 17:37 (4) 20:23	49 16:58 (4) 20:50
7	07:46	07:27	06:49	14:56 (4) 06:59	15:53 (4) 06:16	06:43 (7) 05:53
	17:12	17:48	18:20	101 16:37 (4) 19:53	103 17:36 (4) 20:24	34 16:51 (4) 20:50
8	07:46	07:26	06:48	14:55 (4) 06:57	15:55 (4) 06:15	06:43 (7) 05:53
	17:13	17:49	18:21	102 16:37 (4) 19:54	101 17:36 (4) 20:25	28 07:11 (7) 20:51
9	07:46	07:25	06:46	14:54 (4) 06:56	15:55 (4) 06:14	06:44 (7) 05:53
	17:14	17:50	18:23	104 16:38 (4) 19:55	100 17:35 (4) 20:26	27 07:11 (7) 20:52
10	07:46	07:24	06:44	14:53 (4) 06:54	15:56 (4) 06:13	06:44 (7) 05:53
	17:15	17:51	18:24	106 16:39 (4) 19:56	98 17:34 (4) 20:27	26 07:10 (7) 20:52
11	07:46	07:23	06:43	14:52 (4) 06:53	15:57 (4) 06:12	06:45 (7) 05:53
	17:16	17:53	18:25	107 16:39 (4) 19:57	97 17:34 (4) 20:28	24 07:09 (7) 20:53
12	07:46	07:22	06:41	14:52 (4) 06:51	15:58 (4) 06:11	06:46 (7) 05:53
	17:17	17:54	18:26	108 16:40 (4) 19:58	94 17:32 (4) 20:29	22 07:08 (7) 20:53
13	07:45	07:20	06:40	14:50 (4) 06:49	16:00 (4) 06:10	06:47 (7) 05:52
	17:18	17:55	18:27	110 16:40 (4) 19:59	92 17:32 (4) 20:30	20 07:07 (7) 20:54
14	07:45	07:19	06:38	14:50 (4) 06:48	16:00 (4) 06:09	06:48 (7) 05:52
	17:19	17:56	18:28	111 16:41 (4) 20:00	91 17:31 (4) 20:31	18 07:06 (7) 20:54
15	07:45	07:18	06:36	14:49 (4) 06:46	16:02 (4) 06:08	06:50 (7) 05:52
	17:20	17:57	18:29	112 16:41 (4) 20:01	88 17:30 (4) 20:32	14 07:04 (7) 20:55
16	07:44	07:17	06:35	14:48 (4) 06:45	16:03 (4) 06:07	06:52 (7) 05:52
	17:22	17:59	18:30	113 16:41 (4) 20:02	86 17:29 (4) 20:33	10 07:02 (7) 20:55
17	07:44	07:15	06:33	14:49 (4) 06:43	16:04 (4) 06:06	05:52
	17:23	18:00	18:31	113 16:42 (4) 20:03	84 17:28 (4) 20:34	20:55
18	07:43	07:14	15:39 (4) 06:31	14:48 (4) 06:42	16:05 (4) 06:05	05:53
	17:24	18:01	20 15:59 (4) 18:32	114 16:42 (4) 20:04	82 17:27 (4) 20:35	20:56
19	07:43	07:13	15:33 (4) 06:30	14:47 (4) 06:40	16:07 (4) 06:04	05:53
	17:25	18:02	33 16:06 (4) 18:33	114 16:41 (4) 20:05	79 17:26 (4) 20:35	20:56
20	07:42	07:11	15:27 (4) 06:28	14:48 (4) 06:39	16:07 (4) 06:03	05:53
	17:26	18:03	43 16:10 (4) 18:34	114 16:42 (4) 20:06	78 17:25 (4) 20:36	20:56
21	07:42	07:10	15:24 (4) 06:27	14:47 (4) 06:37	16:09 (4) 06:03	05:53
	17:27	18:04	50 16:14 (4) 18:35	115 16:42 (4) 20:07	75 17:24 (4) 20:37	20:57
22	07:41	07:09	15:21 (4) 06:25	14:47 (4) 06:36	06:55 (7) 06:02	05:53
	17:28	18:06	56 16:17 (4) 18:36	114 16:41 (4) 20:08	82 17:23 (4) 20:38	20:57
23	07:41	07:07	15:18 (4) 06:23	14:47 (4) 06:35	06:53 (7) 06:01	05:53
	17:30	18:07	61 16:19 (4) 18:37	115 16:42 (4) 20:09	84 17:22 (4) 20:39	20:57
24	07:40	07:06	15:16 (4) 06:22	14:47 (4) 06:33	06:52 (7) 06:00	05:54
	17:31	18:08	66 16:22 (4) 18:38	115 16:42 (4) 20:10	84 17:21 (4) 20:40	20:57
25	07:39	07:04	15:13 (4) 06:20	14:47 (4) 06:32	06:51 (7) 06:00	05:54
	17:32	18:09	70 16:23 (4) 18:39	114 16:41 (4) 20:11	85 17:20 (4) 20:41	20:57
26	07:38	07:03	15:11 (4) 06:18	14:47 (4) 06:30	06:49 (7) 05:59	05:54
	17:33	18:10	75 16:26 (4) 18:41	115 16:42 (4) 20:12	84 17:18 (4) 20:42	20:57
27	07:38	07:01	15:08 (4) 06:17	14:47 (4) 06:29	06:48 (7) 05:58	05:55
	17:34	18:11	79 16:27 (4) 18:42	114 16:41 (4) 20:14	83 17:17 (4) 20:42	20:57
28	07:37	07:00	15:07 (4) 06:15	14:47 (4) 06:28	06:47 (7) 05:58	05:55
	17:36	18:13	82 16:29 (4) 18:43	113 16:40 (4) 20:15	82 17:16 (4) 20:43	20:57
29	07:36		07:13	15:48 (4) 06:26	06:45 (7) 05:57	05:55
	17:37		19:44	113 17:41 (4) 20:16	79 17:13 (4) 20:44	20:57
30	07:35		07:12	15:48 (4) 06:25	06:44 (7) 05:57	05:56
	17:38		19:45	112 17:40 (4) 20:17	78 17:12 (4) 20:45	20:57
31	07:34		07:10	15:48 (4)	05:56	
	17:39		19:46	111 17:39 (4)	20:46	
Potential sun hours	299	298	370	398	447	450
Total, worst case		635	3330	2732	602	
Sun reduction		0.43	0.47	0.51	0.58	
Oper. time red.		0.40	0.40	0.40	0.40	
Wind dir. red.		0.72	0.72	0.72	0.73	
Total reduction		0.12	0.14	0.15	0.17	
Total, real		79	450	399	102	

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

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

Project:

windpro Nuoro nord - flickering

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Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: V - R42

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:56	06:20	06:55 (7)	06:49	15:56 (4)	07:19	15:30 (4)	06:52	07:26
	20:57	20:39	23 07:18 (7)	19:57	97 17:33 (4)	19:07	109 17:19 (4)	17:21	16:58
2	05:57	06:21	06:54 (7)	06:50	15:55 (4)	07:20	15:30 (4)	06:53	07:27
	20:57	20:38	25 07:19 (7)	19:55	98 17:33 (4)	19:05	108 17:18 (4)	17:20	16:57
3	05:57	06:21	06:54 (7)	06:51	15:53 (4)	07:21	15:30 (4)	06:54	07:28
	20:57	20:37	26 07:20 (7)	19:53	100 17:33 (4)	19:04	107 17:17 (4)	17:19	16:57
4	05:58	06:22	06:53 (7)	06:52	15:52 (4)	07:22	15:31 (4)	06:55	07:29
	20:57	20:36	27 07:20 (7)	19:52	101 17:33 (4)	19:02	104 17:15 (4)	17:18	16:57
5	05:58	06:23	06:53 (7)	06:53	15:51 (4)	07:23	15:31 (4)	06:56	07:30
	20:57	20:34	28 07:21 (7)	19:50	102 17:33 (4)	19:00	103 17:14 (4)	17:17	16:57
6	05:59	06:24	06:52 (7)	06:54	15:49 (4)	07:24	15:32 (4)	06:58	07:31
	20:56	20:33	41 17:04 (4)	19:49	104 17:33 (4)	18:59	101 17:13 (4)	17:15	16:57
7	05:59	06:25	06:52 (7)	06:55	15:48 (4)	07:25	15:32 (4)	06:59	07:32
	20:56	20:32	52 17:09 (4)	19:47	105 17:33 (4)	18:57	99 17:11 (4)	17:14	16:57
8	06:00	06:26	06:52 (7)	06:56	15:45 (4)	07:26	15:34 (4)	07:00	07:33
	20:56	20:31	58 17:12 (4)	19:45	107 17:32 (4)	18:56	97 17:11 (4)	17:13	16:57
9	06:01	06:27	06:51 (7)	06:57	15:44 (4)	07:27	15:35 (4)	07:01	07:34
	20:55	20:30	64 17:14 (4)	19:44	108 17:32 (4)	18:54	95 17:10 (4)	17:12	16:57
10	06:01	06:28	06:51 (7)	06:58	15:43 (4)	07:28	15:36 (4)	07:02	07:34
	20:55	20:28	69 17:16 (4)	19:42	109 17:32 (4)	18:52	92 17:08 (4)	17:11	16:57
11	06:02	06:29	06:51 (7)	06:59	15:42 (4)	07:29	15:37 (4)	07:03	07:35
	20:55	20:27	73 17:18 (4)	19:40	110 17:32 (4)	18:51	89 17:06 (4)	17:10	16:57
12	06:03	06:30	06:52 (7)	07:00	15:41 (4)	07:30	15:38 (4)	07:05	07:36
	20:54	20:26	76 17:20 (4)	19:39	110 17:31 (4)	18:49	86 17:04 (4)	17:09	16:57
13	06:03	06:31	06:52 (7)	07:01	15:40 (4)	07:31	15:39 (4)	07:06	07:37
	20:54	20:24	77 17:20 (4)	19:37	111 17:31 (4)	18:48	84 17:03 (4)	17:08	16:57
14	06:04	06:32	06:53 (7)	07:02	15:39 (4)	07:32	15:40 (4)	07:07	07:38
	20:53	20:23	79 17:21 (4)	19:35	112 17:31 (4)	18:46	81 17:01 (4)	17:08	16:57
15	06:05	06:33	06:54 (7)	07:03	15:38 (4)	07:33	15:42 (4)	07:08	07:38
	20:53	20:22	81 17:23 (4)	19:34	113 17:31 (4)	18:45	77 16:59 (4)	17:07	16:57
16	06:06	06:34	06:55 (7)	07:04	15:37 (4)	07:34	15:43 (4)	07:09	07:39
	20:52	20:20	82 17:24 (4)	19:32	113 17:30 (4)	18:43	73 16:56 (4)	17:06	16:58
17	06:06	06:35	06:56 (7)	07:05	15:36 (4)	07:35	15:45 (4)	07:10	07:40
	20:51	20:19	83 17:25 (4)	19:30	114 17:30 (4)	18:42	69 16:54 (4)	17:05	16:58
18	06:07	06:36	06:57 (7)	07:06	15:35 (4)	07:36	15:47 (4)	07:12	07:40
	20:51	20:18	84 17:26 (4)	19:29	114 17:29 (4)	18:40	64 16:51 (4)	17:04	16:58
19	06:08	06:37	06:58 (7)	07:07	15:34 (4)	07:37	15:50 (4)	07:13	07:41
	20:50	20:16	85 17:27 (4)	19:27	115 17:29 (4)	18:39	60 16:50 (4)	17:04	16:59
20	06:09	06:38	06:59 (7)	07:08	15:34 (4)	07:38	15:53 (4)	07:14	07:42
	20:49	20:15	85 17:28 (4)	19:25	114 17:28 (4)	18:37	54 16:47 (4)	17:03	16:59
21	06:10	06:39	07:00 (7)	07:09	15:33 (4)	07:39	15:56 (4)	07:15	07:42
	20:49	20:13	83 17:28 (4)	19:24	115 17:28 (4)	18:36	47 16:43 (4)	17:02	16:59
22	06:11	06:40	16:14 (4)	07:10	15:32 (4)	07:41	15:59 (4)	07:16	07:43
	20:48	20:12	75 17:29 (4)	19:22	115 17:27 (4)	18:34	40 16:39 (4)	17:02	17:00
23	06:11	06:41	16:12 (4)	07:11	15:31 (4)	07:42	16:04 (4)	07:17	07:43
	20:47	20:10	78 17:30 (4)	19:20	115 17:26 (4)	18:33	30 16:34 (4)	17:01	17:00
24	06:12	06:42	16:10 (4)	07:12	15:31 (4)	07:43	16:12 (4)	07:18	07:44
	20:46	20:09	80 17:30 (4)	19:19	114 17:25 (4)	18:32	14 16:26 (4)	17:01	17:01
25	06:13	06:43	16:09 (4)	07:13	15:30 (4)	06:44		07:19	07:44
	20:45	20:07	82 17:31 (4)	19:17	114 17:24 (4)	17:30		17:00	17:02
26	06:14	06:44	16:06 (4)	07:14	15:30 (4)	06:45		07:21	07:44
	20:45	20:06	84 17:30 (4)	19:15	113 17:23 (4)	17:29		17:00	17:02
27	06:15	07:04 (7)	16:04 (4)	07:15	15:30 (4)	06:46		07:22	07:45
	20:44	6 07:10 (7)	20:04	19:14	113 17:23 (4)	17:28		16:59	17:03
28	06:16	07:01 (7)	16:03 (4)	07:16	15:30 (4)	06:47		07:23	07:45
	20:43	12 07:13 (7)	20:03	19:12	112 17:22 (4)	17:26		16:59	17:04
29	06:17	06:59 (7)	16:01 (4)	07:17	15:30 (4)	06:48		07:24	07:45
	20:42	16 07:15 (7)	20:01	19:11	111 17:21 (4)	17:25		16:58	17:04
30	06:18	06:58 (7)	16:00 (4)	07:18	15:30 (4)	06:49		07:25	07:46
	20:41	19 07:17 (7)	20:00	19:09	110 17:20 (4)	17:24		16:58	17:05
31	06:19	06:56 (7)	15:58 (4)			06:51			07:46
	20:40	21 07:17 (7)	19:58	17:32 (4)		17:22			17:06
Potential sun hours	457	427	375		346		299		290
Total, worst case	74	2152	3289		1883				
Sun reduction	0.75	0.72	0.64		0.56				
Oper. time red.	0.40	0.40	0.40		0.40				
Wind dir. red.	0.74	0.73	0.72		0.72				
Total reduction	0.22	0.21	0.18		0.16				
Total, real	16	447	607		301				

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

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

Project:

windpro Nuoro nord - flickering

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IT-09028 Sestu

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: W - R16

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:46 17:07	07:33 17:40	16:24 (3) 17:08 (3)	06:58 18:14	07:09 19:47	06:24 20:18	
2	07:46 17:08	07:33 17:42	16:25 (3) 17:08 (3)	06:57 18:15	07:07 19:48	06:22 20:19	
3	07:46 17:08	07:32 17:43	16:25 (3) 17:08 (3)	06:55 18:16	07:05 19:49	06:21 20:20	
4	07:47 17:09	07:31 17:44	16:25 (3) 17:08 (3)	06:54 18:17	07:04 19:50	06:20 20:21	
5	07:47 17:10	07:30 17:45	16:26 (3) 17:08 (3)	06:52 18:18	07:02 19:51	06:19 20:22	
6	07:47 17:11	07:28 17:46	16:26 (3) 17:08 (3)	06:51 18:19	07:00 19:52	06:17 20:23	
7	07:46 17:12	07:27 17:48	16:27 (3) 17:08 (3)	06:49 18:20	06:59 19:53	06:16 20:24	
8	07:46 17:13	07:26 17:49	16:27 (3) 17:08 (3)	06:48 18:21	06:57 19:54	06:15 20:25	
9	07:46 17:14	07:25 17:50	16:28 (3) 17:08 (3)	06:46 18:23	18:00 (2) 19:55	06:14 20:26	
10	07:46 17:15	07:24 17:51	16:28 (3) 17:06 (3)	06:44 18:24	17:55 (2) 18:03 (2)	06:13 19:56	
11	07:46 17:16	16:36 (3) 16:44 (3)	07:23 17:53	16:29 (3) 17:06 (3)	06:43 18:25	06:12 19:57	
12	07:46 17:17	8 16:34 (3)	07:22 17:54	16:30 (3) 17:05 (3)	06:41 18:26	10 18:03 (2)	06:11 19:58
13	07:45 17:18	13 16:47 (3)	07:20 17:55	16:32 (3) 17:04 (3)	06:40 18:27	13 18:05 (2)	06:10 19:59
14	07:45 17:19	17 16:50 (3)	07:19 17:56	16:33 (3) 17:02 (3)	06:38 18:28	16 18:06 (2)	06:09 20:00
15	07:45 17:20	20 16:51 (3)	07:18 17:57	16:35 (3) 17:01 (3)	06:36 18:29	19 18:08 (2)	06:08 20:01
16	07:44 17:21	24 16:54 (3)	07:17 17:59	16:37 (3) 16:59 (3)	06:35 18:30	20 18:09 (2)	06:07 20:02
17	07:44 17:22	26 16:55 (3)	07:15 18:00	16:39 (3) 16:56 (3)	06:33 18:31	22 18:09 (2)	06:06 20:03
18	07:43 17:23	27 16:56 (3)	07:14 18:01	16:44 (3) 16:52 (3)	06:31 18:32	24 18:11 (2)	06:05 20:04
19	07:43 17:24	29 16:57 (3)	07:13 18:02	16:44 (3) 18:33	06:30 18:34	24 18:12 (2)	06:04 20:05
20	07:42 17:25	31 16:58 (3)	07:11 18:03	16:45 (3) 18:34	06:29 18:35	26 18:13 (2)	06:03 20:06
21	07:42 17:26	33 17:00 (3)	07:10 18:04	16:46 (3) 18:35	06:28 18:36	26 18:14 (2)	06:02 20:07
22	07:41 17:27	35 17:01 (3)	07:09 18:05	16:47 (3) 18:36	06:27 18:37	25 18:15 (2)	06:01 20:08
23	07:41 17:28	36 17:02 (3)	07:08 18:06	16:48 (3) 18:37	06:26 18:38	24 18:16 (2)	06:00 20:09
24	07:40 17:29	37 17:03 (3)	07:07 18:07	16:49 (3) 18:38	06:25 18:39	21 18:17 (2)	06:00 20:10
25	07:39 17:30	38 17:04 (3)	07:06 18:08	16:50 (3) 18:39	06:24 18:40	19 18:18 (2)	06:00 20:11
26	07:39 17:31	39 17:05 (3)	07:05 18:09	16:51 (3) 18:40	06:23 18:41	14 18:19 (2)	06:00 20:12
27	07:38 17:32	40 17:06 (3)	07:04 18:10	16:52 (3) 18:41	06:22 18:42	6 18:20 (2)	06:00 20:13
28	07:38 17:33	41 17:07 (3)	07:03 18:11	16:53 (3) 18:42	06:21 18:43	6 18:21 (2)	06:00 20:14
29	07:37 17:34	42 17:08 (3)	07:02 18:12	16:54 (3) 18:43	06:20 18:44	6 18:22 (2)	06:00 20:15
30	07:37 17:35	43 17:09 (3)	07:01 18:13	16:55 (3) 18:44	06:19 18:45	6 18:23 (2)	06:00 20:16
31	07:36 17:36	44 17:10 (3)	07:00 18:14	16:56 (3) 18:45	06:18 18:46	6 18:24 (2)	06:00 20:17
Potential sun hours	299	298	370	398	447	450	
Total, worst case	664	623	319				
Sun reduction	0.40	0.43	0.47				
Oper. time red.	0.40	0.40	0.40				
Wind dir. red.	0.71	0.71	0.74				
Total reduction	0.11	0.12	0.14				
Total, real	75	76	44				

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 38

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: W - R16

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December			
1	05:56	06:20	06:49	07:19	18:30 (2)	06:52	15:58 (3)	07:26	16:18 (3)
	20:57	20:39	19:57	19:07	14 18:44 (2)	17:21	38 16:36 (3)	16:58	8 16:26 (3)
2	05:57	06:20	06:50	07:20	18:31 (2)	06:53	15:57 (3)	07:27	
	20:57	20:38	19:55	19:05	12 18:43 (2)	17:20	39 16:36 (3)	16:57	
3	05:57	06:21	06:51	07:21	18:32 (2)	06:54	15:57 (3)	07:28	
	20:57	20:37	19:53	19:04	9 18:41 (2)	17:19	41 16:38 (3)	16:57	
4	05:58	06:22	06:52	07:22	18:34 (2)	06:55	15:56 (3)	07:29	
	20:57	20:36	19:52	19:02	5 18:39 (2)	17:18	42 16:38 (3)	16:57	
5	05:58	06:23	06:53	07:23	06:56	15:56 (3)	07:30		
	20:57	20:34	19:50	19:00	17:17	42 16:38 (3)	16:57		
6	05:59	06:24	06:54	07:24	06:58	15:55 (3)	07:31		
	20:56	20:33	19:49	18:59	17:15	43 16:38 (3)	16:57		
7	05:59	06:25	06:55	07:25	06:59	15:56 (3)	07:32		
	20:56	20:32	19:47	18:57	17:14	43 16:39 (3)	16:57		
8	06:00	06:26	06:56	07:26	07:00	15:56 (3)	07:33		
	20:56	20:31	19:45	18:56	17:13	43 16:39 (3)	16:56		
9	06:01	06:27	06:57	07:27	07:01	15:55 (3)	07:34		
	20:55	20:30	19:44	18:54	17:12	44 16:39 (3)	16:56		
10	06:01	06:28	06:58	07:28	07:02	15:55 (3)	07:34		
	20:55	20:28	19:42	18:52	17:11	44 16:39 (3)	16:57		
11	06:02	06:29	06:59	07:29	07:03	15:56 (3)	07:35		
	20:55	20:27	19:40	18:51	17:10	43 16:39 (3)	16:57		
12	06:03	06:30	07:00	07:30	07:05	15:56 (3)	07:36		
	20:54	20:26	19:39	18:49	17:09	43 16:39 (3)	16:57		
13	06:03	06:31	07:01	07:31	07:06	15:56 (3)	07:37		
	20:54	20:25	19:37	18:48	17:08	43 16:39 (3)	16:57		
14	06:04	06:32	07:02	07:32	07:07	15:57 (3)	07:38		
	20:53	20:23	19:35	18:46	17:08	41 16:38 (3)	16:57		
15	06:05	06:33	07:03	07:33	07:08	15:58 (3)	07:38		
	20:53	20:22	19:34	18:45	17:07	41 16:39 (3)	16:57		
16	06:06	06:34	07:04	07:34	07:09	15:58 (3)	07:39		
	20:52	20:20	19:32	18:43	17:06	40 16:38 (3)	16:58		
17	06:06	06:35	07:05	18:46 (2)	07:35	07:10	15:59 (3)	07:40	
	20:52	20:19	19:30	2 18:47 (2)	18:42	17:05	39 16:38 (3)	16:58	
18	06:07	06:36	07:06	18:40 (2)	07:36	07:12	15:59 (3)	07:40	
	20:51	20:18	19:29	12 18:52 (2)	18:40	17:04	38 16:37 (3)	16:58	
19	06:08	06:37	07:07	18:37 (2)	07:37	07:13	16:00 (3)	07:41	
	20:50	20:16	19:27	17 18:54 (2)	18:39	17:04	37 16:37 (3)	16:59	
20	06:09	06:38	07:08	18:35 (2)	07:38	07:14	16:01 (3)	07:42	
	20:49	20:15	19:25	21 18:56 (2)	18:37	17:03	36 16:37 (3)	16:59	
21	06:10	06:39	07:09	18:34 (2)	07:39	07:15	16:02 (3)	07:42	
	20:49	20:13	19:24	23 18:57 (2)	18:36	17:02	35 16:37 (3)	16:59	
22	06:11	06:40	07:10	18:33 (2)	07:41	07:16	16:03 (3)	07:43	
	20:48	20:12	19:22	24 18:57 (2)	18:34	17:02	33 16:36 (3)	17:00	
23	06:11	06:41	07:11	18:31 (2)	07:42	07:17	16:04 (3)	07:43	
	20:47	20:10	19:20	26 18:57 (2)	18:33	17:01	31 16:35 (3)	17:00	
24	06:12	06:42	07:12	18:30 (2)	07:43	17:12 (3)	07:18	16:05 (3)	07:44
	20:46	20:09	19:19	26 18:56 (2)	18:32	11 17:23 (3)	17:00	29 16:34 (3)	17:01
25	06:13	06:43	07:13	18:29 (2)	06:44	16:09 (3)	07:20	16:07 (3)	07:44
	20:46	20:07	19:17	25 18:54 (2)	17:30	18 16:27 (3)	17:00	28 16:35 (3)	17:02
26	06:14	06:44	07:14	18:29 (2)	06:45	16:06 (3)	07:21	16:08 (3)	07:45
	20:45	20:06	19:15	24 18:53 (2)	17:29	23 16:29 (3)	16:59	26 16:34 (3)	17:02
27	06:15	06:45	07:15	18:28 (2)	06:46	16:04 (3)	07:22	16:09 (3)	07:45
	20:44	20:04	19:14	23 18:51 (2)	17:28	27 16:31 (3)	16:59	24 16:33 (3)	17:03
28	06:16	06:46	07:16	18:28 (2)	06:47	16:02 (3)	07:23	16:11 (3)	07:45
	20:43	20:03	19:12	21 18:49 (2)	17:26	30 16:32 (3)	16:59	21 16:32 (3)	17:03
29	06:17	06:47	07:17	18:29 (2)	06:48	16:00 (3)	07:24	16:13 (3)	07:46
	20:42	20:01	19:10	19 18:48 (2)	17:25	33 16:33 (3)	16:58	17 16:30 (3)	17:04
30	06:18	06:48	07:18	18:29 (2)	06:50	16:00 (3)	07:25	16:15 (3)	07:46
	20:41	20:00	19:09	17 18:46 (2)	17:24	35 16:35 (3)	16:58	14 16:29 (3)	17:05
31	06:19	06:48	07:18	06:51	15:59 (3)	07:26	16:16 (3)	07:46	
	20:40	19:58	19:07	17:22	37 16:36 (3)	17:06	290		
Potential sun hours	457	427	375	346	299				
Total, worst case			280	254	1078		8		
Sun reduction			0.64	0.56	0.48		0.41		
Oper. time red.			0.40	0.40	0.40		0.40		
Wind dir. red.			0.74	0.72	0.71		0.71		
Total reduction			0.19	0.16	0.14		0.12		
Total, real			53	40	147		1		

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 39

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: X - R45

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

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

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 40

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IT-09028 Sestu

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: Y - R46

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

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

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

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

Project:

windpro Nuoro nord - flickering

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Licensed user:

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IT-09028 Sestu
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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: Z - R47

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

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

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

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

Project:

windpro Nuoro nord - flickering

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Licensed user:

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IT-09028 Sestu

+390702358125

Bruno Manca / ingbrunomanca@gmail.com

Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AB - R23

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	15:38 (5) 06:58	15:17 (5) 07:09	16:53 (5) 06:24	05:56
	17:07	17:40	53 16:31 (5) 18:14	97 16:54 (5) 19:47	23 17:16 (5) 20:18	20:46
2	07:46	07:32	15:36 (5) 06:57	15:17 (5) 07:07	17:00 (5) 06:22	05:55
	17:08	17:42	57 16:33 (5) 18:15	97 16:54 (5) 19:48	8 17:08 (5) 20:19	20:47
3	07:46	07:32	15:35 (5) 06:55	15:17 (5) 07:05		06:21 05:55
	17:08	17:43	60 16:35 (5) 18:16	97 16:54 (5) 19:49		20:20 20:48
4	07:46	07:31	15:33 (5) 06:54	15:17 (5) 07:04		06:20 05:54
	17:09	17:44	63 16:36 (5) 18:17	97 16:54 (5) 19:50		20:21 20:49
5	07:47	07:29	15:32 (5) 06:52	15:17 (5) 07:02		06:19 05:54
	17:10	17:45	66 16:38 (5) 18:18	96 16:53 (5) 19:51		20:22 20:49
6	07:47	07:28	07:48 (7) 06:51	15:17 (5) 07:00		06:18 05:54
	17:11	17:47	71 16:40 (5) 18:19	96 16:53 (5) 19:52		20:23 20:50
7	07:46	07:27	07:47 (7) 06:49	15:18 (5) 06:59		06:16 05:53
	17:12	17:48	76 16:41 (5) 18:20	95 16:53 (5) 19:53		20:24 20:50
8	07:46	07:26	07:46 (7) 06:48	15:18 (5) 06:57		06:15 05:53
	17:13	17:49	82 16:43 (5) 18:21	94 16:52 (5) 19:54		20:25 20:51
9	07:46	07:25	07:45 (7) 06:46	15:19 (5) 06:56		06:14 05:53
	17:14	17:50	86 16:44 (5) 18:23	93 16:52 (5) 19:55		20:26 20:52
10	07:46	07:24	07:43 (7) 06:44	15:19 (5) 06:54		06:13 05:53
	17:15	17:51	90 16:44 (5) 18:24	92 16:51 (5) 19:56		20:27 20:52
11	07:46	07:23	07:42 (7) 06:43	15:19 (5) 06:53		06:12 05:53
	17:16	17:53	96 16:46 (5) 18:25	91 16:50 (5) 19:57		20:28 20:53
12	07:46	07:22	07:41 (7) 06:41	15:20 (5) 06:51		06:11 05:52
	17:17	17:54	98 16:47 (5) 18:26	90 16:50 (5) 19:58		20:29 20:53
13	07:45	07:20	07:40 (7) 06:40	15:20 (5) 06:49		06:10 05:52
	17:18	17:55	102 16:48 (5) 18:27	89 16:49 (5) 19:59		20:30 20:54
14	07:45	07:19	07:38 (7) 06:38	15:22 (5) 06:48		06:09 05:52
	17:19	17:56	106 16:48 (5) 18:28	87 16:49 (5) 20:00		20:31 20:54
15	07:45	07:18	07:37 (7) 06:36	15:22 (5) 06:46		06:08 05:52
	17:20	17:57	108 16:49 (5) 18:29	86 16:48 (5) 20:01		20:32 20:55
16	07:44	07:17	07:36 (7) 06:35	15:23 (5) 06:45		06:07 05:52
	17:21	17:59	111 16:50 (5) 18:30	83 16:46 (5) 20:02		20:33 20:55
17	07:44	07:15	07:34 (7) 06:33	15:24 (5) 06:43		06:06 05:52
	17:23	18:00	114 16:50 (5) 18:31	82 16:46 (5) 20:03		20:34 20:55
18	07:43	07:14	07:33 (7) 06:31	15:25 (5) 06:42		06:05 05:52
	17:24	18:01	116 16:51 (5) 18:32	80 16:45 (5) 20:04		20:35 20:56
19	07:43	07:13	07:32 (7) 06:30	15:26 (5) 06:40		06:04 05:53
	17:25	18:02	118 16:52 (5) 18:33	77 16:43 (5) 20:05		20:35 20:56
20	07:42	07:11	07:30 (7) 06:28	15:28 (5) 06:39		06:03 05:53
	17:26	18:03	120 16:52 (5) 18:34	75 16:43 (5) 20:06		20:36 20:56
21	07:42	07:10	07:29 (7) 06:27	15:28 (5) 06:37		06:03 05:53
	17:27	18:04	122 16:53 (5) 18:35	73 16:41 (5) 20:07		20:37 20:57
22	07:41	07:09	07:28 (7) 06:25	15:29 (5) 06:36		06:02 05:53
	17:28	18:06	124 16:54 (5) 18:36	70 16:39 (5) 20:08		20:38 20:57
23	07:41	07:07	07:26 (7) 06:23	15:31 (5) 06:35		06:01 05:53
	17:30	18:07	124 16:53 (5) 18:37	67 16:38 (5) 20:09		20:39 20:57
24	07:40	07:06	07:27 (7) 06:22	15:33 (5) 06:33		06:00 05:54
	17:31	18:08	124 16:54 (5) 18:38	64 16:37 (5) 20:10		20:40 20:57
25	07:39	07:04	07:28 (7) 06:20	15:34 (5) 06:32		06:00 05:54
	17:32	18:09	122 16:54 (5) 18:39	60 16:34 (5) 20:11		20:41 20:57
26	07:38	15:55 (5) 07:03	15:36 (5) 06:30	15:36 (5) 06:30		05:59 05:54
	17:33	18 16:13 (5) 18:10	118 16:54 (5) 18:41	57 16:33 (5) 20:12		20:42 20:57
27	07:38	15:50 (5) 07:01	15:38 (5) 06:29	15:38 (5) 06:29		05:58 05:55
	17:34	27 16:17 (5) 18:11	114 16:54 (5) 18:42	53 16:31 (5) 20:14		20:42 20:57
28	07:37	15:47 (5) 07:00	15:40 (5) 06:28	15:40 (5) 06:28		05:58 05:55
	17:36	34 16:21 (5) 18:13	107 16:54 (5) 18:43	48 16:28 (5) 20:15		20:43 20:57
29	07:36	15:44 (5) 07:00	15:42 (5) 06:27	15:42 (5) 06:27		05:57 05:54
	17:37	40 16:24 (5) 18:16	104 16:54 (5) 18:44	44 17:27 (5) 20:16		20:44 20:57
30	07:35	15:42 (5) 07:00	15:44 (5) 06:26	15:44 (5) 06:26		05:57 05:56
	17:38	44 16:26 (5) 18:18	101 16:54 (5) 18:45	38 17:23 (5) 20:17		20:45 20:57
31	07:34	15:40 (5) 07:00	15:46 (5) 06:25	15:46 (5) 06:25		05:56 05:55
	17:39	49 16:29 (5) 18:21	98 16:54 (5) 18:46	32 17:20 (5) 20:18		20:46 20:57
Potential sun hours	299	298	370	398	447	450
Total, worst case	212	2748	2400	31		
Sun reduction	0.40	0.43	0.47	0.51		
Oper. time red.	0.40	0.40	0.40	0.40		
Wind dir. red.	0.71	0.71	0.71	0.71		
Total reduction	0.11	0.12	0.13	0.14		
Total, real	24	336	319	4		

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

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

Project:

windpro Nuoro nord - flickering

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Licensed user:

Ing. Bruno Manca

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AB - R23

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56	06:20	06:49	07:19	15:59 (5)	06:52
	20:57	20:39	19:57	19:07	89 17:28 (5)	17:21
						90 16:14 (5)
2	05:57	06:21	06:50	07:20	15:58 (5)	06:53
	20:57	20:38	19:55	19:05	91 17:29 (5)	17:20
						86 16:13 (5)
3	05:57	06:21	06:51	07:21	15:57 (5)	06:54
	20:57	20:37	19:53	19:04	92 17:29 (5)	17:19
						80 16:12 (5)
4	05:58	06:22	06:52	07:22	15:56 (5)	06:55
	20:57	20:36	19:52	19:02	93 17:29 (5)	17:18
						76 16:11 (5)
5	05:58	06:23	06:53	07:23	15:55 (5)	06:56
	20:57	20:34	19:50	19:00	93 17:28 (5)	17:17
						70 16:09 (5)
6	05:59	06:24	06:54	07:24	15:54 (5)	06:58
	20:56	20:33	19:49	18:59	94 17:28 (5)	17:15
						66 16:08 (5)
7	05:59	06:25	06:55	07:25	15:53 (5)	06:59
	20:56	20:32	19:47	18:57	95 17:28 (5)	17:14
						63 16:07 (5)
8	06:00	06:26	06:56	07:26	15:53 (5)	07:00
	20:56	20:31	19:45	18:56	96 17:29 (5)	17:13
						59 16:05 (5)
9	06:01	06:27	06:57	07:27	15:52 (5)	07:01
	20:55	20:30	19:44	18:54	97 17:29 (5)	17:12
						56 16:03 (5)
10	06:01	06:28	06:58	16:55 (5) 07:28	15:52 (5)	07:02
	20:55	20:28	19:42	4 16:59 (5) 18:52	96 17:28 (5)	17:11
						52 16:01 (5)
11	06:02	06:29	06:59	16:46 (5) 07:29	15:51 (5)	07:03
	20:55	20:27	19:40	22 17:08 (5) 18:51	97 17:28 (5)	17:10
						48 16:00 (5)
12	06:03	06:30	07:00	16:41 (5) 07:30	15:50 (5)	07:05
	20:54	20:26	19:39	30 17:11 (5) 18:49	98 17:28 (5)	17:09
						44 15:58 (5)
13	06:03	06:31	07:01	16:37 (5) 07:31	15:50 (5)	07:06
	20:54	20:24	19:37	37 17:14 (5) 18:48	97 17:27 (5)	17:08
						40 15:56 (5)
14	06:04	06:32	07:02	16:33 (5) 07:32	08:06 (7) 07:07	15:19 (5) 07:38
	20:53	20:23	19:35	43 17:16 (5) 18:46	110 17:27 (5)	17:08
						34 15:53 (5)
15	06:05	06:33	07:03	16:30 (5) 07:33	08:03 (7) 07:08	15:23 (5) 07:38
	20:53	20:22	19:34	48 17:18 (5) 18:45	116 17:26 (5)	17:07
						27 15:50 (5)
16	06:06	06:34	07:04	16:28 (5) 07:34	08:01 (7) 07:09	15:28 (5) 07:39
	20:52	20:20	19:32	52 17:20 (5) 18:43	120 17:26 (5)	17:06
						17 15:45 (5)
17	06:06	06:35	07:05	16:25 (5) 07:35	07:59 (7) 07:10	17:40
	20:51	20:19	19:30	56 17:21 (5) 18:42	122 17:25 (5)	17:05
						16:58
18	06:07	06:36	07:06	16:23 (5) 07:36	07:57 (7) 07:12	17:40
	20:51	20:18	19:29	59 17:22 (5) 18:40	125 17:24 (5)	17:04
						16:58
19	06:08	06:37	07:07	16:20 (5) 07:37	07:58 (7) 07:13	17:41
	20:50	20:16	19:27	64 17:24 (5) 18:39	125 17:25 (5)	17:04
						16:59
20	06:09	06:38	07:08	16:18 (5) 07:38	07:59 (7) 07:14	17:42
	20:49	20:15	19:25	66 17:24 (5) 18:37	124 17:24 (5)	17:03
						16:59
21	06:10	06:39	07:09	16:16 (5) 07:39	08:00 (7) 07:15	17:42
	20:49	20:13	19:24	69 17:25 (5) 18:36	122 17:23 (5)	17:02
						16:59
22	06:11	06:40	07:10	16:14 (5) 07:41	08:01 (7) 07:16	17:43
	20:48	20:12	19:22	72 17:26 (5) 18:34	120 17:22 (5)	17:02
						17:00
23	06:11	06:41	07:11	16:11 (5) 07:42	08:02 (7) 07:17	17:43
	20:47	20:10	19:20	75 17:26 (5) 18:33	118 17:22 (5)	17:01
						17:00
24	06:12	06:42	07:12	16:10 (5) 07:43	08:03 (7) 07:18	17:44
	20:46	20:09	19:19	76 17:26 (5) 18:32	116 17:21 (5)	17:00
						17:01
25	06:13	06:43	07:13	16:08 (5) 06:44	07:05 (7) 07:19	17:44
	20:46	20:07	19:17	79 17:27 (5) 17:30	114 16:21 (5)	17:00
						17:02
26	06:14	06:44	07:14	16:06 (5) 06:45	07:06 (7) 07:21	17:45
	20:45	20:06	19:15	81 17:27 (5) 17:29	111 16:20 (5)	16:59
						17:02
27	06:15	06:45	07:15	16:05 (5) 06:46	07:07 (7) 07:22	17:45
	20:44	20:04	19:14	83 17:28 (5) 17:28	108 16:19 (5)	16:59
						17:03
28	06:16	06:46	07:16	16:03 (5) 06:47	07:08 (7) 07:23	17:45
	20:43	20:03	19:12	85 17:28 (5) 17:26	105 16:18 (5)	16:59
						17:04
29	06:17	06:47	07:17	16:02 (5) 06:48	07:09 (7) 07:24	17:45
	20:42	20:01	19:10	86 17:28 (5) 17:25	101 16:16 (5)	16:58
						17:04
30	06:18	06:48	07:18	16:00 (5) 06:49	07:11 (7) 07:25	17:46
	20:41	20:00	19:09	88 17:28 (5) 17:24	98 16:16 (5)	16:58
						17:05
31	06:19	06:48		06:51	07:12 (7)	17:46
	20:40	19:58		17:22	94 16:15 (5)	17:06
						290
Potential sun hours	457	427	375	346	299	290
Total, worst case			1275	3277		908
Sun reduction			0.64	0.56		0.48
Oper. time red.			0.40	0.40		0.40
Wind dir. red.			0.71	0.71		0.71
Total reduction			0.18	0.16		0.14
Total, real			231	514		123

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

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

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AC - R43

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

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

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AD - R40

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 17:07	07:33 17:40	16:19 (4) 18:14	06:58 17:05 (4)	16:08 (4) 19:47	07:09 20:18
2	07:46 17:08	07:32 17:42	16:17 (4) 18:15	06:57 16:10 (4)	17:04 (4) 19:48	07:07 20:19
3	07:46 17:08	07:32 17:43	16:16 (4) 18:16	06:55 16:10 (4)	17:03 (4) 19:49	07:05 20:20
4	07:46 17:09	07:31 17:44	16:14 (4) 18:17	06:54 16:11 (4)	17:02 (4) 19:50	07:04 20:21
5	07:46 17:10	07:29 17:45	16:13 (4) 18:18	06:52 16:12 (4)	17:02 (4) 19:51	07:02 20:22
6	07:46 17:11	07:28 17:47	16:12 (4) 18:19	06:51 16:59 (4)	16:13 (4) 19:52	07:00 20:23
7	07:46 17:12	07:27 17:48	16:12 (4) 18:20	06:49 16:15 (4)	16:59 (4) 19:53	06:59 (7) 20:24
8	07:46 17:13	07:26 17:49	16:11 (4) 18:21	06:48 16:16 (4)	16:57 (4) 19:54	06:57 (7) 20:25
9	07:46 17:14	07:25 17:50	16:10 (4) 18:23	06:46 16:18 (4)	16:56 (4) 19:55	06:56 (7) 20:26
10	07:46 17:15	07:24 17:51	16:09 (4) 18:24	06:44 16:20 (4)	16:54 (4) 19:56	06:54 (7) 20:27
11	07:46 17:16	07:23 17:53	16:08 (4) 18:25	06:43 16:22 (4)	16:53 (4) 19:57	06:53 (7) 20:28
12	07:46 17:17	07:22 17:54	16:08 (4) 18:26	06:41 16:27 (4)	16:51 (4) 19:58	06:51 (7) 20:29
13	07:45 17:18	07:20 17:55	16:08 (4) 18:27	06:40 16:48	16:49 (4) 19:59	06:50 (7) 20:30
14	07:45 17:19	07:19 17:56	16:07 (4) 18:28	06:38 16:46	16:48 (4) 20:00	06:49 (7) 20:31
15	07:45 17:20	07:18 17:57	16:07 (4) 18:29	06:36 16:45 (4)	16:46 (4) 20:01	06:48 (7) 20:32
16	07:44 17:21	07:17 17:59	16:07 (4) 18:30	06:35 16:44	16:45 (4) 20:02	06:47 (7) 20:33
17	07:44 17:23	07:15 18:00	16:06 (4) 18:31	06:33 16:43	16:43 (4) 20:03	06:45 (7) 20:34
18	07:43 17:24	07:14 18:01	16:06 (4) 18:32	06:31 16:42	16:42 (4) 20:04	06:43 (7) 20:35
19	07:43 17:25	07:13 18:02	16:06 (4) 18:33	06:30 16:41	16:41 (4) 20:05	06:42 (7) 20:36
20	07:42 17:26	07:11 18:03	16:06 (4) 18:34	06:28 16:40	16:39 (4) 20:06	06:40 (7) 20:37
21	07:42 17:27	07:10 18:04	16:06 (4) 18:35	06:27 16:39	16:38 (4) 20:07	06:39 (7) 20:38
22	07:41 17:28	07:09 18:06	16:06 (4) 18:36	06:25 16:37	16:37 (4) 20:08	06:37 (7) 20:39
23	07:41 17:30	07:07 18:07	16:06 (4) 18:37	06:23 16:35	16:35 (4) 20:09	06:35 (7) 20:40
24	07:40 17:31	07:06 18:08	16:07 (4) 18:38	06:22 16:33	16:33 (4) 20:10	06:34 (7) 20:41
25	07:39 17:32	07:04 18:09	16:06 (4) 18:39	06:20 16:31	16:32 (4) 20:11	06:32 (7) 20:42
26	07:38 17:33	07:03 18:10	16:07 (4) 18:40	06:18 16:29	16:30 (4) 20:12	06:30 (7) 20:43
27	07:38 17:34	07:01 18:11	16:07 (4) 18:42	06:17 16:27	16:29 (4) 20:14	06:29 (7) 20:44
28	07:37 17:36	16:31 (4) 18:13	07:00 18:43	06:15 16:25	16:28 (4) 20:15	06:28 (7) 20:45
29	07:36 17:37	16:26 (4) 18:14	07:13 18:44 (4)	06:14 16:24	16:26 (4) 20:16	06:26 (7) 20:46
30	07:35 17:38	16:23 (4) 18:15	07:12 18:45 (4)	06:13 16:23	16:25 (4) 20:17	06:25 (7) 20:47
31	07:34 17:39	16:21 (4) 18:16	07:10 18:46 (4)	06:12 16:22	16:24 (4) 20:18	06:24 (7) 20:48
Potential sun hours	299	298	370	398	447	450
Total, worst case	80	1546	504	657	272	558
Sun reduction	0.40	0.43	0.47	0.51	0.58	0.64
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40
Wind dir. red.	0.72	0.72	0.72	0.74	0.74	0.74
Total reduction	0.11	0.12	0.13	0.15	0.17	0.17
Total, real	9	191	68	98	46	110

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

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

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 47

Licensed user:

Ing. Bruno Manca
Via Vittorio Veneto 231
IT-09028 Sestu
+390702358125
Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AD - R40

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:56 20:57	06:20 20:39	06:49 19:57	07:11 (7) 07:22 (7)	07:19 19:07	17:08 (4) 17:21 (4)	06:52 15:39 (4)	15:39 (4) 16:58
2	05:57 20:57	06:21 20:38	07:18 (7) 19:55	07:26 (7) 19:05	07:20 19:04	17:03 (4) 17:25 (4)	06:53 15:39 (4)	16:57 16:57
3	05:57 20:57	06:21 20:37	07:15 (7) 19:53	07:30 (7) 19:04	07:21 19:04	16:59 (4) 17:28 (4)	06:54 15:41 (4)	16:57 16:57
4	05:58 20:57	06:22 20:36	07:13 (7) 19:52	07:32 (7) 19:02	07:22 19:02	16:56 (4) 17:30 (4)	06:55 15:42 (4)	16:57 16:57
5	05:58 20:57	06:23 20:34	07:11 (7) 19:50	07:34 (7) 19:00	07:23 19:00	16:53 (4) 17:31 (4)	06:56 15:42 (4)	16:57 16:57
6	05:59 20:56	06:24 20:33	07:09 (7) 19:49	07:37 (7) 18:59	07:24 18:59	16:51 (4) 17:33 (4)	06:58 15:43 (4)	16:57 16:57
7	05:59 20:56	06:25 20:32	07:08 (7) 19:47	07:38 (7) 18:57	07:25 18:57	16:49 (4) 17:34 (4)	06:59 15:45 (4)	16:57 16:57
8	06:00 20:56	06:26 20:31	07:07 (7) 19:45	07:39 (7) 18:56	07:26 18:56	16:48 (4) 17:36 (4)	07:00 15:47 (4)	16:57 16:57
9	06:01 20:55	06:27 20:30	07:06 (7) 19:44	07:40 (7) 18:54	07:27 18:54	16:47 (4) 17:36 (4)	07:01 15:48 (4)	16:57 16:57
10	06:01 20:55	06:28 20:28	07:05 (7) 19:42	07:41 (7) 18:52	07:28 18:52	16:45 (4) 17:37 (4)	07:02 15:50 (4)	16:57 16:57
11	06:02 20:55	06:29 20:27	07:05 (7) 19:40	07:42 (7) 18:51	07:29 18:51	16:44 (4) 17:38 (4)	07:03 15:53 (4)	16:57 16:57
12	06:03 20:54	06:30 20:26	07:03 (7) 19:39	07:43 (7) 18:49	07:30 18:49	16:43 (4) 17:38 (4)	07:05 15:55 (4)	16:57 16:57
13	06:03 20:54	06:31 20:24	07:02 (7) 19:37	07:44 (7) 18:48	07:31 18:48	16:41 (4) 17:38 (4)	07:06 15:58 (4)	16:57 16:57
14	06:04 20:53	06:32 20:23	07:02 (7) 19:35	07:45 (7) 18:46	07:32 18:46	16:40 (4) 17:38 (4)	07:07 16:03 (4)	16:57 16:57
15	06:05 20:53	06:33 20:22	07:01 (7) 19:34	07:46 (7) 18:45	07:33 18:45	16:39 (4) 17:39 (4)	07:08 15:59 (4)	16:57 16:57
16	06:06 20:52	06:34 20:20	07:01 (7) 19:32	07:47 (7) 18:43	07:34 18:43	16:39 (4) 17:39 (4)	07:09 16:00 (4)	16:57 16:57
17	06:06 20:51	06:35 20:19	07:01 (7) 19:30	07:48 (7) 18:42	07:35 18:42	16:38 (4) 17:39 (4)	07:10 16:01 (4)	16:57 16:57
18	06:07 20:51	06:36 20:18	07:01 (7) 19:29	07:49 (7) 18:40	07:36 18:40	16:37 (4) 17:39 (4)	07:12 16:02 (4)	16:57 16:57
19	06:08 20:50	06:37 20:16	07:00 (7) 19:27	07:50 (7) 18:39	07:37 18:39	16:37 (4) 17:39 (4)	07:13 16:03 (4)	16:57 16:57
20	06:09 20:49	06:38 20:15	07:00 (7) 19:25	07:51 (7) 18:37	07:38 18:37	16:37 (4) 17:39 (4)	07:14 16:04 (4)	16:57 16:57
21	06:10 20:49	06:39 20:13	07:00 (7) 19:24	07:52 (7) 18:36	07:39 18:36	16:36 (4) 17:39 (4)	07:15 16:05 (4)	16:57 16:57
22	06:11 20:48	06:40 20:12	07:01 (7) 19:22	07:53 (7) 18:34	07:40 18:34	16:36 (4) 17:38 (4)	07:16 16:06 (4)	16:57 16:57
23	06:11 20:47	06:41 20:10	07:02 (7) 19:20	07:54 (7) 18:33	07:41 18:33	16:36 (4) 17:38 (4)	07:17 16:07 (4)	16:57 16:57
24	06:12 20:46	06:42 20:09	07:03 (7) 19:19	07:55 (7) 18:32	07:42 18:32	16:36 (4) 17:38 (4)	07:18 16:08 (4)	16:57 16:57
25	06:13 20:45	06:43 20:07	07:04 (7) 19:17	07:56 (7) 18:30	07:43 18:30	16:36 (4) 17:38 (4)	07:19 16:09 (4)	16:57 16:57
26	06:14 20:45	06:44 20:06	07:04 (7) 19:15	07:57 (7) 18:29	07:44 18:29	16:36 (4) 17:38 (4)	07:20 16:10 (4)	16:57 16:57
27	06:15 20:44	06:45 20:04	07:05 (7) 19:14	07:58 (7) 18:28	07:45 18:28	16:36 (4) 17:38 (4)	07:21 16:11 (4)	16:57 16:57
28	06:16 20:43	06:46 20:03	07:06 (7) 19:12	07:59 (7) 18:26	07:46 18:26	16:36 (4) 17:38 (4)	07:22 16:12 (4)	16:57 16:57
29	06:17 20:42	06:47 20:01	07:07 (7) 19:10	08:00 (7) 18:25	07:47 18:25	16:36 (4) 17:38 (4)	07:23 16:13 (4)	16:57 16:57
30	06:18 20:41	06:48 20:00	07:08 (7) 19:09	08:01 (7) 18:24	07:48 18:24	16:36 (4) 17:38 (4)	07:24 16:14 (4)	16:57 16:57
31	06:19 20:40	06:48 19:58	07:09 (7) 19:07	08:02 (7) 18:22	07:49 18:22	16:36 (4) 17:38 (4)	07:25 16:15 (4)	16:57 16:57
Potential sun hours	457	427	375	346	299	290		
Total, worst case		933	11	1627	536			
Sun reduction		0.72	0.64	0.56	0.48			
Oper. time red.		0.40	0.40	0.40	0.40			
Wind dir. red.		0.74	0.74	0.72	0.72			
Total reduction		0.21	0.19	0.16	0.14			
Total, real		197	2	259	74			

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 48

Licensed user:

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IT-09028 Sestu

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AE - R18

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:46 17:07	07:33 17:40	06:58 18:14	17:28 (3) 07:09 18:14	07:09 19:11 (2) 06:24	05:56 20:18 06:24	05:56 20:46 06:24	06:20 20:39 06:20	06:49 19:57 06:50	07:19 19:07 07:20	18:02 (3) 17:21 18:35 (3)	06:52 16:58 07:27
2	07:46 17:08	07:33 17:42	06:57 18:15	17:27 (3) 07:07 18:15	07:07 19:16 (2) 06:22	05:55 20:19 06:22	05:57 20:47 06:22	06:20 20:38 06:21	06:50 19:55 06:51	07:20 19:05 07:21	18:01 (3) 17:20 18:35 (3)	06:53 16:57 07:28
3	07:46 17:08	07:32 17:43	06:55 18:16	17:26 (3) 07:05 18:16	07:05 19:11 (2) 06:21	05:55 20:20 06:21	05:57 20:48 06:21	06:20 20:37 06:22	06:51 19:53 06:52	07:21 19:04 07:22	18:01 (3) 17:19 18:35 (3)	06:54 16:57 07:29
4	07:47 17:09	07:31 17:44	06:54 18:17	17:25 (3) 07:04 18:17	07:04 19:10 (2) 06:20	05:54 20:20 06:20	05:58 20:49 06:20	06:23 20:36 06:23	06:52 19:52 06:53	07:22 19:02 07:23	18:00 (3) 17:18 18:35 (3)	06:55 16:57 07:30
5	07:47 17:10	07:30 17:45	06:52 18:18	17:24 (3) 07:02 18:18	07:02 19:10 (2) 06:19	05:54 20:22 06:19	05:58 20:49 06:19	06:23 20:34 06:24	06:53 19:09 (2) 06:54	07:23 19:00 07:24	17:59 (3) 17:17 18:35 (3)	06:56 16:57 07:31
6	07:47 17:11	07:28 17:46	06:51 18:19	17:23 (3) 07:00 18:19	07:00 19:11 (2) 06:17	05:54 20:23 06:17	05:59 20:50 06:17	06:24 20:33 06:25	06:54 19:49 06:55	07:24 18:59 07:25	17:59 (3) 17:15 18:34 (3)	06:58 16:57 07:32
7	07:46 17:12	07:27 17:48	06:49 18:20	17:23 (3) 06:59 18:20	06:59 19:10 (2) 06:16	05:53 20:24 06:16	05:59 20:56 06:16	06:25 20:32 06:26	06:55 19:47 06:56	07:25 18:57 07:26	17:59 (3) 17:14 18:00 (3)	06:59 16:57 07:33
8	07:46 17:13	07:26 17:49	06:48 18:21	17:23 (3) 06:57 18:21	06:57 19:13 (2) 06:15	05:53 20:25 06:15	06:00 20:56 06:15	06:26 20:31 06:27	06:56 19:45 06:57	07:26 18:56 07:27	18:00 (3) 17:13 18:33 (3)	06:59 16:56 07:34
9	07:46 17:14	07:25 17:50	06:46 18:22	17:23 (3) 06:56 18:22	06:56 19:15 (2) 06:14	05:53 20:26 06:14	06:01 20:55 06:14	06:27 20:30 06:28	06:57 19:44 06:58	07:27 18:54 07:28	18:00 (3) 17:12 18:33 (3)	06:59 16:56 07:34
10	07:46 17:15	07:24 17:51	06:44 18:24	17:23 (3) 06:54 18:24	06:54 19:16 (2) 06:13	05:53 20:27 06:13	06:01 20:55 06:13	06:28 20:28 06:29	06:58 19:42 06:59	07:28 18:52 07:29	18:00 (3) 17:11 18:34 (3)	06:59 16:57 07:35
11	07:46 17:16	07:23 17:53	06:43 18:25	17:23 (3) 06:53 18:25	06:53 19:17 (3) 06:12	05:53 20:28 06:12	06:02 20:55 06:12	06:29 20:27 06:30	06:59 19:40 07:00	07:29 18:51 (2) 07:30	18:00 (3) 17:10 18:01 (3)	06:59 16:57 07:36
12	07:46 17:17	07:22 17:54	06:41 18:26	17:24 (3) 06:51 18:26	06:51 19:18 (2) 06:11	05:52 20:29 06:11	06:03 20:54 06:11	06:30 20:26 06:31	07:00 19:39 07:01	07:30 18:49 07:31	18:01 (3) 17:09 18:02 (3)	06:59 16:57 07:37
13	07:45 17:18	07:20 17:55	06:40 18:27	17:24 (3) 06:49 18:27	06:49 19:19 (2) 06:10	05:52 20:30 06:10	06:03 20:54 06:10	06:31 20:25 06:32	07:01 19:37 07:02	07:31 18:48 07:32	18:02 (3) 17:08 18:03 (3)	06:59 16:57 07:38
14	07:45 17:19	07:19 17:56	06:38 18:28	17:25 (3) 06:48 18:28	06:48 19:20 (2) 06:09	05:52 20:31 06:09	06:04 20:53 06:09	06:32 20:23 06:33	07:02 19:35 07:03	07:32 18:46 07:33	18:03 (3) 17:08 18:05 (3)	06:59 16:57 07:38
15	07:45 17:20	07:18 17:57	06:36 18:29	17:25 (3) 06:46 18:29	06:46 19:21 (2) 06:08	05:52 20:32 06:08	06:05 20:53 06:08	06:33 20:22 06:34	07:03 19:34 07:04	07:33 18:45 07:34	18:05 (3) 17:07 18:07 (3)	06:59 16:57 07:39
16	07:44 17:21	07:17 17:59	06:35 18:30	17:26 (3) 06:45 18:30	06:45 19:22 (2) 06:07	05:52 20:33 06:07	06:06 20:52 06:06	06:34 20:20 06:35	07:04 19:32 07:05	07:34 18:43 07:35	18:07 (3) 17:06 18:11 (3)	06:59 16:58 07:40
17	07:44 17:23	07:15 18:00	06:33 18:31	17:28 (3) 06:43 18:31	06:43 19:23 (2) 06:06	05:52 20:34 06:06	06:06 20:55 06:06	06:35 20:19 06:36	07:05 19:30 07:06	07:35 18:42 07:36	18:11 (3) 17:05 18:17 (3)	06:59 16:58 07:40
18	07:43 17:24	07:14 18:01	06:31 18:32	17:30 (3) 06:42 18:32	06:42 19:24 (2) 06:05	05:52 20:35 06:05	06:07 20:56 06:07	06:36 20:18 06:37	07:06 19:29 07:07	07:36 18:40 07:37	18:12 (3) 17:04 18:18 (3)	06:59 16:58 07:41
19	07:43 17:25	07:13 18:02	06:30 18:33	17:34 (3) 06:40 18:33	06:40 19:25 (2) 06:04	05:53 20:36 06:04	06:08 20:57 06:08	06:37 20:16 06:38	07:07 19:27 07:08	07:37 18:39 07:38	18:13 (3) 17:04 18:19 (3)	06:59 16:59 07:42
20	07:42 17:26	07:11 18:03	06:28 18:34	17:41 (3) 06:39 18:34	06:39 19:26 (2) 06:03	05:53 20:36 06:03	06:09 20:49 06:09	06:38 20:15 06:39	07:08 19:25 07:09	07:38 18:37 07:39	18:14 (3) 17:03 18:20 (3)	06:59 16:59 07:43
21	07:42 17:27	07:10 18:04	06:27 18:35	17:31 (3) 06:37 18:35	06:37 19:27 (2) 06:02	05:53 20:37 06:02	06:10 20:49 06:11	06:39 20:13 06:40	07:09 19:24 07:10	07:39 18:36 07:41	18:15 (3) 17:02 18:21 (3)	06:59 16:59 07:44
22	07:41 17:28	07:09 18:06	06:25 18:36	17:30 (3) 06:36 18:36	06:36 19:28 (2) 06:01	05:53 20:38 06:01	06:11 20:48 06:11	06:40 20:12 06:41	07:10 19:22 07:11	07:41 18:34 07:42	18:16 (3) 17:02 18:22 (3)	06:59 16:59 07:45
23	07:41 17:29	07:07 18:07	06:23 18:37	17:30 (3) 06:34 18:37	06:34 19:29 (2) 06:00	05:53 20:39 06:00	06:12 20:47 06:12	06:41 20:10 06:42	07:11 19:20 07:12	07:42 18:33 07:43	18:17 (3) 17:01 18:23 (3)	06:59 16:59 07:46
24	07:40 17:31	07:06 18:08	06:22 18:38	17:30 (3) 06:33 18:38	06:33 19:30 (2) 06:00	05:54 20:40 06:00	06:12 20:46 06:13	06:42 20:09 06:43	07:12 19:19 07:13	07:43 18:32 07:44	18:18 (3) 17:00 18:24 (3)	06:59 16:59 07:46
25	07:39 17:32	07:04 18:09	06:20 18:39	17:37 (3) 06:32 18:39	06:32 19:31 (2) 06:00	05:54 20:41 06:00	06:13 20:46 06:13	06:43 20:07 06:44	07:13 19:17 07:14	07:44 18:30 07:45	18:19 (3) 17:00 18:25 (3)	06:59 16:59 07:47
26	07:38 17:33	07:03 18:10	06:18 18:41	17:34 (3) 06:18 18:41	06:18 19:32 (2) 06:00	05:54 20:42 06:00	06:14 20:45 06:14	06:44 20:06 06:45	07:14 19:15 07:15	07:45 18:29 07:46	18:20 (3) 17:00 18:26 (3)	06:59 16:59 07:48
27	07:38 17:34	07:01 18:11	06:17 18:42	17:31 (3) 06:17 18:42	06:17 19:33 (2) 06:00	05:54 20:43 06:00	06:15 20:44 06:15	06:45 20:04 06:46	07:15 19:14 07:16	07:46 18:32 07:47	18:21 (3) 17:00 18:27 (3)	06:59 16:59 07:49
28	07:37 17:35	07:00 18:12	06:15 18:43	18:15 (2) 06:28 18:43	06:28 19:34 (2) 06:00	05:55 20:44 06:00	06:16 20:45 06:16	06:46 20:03 06:47	07:16 19:12 07:17	07:47 18:33 (3) 07:48	18:22 (3) 17:00 18:28 (3)	06:59 16:59 07:50
29	07:36 17:37	06:59 18:07	06:14 18:44	18:14 (2) 06:26 18:44	06:26 19:35 (2) 06:00	05:55 20:45 06:00	06:17 20:46 06:17	06:47 20:04 06:48	07:17 19:11 07:18	07:48 18:34 (3) 07:49	18:23 (3) 17:00 18:29 (3)	06:59 16:59 07:51
30	07:35 17:38	06:58 18:08	06:13 18:45	18:13 (2) 06:25 18:45	06:25 19:36 (2) 06:00	05:56 20:46 06:00	06:18 20:47 06:18	06:48 20:05 06:49	07:18 19:10 07:19	07:49 18:35 (3) 07:50	18:24 (3) 17:00 18:30 (3)	06:59 16:59 07:52
31	07:34 17:39	06:57 18:09	06:12 18:46	18:12 (2) 06:24 18:46	06:24 19:37 (2) 06:00	05:56 20:47 06:00	06:19 20:48 06:19	06:48 20:06 06:49	07:19 19:09 07:20	07:50 18:36 (3) 07:51	18:25 (3) 17:00 18:31 (3)	06:59 16:59 07:53
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290
Total, worst case		65	586	150					337	470		
Sun reduction		0.43	0.47	0.51					0.64	0.56		
Oper. time red.		0.40	0.40	0.40					0.40	0.40		
Wind dir. red.		0.74	0.74	0.74					0.74	0.74		
Total reduction		0.13	0.14	0.15					0.19	0.16		
Total, real		8	81	22					64	77		

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 49

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AF - R44

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

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

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 50

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: AG - R39

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June					
1	07:46	16:13 (4)	07:33	16:15 (4)	06:58		07:09	07:55 (7)	06:24	18:26 (5)	05:56	18:47 (5)				
	17:07	20	16:33 (4)	17:40	37	16:52 (4)	18:14	19:47	47	08:42 (7)	20:18	53	19:19 (5)	20:46	14	19:01 (5)
2	07:46	16:13 (4)	07:32	16:16 (4)	06:57		07:07	07:55 (7)	06:22	18:26 (5)	05:55	18:49 (5)				
	17:08	21	16:34 (4)	17:42	36	16:52 (4)	18:15	19:48	45	08:40 (7)	20:19	53	19:19 (5)	20:47	10	18:59 (5)
3	07:46	16:13 (4)	07:31	16:16 (4)	06:55		07:05	07:57 (7)	06:21	18:25 (5)	05:55					
	17:08	22	16:35 (4)	17:43	35	16:51 (4)	18:16	19:49	42	08:39 (7)	20:20	53	19:18 (5)	20:48		
4	07:46	16:12 (4)	07:30	16:17 (4)	06:54		07:04	07:57 (7)	06:20	18:25 (5)	05:54					
	17:09	24	16:36 (4)	17:44	34	16:51 (4)	18:17	19:50	40	08:37 (7)	20:21	54	19:19 (5)	20:49		
5	07:46	16:12 (4)	07:29	16:19 (4)	06:52		07:21 (7)	07:02	07:58 (7)	06:19	18:25 (5)	05:54				
	17:10	25	16:37 (4)	17:45	31	16:50 (4)	18:18	11	07:32 (7)	19:51	36	08:34 (7)	20:22	54	19:19 (5)	20:49
6	07:46	16:12 (4)	07:28	16:20 (4)	06:51		07:15 (7)	07:00	08:00 (7)	06:17	18:26 (5)	05:54				
	17:11	26	16:38 (4)	17:46	29	16:49 (4)	18:19	22	07:37 (7)	19:52	33	08:33 (7)	20:23	53	19:19 (5)	20:50
7	07:46	16:12 (4)	07:27	16:22 (4)	06:49		07:13 (7)	06:59	08:02 (7)	06:16	18:26 (5)	05:53				
	17:12	27	16:39 (4)	17:48	26	16:48 (4)	18:20	27	07:40 (7)	19:53	28	08:30 (7)	20:24	52	19:18 (5)	20:50
8	07:46	16:12 (4)	07:26	16:23 (4)	06:48		07:09 (7)	06:57	08:05 (7)	06:15	18:26 (5)	05:53				
	17:13	28	16:40 (4)	17:49	24	16:47 (4)	18:21	33	07:42 (7)	19:54	22	08:27 (7)	20:25	52	19:18 (5)	20:51
9	07:46	16:12 (4)	07:25	16:26 (4)	06:46		07:08 (7)	06:56	08:08 (7)	06:14	18:26 (5)	05:53				
	17:14	30	16:42 (4)	17:50	19	16:45 (4)	18:22	36	07:44 (7)	19:55	14	08:22 (7)	20:26	52	19:18 (5)	20:52
10	07:46	16:11 (4)	07:24	16:28 (4)	06:44		07:06 (7)	06:54	06:13	18:27 (5)	05:53					
	17:15	31	16:42 (4)	17:51	13	16:41 (4)	18:24	40	07:46 (7)	19:56	20:27	51	19:18 (5)	20:52		
11	07:46	16:11 (4)	07:23	06:43			07:03 (7)	06:53	06:12	18:27 (5)	05:53					
	17:16	32	16:43 (4)	17:53	43	07:46 (7)	19:57	20:28	51	19:18 (5)	20:53					
12	07:46	16:12 (4)	07:22	06:41			07:03 (7)	06:51	06:11	18:28 (5)	05:52					
	17:17	32	16:44 (4)	17:54	45	07:48 (7)	19:58	20:29	49	19:17 (5)	20:53					
13	07:45	16:11 (4)	07:20	06:40			07:01 (7)	06:49	06:10	18:28 (5)	05:52					
	17:18	34	16:45 (4)	17:55	47	07:48 (7)	19:59	20:30	49	19:17 (5)	20:54					
14	07:45	16:11 (4)	07:19	06:38			06:59 (7)	06:48	18:50 (5)	06:09	18:28 (5)	05:52				
	17:19	35	16:46 (4)	17:56	50	07:49 (7)	20:00	10	19:00 (5)	20:31	48	19:16 (5)	20:54			
15	07:45	16:11 (4)	07:18	06:36			06:59 (7)	06:46	18:45 (5)	06:08	18:29 (5)	05:52				
	17:20	36	16:47 (4)	17:57	51	07:50 (7)	20:01	20	19:05 (5)	20:32	47	19:16 (5)	20:55			
16	07:44	16:11 (4)	07:17	06:35			06:57 (7)	06:45	18:41 (5)	06:07	18:29 (5)	05:52				
	17:21	36	16:47 (4)	17:59	53	07:50 (7)	20:02	26	19:07 (5)	20:33	46	19:15 (5)	20:55			
17	07:44	16:11 (4)	07:15	06:33			06:57 (7)	06:43	18:39 (5)	06:06	18:30 (5)	05:52				
	17:23	38	16:49 (4)	18:00	54	07:51 (7)	20:03	31	19:10 (5)	20:34	44	19:14 (5)	20:55			
18	07:43	16:11 (4)	07:14	06:31			06:56 (7)	06:42	18:37 (5)	06:05	18:30 (5)	05:52				
	17:24	38	16:49 (4)	18:01	54	07:50 (7)	20:04	34	19:11 (5)	20:35	44	19:14 (5)	20:56			
19	07:43	16:12 (4)	07:13	06:30			06:55 (7)	06:40	18:35 (5)	06:04	18:31 (5)	05:53				
	17:25	38	16:50 (4)	18:02	55	07:50 (7)	20:05	38	19:13 (5)	20:35	42	19:13 (5)	20:56			
20	07:42	16:11 (4)	07:11	06:28			06:55 (7)	06:39	18:33 (5)	06:03	18:33 (5)	05:53				
	17:26	39	16:50 (4)	18:03	56	07:51 (7)	20:06	40	19:13 (5)	20:36	40	19:13 (5)	20:56			
21	07:42	16:11 (4)	07:10	06:27			06:54 (7)	06:37	18:32 (5)	06:03	18:33 (5)	05:53				
	17:27	39	16:50 (4)	18:04	56	07:50 (7)	20:07	43	19:15 (5)	20:37	39	19:12 (5)	20:56			
22	07:41	16:12 (4)	07:08	06:25			06:54 (7)	06:36	18:31 (5)	06:02	18:34 (5)	05:53				
	17:28	39	16:51 (4)	18:06	55	07:49 (7)	20:08	45	19:16 (5)	20:38	37	19:11 (5)	20:57			
23	07:41	16:12 (4)	07:07	06:23			06:54 (7)	06:35	18:30 (5)	06:01	18:35 (5)	05:53				
	17:30	40	16:52 (4)	18:07	56	07:50 (7)	20:09	46	19:16 (5)	20:39	36	19:11 (5)	20:57			
24	07:40	16:11 (4)	07:06	06:22			06:53 (7)	06:33	18:29 (5)	06:00	18:36 (5)	05:54				
	17:31	41	16:52 (4)	18:08	56	07:49 (7)	20:10	48	19:17 (5)	20:40	34	19:10 (5)	20:57			
25	07:39	16:11 (4)	07:04	06:20			06:53 (7)	06:32	18:28 (5)	06:00	18:37 (5)	05:54				
	17:32	41	16:52 (4)	18:09	55	07:48 (7)	20:11	49	19:17 (5)	20:41	32	19:09 (5)	20:57			
26	07:38	16:13 (4)	07:03	06:18			06:53 (7)	06:30	18:28 (5)	05:59	18:38 (5)	05:54				
	17:33	40	16:53 (4)	18:10	55	07:48 (7)	20:12	50	19:18 (5)	20:42	30	19:08 (5)	20:57			
27	07:38	16:13 (4)	07:01	06:17			06:53 (7)	06:29	18:27 (5)	05:58	18:39 (5)	05:55				
	17:34	40	16:53 (4)	18:11	54	07:47 (7)	20:14	51	19:18 (5)	20:42	28	19:07 (5)	20:57			
28	07:37	16:13 (4)	07:00	06:15			06:53 (7)	06:28	18:27 (5)	05:58	18:41 (5)	05:55				
	17:36	40	16:53 (4)	18:12	53	07:46 (7)	20:15	52	19:19 (5)	20:43	26	19:07 (5)	20:57			
29	07:36	16:13 (4)		07:13			07:54 (7)	06:26	18:26 (5)	05:57	18:42 (5)	05:55				
	17:37	40	16:53 (4)		51	08:45 (7)	20:16	52	19:18 (5)	20:44	23	19:05 (5)	20:57			
30	07:35	16:14 (4)		07:12			07:54 (7)	06:25	18:26 (5)	05:57	18:44 (5)	05:56				
	17:38	39	16:53 (4)		50	08:44 (7)	20:17	53	19:19 (5)	20:45	20	19:04 (5)	20:57			
31	07:34	16:14 (4)		07:10			07:54 (7)		05:56		18:45 (5)					
	17:39	38	16:52 (4)		48	08:42 (7)		20:46	17	19:02 (5)						
Potential sun hours	299		298		370		398		447		450					
Total, worst case	1049		284		1266		995		1309		24					
Sun reduction	0.40		0.43		0.47		0.51		0.58		0.67					
Oper. time red.	0.40		0.40		0.40		0.40		0.40		0.40					
Wind dir. red.	0.70		0.70		0.73		0.73		0.73		0.73					
Total reduction	0.11		0.12		0.14		0.15		0.17		0.19					
Total, real	117		34		172		146		219		5					

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 51

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AG - R39

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56	06:20	18:37 (5) 06:49	07:19	07:41 (7) 06:52	15:57 (4) 07:26
	20:57	20:39	50 19:27 (5) 19:57	19:07	46 08:27 (7) 17:21	15 16:12 (4) 16:58
2	05:57	06:20	18:37 (5) 06:50	07:20	07:41 (7) 06:53	15:54 (4) 07:27
	20:57	20:38	50 19:27 (5) 19:55	19:05	44 08:25 (7) 17:20	20 16:14 (4) 16:57
3	05:57	06:21	18:36 (5) 06:51	08:06 (7) 07:21	07:42 (7) 06:54	15:53 (4) 07:28
	20:57	20:37	52 19:28 (5) 19:53	14 08:20 (7) 19:04	42 08:24 (7) 17:19	24 16:17 (4) 16:57
4	05:58	06:22	18:36 (5) 06:52	08:02 (7) 07:22	07:44 (7) 06:55	15:51 (4) 07:29
	20:57	20:36	52 19:28 (5) 19:52	22 08:24 (7) 19:02	38 08:22 (7) 17:18	27 16:18 (4) 16:57
5	05:58	06:23	18:36 (5) 06:53	07:59 (7) 07:23	07:45 (7) 06:56	15:50 (4) 07:30
	20:57	20:34	52 19:28 (5) 19:50	28 08:27 (7) 19:00	35 08:20 (7) 17:17	29 16:19 (4) 16:57
6	05:59	06:24	18:35 (5) 06:54	07:57 (7) 07:24	07:47 (7) 06:58	15:48 (4) 07:31
	20:56	20:33	53 19:28 (5) 19:49	32 08:29 (7) 18:59	30 08:17 (7) 17:15	32 16:20 (4) 16:57
7	05:59	06:25	18:35 (5) 06:55	07:54 (7) 07:25	07:49 (7) 06:59	15:47 (4) 07:32
	20:56	20:32	53 19:28 (5) 19:47	36 08:30 (7) 18:57	25 08:14 (7) 17:14	34 16:21 (4) 16:57
8	06:00	06:26	18:35 (5) 06:56	07:52 (7) 07:26	07:54 (7) 07:00	15:47 (4) 07:33
	20:56	20:31	53 19:28 (5) 19:45	39 08:31 (7) 18:56	17 08:11 (7) 17:13	35 16:22 (4) 16:57
9	06:01	06:27	18:35 (5) 06:57	07:50 (7) 07:27	07:01	15:46 (4) 07:34
	20:55	20:30	53 19:28 (5) 19:44	42 08:32 (7) 18:54	17:12	37 16:23 (4) 16:57
10	06:01	18:59 (5) 06:28	18:35 (5) 06:58	07:49 (7) 07:28	07:02	15:46 (4) 07:34
	20:55	6 19:05 (5) 20:28	53 19:28 (5) 19:42	44 08:33 (7) 18:52	17:11	37 16:23 (4) 16:57
11	06:02	18:55 (5) 06:29	18:35 (5) 06:59	07:47 (7) 07:29	07:03	15:45 (4) 07:35
	20:55	13 19:08 (5) 20:27	53 19:28 (5) 19:40	47 08:34 (7) 18:51	17:10	38 16:23 (4) 16:57
12	06:03	18:54 (5) 06:30	18:34 (5) 07:00	07:46 (7) 07:30	07:05	15:46 (4) 07:36
	20:54	16 19:10 (5) 20:26	53 19:27 (5) 19:39	48 08:34 (7) 18:49	17:09	38 16:24 (4) 16:57
13	06:03	18:53 (5) 06:31	18:34 (5) 07:01	07:45 (7) 07:31	07:06	15:45 (4) 07:37
	20:54	19 19:12 (5) 20:24	52 19:26 (5) 19:37	50 08:35 (7) 18:48	17:08	40 16:25 (4) 16:57
14	06:04	18:51 (5) 06:32	18:34 (5) 07:02	07:44 (7) 07:32	07:07	15:45 (4) 07:38
	20:53	22 19:13 (5) 20:23	52 19:26 (5) 19:35	51 08:35 (7) 18:46	17:08	40 16:25 (4) 16:57
15	06:05	18:50 (5) 06:33	18:34 (5) 07:03	07:43 (7) 07:33	07:08	15:45 (4) 07:38
	20:53	24 19:14 (5) 20:22	52 19:26 (5) 19:34	53 08:36 (7) 18:45	17:07	40 16:25 (4) 16:57
16	06:06	18:49 (5) 06:34	18:34 (5) 07:04	07:42 (7) 07:34	07:09	15:46 (4) 07:39
	20:52	27 19:16 (5) 20:20	51 19:25 (5) 19:32	54 08:36 (7) 18:43	17:06	40 16:26 (4) 16:58
17	06:06	18:48 (5) 06:35	18:34 (5) 07:05	07:42 (7) 07:35	07:10	15:45 (4) 07:40
	20:51	29 19:17 (5) 20:19	50 19:24 (5) 19:30	54 08:36 (7) 18:42	17:05	41 16:26 (4) 16:58
18	06:07	18:47 (5) 06:36	18:35 (5) 07:06	07:41 (7) 07:36	07:12	15:45 (4) 07:40
	20:51	31 19:18 (5) 20:18	49 19:24 (5) 19:29	55 08:36 (7) 18:40	17:04	41 16:26 (4) 16:58
19	06:08	18:46 (5) 06:37	18:35 (5) 07:07	07:41 (7) 07:37	07:13	15:46 (4) 07:41
	20:50	33 19:19 (5) 20:16	48 19:23 (5) 19:27	55 08:36 (7) 18:39	17:04	40 16:26 (4) 16:59
20	06:09	18:45 (5) 06:38	18:36 (5) 07:08	07:40 (7) 07:38	07:14	15:47 (4) 07:42
	20:49	35 19:20 (5) 20:15	46 19:22 (5) 19:25	56 08:36 (7) 18:37	17:03	39 16:26 (4) 16:59
21	06:10	18:45 (5) 06:39	18:36 (5) 07:09	07:40 (7) 07:39	07:15	15:47 (4) 07:42
	20:49	36 19:21 (5) 20:13	45 19:21 (5) 19:24	56 08:36 (7) 18:36	17:02	39 16:26 (4) 16:59
22	06:11	18:44 (5) 06:40	18:37 (5) 07:10	07:40 (7) 07:40	07:16	15:47 (4) 07:43
	20:48	38 19:22 (5) 20:12	43 19:20 (5) 19:22	55 08:35 (7) 18:34	17:02	39 16:26 (4) 17:00
23	06:11	18:42 (5) 06:41	18:38 (5) 07:11	07:39 (7) 07:42	07:17	15:48 (4) 07:43
	20:47	40 19:22 (5) 20:10	40 19:18 (5) 19:20	55 08:34 (7) 18:33	17:01	38 16:26 (4) 17:00
24	06:12	18:42 (5) 06:42	18:39 (5) 07:12	07:38 (7) 07:43	07:18	15:48 (4) 07:44
	20:46	41 19:23 (5) 20:09	38 19:17 (5) 19:19	56 08:34 (7) 18:32	17:00	38 16:26 (4) 17:01
25	06:13	18:41 (5) 06:43	18:41 (5) 07:13	07:38 (7) 06:44	07:19	15:49 (4) 07:44
	20:45	43 19:24 (5) 20:07	34 19:15 (5) 19:17	55 08:33 (7) 17:30	17:00	38 16:27 (4) 17:02
26	06:14	18:41 (5) 06:44	18:41 (5) 07:14	07:39 (7) 06:45	07:21	15:50 (4) 07:44
	20:45	43 19:24 (5) 20:06	31 19:12 (5) 19:15	53 08:32 (7) 17:29	16:59	36 16:26 (4) 17:02
27	06:15	18:40 (5) 06:45	18:44 (5) 07:15	07:39 (7) 06:46	07:22	15:51 (4) 07:45
	20:44	45 19:25 (5) 20:04	25 19:09 (5) 19:14	52 08:31 (7) 17:28	16:59	35 16:26 (4) 17:03
28	06:16	18:40 (5) 06:46	18:46 (5) 07:16	07:39 (7) 06:47	07:23	15:51 (4) 07:45
	20:43	46 19:26 (5) 20:03	20 19:06 (5) 19:12	52 08:31 (7) 17:26	16:59	35 16:26 (4) 17:04
29	06:17	18:39 (5) 06:47	18:52 (5) 07:17	07:39 (7) 06:48	07:24	15:52 (4) 07:45
	20:42	47 19:26 (5) 20:01	8 19:00 (5) 19:10	50 08:29 (7) 17:25	16:58	34 16:26 (4) 17:04
30	06:18	18:39 (5) 06:48	07:18	07:40 (7) 06:49	07:25	15:53 (4) 07:46
	20:41	48 19:27 (5) 20:00	19:09	48 08:28 (7) 17:24	16:58	32 16:25 (4) 17:05
31	06:19	18:37 (5) 06:48		06:51		07:46
	20:40	49 19:26 (5) 19:58		17:22	3 16:03 (4)	17:06
Potential sun hours	457	427	375	346	299	290
Total, worst case	731	1311	1312	280	1051	558
Sun reduction	0.75	0.72	0.64	0.56	0.48	0.41
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40
Wind dir. red.	0.73	0.73	0.73	0.73	0.70	0.70
Total reduction	0.22	0.21	0.19	0.16	0.13	0.12
Total, real	158	273	244	45	140	64

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

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

windpro Nuoro nord - flickering

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AH - R38

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	16:22 (4) 06:58	07:09	07:59 (7) 06:24	18:29 (5) 05:56
	17:07	17:40	38 17:00 (4) 18:14	19:47	56 08:55 (7) 20:18	49 19:18 (5) 20:46
2	07:46	07:32	16:22 (4) 06:57	07:07	07:59 (7) 06:22	18:30 (5) 05:55
	17:08	17:42	38 17:00 (4) 18:15	19:48	54 08:53 (7) 20:19	48 19:18 (5) 20:47
3	07:46	07:31	16:23 (4) 06:55	07:05	08:00 (7) 06:21	18:29 (5) 05:55
	17:08	17:43	37 17:00 (4) 18:16	19:49	53 08:53 (7) 20:20	48 19:17 (5) 20:48
4	07:46	07:30	16:23 (4) 06:54	07:04	08:00 (7) 06:20	18:29 (5) 05:54
	17:09	17:44	37 17:00 (4) 18:17	19:50	51 08:51 (7) 20:21	47 19:16 (5) 20:49
5	07:46	07:29	16:24 (4) 06:52	07:26 (7) 07:02	08:00 (7) 06:19	18:30 (5) 05:54
	17:10	17:45	35 16:59 (4) 18:18	19 07:45 (7) 19:51	49 08:49 (7) 20:22	46 19:16 (5) 20:49
6	07:46	07:28	16:25 (4) 06:51	07:21 (7) 07:00	08:02 (7) 06:17	18:30 (5) 05:54
	17:11	17:46	34 16:59 (4) 18:19	27 07:48 (7) 19:52	46 08:48 (7) 20:23	46 19:16 (5) 20:50
7	07:46	07:27	16:26 (4) 06:49	07:19 (7) 06:59	08:02 (7) 06:16	18:31 (5) 05:53
	17:12	17:48	33 16:59 (4) 18:20	33 07:52 (7) 19:53	44 08:46 (7) 20:24	45 19:16 (5) 20:50
8	07:46	07:26	16:27 (4) 06:48	07:16 (7) 06:57	08:04 (7) 06:15	18:31 (5) 05:53
	17:13	17:49	31 16:58 (4) 18:21	37 07:53 (7) 19:54	41 08:45 (7) 20:25	44 19:15 (5) 20:51
9	07:46	07:25	16:28 (4) 06:46	07:14 (7) 06:56	08:05 (7) 06:14	18:32 (5) 05:53
	17:14	17:50	30 16:58 (4) 18:22	42 07:56 (7) 19:55	37 08:42 (7) 20:26	43 19:15 (5) 20:52
10	07:46	07:24	16:28 (4) 06:44	07:12 (7) 06:54	08:06 (7) 06:13	18:33 (5) 05:53
	17:15	17:51	28 16:56 (4) 18:24	45 07:57 (7) 19:56	33 08:39 (7) 20:27	41 19:14 (5) 20:52
11	07:46	16:33 (4) 07:23	16:30 (4) 06:43	07:10 (7) 06:53	08:09 (7) 06:12	18:33 (5) 05:53
	17:16	4 16:37 (4) 17:53	25 16:55 (4) 18:25	47 07:57 (7) 19:57	28 08:37 (7) 20:28	40 19:13 (5) 20:53
12	07:46	16:30 (4) 07:22	16:32 (4) 06:41	07:09 (7) 06:51	08:11 (7) 06:11	18:34 (5) 05:52
	17:17	11 16:41 (4) 17:54	21 16:53 (4) 18:26	50 07:59 (7) 19:58	22 08:33 (7) 20:29	39 19:13 (5) 20:53
13	07:45	16:28 (4) 07:20	16:35 (4) 06:40	07:07 (7) 06:49	08:16 (7) 06:10	18:35 (5) 05:52
	17:18	15 16:43 (4) 17:55	16 16:51 (4) 18:27	52 07:59 (7) 19:59	27 19:04 (5) 20:30	37 19:12 (5) 20:54
14	07:45	16:27 (4) 07:19	16:38 (4) 06:38	07:05 (7) 06:48	08:45 (5) 06:09	18:36 (5) 05:52
	17:19	18 16:45 (4) 17:56	9 16:47 (4) 18:28	55 08:00 (7) 20:00	22 19:07 (5) 20:31	35 19:11 (5) 20:54
15	07:45	16:27 (4) 07:18	06:36	07:05 (7) 06:46	18:43 (5) 06:08	18:36 (5) 05:52
	17:20	20 16:47 (4) 17:57	18:29	56 08:01 (7) 20:01	26 19:09 (5) 20:32	34 19:10 (5) 20:55
16	07:44	16:25 (4) 07:17	06:35	07:04 (7) 06:45	18:40 (5) 06:07	18:37 (5) 05:52
	17:21	23 16:48 (4) 17:59	18:30	57 08:01 (7) 20:02	31 19:11 (5) 20:33	32 19:09 (5) 20:55
17	07:44	16:25 (4) 07:15	06:33	07:03 (7) 06:43	18:39 (5) 06:06	18:38 (5) 05:52
	17:23	25 16:50 (4) 18:00	18:31	59 08:02 (7) 20:03	34 19:13 (5) 20:34	30 19:08 (5) 20:55
18	07:43	16:24 (4) 07:14	06:31	07:02 (7) 06:42	18:37 (5) 06:05	18:39 (5) 05:52
	17:24	27 16:51 (4) 18:01	18:32	60 08:02 (7) 20:04	36 19:13 (5) 20:35	27 19:06 (5) 20:56
19	07:43	16:24 (4) 07:13	06:30	07:01 (7) 06:40	18:36 (5) 06:04	18:41 (5) 05:53
	17:25	28 16:52 (4) 18:02	18:33	61 08:02 (7) 20:05	39 19:15 (5) 20:35	24 19:05 (5) 20:56
20	07:42	16:23 (4) 07:11	06:28	07:01 (7) 06:39	18:34 (5) 06:03	18:43 (5) 05:53
	17:26	30 16:53 (4) 18:03	18:34	61 08:02 (7) 20:06	41 19:15 (5) 20:36	21 19:04 (5) 20:56
21	07:42	16:23 (4) 07:10	06:27	07:00 (7) 06:37	18:33 (5) 06:03	18:45 (5) 05:53
	17:27	31 16:54 (4) 18:04	18:35	62 08:02 (7) 20:07	43 19:16 (5) 20:37	17 19:02 (5) 20:56
22	07:41	16:23 (4) 07:08	06:25	06:59 (7) 06:36	18:33 (5) 06:02	18:47 (5) 05:53
	17:28	32 16:55 (4) 18:06	18:36	62 08:01 (7) 20:08	44 19:17 (5) 20:38	12 18:59 (5) 20:57
23	07:41	16:22 (4) 07:07	06:23	06:59 (7) 06:34	18:32 (5) 06:01	18:53 (5) 05:53
	17:30	34 16:56 (4) 18:07	18:37	63 08:02 (7) 20:09	45 19:17 (5) 20:39	2 18:55 (5) 20:57
24	07:40	16:22 (4) 07:06	06:22	06:59 (7) 06:33	18:31 (5) 06:00	05:54
	17:31	34 16:56 (4) 18:08	18:38	62 08:01 (7) 20:10	46 19:17 (5) 20:40	20:57
25	07:39	16:22 (4) 07:04	06:20	06:58 (7) 06:32	18:30 (5) 06:00	05:54
	17:32	35 16:57 (4) 18:09	18:39	62 08:00 (7) 20:11	47 19:17 (5) 20:41	20:57
26	07:38	16:22 (4) 07:03	06:18	06:58 (7) 06:30	18:30 (5) 05:59	05:54
	17:33	36 16:58 (4) 18:10	18:40	62 08:00 (7) 20:12	47 19:17 (5) 20:42	20:57
27	07:38	16:22 (4) 07:01	06:17	06:58 (7) 06:29	18:30 (5) 05:58	05:55
	17:34	37 16:59 (4) 18:11	18:42	61 07:59 (7) 20:14	48 19:18 (5) 20:42	20:57
28	07:37	16:22 (4) 07:00	06:15	06:57 (7) 06:28	18:30 (5) 05:58	05:55
	17:36	37 16:59 (4) 18:12	18:43	61 07:58 (7) 20:15	48 19:18 (5) 20:43	20:57
29	07:36	16:22 (4) 07:00	06:14	06:57 (7) 06:27	18:29 (5) 05:57	05:55
	17:37	37 16:59 (4) 18:13	18:44	60 08:58 (7) 20:16	48 19:17 (5) 20:44	20:57
30	07:35	16:22 (4) 07:00	06:13	06:57 (7) 06:26	18:29 (5) 05:57	05:56
	17:38	37 16:59 (4) 18:14	18:45	59 08:57 (7) 20:17	49 19:18 (5) 20:45	20:57
31	07:34	16:22 (4) 07:00	06:12	06:57 (7) 06:25	18:28 (5) 05:56	05:56
	17:39	38 17:00 (4) 18:15	18:46	57 08:55 (7) 20:18	49 19:18 (5) 20:45	20:57
Potential sun hours	299	298	370	398	447	450
Total, worst case	589	412	1432	1235	807	
Sun reduction	0.40	0.43	0.47	0.51	0.58	
Oper. time red.	0.40	0.40	0.40	0.40	0.40	
Wind dir. red.	0.71	0.71	0.73	0.73	0.73	
Total reduction	0.11	0.12	0.14	0.15	0.17	
Total, real	66	50	195	181	136	

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

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

Project:

windpro Nuoro nord - flickering

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 Calculated:
 2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: AH - R38

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	18:43 (5) 19:57	06:49 28	08:08 (7) 19:07	07:18 51
2	05:57 20:57	06:20 20:38	18:43 (5) 19:55	06:50 33	08:05 (7) 19:05	07:19 48
3	05:57 20:57	06:21 20:37	18:42 (5) 19:53	06:51 37	08:03 (7) 19:04	07:21 46
4	05:58 20:57	06:22 20:36	18:41 (5) 19:52	06:52 41	08:01 (7) 19:02	07:22 43
5	05:58 20:57	06:23 20:34	18:41 (5) 19:50	06:53 44	07:59 (7) 19:00	07:23 40
6	05:59 20:56	06:24 20:33	18:40 (5) 19:49	06:54 46	07:58 (7) 18:59	07:24 35
7	05:59 20:56	06:25 20:32	18:40 (5) 19:47	06:55 49	07:56 (7) 18:57	07:25 30
8	06:00 20:56	06:26 20:31	18:39 (5) 19:45	06:56 51	07:54 (7) 18:56	07:26 24
9	06:01 20:55	06:27 20:30	18:39 (5) 19:44	06:57 53	07:53 (7) 18:54	07:27 14
10	06:01 20:55	06:28 20:28	18:39 (5) 19:42	06:58 55	07:52 (7) 18:52	07:28 38
11	06:02 20:55	06:29 20:27	18:38 (5) 19:40	06:59 56	07:51 (7) 18:51	07:29 37
12	06:03 20:54	06:30 20:26	18:37 (5) 19:39	07:00 58	07:50 (7) 18:49	07:30 37
13	06:03 20:54	06:31 20:24	18:37 (5) 19:37	07:01 59	07:49 (7) 18:48	07:31 37
14	06:04 20:53	06:32 20:23	18:37 (5) 19:35	07:02 60	07:48 (7) 18:46	07:32 37
15	06:05 20:53	06:33 20:22	18:37 (5) 19:34	07:03 60	07:48 (7) 18:45	07:33 36
16	06:06 20:52	06:34 20:20	18:37 (5) 19:32	07:04 61	07:47 (7) 18:43	07:34 36
17	06:06 20:51	06:35 20:19	18:37 (5) 19:30	07:05 61	07:47 (7) 18:42	07:35 35
18	06:07 20:51	06:36 20:18	18:37 (5) 19:29	07:06 62	07:46 (7) 18:40	07:36 34
19	06:08 20:50	06:37 20:16	18:37 (5) 19:27	07:07 62	07:46 (7) 18:39	07:37 34
20	06:09 20:49	06:38 20:15	18:37 (5) 19:25	07:08 62	07:46 (7) 18:37	07:38 32
21	06:10 20:49	18:59 (5) 19:08 (5)	06:39 20:13	18:38 (5) 19:24	07:09 63	07:39 31
22	06:11 20:48	18:57 (5) 19:11 (5)	06:40 20:12	18:38 (5) 19:22	07:10 62	07:40 30
23	06:11 20:47	18:54 (5) 19:13 (5)	06:41 20:10	18:39 (5) 19:20	07:11 62	07:41 28
24	06:12 20:46	18:52 (5) 19:15 (5)	06:42 20:09	18:40 (5) 19:19	07:12 61	07:42 27
25	06:13 20:45	18:51 (5) 19:16 (5)	06:43 20:07	18:41 (5) 19:17	07:13 60	07:43 25
26	06:14 20:45	18:50 (5) 19:18 (5)	06:44 20:06	18:41 (5) 19:15	07:14 60	07:44 23
27	06:15 20:44	18:48 (5) 19:19 (5)	06:45 20:04	18:42 (5) 19:14	07:15 58	07:45 20
28	06:16 20:43	18:47 (5) 19:20 (5)	06:46 20:03	18:44 (5) 19:12	07:16 57	07:46 12
29	06:17 20:42	18:47 (5) 19:21 (5)	06:47 20:01	18:46 (5) 19:10	07:17 55	07:47 17
30	06:18 20:41	18:46 (5) 19:22 (5)	06:48 20:00	08:16 (7) 19:09	07:18 53	07:48 22
31	06:19 20:40	18:44 (5) 19:22 (5)	06:48 19:58	08:11 (7) 08:33 (7)	07:19 22	07:49 25
Potential sun hours	457	427	375	346	299	290
Total, worst case	290	1272	1629	407	924	5
Sun reduction	0.75	0.72	0.64	0.56	0.48	0.41
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40
Wind dir. red.	0.73	0.73	0.73	0.72	0.71	0.71
Total reduction	0.22	0.21	0.19	0.16	0.14	0.12
Total, real	63	265	302	65	125	1

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 54

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AI - R20

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	16:20 (6) 06:58	16:25 (6) 07:09	06:24	05:56
	17:07	17:40	24 16:44 (6) 18:14	16 16:41 (6) 19:47	20:18	20:46
2	07:46	07:32	16:18 (6) 06:57	16:33 (6) 07:07	06:22	05:55
	17:08	17:42	28 16:46 (6) 18:15	2 16:34 (6) 19:48	20:19	20:47
3	07:46	07:32	16:17 (6) 06:55	07:05	06:21	05:55
	17:08	17:43	30 16:47 (6) 18:16	19:49	20:20	20:48
4	07:46	07:31	16:16 (6) 06:54	07:04	06:20	05:54
	17:09	17:44	33 16:49 (6) 18:17	19:50	20:21	20:49
5	07:47	07:29	16:15 (6) 06:52	07:02	06:19	05:54
	17:10	17:45	35 16:50 (6) 18:18	19:51	20:22	20:49
6	07:47	07:28	16:14 (6) 06:51	07:00	19:01 (3) 06:17	05:54
	17:11	17:46	37 16:51 (6) 18:19	19:52	12 19:13 (3) 20:23	20:50
7	07:46	07:27	16:14 (6) 06:49	06:59	18:58 (3) 06:16	05:53
	17:12	17:48	38 16:52 (6) 18:20	19:53	16 19:14 (3) 20:24	20:51
8	07:46	07:26	16:13 (6) 06:48	06:57	18:56 (3) 06:15	05:53
	17:13	17:49	40 16:53 (6) 18:21	19:54	20 19:16 (3) 20:25	20:51
9	07:46	07:25	16:13 (6) 06:46	06:56	18:54 (3) 06:14	05:53
	17:14	17:50	41 16:54 (6) 18:22	19:55	23 19:17 (3) 20:26	20:52
10	07:46	07:24	16:12 (6) 06:44	06:54	18:53 (3) 06:13	05:53
	17:15	17:51	42 16:54 (6) 18:24	19:56	24 19:17 (3) 20:27	20:52
11	07:46	07:23	16:12 (6) 06:43	06:52	18:52 (3) 06:12	05:53
	17:16	17:53	43 16:55 (6) 18:25	19:57	26 19:18 (3) 20:28	20:53
12	07:46	07:22	16:12 (6) 06:41	06:51	18:51 (3) 06:11	05:52
	17:17	17:54	43 16:55 (6) 18:26	19:58	26 19:17 (3) 20:29	20:53
13	07:45	07:20	16:12 (6) 06:40	06:49	18:51 (3) 06:10	05:52
	17:18	17:55	44 16:56 (6) 18:27	19:59	27 19:18 (3) 20:30	20:54
14	07:45	07:19	16:11 (6) 06:38	06:48	18:51 (3) 06:09	05:52
	17:19	17:56	44 16:55 (6) 18:28	20:00	26 19:17 (3) 20:31	20:54
15	07:45	07:18	16:11 (6) 06:36	06:46	18:51 (3) 06:08	05:52
	17:20	17:57	44 16:55 (6) 18:29	20:01	26 19:17 (3) 20:32	20:55
16	07:44	07:17	16:12 (6) 06:35	06:45	18:50 (3) 06:07	05:52
	17:21	17:59	44 16:56 (6) 18:30	20:02	26 19:16 (3) 20:33	20:55
17	07:44	07:15	16:11 (6) 06:33	06:43	18:51 (3) 06:06	05:52
	17:23	18:00	44 16:55 (6) 18:31	20:03	25 19:16 (3) 20:34	20:55
18	07:43	07:14	16:12 (6) 06:31	06:42	18:51 (3) 06:05	05:52
	17:24	18:01	43 16:55 (6) 18:32	20:04	24 19:15 (3) 20:35	20:56
19	07:43	07:13	16:13 (6) 06:30	06:40	18:52 (3) 06:04	05:53
	17:25	18:02	42 16:55 (6) 18:33	20:05	22 19:14 (3) 20:35	20:56
20	07:42	07:11	16:12 (6) 06:28	06:39	18:52 (3) 06:03	05:53
	17:26	18:03	42 16:54 (6) 18:34	20:06	21 19:13 (3) 20:36	20:56
21	07:42	07:10	16:13 (6) 06:27	06:37	18:54 (3) 06:02	05:53
	17:27	18:04	41 16:54 (6) 18:35	20:07	17 19:11 (3) 20:37	20:57
22	07:41	07:09	16:14 (6) 06:25	06:36	18:56 (3) 06:02	05:53
	17:28	18:06	40 16:54 (6) 18:36	20:08	14 19:10 (3) 20:38	20:57
23	07:41	07:07	16:15 (6) 06:23	06:34	18:58 (3) 06:01	05:53
	17:29	18:07	37 16:52 (6) 18:37	20:09	8 19:06 (3) 20:39	20:57
24	07:40	07:06	16:16 (6) 06:22	06:33	06:00	05:54
	17:31	18:08	35 16:51 (6) 18:38	20:10	20:40	20:57
25	07:39	07:04	16:17 (6) 06:20	06:32	06:00	05:54
	17:32	18:09	33 16:50 (6) 18:39	20:11	20:41	20:57
26	07:38	07:03	16:19 (6) 06:18	06:30	05:59	05:54
	17:33	18:10	30 16:49 (6) 18:40	20:12	20:42	20:57
27	07:38	07:01	16:20 (6) 06:17	06:29	05:58	05:54
	17:34	18:11	26 16:46 (6) 18:42	20:14	20:42	20:57
28	07:37	07:00	16:23 (6) 06:15	06:28	05:58	05:55
	17:35	18:12	22 16:45 (6) 18:43	20:15	20:43	20:57
29	07:36	16:29 (6)	07:13	06:26	05:57	05:55
	17:37	5 16:34 (6)	19:44	20:16	20:44	20:57
30	07:35	16:24 (6)	07:12	06:25	05:56	05:56
	17:38	15 16:39 (6)	19:45	20:17	20:45	20:57
31	07:34	16:22 (6)	07:10		05:56	
	17:39	20 16:42 (6)	19:46		20:46	
Potential sun hours	299	298	370	398	447	450
Total, worst case	40	1045	18	383		
Sun reduction	0.40	0.43	0.47	0.51		
Oper. time red.	0.40	0.40	0.40	0.40		
Wind dir. red.	0.71	0.71	0.71	0.74		
Total reduction	0.11	0.12	0.13	0.15		
Total, real	5	128	2	57		

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AI - R20

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	06:49 19:57	18:51 (3) 19:17 (3)	07:18 19:07	06:52 17:21
2	05:57 20:57	06:20 20:38	06:50 19:55	18:52 (3) 19:16 (3)	07:20 19:05	06:53 17:20
3	05:57 20:57	06:21 20:37	06:51 19:53	18:52 (3) 19:15 (3)	07:21 19:04	06:54 17:19
4	05:58 20:57	06:22 20:36	06:52 19:52	18:53 (3) 19:13 (3)	07:22 19:02	06:55 17:18
5	05:58 20:57	06:23 20:34	06:53 19:50	18:55 (3) 19:11 (3)	07:23 19:00	06:56 17:17
6	05:59 20:56	06:24 20:33	06:54 19:49	18:57 (3) 19:09 (3)	07:24 18:59	06:58 17:15
7	05:59 20:56	06:25 20:32	06:55 19:47	19:00 (3) 19:03 (3)	07:25 18:57	06:59 17:14
8	06:00 20:56	06:26 20:31	06:56 19:45	07:26 18:56	07:00 17:13	15:48 (6) 16:18 (6)
9	06:01 20:55	06:27 20:30	06:57 19:44	07:27 18:54	07:01 17:12	15:49 (6) 16:16 (6)
10	06:01 20:55	06:28 20:28	06:58 19:42	07:28 18:52	07:02 17:11	15:51 (6) 16:15 (6)
11	06:02 20:55	06:29 20:27	06:59 19:40	07:29 18:51	07:03 17:10	15:54 (6) 16:13 (6)
12	06:03 20:54	06:30 20:26	07:00 19:39	07:30 18:49	17:02 (6) 17:12 (6)	15:56 (6) 16:11 (6)
13	06:03 20:54	06:31 20:24	07:01 19:37	07:31 18:48	16:57 (6) 17:16 (6)	16:02 (6) 16:05 (6)
14	06:04 20:53	06:32 20:23	07:02 19:35	07:32 18:46	16:54 (6) 17:18 (6)	16:07 (6) 16:57 (6)
15	06:05 20:53	06:33 20:22	07:03 19:34	07:33 18:45	16:52 (6) 17:20 (6)	16:57 (6) 16:57 (6)
16	06:06 20:52	06:34 20:20	07:04 19:32	07:34 18:43	16:50 (6) 17:21 (6)	16:59 (6) 17:06 (6)
17	06:06 20:51	06:35 20:19	07:05 19:30	07:35 18:42	16:48 (6) 17:22 (6)	17:00 (6) 17:05 (6)
18	06:07 20:51	06:36 20:18	07:06 19:29	07:36 18:40	16:46 (6) 17:22 (6)	17:02 (6) 17:04 (6)
19	06:08 20:50	06:37 20:16	07:07 19:27	07:37 18:39	16:46 (6) 17:24 (6)	17:13 (6) 17:04 (6)
20	06:09 20:49	06:38 20:15	19:03 (3) 19:13 (3)	07:08 19:25	16:45 (6) 17:24 (6)	17:14 (6) 17:03 (6)
21	06:10 20:49	06:39 20:13	19:00 (3) 19:15 (3)	07:09 19:24	16:44 (6) 17:25 (6)	17:15 (6) 17:02 (6)
22	06:11 20:48	06:40 20:12	18:58 (3) 19:17 (3)	07:10 19:22	16:43 (6) 17:25 (6)	17:16 (6) 17:02 (6)
23	06:11 20:47	06:41 20:10	18:57 (3) 19:18 (3)	07:11 19:20	16:42 (6) 17:25 (6)	17:17 (6) 17:01 (6)
24	06:12 20:46	06:42 20:09	18:56 (3) 19:18 (3)	07:12 19:19	16:41 (6) 17:25 (6)	17:18 (6) 17:00 (6)
25	06:13 20:46	06:43 20:07	18:55 (3) 19:19 (3)	07:13 19:17	16:44 (6) 17:30 (6)	17:19 (6) 17:00 (6)
26	06:14 20:45	06:44 20:06	18:53 (3) 19:18 (3)	07:14 19:15	16:45 (6) 17:29 (6)	17:21 (6) 16:59 (6)
27	06:15 20:44	06:45 20:04	18:52 (3) 19:18 (3)	07:15 19:14	16:46 (6) 17:28 (6)	17:22 (6) 16:59 (6)
28	06:16 20:43	06:46 20:03	18:52 (3) 19:18 (3)	07:16 19:12	16:47 (6) 17:26 (6)	17:23 (6) 16:59 (6)
29	06:17 20:42	06:47 20:01	18:52 (3) 19:18 (3)	07:17 19:10	16:48 (6) 17:25 (6)	17:24 (6) 16:58 (6)
30	06:18 20:41	06:47 20:00	18:51 (3) 19:18 (3)	07:18 19:09	16:49 (6) 17:24 (6)	17:25 (6) 16:58 (6)
31	06:19 20:40	06:48 19:58	18:51 (3) 19:17 (3)	07:18 19:09	16:51 (6) 17:22 (6)	17:05 (6) 17:06 (6)
Potential sun hours	457	427	375	346	299	290
Total, worst case		267	124	734	383	
Sun reduction		0.72	0.64	0.56	0.48	
Oper. time red.		0.40	0.40	0.40	0.40	
Wind dir. red.		0.74	0.74	0.71	0.71	
Total reduction		0.21	0.19	0.16	0.14	
Total, real		56	23	116	52	

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

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

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: AJ - R24

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	08:58 (7)	07:33		06:58	16:18 (5)	07:09	06:24		05:56	18:47 (6)	
	17:07	48 09:46 (7)	17:40		18:14	37 16:55 (5)	19:47	20:18		20:46	26 19:13 (6)	
2	07:46	08:59 (7)	07:32		06:57	16:20 (5)	07:07	06:22		05:55	18:46 (6)	
	17:08	48 09:47 (7)	17:42		18:15	35 16:55 (5)	19:48	20:19		20:47	27 19:13 (6)	
3	07:46	09:00 (7)	07:31		06:55	16:20 (5)	07:05	06:21		05:55	18:45 (6)	
	17:08	47 09:47 (7)	17:43		18:16	33 16:53 (5)	19:49	20:20		20:48	29 19:14 (6)	
4	07:46	09:00 (7)	07:31		06:54	16:22 (5)	07:04	06:20		05:54	18:45 (6)	
	17:09	47 09:47 (7)	17:44		18:17	31 16:53 (5)	19:50	20:21		20:49	31 19:16 (6)	
5	07:47	09:01 (7)	07:29		06:52	16:23 (5)	07:02	06:19		05:54	18:44 (6)	
	17:10	47 09:48 (7)	17:45		18:18	28 16:51 (5)	19:51	20:22		20:49	32 19:16 (6)	
6	07:46	09:01 (7)	07:28		06:51	16:24 (5)	07:00	06:17		05:54	18:44 (6)	
	17:11	47 09:48 (7)	17:46		18:19	24 16:48 (5)	19:52	20:23		20:50	33 19:17 (6)	
7	07:46	09:02 (7)	07:27		06:49	16:26 (5)	06:59	06:16		05:53	18:44 (6)	
	17:12	46 09:48 (7)	17:48		18:20	21 16:47 (5)	19:53	20:24		20:50	34 19:18 (6)	
8	07:46	09:03 (7)	07:26		06:48	16:29 (5)	06:57	06:15		05:53	18:44 (6)	
	17:13	46 09:49 (7)	17:49		18:21	14 16:43 (5)	19:54	20:25		20:51	34 19:18 (6)	
9	07:46	09:04 (7)	07:25		06:46		06:56	06:14		05:53	18:44 (6)	
	17:14	45 09:49 (7)	17:50		18:22		19:55	20:26		20:52	35 19:19 (6)	
10	07:46	09:04 (7)	07:24		16:33 (5)	06:44	06:54	06:13		05:53	18:43 (6)	
	17:15	44 09:48 (7)	17:51	8	16:41 (5)	18:24	19:56	20:27		20:52	36 19:19 (6)	
11	07:46	09:05 (7)	07:23		16:29 (5)	06:43	06:53	06:12		05:53	18:43 (6)	
	17:16	43 09:48 (7)	17:53	17	16:46 (5)	18:25	19:57	20:28		20:53	36 19:19 (6)	
12	07:46	09:06 (7)	07:22		16:27 (5)	06:41	06:51	06:11		05:52	18:43 (6)	
	17:17	43 09:49 (7)	17:54	21	16:48 (5)	18:26	19:58	20:29		20:53	37 19:20 (6)	
13	07:45	09:06 (7)	07:20		16:25 (5)	06:40	06:49	06:10		05:52	18:43 (6)	
	17:18	42 09:48 (7)	17:55	26	16:51 (5)	18:27	19:59	20:30		20:54	37 19:20 (6)	
14	07:45	09:07 (7)	07:19		16:23 (5)	06:38	06:48	06:09		05:52	18:43 (6)	
	17:19	41 09:48 (7)	17:56	28	16:51 (5)	18:28	20:00	20:31		20:54	38 19:21 (6)	
15	07:45	09:09 (7)	07:18		16:22 (5)	06:36	06:46	06:08		05:52	18:43 (6)	
	17:20	39 09:48 (7)	17:57	31	16:53 (5)	18:29	20:01	20:32		20:55	38 19:21 (6)	
16	07:44	09:09 (7)	07:17		16:21 (5)	06:35	06:45	06:07		05:52	18:43 (6)	
	17:21	39 09:48 (7)	17:59	33	16:54 (5)	18:30	20:02	20:33		20:55	38 19:21 (6)	
17	07:44	09:11 (7)	07:15		16:20 (5)	06:33	06:43	06:06		05:52	18:43 (6)	
	17:23	37 09:48 (7)	18:00	35	16:55 (5)	18:31	20:03	20:34		20:55	39 19:22 (6)	
18	07:43	09:11 (7)	07:14		16:19 (5)	06:31	06:42	06:05		05:52	18:43 (6)	
	17:24	36 09:47 (7)	18:01	37	16:56 (5)	18:32	20:04	20:35		20:56	39 19:22 (6)	
19	07:43	09:13 (7)	07:13		16:19 (5)	06:30	06:40	06:04		05:53	18:44 (6)	
	17:25	34 09:47 (7)	18:02	38	16:57 (5)	18:33	20:05	20:35		20:56	39 19:23 (6)	
20	07:42	09:14 (7)	07:11		16:18 (5)	06:28	06:39	06:03		05:53	18:44 (6)	
	17:26	31 09:45 (7)	18:03	39	16:57 (5)	18:34	20:06	20:36		20:56	39 19:23 (6)	
21	07:42	09:15 (7)	07:10		16:18 (5)	06:27	06:37	06:02		05:53	18:44 (6)	
	17:27	29 09:44 (7)	18:04	39	16:57 (5)	18:35	20:07	20:37		20:56	39 19:23 (6)	
22	07:41	09:17 (7)	07:08		16:17 (5)	06:25	06:36	06:02		05:53	18:44 (6)	
	17:28	26 09:43 (7)	18:06	40	16:57 (5)	18:36	20:08	20:38		20:57	39 19:23 (6)	
23	07:41	09:19 (7)	07:07		16:17 (5)	06:23	06:34	06:01		05:53	18:44 (6)	
	17:30	23 09:42 (7)	18:07	40	16:57 (5)	18:37	20:09	20:39		20:57	39 19:23 (6)	
24	07:40	09:21 (7)	07:06		16:18 (5)	06:22	06:33	06:00		05:54	18:45 (6)	
	17:31	18 09:39 (7)	18:08	40	16:58 (5)	18:38	20:10	20:40		20:57	39 19:24 (6)	
25	07:39	09:24 (7)	07:04		16:17 (5)	06:20	06:32	06:00		05:54	18:45 (6)	
	17:32	12 09:36 (7)	18:09	40	16:57 (5)	18:39	20:11	20:41		20:57	39 19:24 (6)	
26	07:38		07:03		16:18 (5)	06:18	06:30	05:59		05:54	18:45 (6)	
	17:33		18:10	39	16:57 (5)	18:40	20:12	20:42		20:57	38 19:23 (6)	
27	07:38		07:01		16:18 (5)	06:17	06:29	05:58		18:54 (6)	05:54	18:46 (6)
	17:34		18:11	38	16:56 (5)	18:42	20:14	20:42	9	19:03 (6)	20:57	38 19:24 (6)
28	07:37		07:00		16:18 (5)	06:15	06:28	05:58		18:52 (6)	05:55	18:46 (6)
	17:35		18:12	38	16:56 (5)	18:43	20:15	20:43	15	19:07 (6)	20:57	38 19:24 (6)
29	07:36				07:13		06:26	05:57		18:50 (6)	05:55	18:47 (6)
	17:37				07:12		20:16	20:44	18	19:08 (6)	20:57	37 19:24 (6)
30	07:35				07:12		06:25	05:57		18:49 (6)	05:56	18:47 (6)
	17:38				19:45		20:17	20:45	21	19:10 (6)	20:57	37 19:24 (6)
31	07:34				07:10			05:56		18:47 (6)		
	17:39				19:46			20:46	24	19:11 (6)		
Potential sun hours	299		298		370		398	447		450		
Total, worst case	958		627		223		87			1080		
Sun reduction	0.40		0.43		0.47		0.58			0.67		
Oper. time red.	0.40		0.40		0.40		0.40			0.40		
Wind dir. red.	0.61		0.72		0.72		0.71			0.71		
Total reduction	0.10		0.12		0.13		0.16			0.19		
Total, real	92		77		30		14			201		

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 57

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AJ - R24

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	18:47 (6) 19:24 (6)	06:20 20:39	06:49 19:57	07:18 19:07	06:52 17:21
2	05:57 20:57	18:48 (6) 19:24 (6)	06:20 20:38	06:50 19:55	07:19 19:05	06:53 17:20
3	05:57 20:57	18:48 (6) 19:23 (6)	06:21 20:37	06:51 19:53	07:21 19:04	06:54 17:19
4	05:58 20:57	18:49 (6) 19:24 (6)	06:22 20:36	06:52 19:52	07:22 19:02	06:55 17:18
5	05:58 20:57	18:50 (6) 19:24 (6)	06:23 20:34	06:53 19:50	07:23 19:00	17:08 (5) 17:17 (5)
6	05:59 20:56	18:50 (6) 19:23 (6)	06:24 20:33	06:54 19:49	07:24 18:59	17:03 (5) 17:15 (5)
7	05:59 20:56	18:51 (6) 19:23 (6)	06:25 20:32	06:55 19:47	07:25 18:57	17:00 (5) 17:14 (5)
8	06:00 20:56	18:51 (6) 19:22 (6)	06:26 20:31	06:56 19:45	07:26 18:56	16:59 (5) 17:13 (5)
9	06:01 20:55	18:52 (6) 19:22 (6)	06:27 20:30	06:57 19:44	07:27 18:54	16:57 (5) 17:12 (5)
10	06:01 20:55	18:53 (6) 19:22 (6)	06:28 20:28	06:58 19:42	07:28 18:52	16:55 (5) 17:11 (5)
11	06:02 20:55	18:54 (6) 19:20 (6)	06:29 20:27	06:59 19:40	07:29 18:51	16:54 (5) 17:10 (5)
12	06:03 20:54	18:55 (6) 19:20 (6)	06:30 20:26	07:00 19:39	07:30 18:49	16:53 (5) 17:09 (5)
13	06:03 20:54	18:57 (6) 19:19 (6)	06:31 20:24	07:01 19:37	07:31 18:48	16:52 (5) 17:08 (5)
14	06:04 20:53	18:57 (6) 19:17 (6)	06:32 20:23	07:02 19:35	07:32 18:46	16:51 (5) 17:08 (5)
15	06:05 20:53	18:59 (6) 19:16 (6)	06:33 20:22	07:03 19:34	07:33 18:45	16:50 (5) 17:07 (5)
16	06:06 20:52	19:02 (6) 19:14 (6)	06:34 20:20	07:04 19:32	07:34 18:43	16:49 (5) 17:06 (5)
17	06:06 20:51	19:07 (6) 19:10 (6)	06:35 20:19	07:05 19:30	07:35 18:42	16:49 (5) 17:05 (5)
18	06:07 20:51	06:36 20:18	07:06 19:29	07:36 18:40	07:12 17:04	08:58 (7) 09:10 (7)
19	06:08 20:50	06:37 20:16	07:07 19:27	07:37 18:39	07:13 17:04	09:13 (7) 09:16 (7)
20	06:09 20:49	06:38 20:15	07:08 19:25	07:38 18:37	07:14 17:03	08:52 (7) 09:18 (7)
21	06:10 20:49	06:39 20:13	07:09 19:24	07:39 18:36	07:15 17:02	08:51 (7) 09:20 (7)
22	06:11 20:48	06:40 19:22	07:10 19:22	07:40 18:34	07:16 17:02	08:50 (7) 09:21 (7)
23	06:11 20:47	06:41 19:20	07:11 19:20	07:41 18:33	07:17 17:01	08:49 (7) 09:23 (7)
24	06:12 20:46	06:42 20:09	07:12 19:19	07:43 18:32	07:18 17:00	08:48 (7) 09:24 (7)
25	06:13 20:45	06:43 20:07	07:13 19:17	07:44 18:30	07:19 17:00	08:49 (7) 09:26 (7)
26	06:14 20:45	06:44 20:06	07:14 19:15	07:45 18:29	07:21 16:59	08:48 (7) 09:27 (7)
27	06:15 20:44	06:45 20:04	07:15 19:14	07:46 18:28	07:22 16:59	08:48 (7) 09:27 (7)
28	06:16 20:43	06:46 20:03	07:16 19:12	07:47 18:26	07:23 16:59	08:47 (7) 09:28 (7)
29	06:17 20:42	06:47 19:01	07:17 19:10	07:48 18:25	07:24 16:58	08:47 (7) 09:29 (7)
30	06:18 20:41	06:48 20:00	07:18 19:09	07:49 18:24	07:25 16:58	08:47 (7) 09:30 (7)
31	06:19 20:40	06:48 19:58	07:19 19:08	07:50 18:23	07:26 16:57	08:47 (7) 09:31 (7)
Potential sun hours	457	427	375	346	299	290
Total, worst case	457			862	456	1481
Sun reduction	0.75			0.56	0.48	0.41
Oper. time red.	0.40			0.40	0.40	0.40
Wind dir. red.	0.71			0.72	0.61	0.61
Total reduction	0.21			0.16	0.12	0.10
Total, real	96			136	53	146

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 58

Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AK - R19

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June				
1	07:46	07:33	16:06 (6)	06:58	07:09	18:51 (3)	06:24	05:56		
	17:07	17:40	39	16:45 (6)	18:14	19:47	19	19:10 (3)	20:18	20:46
2	07:46	07:32	16:06 (6)	06:57	07:07	18:49 (3)	06:22	05:55		
	17:08	17:42	40	16:46 (6)	18:15	19:48	22	19:11 (3)	20:19	20:47
3	07:46	07:32	16:05 (6)	06:55	07:05	18:49 (3)	06:21	05:55		
	17:08	17:43	41	16:46 (6)	18:16	19:49	23	19:12 (3)	20:20	20:48
4	07:47	07:31	16:06 (6)	06:54	07:04	18:47 (3)	06:20	05:54		
	17:09	17:44	41	16:47 (6)	18:17	19:50	25	19:12 (3)	20:21	20:49
5	07:47	07:29	16:06 (6)	06:52	07:02	18:46 (3)	06:19	05:54		
	17:10	17:45	41	16:47 (6)	18:18	19:51	26	19:12 (3)	20:22	20:49
6	07:47	07:28	16:06 (6)	06:51	07:00	18:46 (3)	06:17	05:54		
	17:11	17:46	41	16:47 (6)	18:19	19:52	26	19:12 (3)	20:23	20:50
7	07:46	07:27	16:06 (6)	06:49	06:59	18:46 (3)	06:16	05:53		
	17:12	17:48	42	16:48 (6)	18:20	19:53	26	19:12 (3)	20:24	20:51
8	07:46	07:26	16:07 (6)	06:48	06:57	18:46 (3)	06:15	05:53		
	17:13	17:49	41	16:48 (6)	18:21	19:54	26	19:12 (3)	20:25	20:51
9	07:46	07:25	16:07 (6)	06:46	06:56	18:46 (3)	06:14	05:53		
	17:14	17:50	41	16:48 (6)	18:22	19:55	25	19:11 (3)	20:26	20:52
10	07:46	07:24	16:07 (6)	06:44	06:54	18:46 (3)	06:13	05:53		
	17:15	17:51	40	16:47 (6)	18:24	19:56	24	19:10 (3)	20:27	20:52
11	07:46	07:23	16:07 (6)	06:43	06:52	18:47 (3)	06:12	05:53		
	17:16	17:53	40	16:47 (6)	18:25	19:57	22	19:09 (3)	20:28	20:53
12	07:46	07:22	16:08 (6)	06:41	06:51	18:47 (3)	06:11	05:52		
	17:17	17:54	38	16:46 (6)	18:26	19:58	20	19:07 (3)	20:29	20:53
13	07:45	07:20	16:09 (6)	06:40	06:49	18:48 (3)	06:10	05:52		
	17:18	17:55	37	16:46 (6)	18:27	19:59	18	19:06 (3)	20:30	20:54
14	07:45	07:19	16:09 (6)	06:38	06:48	18:49 (3)	06:09	05:52		
	17:19	17:56	36	16:45 (6)	18:28	20:00	15	19:04 (3)	20:31	20:54
15	07:45	07:18	16:11 (6)	06:36	06:46	18:53 (3)	06:08	05:52		
	17:20	17:57	33	16:44 (6)	18:29	20:01	8	19:01 (3)	20:32	20:55
16	07:44	07:17	16:12 (6)	06:35	06:45	19:07 (3)	06:07	05:52		
	17:21	17:59	31	16:43 (6)	18:30	20:02	20:33	20:55		
17	07:44	07:15	16:13 (6)	06:33	06:43	19:06 (3)	06:06	05:52		
	17:23	18:00	28	16:41 (6)	18:31	20:03	20:34	20:55		
18	07:43	07:14	16:15 (6)	06:31	06:42	19:05 (3)	06:05	05:52		
	17:24	18:01	25	16:40 (6)	18:32	20:04	20:35	20:56		
19	07:43	16:17 (6)	07:13	16:17 (6)	06:30	06:40	06:04	05:53		
	17:25	12	16:29 (6)	18:02	21	16:38 (6)	18:33	20:05	20:35	20:56
20	07:42	16:15 (6)	07:11	16:20 (6)	06:28	06:39	06:03	05:53		
	17:26	16	16:31 (6)	18:03	15	16:35 (6)	18:34	20:06	20:36	20:56
21	07:42	16:13 (6)	07:10	16:27 (6)	06:27	06:37	06:02	05:53		
	17:27	20	16:33 (6)	18:04	2	16:29 (6)	18:35	20:07	20:37	20:57
22	07:41	16:12 (6)	07:09	16:25	06:36	06:36	06:02	05:53		
	17:28	23	16:35 (6)	18:06	18:36	20:08	20:38	20:57		
23	07:41	16:11 (6)	07:07	16:23	06:34	06:34	06:01	05:53		
	17:29	26	16:37 (6)	18:07	18:37	20:09	20:39	20:57		
24	07:40	16:10 (6)	07:06	16:22	06:33	06:33	06:00	05:54		
	17:31	28	16:38 (6)	18:08	18:38	20:10	20:40	20:57		
25	07:39	16:09 (6)	07:04	16:20	06:32	06:32	06:00	05:54		
	17:32	30	16:39 (6)	18:09	18:39	20:11	20:41	20:57		
26	07:38	16:09 (6)	07:03	16:18	06:30	06:30	05:59	05:54		
	17:33	32	16:41 (6)	18:10	18:40	20:12	20:42	20:57		
27	07:38	16:08 (6)	07:01	16:17	06:29	06:29	05:58	05:54		
	17:34	34	16:42 (6)	18:11	18:42	20:14	20:42	20:57		
28	07:37	16:07 (6)	07:00	16:15	06:28	06:28	05:58	05:55		
	17:35	36	16:43 (6)	18:12	18:43	20:15	20:43	20:57		
29	07:36	16:07 (6)	18:12	16:13	06:26	06:26	05:57	05:55		
	17:37	37	16:44 (6)	18:13	19:44	20:16	20:44	20:57		
30	07:35	16:06 (6)	18:13	16:12	06:25	06:25	05:56	05:56		
	17:38	38	16:44 (6)	18:14	19:45	10	19:06 (3)	20:17	20:45	20:57
31	07:34	16:06 (6)	18:14	16:11	06:24	06:24	05:56	05:56		
	17:39	39	16:45 (6)	18:15	19:46	16	19:08 (3)	20:18	20:46	20:57
Potential sun hours	299	298	370	398	447	450				
Total, worst case	371	713	26	325						
Sun reduction	0.40	0.43	0.47	0.51						
Oper. time red.	0.40	0.40	0.40	0.40						
Wind dir. red.	0.70	0.70	0.74	0.74						
Total reduction	0.11	0.12	0.14	0.15						
Total, real	41	86	4	48						

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AK - R19

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	06:49 19:57	18:46 (3) 19:07	06:52 17:21	15:36 (6) 16:58
2	05:57 20:57	06:20 20:38	06:50 19:55	18:45 (3) 19:05	06:53 17:20	15:36 (6) 16:57
3	05:57 20:57	06:21 20:37	06:51 19:53	18:44 (3) 19:04	06:54 17:19	15:36 (6) 16:57
4	05:58 20:57	06:22 20:36	06:52 19:52	18:43 (3) 19:02	06:55 17:18	15:36 (6) 16:57
5	05:58 20:57	06:23 20:34	06:53 19:50	18:43 (3) 19:00	06:56 17:17	15:36 (6) 16:57
6	05:59 20:56	06:24 20:33	06:54 19:49	18:42 (3) 18:59	06:58 17:15	15:35 (6) 16:57
7	05:59 20:56	06:25 20:32	06:55 19:47	18:41 (3) 18:57	06:59 17:14	15:36 (6) 16:57
8	06:00 20:56	06:26 20:31	06:56 19:45	18:41 (3) 18:56	07:00 17:13	15:36 (6) 16:56
9	06:01 20:55	06:27 20:30	06:57 19:44	18:42 (3) 18:54	07:01 17:12	15:36 (6) 16:56
10	06:01 20:55	06:28 20:28	06:58 19:42	18:42 (3) 18:52	07:02 17:11	15:37 (6) 16:57
11	06:02 20:55	06:29 20:27	06:59 19:40	18:43 (3) 18:51	07:03 17:10	15:38 (6) 16:57
12	06:03 20:54	06:30 20:26	07:00 19:39	18:44 (3) 18:49	07:05 17:09	15:38 (6) 16:57
13	06:03 20:54	06:31 20:24	07:01 19:37	19:01 (3) 18:49	07:06 17:08	15:39 (6) 16:57
14	06:04 20:53	06:32 20:23	07:02 19:35	18:46 (3) 18:48	07:07 17:07	15:39 (6) 16:57
15	06:05 20:53	06:33 20:22	07:03 19:34	18:58 (3) 18:46	07:08 17:06	15:41 (6) 16:57
16	06:06 20:52	06:34 20:20	07:04 19:32	18:45 (3) 18:45	07:09 17:05	15:42 (6) 16:57
17	06:06 20:51	06:35 20:19	07:05 19:30	18:43 (3) 18:43	07:10 17:04	15:42 (6) 16:58
18	06:07 20:51	06:36 20:18	07:06 19:29	18:42 (3) 18:42	07:12 17:03	15:43 (6) 16:58
19	06:08 20:50	06:37 20:16	07:07 19:27	18:41 (3) 18:41	07:13 17:02	15:44 (6) 16:58
20	06:09 20:49	06:38 20:15	07:08 19:25	18:40 (3) 18:40	07:14 17:01	15:45 (6) 16:58
21	06:10 20:49	06:39 20:13	07:09 19:24	18:39 (3) 18:39	07:15 17:00	15:46 (6) 16:59
22	06:11 20:48	06:40 20:12	07:10 19:22	18:38 (3) 18:38	07:16 16:59	15:47 (6) 16:59
23	06:11 20:47	06:41 20:10	07:11 19:20	18:37 (3) 18:37	07:17 16:58	15:48 (6) 16:59
24	06:12 20:46	06:42 20:09	07:12 19:19	18:36 (3) 18:36	07:18 16:57	15:49 (6) 16:59
25	06:13 20:46	06:43 20:07	07:13 19:17	18:35 (3) 18:35	07:19 16:56	15:50 (6) 16:59
26	06:14 20:45	06:44 20:06	07:14 19:15	18:34 (3) 18:34	07:20 16:55	15:51 (6) 16:59
27	06:15 20:44	06:45 20:04	07:15 19:14	18:33 (3) 18:33	07:21 16:54	15:52 (6) 16:59
28	06:16 20:43	06:46 20:03	18:53 (3) 19:12	18:32 (3) 18:32	07:22 16:53	15:53 (6) 16:59
29	06:17 20:42	06:47 20:01	19:02 (3) 19:10	18:31 (3) 18:31	07:23 16:52	15:54 (6) 16:59
30	06:18 20:41	06:47 20:00	18:50 (3) 19:09	18:30 (3) 18:30	07:24 16:51	15:55 (6) 16:59
31	06:19 20:40	06:48 19:58	18:48 (3) 19:07	18:29 (3) 18:29	07:25 16:50	15:56 (6) 16:59
Potential sun hours	457	427	375	346	299	290
Total, worst case		62	293	320	782	
Sun reduction		0.72	0.64	0.56	0.48	
Oper. time red.		0.40	0.40	0.40	0.40	
Wind dir. red.		0.74	0.74	0.70	0.70	
Total reduction		0.21	0.19	0.15	0.13	
Total, real		13	55	50	105	

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

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

windpro Nuoro nord - flickering

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AL - R21

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46	07:33	06:58	16:30 (6) 07:09	06:24	05:56
	17:07	17:40	18:14	37 17:07 (6) 19:47	20:18	20:46
2	07:46	07:32	06:57	16:31 (6) 07:07	06:22	05:55
	17:08	17:42	18:15	36 17:07 (6) 19:48	20:19	20:47
3	07:46	07:32	06:55	16:31 (6) 07:05	06:21	05:55
	17:08	17:43	18:16	34 17:05 (6) 19:49	20:20	20:48
4	07:46	07:31	06:54	16:33 (6) 07:04	06:20	05:54
	17:09	17:44	18:17	32 17:05 (6) 19:50	20:21	20:49
5	07:47	07:29	06:52	16:33 (6) 07:02	06:19	05:54
	17:10	17:45	18:18	30 17:03 (6) 19:51	20:22	20:49
6	07:46	07:28	06:51	16:34 (6) 07:00	06:17	05:54
	17:11	17:46	18:19	27 17:01 (6) 19:52	20:23	20:50
7	07:46	07:27	06:49	16:37 (6) 06:59	06:16	05:53
	17:12	17:48	18:20	22 16:59 (6) 19:53	20:24	20:50
8	07:46	07:26	06:48	16:39 (6) 06:57	19:09 (3) 06:15	05:53
	17:13	17:49	18:21	17 16:56 (6) 19:54	5 19:14 (3) 20:25	20:51
9	07:46	07:25	06:46	16:45 (6) 06:56	19:04 (3) 06:14	05:53
	17:14	17:50	18:22	6 16:51 (6) 19:55	13 19:17 (3) 20:26	20:52
10	07:46	07:24	16:43 (6) 06:44	06:54	19:01 (3) 06:13	05:53
	17:15	17:51	12 16:55 (6) 18:24	17 19:18 (3) 20:27	19:18 (3) 20:27	20:52
11	07:46	07:23	16:40 (6) 06:43	06:52	19:00 (3) 06:12	05:53
	17:16	17:53	19 16:59 (6) 18:25	20 19:20 (3) 20:28	19:57 20:28	20:53
12	07:46	07:22	16:38 (6) 06:41	06:51	18:58 (3) 06:11	05:52
	17:17	17:54	23 17:01 (6) 18:26	19:58 22 19:20 (3) 20:29	19:58 22 19:20 (3) 20:29	20:53
13	07:45	07:20	16:36 (6) 06:40	06:49	18:58 (3) 06:10	05:52
	17:18	17:55	27 17:03 (6) 18:27	19:59 23 19:21 (3) 20:30	19:59 23 19:21 (3) 20:30	20:54
14	07:45	07:19	16:34 (6) 06:38	06:48	18:57 (3) 06:09	05:52
	17:19	17:56	30 17:04 (6) 18:28	20:00 24 19:21 (3) 20:31	20:00 24 19:21 (3) 20:31	20:54
15	07:45	07:18	16:33 (6) 06:36	06:46	18:56 (3) 06:08	05:52
	17:20	17:57	32 17:05 (6) 18:29	20:01 25 19:21 (3) 20:32	20:01 25 19:21 (3) 20:32	20:55
16	07:44	07:17	16:32 (6) 06:35	06:45	18:56 (3) 06:07	05:52
	17:21	17:59	35 17:07 (6) 18:30	20:02 25 19:21 (3) 20:33	20:02 25 19:21 (3) 20:33	20:55
17	07:44	07:15	16:31 (6) 06:33	06:43	18:56 (3) 06:06	05:52
	17:23	18:00	36 17:07 (6) 18:31	20:03 25 19:21 (3) 20:34	20:03 25 19:21 (3) 20:34	20:55
18	07:43	07:14	16:30 (6) 06:31	06:42	18:55 (3) 06:05	05:52
	17:24	18:01	38 17:08 (6) 18:32	20:04 25 19:20 (3) 20:35	20:04 25 19:20 (3) 20:35	20:56
19	07:43	07:13	16:30 (6) 06:30	06:40	18:56 (3) 06:04	05:53
	17:25	18:02	39 17:09 (6) 18:33	20:05 24 19:20 (3) 20:35	20:05 24 19:20 (3) 20:35	20:56
20	07:42	07:11	16:29 (6) 06:28	06:39	18:56 (3) 06:03	05:53
	17:26	18:03	40 17:09 (6) 18:34	20:06 23 19:19 (3) 20:36	20:06 23 19:19 (3) 20:36	20:56
21	07:42	07:10	16:29 (6) 06:27	06:37	18:57 (3) 06:02	05:53
	17:27	18:04	40 17:09 (6) 18:35	20:07 21 19:18 (3) 20:37	20:07 21 19:18 (3) 20:37	20:57
22	07:41	07:08	16:28 (6) 06:25	06:36	18:58 (3) 06:02	05:53
	17:28	18:06	41 17:09 (6) 18:36	20:08 19 19:17 (3) 20:38	20:08 19 19:17 (3) 20:38	20:57
23	07:41	07:07	16:28 (6) 06:23	06:34	18:58 (3) 06:01	05:53
	17:29	18:07	42 17:10 (6) 18:37	20:09 17 19:15 (3) 20:39	20:09 17 19:15 (3) 20:39	20:57
24	07:40	07:06	16:29 (6) 06:22	06:33	19:00 (3) 06:00	05:54
	17:31	18:08	41 17:10 (6) 18:38	20:10 14 19:14 (3) 20:40	20:10 14 19:14 (3) 20:40	20:57
25	07:39	07:04	16:28 (6) 06:20	06:32	19:02 (3) 06:00	05:54
	17:32	18:09	41 17:09 (6) 18:39	20:11 8 19:10 (3) 20:41	20:11 8 19:10 (3) 20:41	20:57
26	07:38	07:03	16:29 (6) 06:18	06:30	05:59	05:54
	17:33	18:10	40 17:09 (6) 18:40	20:12	20:42	20:57
27	07:38	07:01	16:29 (6) 06:17	06:29	05:58	05:54
	17:34	18:11	39 17:08 (6) 18:42	20:14	20:42	20:57
28	07:37	07:00	16:29 (6) 06:15	06:28	05:58	05:55
	17:35	18:12	39 17:08 (6) 18:43	20:15	20:43	20:57
29	07:36		07:13	06:26	05:57	05:55
	17:37		19:44	20:16	20:44	20:57
30	07:35		07:12	06:25	05:56	05:56
	17:38		19:45	20:17	20:45	20:57
31	07:34		07:10		05:56	
	17:39		19:46		20:46	
Potential sun hours	299	298	370	398	447	450
Total, worst case		654	241	350		
Sun reduction		0.43	0.47	0.51		
Oper. time red.		0.40	0.40	0.40		
Wind dir. red.		0.73	0.73	0.73		
Total reduction		0.13	0.14	0.15		
Total, real		82	33	52		

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

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

Project:

windpro Nuoro nord - flickering

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Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AL - R21

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	06:49 19:57	18:59 (3) 19:19 (3)	07:18 19:07	06:52 17:21
2	05:57 20:57	06:20 20:38	06:50 19:55	19:00 (3) 19:17 (3)	07:19 19:05	06:53 17:20
3	05:57 20:57	06:21 20:37	06:51 19:53	19:02 (3) 19:15 (3)	07:21 19:04	06:54 17:19
4	05:58 20:57	06:22 20:36	06:52 19:52	19:05 (3) 19:11 (3)	07:22 19:02	06:55 17:18
5	05:58 20:57	06:23 20:34	06:53 19:50	19:00 17:31 (6)	06:56 17:17	07:30 16:57
6	05:59 20:56	06:24 20:33	06:54 19:49	07:24 18:59	06:58 17:15	07:31 16:57
7	05:59 20:56	06:25 20:32	06:55 19:47	07:25 18:57	06:59 17:14	07:32 16:57
8	06:00 20:56	06:26 20:31	06:56 19:45	07:26 18:56	07:00 17:38 (6)	07:33 16:56
9	06:01 20:55	06:27 20:30	06:57 19:44	07:27 18:54	07:01 17:39 (6)	07:34 16:56
10	06:01 20:55	06:28 20:28	06:58 19:42	07:28 18:52	07:02 17:40 (6)	07:34 16:57
11	06:02 20:55	06:29 20:27	06:59 19:40	07:29 18:51	07:03 17:40 (6)	07:35 16:57
12	06:03 20:54	06:30 20:26	07:00 19:39	07:30 18:49	07:05 17:41 (6)	07:36 16:57
13	06:03 20:54	06:31 20:24	07:01 19:37	07:31 18:48	07:06 17:41 (6)	07:37 16:57
14	06:04 20:53	06:32 20:23	07:02 19:35	07:32 18:46	07:07 17:41 (6)	07:38 16:57
15	06:05 20:53	06:33 20:22	07:03 19:34	07:33 18:45	07:08 17:41 (6)	07:38 16:57
16	06:06 20:52	06:34 20:20	07:04 19:32	07:34 18:43	07:09 17:41 (6)	07:39 16:58
17	06:06 20:51	06:35 20:19	07:05 19:30	07:35 18:42	07:10 17:41 (6)	07:40 16:58
18	06:07 20:51	06:36 20:18	19:08 (3) 19:18 (3)	07:06 19:29	07:12 18:40	07:40 17:04
19	06:08 20:50	06:37 20:16	19:06 (3) 19:20 (3)	07:07 19:27	07:13 18:39	07:41 17:04
20	06:09 20:49	06:38 20:15	19:04 (3) 19:21 (3)	07:08 19:25	07:14 18:37	07:42 17:03
21	06:10 20:49	06:39 20:13	19:02 (3) 19:22 (3)	07:09 19:24	07:15 18:36	07:42 17:02
22	06:11 20:48	06:40 20:12	19:01 (3) 19:23 (3)	07:10 19:22	07:16 18:34	07:43 17:02
23	06:11 20:47	06:41 20:10	19:00 (3) 19:24 (3)	07:11 19:20	07:17 18:33	07:43 17:01
24	06:12 20:46	06:42 20:09	19:00 (3) 19:24 (3)	07:12 19:19	07:18 18:32	07:44 17:00
25	06:13 20:45	06:43 20:07	18:59 (3) 19:24 (3)	07:13 19:17	07:19 18:30	07:44 17:02
26	06:14 20:45	06:44 20:06	18:58 (3) 19:23 (3)	07:14 19:15	07:21 18:29	07:45 17:02
27	06:15 20:44	06:45 20:04	18:57 (3) 19:23 (3)	07:15 19:14	07:22 18:28	07:45 17:03
28	06:16 20:43	06:46 20:03	18:57 (3) 19:22 (3)	07:16 19:12	07:23 18:26	07:45 17:03
29	06:17 20:42	06:47 20:01	18:57 (3) 19:22 (3)	07:17 19:10	07:24 18:25	07:45 17:04
30	06:18 20:41	06:47 20:00	18:58 (3) 19:21 (3)	07:17 19:09	07:25 18:24	07:46 17:05
31	06:19 20:40	06:48 19:58	18:58 (3) 19:20 (3)	07:17 19:09	07:26 18:23	07:46 17:06
Potential sun hours	457	427	375	346	299	290
Total, worst case		302	56	894	11	
Sun reduction		0.72	0.64	0.56	0.48	
Oper. time red.		0.40	0.40	0.40	0.40	
Wind dir. red.		0.73	0.73	0.73	0.73	
Total reduction		0.21	0.19	0.16	0.14	
Total, real		63	10	144	2	

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

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

windpro Nuoro nord - flickering

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AM - R36

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	07:46	07:33	06:58	17:24 (4)	07:09	06:24	05:56
	17:07	17:40	18:14	16 17:40 (4)	19:47	20:18	20:46
2	07:46	07:32	06:57	17:22 (4)	07:07	06:22	05:55
	17:08	17:42	18:15	21 17:43 (4)	19:48	20:19	20:47
3	07:46	07:31	06:55	17:19 (4)	07:05	06:21	05:55
	17:08	17:43	18:16	25 17:44 (4)	19:49	20:20	20:48
4	07:46	07:30	06:54	17:17 (4)	07:04	06:20	05:54
	17:09	17:44	18:17	28 17:45 (4)	19:50	20:21	20:49
5	07:46	07:29	06:52	17:17 (4)	07:02	06:19	05:54
	17:10	17:45	18:18	29 17:46 (4)	19:51	20:22	20:49
6	07:46	07:28	06:51	17:15 (4)	07:00	06:17	05:54
	17:11	17:46	18:19	31 17:46 (4)	19:52	20:23	20:50
7	07:46	07:27	06:49	17:15 (4)	06:59	06:16	05:53
	17:12	17:48	18:20	32 17:47 (4)	19:53	20:24	20:50
8	07:46	07:26	06:48	17:14 (4)	06:57	06:15	05:53
	17:13	17:49	18:21	33 17:47 (4)	19:54	20:25	20:51
9	07:46	07:25	06:46	17:14 (4)	06:56	06:14	05:53
	17:14	17:50	18:22	34 17:48 (4)	19:55	20:26	20:52
10	07:46	07:24	06:44	17:13 (4)	06:54	06:13	05:53
	17:15	17:51	18:24	34 17:47 (4)	19:56	20:27	20:52
11	07:46	07:23	06:43	17:13 (4)	06:53	06:12	05:53
	17:16	17:53	18:25	34 17:47 (4)	19:57	20:28	20:53
12	07:46	07:22	06:41	17:13 (4)	06:51	06:11	05:52
	17:17	17:54	18:26	34 17:47 (4)	19:58	20:29	20:53
13	07:45	07:20	06:40	17:13 (4)	06:49	06:10	05:52
	17:18	17:55	18:27	33 17:46 (4)	19:59	20:30	20:54
14	07:45	07:19	06:38	17:13 (4)	06:48	06:09	05:52
	17:19	17:56	18:28	32 17:45 (4)	20:00	20:31	20:54
15	07:45	07:18	06:36	17:14 (4)	06:46	06:08	05:52
	17:20	17:57	18:29	30 17:44 (4)	20:01	20:32	20:55
16	07:44	07:17	06:35	17:14 (4)	06:45	06:07	05:52
	17:21	17:59	18:30	29 17:43 (4)	20:02	20:33	20:55
17	07:44	07:15	06:33	17:16 (4)	06:43	06:06	05:52
	17:23	18:00	18:31	26 17:42 (4)	20:03	20:34	20:55
18	07:43	07:14	06:31	17:17 (4)	06:42	06:05	05:52
	17:24	18:01	18:32	23 17:40 (4)	20:04	20:34	20:56
19	07:43	07:13	06:30	17:18 (4)	06:40	06:04	05:53
	17:25	18:02	18:33	20 17:38 (4)	20:05	20:35	20:56
20	07:42	07:11	06:28	17:21 (4)	06:39	06:03	05:53
	17:26	18:03	18:34	15 17:36 (4)	20:06	20:36	20:56
21	07:42	07:10	06:27	17:25 (4)	06:37	06:03	19:36 (5)
	17:27	18:04	18:35	5 17:30 (4)	20:07	20:37	7 19:43 (5)
22	07:41	07:08	06:25	17:25 (4)	06:36	06:02	19:33 (5)
	17:28	18:06	18:36	20:08	20:38	13 19:46 (5)	05:53
23	07:41	07:07	06:23	17:25 (4)	06:34	06:01	19:32 (5)
	17:30	18:07	18:37	20:09	20:39	17 19:49 (5)	05:53
24	07:40	07:06	06:22	17:26 (4)	06:33	06:00	19:30 (5)
	17:31	18:08	18:38	20:10	20:40	20 19:50 (5)	05:54
25	07:39	07:04	06:20	17:27 (4)	06:32	06:00	19:29 (5)
	17:32	18:09	18:39	20:11	20:41	22 19:51 (5)	05:54
26	07:38	07:03	06:18	17:28 (4)	06:30	05:59	19:28 (5)
	17:33	18:10	18:40	20:12	20:42	25 19:53 (5)	05:54
27	07:38	07:01	06:17	17:29 (4)	06:29	05:58	19:27 (5)
	17:34	18:11	18:42	20:13	20:42	26 19:53 (5)	05:55
28	07:37	07:00	17:28 (4)	06:15	06:28	05:58	19:27 (5)
	17:36	18:12	10 17:38 (4)	18:43	20:15	20:43	28 19:55 (5)
29	07:36		07:13	17:30 (4)	06:26	05:57	19:26 (5)
	17:37		19:44	20:16	20:44	29 19:55 (5)	05:55
30	07:35		07:12	17:31 (4)	06:25	05:57	19:26 (5)
	17:38		19:45	20:17	20:45	30 19:56 (5)	05:56
31	07:34		07:10	17:32 (4)	06:24	05:56	19:25 (5)
	17:39		19:46	20:18	20:46	31 19:56 (5)	05:56
Potential sun hours	299	298	370	398	447	450	
Total, worst case			564			1708	
Sun reduction		0.43	0.47			0.67	
Oper. time red.		0.40	0.40			0.40	
Wind dir. red.		0.74	0.74			0.71	
Total reduction		0.13	0.14			0.19	
Total, real		1	78			322	

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

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

windpro Nuoro nord - flickering

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Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AM - R36

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:56	07:03 (7)	06:20	06:49	07:18	17:52 (4)	06:52	07:26
	20:57	59 20:05 (5)	20:39	19:57	19:07	33 18:25 (4)	17:21	16:58
2	05:57	07:05 (7)	06:20	06:50	07:19	17:52 (4)	06:53	07:27
	20:57	56 20:06 (5)	20:38	19:55	19:05	33 18:25 (4)	17:20	16:57
3	05:57	07:06 (7)	06:21	06:51	07:20	17:51 (4)	06:54	07:28
	20:57	52 20:05 (5)	20:37	19:53	19:04	34 18:25 (4)	17:19	16:57
4	05:58	07:10 (7)	06:22	06:52	07:22	17:51 (4)	06:55	07:29
	20:57	46 20:06 (5)	20:35	19:52	19:02	33 18:24 (4)	17:18	16:57
5	05:58	19:31 (5)	06:23	06:53	07:23	17:51 (4)	06:56	07:30
	20:57	35 20:06 (5)	20:34	19:50	19:00	33 18:24 (4)	17:17	16:57
6	05:59	19:30 (5)	06:24	06:54	07:24	17:51 (4)	06:58	07:31
	20:56	36 20:06 (5)	20:33	19:48	18:59	32 18:23 (4)	17:15	16:57
7	05:59	19:31 (5)	06:25	06:55	07:25	17:51 (4)	06:59	07:32
	20:56	35 20:06 (5)	20:32	19:47	18:57	31 18:22 (4)	17:14	16:57
8	06:00	19:31 (5)	06:26	06:56	07:26	17:51 (4)	07:00	07:33
	20:56	34 20:05 (5)	20:31	19:45	18:56	30 18:21 (4)	17:13	16:57
9	06:01	19:32 (5)	06:27	06:57	07:27	17:53 (4)	07:01	07:34
	20:55	33 20:05 (5)	20:30	19:44	18:54	28 18:21 (4)	17:12	16:57
10	06:01	19:33 (5)	06:28	06:58	07:28	17:53 (4)	07:02	07:34
	20:55	33 20:06 (5)	20:28	19:42	18:52	26 18:19 (4)	17:11	16:57
11	06:02	19:32 (5)	06:29	06:59	07:29	17:54 (4)	07:03	07:35
	20:55	33 20:05 (5)	20:27	19:40	18:51	24 18:18 (4)	17:10	16:57
12	06:03	19:33 (5)	06:30	07:00	07:30	17:56 (4)	07:05	07:36
	20:54	32 20:05 (5)	20:26	19:39	18:49	20 18:16 (4)	17:09	16:57
13	06:03	19:34 (5)	06:31	07:01	07:31	17:58 (4)	07:06	07:37
	20:54	31 20:05 (5)	20:24	19:37	18:48	15 18:13 (4)	17:08	16:57
14	06:04	19:34 (5)	06:32	07:02	07:32	18:03 (4)	07:07	07:38
	20:53	30 20:04 (5)	20:23	19:35	18:46	4 18:07 (4)	17:08	16:57
15	06:05	19:35 (5)	06:33	07:03	07:33	07:08	07:38	07:38
	20:53	28 20:03 (5)	20:22	19:34	18:45	17:07	16:57	16:57
16	06:06	19:36 (5)	06:34	07:04	07:34	07:09	07:39	07:39
	20:52	27 20:03 (5)	20:20	19:32	18:43	17:06	16:58	16:58
17	06:06	19:37 (5)	06:35	07:05	07:35	07:10	07:40	07:40
	20:51	26 20:03 (5)	20:19	19:30	18:42	17:05	16:58	16:58
18	06:07	19:37 (5)	06:36	07:06	07:36	07:12	07:40	07:40
	20:51	24 20:01 (5)	20:18	19:29	18:40	17:04	16:58	16:58
19	06:08	19:39 (5)	06:37	07:07	07:37	07:13	07:41	07:41
	20:50	21 20:00 (5)	20:16	19:27	18:39	17:04	16:59	16:59
20	06:09	19:40 (5)	06:38	07:08	07:38	07:14	07:42	07:42
	20:49	19 19:59 (5)	20:15	19:25	18:37	17:03	16:59	16:59
21	06:10	19:42 (5)	06:39	07:09	07:39	07:15	07:42	07:42
	20:49	16 19:58 (5)	20:13	19:24	18:36	17:02	16:59	16:59
22	06:11	19:45 (5)	06:40	07:10	07:40	07:16	07:43	07:43
	20:48	11 19:56 (5)	20:12	19:22	18:34	17:02	17:00	17:00
23	06:11	06:41	07:11	18:05 (4)	07:42	07:17	07:43	07:43
	20:47	20:10	19:20	13 18:18 (4)	18:33	17:01	17:00	17:00
24	06:12	06:42	07:12	18:02 (4)	07:43	07:18	07:44	07:44
	20:46	20:09	19:19	19 18:21 (4)	18:32	17:00	17:01	17:01
25	06:13	06:43	07:13	18:00 (4)	06:44	07:19	07:44	07:44
	20:45	20:07	19:17	22 18:22 (4)	17:30	17:00	17:02	17:02
26	06:14	06:44	07:14	17:58 (4)	06:45	07:21	07:44	07:44
	20:45	20:06	19:15	25 18:23 (4)	17:29	16:59	17:02	17:02
27	06:15	06:45	07:15	17:56 (4)	06:46	07:22	07:45	07:45
	20:44	20:04	19:14	28 18:24 (4)	17:28	16:59	17:03	17:03
28	06:16	06:46	07:16	17:55 (4)	06:47	07:23	07:45	07:45
	20:43	20:03	19:12	30 18:25 (4)	17:26	16:59	17:04	17:04
29	06:17	06:47	07:16	17:54 (4)	06:48	07:24	07:45	07:45
	20:42	20:01	19:10	31 18:25 (4)	17:25	16:58	17:04	17:04
30	06:18	06:48	07:17	17:53 (4)	06:49	07:25	07:46	07:46
	20:41	20:00	19:09	32 18:25 (4)	17:24	16:58	17:05	17:05
31	06:19	06:48	07:17	06:51	07:22	07:25	07:46	07:46
	20:40	19:58	19:07	07:22	07:22	17:06	17:06	17:06
Potential sun hours	457	427	375	346	299	290		
Total, worst case	717		200		376			
Sun reduction	0.75		0.64		0.56			
Oper. time red.	0.40		0.40		0.40			
Wind dir. red.	0.70		0.74		0.74			
Total reduction	0.21		0.19		0.16			
Total, real	151		38		62			

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

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

Project:

windpro Nuoro nord - flickering

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Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AN - R52

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 17:07	07:33 17:40	06:58 18:14	16:59 (4) 17:29 (4)	07:09 19:47	06:24 20:18
2	07:46 17:08	07:32 17:42	06:57 18:15	17:00 (4) 17:29 (4)	07:07 19:48	06:22 20:19
3	07:46 17:08	07:31 17:43	06:55 18:16	17:00 (4) 17:28 (4)	07:05 19:49	06:21 20:20
4	07:46 17:09	07:30 17:44	06:54 18:17	17:01 (4) 17:26 (4)	07:04 19:50	06:20 20:21
5	07:46 17:10	07:29 17:45	06:52 18:18	17:02 (4) 17:25 (4)	07:02 19:51	06:19 20:22
6	07:46 17:11	07:28 17:46	06:51 18:19	17:04 (4) 17:23 (4)	07:00 19:52	06:17 20:23
7	07:46 17:12	07:27 17:48	06:49 18:20	17:07 (4) 17:20 (4)	06:59 19:53	06:16 20:24
8	07:46 17:13	07:26 17:49	06:48 18:21	17:07 (4) 17:20 (4)	06:57 19:54	06:15 20:25
9	07:46 17:14	07:25 17:50	06:46 18:22	17:07 (4) 17:20 (4)	06:56 19:55	06:14 20:26
10	07:46 17:15	07:24 17:51	06:44 18:24	17:07 (4) 17:20 (4)	06:54 19:56	06:13 20:27
11	07:46 17:16	07:23 17:53	06:43 18:25	17:07 (4) 17:20 (4)	06:53 19:57	06:12 20:28
12	07:46 17:17	07:22 17:54	06:41 18:26	17:07 (4) 17:20 (4)	06:51 19:58	06:11 20:29
13	07:45 17:18	07:20 17:55	06:40 18:27	17:07 (4) 17:20 (4)	06:49 19:59	06:10 20:30
14	07:45 17:19	07:19 17:56	06:38 18:28	17:07 (4) 17:20 (4)	06:48 20:00	06:09 20:31
15	07:45 17:20	07:18 17:57	17:10 (4) 18:29	06:36 18:29	06:46 20:01	133 08:05 (7)
16	07:44 17:21	07:17 17:59	17:07 (4) 18:30	06:35 18:30	06:45 20:02	133 08:19 (7)
17	07:44 17:23	07:15 18:00	17:05 (4) 18:31	06:33 18:31	06:43 20:03	131 08:25 (7)
18	07:43 17:24	07:14 18:01	17:03 (4) 18:32	06:31 18:32	06:42 20:04	131 08:32 (7)
19	07:43 17:25	07:13 18:02	17:02 (4) 18:33	06:30 18:33	06:40 20:05	132 08:35 (7)
20	07:42 17:26	07:11 18:03	17:01 (4) 18:34	06:28 18:34	06:39 20:06	132 08:43 (7)
21	07:42 17:27	07:10 18:04	17:00 (4) 18:35	06:27 18:35	06:37 20:07	132 08:39 (7)
22	07:41 17:28	07:08 18:06	16:59 (4) 18:36	06:25 18:36	06:36 20:08	131 08:41 (7)
23	07:41 17:30	07:07 18:07	16:59 (4) 18:37	06:23 18:37	06:34 20:09	131 08:41 (7)
24	07:40 17:31	07:06 18:08	16:59 (4) 18:38	06:22 18:38	06:33 20:10	131 08:43 (7)
25	07:39 17:32	07:04 18:09	16:58 (4) 18:39	06:20 18:39	06:32 20:11	129 08:44 (7)
26	07:38 17:33	07:03 18:10	16:59 (4) 18:40	06:18 18:40	06:30 20:12	128 08:45 (7)
27	07:38 17:34	07:01 18:11	16:58 (4) 18:42	06:17 18:42	06:29 20:13	126 08:46 (7)
28	07:37 17:35	07:00 18:12	16:59 (4) 18:43	06:15 18:43	06:28 20:15	126 08:47 (7)
29	07:36 17:37		17:30 (4) 19:44	06:13 19:44	06:26 20:16	127 08:47 (7)
30	07:35 17:38		17:30 (4) 19:45	06:12 19:45	06:25 20:17	125 08:47 (7)
31	07:34 17:39		17:30 (4) 19:46	06:11 19:46	06:24 20:18	124 08:47 (7)
Potential sun hours	299	298	370	398	447	450
Total, worst case		380	167	949	3902	3208
Sun reduction		0.43	0.47	0.51	0.58	0.67
Oper. time red.		0.40	0.40	0.40	0.40	0.40
Wind dir. red.		0.74	0.74	0.74	0.73	0.74
Total reduction		0.13	0.14	0.15	0.17	0.20
Total, real		48	23	142	660	629

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

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

windpro Nuoro nord - flickering

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Bruno Manca / ingbrunomanca@gmail.com

Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AN - R52

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:56		07:24 (7)	06:20		07:30 (7)	06:49		07:18		06:52	07:26
	20:57	108	19:31 (5)	20:39	130	19:45 (5)	19:57		19:07		17:21	16:58
2	05:57		07:25 (7)	06:20		07:30 (7)	06:50		07:19		06:53	07:27
	20:57	109	19:33 (5)	20:38	129	19:45 (5)	19:55		19:05		17:20	16:57
3	05:57		07:25 (7)	06:21		07:31 (7)	06:51		07:20		06:54	07:28
	20:57	110	19:33 (5)	20:37	127	19:44 (5)	19:53		19:04		17:19	16:57
4	05:58		07:25 (7)	06:22		07:31 (7)	06:52		07:22		06:55	07:29
	20:57	112	19:34 (5)	20:35	127	19:44 (5)	19:52		19:02		17:18	16:57
5	05:58		07:26 (7)	06:23		07:32 (7)	06:53		07:23		06:56	07:30
	20:57	114	19:36 (5)	20:34	123	19:43 (5)	19:50		19:00		17:17	16:57
6	05:59		07:26 (7)	06:24		07:32 (7)	06:54		07:24		17:44 (4)	06:58
	20:56	115	19:36 (5)	20:33	123	19:43 (5)	19:48		18:59	10	17:54 (4)	17:15
7	05:59		07:26 (7)	06:25		07:33 (7)	06:55		07:25		17:40 (4)	06:59
	20:56	116	19:37 (5)	20:32	120	19:42 (5)	19:47		18:57	17	17:57 (4)	17:14
8	06:00		07:26 (7)	06:26		07:33 (7)	06:56		07:26		17:38 (4)	07:00
	20:56	117	19:37 (5)	20:31	117	19:41 (5)	19:45		18:56	21	17:59 (4)	17:13
9	06:01		07:26 (7)	06:27		07:34 (7)	06:57		07:27		17:37 (4)	07:01
	20:55	119	19:38 (5)	20:30	114	19:40 (5)	19:44		18:54	24	18:01 (4)	17:12
10	06:01		07:27 (7)	06:28		07:34 (7)	06:58		07:28		17:35 (4)	07:02
	20:55	119	19:39 (5)	20:28	111	19:39 (5)	19:42		18:52	27	18:02 (4)	17:11
11	06:02		07:26 (7)	06:29		07:35 (7)	06:59		07:29		17:34 (4)	07:03
	20:55	121	19:39 (5)	20:27	106	19:37 (5)	19:40		18:51	28	18:02 (4)	17:10
12	06:03		07:27 (7)	06:30		07:35 (7)	07:00		07:30		17:33 (4)	07:05
	20:54	121	19:40 (5)	20:26	101	19:34 (5)	19:39		18:49	30	18:03 (4)	17:09
13	06:03		07:27 (7)	06:31		07:36 (7)	07:01		07:31		17:32 (4)	07:06
	20:54	124	19:41 (5)	20:24	93	19:31 (5)	19:37		18:48	31	18:03 (4)	17:08
14	06:04		07:26 (7)	06:32		07:36 (7)	07:02		07:32		17:31 (4)	07:07
	20:53	126	19:41 (5)	20:23	79	08:55 (7)	19:35		18:46	32	18:03 (4)	17:08
15	06:05		07:27 (7)	06:33		07:37 (7)	07:03		07:33		17:31 (4)	07:08
	20:53	126	19:42 (5)	20:22	77	08:54 (7)	19:34		18:45	32	18:03 (4)	17:07
16	06:06		07:27 (7)	06:34		07:38 (7)	07:04		07:34		17:30 (4)	07:09
	20:52	128	19:43 (5)	20:20	75	08:53 (7)	19:32		18:43	33	18:03 (4)	17:06
17	06:06		07:28 (7)	06:35		07:39 (7)	07:05		07:35		17:30 (4)	07:10
	20:51	127	19:43 (5)	20:19	72	08:51 (7)	19:30		18:42	32	18:02 (4)	17:05
18	06:07		07:27 (7)	06:36		07:41 (7)	07:06		07:36		17:30 (4)	07:12
	20:51	128	19:43 (5)	20:18	69	08:50 (7)	19:29		18:40	32	18:02 (4)	17:04
19	06:08		07:27 (7)	06:37		07:42 (7)	07:07		07:37		17:31 (4)	07:13
	20:50	130	19:44 (5)	20:16	67	08:49 (7)	19:27		18:39	31	18:02 (4)	17:04
20	06:09		07:28 (7)	06:38		07:43 (7)	07:08		07:38		17:31 (4)	07:14
	20:49	129	19:44 (5)	20:15	64	08:47 (7)	19:25		18:37	30	18:01 (4)	17:03
21	06:10		07:28 (7)	06:39		07:45 (7)	07:09		07:39		17:31 (4)	07:15
	20:49	131	19:45 (5)	20:13	60	08:45 (7)	19:24		18:36	29	18:00 (4)	17:02
22	06:11		07:28 (7)	06:40		07:46 (7)	07:10		07:40		17:32 (4)	07:16
	20:48	131	19:45 (5)	20:12	57	08:43 (7)	19:22		18:34	27	17:59 (4)	17:02
23	06:11		07:28 (7)	06:41		07:48 (7)	07:11		07:42		17:32 (4)	07:17
	20:47	131	19:45 (5)	20:10	53	08:41 (7)	19:20		18:33	26	17:58 (4)	17:01
24	06:12		07:28 (7)	06:42		07:51 (7)	07:12		07:43		17:33 (4)	07:18
	20:46	131	19:45 (5)	20:09	47	08:38 (7)	19:19		18:32	23	17:56 (4)	17:00
25	06:13		07:28 (7)	06:43		07:53 (7)	07:13		06:44		16:36 (4)	07:19
	20:45	132	19:45 (5)	20:07	42	08:35 (7)	19:17		17:30	19	16:55 (4)	17:00
26	06:14		07:29 (7)	06:44		07:55 (7)	07:14		06:45		16:38 (4)	07:21
	20:45	132	19:46 (5)	20:06	36	08:31 (7)	19:15		17:29	15	16:53 (4)	16:59
27	06:15		07:29 (7)	06:45		08:00 (7)	07:15		06:46		16:41 (4)	07:22
	20:44	132	19:46 (5)	20:04	26	08:26 (7)	19:14		17:28	8	16:49 (4)	16:59
28	06:16		07:29 (7)	06:46		08:07 (7)	07:16		06:47		07:23	07:45
	20:43	132	19:46 (5)	20:03	12	08:19 (7)	19:12		17:26		16:59	17:03
29	06:17		07:30 (7)	06:47			07:16		06:48		07:24	07:45
	20:42	131	19:46 (5)	20:01			19:10		17:25		16:58	17:04
30	06:18		07:30 (7)	06:48			07:17		06:49		07:25	07:46
	20:41	131	19:46 (5)	20:00			19:09		17:24		16:58	17:05
31	06:19		07:29 (7)	06:48					06:51			07:46
	20:40	131	19:45 (5)	19:58					17:22			17:06
Potential sun hours	457		427			375	346			299		290
Total, worst case	3844		2357				557					
Sun reduction	0.75		0.72				0.56					
Oper. time red.	0.40		0.40				0.40					
Wind dir. red.	0.73		0.74				0.74					
Total reduction	0.22		0.21				0.16					
Total, real	842		497				91					

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

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

Project:

windpro Nuoro nord - flickering

Printed/Page

2023-12-12 12:06 / 66

Licensed user:

Ing. Bruno Manca

Via Vittorio Veneto 231

IT-09028 Sestu

+390702358125

Bruno Manca / ingbrunomanca@gmail.com

Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AO - R37

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:46 17:07	07:33 17:40	06:58 18:14	07:09 19:47	06:24 20:18	05:56 20:46	05:56 20:57	19:51 (5) 20:07 (5)	06:20 20:39	06:49 19:57	18:08 (4) 26 18:34 (4)	06:52 17:21	07:26 16:58
2	07:46 17:08	07:32 17:42	06:57 18:15	07:07 19:48	06:22 20:19	05:55 20:47	05:57 20:57	19:52 (5) 20:07 (5)	06:20 20:38	06:50 19:55	18:09 (4) 23 18:32 (4)	06:53 17:20	07:27 16:57
3	07:46 17:08	07:31 17:43	06:55 18:16	07:05 19:49	06:21 20:20	05:55 20:48	05:57 20:57	19:52 (5) 20:06 (5)	06:21 20:37	06:51 19:53	18:11 (4) 19 18:30 (4)	06:54 17:19	07:28 16:57
4	07:46 17:09	07:30 17:44	06:54 18:17	07:04 19:50	06:20 20:21	05:54 20:48	05:58 20:57	19:54 (5) 20:06 (5)	06:22 20:35	06:52 19:52	18:13 (4) 14 18:27 (4)	06:55 17:18	07:29 16:57
5	07:46 17:10	07:29 17:45	06:52 18:18	07:02 19:51	06:19 20:22	05:54 20:49	05:58 20:57	19:56 (5) 20:05 (5)	06:23 20:34	06:53 19:50	18:14 (4) 19:00	06:56 17:17	07:30 16:57
6	07:46 17:11	07:28 17:46	06:51 18:19	07:00 19:52	06:17 20:23	05:54 20:50	05:59 20:56	19:58 (5) 20:02 (5)	06:24 20:33	06:54 19:48	18:15 (4) 18:59	06:58 17:15	07:31 16:57
7	07:46 17:12	07:27 17:48	06:49 18:20	06:59 19:53	06:16 20:24	05:53 20:50	05:59 20:56	19:51 (5) 19:58 (5)	06:25 20:32	06:55 19:47	18:16 (4) 18:57	06:59 17:14	07:32 16:57
8	07:46 17:13	07:26 17:49	06:48 18:21	06:57 19:54	06:15 20:25	05:53 20:51	06:00 20:56	19:49 (5) 20:00 (5)	06:00 20:31	06:56 19:45	18:17 (4) 18:56	07:00 17:13	07:33 16:57
9	07:46 17:14	07:25 17:50	06:46 18:22	06:56 19:55	06:14 20:26	05:53 20:52	06:01 20:55	19:49 (5) 20:02 (5)	06:01 20:30	06:57 19:44	18:18 (4) 18:54	07:01 17:12	07:34 16:57
10	07:46 17:15	07:24 17:51	06:44 18:24	06:54 19:56	06:13 20:27	05:53 20:52	06:01 20:55	19:47 (5) 20:02 (5)	06:01 20:28	06:58 19:42	18:19 (4) 18:52	07:02 17:11	07:34 16:57
11	07:46 17:16	07:23 17:53	06:43 18:25	06:53 19:57	06:12 20:28	05:53 20:53	06:02 20:55	19:47 (5) 20:03 (5)	06:02 20:27	06:59 19:40	18:20 (4) 18:51	07:03 17:10	07:35 16:57
12	07:46 17:17	07:22 17:54	06:41 18:26	06:51 19:58	06:11 20:29	05:52 20:53	06:03 20:54	19:46 (5) 20:04 (5)	06:03 20:26	07:00 19:39	18:21 (4) 18:49	07:05 17:09	07:36 16:57
13	07:45 17:18	07:20 17:55	06:40 18:27	06:49 19:59	06:10 20:30	05:52 20:54	06:03 20:54	19:46 (5) 20:04 (5)	06:04 20:31	07:01 19:37	18:22 (4) 18:48	07:06 17:08	07:37 16:57
14	07:45 17:19	07:19 17:56	06:38 18:28	06:48 19:59	06:09 20:31	05:52 20:54	06:04 20:53	19:46 (5) 20:05 (5)	06:04 20:33	07:02 19:35	18:23 (4) 10 18:33 (4)	07:07 17:08	07:38 16:57
15	07:45 17:20	07:18 17:57	06:36 18:29	06:46 19:59	06:08 20:32	05:52 20:55	06:05 20:53	19:46 (5) 20:05 (5)	06:05 20:33	07:03 19:34	18:24 (4) 17 18:36 (4)	07:08 17:07	07:39 16:57
16	07:44 17:21	07:17 17:59	06:35 18:30	06:45 19:59	06:07 20:33	05:52 20:55	06:06 20:52	19:46 (5) 20:06 (5)	06:06 20:34	07:04 19:32	18:25 (4) 21 18:38 (4)	07:09 17:06	07:40 16:58
17	07:44 17:23	07:15 18:00	06:33 18:31	06:43 19:59	06:06 20:34	05:52 20:55	06:06 20:51	19:46 (5) 20:06 (5)	06:06 20:19	07:05 19:30	18:26 (4) 24 18:39 (4)	07:10 17:05	07:41 16:58
18	07:43 17:24	07:14 18:01	06:31 18:32	06:42 19:59	06:05 20:34	05:52 20:56	06:07 20:51	19:46 (5) 20:07 (5)	06:07 20:18	07:06 19:29	18:27 (4) 27 18:40 (4)	07:12 17:04	07:42 16:58
19	07:43 17:25	07:13 18:02	06:30 18:33	06:40 19:59	06:04 20:35	05:53 20:56	06:08 20:50	19:46 (5) 20:08 (5)	06:08 20:16	07:07 19:27	18:28 (4) 29 18:41 (4)	07:13 17:04	07:43 16:59
20	07:42 17:26	07:11 18:03	06:28 18:34	06:39 19:59	06:03 20:36	05:53 20:56	06:09 20:49	19:46 (5) 20:09 (5)	06:09 20:15	07:08 19:25	18:29 (4) 30 18:42 (4)	07:14 17:03	07:44 16:59
21	07:42 17:27	07:10 18:04	06:27 18:35	06:37 19:59	06:03 20:37	05:53 20:56	06:10 20:49	19:46 (5) 20:08 (5)	06:10 20:13	07:09 19:24	18:30 (4) 31 18:43 (4)	07:15 17:02	07:45 16:59
22	07:41 17:28	07:08 18:06	06:25 18:36	06:36 19:59	06:02 20:38	05:53 20:57	06:11 20:48	19:46 (5) 20:08 (5)	06:11 20:12	07:10 19:22	18:31 (4) 33 18:44 (4)	07:16 17:02	07:46 17:00
23	07:41 17:30	07:07 18:07	06:23 18:37	06:34 19:59	06:01 20:39	05:53 20:57	06:11 20:47	19:46 (5) 20:08 (5)	06:11 20:10	07:11 19:20	18:32 (4) 33 18:45 (4)	07:17 17:01	07:47 17:00
24	07:40 17:31	07:06 18:08	06:22 18:38	06:33 19:59	06:00 20:40	05:54 20:57	06:12 20:46	19:47 (5) 20:09 (5)	06:12 20:09	07:12 19:19	18:33 (4) 33 18:46 (4)	07:18 17:00	07:48 17:01
25	07:39 17:32	07:04 18:09	06:20 18:39	06:32 19:59	06:00 20:41	05:54 20:57	06:13 20:45	19:48 (5) 20:08 (5)	06:13 20:07	07:13 19:17	18:34 (4) 33 18:47 (4)	07:19 17:00	07:49 17:02
26	07:38 17:33	07:03 18:10	06:18 18:40	06:30 19:59	05:59 20:42	05:54 20:57	06:14 20:45	19:48 (5) 20:08 (5)	06:14 20:06	07:14 19:15	18:35 (4) 33 18:48 (4)	07:20 16:59	07:50 17:02
27	07:38 17:34	07:01 18:11	06:17 18:42	06:29 19:59	05:58 20:43	05:55 20:57	06:15 20:44	19:49 (5) 20:09 (5)	06:15 20:04	07:15 19:14	18:36 (4) 33 18:49 (4)	07:21 16:59	07:51 17:03
28	07:37 17:36	07:00 18:12	06:15 18:43	06:28 19:59	05:58 20:44	05:55 20:57	06:16 20:43	19:49 (5) 20:08 (5)	06:16 20:03	07:16 19:12	18:37 (4) 31 18:50 (4)	07:22 16:59	07:52 17:04
29	07:36 17:37	06:59 18:13	06:14 18:44	06:27 19:59	05:57 20:45	05:55 20:57	06:17 20:42	19:50 (5) 20:09 (5)	06:17 20:01	07:16 19:10	18:38 (4) 30 18:51 (4)	07:23 16:58	07:53 17:04
30	07:35 17:38	06:58 18:14	06:13 18:45	06:26 19:59	05:56 20:46	05:56 20:57	06:18 20:41	19:51 (5) 20:08 (5)	06:18 20:00	07:17 19:09	18:39 (4) 29 18:52 (4)	07:24 16:58	07:54 17:05
31	07:34 17:39	06:57 18:15	06:12 18:46	06:25 19:59	05:55 20:46	05:56 20:57	06:19 20:40	19:52 (5) 20:09 (5)	06:19 20:01	07:18 19:08	18:40 (4) 29 18:53 (4)	07:25 16:58	07:55 17:06
Potential sun hours	299	298	370	398	447	450	457	427	375	346	299	290	
Total, worst case			555			445		70		477		82	
Sun reduction			0.47			0.67		0.75		0.64		0.56	
Oper. time red.			0.40			0.40		0.40		0.40		0.40	
Wind dir. red.			0.74			0.69		0.69		0.74		0.74	
Total reduction			0.14			0.18		0.21		0.19		0.16	
Total, real			77			82		14		91		13	

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

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

Printed/Page
2023-12-12 12:06 / 67
Licensed user:
Ing. Bruno Manca
Via Vittorio Veneto 231
IT-09028 Sestu
+390702358125
Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AP - R35

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June					
1	07:46	07:33	06:58	07:09	06:24	05:56	19:35 (5)				
	17:07	17:40	18:14	19:47	20:18	20:46	27 20:02 (5)				
2	07:46	07:32	06:57	07:07	06:22	05:55	19:35 (5)				
	17:08	17:42	18:15	19:48	20:19	20:47	27 20:02 (5)				
3	07:46	07:31	06:55	07:05	06:21	05:55	19:35 (5)				
	17:08	17:43	18:16	19:49	20:20	20:48	28 20:03 (5)				
4	07:46	07:30	06:54	07:04	06:20	05:54	19:35 (5)				
	17:09	17:44	18:17	19:50	20:21	20:48	29 20:04 (5)				
5	07:46	07:29	06:52	07:02	06:19	05:54	19:34 (5)				
	17:10	17:45	18:18	19:51	20:22	20:49	30 20:04 (5)				
6	07:46	07:28	06:51	07:00	06:17	05:54	19:34 (5)				
	17:11	17:46	18:19	19:52	20:23	20:50	30 20:04 (5)				
7	07:46	07:27	06:49	06:59	06:16	05:53	19:34 (5)				
	17:12	17:48	18:20	19:53	20:24	20:50	31 20:05 (5)				
8	07:46	07:26	06:48	17:42 (4)	06:57	06:15	05:53	19:34 (5)			
	17:13	17:49	18:21	6 17:48 (4)	19:54	20:25	20:51	32 20:06 (5)			
9	07:46	07:25	06:46	17:38 (4)	06:56	06:14	05:53	19:35 (5)			
	17:14	17:50	18:22	14 17:52 (4)	19:55	20:26	20:52	31 20:06 (5)			
10	07:46	07:24	06:44	17:35 (4)	06:54	06:13	05:53	19:34 (5)			
	17:15	17:51	18:24	19 17:54 (4)	19:56	20:27	20:52	32 20:06 (5)			
11	07:46	07:23	06:43	17:32 (4)	06:52	06:12	05:53	19:34 (5)			
	17:16	17:53	18:25	23 17:55 (4)	19:57	20:28	20:53	32 20:06 (5)			
12	07:46	07:22	06:41	17:31 (4)	06:51	06:11	05:52	19:34 (5)			
	17:17	17:54	18:26	26 17:57 (4)	19:58	20:29	20:53	33 20:07 (5)			
13	07:45	07:20	06:40	17:30 (4)	06:49	06:10	05:52	19:34 (5)			
	17:18	17:55	18:27	27 17:57 (4)	19:59	20:30	20:54	33 20:07 (5)			
14	07:45	07:19	06:38	17:28 (4)	06:48	06:09	05:52	19:34 (5)			
	17:19	17:56	18:28	29 17:57 (4)	20:00	20:31	20:54	33 20:07 (5)			
15	07:45	07:18	06:36	17:28 (4)	06:46	06:08	05:52	19:35 (5)			
	17:20	17:57	18:29	30 17:58 (4)	20:01	20:32	20:55	32 20:07 (5)			
16	07:44	07:17	06:35	17:27 (4)	06:45	06:07	05:52	19:35 (5)			
	17:21	17:59	18:30	31 17:58 (4)	20:02	20:33	20:55	33 20:08 (5)			
17	07:44	07:15	06:33	17:27 (4)	06:43	06:06	05:52	19:35 (5)			
	17:23	18:00	18:31	31 17:58 (4)	20:03	20:34	20:55	33 20:08 (5)			
18	07:43	07:14	06:31	17:27 (4)	06:42	06:05	05:52	19:35 (5)			
	17:24	18:01	18:32	31 17:58 (4)	20:04	20:34	20:56	33 20:08 (5)			
19	07:43	07:13	06:30	17:26 (4)	06:40	06:04	05:53	19:36 (5)			
	17:25	18:02	18:33	31 17:57 (4)	20:05	20:35	20:56	33 20:09 (5)			
20	07:42	07:11	06:28	17:27 (4)	06:39	06:03	05:53	19:36 (5)			
	17:26	18:03	18:34	30 17:57 (4)	20:06	20:36	20:56	33 20:09 (5)			
21	07:42	07:10	06:27	17:27 (4)	06:37	06:02	05:53	19:36 (5)			
	17:27	18:04	18:35	29 17:56 (4)	20:07	20:37	20:56	33 20:09 (5)			
22	07:41	07:08	06:25	17:27 (4)	06:36	06:02	05:53	19:36 (5)			
	17:28	18:06	18:36	28 17:55 (4)	20:08	20:38	20:57	33 20:09 (5)			
23	07:41	07:07	06:23	17:28 (4)	06:34	06:01	05:53	19:36 (5)			
	17:30	18:07	18:37	26 17:54 (4)	20:09	20:39	20:57	33 20:09 (5)			
24	07:40	07:06	06:22	17:29 (4)	06:33	06:00	19:43 (5)	05:54	19:37 (5)		
	17:31	18:08	18:38	23 17:52 (4)	20:10	20:40	10 19:53 (5)	20:57	33 20:10 (5)		
25	07:39	07:04	06:20	17:30 (4)	06:32	06:00	19:40 (5)	05:54	19:37 (5)		
	17:32	18:09	18:39	20 17:50 (4)	20:11	20:41	14 19:54 (5)	20:57	33 20:10 (5)		
26	07:38	07:03	06:18	17:32 (4)	06:30	05:59	19:40 (5)	05:54	19:37 (5)		
	17:33	18:10	18:40	17 17:49 (4)	20:12	20:42	17 19:57 (5)	20:57	33 20:10 (5)		
27	07:38	07:01	06:17	17:35 (4)	06:29	05:58	19:38 (5)	05:55	19:38 (5)		
	17:34	18:11	18:42	10 17:45 (4)	20:13	20:42	20 19:58 (5)	20:57	33 20:11 (5)		
28	07:37	07:00	06:15	06:28	05:58	05:58	19:38 (5)	05:55	19:37 (5)		
	17:35	18:12	18:43	20:15	20:43	21 19:59 (5)	20:57	33 20:10 (5)			
29	07:36		07:13	06:26	05:57	05:55	19:37 (5)	05:55	19:38 (5)		
	17:37		19:44	20:16	20:44	23 20:00 (5)	20:57	33 20:11 (5)			
30	07:35		07:12	06:25	05:57	05:56	19:36 (5)	05:56	19:38 (5)		
	17:38		19:45	20:17	20:45	25 20:01 (5)	20:57	33 20:11 (5)			
31	07:34		07:10	05:56	05:56	05:56	19:35 (5)				
	17:39		19:46	20:46	26 20:01 (5)						
Potential sun hours	299	298	370	398	447	450					
Total, worst case			481		156						955
Sun reduction			0.47		0.58						0.67
Oper. time red.			0.40		0.40						0.40
Wind dir. red.			0.74		0.70						0.70
Total reduction			0.14		0.16						0.19
Total, real			67		25						178

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

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

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AP - R35

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December		
1	05:56	19:38 (5)	06:20	06:49	07:18	18:10 (4)	06:52	07:26
	20:57	32 20:10 (5)	20:39	19:57	19:07	26 18:36 (4)	17:21	16:58
2	05:57	19:39 (5)	06:20	06:50	07:19	18:10 (4)	06:53	07:27
	20:57	32 20:11 (5)	20:38	19:55	19:05	24 18:34 (4)	17:20	16:57
3	05:57	19:39 (5)	06:21	06:51	07:20	18:11 (4)	06:54	07:28
	20:57	31 20:10 (5)	20:37	19:53	19:04	22 18:33 (4)	17:19	16:57
4	05:58	19:40 (5)	06:22	06:52	07:21	18:13 (4)	06:55	07:29
	20:57	31 20:11 (5)	20:35	19:52	19:02	17 18:30 (4)	17:18	16:57
5	05:58	19:40 (5)	06:23	06:53	07:23	18:16 (4)	06:56	07:30
	20:57	31 20:11 (5)	20:34	19:50	19:00	11 18:27 (4)	17:17	16:57
6	05:59	19:40 (5)	06:24	06:54	07:24		06:58	07:31
	20:56	31 20:11 (5)	20:33	19:48	18:59		17:15	16:57
7	05:59	19:41 (5)	06:25	06:55	07:25		06:59	07:32
	20:56	30 20:11 (5)	20:32	19:47	18:57		17:14	16:57
8	06:00	19:41 (5)	06:26	06:56	07:26		07:00	07:33
	20:56	29 20:10 (5)	20:31	19:45	18:56		17:13	16:57
9	06:01	19:42 (5)	06:27	06:57	07:27		07:01	07:34
	20:55	28 20:10 (5)	20:30	19:44	18:54		17:12	16:57
10	06:01	19:43 (5)	06:28	06:58	07:28		07:02	07:34
	20:55	28 20:11 (5)	20:28	19:42	18:52		17:11	16:57
11	06:02	19:43 (5)	06:29	06:59	07:29		07:03	07:35
	20:55	27 20:10 (5)	20:27	19:40	18:51		17:10	16:57
12	06:03	19:43 (5)	06:30	07:00	07:30		07:05	07:36
	20:54	27 20:10 (5)	20:26	19:39	18:49		17:09	16:57
13	06:03	19:44 (5)	06:31	07:01	07:31		07:06	07:37
	20:54	25 20:09 (5)	20:24	19:37	18:48		17:08	16:57
14	06:04	19:45 (5)	06:32	07:02	07:32		07:07	07:38
	20:53	23 20:08 (5)	20:23	19:35	18:46		17:08	16:57
15	06:05	19:46 (5)	06:33	07:03	07:33		07:08	07:38
	20:53	22 20:08 (5)	20:22	19:34	18:45		17:07	16:57
16	06:06	19:47 (5)	06:34	07:04	18:25 (4)	07:34	07:09	07:39
	20:52	20 20:07 (5)	20:20	19:32	8 18:33 (4)	18:43	17:06	16:58
17	06:06	19:48 (5)	06:35	07:05	18:21 (4)	07:35	07:10	07:40
	20:51	19 20:07 (5)	20:19	19:30	15 18:36 (4)	18:42	17:05	16:58
18	06:07	19:49 (5)	06:36	07:06	18:18 (4)	07:36	07:12	07:40
	20:51	16 20:05 (5)	20:18	19:29	20 18:38 (4)	18:40	17:04	16:58
19	06:08	19:51 (5)	06:37	07:07	18:16 (4)	07:37	07:13	07:41
	20:50	12 20:03 (5)	20:16	19:27	23 18:39 (4)	18:39	17:04	16:59
20	06:09	19:54 (5)	06:38	07:08	18:15 (4)	07:38	07:14	07:42
	20:49	7 20:01 (5)	20:15	19:25	25 18:40 (4)	18:37	17:03	16:59
21	06:10		06:39	07:09	18:14 (4)	07:39	07:15	07:42
	20:49		20:13	19:24	27 18:41 (4)	18:36	17:02	16:59
22	06:11		06:40	07:10	18:11 (4)	07:40	07:16	07:43
	20:48		20:12	19:22	29 18:40 (4)	18:34	17:02	17:00
23	06:11		06:41	07:11	18:11 (4)	07:42	07:17	07:43
	20:47		20:10	19:20	29 18:40 (4)	18:33	17:01	17:00
24	06:12		06:42	07:12	18:10 (4)	07:43	07:18	07:44
	20:46		20:09	19:19	30 18:40 (4)	18:32	17:00	17:01
25	06:13		06:43	07:13	18:09 (4)	06:44	07:19	07:44
	20:45		20:07	19:17	31 18:40 (4)	17:30	17:00	17:02
26	06:14		06:44	07:14	18:09 (4)	06:45	07:21	07:44
	20:45		20:06	19:15	31 18:40 (4)	17:29	16:59	17:02
27	06:15		06:45	07:15	18:09 (4)	06:46	07:22	07:45
	20:44		20:04	19:14	30 18:39 (4)	17:28	16:59	17:03
28	06:16		06:46	07:15	18:09 (4)	06:47	07:23	07:45
	20:43		20:03	19:12	30 18:39 (4)	17:26	16:59	17:03
29	06:17		06:47	07:16	18:09 (4)	06:48	07:24	07:45
	20:42		20:01	19:10	29 18:38 (4)	17:25	16:58	17:04
30	06:18		06:47	07:17	18:09 (4)	06:49	07:25	07:46
	20:41		20:00	19:09	28 18:37 (4)	17:24	16:58	17:05
31	06:19		06:48		06:51			07:46
	20:40		19:58		17:22			17:06
Potential sun hours	457	427	375	346	299	290		
Total, worst case	501		385	100				
Sun reduction	0.75		0.64	0.56				
Oper. time red.	0.40		0.40	0.40				
Wind dir. red.	0.70		0.74	0.74				
Total reduction	0.21		0.19	0.16				
Total, real	105		73	16				

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AQ - R33

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 17:07	07:33 17:40	06:58 18:14	17:27 (4) 17:47 (4)	07:09 19:47	06:24 20:18
2	07:46 17:08	07:32 17:42	06:57 18:15	17:26 (4) 17:49 (4)	07:07 19:48	06:22 20:19
3	07:46 17:08	07:31 17:43	06:55 18:16	17:24 (4) 17:50 (4)	07:05 19:49	06:21 20:20
4	07:46 17:09	07:30 17:44	06:54 18:17	17:23 (4) 17:50 (4)	07:04 19:50	06:20 20:21
5	07:46 17:10	07:29 17:45	06:52 18:18	17:23 (4) 17:51 (4)	07:02 19:51	06:19 20:22
6	07:46 17:11	07:28 17:46	06:51 18:19	17:22 (4) 17:51 (4)	07:00 19:52	06:17 20:23
7	07:46 17:12	07:27 17:48	06:49 18:20	17:22 (4) 17:51 (4)	06:59 19:53	06:16 20:24
8	07:46 17:13	07:26 17:49	06:48 18:21	17:21 (4) 17:51 (4)	06:57 19:54	06:15 20:25
9	07:46 17:14	07:25 17:50	06:46 18:22	17:22 (4) 17:51 (4)	06:56 19:55	06:14 20:26
10	07:46 17:15	07:24 17:51	06:44 18:24	17:21 (4) 17:50 (4)	06:54 19:56	06:13 20:27
11	07:46 17:16	07:23 17:53	06:43 18:25	17:21 (4) 17:49 (4)	06:52 19:57	06:12 20:28
12	07:46 17:17	07:22 17:54	06:41 18:26	17:22 (4) 17:48 (4)	06:51 19:58	06:11 20:29
13	07:45 17:18	07:20 17:55	06:40 18:27	17:22 (4) 17:47 (4)	06:49 19:59	06:10 20:30
14	07:45 17:19	07:19 17:56	06:38 18:28	17:23 (4) 17:45 (4)	06:48 20:00	06:09 20:31
15	07:45 17:20	07:18 17:57	06:36 18:29	17:25 (4) 17:44 (4)	06:46 20:01	06:08 20:32
16	07:44 17:21	07:17 17:59	06:35 18:30	17:27 (4) 17:41 (4)	06:45 20:02	06:07 20:33
17	07:44 17:23	07:15 18:00	06:33 18:31	17:31 (4) 17:38 (4)	06:43 20:03	06:06 20:34
18	07:43 17:24	07:14 18:01	06:31 18:32	06:42 20:04	06:05 20:34	19:17 (5) 20:56
19	07:43 17:25	07:13 18:02	06:30 18:33	06:40 20:05	06:04 20:35	19:16 (5) 20:56
20	07:42 17:26	07:11 18:03	06:28 18:34	06:39 20:06	06:03 20:36	19:17 (5) 20:56
21	07:42 17:27	07:10 18:04	06:27 18:35	06:37 20:07	06:02 20:37	19:17 (5) 20:56
22	07:41 17:28	07:08 18:06	06:25 18:36	06:36 20:08	06:02 20:38	19:17 (5) 20:57
23	07:41 17:30	07:07 18:07	06:23 18:37	06:34 20:09	06:01 20:39	19:18 (5) 20:57
24	07:40 17:31	07:06 18:08	06:22 18:38	06:33 20:10	06:00 20:40	19:18 (5) 20:57
25	07:39 17:32	07:04 18:09	06:20 18:39	06:32 20:11	06:00 20:41	19:18 (5) 20:57
26	07:38 17:33	07:03 18:10	06:18 18:40	06:30 20:12	05:59 20:42	19:19 (5) 20:57
27	07:38 17:34	07:01 18:11	17:32 (4) 17:43 (4)	06:17 18:41	05:58 20:13	19:19 (5) 20:57
28	07:37 17:35	07:00 18:12	17:29 (4) 17:46 (4)	06:15 18:43	05:58 20:15	19:20 (5) 20:57
29	07:36 17:37		07:13 19:44	06:26 20:16	05:57 20:44	19:20 (5) 20:57
30	07:35 17:38		07:12 19:45	06:25 20:17	05:57 20:45	19:20 (5) 20:57
31	07:34 17:39		07:10 19:46		05:56 20:46	19:20 (5) 20:57
Potential sun hours	299	298	370	398	447	450
Total, worst case		28	411		801	558
Sun reduction		0.43	0.47		0.58	0.67
Oper. time red.		0.40	0.40		0.40	0.40
Wind dir. red.		0.74	0.74		0.71	0.71
Total reduction		0.13	0.14		0.16	0.19
Total, real		4	57		132	106

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

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

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AQ - R33

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:56	19:31 (5)	06:20	19:29 (5)	06:49	07:18	18:01 (4)	06:52	07:26			
	20:57	19	19:50 (5)	20:39	29	19:58 (5)	19:57	19:07	26	18:27 (4)	17:21	16:58
2	05:57	19:31 (5)	06:20	19:29 (5)	06:50	07:19	18:00 (4)	06:53	07:27			
	20:57	20	19:51 (5)	20:38	29	19:58 (5)	19:55	19:05	27	18:27 (4)	17:20	16:57
3	05:57	19:31 (5)	06:21	19:30 (5)	06:51	07:20	17:59 (4)	06:54	07:28			
	20:57	20	19:51 (5)	20:37	27	19:57 (5)	19:53	19:04	28	18:27 (4)	17:19	16:57
4	05:58	19:31 (5)	06:22	19:31 (5)	06:52	07:21	17:58 (4)	06:55	07:29			
	20:57	21	19:52 (5)	20:35	25	19:56 (5)	19:52	19:02	29	18:27 (4)	17:18	16:57
5	05:58	19:31 (5)	06:23	19:32 (5)	06:53	07:23	17:58 (4)	06:56	07:30			
	20:57	23	19:54 (5)	20:34	23	19:55 (5)	19:50	19:00	29	18:27 (4)	17:17	16:57
6	05:59	19:30 (5)	06:24	19:33 (5)	06:54	07:24	17:57 (4)	06:58	07:31			
	20:56	24	19:54 (5)	20:33	21	19:54 (5)	19:48	18:59	30	18:27 (4)	17:15	16:57
7	05:59	19:30 (5)	06:25	19:35 (5)	06:55	07:25	17:57 (4)	06:59	07:32			
	20:56	25	19:55 (5)	20:32	17	19:52 (5)	19:47	18:57	29	18:26 (4)	17:14	16:57
8	06:00	19:30 (5)	06:26	19:38 (5)	06:56	07:26	17:57 (4)	07:00	07:33			
	20:56	25	19:55 (5)	20:31	11	19:49 (5)	19:45	18:56	29	18:26 (4)	17:13	16:57
9	06:01	19:30 (5)	06:27		06:57	07:27	17:58 (4)	07:01	07:34			
	20:55	26	19:56 (5)	20:30		19:44		18:54	28	18:26 (4)	17:12	16:57
10	06:01	19:30 (5)	06:28		06:58	07:28	17:58 (4)	07:02	07:34			
	20:55	26	19:56 (5)	20:28		19:42		18:52	27	18:25 (4)	17:11	16:57
11	06:02	19:29 (5)	06:29		06:59	07:29	17:59 (4)	07:03	07:35			
	20:55	27	19:56 (5)	20:27		19:40		18:51	25	18:24 (4)	17:10	16:57
12	06:03	19:29 (5)	06:30		07:00	07:30	18:00 (4)	07:05	07:36			
	20:54	28	19:57 (5)	20:26		19:39		18:49	22	18:22 (4)	17:09	16:57
13	06:03	19:29 (5)	06:31		07:01	07:31	18:01 (4)	07:06	07:37			
	20:54	29	19:58 (5)	20:24		19:37		18:48	19	18:20 (4)	17:08	16:57
14	06:04	19:28 (5)	06:32		07:02	07:32	18:03 (4)	07:07	07:38			
	20:53	30	19:58 (5)	20:23		19:35		18:46	15	18:18 (4)	17:08	16:57
15	06:05	19:28 (5)	06:33		07:03	07:33	18:06 (4)	07:08	07:38			
	20:53	30	19:58 (5)	20:22		19:34		18:45	8	18:14 (4)	17:07	16:57
16	06:06	19:28 (5)	06:34		07:04	07:34		07:09	07:39			
	20:52	31	19:59 (5)	20:20		19:32		18:43		17:06	16:58	
17	06:06	19:28 (5)	06:35		07:05	07:35		07:10	07:40			
	20:51	32	20:00 (5)	20:19		19:30		18:42		17:05	16:58	
18	06:07	19:27 (5)	06:36		07:06	07:36		07:12	07:40			
	20:51	32	19:59 (5)	20:18		19:29		18:40		17:04	16:58	
19	06:08	19:27 (5)	06:37		07:07	07:37		07:13	07:41			
	20:50	33	20:00 (5)	20:16		19:27		18:39		17:04	16:59	
20	06:09	19:27 (5)	06:38		07:08	07:38		07:14	07:42			
	20:49	33	20:00 (5)	20:15		19:25		18:37		17:03	16:59	
21	06:10	19:27 (5)	06:39		07:09	07:39		07:15	07:42			
	20:49	34	20:01 (5)	20:13		19:24		18:36		17:02	16:59	
22	06:11	19:28 (5)	06:40		07:10	07:40		07:16	07:43			
	20:48	33	20:01 (5)	20:12		19:22		18:34		17:02	17:00	
23	06:11	19:27 (5)	06:41		07:11	07:42		07:17	07:43			
	20:47	33	20:00 (5)	20:10		19:20		18:33		17:01	17:00	
24	06:12	19:27 (5)	06:42		07:12	07:43		07:18	07:44			
	20:46	33	20:00 (5)	20:09		19:19		18:32		17:00	17:01	
25	06:13	19:27 (5)	06:43		07:13	06:44		07:19	07:44			
	20:45	33	20:00 (5)	20:07		19:17		17:30		17:00	17:02	
26	06:14	19:27 (5)	06:44		07:14	06:45		07:21	07:44			
	20:45	34	20:01 (5)	20:06		19:15		17:29		16:59	17:02	
27	06:15	19:28 (5)	06:45		07:15		18:09 (4)	06:46	07:22	07:45		
	20:44	33	20:01 (5)	20:04		19:14	13	18:22 (4)	17:28	16:59	17:03	
28	06:16	19:28 (5)	06:46		07:15		18:06 (4)	06:47	07:23	07:45		
	20:43	32	20:00 (5)	20:03		19:12	18	18:24 (4)	17:26	16:59	17:03	
29	06:17	19:28 (5)	06:47		07:16		18:04 (4)	06:48	07:24	07:45		
	20:42	32	20:00 (5)	20:01		19:10	21	18:25 (4)	17:25	16:58	17:04	
30	06:18	19:29 (5)	06:47		07:17		18:02 (4)	06:49	07:25	07:46		
	20:41	31	20:00 (5)	20:00		19:09	24	18:26 (4)	17:24	16:58	17:05	
31	06:19	19:28 (5)	06:48					06:51	07:46			
	20:40	31	19:59 (5)	19:58				17:22	17:06			
Potential sun hours	457		427		375		346		299		290	
Total, worst case	893		182		76		371					
Sun reduction	0.75		0.72		0.64		0.56					
Oper. time red.	0.40		0.40		0.40		0.40					
Wind dir. red.	0.71		0.71		0.74		0.74					
Total reduction	0.21		0.20		0.19		0.16					
Total, real	190		37		14		61					

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

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

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AR - R34

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June		
1	07:46	07:33	06:58	07:08	06:24	05:56		19:29 (5)
	17:07	17:40	18:14	19:47	20:18	20:46	29	19:58 (5)
2	07:46	07:32	06:57	07:07	06:22	05:55		19:28 (5)
	17:08	17:42	18:15	19:48	20:19	20:47	29	19:57 (5)
3	07:46	07:31	06:55	07:05	06:21	05:55		19:29 (5)
	17:08	17:43	18:16	19:49	20:20	20:48	29	19:58 (5)
4	07:46	07:30	06:54	07:04	06:20	05:54		19:30 (5)
	17:09	17:44	18:17	19:50	20:21	20:48	28	19:58 (5)
5	07:46	07:29	06:52	07:02	06:19	05:54		19:29 (5)
	17:10	17:45	18:18	19:51	20:22	20:49	28	19:57 (5)
6	07:46	07:28	06:51	07:00	06:17	05:54		19:30 (5)
	17:11	17:46	18:19	19:52	20:23	20:50	28	19:58 (5)
7	07:46	07:27	06:49	06:59	06:16	05:53		19:31 (5)
	17:12	17:48	18:20	19:53	20:24	20:50	27	19:58 (5)
8	07:46	07:26	06:48	06:57	06:15	05:53		19:31 (5)
	17:13	17:49	18:21	19:54	20:25	20:51	27	19:58 (5)
9	07:46	07:25	06:46	17:45 (4)	06:56	06:14		05:53
	17:14	17:50	18:22	19:55	20:26	20:52	26	19:58 (5)
10	07:46	07:24	06:44	17:42 (4)	06:54	06:13		05:53
	17:15	17:51	18:24	19:56	20:27	20:52	26	19:57 (5)
11	07:46	07:23	06:43	17:39 (4)	06:52	06:12	19:37 (5)	05:53
	17:16	17:53	18:25	19:57	20:28	20:53	25	19:57 (5)
12	07:46	07:22	06:41	17:38 (4)	06:51	06:11	19:35 (5)	05:52
	17:17	17:54	18:26	19:58	20:29	20:53	25	19:57 (5)
13	07:45	07:20	06:40	17:36 (4)	06:49	06:10	19:33 (5)	05:52
	17:18	17:55	18:27	19:59	20:30	20:54	25	19:58 (5)
14	07:45	07:19	06:38	17:35 (4)	06:48	06:09	19:32 (5)	05:52
	17:19	17:56	18:28	19:59	20:31	20:54	25	19:58 (5)
15	07:45	07:18	06:36	17:35 (4)	06:46	06:08	19:31 (5)	05:52
	17:20	17:57	18:29	19:59	20:32	20:55	25	19:58 (5)
16	07:44	07:17	06:35	17:34 (4)	06:45	06:07	19:30 (5)	05:52
	17:21	17:59	18:30	19:59	20:33	20:55	24	19:58 (5)
17	07:44	07:15	06:33	17:34 (4)	06:43	06:06	19:29 (5)	05:52
	17:23	18:00	18:31	19:59	20:34	20:55	24	19:58 (5)
18	07:43	07:14	06:31	17:33 (4)	06:42	06:05	19:28 (5)	05:52
	17:24	18:01	18:32	19:59	20:34	20:56	24	19:58 (5)
19	07:43	07:13	06:30	17:33 (4)	06:40	06:04	19:28 (5)	05:53
	17:25	18:02	18:33	19:59	20:35	20:56	24	19:59 (5)
20	07:42	07:11	06:28	17:34 (4)	06:39	06:03	19:28 (5)	05:53
	17:26	18:03	18:34	19:59	20:36	20:56	24	19:59 (5)
21	07:42	07:10	06:27	17:34 (4)	06:37	06:02	19:28 (5)	05:53
	17:27	18:04	18:35	19:59	20:37	20:56	24	19:59 (5)
22	07:41	07:08	06:25	17:34 (4)	06:36	06:02	19:27 (5)	05:53
	17:28	18:06	18:36	19:59	20:38	20:57	24	19:59 (5)
23	07:41	07:07	06:23	17:36 (4)	06:34	06:01	19:27 (5)	05:53
	17:30	18:07	18:37	19:59	20:39	20:57	24	19:59 (5)
24	07:40	07:06	06:22	17:37 (4)	06:33	06:00	19:27 (5)	05:54
	17:31	18:08	18:38	19:59	20:40	20:57	24	20:00 (5)
25	07:39	07:04	06:20	17:39 (4)	06:32	06:00	19:27 (5)	05:54
	17:32	18:09	18:39	19:59	20:41	20:57	24	20:00 (5)
26	07:38	07:03	06:18	17:40 (4)	06:30	05:59	19:28 (5)	05:54
	17:33	18:10	18:40	19:59	20:42	20:57	24	20:00 (5)
27	07:38	07:01	06:17	17:41 (4)	06:29	05:58	19:27 (5)	05:55
	17:34	18:11	18:41	19:59	20:43	20:57	24	20:01 (5)
28	07:37	07:00	06:15	17:42 (4)	06:28	05:58	19:28 (5)	05:55
	17:35	18:12	18:43	19:59	20:44	20:57	25	20:01 (5)
29	07:36		07:13	17:43 (4)	06:26	05:57	19:28 (5)	05:55
	17:37		19:44	19:59	20:45	20:57	25	20:02 (5)
30	07:35		07:12	17:44 (4)	06:25	05:57	19:28 (5)	05:56
	17:38		19:45	19:59	20:46	20:57	25	20:01 (5)
31	07:34		07:10	17:45 (4)	06:24	05:56	19:28 (5)	
	17:39		19:46	19:59	20:46	20:57	25	20:01 (5)
Potential sun hours	299	298	370	398	447	450		
Total, worst case			367		541			765
Sun reduction			0.47		0.58			0.67
Oper. time red.			0.40		0.40			0.40
Wind dir. red.			0.74		0.71			0.71
Total reduction			0.14		0.16			0.19
Total, real			51		88			144

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

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

windpro Nuoro nord - flickering

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Licensed user:

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AR - R34

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:56	19:36 (5)	06:20	19:45 (5)	06:49	07:18	18:16 (4)	06:52	07:26			
	20:57	25 20:01 (5)	20:39	13 19:58 (5)	19:57	19:07	23 18:39 (4)	17:21	16:58			
2	05:57	19:37 (5)	06:20	19:49 (5)	06:50	07:19	18:17 (4)	06:53	07:27			
	20:57	25 20:02 (5)	20:38	6 19:55 (5)	19:55	19:05	20 18:37 (4)	17:20	16:57			
3	05:57	19:36 (5)	06:21		06:51	07:20	18:18 (4)	06:54	07:28			
	20:57	26 20:02 (5)	20:37		19:53	19:04	17 18:35 (4)	17:19	16:57			
4	05:58	19:36 (5)	06:22		06:52	07:21	18:20 (4)	06:55	07:29			
	20:57	27 20:03 (5)	20:35		19:52	19:02	12 18:32 (4)	17:18	16:57			
5	05:58	19:37 (5)	06:23		06:53	07:23		06:56	07:30			
	20:57	27 20:04 (5)	20:34		19:50	19:00		17:17	16:57			
6	05:59	19:36 (5)	06:24		06:54	07:24		06:58	07:31			
	20:56	28 20:04 (5)	20:33		19:48	18:59		17:15	16:57			
7	05:59	19:37 (5)	06:25		06:55	07:25		06:59	07:32			
	20:56	27 20:04 (5)	20:32		19:47	18:57		17:14	16:57			
8	06:00	19:36 (5)	06:26		06:56	07:26		07:00	07:33			
	20:56	28 20:04 (5)	20:31		19:45	18:56		17:13	16:57			
9	06:01	19:36 (5)	06:27		06:57	07:27		07:01	07:34			
	20:55	29 20:05 (5)	20:30		19:44	18:54		17:12	16:57			
10	06:01	19:37 (5)	06:28		06:58	07:28		07:02	07:34			
	20:55	29 20:06 (5)	20:28		19:42	18:52		17:11	16:57			
11	06:02	19:36 (5)	06:29		06:59	07:29		07:03	07:35			
	20:55	29 20:05 (5)	20:27		19:40	18:51		17:10	16:57			
12	06:03	19:36 (5)	06:30		07:00	07:30		07:05	07:36			
	20:54	30 20:06 (5)	20:26		19:39	18:49		17:09	16:57			
13	06:03	19:37 (5)	06:31		07:01	07:31		07:06	07:37			
	20:54	29 20:06 (5)	20:24		19:37	18:48		17:08	16:57			
14	06:04	19:36 (5)	06:32		07:02	07:32		07:07	07:38			
	20:53	30 20:06 (5)	20:23		19:35	18:46		17:08	16:57			
15	06:05	19:36 (5)	06:33		07:03	07:33		07:08	07:38			
	20:53	30 20:06 (5)	20:22		19:34	18:45		17:07	16:57			
16	06:06	19:37 (5)	06:34		07:04	07:34		07:09	07:39			
	20:52	30 20:07 (5)	20:20		19:32	18:43		17:06	16:58			
17	06:06	19:37 (5)	06:35		07:05	07:35		07:10	07:40			
	20:51	30 20:07 (5)	20:19		19:30	18:42		17:05	16:58			
18	06:07	19:36 (5)	06:36		07:06	18:28 (4)	07:36	07:12	07:40			
	20:51	30 20:06 (5)	20:18		19:29	10 18:38 (4)	18:40	17:04	16:58			
19	06:08	19:37 (5)	06:37		07:07	18:25 (4)	07:37	07:13	07:41			
	20:50	30 20:07 (5)	20:16		19:27	15 18:40 (4)	18:39	17:04	16:59			
20	06:09	19:37 (5)	06:38		07:08	18:23 (4)	07:38	07:14	07:42			
	20:49	30 20:07 (5)	20:15		19:25	19 18:42 (4)	18:37	17:03	16:59			
21	06:10	19:37 (5)	06:39		07:09	18:21 (4)	07:39	07:15	07:42			
	20:49	30 20:07 (5)	20:13		19:24	22 18:43 (4)	18:36	17:02	16:59			
22	06:11	19:38 (5)	06:40		07:10	18:19 (4)	07:40	07:16	07:43			
	20:48	29 20:07 (5)	20:12		19:22	23 18:42 (4)	18:34	17:02	17:00			
23	06:11	19:37 (5)	06:41		07:11	18:17 (4)	07:42	07:17	07:43			
	20:47	29 20:06 (5)	20:10		19:20	26 18:43 (4)	18:33	17:01	17:00			
24	06:12	19:38 (5)	06:42		07:12	18:17 (4)	07:43	07:18	07:44			
	20:46	28 20:06 (5)	20:09		19:19	26 18:43 (4)	18:32	17:00	17:01			
25	06:13	19:38 (5)	06:43		07:13	18:16 (4)	06:44	07:19	07:44			
	20:45	27 20:05 (5)	20:07		19:17	27 18:43 (4)	17:30	17:00	17:02			
26	06:14	19:39 (5)	06:44		07:14	18:15 (4)	06:45	07:21	07:44			
	20:45	26 20:05 (5)	20:06		19:15	28 18:43 (4)	17:29	16:59	17:02			
27	06:15	19:40 (5)	06:45		07:15	18:15 (4)	06:46	07:22	07:45			
	20:44	25 20:05 (5)	20:04		19:14	27 18:42 (4)	17:28	16:59	17:03			
28	06:16	19:41 (5)	06:46		07:15	18:15 (4)	06:47	07:23	07:45			
	20:43	23 20:04 (5)	20:03		19:12	27 18:42 (4)	17:26	16:59	17:03			
29	06:17	19:42 (5)	06:47		07:16	18:15 (4)	06:48	07:24	07:45			
	20:42	21 20:03 (5)	20:01		19:10	26 18:41 (4)	17:25	16:58	17:04			
30	06:18	19:43 (5)	06:47		07:17	18:15 (4)	06:49	07:25	07:46			
	20:41	19 20:02 (5)	20:00		19:09	25 18:40 (4)	17:24	16:58	17:05			
31	06:19	19:43 (5)	06:48				06:51		07:46			
	20:40	17 20:00 (5)	19:58				17:22		17:06			
Potential sun hours	457		427		375		346		299			290
Total, worst case	843		19		301		72					
Sun reduction	0.75		0.72		0.64		0.56					
Oper. time red.	0.40		0.40		0.40		0.40					
Wind dir. red.	0.71		0.71		0.74		0.74					
Total reduction	0.21		0.20		0.19		0.16					
Total, real	178		4		57		12					

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

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

windpro Nuoro nord - flickering

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AS - R27

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June			
1	07:46	12:08 (7)	07:33	12:26 (7)	06:58	07:08	06:24	05:56	18:41 (6)					
	17:07	55	13:03 (7)	17:40	41	13:07 (7)	18:14	19:47	20:18	20:46	15	18:56 (6)		
2	07:46	12:08 (7)	07:32	12:28 (7)	06:57	07:07	06:22	05:55	18:41 (6)					
	17:08	56	13:04 (7)	17:42	37	13:05 (7)	18:15	19:48	20:19	20:47	13	18:54 (6)		
3	07:46	12:08 (7)	07:31	12:30 (7)	06:55	07:05	06:21	05:55	18:43 (6)					
	17:08	56	13:04 (7)	17:43	34	13:04 (7)	18:16	19:49	20:20	20:48	11	18:54 (6)		
4	07:46	12:09 (7)	07:30	12:33 (7)	06:54	07:04	06:20	05:54	18:45 (6)					
	17:09	56	13:05 (7)	17:44	28	13:01 (7)	18:17	19:50	20:21	20:49	8	18:53 (6)		
5	07:46	12:09 (7)	07:29	12:37 (7)	06:52	07:02	06:19	18:41 (6)	05:54	18:46 (6)				
	17:10	57	13:06 (7)	17:45	21	12:58 (7)	18:18	19:51	20:22	10	18:51 (6)	20:49		
6	07:46	12:10 (7)	07:28	12:44 (7)	06:51	17:00 (5)	07:00	06:17	18:39 (6)	05:54				
	17:11	56	13:06 (7)	17:46	7	12:51 (7)	18:19	3	17:03 (5)	19:52	20:23	14	18:53 (6)	20:50
7	07:46	12:10 (7)	07:27	12:44 (7)	06:49	16:56 (5)	06:59	06:16	18:37 (6)	05:53				
	17:12	57	13:07 (7)	17:48	12	17:08 (5)	19:53	20:24	18	18:55 (6)	20:50			
8	07:46	12:11 (7)	07:26	12:44 (7)	06:48	16:53 (5)	06:57	06:15	18:36 (6)	05:53				
	17:13	57	13:08 (7)	17:49	17	17:10 (5)	19:54	20:25	20	18:56 (6)	20:51			
9	07:46	12:11 (7)	07:25	12:44 (7)	06:46	16:52 (5)	06:56	06:14	18:35 (6)	05:53				
	17:14	57	13:08 (7)	17:50	19	18:22	19:55	20:26	22	18:57 (6)	20:52			
10	07:46	12:11 (7)	07:24	12:44 (7)	06:44	16:50 (5)	06:54	06:13	18:34 (6)	05:53				
	17:15	57	13:08 (7)	17:51	18:24	22	17:12 (5)	19:56	24	18:58 (6)	20:52			
11	07:46	12:11 (7)	07:23	12:44 (7)	06:43	16:49 (5)	06:52	06:12	18:34 (6)	05:53				
	17:16	58	13:09 (7)	17:53	18:25	23	17:12 (5)	19:57	24	18:58 (6)	20:53			
12	07:46	12:12 (7)	07:22	12:44 (7)	06:41	16:49 (5)	06:51	06:11	18:33 (6)	05:52				
	17:17	58	13:10 (7)	17:54	18:26	24	17:13 (5)	19:58	26	18:59 (6)	20:53			
13	07:45	12:12 (7)	07:20	12:44 (7)	06:40	16:48 (5)	06:49	06:10	18:33 (6)	05:52				
	17:18	57	13:09 (7)	17:55	18:27	25	17:13 (5)	19:59	26	18:59 (6)	20:54			
14	07:45	12:12 (7)	07:19	12:44 (7)	06:38	16:47 (5)	06:48	06:09	18:33 (6)	05:52				
	17:19	58	13:10 (7)	17:56	18:28	25	17:12 (5)	20:00	26	18:59 (6)	20:54			
15	07:45	12:13 (7)	07:18	12:44 (7)	06:36	16:48 (5)	06:46	06:08	18:32 (6)	05:52				
	17:20	58	13:11 (7)	17:57	18:29	24	17:12 (5)	20:01	28	19:00 (6)	20:55			
16	07:44	12:13 (7)	07:17	12:44 (7)	06:35	16:48 (5)	06:45	06:07	18:32 (6)	05:52				
	17:21	58	13:11 (7)	17:59	18:30	23	17:11 (5)	20:02	28	19:00 (6)	20:55			
17	07:44	12:14 (7)	07:15	12:44 (7)	06:33	16:49 (5)	06:43	06:06	18:32 (6)	05:52				
	17:23	58	13:12 (7)	18:00	18:31	22	17:11 (5)	20:03	28	19:00 (6)	20:55			
18	07:43	12:14 (7)	07:14	12:44 (7)	06:31	16:49 (5)	06:42	06:05	18:32 (6)	05:52				
	17:24	57	13:11 (7)	18:01	18:32	21	17:10 (5)	20:04	27	18:59 (6)	20:56			
19	07:43	12:15 (7)	07:13	12:44 (7)	06:30	16:49 (5)	06:40	06:04	18:32 (6)	05:53				
	17:25	57	13:12 (7)	18:02	18:33	19	17:08 (5)	20:05	27	18:59 (6)	20:56			
20	07:42	12:15 (7)	07:11	12:44 (7)	06:28	16:51 (5)	06:39	06:03	18:33 (6)	05:53				
	17:26	57	13:12 (7)	18:03	18:34	16	17:07 (5)	20:06	27	19:00 (6)	20:56			
21	07:42	12:15 (7)	07:10	12:44 (7)	06:27	16:53 (5)	06:37	06:02	18:33 (6)	05:53				
	17:27	57	13:12 (7)	18:04	18:35	11	17:04 (5)	20:07	27	19:00 (6)	20:56			
22	07:41	12:16 (7)	07:08	12:44 (7)	06:25	16:48 (5)	06:36	06:02	18:33 (6)	05:53				
	17:28	56	13:12 (7)	18:06	18:36	20	20:08	20:38	26	18:59 (6)	20:57			
23	07:41	12:17 (7)	07:07	12:44 (7)	06:23	16:48 (5)	06:34	06:01	18:33 (6)	05:53				
	17:29	55	13:12 (7)	18:07	18:37	19	20:09	20:39	26	18:59 (6)	20:57			
24	07:40	12:17 (7)	07:06	12:44 (7)	06:22	16:48 (5)	06:33	06:00	18:35 (6)	05:54				
	17:31	55	13:12 (7)	18:08	18:38	18	20:10	20:40	24	18:59 (6)	20:57			
25	07:39	12:18 (7)	07:04	12:44 (7)	06:20	16:48 (5)	06:32	05:59	18:35 (6)	05:54				
	17:32	53	13:11 (7)	18:09	18:39	17	20:11	20:41	23	18:58 (6)	20:57			
26	07:38	12:19 (7)	07:03	12:44 (7)	06:18	16:48 (5)	06:30	05:59	18:36 (6)	05:54				
	17:33	53	13:12 (7)	18:10	18:40	16	20:12	20:42	23	18:59 (6)	20:57			
27	07:38	12:20 (7)	07:01	12:44 (7)	06:17	16:48 (5)	06:29	05:58	18:36 (6)	05:54				
	17:34	51	13:11 (7)	18:11	18:41	15	20:13	20:42	22	18:58 (6)	20:57			
28	07:37	12:21 (7)	07:00	12:44 (7)	06:15	16:48 (5)	06:28	05:58	18:37 (6)	05:55				
	17:35	50	13:11 (7)	18:12	18:43	14	20:15	20:43	21	18:58 (6)	20:57			
29	07:36	12:22 (7)	06:59	12:44 (7)	06:13	16:48 (5)	06:26	05:57	18:38 (6)	05:55				
	17:37	48	13:10 (7)	18:13	18:44	13	20:16	20:44	19	18:57 (6)	20:57			
30	07:35	12:23 (7)	06:58	12:44 (7)	06:11	16:48 (5)	06:25	05:56	18:39 (6)	05:56				
	17:38	46	13:09 (7)	18:14	18:45	12	20:17	20:45	18	18:57 (6)	20:57			
31	07:34	12:24 (7)	06:57	12:44 (7)	06:10	16:48 (5)	06:24	05:55	18:39 (6)	05:56				
	17:39	44	13:08 (7)	18:15	18:46	11	20:18	20:46	17	18:56 (6)	20:57			
Potential sun hours	299		298		370		398	447		450				
Total, worst case	1708		168		306		621			51				
Sun reduction	0.40		0.43		0.47		0.58			0.67				
Oper. time red.	0.40		0.40		0.40		0.40			0.40				
Wind dir. red.	0.53		0.53		0.74		0.72			0.72				
Total reduction	0.08		0.09		0.13		0.16			0.19				
Total, real	140		15		41		101			10				

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 74

Licensed user:

Ing. Bruno Manca
Via Vittorio Veneto 231
IT-09028 Sestu
+390702358125
Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AS - R27

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	18:43 (6) 19:08 (6)	06:49 19:57	07:18 19:07	17:27 (5) 17:52 (5)
2	05:57 20:57	06:20 20:38	18:44 (6) 19:08 (6)	06:50 19:55	07:19 19:05	17:27 (5) 17:51 (5)
3	05:57 20:57	06:21 20:37	18:44 (6) 19:07 (6)	06:51 19:53	07:20 19:04	17:27 (5) 17:50 (5)
4	05:58 20:57	06:22 20:35	18:45 (6) 19:06 (6)	06:52 19:52	07:21 19:02	17:28 (5) 17:49 (5)
5	05:58 20:57	06:23 20:34	18:46 (6) 19:05 (6)	06:53 19:50	07:22 19:00	17:29 (5) 17:47 (5)
6	05:59 20:56	06:24 20:33	18:47 (6) 19:04 (6)	06:54 19:48	07:24 18:59	17:30 (5) 17:45 (5)
7	05:59 20:56	06:25 20:32	18:49 (6) 19:02 (6)	06:55 19:47	07:25 18:57	17:33 (5) 17:42 (5)
8	06:00 20:56	18:52 (6) 18:58 (6)	06:26 20:31	18:52 (6) 18:59 (6)	06:56 19:45	07:26 18:56
9	06:01 20:55	18:51 (6) 19:00 (6)	06:27 20:30	19:44	06:57 18:54	07:27 17:12
10	06:01 20:55	18:50 (6) 19:02 (6)	06:28 20:28	19:42	06:58 18:52	07:28 17:11
11	06:02 20:55	18:48 (6) 19:02 (6)	06:29 20:27	19:40	06:59 18:51	07:29 17:10
12	06:03 20:54	18:48 (6) 19:04 (6)	06:30 20:26	19:39	07:30 18:49	07:05 17:09
13	06:03 20:54	18:48 (6) 19:05 (6)	06:31 20:24	19:37	07:31 18:48	07:06 17:08
14	06:04 20:53	18:46 (6) 19:05 (6)	06:32 20:23	19:35	07:32 18:46	07:07 17:08
15	06:05 20:53	18:46 (6) 19:06 (6)	06:33 20:22	19:34	07:33 18:45	07:08 17:07
16	06:06 20:52	18:46 (6) 19:07 (6)	06:34 20:20	19:32	07:34 18:43	07:09 17:06
17	06:06 20:51	18:46 (6) 19:08 (6)	06:35 20:19	19:30	07:35 18:42	07:10 17:05
18	06:07 20:51	18:44 (6) 19:07 (6)	06:36 20:18	19:29	07:36 18:40	07:12 17:04
19	06:08 20:50	18:44 (6) 19:08 (6)	06:37 20:16	19:27	07:37 18:39	07:13 17:04
20	06:09 20:49	18:44 (6) 19:09 (6)	06:38 20:15	19:25	07:38 18:37	07:14 17:03
21	06:10 20:49	18:44 (6) 19:09 (6)	06:39 20:13	19:24	07:39 18:36	07:15 17:02
22	06:11 20:48	18:44 (6) 19:10 (6)	06:40 20:12	19:22	17:39 (5) 17:47 (5)	07:40 18:34
23	06:11 20:47	18:43 (6) 19:09 (6)	06:41 20:10	19:20	17:35 (5) 17:50 (5)	07:42 18:33
24	06:12 20:46	18:43 (6) 19:10 (6)	06:42 20:09	19:19	17:33 (5) 17:51 (5)	07:43 18:32
25	06:13 20:45	18:43 (6) 19:10 (6)	06:43 20:07	19:17	17:32 (5) 17:52 (5)	06:44 17:30
26	06:14 20:45	18:43 (6) 19:10 (6)	06:44 20:06	19:15	17:30 (5) 17:53 (5)	06:45 17:29
27	06:15 20:44	18:43 (6) 19:10 (6)	06:45 20:04	19:14	17:29 (5) 17:53 (5)	06:46 17:28
28	06:16 20:43	18:43 (6) 19:10 (6)	06:46 20:03	19:12	17:28 (5) 17:53 (5)	06:47 17:26
29	06:17 20:42	18:43 (6) 19:10 (6)	06:47 20:01	19:10	17:28 (5) 17:53 (5)	06:48 17:25
30	06:18 20:41	18:43 (6) 19:10 (6)	06:47 20:00	19:09	17:27 (5) 17:52 (5)	06:49 17:24
31	06:19 20:40	18:43 (6) 19:09 (6)	06:48 19:58	17:22	06:51 17:22	17:05 17:06
Potential sun hours	457	427	375	346	299	290
Total, worst case	520	149	183	135	1260	1708
Sun reduction	0.75	0.72	0.64	0.56	0.48	0.41
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40
Wind dir. red.	0.72	0.72	0.74	0.74	0.53	0.53
Total reduction	0.21	0.20	0.18	0.16	0.10	0.08
Total, real	109	30	34	21	124	144

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 75

Licensed user:

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+390702358125
Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AT - R25

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	12:31 (7)	07:33	06:58	16:41 (5)	07:08	06:24	18:19 (6)	05:55			
	17:07	41	13:12 (7)	17:40	18:14	22	17:03 (5)	19:47	20:18	24	18:43 (6)	20:46
2	07:46	12:32 (7)	07:32	06:57	16:41 (5)	07:07	06:22	18:19 (6)	05:55			
	17:08	40	13:12 (7)	17:42	18:15	23	17:04 (5)	19:48	20:19	23	18:42 (6)	20:47
3	07:46	12:33 (7)	07:31	06:55	16:40 (5)	07:05	06:21	18:20 (6)	05:55			
	17:08	39	13:12 (7)	17:43	18:16	23	17:03 (5)	19:49	20:20	21	18:41 (6)	20:48
4	07:46	12:34 (7)	07:30	06:54	16:39 (5)	07:04	06:20	18:21 (6)	05:54			
	17:09	38	13:12 (7)	17:44	18:17	24	17:03 (5)	19:50	20:21	19	18:40 (6)	20:49
5	07:46	12:35 (7)	07:29	06:52	16:40 (5)	07:02	06:19	18:22 (6)	05:54			
	17:10	37	13:12 (7)	17:45	18:18	23	17:03 (5)	19:51	20:22	17	18:39 (6)	20:49
6	07:46	12:36 (7)	07:28	06:51	16:40 (5)	07:00	06:17	18:23 (6)	05:54			
	17:11	36	13:12 (7)	17:46	18:19	22	17:02 (5)	19:52	20:23	15	18:38 (6)	20:50
7	07:46	12:37 (7)	07:27	06:49	16:41 (5)	06:59	06:16	18:26 (6)	05:53			
	17:12	35	13:12 (7)	17:48	18:20	20	17:01 (5)	19:53	20:24	10	18:36 (6)	20:50
8	07:46	12:38 (7)	07:26	06:48	16:41 (5)	06:57	06:15	18:30 (6)	05:53			
	17:13	34	13:12 (7)	17:49	18:21	19	17:00 (5)	19:54	20:25	2	18:32 (6)	20:51
9	07:46	12:40 (7)	07:25	06:46	16:43 (5)	06:56	06:14	18:26 (6)	05:53			
	17:14	32	13:12 (7)	17:50	18:22	16	16:59 (5)	19:55	20:26			20:52
10	07:46	12:40 (7)	07:24	06:44	16:45 (5)	06:54	06:13	18:26 (6)	05:53			
	17:15	31	13:11 (7)	17:51	18:24	11	16:56 (5)	19:56	20:27			20:52
11	07:46	12:42 (7)	07:23	06:43	16:46 (5)	06:52	06:12	18:27 (6)	05:53			
	17:16	28	13:10 (7)	17:53	18:25		19:57	20:28	20:53			
12	07:46	12:44 (7)	07:22	06:41	16:47 (5)	06:51	06:11	18:28 (6)	05:52			
	17:17	26	13:10 (7)	17:54	18:26		19:58	20:29	20:53			
13	07:45	12:46 (7)	07:20	06:40	16:48 (5)	06:49	06:10	18:29 (6)	05:52			
	17:18	22	13:08 (7)	17:55	18:27		19:59	20:30	20:54			
14	07:45	12:49 (7)	07:19	06:38	16:49 (5)	06:48	06:09	18:30 (6)	05:52			
	17:19	18	13:07 (7)	17:56	18:28		20:00	20:31	20:54			
15	07:45	12:52 (7)	07:18	06:36	16:50 (5)	06:46	06:08	18:31 (6)	05:52			
	17:20	13	13:05 (7)	17:57	18:29		20:01	20:32	20:55			
16	07:44	12:54 (7)	07:17	06:35	16:51 (5)	06:45	06:07	18:32 (6)	05:52			
	17:21		17:59	18:30		20:02	20:33	20:55				
17	07:44	12:56 (7)	07:15	06:33	16:52 (5)	06:43	06:06	18:33 (6)	05:52			
	17:23		18:00	18:31		20:03	20:34	20:55				
18	07:43	12:58 (7)	07:14	06:31	16:53 (5)	06:42	06:05	18:34 (6)	05:52			
	17:24		18:01	18:32		20:04	6	18:35 (6)	20:34			20:56
19	07:43	12:59 (7)	07:13	06:30	16:54 (5)	06:40	06:04	18:36 (6)	05:53			
	17:25		18:02	18:33		20:05	13	18:39 (6)	20:35			20:56
20	07:42	13:01 (7)	07:11	06:28	16:55 (5)	06:39	06:03	18:40 (6)	05:53			
	17:26		18:03	18:34		20:06	17	18:40 (6)	20:36			20:56
21	07:42	13:02 (7)	07:10	06:27	16:56 (5)	06:37	06:02	18:41 (6)	05:53			
	17:27		18:04	18:35		20:07	20	18:42 (6)	20:37			20:56
22	07:41	13:03 (7)	07:08	06:25	16:57 (5)	06:36	06:02	18:43 (6)	05:53			
	17:28		18:06	18:36		20:08	22	18:43 (6)	20:38			20:57
23	07:41	13:04 (7)	07:07	06:23	16:58 (5)	06:34	06:01	18:44 (6)	05:53			
	17:29		18:07	18:37		20:09	23	18:43 (6)	20:39			20:57
24	07:40	13:05 (7)	07:06	06:22	16:59 (5)	06:33	06:00	18:44 (6)	05:54			
	17:31		18:08	6	16:56 (5)	18:38	20:10	25	18:44 (6)	20:40		20:57
25	07:39	13:06 (7)	07:04	06:20	16:46 (5)	06:20	06:32	18:18 (6)	05:59			05:54
	17:32		18:09	13	16:59 (5)	18:39	20:11	26	18:44 (6)	20:41		20:57
26	07:38	13:07 (7)	07:03	06:18	16:44 (5)	06:18	06:30	18:18 (6)	05:59			05:54
	17:33		18:10	17	17:01 (5)	18:40	20:12	26	18:44 (6)	20:42		20:57
27	07:38	13:08 (7)	07:01	06:17	16:42 (5)	06:17	06:29	18:18 (6)	05:58			05:54
	17:34		18:11	19	17:01 (5)	18:41	20:13	26	18:44 (6)	20:42		20:57
28	07:37	13:09 (7)	07:00	06:15	16:42 (5)	06:15	06:28	18:18 (6)	05:58			05:55
	17:35		18:12	21	17:03 (5)	18:43	20:15	26	18:44 (6)	20:43		20:57
29	07:36	13:10 (7)	06:59	06:14	16:43 (5)	06:14	06:26	18:18 (6)	05:57			05:55
	17:37		18:13		17:04 (5)	18:44	20:16	26	18:44 (6)	20:44		20:57
30	07:35	13:11 (7)	06:58	06:13	16:44 (5)	06:13	06:25	18:19 (6)	05:56			05:56
	17:38		18:14		17:05 (5)	18:45	20:17	24	18:43 (6)	20:45		20:57
31	07:34	13:12 (7)	06:57	06:12	16:45 (5)	06:12	06:24	18:19 (6)	05:56			05:56
	17:39		18:15		17:06 (5)	18:46	20:18		20:46			20:57
Potential sun hours	299		298		370		398		447			450
Total, worst case	470		76		203		280		131			
Sun reduction	0.40		0.43		0.47		0.51		0.58			
Oper. time red.	0.40		0.40		0.40		0.40		0.40			
Wind dir. red.	0.53		0.73		0.73		0.74		0.74			
Total reduction	0.08		0.12		0.13		0.14		0.17			
Total, real	39		9		27		41		22			

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

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

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AT - R25

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:19 20:39	06:49 19:57	07:18 19:07	06:52 17:21	07:26 16:58
2	05:57 20:57	06:20 20:38	06:50 19:55	07:19 19:05	06:53 17:20	28 12:52 (7)
3	05:57 20:57	06:21 20:37	06:51 19:53	07:20 19:04	17:24 (5) 06:54	30 12:54 (7)
4	05:58 20:57	06:22 20:35	06:52 19:52	07:21 19:02	8 17:32 (5) 17:19	32 12:55 (7)
5	05:58 20:57	06:23 20:34	18:37 (6) 06:53	07:22 19:00	14 17:35 (5) 17:18	33 12:56 (7)
6	05:59 20:56	06:24 20:33	18:44 (6) 06:54	07:23 19:00	17 17:36 (5) 17:16	35 12:57 (7)
7	05:59 20:56	06:25 20:32	18:34 (6) 06:55	07:24 18:59	20 17:37 (5) 17:15	36 12:58 (7)
8	06:00 20:56	06:26 20:31	18:47 (6) 06:56	07:25 18:57	21 17:37 (5) 17:14	37 12:59 (7)
9	06:01 20:55	06:27 20:30	18:31 (6) 06:57	07:26 18:56	22 17:37 (5) 17:13	38 13:00 (7)
10	06:01 20:55	06:28 20:28	18:49 (6) 06:58	07:27 18:54	23 17:37 (5) 17:12	39 13:01 (7)
11	06:02 20:55	06:29 20:27	18:29 (6) 06:59	07:28 18:52	24 17:38 (5) 17:11	40 13:02 (7)
12	06:03 20:54	06:30 20:26	18:27 (6) 07:00	07:29 18:51	25 17:38 (5) 17:10	41 13:03 (7)
13	06:03 20:54	06:31 20:24	18:26 (6) 07:01	07:30 18:49	26 17:38 (5) 17:09	42 13:04 (7)
14	06:04 20:53	06:32 20:23	18:51 (6) 07:02	07:31 18:48	27 17:39 (5) 17:08	43 13:05 (7)
15	06:05 20:53	06:33 20:22	18:26 (6) 07:03	07:32 18:46	28 17:39 (5) 17:07	44 13:06 (7)
16	06:06 20:52	06:34 20:20	18:25 (6) 07:04	07:33 18:45	29 17:39 (5) 17:06	45 13:07 (7)
17	06:06 20:51	06:35 20:19	18:51 (6) 07:05	07:34 18:43	16 17:39 (5) 17:05	46 13:08 (7)
18	06:07 20:51	06:36 20:18	18:25 (6) 07:06	07:35 18:42	11 17:39 (5) 17:04	47 13:09 (7)
19	06:08 20:50	06:37 20:16	18:25 (6) 07:07	07:36 18:40	20 17:39 (5) 17:03	48 13:10 (7)
20	06:09 20:49	06:38 20:15	18:26 (6) 07:08	07:37 18:39	25 17:39 (5) 17:02	49 13:11 (7)
21	06:10 20:49	06:39 20:13	18:26 (6) 07:09	07:38 18:37	22 17:39 (5) 17:01	50 13:12 (7)
22	06:11 20:48	06:40 20:12	18:48 (6) 07:10	07:39 18:36	17 17:39 (5) 17:00	51 13:13 (7)
23	06:11 20:47	06:41 20:10	18:27 (6) 07:11	07:40 18:34	12 17:39 (5) 16:59	52 13:14 (7)
24	06:12 20:46	06:42 20:09	18:45 (6) 07:12	07:41 18:33	17 17:39 (5) 16:58	53 13:15 (7)
25	06:13 20:45	06:43 20:07	18:30 (6) 07:13	07:42 18:32	23 17:39 (5) 16:57	54 13:16 (7)
26	06:14 20:45	06:44 20:06	18:43 (6) 07:14	07:43 18:30	18 17:39 (5) 16:56	55 13:17 (7)
27	06:15 20:44	06:45 20:04	18:33 (6) 07:15	07:44 18:29	26 17:39 (5) 16:55	56 13:18 (7)
28	06:16 20:43	06:46 20:03	18:26 (6) 07:16	07:45 18:27	13 17:39 (5) 16:54	57 13:19 (7)
29	06:17 20:42	06:47 20:01	19:12 07:17	07:46 18:26	18 17:39 (5) 16:53	58 13:20 (7)
30	06:18 20:41	06:47 20:00	19:11 07:18	07:47 18:25	22 17:39 (5) 16:52	59 13:21 (7)
31	06:19 20:40	06:48 19:58	19:09 07:19	07:48 18:24	26 17:39 (5) 16:51	60 13:22 (7)
Potential sun hours	457	427	375	346	299	290
Total, worst case		421		281		1230
Sun reduction		0.72		0.56		0.41
Oper. time red.		0.40		0.40		0.40
Wind dir. red.		0.74		0.73		0.53
Total reduction		0.21		0.16		0.08
Total, real		87		44		104

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 77

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AU - R26

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:46	12:46 (7)	07:33	06:58	16:52 (5)	07:08	06:24	18:25 (6)	05:55			
	17:07	49 13:35 (7)	17:40	18:14	13 17:05 (5)	19:47	20:18	25 18:50 (6)	20:46			
2	07:46	12:47 (7)	07:32	06:57	16:51 (5)	07:07	06:22	18:24 (6)	05:55			
	17:08	49 13:36 (7)	17:42	18:15	16 17:07 (5)	19:48	20:19	25 18:49 (6)	20:47			
3	07:46	12:47 (7)	07:31	06:55	16:49 (5)	07:05	06:21	18:25 (6)	05:55			
	17:08	49 13:36 (7)	17:43	18:16	19 17:08 (5)	19:49	20:20	23 18:48 (6)	20:48			
4	07:46	12:48 (7)	07:30	06:54	16:47 (5)	07:04	06:20	18:25 (6)	05:54			
	17:09	48 13:36 (7)	17:44	18:17	21 17:08 (5)	19:50	20:21	23 18:48 (6)	20:49			
5	07:46	12:49 (7)	07:29	06:52	16:47 (5)	07:02	06:19	18:26 (6)	05:54			
	17:10	48 13:37 (7)	17:45	18:18	22 17:09 (5)	19:51	20:22	21 18:47 (6)	20:49			
6	07:46	12:49 (7)	07:28	06:51	16:46 (5)	07:00	06:17	18:27 (6)	05:54			
	17:11	48 13:37 (7)	17:46	18:19	23 17:09 (5)	19:52	20:23	20 18:47 (6)	20:50			
7	07:46	12:50 (7)	07:27	06:49	16:47 (5)	06:59	06:16	18:28 (6)	05:53			
	17:12	47 13:37 (7)	17:48	18:20	22 17:09 (5)	19:53	20:24	18 18:46 (6)	20:50			
8	07:46	12:51 (7)	07:26	06:48	16:46 (5)	06:57	06:15	18:29 (6)	05:53			
	17:13	47 13:38 (7)	17:49	18:21	23 17:09 (5)	19:54	20:25	16 18:45 (6)	20:51			
9	07:46	12:52 (7)	07:25	06:46	16:47 (5)	06:56	06:14	18:31 (6)	05:53			
	17:14	46 13:38 (7)	17:50	18:22	22 17:09 (5)	19:55	20:26	12 18:43 (6)	20:52			
10	07:46	12:52 (7)	07:24	06:44	16:47 (5)	06:54	06:13	18:33 (6)	05:53			
	17:15	45 13:37 (7)	17:51	18:24	21 17:08 (5)	19:56	20:27	8 18:41 (6)	20:52			
11	07:46	12:53 (7)	07:23	06:43	16:47 (5)	06:52	06:12	18:34 (6)	05:53			
	17:16	45 13:38 (7)	17:53	18:25	19 17:06 (5)	19:57	20:28	18:41 (6)	20:53			
12	07:46	12:54 (7)	07:22	06:41	16:49 (5)	06:51	06:11	18:35 (6)	05:52			
	17:17	44 13:38 (7)	17:54	18:26	16 17:05 (5)	19:58	20:29	18:42 (6)	20:53			
13	07:45	12:55 (7)	07:20	06:40	16:50 (5)	06:49	06:10	18:36 (6)	05:52			
	17:18	42 13:37 (7)	17:55	18:27	13 17:03 (5)	19:59	20:30	18:39 (6)	20:54			
14	07:45	12:56 (7)	07:19	06:38	16:53 (5)	06:48	06:09	18:40 (6)	05:52			
	17:19	42 13:38 (7)	17:56	18:28	6 16:59 (5)	20:00	20:31	18:41 (6)	20:54			
15	07:45	12:58 (7)	07:18	06:36	16:56 (5)	06:46	06:08	18:42 (6)	05:52			
	17:20	40 13:38 (7)	17:57	18:29	20:01	06:45	20:32	18:43 (6)	20:55			
16	07:44	12:58 (7)	07:17	06:35	16:57 (5)	06:45	06:07	18:44 (6)	05:52			
	17:21	39 13:37 (7)	17:59	18:30	20:02	06:44	20:33	18:45 (6)	20:55			
17	07:44	13:00 (7)	07:15	06:33	16:58 (5)	06:43	06:06	18:46 (6)	05:52			
	17:23	37 13:37 (7)	18:00	18:31	20:03	06:43	20:34	18:47 (6)	20:55			
18	07:43	13:01 (7)	07:14	06:31	16:59 (5)	06:42	06:05	18:48 (6)	05:52			
	17:24	35 13:36 (7)	18:01	18:32	20:04	06:42	20:34	18:49 (6)	20:56			
19	07:43	13:03 (7)	07:13	06:30	17:01 (5)	06:40	06:04	18:50 (6)	05:53			
	17:25	33 13:36 (7)	18:02	18:33	20:05	06:40	20:35	18:51 (6)	20:56			
20	07:42	13:05 (7)	07:11	06:28	17:02 (5)	06:39	06:03	18:52 (6)	05:53			
	17:26	29 13:34 (7)	18:03	18:34	20:06	06:39	20:36	18:53 (6)	20:56			
21	07:42	13:06 (7)	07:10	06:27	17:03 (5)	06:37	06:02	18:54 (6)	05:53			
	17:27	27 13:33 (7)	18:04	18:35	20:07	9 18:34 (6)	20:37	18:55 (6)	20:56			
22	07:41	13:09 (7)	07:08	06:25	17:04 (5)	06:36	06:02	18:56 (6)	05:53			
	17:28	23 13:32 (7)	18:06	18:36	20:08	15 18:46 (6)	20:38	18:57 (6)	20:57			
23	07:41	13:12 (7)	07:07	06:23	17:05 (5)	06:34	06:01	18:58 (6)	05:53			
	17:29	17 13:29 (7)	18:07	18:37	20:09	17 18:46 (6)	20:39	18:59 (6)	20:57			
24	07:40	13:18 (7)	07:06	06:22	17:06 (5)	06:33	06:00	18:59 (6)	05:54			
	17:31	6 13:24 (7)	18:08	18:38	20:10	20 18:48 (6)	20:40	19:00 (6)	20:57			
25	07:39	13:25 (7)	07:04	06:20	17:07 (5)	06:32	05:59	19:01 (6)	05:54			
	17:32	18:09	07:03	18:39	20:11	22 18:48 (6)	20:41	19:02 (6)	20:57			
26	07:38	13:26 (7)	07:03	06:18	17:08 (5)	06:30	05:59	19:03 (6)	05:54			
	17:33	18:10	07:02	18:40	20:12	23 18:49 (6)	20:42	19:04 (6)	20:57			
27	07:38	13:27 (7)	07:01	06:17	17:09 (5)	06:29	05:58	19:05 (6)	05:54			
	17:34	18:11	07:00	18:41	20:13	24 18:49 (6)	20:42	19:06 (6)	20:57			
28	07:37	13:28 (7)	07:00	06:15	17:10 (5)	06:28	05:58	19:07 (6)	05:55			
	17:35	18:12	7 17:03 (5)	18:43	20:15	25 18:49 (6)	20:43	19:08 (6)	20:57			
29	07:36	13:29 (7)	07:00	07:13	17:11 (5)	06:26	05:57	19:09 (6)	05:55			
	17:37	18:13	07:00	19:44	20:16	25 18:49 (6)	20:44	19:10 (6)	20:57			
30	07:35	13:30 (7)	07:00	07:12	17:12 (5)	06:25	05:56	19:11 (6)	05:56			
	17:38	18:14	07:00	19:45	20:17	26 18:50 (6)	20:45	19:12 (6)	20:57			
31	07:34	13:31 (7)	07:00	07:10	17:13 (5)	06:24	05:56	19:13 (6)	05:56			
	17:39	18:15	07:00	19:46	20:18	26 18:50 (6)	20:46	19:14 (6)	20:57			
Potential sun hours	299	298	370	398	447	450						
Total, worst case	935	7	256	206	191							
Sun reduction	0.40	0.43	0.47	0.51	0.58							
Oper. time red.	0.40	0.40	0.40	0.40	0.40							
Wind dir. red.	0.53	0.74	0.74	0.74	0.74							
Total reduction	0.08	0.12	0.13	0.14	0.17							
Total, real	77	1	34	30	32							

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AU - R26

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December	
1	05:56 20:57	06:19 20:39	06:49 19:57	07:18 19:07	17:28 (5) 17:21	06:52 16:58	12:35 (7) 13:20 (7)
2	05:57 20:57	06:20 20:38	06:50 19:55	07:19 19:05	17:26 (5) 17:20	06:53 16:57	12:35 (7) 13:20 (7)
3	05:57 20:57	06:21 20:37	18:42 (6) 18:52 (6)	06:51 19:04	17:25 (5) 17:19	06:54 16:57	12:35 (7) 13:21 (7)
4	05:58 20:57	06:22 20:35	18:40 (6) 18:54 (6)	06:52 19:02	17:24 (5) 17:18	06:55 16:57	12:35 (7) 13:22 (7)
5	05:58 20:57	06:23 20:34	18:38 (6) 18:55 (6)	06:53 19:00	17:23 (5) 17:16	06:56 16:57	12:35 (7) 13:22 (7)
6	05:59 20:56	06:24 20:33	18:37 (6) 18:56 (6)	06:54 19:00	17:22 (5) 17:15	06:58 16:57	12:36 (7) 13:23 (7)
7	05:59 20:56	06:25 20:32	18:36 (6) 18:57 (6)	06:55 19:01	17:22 (5) 17:14	06:59 16:57	12:36 (7) 13:24 (7)
8	06:00 20:56	06:26 20:31	18:35 (6) 18:57 (6)	06:56 19:00	17:22 (5) 17:13	07:00 16:56	12:36 (7) 13:24 (7)
9	06:01 20:55	06:27 20:30	18:35 (6) 18:58 (6)	06:57 19:01	17:23 (5) 17:12	07:01 16:56	12:36 (7) 13:25 (7)
10	06:01 20:55	06:28 20:28	18:34 (6) 18:58 (6)	06:58 19:02	17:23 (5) 17:11	07:02 16:57	12:37 (7) 13:26 (7)
11	06:02 20:55	06:29 20:27	18:33 (6) 18:57 (6)	06:59 19:03	17:24 (5) 17:10	07:03 16:57	12:37 (7) 13:26 (7)
12	06:03 20:54	06:30 20:26	18:32 (6) 18:57 (6)	07:00 19:04	17:25 (5) 17:09	07:05 16:57	12:37 (7) 13:26 (7)
13	06:03 20:54	06:31 20:24	18:32 (6) 18:57 (6)	07:01 19:05	17:27 (5) 17:08	07:06 16:57	12:37 (7) 13:27 (7)
14	06:04 20:53	06:32 20:23	18:32 (6) 18:57 (6)	07:02 19:06	17:38 (5) 17:07	17:08 16:57	13:27 (7) 13:27 (7)
15	06:05 20:53	06:33 20:22	18:32 (6) 18:57 (6)	07:03 19:07	17:07 17:07	07:08 16:57	13:27 (7) 13:28 (7)
16	06:06 20:52	06:34 20:20	18:32 (6) 18:56 (6)	07:04 19:08	17:06 17:06	07:09 16:58	13:29 (7) 13:28 (7)
17	06:06 20:51	06:35 20:19	18:33 (6) 18:55 (6)	07:05 19:09	17:05 17:05	07:10 16:58	13:29 (7) 13:29 (7)
18	06:07 20:51	06:36 20:18	18:33 (6) 18:55 (6)	07:06 19:10	17:12 17:04	12:52 (7) 16:58	12:40 (7) 13:30 (7)
19	06:08 20:50	06:37 20:16	18:34 (6) 18:53 (6)	07:07 19:11	17:13 17:04	12:58 (7) 16:59	13:30 (7) 13:30 (7)
20	06:09 20:49	06:38 20:15	18:35 (6) 18:52 (6)	07:08 19:12	17:14 17:03	12:44 (7) 16:59	12:41 (7) 13:31 (7)
21	06:10 20:49	06:39 20:13	18:36 (6) 18:50 (6)	07:09 19:13	17:15 17:02	12:42 (7) 13:09 (7)	12:41 (7) 13:31 (7)
22	06:11 20:48	06:40 20:12	18:39 (6) 18:47 (6)	07:10 19:14	17:16 17:02	12:41 (7) 13:10 (7)	12:42 (7) 13:32 (7)
23	06:11 20:47	06:41 20:10	07:11 19:15	07:12 19:16	17:17 17:01	12:39 (7) 13:12 (7)	12:42 (7) 13:32 (7)
24	06:12 20:46	06:42 20:09	07:12 19:16	07:13 19:17	17:18 17:00	12:38 (7) 13:13 (7)	12:42 (7) 13:32 (7)
25	06:13 20:45	06:43 20:07	07:13 19:17	06:44 17:30	07:19 17:00	12:37 (7) 13:14 (7)	12:43 (7) 13:33 (7)
26	06:14 20:45	06:44 20:06	07:14 19:18	06:45 17:29	07:21 16:59	12:37 (7) 13:16 (7)	12:43 (7) 13:33 (7)
27	06:15 20:44	06:45 20:04	07:14 19:19	06:46 17:27	07:22 16:59	12:37 (7) 13:17 (7)	12:43 (7) 13:33 (7)
28	06:16 20:43	06:46 20:03	07:15 19:20	06:47 17:26	07:23 16:59	12:36 (7) 13:18 (7)	12:45 (7) 13:34 (7)
29	06:17 20:42	06:47 20:01	07:16 19:21	06:48 17:25	07:24 16:58	12:36 (7) 13:18 (7)	12:45 (7) 13:34 (7)
30	06:18 20:41	06:47 20:00	07:17 19:22	17:31 (5) 17:24	06:49 17:25	12:36 (7) 13:19 (7)	12:45 (7) 13:35 (7)
31	06:19 20:40	06:48 19:58	07:17 19:23	11 17:42 (5)	06:51 17:22	17:05 17:06	12:46 (7) 13:35 (7)
Potential sun hours	457	427	375	346	299	290	1513
Total, worst case			400	11	249	413	0.41
Sun reduction			0.72	0.64	0.56	0.48	0.40
Oper. time red.			0.40	0.40	0.40	0.40	0.53
Wind dir. red.			0.74	0.74	0.74	0.53	0.09
Total reduction			0.21	0.18	0.16	0.10	129
Total, real			82	2	40	41	

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 79

Licensed user:

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IT-09028 Sestu
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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AV - R28

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June					
1	07:46	07:33	13:12 (7)	06:58	13:24 (7)	07:08	18:15 (5)	06:24	05:56	19:04 (6)	
	17:07	17:40	62 14:14 (7)	18:14	49 14:13 (7)	19:47	19 18:34 (5)	20:18	20:46	25 19:29 (6)	
2	07:46	07:32	13:11 (7)	06:57	13:27 (7)	07:07	18:16 (5)	06:22	05:55	19:03 (6)	
	17:08	17:42	64 14:15 (7)	18:15	45 14:12 (7)	19:48	15 18:31 (5)	20:19	20:47	25 19:28 (6)	
3	07:46	07:31	13:11 (7)	06:55	13:30 (7)	07:05	18:19 (5)	06:21	05:55	19:03 (6)	
	17:08	17:43	65 14:16 (7)	18:16	39 14:09 (7)	19:49	10 18:29 (5)	20:20	20:48	26 19:29 (6)	
4	07:46	07:30	13:10 (7)	06:54	13:34 (7)	07:04		06:20	05:54	19:04 (6)	
	17:09	17:44	67 14:17 (7)	18:17	32 14:06 (7)	19:50		20:21	20:48	25 19:29 (6)	
5	07:46	07:29	13:10 (7)	06:52	13:40 (7)	07:02		06:19	05:54	19:03 (6)	
	17:10	17:45	68 14:18 (7)	18:18	22 14:02 (7)	19:51		20:22	20:49	26 19:29 (6)	
6	07:46	07:28	13:10 (7)	06:51		07:00		06:17	05:54	19:04 (6)	
	17:11	17:46	68 14:18 (7)	18:19		19:52		20:23	20:50	25 19:29 (6)	
7	07:46	07:27	13:10 (7)	06:49		06:59		06:16	05:53	19:04 (6)	
	17:12	17:48	69 14:19 (7)	18:20		19:53		20:24	20:50	26 19:30 (6)	
8	07:46	07:26	13:09 (7)	06:48		06:57		06:15	05:53	19:05 (6)	
	17:13	17:49	71 14:20 (7)	18:21		19:54		20:25	20:51	25 19:30 (6)	
9	07:46	07:25	13:09 (7)	06:46		06:56		06:14	05:53	19:05 (6)	
	17:14	17:50	72 14:21 (7)	18:22		19:55		20:26	20:52	26 19:31 (6)	
10	07:46	07:24	13:08 (7)	06:44		06:54		06:13	05:53	19:04 (6)	
	17:15	17:51	72 14:20 (7)	18:24		19:56		20:27	20:52	26 19:30 (6)	
11	07:46	07:23	13:08 (7)	06:43		06:52		06:12	05:53	19:05 (6)	
	17:16	17:53	73 14:21 (7)	18:25		19:57		20:28	20:53	25 19:30 (6)	
12	07:46	07:22	13:09 (7)	06:41		06:51		06:11	05:52	19:05 (6)	
	17:17	17:54	72 14:21 (7)	18:26		19:58		20:29	20:53	25 19:30 (6)	
13	07:45	07:20	13:09 (7)	06:40		06:49		06:10	05:52	19:05 (6)	
	17:18	17:55	73 14:22 (7)	18:27		19:59		20:30	20:54	26 19:31 (6)	
14	07:45	07:19	13:08 (7)	06:38		06:48		06:09	05:52	19:06 (6)	
	17:19	17:56	73 14:21 (7)	18:28		20:00		20:31	20:54	25 19:31 (6)	
15	07:45	07:18	13:09 (7)	06:36		06:46		06:08	05:52	19:06 (6)	
	17:20	17:57	73 14:22 (7)	18:29		20:01		20:32	20:55	25 19:31 (6)	
16	07:44	13:35 (7)	07:17	13:09 (7)	06:35	06:45		06:07	05:52	19:06 (6)	
	17:21	8 13:43 (7)	17:59	73 14:22 (7)	18:30	20:02		20:33	20:55	25 19:31 (6)	
17	07:44	13:31 (7)	07:15	13:09 (7)	06:33	06:43		06:06	05:52	19:06 (6)	
	17:23	17 13:48 (7)	18:00	72 14:21 (7)	18:31	20:03		20:34	20:55	25 19:31 (6)	
18	07:43	13:28 (7)	07:14	13:10 (7)	06:31	06:42		06:05	05:52	19:06 (6)	
	17:24	23 13:51 (7)	18:01	72 14:22 (7)	18:32	20:04		20:34	20:56	25 19:31 (6)	
19	07:43	13:26 (7)	07:13	13:10 (7)	06:30	06:40		06:04	05:53	19:07 (6)	
	17:25	29 13:55 (7)	18:02	72 14:22 (7)	18:33	20:05		20:35	20:56	25 19:32 (6)	
20	07:42	13:24 (7)	07:11	13:10 (7)	06:28	17:23 (5)	06:39	06:03	19:10 (6)	05:53	19:07 (6)
	17:26	33 13:57 (7)	18:03	71 14:21 (7)	18:34	10 17:33 (5)	20:06	20:36	9 19:19 (6)	20:56	25 19:32 (6)
21	07:42	13:22 (7)	07:10	13:11 (7)	06:27	17:20 (5)	06:37	06:02	19:08 (6)	05:53	19:07 (6)
	17:27	36 13:58 (7)	18:04	70 14:21 (7)	18:35	15 17:35 (5)	20:07	20:37	13 19:21 (6)	20:56	25 19:32 (6)
22	07:41	13:22 (7)	07:08	13:12 (7)	06:25	17:18 (5)	06:36	06:02	19:07 (6)	05:53	19:07 (6)
	17:28	39 14:01 (7)	18:06	68 14:20 (7)	18:36	18 17:36 (5)	20:08	20:38	15 19:22 (6)	20:57	25 19:32 (6)
23	07:41	13:20 (7)	07:07	13:13 (7)	06:23	17:17 (5)	06:34	06:01	19:05 (6)	05:53	19:07 (6)
	17:29	43 14:03 (7)	18:07	67 14:20 (7)	18:37	20 17:37 (5)	20:09	20:39	18 19:23 (6)	20:57	25 19:32 (6)
24	07:40	13:19 (7)	07:06	13:15 (7)	06:22	17:15 (5)	06:33	06:00	19:05 (6)	05:54	19:08 (6)
	17:31	45 14:04 (7)	18:08	65 14:20 (7)	18:38	23 17:38 (5)	20:10	20:40	19 19:24 (6)	20:57	25 19:33 (6)
25	07:39	13:17 (7)	07:04	13:16 (7)	06:20	17:14 (5)	06:32	05:59	19:04 (6)	05:54	19:08 (6)
	17:32	48 14:05 (7)	18:09	62 14:18 (7)	18:39	24 17:38 (5)	20:11	20:41	21 19:25 (6)	20:57	25 19:33 (6)
26	07:38	13:17 (7)	07:03	13:18 (7)	06:18	17:14 (5)	06:30	05:59	19:05 (6)	05:54	19:08 (6)
	17:33	51 14:08 (7)	18:10	60 14:18 (7)	18:40	24 17:38 (5)	20:12	20:42	21 19:26 (6)	20:57	25 19:33 (6)
27	07:38	13:16 (7)	07:01	13:19 (7)	06:17	17:14 (5)	06:29	05:58	19:04 (6)	05:54	19:09 (6)
	17:34	53 14:09 (7)	18:11	57 14:16 (7)	18:41	24 17:38 (5)	20:13	20:42	22 19:26 (6)	20:57	25 19:34 (6)
28	07:37	13:15 (7)	07:00	13:22 (7)	06:15	17:13 (5)	06:28	05:58	19:04 (6)	05:55	19:09 (6)
	17:35	55 14:10 (7)	18:12	53 14:15 (7)	18:43	24 17:37 (5)	20:15	20:43	23 19:27 (6)	20:57	25 19:34 (6)
29	07:36	13:14 (7)		07:13	18:14 (5)	06:26		05:57	19:03 (6)	05:55	19:09 (6)
	17:37	57 14:11 (7)		19:44	23 18:37 (5)	20:16		20:44	24 19:27 (6)	20:57	26 19:35 (6)
30	07:35	13:13 (7)		07:12	18:14 (5)	06:25		05:56	19:04 (6)	05:56	19:09 (6)
	17:38	59 14:12 (7)		19:45	22 18:36 (5)	20:17		20:45	24 19:28 (6)	20:57	25 19:34 (6)
31	07:34	13:13 (7)		07:10	18:14 (5)			05:56	19:03 (6)		
	17:39	60 14:13 (7)		19:46	20 18:34 (5)			20:46	25 19:28 (6)		
Potential sun hours	299	298	370	398	447	450					
Total, worst case	656	1904	434	44	234	757					
Sun reduction	0.40	0.43	0.47	0.51	0.58	0.67					
Oper. time red.	0.40	0.40	0.40	0.40	0.40	0.40					
Wind dir. red.	0.58	0.58	0.67	0.74	0.71	0.71					
Total reduction	0.09	0.10	0.12	0.15	0.16	0.19					
Total, real	60	187	54	6	38	141					

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

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

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AV - R28

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:56	19:09 (6)	06:20	06:49			07:18		06:52	12:38 (7)	07:26	
	20:57	25 19:34 (6)	20:39	19:57			19:07		17:21	72 13:50 (7)	16:58	
2	05:57	19:09 (6)	06:20	06:50			07:19		06:53	12:38 (7)	07:27	
	20:57	26 19:35 (6)	20:38	19:55			19:05		17:20	71 13:49 (7)	16:57	
3	05:57	19:09 (6)	06:21	06:51			07:20		06:54	12:38 (7)	07:28	
	20:57	26 19:35 (6)	20:37	19:53			19:04		17:19	71 13:49 (7)	16:57	
4	05:58	19:10 (6)	06:22	06:52			07:21		06:55	12:39 (7)	07:29	
	20:57	25 19:35 (6)	20:35	19:52			19:02		17:18	70 13:49 (7)	16:57	
5	05:58	19:09 (6)	06:23	06:53			07:22		06:56	12:40 (7)	07:30	
	20:57	26 19:35 (6)	20:34	19:50			19:00		17:16	68 13:48 (7)	16:57	
6	05:59	19:10 (6)	06:24	06:54			07:24		06:58	12:40 (7)	07:31	
	20:56	26 19:36 (6)	20:33	19:48			18:59		17:15	67 13:47 (7)	16:57	
7	05:59	19:11 (6)	06:25	06:55			07:25		06:59	12:40 (7)	07:32	
	20:56	25 19:36 (6)	20:32	19:47			18:57		17:14	67 13:47 (7)	16:57	
8	06:00	19:10 (6)	06:26	06:56			07:26		14:19 (7)	07:00	12:42 (7)	07:33
	20:56	26 19:36 (6)	20:31	19:45			18:56	15	14:34 (7)	17:13	65 13:47 (7)	16:56
9	06:01	19:11 (6)	06:27	06:57		18:13 (5)	07:27		14:12 (7)	07:01	12:42 (7)	07:34
	20:55	25 19:36 (6)	20:30	19:44	9	18:22 (5)	18:54	28	14:40 (7)	17:12	64 13:46 (7)	16:56
10	06:01	19:11 (6)	06:28	06:58		18:10 (5)	07:28		14:07 (7)	07:02	12:43 (7)	07:34
	20:55	26 19:37 (6)	20:28	19:42	14	18:24 (5)	18:52	36	14:43 (7)	17:11	62 13:45 (7)	16:57
11	06:02	19:11 (6)	06:29	06:59		18:08 (5)	07:29		14:03 (7)	07:03	12:44 (7)	07:35
	20:55	25 19:36 (6)	20:27	19:40	18	18:26 (5)	18:51	42	14:45 (7)	17:10	60 13:44 (7)	16:57
12	06:03	19:11 (6)	06:30	07:00		18:06 (5)	07:30		13:59 (7)	07:05	12:45 (7)	07:36
	20:54	25 19:36 (6)	20:26	19:39	20	18:26 (5)	18:49	47	14:46 (7)	17:09	59 13:44 (7)	16:57
13	06:03	19:12 (6)	06:31	07:01		18:05 (5)	07:31		13:56 (7)	07:06	12:46 (7)	07:37
	20:54	24 19:36 (6)	20:24	19:37	22	18:27 (5)	18:48	51	14:47 (7)	17:08	57 13:43 (7)	16:57
14	06:04	19:12 (6)	06:32	07:02		18:04 (5)	07:32		13:53 (7)	07:07	12:47 (7)	07:38
	20:53	24 19:36 (6)	20:23	19:35	23	18:27 (5)	18:46	55	14:48 (7)	17:08	55 13:42 (7)	16:57
15	06:05	19:12 (6)	06:33	07:03		18:03 (5)	07:33		13:51 (7)	07:08	12:48 (7)	07:38
	20:53	24 19:36 (6)	20:22	19:34	24	18:27 (5)	18:45	58	14:49 (7)	17:07	53 13:41 (7)	16:57
16	06:06	19:13 (6)	06:34	07:04		18:03 (5)	07:34		13:48 (7)	07:09	12:50 (7)	07:39
	20:52	23 19:36 (6)	20:20	19:32	24	18:27 (5)	18:43	62	14:50 (7)	17:06	50 13:40 (7)	16:58
17	06:06	19:14 (6)	06:35	07:05		18:03 (5)	07:35		13:47 (7)	07:10	12:51 (7)	07:40
	20:51	22 19:36 (6)	20:19	19:30	24	18:27 (5)	18:42	63	14:50 (7)	17:05	48 13:39 (7)	16:58
18	06:07	19:13 (6)	06:36	07:06		18:03 (5)	07:36		13:45 (7)	07:12	12:53 (7)	07:40
	20:51	21 19:34 (6)	20:18	19:29	23	18:26 (5)	18:40	65	14:50 (7)	17:04	45 13:38 (7)	16:58
19	06:08	19:14 (6)	06:37	07:07		18:03 (5)	07:37		13:44 (7)	07:13	12:54 (7)	07:41
	20:50	20 19:34 (6)	20:16	19:27	22	18:25 (5)	18:39	68	14:52 (7)	17:04	43 13:37 (7)	16:59
20	06:09	19:15 (6)	06:38	07:08		18:03 (5)	07:38		13:43 (7)	07:14	12:57 (7)	07:42
	20:49	19 19:34 (6)	20:15	19:25	21	18:24 (5)	18:37	69	14:52 (7)	17:03	39 13:36 (7)	16:59
21	06:10	19:16 (6)	06:39	07:09		18:04 (5)	07:39		13:42 (7)	07:15	12:58 (7)	07:42
	20:49	17 19:33 (6)	20:13	19:24	19	18:23 (5)	18:36	70	14:52 (7)	17:02	36 13:34 (7)	16:59
22	06:11	19:18 (6)	06:40	07:10		18:04 (5)	07:40		13:41 (7)	07:16	13:00 (7)	07:43
	20:48	14 19:32 (6)	20:12	19:22	16	18:20 (5)	18:34	71	14:52 (7)	17:02	33 13:33 (7)	17:00
23	06:11	19:18 (6)	06:41	07:11		18:06 (5)	07:42		13:40 (7)	07:17	13:02 (7)	07:43
	20:47	12 19:30 (6)	20:10	19:20	11	18:17 (5)	18:33	71	14:51 (7)	17:01	29 13:31 (7)	17:00
24	06:12	19:21 (6)	06:42	07:12			07:43		13:39 (7)	07:18	13:05 (7)	07:44
	20:46	7 19:28 (6)	20:09	19:19			18:32	72	14:51 (7)	17:00	23 13:28 (7)	17:01
25	06:13		06:43	07:13			06:44		12:39 (7)	07:19	13:08 (7)	07:44
	20:45		20:07	19:17			17:30	73	13:52 (7)	17:00	18 13:26 (7)	17:02
26	06:14		06:44	07:14			06:45		12:39 (7)	07:21	13:13 (7)	07:44
	20:45		20:06	19:15			17:29	73	13:52 (7)	16:59	9 13:22 (7)	17:02
27	06:15		06:45	07:14			06:46		12:38 (7)	07:22		07:45
	20:44		20:04	19:13			17:27	73	13:51 (7)	16:59		17:03
28	06:16		06:46	07:15			06:47		12:38 (7)	07:23		07:45
	20:43		20:03	19:12			17:26	73	13:51 (7)	16:59		17:03
29	06:17		06:47	07:16			06:48		12:38 (7)	07:24		07:45
	20:42		20:01	19:10			17:25	73	13:51 (7)	16:58		17:04
30	06:18		06:47	07:17			06:49		12:38 (7)	07:25		07:46
	20:41		20:00	19:09			17:24	73	13:51 (7)	16:58		17:05
31	06:19		06:48				06:51		12:38 (7)			07:46
	20:40		19:58				17:22	73	13:51 (7)			17:06
Potential sun hours	457		427	375			346		299			290
Total, worst case		533		290			1454		1334			
Sun reduction		0.75		0.64			0.56		0.48			
Oper. time red.		0.40		0.40			0.40		0.40			
Wind dir. red.		0.71		0.74			0.58		0.58			
Total reduction		0.21		0.19			0.13		0.11			
Total, real		112		54			183		145			

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

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

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 81

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: AW - R32

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
3.87 4.61 5.62 6.73 8.36 10.04 11.06 9.91 8.03 6.21 4.80 3.87

Operational time
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
120 150 155 163 189 206 215 185 142 146 180 335 601 438 155 103 3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:46 17:07	07:33 17:40	06:58 18:14	07:08 19:47	06:24 20:18	17:15 (7) 20:46	05:55 20:46	17:11 (7) 20:57	17:19 (7) 20:39	06:19 18:08 (7)	17:17 (7) 19:56	06:49 19:07	07:18 17:21
2	07:46 17:08	07:32 17:42	06:57 18:15	07:07 19:48	06:22 20:19	17:13 (7) 20:47	05:55 20:48	17:11 (7) 20:57	17:12 (7) 20:38	06:20 18:08 (7)	17:17 (7) 19:55	06:50 19:05	07:19 17:20
3	07:46 17:08	07:31 17:43	06:55 18:16	07:05 19:49	06:21 20:20	17:12 (7) 20:48	05:55 20:48	17:12 (7) 20:57	17:19 (7) 20:37	06:21 18:07 (7)	17:18 (7) 19:53	06:51 19:04	07:20 17:19
4	07:46 17:09	07:30 17:44	06:54 18:17	07:04 19:50	06:20 20:21	17:11 (7) 20:48	05:54 20:48	17:13 (7) 20:57	17:20 (7) 20:35	06:22 18:08 (7)	17:18 (7) 19:52	06:52 19:02	07:21 17:18
5	07:46 17:10	07:29 17:45	06:52 18:18	07:02 19:51	06:19 20:22	17:10 (7) 20:49	05:54 20:49	17:12 (7) 20:56	17:19 (7) 20:34	06:23 18:06 (7)	17:18 (7) 19:50	06:53 19:00	07:22 17:16
6	07:46 17:11	07:28 17:46	06:51 18:19	07:00 19:52	06:17 20:23	17:10 (7) 20:50	05:54 20:50	17:13 (7) 20:56	17:19 (7) 20:33	06:24 18:09 (7)	17:19 (7) 19:48	06:54 18:59	07:23 17:15
7	07:46 17:12	07:27 17:48	06:49 18:20	06:59 19:53	06:16 20:24	17:09 (7) 20:50	05:53 20:50	17:14 (7) 20:56	17:20 (7) 20:32	06:25 18:04 (7)	17:19 (7) 19:47	06:55 18:57	07:25 17:14
8	07:46 17:13	07:26 17:49	06:47 18:21	06:57 19:54	06:15 20:25	17:08 (7) 20:51	05:53 20:51	17:14 (7) 20:56	17:19 (7) 20:31	06:26 18:09 (7)	17:20 (7) 19:45	06:56 18:56	07:26 17:13
9	07:46 17:14	07:25 17:50	06:46 18:22	06:56 19:55	06:14 20:26	17:08 (7) 20:52	05:53 20:52	17:14 (7) 20:55	17:19 (7) 20:30	06:27 18:02 (7)	17:21 (7) 19:44	06:57 18:54	07:27 17:12
10	07:46 17:15	07:24 17:51	06:44 18:24	06:54 19:56	06:13 20:27	17:08 (7) 20:52	05:53 20:52	17:14 (7) 20:55	17:20 (7) 20:28	06:28 18:00 (7)	17:22 (7) 19:42	06:58 18:52	07:28 17:11
11	07:46 17:16	07:23 17:53	06:43 18:25	06:52 19:57	06:12 20:28	17:08 (7) 20:53	05:53 20:53	17:15 (7) 20:55	17:19 (7) 20:27	06:29 17:58 (7)	17:22 (7) 19:40	06:59 18:51	07:29 17:10
12	07:46 17:17	07:22 17:54	06:41 18:26	06:51 19:58	06:11 20:29	17:07 (7) 20:53	05:52 20:53	17:15 (7) 20:58	17:19 (7) 20:26	06:30 17:56 (7)	17:23 (7) 19:39	07:00 18:49	07:30 17:09
13	07:45 17:18	07:20 17:55	06:40 18:27	06:49 19:59	06:10 20:30	17:07 (7) 20:54	05:52 20:54	17:16 (7) 20:53	17:19 (7) 20:24	06:31 18:11 (7)	17:25 (7) 19:37	07:01 18:48	07:31 17:08
14	07:45 17:19	07:19 17:56	06:38 18:28	06:48 20:00	06:09 20:31	17:07 (7) 20:54	05:52 20:54	17:16 (7) 20:53	17:18 (7) 20:23	06:32 18:10 (7)	17:27 (7) 19:35	07:02 18:46	07:32 17:07
15	07:45 17:20	07:18 17:57	06:36 18:29	06:46 20:01	06:08 20:32	17:07 (7) 20:55	05:52 20:55	17:16 (7) 20:53	17:18 (7) 20:22	06:33 18:11 (7)	17:30 (7) 19:34	07:03 18:45	07:33 17:07
16	07:44 17:21	07:17 17:59	06:35 18:30	06:45 20:02	06:07 20:33	17:07 (7) 20:55	05:52 20:55	17:17 (7) 20:52	17:19 (7) 20:20	06:34 17:40 (7)	17:37 (7) 19:32	07:04 18:43	07:34 17:06
17	07:44 17:23	07:15 18:00	06:33 18:31	06:43 20:03	06:06 20:34	17:07 (7) 20:55	05:52 20:55	17:17 (7) 20:51	17:19 (7) 20:19	06:35 19:30	17:39 (7) 18:42	07:05 17:05	07:35 17:05
18	07:43 17:24	07:14 18:01	06:31 18:32	06:42 20:04	06:05 20:34	17:07 (7) 20:56	05:52 20:56	17:17 (7) 20:51	17:18 (7) 20:18	06:36 19:29	17:48 (7) 18:40	07:06 17:04	07:36 17:04
19	07:43 17:25	07:13 18:02	06:30 18:33	06:40 20:05	06:04 20:35	17:07 (7) 20:56	05:53 20:56	17:18 (7) 20:50	17:18 (7) 20:16	06:37 19:27	17:49 (7) 18:39	07:07 17:04	07:37 17:04
20	07:42 17:26	07:11 18:03	06:28 18:34	06:39 20:06	06:03 20:36	17:08 (7) 20:56	05:53 20:56	17:18 (7) 20:49	17:18 (7) 20:15	06:38 19:25	17:49 (7) 18:37	07:08 17:04	07:38 17:04
21	07:42 17:27	07:10 18:04	06:26 18:35	06:37 20:07	06:02 20:37	17:07 (7) 20:56	05:53 20:56	17:18 (7) 20:49	17:18 (7) 20:13	06:39 19:24	17:49 (7) 18:36	07:09 17:04	07:39 17:04
22	07:41 17:28	07:08 18:06	06:25 18:36	06:36 20:08	06:02 20:38	17:07 (7) 20:57	05:53 20:57	17:18 (7) 20:48	17:18 (7) 20:12	06:40 19:22	17:49 (7) 18:34	07:10 17:04	07:40 17:04
23	07:40 17:29	07:07 18:07	06:23 18:37	06:34 20:09	06:01 20:39	17:07 (7) 20:57	05:53 20:57	17:18 (7) 20:47	17:17 (7) 20:10	06:41 19:21	17:50 (7) 18:33	07:11 17:04	07:41 17:00
24	07:40 17:31	07:06 18:08	06:22 18:38	06:33 20:10	06:00 20:40	17:08 (7) 20:57	05:54 20:57	17:19 (7) 20:46	17:17 (7) 20:09	06:42 19:18	17:51 (7) 18:32	07:12 17:04	07:42 17:00
25	07:39 17:32	07:04 18:09	06:20 18:39	06:32 20:11	05:59 20:41	17:08 (7) 20:57	05:54 20:57	17:19 (7) 20:45	17:17 (7) 20:07	06:43 19:17	17:52 (7) 18:30	07:13 17:04	07:43 17:00
26	07:38 17:33	07:03 18:10	06:18 18:40	06:30 20:12	05:59 20:42	17:09 (7) 20:57	05:54 20:57	17:19 (7) 20:45	17:17 (7) 20:06	06:44 19:15	17:53 (7) 18:29	07:14 17:04	07:44 17:00
27	07:38 17:34	07:01 18:11	06:17 18:41	06:29 20:13	9 17:27 (7) 17:36 (7)	17:09 (7) 20:57	05:54 20:57	17:19 (7) 20:44	17:17 (7) 20:04	06:45 19:13	17:54 (7) 18:27	07:15 17:04	07:45 17:00
28	07:37 17:35	07:00 18:12	06:15 18:42	06:28 20:14	17:22 (7) 17:41 (7)	17:09 (7) 20:57	05:55 20:57	17:19 (7) 20:43	17:17 (7) 20:03	06:46 19:12	17:55 (7) 18:26	07:16 17:04	07:46 17:00
29	07:36 17:37	07:08 18:13	06:25 18:43	06:33 20:15	17:19 (7) 17:44 (7)	17:07 (7) 20:57	05:52 20:57	17:17 (7) 20:42	17:19 (7) 20:02	06:36 19:10	17:56 (7) 18:25	07:05 17:04	07:47 17:00
30	07:35 17:38	07:12 18:14	06:25 18:44	06:33 20:16	25 17:44 (7) 17:47 (7)	17:08 (7) 20:57	05:56 20:57	17:19 (7) 20:41	17:18 (7) 20:00	06:47 19:09	17:57 (7) 18:24	07:06 17:04	07:48 17:00
31	07:34 17:39	07:10 18:15	06:25 18:45	06:34 20:17	30 17:47 (7) 20:46	17:09 (7) 20:57	05:56 20:57	17:19 (7) 20:40	17:17 (7) 19:58	06:48 19:09	17:58 (7) 18:24	07:07 17:04	07:49 17:00
Potential sun hours	299	298	370	398	447	450	457	427		375	346	299	290
Total, worst case				83	1537	1442	1600	603					
Sun reduction				0.51	0.58	0.67	0.75	0.72					
Oper. time red.				0.40	0.40	0.40	0.40	0.40					
Wind dir. red.				0.74	0.74	0.74	0.74	0.74					
Total reduction				0.15	0.17	0.20	0.22	0.21					
Total, real				12	263	285	354	128					

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

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

windpro Nuoro nord - flickering

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2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AX - R31

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
3.87 4.61 5.62 6.73 8.36 10.04 11.06 9.91 8.03 6.21 4.80 3.87

Operational time
N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
120 150 155 163 189 206 215 185 142 146 180 335 601 438 155 103 3,483
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (January to December) and rows for each day (1-31) showing shadow calculations. Includes summary rows for 'Potential sun hours', 'Total, worst case', 'Sun reduction', 'Oper. time red.', 'Wind dir. red.', 'Total reduction', and 'Total, real'.

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

Matrix with 2 rows and 2 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time)

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:06 / 83

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progetto Shadow receptor: AY - R30

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December																																																									
1	07:46 07:33 06:58 15:54 (7) 07:08 06:24 05:55 05:56 06:19 06:49 07:18 16:30 (7) 06:52 07:26	17:07 17:40 18:14 39 16:33 (7) 19:47 20:18 20:46 20:39 19:56 19:07 43 17:13 (7) 17:21 16:58	07:46 07:32 06:57 15:53 (7) 07:07 06:22 05:55 05:57 06:20 06:50 07:19 16:29 (7) 06:53 07:27	17:08 17:42 18:15 41 16:34 (7) 19:48 20:19 20:47 20:37 19:55 19:05 44 17:13 (7) 17:20 16:57	07:46 07:31 06:55 15:52 (7) 07:05 06:21 05:55 05:57 06:21 06:51 06:21 19:05 44 17:13 (7) 17:20 16:57	17:08 17:43 18:16 43 16:35 (7) 19:49 20:20 20:48 20:37 19:53 19:04 45 17:13 (7) 17:19 16:57	07:46 07:30 06:54 15:51 (7) 07:04 06:20 05:54 05:58 06:22 06:52 07:21 16:27 (7) 06:55 07:29	17:09 17:44 18:17 44 16:35 (7) 19:50 20:21 20:48 20:57 20:35 19:52 19:02 45 17:12 (7) 17:18 16:57	07:46 07:29 06:52 15:51 (7) 07:02 06:19 05:54 05:58 06:23 06:53 07:22 16:27 (7) 06:56 07:30	17:10 17:45 18:18 44 16:35 (7) 19:51 20:22 20:49 20:57 20:34 19:50 19:00 45 17:12 (7) 17:16 16:57	07:46 07:28 06:51 15:50 (7) 07:00 06:17 05:54 05:59 06:24 06:54 07:23 16:26 (7) 06:58 07:31	17:11 17:46 18:19 45 16:35 (7) 19:52 20:23 20:50 20:56 20:33 19:48 18:59 46 17:12 (7) 17:15 16:57	07:46 07:27 06:49 15:51 (7) 06:59 06:16 05:53 05:59 06:25 06:55 07:25 16:26 (7) 06:59 07:32	17:12 17:48 18:20 45 16:36 (7) 19:53 20:24 20:50 20:56 20:32 19:47 18:57 45 17:11 (7) 17:14 16:56	07:46 07:26 06:47 15:50 (7) 06:57 06:15 05:53 06:00 06:26 06:56 07:26 16:26 (7) 07:00 07:33	17:13 17:49 18:21 45 16:35 (7) 19:54 20:25 20:51 20:56 20:31 19:45 18:55 44 17:10 (7) 17:13 16:56	07:46 07:25 06:46 15:51 (7) 06:56 06:14 05:53 06:01 06:27 06:57 07:27 16:27 (7) 07:01 07:33	17:14 17:50 18:22 45 16:36 (7) 19:55 20:26 20:52 20:55 20:30 19:44 18:54 44 17:11 (7) 17:12 16:56	07:46 07:24 06:44 15:50 (7) 06:54 06:13 05:53 06:01 06:28 06:58 07:28 16:27 (7) 07:02 07:34	17:15 17:51 18:24 45 16:35 (7) 19:56 20:27 20:52 20:55 20:28 19:42 18:52 43 17:10 (7) 17:11 16:56	07:46 07:23 06:43 15:50 (7) 06:52 06:12 05:53 06:02 06:29 06:59 07:29 16:27 (7) 07:03 07:35	17:16 17:53 18:25 44 16:34 (7) 19:57 20:28 20:53 20:55 20:27 19:40 18:51 42 17:09 (7) 17:10 16:57	07:46 07:22 06:41 15:51 (7) 06:51 06:11 05:52 06:03 06:30 07:00 07:30 16:27 (7) 07:05 07:36	17:17 17:54 18:26 44 16:35 (7) 19:58 20:29 20:53 20:54 20:26 19:39 18:49 41 17:08 (7) 17:09 16:57	07:45 07:20 06:40 15:51 (7) 06:49 06:10 05:52 06:03 06:31 07:01 07:31 16:28 (7) 07:06 07:37	17:18 17:55 18:27 43 16:34 (7) 19:59 20:30 20:54 20:54 20:24 19:37 18:48 38 17:06 (7) 17:08 16:57	07:45 07:19 06:38 15:51 (7) 06:48 06:09 05:52 06:04 06:32 07:02 07:32 16:28 (7) 07:07 07:38	17:19 17:56 18:28 41 16:32 (7) 20:00 20:31 20:54 20:53 20:23 19:35 18:46 37 17:05 (7) 17:07 16:57	07:45 07:18 06:36 15:53 (7) 06:46 06:08 05:52 06:05 06:33 07:03 07:33 16:29 (7) 07:08 07:38	17:20 17:57 18:29 39 16:32 (7) 20:01 20:32 20:55 20:53 20:22 19:34 18:45 34 17:03 (7) 17:07 16:57	07:44 07:17 06:35 15:53 (7) 06:45 06:07 05:52 06:06 06:34 07:04 07:34 16:30 (7) 07:09 07:39	17:21 17:58 18:30 38 16:31 (7) 20:02 20:33 20:55 20:52 20:20 19:32 18:43 31 17:01 (7) 17:06 16:58	07:44 07:15 06:33 15:55 (7) 06:43 06:06 05:52 06:06 06:35 07:05 07:35 16:32 (7) 07:10 07:40	17:23 18:00 18:31 35 16:30 (7) 20:03 20:34 20:55 20:51 20:19 19:30 18:42 27 16:59 (7) 17:05 16:58	07:43 07:14 06:31 15:56 (7) 06:42 06:05 05:52 06:07 06:36 07:06 07:36 16:34 (7) 07:11 07:40	17:24 18:01 18:32 32 16:28 (7) 20:04 20:34 20:56 20:51 20:18 19:29 18:40 22 16:56 (7) 17:04 16:58	07:43 07:13 06:30 15:57 (7) 06:40 06:04 05:52 06:08 06:37 07:07 07:37 16:38 (7) 07:13 07:41	17:25 18:02 18:33 29 16:26 (7) 20:05 20:35 20:56 20:50 20:16 19:27 18:39 16 16:54 (7) 17:04 16:59	07:42 07:11 06:28 15:59 (7) 06:39 06:03 05:53 06:09 06:38 07:08 07:38 16:38 (7) 07:14 07:42	17:26 18:03 18:34 26 16:25 (7) 20:06 20:36 20:56 20:49 20:15 19:25 18:37 17:03 16:59	07:42 07:10 06:26 16:01 (7) 06:37 06:02 05:53 06:10 06:39 07:09 07:39 16:51 (7) 07:39 07:15 07:42	17:27 18:04 18:35 21 16:22 (7) 20:07 20:37 20:56 20:49 20:13 19:23 11 17:02 (7) 18:36 17:02 16:59	07:41 07:08 16:09 (7) 06:25 16:04 (7) 06:36 06:02 05:53 06:10 06:40 07:10 16:46 (7) 07:40 07:16 07:43	17:28 18:06 9 16:18 (7) 18:36 14 16:18 (7) 20:08 20:38 20:57 20:48 20:12 19:22 20 17:06 (7) 18:34 17:02 17:00	07:40 07:07 16:05 (7) 06:23 16:03 06:01 05:53 06:11 06:41 07:11 16:43 (7) 07:42 07:17 07:43	17:29 18:07 18 16:23 (7) 18:37 20:09 20:39 20:57 20:47 20:10 19:20 25 17:08 (7) 18:33 17:01 17:00	07:40 07:06 16:02 (7) 06:22 16:03 06:00 05:53 06:12 06:42 07:12 16:41 (7) 07:43 07:18 07:44	17:31 18:08 25 16:27 (7) 18:38 20:10 20:40 20:57 20:46 20:09 19:18 28 17:09 (7) 18:32 17:00 17:01	07:39 07:04 16:00 (7) 06:20 16:03 05:59 05:54 06:13 06:43 07:12 16:39 (7) 06:44 07:19 07:44	17:32 18:09 28 16:28 (7) 18:39 20:11 20:41 20:57 20:45 20:07 19:17 31 17:10 (7) 17:30 17:00 17:01	07:38 07:03 15:58 (7) 06:18 16:03 05:59 05:54 06:14 06:44 07:13 16:37 (7) 06:45 07:21 07:44	17:33 18:10 32 16:30 (7) 18:40 20:12 20:42 20:57 20:45 20:06 19:15 34 17:11 (7) 17:29 16:59 17:02	07:38 07:01 15:56 (7) 06:17 16:02 06:29 05:58 05:54 06:15 06:45 07:14 16:35 (7) 06:46 07:22 07:45	17:34 18:11 35 16:31 (7) 18:41 20:13 20:42 20:57 20:44 20:04 19:13 37 17:12 (7) 17:27 16:59 17:03	07:37 07:00 15:55 (7) 06:15 16:02 06:28 05:58 05:55 06:16 06:46 07:15 16:33 (7) 06:47 07:23 07:45	17:35 18:12 38 16:33 (7) 18:42 20:14 20:43 20:57 20:43 20:03 19:12 39 17:12 (7) 17:26 16:59 17:03	07:36 07:13 16:02 06:26 16:05 05:57 05:55 06:17 06:46 07:16 16:32 (7) 06:48 07:24 07:45	17:37 19:44 19:44 20:16 20:44 20:57 20:42 20:01 19:10 41 17:13 (7) 17:25 16:58 17:04	07:35 07:12 16:02 06:25 16:05 05:56 05:56 06:18 06:47 07:17 16:31 (7) 06:49 07:25 07:46	17:38 19:45 19:45 20:17 20:45 20:57 20:41 20:00 19:09 42 17:13 (7) 17:24 16:58 17:05	07:34 07:10 16:01 06:25 16:05 05:56 05:56 06:19 06:48 07:18 16:31 (7) 06:49 07:25 07:46	17:39 19:46 19:46 20:16 20:46 20:57 20:40 19:58 19:09 42 17:13 (7) 17:24 16:58 17:06	Potential sun hours 299 298 370 398 447 450 457 427 375 346 299 290	Total, worst case 185 842 308 732	Sun reduction 0.43 0.47 0.64 0.56	Oper. time red. 0.40 0.40 0.40 0.40	Wind dir. red. 0.72 0.72 0.72 0.72	Total reduction 0.12 0.14 0.18 0.16	Total, real 23 114 57 117

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

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

Project:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar

Calculation: Nuoro Nord progettoShadow receptor: AZ - R29

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Table with 12 columns: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec. Values: 3.87, 4.61, 5.62, 6.73, 8.36, 10.04, 11.06, 9.91, 8.03, 6.21, 4.80, 3.87.

Operational time

Table with 17 columns: N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW, Sum. Values: 120, 150, 155, 163, 189, 206, 215, 185, 142, 146, 180, 335, 601, 438, 155, 103, 3,483.

Idle start wind speed: Cut in wind speed from power curve

Main shadow calculation table with columns for months (January to December) and rows for each day of the year, showing sun rise/set times and shadow durations.

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

Summary matrix with 5 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), Minutes with flicker, First time (hh:mm) with flicker, Last time (hh:mm) with flicker, (WTG causing flicker first time), (WTG causing flicker last time).

Project:

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2023-12-12 12:11 / 1

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Calculated:

2023-12-11 14:55/2,8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 1 - SG01

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June		
1	07:46	09:37-11:20/103	14:37-15:37/60	07:34	10:08-10:58/50	06:58	11:29-15:46/257	07:09	12:42-17:01/259	06:24	14:39-16:53/134	05:56	15:16-16:44/88
2	07:46	09:38-11:20/102	14:37-15:37/60	07:33	10:11-10:55/44	06:57	11:29-15:47/258	07:07	12:47-17:01/254	06:23	14:41-16:53/132	05:55	15:16-16:43/87
3	07:47	09:39-11:20/101	14:38-15:37/59	07:32	10:14-10:52/38	06:55	11:28-15:48/260	07:05	13:13-17:02/229	06:21	14:42-16:52/130	05:55	15:17-16:43/86
4	07:47	09:39-11:20/101	14:39-15:37/58	07:31	10:18-10:48/30	06:54	11:29-15:50/261	07:04	13:41-17:01/200	06:20	14:44-16:52/128	05:54	15:18-16:43/85
5	07:47	09:40-11:21/101	14:39-15:35/56	07:30	10:23-10:42/19	06:52	11:28-15:50/262	07:02	13:53-17:02/189	06:19	14:46-16:52/126	05:54	15:19-16:43/84
6	07:47	09:40-11:20/100	14:40-15:35/55	07:29	11:37-14:32/175	06:51	11:28-15:52/264	07:01	13:53-17:01/188	06:18	14:48-16:51/123	05:54	15:19-16:43/84
7	07:47	09:40-11:20/100	14:41-15:35/54	07:28	11:37-14:33/176	06:49	11:28-15:52/264	06:59	13:52-17:00/188	06:16	14:50-16:51/121	05:54	15:20-16:43/83
8	07:46	09:41-11:20/99	14:42-15:34/52	07:26	11:37-14:33/176	06:48	11:27-15:53/266	06:57	13:53-17:01/188	06:15	14:51-16:51/120	05:53	15:21-16:43/82
9	07:46	09:42-11:20/98	14:44-15:34/50	07:25	11:37-14:34/177	06:46	11:28-15:54/266	06:56	13:53-17:00/187	06:14	14:53-16:50/117	05:53	15:21-16:43/82
10	07:46	09:43-11:21/98	14:45-15:33/48	07:24	11:36-14:35/179	06:45	11:27-15:55/268	06:54	13:54-17:01/187	06:13	14:54-16:50/116	05:53	15:22-16:43/81
11	07:46	09:43-11:20/97	14:46-15:31/45	07:23	11:35-14:59/204	06:43	11:28-15:56/268	06:53	13:54-17:00/186	06:12	14:56-16:50/114	05:53	15:22-16:42/80
12	07:46	09:44-11:20/96	14:47-15:30/43	07:22	11:35-15:05/210	06:41	11:27-15:56/269	06:51	13:54-16:59/185	06:11	14:57-16:49/112	05:53	15:22-16:42/80
13	07:45	09:45-11:20/95	14:49-15:27/38	07:21	11:35-15:10/215	06:40	11:27-15:57/270	06:50	13:56-17:00/184	06:10	14:58-16:49/111	05:53	15:23-16:43/80
14	07:45	09:46-11:19/93	14:50-15:35/45	07:19	11:35-15:15/220	06:38	11:27-15:58/271	06:48	13:57-16:59/182	06:09	14:59-16:48/109	05:52	15:23-16:43/80
15	07:45	09:47-11:19/92	14:52-15:35/43	07:18	11:34-15:17/223	06:37	11:27-15:58/271	06:46	13:59-16:59/180	06:08	15:00-16:48/108	05:52	15:23-16:43/80
16	07:44	09:47-11:18/91	14:53-15:33/40	07:17	11:34-15:21/227	06:35	11:27-15:58/271	06:45	14:00-16:58/178	06:07	15:01-16:47/106	05:52	15:24-16:43/79
17	07:44	09:49-11:19/90	14:56-15:33/37	07:15	11:34-15:24/230	06:33	11:27-15:59/272	06:43	14:03-16:58/175	06:06	15:02-16:47/105	05:53	15:25-16:44/79
18	07:44	09:49-11:18/89	14:58-15:31/33	07:14	11:33-15:26/233	06:32	11:27-15:59/272	06:42	14:05-16:58/173	06:05	15:03-16:46/103	05:53	15:25-16:44/79
19	07:43	09:51-11:18/87	15:01-15:30/29	07:13	11:33-15:29/236	06:30	11:27-15:59/272	06:40	14:08-16:58/170	06:04	15:05-16:47/102	05:53	15:25-16:44/79
20	07:43	09:51-11:16/85	15:03-15:28/25	07:11	11:32-15:30/238	06:28	11:28-16:00/272	06:39	14:12-16:58/166	06:03	15:06-16:46/100	05:53	15:25-16:44/79
21	07:42	09:52-11:15/83	15:07-15:24/17	07:10	11:32-15:33/241	06:27	11:28-16:00/272	06:38	14:14-16:57/163	06:03	15:07-16:46/99	05:53	15:25-16:44/79
22	07:41	09:53-11:15/82	15:14-15:19/5	07:09	11:32-15:35/243	06:25	11:28-16:00/272	06:36	14:17-16:57/160	06:02	15:08-16:45/97	05:53	15:25-16:44/79
23	07:41	09:54-11:14/80		07:07	11:31-15:37/246	06:23	11:29-16:01/272	06:35	14:19-16:56/157	06:01	15:09-16:46/97	05:53	15:26-16:45/79
24	07:40	09:55-11:13/78		07:06	11:31-15:39/248	06:22	11:29-16:01/272	06:33	14:23-16:56/153	06:00	15:10-16:45/95	05:54	15:26-16:45/79
25	07:39	09:57-11:12/75		07:04	11:30-15:40/250	06:20	11:29-16:01/272	06:32	14:26-16:56/150	06:00	15:10-16:44/94	05:54	15:26-16:45/79
26	07:39	09:58-11:11/73		07:03	11:30-15:42/252	06:18	11:31-16:01/270	06:30	14:27-16:55/148	05:59	15:12-16:45/93	05:54	15:27-16:46/79
27	07:38	10:00-11:09/69		07:01	11:29-15:43/254	06:17	11:31-16:01/270	06:29	14:30-16:55/145	05:58	15:12-16:44/92	05:55	15:27-16:46/79
28	07:37	10:01-11:07/66		07:00	11:29-15:45/255	06:15	11:33-16:02/269	06:28	14:33-16:55/142	05:58	15:13-16:44/91	05:55	15:26-16:46/80
29	07:37	10:02-11:05/63				06:14		06:27		05:57		05:55	
30	07:35	10:04-11:03/59				06:12		06:25		05:57		05:56	
31	07:34	10:06-11:01/55				06:11		06:24		05:56		05:55	
	Potential sun hours	299	298	370	398	447	450						
	Sum of minutes with flicker	8417	7231	9018	5662	3342	2430						

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	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
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Project:

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2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 1 - SG01

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Table with columns: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec. Values: 3.87, 4.61, 5.62, 6.73, 8.36, 10.04, 11.06, 9.91, 8.03, 6.21, 4.80, 3.87

Operational time

Table with columns: N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW, Sum. Values: 120, 150, 155, 163, 189, 206, 215, 185, 142, 146, 180, 335, 601, 438, 155, 103, 3,483

Main shadow calculation table with columns for months (July-December) and rows for time intervals (00:00-00:15, 00:15-00:30, etc.). Includes summary rows for Potential sun hours and Sum of minutes with flicker.

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

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

Project:

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2023-12-12 12:11 / 3

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 2 - SG02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

		January	February	March	April	May	June								
1	07:46	10:47-11:53/66	07:34	14:10-16:18/128	06:58	14:26-16:06/100	07:09	16:29-18:30/121	19:11-19:26/15	06:24	16:26-18:33/127	05:56	16:45-18:25/100		
	17:07	14:09-16:00/111	17:40		18:14	17:38-17:52/14	19:47	18:37-18:56/19		20:18	19:13-19:55/42	20:47	19:17-19:54/37		
2	07:46	10:48-11:53/65	07:33	14:10-16:18/128	06:57	14:28-16:05/97	07:07	16:27-18:30/123	19:10-19:26/16	06:22	16:26-18:33/127	05:55	16:45-18:24/99		
	17:08	14:11-16:01/110	17:42		18:15	17:37-17:54/17	19:48	18:40-18:51/11		20:19	19:12-19:56/44	20:47	19:17-19:53/36		
3	07:47	10:49-11:53/64	07:32	14:10-16:18/128	06:55	14:30-16:02/92	07:05	16:27-18:31/124		06:21	16:26-18:32/126	05:55	16:46-18:25/99		
	17:08	14:11-16:02/111	17:43		18:16	17:36-17:55/19	19:49	19:11-19:28/17		20:20	19:11-19:57/46	20:48	19:18-19:53/35		
4	07:47	10:50-11:53/63	07:31	14:10-16:18/128	06:54	14:32-16:02/90	07:04	16:26-18:32/126		06:20	16:27-18:32/125	05:54	16:47-18:25/98		
	17:09	14:11-16:03/112	17:44		18:17	17:36-17:56/20	19:50	19:10-19:29/19		20:21	19:10-19:57/47	20:49	19:19-19:53/34		
5	07:47	10:50-11:51/61	07:30	14:11-16:19/128	06:52	14:33-16:00/87	07:02	16:25-18:32/127		06:19	16:27-18:32/125	05:54	16:47-18:24/97		
	17:10	14:10-16:02/112	17:45		18:18	17:36-17:57/21	19:51	19:10-19:29/19		20:22	19:10-19:58/48	20:49	19:19-19:52/33		
6	07:47	10:51-11:51/60	07:29	14:11-16:19/128	06:51	14:34-15:58/84	07:01	16:25-18:33/128		06:18	16:28-18:31/123	05:54	16:48-18:24/96		
	17:11	14:10-16:03/113	17:47		18:19	17:35-17:58/23	19:52	19:11-19:31/20		20:23	19:10-19:58/48	20:50	19:20-19:52/32		
7	07:47	10:53-11:50/57	07:27	14:11-16:19/128	06:49	14:37-15:58/81	06:59	16:24-18:33/129		06:16	16:29-18:31/122	05:53	16:48-18:24/96		
	17:12	14:10-16:04/114	17:48		18:20	17:36-17:59/23	19:53	19:11-19:30/19		20:24	19:09-19:59/50	20:51	19:21-19:52/31		
8	07:46	10:54-11:50/56	07:26	14:12-16:19/127	06:48	14:39-15:56/77	06:57	16:24-18:33/129		06:15	16:30-18:31/121	05:53	16:49-18:25/96		
	17:13	14:11-16:05/114	17:49		18:21	17:36-18:00/24	19:54	19:13-19:28/15		20:25	19:09-19:59/50	20:51	19:22-19:52/30		
9	07:46	10:56-11:49/53	07:25	14:12-16:19/127	06:46	14:41-15:55/74	06:56	16:23-18:33/130		06:14	16:30-18:31/121	05:53	16:50-18:25/95		
	17:14	14:11-16:06/115	17:50		18:23	17:36-18:02/26	19:55	19:15-19:25/10		20:26	19:09-19:59/50	20:52	19:22-19:52/30		
10	07:46	10:58-11:48/50	07:24	14:11-16:18/127	06:44	14:43-15:53/70	06:54	16:23-18:34/131		06:13	16:31-18:31/120	05:53	16:49-18:24/95		
	17:15	14:11-16:07/116	17:51		18:24	17:34-18:03/29	19:56			20:27	19:09-19:59/50	20:52	19:22-19:51/29		
11	07:46	10:59-11:46/47	07:23	14:12-16:18/126	06:43	14:45-15:50/65	06:53	16:22-18:34/132		06:12	16:32-18:30/118	05:53	16:50-18:24/94		
	17:16	14:11-16:07/116	17:53		18:25	16:21-16:49/28	19:57			20:28	19:09-19:59/50	20:53	19:23-19:50/27		
12	07:46	11:01-11:45/44	07:22	14:13-16:18/125	06:41	14:49-15:49/60	06:51	16:22-18:34/132		06:11	16:32-18:30/118	05:53	16:50-18:24/94		
	17:17	14:11-16:08/117	17:54		18:26	16:14-16:56/42	19:58			20:29	19:09-19:59/50	20:53	19:24-19:50/26		
13	07:45	11:03-11:44/41	07:20	14:13-16:18/125	06:40	14:51-15:46/55	06:49	16:22-18:34/132		06:10	16:33-18:30/117	05:52	16:51-18:24/93		
	17:18	14:11-16:09/118	17:55		18:27	16:09-17:00/51	19:59			20:30	19:09-19:59/50	20:54	19:24-19:50/26		
14	07:45	11:05-11:41/36	07:19	14:13-16:17/124	06:38	14:55-15:44/49	06:48	16:21-18:34/133		06:09	16:33-18:29/116	05:52	16:51-18:24/93		
	17:19	14:11-16:09/118	17:56		18:28	16:05-17:04/59	20:00			20:31	19:09-19:59/50	20:54	19:25-19:50/25		
15	07:45	11:09-11:39/30	07:18	14:14-16:17/123	06:36	14:58-15:41/43	06:46	16:22-18:34/132		06:08	16:34-18:29/115	05:52	16:52-18:24/92		
	17:20	14:11-16:10/119	17:57		18:29	16:01-17:07/66	20:01			20:32	19:09-19:59/50	20:55	19:26-19:50/24		
16	07:44	11:12-11:34/22	07:17	14:15-16:17/122	06:35	15:02-15:37/35	06:45	16:21-18:34/133		06:07	16:34-18:29/115	05:52	16:52-18:24/92		
	17:22	14:10-16:10/120	17:59		18:30	15:58-17:09/71	20:02			20:33	19:09-19:58/49	20:55	19:26-19:50/24		
17	07:44	11:19-11:29/10	07:15	14:15-16:17/122	06:33	15:08-15:33/25	06:43	16:22-18:34/132		06:06	16:35-18:28/113	05:52	16:52-18:24/92		
	17:23	14:11-16:11/120	18:00		18:31	15:55-17:12/77	20:03			20:34	19:09-19:58/49	20:55	19:26-19:49/23		
18	07:44	14:10-16:12/122	07:14	14:15-16:16/121	06:32	15:17-15:23/6	06:42	16:21-18:34/133		06:05	16:35-18:28/113	05:53	16:53-18:25/92		
	17:24		18:01		18:32	15:52-17:14/82	20:04			20:35	19:09-19:58/49	20:56	19:27-19:49/22		
19	07:43	14:11-16:13/122	07:13	14:16-16:16/120	06:30	15:49-17:15/86	06:40	16:22-18:34/132		06:04	16:36-18:27/111	05:53	16:54-18:25/91		
	17:25		18:02		18:33	17:27-18:12/45	20:05			20:36	19:09-19:57/48	20:56	19:28-19:50/22		
20	07:42	14:11-16:13/122	07:11	14:17-16:15/118	06:28	15:48-17:18/90	06:39	16:21-18:34/133		06:03	16:37-18:28/111	05:53	16:54-18:25/91		
	17:26		18:03		18:34	17:27-18:13/46	20:06			20:36	19:10-19:58/48	20:56	19:28-19:50/22		
21	07:42	14:10-16:13/123	07:10	14:18-16:14/116	06:27	15:45-17:19/94	06:37	16:22-18:34/132		06:03	16:38-18:27/109	05:53	16:54-18:25/91		
	17:27		18:05		18:35	17:27-18:12/45	20:07			20:37	19:10-19:57/47	20:57	19:28-19:50/22		
22	07:41	14:11-16:14/123	07:09	14:19-16:14/115	06:25	15:43-17:20/97	06:36	16:22-18:34/132		06:02	16:38-18:27/109	05:53	16:54-18:25/91		
	17:28		18:06		18:36	17:26-18:11/45	20:08			20:38	19:11-19:57/46	20:57	19:28-19:50/22		
23	07:41	14:10-16:15/125	07:07	14:19-16:12/113	06:23	15:41-17:22/101	06:35	16:22-18:34/132		06:01	16:40-18:27/107	05:53	16:55-18:26/91		
	17:30		18:07		18:37	17:27-18:11/44	20:09			20:39	19:12-19:57/45	20:57	19:28-19:50/22		
24	07:40	14:10-16:15/125	07:06	14:21-16:12/111	06:22	15:39-17:23/104	06:33	16:23-18:34/131		06:00	16:40-18:27/107	05:54	16:55-18:26/91		
	17:31		18:08		18:39	17:27-18:09/42	20:11			20:40	19:12-19:57/45	20:57	19:29-19:51/22		
25	07:39	14:11-16:16/125	07:04	14:21-16:10/109	06:20	15:37-17:24/107	06:32	16:23-18:34/131		06:00	16:40-18:26/106	05:54	16:54-18:26/92		
	17:32		18:09		18:40	17:27-18:06/39	20:12			20:41	19:12-19:56/44	20:57	19:29-19:51/22		
26	07:39	14:11-16:16/125	07:03	14:23-16:10/107	06:18	15:36-17:25/109	06:30	16:23-18:33/130		05:59	16:41-18:26/105	05:54	16:54-18:26/92		
	17:33		18:10		18:41	17:28-18:02/34	20:13			20:42	19:13-19:56/43	20:57	19:28-19:52/24		
27	07:38	14:10-16:17/127	07:01	14:24-16:08/104	06:17	15:34-17:26/112	06:29	16:24-18:34/130		05:58	16:42-18:26/104	05:55	16:55-18:27/92		
	17:34		18:11		18:42	17:29-18:06/37	20:14			20:43	19:13-19:56/43	20:57	19:29		

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:11 / 4

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 2 - SG02

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 16:55-18:29/94 20:57 19:27-19:54/27	06:20 16:42-18:40/118 20:39 19:18-20:09/51	06:50 16:21-18:33/132 19:57	07:19 15:28-16:27/59 19:07 16:51-17:37/46	06:52 13:41-15:48/127 17:21	07:26 10:41-11:28/47 16:58 13:53-15:49/116
2	05:57 16:55-18:29/94 20:57 19:28-19:55/27	06:21 16:41-18:40/119 20:38 19:18-20:09/51	06:50 16:21-18:32/131 19:55	07:20 15:25-16:28/63 19:05 16:56-17:31/35	06:53 13:41-15:48/127 17:20	07:27 10:40-11:30/50 16:57 13:53-15:49/116
3	05:57 16:55-18:30/95 20:57 19:27-19:56/29	06:21 16:40-18:40/120 20:37 19:19-20:09/50	06:51 16:21-18:31/130 19:53	07:21 15:22-16:29/67 19:04 17:04-17:22/18	06:54 13:41-15:49/128 17:19	07:28 10:39-11:32/53 16:57 13:54-15:49/115
4	05:58 16:54-18:30/96 20:57 19:27-19:57/30	06:22 16:40-18:41/121 20:36 19:19-20:08/49	06:52 16:21-18:30/129 19:52	07:22 15:22-16:29/67 19:02 18:12-18:39/27	06:55 13:41-15:49/128 17:18	07:29 10:38-11:34/56 16:57 13:55-15:49/114
5	05:58 16:55-18:30/95 20:57 19:27-19:58/31	06:23 16:39-18:41/122 20:34 19:19-20:08/49	06:53 16:21-18:30/129 19:50	07:23 15:16-16:32/76 19:00 18:13-18:37/24	06:57 13:41-15:49/128 17:17	07:30 10:38-11:35/57 16:57 13:55-15:49/114
6	05:59 16:54-18:30/96 20:56 19:26-19:59/33	06:24 16:38-18:41/123 20:33 19:19-20:08/49	06:54 16:21-18:29/128 19:49	07:24 15:15-16:34/79 18:59 18:12-18:36/24	06:58 13:40-15:49/129 17:15	07:31 10:37-11:37/60 16:57 13:56-15:49/113
7	05:59 16:54-18:31/97 20:56 19:26-19:59/33	06:25 16:38-18:41/123 20:32 19:19-20:08/49	06:55 16:21-18:28/127 19:47	07:25 15:12-16:34/82 18:57 18:11-18:35/24	06:59 13:41-15:49/128 17:14	07:32 10:37-11:38/61 16:57 13:57-15:49/112
8	06:00 16:53-18:31/98 20:56 19:25-19:59/34	06:26 16:37-18:41/124 20:31 19:20-20:07/47	06:56 16:21-18:27/126 19:45	07:26 15:10-16:35/85 18:56 18:11-18:33/22	07:00 13:41-15:49/128 17:13	07:33 10:37-11:40/63 16:57 13:58-15:50/112
9	06:01 16:54-18:32/98 20:56 19:25-20:00/35	06:27 16:36-18:41/125 20:30 19:20-20:07/47	06:57 16:20-18:25/125 19:44	07:27 15:07-16:36/89 18:54 18:11-18:32/21	07:01 13:41-15:49/128 17:12	07:34 10:37-11:41/64 16:57 13:59-15:50/111
10	06:01 16:54-18:33/99 20:55 19:25-20:01/36	06:28 16:36-18:41/125 20:28 19:20-20:06/46	06:58 16:20-18:24/124 19:42	07:28 15:05-16:37/92 18:52 18:11-18:30/19	07:02 13:41-15:49/128 17:11	07:35 10:37-11:42/65 16:57 14:00-15:50/110
11	06:02 16:53-18:32/99 20:55 19:24-20:01/37	06:29 16:35-18:42/127 20:27 19:21-20:05/44	06:59 16:21-18:22/121 19:40	07:29 15:03-16:38/95 18:51 18:11-18:28/17	07:04 13:42-15:49/127 17:10	07:35 10:37-11:43/66 16:57 14:00-15:51/111
12	06:03 16:53-18:33/100 20:54 19:24-20:02/38	06:30 16:34-18:42/128 20:26 19:22-20:04/42	07:00 16:21-18:21/120 19:39	07:30 15:01-16:39/98 18:49 18:11-18:27/16	07:05 13:42-15:49/127 17:09	07:36 10:37-11:45/68 16:57 14:01-15:51/110
13	06:03 16:53-18:34/101 20:54 19:24-20:03/39	06:31 16:32-18:41/129 20:25 19:21-20:01/40	07:01 16:22-18:20/119 19:37	07:31 14:59-16:39/100 18:48 18:11-18:25/14	07:06 13:42-15:49/127 17:08	07:37 10:36-11:45/69 16:57 14:01-15:51/110
14	06:04 16:52-18:34/102 20:53 19:23-20:03/40	06:32 16:32-18:40/128 20:23 19:22-20:00/38	07:02 16:22-18:19/117 19:35	07:32 14:57-16:40/103 18:46 18:12-18:23/11	07:07 13:42-15:49/127 17:08	07:38 10:37-11:46/69 16:57 14:02-15:51/109
15	06:05 16:51-18:34/103 20:53 19:23-20:04/41	06:33 16:31-18:40/129 20:22 19:23-19:59/36	07:03 16:23-18:17/114 19:34	07:33 14:56-16:41/105 18:45 18:13-18:22/9	07:08 13:43-15:50/127 17:07	07:38 10:37-11:47/70 16:57 14:03-15:52/109
16	06:06 16:51-18:35/104 20:52 19:23-20:05/42	06:34 16:30-18:40/130 20:21 19:24-19:58/34	07:04 16:23-18:16/113 19:32	07:34 14:54-16:42/108 18:43 18:14-18:20/6	07:09 13:44-15:49/125 17:06	07:39 10:37-11:47/70 16:58 14:03-15:51/108
17	06:07 16:51-18:36/105 20:52 19:23-20:05/42	06:35 16:30-18:40/130 20:19 19:26-19:56/30	07:05 16:24-18:14/110 19:30	07:35 14:53-16:42/109 18:42 18:16-18:18/2	07:11 13:44-15:49/125 17:05	07:40 10:37-11:48/71 16:58 14:04-15:52/108
18	06:07 16:50-18:35/105 20:51 19:22-20:05/43	06:36 16:29-18:40/131 20:18 19:27-19:55/28	07:06 16:25-18:12/107 19:29	07:36 14:52-16:44/112 18:40	07:12 13:44-15:49/125 17:04	07:41 10:38-11:49/71 16:58 14:05-15:53/108
19	06:08 16:50-18:36/106 20:50 19:21-20:06/45	06:37 16:28-18:40/132 20:16 19:29-19:53/24	07:07 16:26-18:11/105 19:27	07:37 14:51-16:44/113 18:39	07:13 13:45-15:50/125 17:04	07:41 10:38-11:49/71 16:59 14:05-15:53/108
20	06:09 16:49-18:36/107 20:50 19:21-20:07/46	06:38 16:28-18:39/131 20:15 19:32-19:50/18	07:08 16:27-18:09/102 19:25	07:38 14:49-16:45/116 18:37	07:14 13:46-15:49/123 17:03	07:42 10:39-11:50/71 16:59 14:06-15:54/108
21	06:10 16:49-18:37/108 20:49 19:21-20:07/46	06:39 16:27-18:39/132 20:13 19:37-19:45/8	07:09 16:29-18:07/98 19:24	07:39 14:48-16:45/117 18:36	07:15 13:46-15:49/123 17:02	07:42 10:39-11:50/71 16:59 14:06-15:53/107
22	06:11 16:49-18:38/109 20:48 19:21-20:08/47	06:40 16:27-18:39/132 20:12	07:10 16:30-18:05/95 19:22	07:41 14:47-16:45/118 18:34	07:16 13:47-15:49/122 17:02	07:43 10:40-11:51/71 17:00 14:07-15:54/107
23	06:11 16:48-18:38/110 20:47 19:21-20:08/47	06:41 16:26-18:39/133 20:11	07:11 16:31-18:03/92 19:20	07:42 14:46-16:46/120 18:33	07:17 13:47-15:49/122 17:01	07:43 10:40-11:51/71 17:00 14:07-15:54/107
24	06:12 16:47-18:38/111 20:46 19:20-20:08/48	06:42 16:25-18:38/133 20:09	07:12 16:33-18:01/88 19:19	07:43 14:45-16:46/121 18:32	07:18 13:47-15:49/122 17:01	07:44 10:41-11:52/71 17:01 14:08-15:56/108
25	06:13 16:46-18:38/112 20:46 19:20-20:08/48	06:43 16:25-18:38/133 20:08	07:13 16:34-17:57/83 19:17	07:44 13:45-15:47/122 17:30	07:20 10:58-11:06/8 17:00	07:44 10:41-11:52/71 17:02 14:08-15:56/108
26	06:14 16:46-18:39/113 20:45 19:20-20:09/49	06:44 16:24-18:37/133 20:06	07:14 15:52-16:12/20 19:15	07:45 13:44-15:47/123 17:29	07:21 10:51-11:13/22 17:00	07:45 10:41-11:52/71 17:02 14:08-15:56/108
27	06:15 16:45-18:39/114 20:44 19:20-20:09/49	06:45 16:23-18:36/133 20:04	07:15 15:45-16:17/32 19:14	07:46 13:43-15:47/124 17:28	07:22 10:48-11:18/30 16:59	07:45 10:43-11:53/70 17:03 14:09-15:57/108
28	06:16 16:45-18:39/114 20:43 19:19-20:09/50	06:46 16:23-18:35/132 20:03	07:16 15:40-16:20/40 19:12	07:47 13:43-15:47/124 17:26	07:23 10:45-11:21/36 16:59	07:45 10:43-11:53/70 17:04 14:09-15:58/109
29	06:17 16:44-18:40/116 20:42 19:19-20:09/50	06:47 16:22-18:35/133 20:01	07:17 15:36-16:23/47 19:10	07:48 13:42-15:47/125 17:25	07:24 10:44-11:24/40 16:58	07:46 10:44-11:53/69 17:04 14:09-15:58/109
30	06:18 16:44-18:40/116 20:41 19:19-20:10/51	06:48 16:22-18:34/132 20:00	07:18 15:32-16:25/53 19:09	07:49 13:42-15:48/126 17:24	07:25 10:42-11:26/44 16:58	07:46 10:44-11:53/69 17:05 14:09-15:58/109
31	06:19 16:43-18:41/118 20:40 19:18-20:09/51	06:49 16:22-18:33/131 19:58	07:19 16:47-17:41/54	07:50 13:42-15:48/126 17:22	07:26 10:42-11:26/44 16:57	07:46 10:45-11:53/68 17:06 14:09-15:59/110
Potential sun hours	457	427	375	346	299	290
Sum of minutes with flicker	4498	4803	4362	3601	3917	5456

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:

windpro Nuoro nord - flickering

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2023-12-12 12:11 / 5

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 3 - SG03

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) (OLBIA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103 3,483

Idle start wind speed: Cut in wind speed from power curve

January		February		March		April		May		June	
1	07:46 08:47-10:06/79 15:52-16:35/43	07:33 08:56-10:08/72 16:24-17:08/44	06:58 14:16-16:39/143	07:09 15:11-17:41/150	06:24 06:59-07:25/26	05:56 06:29-06:55/26					
	17:07 14:04-15:01/57	17:40 15:11-15:48/37	18:14 17:28-17:52/24	19:47 18:51-19:10/19	20:18 15:49-17:20/91	20:46					
2	07:46 08:48-10:06/78 15:53-16:35/42	07:33 08:56-10:08/72 16:25-17:08/43	06:57 14:16-16:40/144	07:07 15:12-17:41/149	06:22 06:59-07:25/26	05:55 06:28-06:55/27					
	17:08 14:05-15:02/57	17:42 15:07-15:53/46	18:15 17:27-17:54/27	19:48 18:49-19:11/22	20:19 15:51-17:19/88	20:47					
3	07:47 08:49-10:06/77 15:54-16:37/43	07:32 08:57-10:07/70 16:25-17:08/43	06:55 14:14-16:41/147	07:05 15:13-17:41/148	06:21 06:58-07:25/27	05:55 06:28-06:56/28					
	17:08 14:06-15:02/56	17:43 15:03-15:57/54	18:16 17:26-17:55/29	19:49 18:49-19:12/23	20:20 15:51-17:18/87	20:48					
4	07:47 08:49-10:06/77 15:54-16:36/42	07:31 08:57-10:07/70 16:25-17:08/43	06:54 14:14-16:42/148	07:04 15:14-17:40/146	06:20 06:58-07:25/27	05:54 06:28-06:56/28					
	17:09 14:07-15:01/54	17:44 15:00-16:00/60	18:17 17:25-17:56/31	19:50 18:47-19:12/25	20:21 15:53-17:17/84	20:49					
5	07:47 08:48-10:05/77 15:54-16:36/42	07:30 08:58-10:06/68 16:26-17:08/42	06:52 14:13-16:42/149	07:02 15:15-17:39/144	06:19 06:58-07:25/27	05:54 06:28-06:57/29					
	17:10 14:08-15:00/52	17:45 14:57-16:03/66	18:18 17:24-17:57/33	19:51 18:46-19:12/26	20:22 15:54-17:16/82	20:49					
6	07:47 08:49-10:05/76 15:55-16:37/42	07:29 08:59-10:06/67 16:26-17:08/42	06:51 14:11-16:42/151	07:00 15:16-17:39/143	06:18 06:58-07:25/27	05:54 06:28-06:56/28					
	17:11 14:09-15:00/51	17:47 14:54-16:06/72	18:19 17:23-17:58/35	19:52 18:46-19:13/27	20:23 15:56-17:15/79	20:50					
7	07:47 08:49-10:05/76 15:55-16:37/42	07:27 08:59-10:05/66 16:27-17:08/41	06:49 14:11-16:43/152	06:59 15:17-17:38/141	06:16 06:58-07:25/27	05:53 06:28-06:57/29					
	17:12 14:11-15:00/49	17:48 14:52-16:09/77	18:20 17:23-17:59/36	19:53 18:46-19:13/27	20:24 15:57-17:14/77	20:51					
8	07:46 08:49-10:04/75 15:56-16:38/42	07:26 09:00-10:05/65 16:27-17:08/41	06:48 14:10-16:43/153	06:57 15:19-17:38/139	06:15 06:58-07:25/27	05:53 06:28-06:57/29					
	17:13 14:12-15:00/48	17:49 14:50-16:11/81	18:21 17:23-17:58/35	19:54 18:46-19:15/29	20:25 15:59-17:13/74	20:51					
9	07:46 08:50-10:04/74 15:57-16:38/41	07:25 09:01-10:04/63 16:28-17:08/40	06:46 14:10-16:44/154	06:56 15:20-17:37/137	06:14 06:58-07:24/26	05:53 06:29-06:57/28					
	17:14 14:14-15:00/46	17:50 14:48-16:14/86	18:23 17:23-17:58/35	19:55 18:46-19:17/31	20:26 16:00-17:12/72	20:52					
10	07:46 08:50-10:04/74 15:58-16:39/41	07:24 09:01-10:02/61 16:28-17:06/38	06:44 14:09-16:44/155	06:54 15:21-17:36/135	06:13 06:59-07:24/25	05:53 06:29-06:58/29					
	17:15 14:16-14:59/43	17:51 14:45-16:15/90	18:24 17:23-17:58/35	19:56 18:46-19:18/32	20:27 16:02-17:11/69	20:52					
11	07:46 08:50-10:04/74 15:58-16:44/46	07:23 09:03-10:01/58 16:29-17:06/37	06:43 14:08-16:44/156	06:53 15:22-17:36/134	06:12 06:59-07:23/24	05:53 06:28-06:57/29					
	17:16 14:17-14:58/41	17:53 14:43-16:17/94	18:25 17:23-17:57/34	19:57 18:47-19:20/33	20:28 16:03-17:10/67	20:53					
12	07:46 08:50-10:04/74 15:59-16:47/48	07:22 09:04-10:00/56 16:30-17:05/35	06:41 14:08-16:44/156	06:51 15:23-17:35/132	06:11 07:00-07:22/22	05:53 06:28-06:57/29					
	17:17 14:19-14:57/38	17:54 14:41-16:19/98	18:26 17:24-17:56/32	19:58 18:47-19:20/33	20:29 16:04-17:09/65	20:53					
13	07:45 08:51-10:05/74 16:00-16:50/50	07:20 09:05-09:59/54 16:32-17:04/32	06:40 14:07-16:44/157	06:49 15:25-17:35/130	06:10 07:01-07:21/20	05:52 06:28-06:57/29					
	17:18 14:22-14:56/34	17:55 14:39-16:21/102	18:27 17:24-17:55/31	19:59 18:48-19:21/33	20:30 16:06-17:08/62	20:54					
14	07:45 08:51-10:05/74 16:00-16:51/51	07:19 09:06-09:56/50 16:33-17:02/29	06:38 14:07-16:45/158	06:48 15:26-17:34/128	06:09 07:01-07:20/19	05:52 06:29-06:58/29					
	17:19 14:24-14:54/30	17:56 14:37-16:22/105	18:28 17:25-17:55/30	20:00 18:49-19:21/32	20:31 16:07-17:07/60	20:54					
15	07:45 08:51-10:06/75 16:01-16:54/53	07:18 09:08-09:55/47 16:35-17:01/26	06:36 14:06-16:45/159	06:46 15:28-17:33/125	06:08 07:03-07:19/16	05:52 06:29-06:58/29					
	17:20 14:27-14:53/26	17:57 14:35-16:24/109	18:29 17:25-17:53/28	20:01 18:51-19:21/30	20:32 16:08-17:06/58	20:55					
16	07:44 08:51-10:06/75 16:01-16:55/54	07:17 09:09-09:53/44 16:37-16:59/22	06:35 14:06-16:44/156	06:45 15:29-17:32/123	06:07 07:04-07:18/14	05:52 06:29-06:58/29					
	17:22 14:30-14:50/20	17:59 14:34-16:26/112	18:30 17:26-17:51/25	20:02 18:50-19:21/31	20:33 16:10-17:04/54	20:55					
17	07:44 08:52-10:07/75 16:02-16:56/54	07:15 09:12-09:51/39 16:39-16:56/17	06:33 14:06-16:45/159	06:43 15:30-17:32/122	06:06 07:06-07:16/10	05:52 06:29-06:58/29					
	17:23 14:36-14:46/10	18:00 14:33-16:28/115	18:31 17:28-17:49/21	20:03 18:51-19:21/30	20:34 16:11-17:03/52	20:55					
18	07:43 08:51-10:07/76	07:14 09:13-09:47/34 16:44-16:52/8	06:32 14:06-16:45/159	06:42 15:31-17:31/120	06:05 07:09-07:11/2	05:52 06:30-06:59/29					
	17:24 16:03-16:57/54	18:01 14:31-16:28/117	18:32 17:30-17:46/16	20:04 18:51-19:20/29	20:35 16:12-17:02/50	20:56					
19	07:43 08:52-10:08/76	07:13 09:16-09:44/28	06:30 14:05-16:44/159	06:40 15:33-17:30/117	06:04 16:14-17:00/46	05:53 06:30-06:59/29					
	17:25 16:04-16:59/55	18:02 14:29-16:30/121	18:33 17:34-17:41/17	20:05 18:52-19:20/28	20:36	20:56					
20	07:42 08:52-10:08/76	07:11 09:20-09:39/19	06:28 14:06-16:45/159	06:39 15:34-17:29/115	06:03 16:16-17:00/44	05:53 06:30-06:59/29					
	17:26 16:05-17:00/55	18:03 14:27-16:31/124	18:34	20:06 18:52-19:19/27	20:36	20:56					
21	07:42 08:52-10:08/76	07:10 14:26-16:32/126	06:27 14:06-16:44/158	06:37 15:36-17:29/113	06:03 06:38-06:46/8	05:53 06:30-06:59/29					
	17:27 16:06-17:01/55	18:04	18:35	20:07 18:54-19:18/24	20:37 16:17-16:58/41	20:57					
22	07:41 08:53-10:09/76	07:09 14:25-16:34/129	06:25 14:05-16:44/159	06:36 15:37-17:28/111	06:02 06:36-06:48/12	05:53 06:30-06:59/29					
	17:28 16:08-17:02/54	18:06	18:36	20:08 18:56-19:17/21	20:38 16:19-16:57/38	20:57					
23	07:41 08:53-10:09/76	07:07 14:23-16:34/131	06:23 14:06-16:44/158	06:35 15:38-17:27/109	06:01 06:35-06:50/15	05:53 06:31-07:00/29					
	17:30 16:09-17:03/54	18:07	18:37	20:09 18:58-19:15/17	20:39 16:21-16:56/35	20:57					
24	07:40 08:53-10:09/76	07:06 14:23-16:36/133	06:22 14:06-16:44/158	06:33 15:40-17:26/106	06:00 06:34-06:51/17	05:54 06:31-07:00/29					
	17:31 16:10-17:03/53	18:08	18:38	20:10 19:00-19:14/14	20:40 16:23-16:54/31	20:57					
25	07:39 08:54-10:09/75	07:04 14:21-16:36/135	06:20 14:06-16:43/157	06:32 15:39-17:27/107	06:00 06:33-06:51/18	05:54 06:31-07:00/29					
	17:32 16:13-17:05/52	18:09 17:37-17:47/10	18:40	20:12 19:02-19:10/8	20:41 16:25-16:52/27	20:57					
26	07:39 08:54-10:09/75	07:03 14:20-16:37/137	06:18 14:07-16:44/157	06:30 15:42-17:26/104	05:59 06:32-06:52/20	05:54 06:32-07:01/29					
	17:33 16:15-17:05/50	18:10 17:34-17:49/15	18:41	20:13 19:02-19:10/8	20:42 16:27-16:50/23	20:57					
27	07:38 08:54-10:09/75	07:01 14:18-16:38/140	06:17 14:07-16:43/156	06:29 15:44-17:22/108	05:58 06:30-06:53/23	05:55 06:32-07:01/29					
	17:34 16:18-17:06/48	18:11 17:31-17:50/19	18:42	20:14 19:02-19:10/8	20:43 16:30-16:48/18	20:57					
28	07:37 08:54-10:09/75	07:00 14:18-16:39/141	06:15 14:08-16:42/154	06:28 15:48-17:24/100	05:58 06:30-06:54/24	05:55 06:32-07:01/29					
	17:36 16:25-17:06/41	18:13 17:30-17:51/21	18:43	20:15 19:02-19:10/8	20:43 16:34-16:45/11	20:57					
29	07:36										

Project:

windpro Nuoro nord - flickering

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 3 - SG03

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) (OLBIA)

Table with 12 columns (Jan-Dec) and 1 row of values: 3.87, 4.61, 5.62, 6.73, 8.36, 10.04, 11.06, 9.91, 8.03, 6.21, 4.80, 3.87

Operational time

Table with 13 columns (N to Sum) and 1 row of values: 120, 150, 155, 142, 146, 180, 335, 601, 438, 155, 103, 3,483

Main shadow calculation table with columns for months (July-December) and rows for each minute of the day, including sun rise/set times and flicker minutes.

Summary row: Potential sun hours (457), Sum of minutes with flicker (1306, 3875, 375, 5013, 346, 5252, 299, 4448, 290, 5561)

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

Matrix layout table with columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), First time (hh:mm) with flicker, Last time (hh:mm) with flicker, Minutes with flicker

Project:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 4 - SG06

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) (OLBIA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 13:40-15:11/91 17:07 16:13-16:33/20	07:33 08:00-08:34/34 16:15-17:00/45 17:40 14:15-15:04/49	06:58 15:05-17:47/162 18:14	07:09 15:50-17:40/110 19:47	06:24 16:26-17:10/44 20:18	05:56 20:46
2	07:46 13:41-15:11/90 17:08 16:13-16:34/21	07:32 08:00-08:35/35 16:16-17:00/44 17:42 14:18-15:03/45	06:57 15:04-17:49/165 18:15	07:07 15:50-17:39/109 19:48	06:22 16:28-17:09/41 20:19	05:55 20:47
3	07:46 13:41-15:12/91 17:08 16:13-16:35/22	07:32 07:59-08:35/36 16:16-17:00/44 17:43 14:21-15:00/39	06:55 15:02-17:50/168 18:16	07:05 15:51-17:39/108 19:49	06:21 16:29-17:06/37 20:20	05:55 20:48
4	07:46 13:42-15:12/90 17:09 16:12-16:36/24	07:31 07:59-08:36/37 16:14-17:00/46 17:44 14:25-14:58/33	06:54 15:01-17:50/169 18:17	07:04 15:51-17:38/107 19:50	06:20 16:32-17:04/32 20:21	05:54 20:49
5	07:47 13:43-15:12/89 17:10 16:12-16:37/25	07:30 07:58-08:37/39 16:13-16:59/46 17:45 14:29-14:54/25	06:52 14:59-17:01/122 18:18	07:02 15:52-17:37/105 19:51	06:19 16:35-17:01/26 20:22	05:54 20:49
6	07:47 13:44-15:13/89 17:11 16:12-16:38/26	07:28 07:58-08:37/39 16:12-17:00/48 17:47 14:36-14:49/13	06:51 14:57-16:59/122 18:19	07:00 15:53-17:37/104 19:52	06:18 16:39-16:58/19 20:23	05:54 20:50
7	07:46 13:44-15:13/89 17:12 16:12-16:39/27	07:27 07:58-08:38/40 17:00-17:02/2 17:48 16:12-17:00/48	06:49 14:56-16:58/122 17:15-17:51/36 18:20	06:59 15:53-17:36/103 19:53	06:16 16:46-16:51/5 20:24	05:53 20:50
8	07:46 13:45-15:14/89 17:13 16:12-16:40/28	07:26 07:58-08:38/40 16:59-17:03/4 17:49 16:11-16:59/48	06:48 14:55-16:56/121 18:21	06:57 15:55-17:36/101 19:54	06:15 20:25	05:53 20:51
9	07:46 13:46-15:14/88 17:14 16:12-16:42/30	07:25 07:58-08:38/40 16:59-17:04/5 17:50 16:10-16:59/49	06:46 14:54-16:54/120 18:23	06:56 15:55-17:35/100 19:55	06:14 20:26	05:53 20:52
10	07:46 13:46-15:13/87 17:15 16:11-16:42/31	07:24 07:58-08:38/40 16:57-17:04/7 17:51 16:09-16:57/48	06:44 14:53-16:51/118 18:24	06:54 15:56-17:34/98 19:56	06:13 20:27	05:53 20:52
11	07:46 13:47-15:14/87 16:38-16:43/5 17:16 16:11-16:38/27	07:23 07:58-08:38/40 16:56-17:05/9 17:53 16:08-16:56/48	06:43 14:52-16:48/116 18:25	06:53 15:57-17:34/97 19:57	06:12 20:28	05:53 20:53
12	07:46 13:48-15:14/86 16:42-16:44/2 17:17 16:12-16:42/30	07:22 07:58-08:38/40 16:54-17:06/12 17:54 16:08-16:54/46	06:41 14:52-16:45/113 18:26	06:51 15:58-17:32/94 19:58	06:11 20:29	05:53 20:53
13	07:45 13:49-15:14/85 16:44-16:45/1 17:18 16:11-16:44/33	07:20 07:59-08:38/39 16:52-17:07/15 17:55 16:08-16:52/44	06:40 14:50-16:40/110 18:27	06:49 16:00-17:32/92 19:59	06:10 20:30	05:52 20:54
14	07:45 13:50-15:14/84 17:19 16:11-16:46/35	07:19 07:59-08:37/38 16:48-17:06/18 17:56 16:07-16:48/41	06:38 14:50-16:41/111 18:28	06:48 16:00-17:31/91 20:00	06:09 20:31	05:52 20:54
15	07:45 13:51-15:15/84 17:20 16:11-16:47/36	07:18 07:59-08:37/38 17:10-17:21/11 17:57 16:07-17:07/60	06:36 14:49-16:41/112 18:29	06:46 16:02-17:30/88 20:01	06:08 20:32	05:52 20:55
16	07:44 13:51-15:14/83 17:22 16:11-16:48/37	07:17 08:00-08:36/36 17:59 16:07-17:24/77	06:35 14:48-16:41/113 18:30	06:45 16:03-17:29/86 20:02	06:07 20:33	05:52 20:55
17	07:44 13:53-15:14/81 17:23 16:11-16:50/39	07:15 08:01-08:36/35 18:00 16:06-17:25/79	06:33 14:49-16:42/113 18:31	06:43 16:04-17:28/84 20:03	06:06 20:34	05:52 20:55
18	07:43 13:53-15:14/81 17:24 16:11-16:51/40	07:14 08:01-08:34/33 16:06-17:27/81 18:01 15:39-15:59/20	06:32 14:48-16:42/114 18:32	06:42 16:05-17:27/82 20:04	06:05 20:35	05:53 20:56
19	07:43 13:55-15:14/79 17:25 16:12-16:52/40	07:13 08:03-08:33/30 18:02 15:33-17:29/116	06:30 14:47-16:41/114 18:33	06:40 16:07-17:26/79 20:05	06:04 20:35	05:53 20:56
20	07:42 13:56-15:14/78 17:26 16:11-16:53/42	07:11 08:04-08:31/27 18:03 15:27-17:29/122	06:28 14:48-16:42/114 18:34	06:39 16:07-17:25/78 20:06	06:03 20:36	05:53 20:56
21	07:42 13:57-15:13/76 17:27 16:11-16:54/43	07:10 08:05-08:30/25 18:04 15:24-17:30/126	06:27 14:47-16:42/115 18:35	06:37 16:09-17:24/75 20:07	06:03 20:37	05:53 20:57
22	07:41 13:58-15:13/75 17:28 16:12-16:55/43	07:09 08:08-08:28/20 18:06 15:21-17:30/129	06:25 14:47-16:41/114 18:36	06:36 16:11-17:23/72 20:08	06:02 20:38	05:53 20:57
23	07:41 13:59-15:13/74 17:30 16:12-16:56/44	07:07 08:10-08:24/14 18:07 15:18-17:31/133	06:23 14:47-16:42/115 18:37	06:35 16:12-17:22/70 20:09	06:01 20:39	05:53 20:57
24	07:40 08:12-08:18/6 16:11-16:56/45 17:31 14:00-15:12/72	07:06 15:16-17:31/135 18:08	06:22 14:47-16:42/115 18:38	06:33 16:14-17:21/67 20:10	06:00 20:40	05:54 20:57
25	07:39 08:09-08:23/14 16:11-16:57/46 17:32 14:02-15:11/69	07:04 15:13-17:31/138 18:09	06:20 14:47-16:41/114 17:51-17:52/1 18:39	06:32 16:15-17:20/65 20:11	06:00 20:41	05:54 20:57
26	07:38 08:07-08:26/19 16:13-16:58/45 17:33 14:04-15:11/67	07:03 15:11-17:31/140 18:10	06:18 14:47-16:42/115 17:50-17:51/1 18:41	06:30 16:16-17:18/62 20:13	05:59 20:42	05:54 20:57
27	07:38 08:05-08:28/23 16:13-16:59/46 17:34 14:05-15:10/65	07:01 15:08-17:30/142 18:11	06:17 14:47-16:41/114 17:46-17:49/3 18:42	06:29 16:18-17:17/59 20:14	05:58 20:42	05:55 20:57
28	07:37 08:04-08:29/25 16:13-16:59/46 17:36 14:07-15:09/62	07:00 15:07-17:46/159 18:13	06:15 14:47-16:40/113 18:43	06:28 16:20-17:16/56 20:15	05:58 20:43	05:55 20:57
29	07:36 08:03-08:30/27 16:13-16:59/46 17:37 14:09-15:08/59	07:00 15:07-17:46/159 18:13	06:13 15:48-17:41/113 19:44	06:26 16:21-17:13/52 20:16	05:57 20:44	05:55 20:57
30	07:35 08:02-08:32/30 16:14-16:59/45 17:38 14:11-15:07/56	07:00 15:07-17:46/159 18:13	07:12 15:48-17:40/112 19:45	06:25 16:23-17:12/49 20:17	05:57 20:45	05:56 20:57
31	07:34 08:01-08:33/32 16:14-17:00/46 17:39 14:13-15:06/53	07:00 15:07-17:46/159 18:13	07:10 15:48-17:39/111 19:46	06:24 16:23-17:12/49 20:17	05:56 20:46	05:55 20:57
Potential sun hours	299	298	370	398	447	450
Sum of minutes with flicker	3741	3395	4712	2543	204	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:

windpro Nuoro nord - flickering

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Licensed user:

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 4 - SG06

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103 3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 20:57	06:20 20:39	06:49 19:57	07:19 19:07	06:52 17:21	07:26 16:58
2	05:57 20:57	06:21 20:38	06:50 19:55	07:20 19:05	06:53 17:20	07:27 16:57
3	05:57 20:57	06:21 20:37	06:51 19:53	07:21 19:04	06:54 17:19	07:28 16:57
4	05:58 20:57	06:22 20:36	06:52 19:52	07:22 19:02	06:55 17:18	07:29 16:57
5	05:58 20:57	06:23 20:34	06:53 19:50	07:23 19:00	06:56 17:17	07:30 16:57
6	05:59 20:56	06:24 20:33	06:54 19:49	07:24 18:59	06:58 17:15	07:31 16:57
7	05:59 20:56	06:25 20:32	06:55 19:47	07:25 18:57	06:59 17:14	07:32 16:57
8	06:00 20:56	06:26 20:31	06:56 19:45	07:26 18:56	07:00 17:13	07:33 16:57
9	06:01 20:55	06:27 20:30	06:57 19:44	07:27 18:54	07:01 17:12	07:34 16:57
10	06:01 20:55	06:28 20:28	06:58 19:42	07:28 18:52	07:02 17:11	07:35 16:57
11	06:02 20:55	06:29 20:27	06:59 19:40	07:29 18:51	07:03 17:10	07:36 16:57
12	06:03 20:54	06:30 20:26	07:00 19:39	07:30 18:49	07:05 17:09	07:37 16:57
13	06:03 20:54	06:31 20:25	07:01 19:37	07:31 18:48	07:06 17:08	07:38 16:57
14	06:04 20:53	06:32 20:23	07:02 19:35	07:32 18:46	07:07 17:08	07:39 16:57
15	06:05 20:53	06:33 20:22	07:03 19:34	07:33 18:45	07:08 17:07	07:40 16:57
16	06:06 20:52	06:34 20:20	07:04 19:32	07:34 18:43	07:09 17:06	07:41 16:58
17	06:07 20:51	06:35 20:19	07:05 19:30	07:35 18:42	07:10 17:05	07:42 16:58
18	06:07 20:51	06:36 20:18	07:06 19:29	07:36 18:40	07:12 17:04	07:43 16:58
19	06:08 20:50	06:37 20:16	07:07 19:27	07:37 18:39	07:13 17:04	07:44 16:59
20	06:09 20:49	06:38 20:15	07:08 19:25	07:38 18:37	07:14 17:03	07:45 16:59
21	06:10 20:49	06:39 20:13	07:09 19:24	07:39 18:36	07:15 17:02	07:46 16:59
22	06:11 20:48	06:40 20:12	07:10 19:22	07:41 18:34	07:16 17:02	07:47 17:00
23	06:11 20:47	06:41 20:10	07:11 19:20	07:42 18:33	07:17 17:01	07:48 17:00
24	06:12 20:46	06:42 20:09	07:12 19:19	07:43 18:32	07:18 17:01	07:49 17:01
25	06:13 20:46	06:43 20:07	07:13 19:17	07:44 18:30	07:19 17:00	07:50 17:02
26	06:14 20:45	06:44 20:06	07:14 19:15	07:45 18:29	07:21 17:00	07:51 17:02
27	06:15 20:44	06:45 20:04	07:15 19:14	07:46 18:28	07:22 16:59	07:52 17:03
28	06:16 20:43	06:46 20:03	07:16 19:12	07:47 18:26	07:23 16:59	07:53 17:04
29	06:17 20:42	06:47 20:01	07:17 19:10	07:48 18:25	07:24 16:58	07:54 17:04
30	06:18 20:41	06:48 20:00	07:18 19:09	07:49 18:24	07:25 16:58	07:55 17:05
31	06:19 20:40	06:49 19:58	07:19 19:07	07:50 18:22	07:26 16:58	07:56 17:06
Potential sun hours	457	427	375	346	299	290
Sum of minutes with flicker	0	1627	3869	4439	3542	3364

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:

windpro Nuoro nord - flickering

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progetto WTG: 5 - SG05

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 14:28-14:59/31 17:07	07:33 15:38-16:31/53 17:40	06:58 15:17-17:05/108 18:14	07:09 16:53-17:16/23 19:47 18:15-18:34/19	06:24 07:03-08:46/103 20:18 18:26-19:27/61	05:56 07:19-08:49/90 19:04-19:59/55 20:46 18:47-19:01/14 19:59-20:02/3
2	07:46 14:29-14:59/30 17:08	07:33 15:36-16:33/57 17:42	06:57 15:17-17:07/110 18:15	07:07 17:00-17:08/8 19:48 18:16-18:31/15	06:22 07:03-08:47/104 20:19 18:26-19:29/63	05:55 07:19-08:49/90 19:04-19:59/54 20:47 18:48-18:59/10 19:58-20:02/4
3	07:46 14:30-14:58/28 17:08	07:32 15:35-16:35/60 17:43	06:55 15:17-17:08/111 18:16	07:05 18:19-18:29/10 19:49	06:21 07:02-08:46/104 20:20 18:25-19:30/65	05:55 07:19-08:49/89 19:59-20:03/4 20:48 19:05-19:59/54
4	07:47 14:32-14:58/26 17:09	07:31 15:33-16:36/63 17:44	06:54 15:17-17:08/111 18:17	07:04 19:50	06:20 07:02-08:47/105 20:21 18:25-19:36/71	05:54 07:19-08:49/90 19:59-20:04/5 20:49 19:06-19:59/53
5	07:47 14:34-14:57/23 17:10	07:30 15:32-16:38/66 17:45	06:52 15:17-17:09/112 18:18	07:02 19:51	06:19 07:02-08:47/105 20:22 18:25-19:40/75	05:54 07:19-08:48/89 19:58-20:04/6 20:49 19:06-19:59/53
6	07:47 14:36-14:56/20 17:11	07:28 15:31-16:40/69 17:47	06:51 07:09-07:16/7 18:19 15:17-17:09/112	07:00 19:52	06:18 07:02-08:48/107 20:23 18:26-19:43/77	05:54 07:19-08:48/89 19:59-20:04/5 20:50 19:07-19:59/52
7	07:46 14:39-14:54/15 17:12	07:27 15:30-16:41/71 17:48	06:49 07:08-07:19/11 18:20 15:18-17:09/111	06:59 19:53	06:16 07:02-08:48/106 20:24 18:26-19:44/78	05:53 07:20-08:49/89 19:59-20:05/6 20:51 19:08-20:00/52
8	07:46 14:44-14:51/7 17:13	07:26 15:29-16:43/74 17:49	06:48 07:06-07:19/13 18:21 15:18-17:10/112	06:57 19:54	06:15 07:02-08:48/106 20:25 18:26-19:46/80	05:53 07:20-08:49/89 19:59-20:06/7 20:51 19:09-20:00/51
9	07:46 17:14 07:46 17:15	07:25 15:28-16:44/76 17:50	06:46 07:05-07:21/16 17:10-17:11/1 18:23 15:19-17:10/111	06:56 19:55	06:14 07:03-08:49/106 20:26 18:26-19:47/81	05:53 07:21-08:49/88 19:59-20:06/7 20:52 19:10-20:01/51
10	07:46 17:15 07:46 17:16	07:24 15:26-16:42/76 17:51 16:42-16:44/2	06:44 07:03-07:21/18 17:09-17:12/3 18:24 15:19-17:09/110	06:54 19:56	06:13 07:03-08:49/106 20:27 18:27-19:48/81	05:53 07:20-08:48/88 19:58-20:06/8 20:52 19:10-20:00/50
11	07:46 17:16 07:46 17:17	07:23 15:25-16:46/81 17:53	06:43 07:01-07:20/19 17:07-17:12/5 18:25 15:19-17:07/108	06:53 19:57	06:12 07:03-08:49/106 20:28 18:27-19:48/81	05:53 07:20-08:49/89 19:58-20:06/8 20:53 19:11-20:00/49
12	07:46 17:17 07:46 17:18	07:22 15:25-16:48/83 17:54	06:41 07:01-07:20/19 17:06-17:13/7 18:26 15:20-17:06/106	06:51 19:58	06:11 07:04-08:49/105 20:29 18:28-19:49/81	05:53 07:21-08:49/88 19:24-20:00/36 20:53 19:12-19:27/15 19:58-20:07/9
13	07:45 17:19 07:45 17:20	07:20 15:24-16:51/87 17:55	06:40 07:00-07:20/20 17:04-17:13/9 18:27 15:20-17:04/104	06:49 18:50-19:04/14 19:59	06:10 07:04-08:49/105 20:30 18:28-19:51/83	05:52 07:21-08:49/88 19:25-20:01/36 20:54 19:13-19:27/14 19:59-20:07/8
14	07:45 17:19 07:45 17:20	07:19 15:22-16:51/89 17:56	06:38 07:01-07:19/18 17:00-17:12/12 18:28 15:22-17:00/98	06:48 18:45-19:07/22 20:00	06:09 07:05-08:49/104 20:31 18:28-19:52/84	05:52 07:21-08:49/88 19:25-20:01/36 20:54 19:14-19:26/12 19:59-20:07/8
15	07:45 17:20 07:45 17:21	07:18 15:22-16:53/91 17:57	06:36 07:01-07:18/17 18:29 15:22-17:12/110	06:46 08:02-08:17/15 20:01 18:43-19:09/26	06:08 07:06-08:49/103 20:32 18:29-19:53/84	05:52 07:21-08:49/88 19:25-20:01/36 20:55 19:15-19:26/11 19:59-20:07/8
16	07:44 17:22 07:44 17:23	07:17 15:22-16:54/92 17:59	06:35 07:02-07:16/14 16:48-17:11/23 18:30 15:23-16:46/83	06:45 07:55-08:23/28 20:02 18:40-19:11/31	06:07 07:06-08:49/103 20:33 18:29-19:54/85	05:52 07:22-08:49/87 19:25-20:01/36 20:55 19:15-19:26/11 19:59-20:08/9
17	07:44 17:23 07:43 17:24	07:15 15:20-16:55/95 18:00	06:33 07:04-07:14/10 16:49-17:11/22 18:31 15:24-16:46/82	06:43 07:51-08:27/36 20:03 18:39-19:13/34	06:06 07:07-08:49/102 20:34 18:30-19:54/84	05:52 07:22-08:49/87 19:25-20:01/36 20:55 19:16-19:25/9 19:59-20:08/9
18	07:43 17:24 07:43 17:25	07:14 15:20-16:56/96 18:01	06:32 15:25-16:45/80 18:32 16:49-17:10/21	06:42 07:47-08:29/42 20:04 18:37-19:13/36	06:05 07:08-08:49/101 20:35 18:30-19:55/85	05:52 07:23-08:50/87 19:25-20:01/36 20:56 19:17-19:25/8 19:59-20:08/9
19	07:43 17:25 07:42 17:26	07:13 15:20-16:57/97 18:02	06:30 15:26-16:43/77 18:33 16:49-17:08/19	06:40 07:45-08:32/47 20:05 18:35-19:15/40	06:04 07:10-08:49/98 20:35 18:31-19:55/84	05:53 07:23-08:50/87 19:25-20:02/36 20:56 19:18-19:26/8 20:00-20:09/9
20	07:42 17:26 07:42 17:27	07:11 15:19-16:57/98 18:03	06:28 15:28-16:43/75 17:23-17:33/10 18:34 16:51-17:07/16	06:39 07:17-07:31/14 18:33-19:15/42 20:06 07:42-08:34/52	06:03 07:11-08:49/98 20:36 18:33-19:56/83	05:53 07:23-08:50/87 19:26-20:02/36 20:56 19:18-19:26/8 20:00-20:09/9
21	07:42 17:27 07:41 17:28	07:10 15:19-16:57/98 18:04	06:27 15:28-16:41/73 17:20-17:35/15 18:35 16:53-17:04/11	06:37 07:14-07:33/19 18:32-19:16/44 20:07 07:40-08:36/56	06:03 07:13-08:49/96 20:37 18:33-19:56/83	05:53 07:23-08:50/87 19:26-20:02/36 20:57 19:19-19:25/6 20:00-20:09/9
22	07:41 17:28 07:41 17:29	07:09 15:19-16:57/98 18:06	06:25 15:29-16:39/70 18:36 17:18-17:36/18	06:36 07:12-07:36/24 18:31-19:17/46 20:08 07:38-08:38/60	06:02 07:15-08:49/94 20:38 18:34-19:56/82	05:53 07:23-08:50/87 19:26-20:02/36 20:57 19:18-19:25/7 20:00-20:09/9
23	07:41 17:30 07:40 17:31	07:07 15:18-16:57/99 18:07	06:23 15:31-16:38/67 18:37 17:17-17:37/20	06:35 07:09-08:39/90 20:09 18:30-19:17/47	06:01 07:18-08:49/91 18:53-18:55/2 20:39 18:35-19:56/81	05:53 07:24-08:51/87 19:26-20:02/36 20:57 19:18-19:26/8 20:00-20:09/9
24	07:40 17:31 07:39 17:32	07:06 15:18-16:57/99 18:08 16:57-16:59/1	06:22 15:33-16:37/64 18:38 17:15-17:38/23	06:33 07:08-08:40/82 20:10 18:29-19:17/48	06:00 07:17-08:49/92 20:40 18:36-19:57/81	05:54 07:24-08:51/87 19:27-20:03/36 20:57 19:19-19:27/8 20:01-20:10/9
25	07:39 17:32 07:38 17:33	07:04 15:17-16:59/102 18:09	06:20 15:34-16:34/60 18:39 17:14-17:38/24	06:32 07:07-08:42/95 20:11 18:28-19:17/49	06:00 07:17-08:48/91 20:41 18:37-19:57/80	05:54 07:24-08:51/87 19:27-20:03/36 20:57 19:18-19:27/9 20:01-20:10/9
26	07:38 17:33 07:38 17:34	07:03 15:17-17:01/104 18:10	06:18 15:36-16:33/57 18:41 17:14-17:38/24	06:30 07:06-08:42/96 20:13 18:28-19:18/50	05:59 07:18-08:49/91 20:42 18:38-19:58/80	05:54 07:24-08:51/87 19:27-20:03/36 20:57 19:18-19:28/10 20:01-20:10/9
27	07:38 17:34 07:37 17:35	07:01 15:17-17:01/104 18:11	06:17 15:38-16:31/53 18:42 17:14-17:38/24	06:29 07:05-08:43/98 20:14 18:27-19:18/51	05:58 07:18-08:49/91 20:43 18:39-19:58/79	05:55 07:24-08:52/88 19:28-20:04/36 20:57 19:18-19:29/11 20:02-20:11/9
28	07:37 17:35 07:36 17:36	07:00 15:17-17:03/106 18:13	06:15 15:40-16:28/48 18:43 17:13-17:37/24	06:28 07:05-08:44/99 20:15 18:27-19:19/52	05:58 07:18-08:49/91 20:43 18:41-19:59/78	05:55 07:24-08:52/88 19:28-20:04/36 20:57 19:17-19:29/12 20:02-20:10/8
29	07:36 17:36 07:35 17:37	15:44-16:26/40 17:37	07:13 16:43-17:27/44 19:44 18:14-18:37/23	06:26 07:03-08:44/101 20:16 18:26-19:20/54	05:57 07:18-08:48/90 19:59-20:00/1 20:44 18:42-19:59/77	05:55 07:25-08:53/88 19:29-20:05/36 20:57 19:17-19:31/14 20:03-20:11/8
30	07:35 17:38 07:34 17:39	15:42-16:26/44 17:38	07:12 16:45-17:23/38 19:45 18:14-18:36/22	06:25 07:03-08:45/102 20:17 18:26-19:25/59	05:57 07:18-08:49/91 19:59-20:01/2 20:45 18:44-19:59/75	05:56 07:25-08:53/88 19:28-20:04/36 20:57 19:17-19:31/14 20:02-20:11/9
31	07:34 17:39 07:33 17:40	15:40-16:29/49 17:39	07:10 16:48-17:20/32 19:46 18:14-18:34/20	06:24 07:03-08:44/101 20:18 18:26-19:20/54	05:56 07:18-08:48/90 19:03-19:59/56 20:46 18:45-19:02/17 19:59-20:01/2	05:55 07:25-08:53/88 19:28-20:04/36 20:57 19:17-19:31/14 20:02-20:11/9
Potential sun hours	299	298	370	398	447	450
Sum of minutes with flicker	392	2387	3215	1986	5524	4289

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	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	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:

windpro Nuoro nord - flickering

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2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progetto WTG: 5 - SG05

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) (OLBIA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

		July	August	September	October	November	December
1	05:56	07:25-08:54/89	20:02-20:10/8	06:20	07:13-08:59/106	06:49	
	20:57	19:16-20:04/48		20:39	18:37-19:58/81	19:57	
2	05:57	07:25-08:53/88	20:03-20:11/8	06:21	07:13-08:58/105	06:50	
	20:57	19:16-20:05/49		20:38	18:37-19:56/79	19:55	
3	05:57	07:26-08:54/88	20:03-20:10/7	06:21	07:13-08:58/105	06:51	
	20:57	19:15-20:05/50		20:37	18:36-19:57/81	19:53	
4	05:58	07:25-08:54/89	20:04-20:11/7	06:22	07:12-08:58/106	06:52	
	20:57	19:15-20:06/51		20:36	18:36-19:56/80	19:52	
5	05:58	07:26-08:55/89	20:05-20:11/6	06:23	07:12-08:58/106	06:53	
	20:57	19:15-20:06/51		20:34	18:36-19:55/79	19:50	
6	05:59	07:25-08:55/90	20:05-20:11/6	06:24	07:12-08:58/106	06:54	
	20:56	19:14-20:06/52		20:33	18:35-19:54/79	19:49	
7	05:59	07:26-08:55/89	20:05-20:11/6	06:25	07:12-08:57/105	06:55	
	20:56	19:14-20:06/52		20:32	18:35-19:52/77	19:47	
8	06:00	07:26-08:55/89	20:05-20:10/5	06:26	07:11-08:57/106	06:56	
	20:56	19:13-20:05/52		20:31	18:35-19:49/74	19:45	
9	06:01	07:26-08:56/90	20:06-20:10/4	06:27	07:11-08:56/105	06:57	18:13-18:22/9
	20:55	19:13-20:06/53		20:30	18:35-19:40/65	19:44	
10	06:01	07:26-08:56/90	19:13-20:07/54	06:28	07:11-08:56/105	06:58	16:55-16:59/4
	20:55	18:59-19:05/6	20:07-20:11/4	20:28	18:35-19:39/64	19:42	18:10-18:24/14
11	06:02	07:26-08:56/90	19:12-20:06/54	06:29	07:11-08:55/104	06:59	16:46-17:08/22
	20:55	18:55-19:08/13	20:06-20:10/4	20:27	18:35-19:37/62	19:40	18:08-18:26/18
12	06:03	07:26-08:57/91	19:12-20:07/55	06:30	07:12-08:54/102	07:00	16:41-17:11/30
	20:54	18:54-19:10/16	20:07-20:10/3	20:26	18:34-19:34/60	19:39	18:06-18:26/20
13	06:03	07:27-08:57/90	20:07-20:09/2	06:31	07:11-08:53/102	07:01	16:37-17:14/37
	20:54	18:53-20:07/74		20:25	18:34-19:31/57	19:37	18:05-18:27/22
14	06:04	07:26-08:57/91	20:07-20:08/1	06:32	07:11-08:52/101	07:02	16:33-17:16/43
	20:53	18:51-20:07/76		20:23	18:34-19:26/52	19:35	18:04-18:27/23
15	06:05	07:26-08:57/91	20:07-20:08/1	06:33	07:11-08:51/100	07:03	16:30-17:18/48
	20:53	18:50-20:07/77		20:22	18:34-19:26/52	19:34	18:03-18:27/24
16	06:06	07:27-08:58/91		06:34	07:12-08:50/98	07:04	16:28-17:20/52
	20:52	18:49-20:07/78		20:20	18:34-19:25/51	19:32	18:03-18:27/24
17	06:06	07:27-08:58/91		06:35	07:13-08:49/96	07:05	16:25-17:21/56
	20:51	18:48-20:07/79		20:19	18:34-19:24/50	19:30	18:03-18:27/24
18	06:07	07:27-08:58/91		06:36	07:13-08:47/94	07:06	16:23-17:22/59
	20:51	18:47-20:06/79		20:18	18:35-19:24/49	19:29	18:03-18:26/23
19	06:08	07:27-08:58/91		06:37	07:14-08:46/92	07:07	16:20-17:24/64
	20:50	18:46-20:07/81		20:16	18:35-19:23/48	19:27	18:03-18:25/22
20	06:09	07:27-08:59/92		06:38	07:15-08:44/89	07:08	16:18-17:24/66
	20:49	18:45-20:07/82		20:15	18:36-19:22/46	19:25	18:03-18:24/21
21	06:10	07:27-08:59/92	18:59-19:08/9	06:39	07:17-07:40/23	07:09	16:16-17:25/69
	20:49	18:45-20:07/82		20:13	07:43-08:42/59	19:24	18:04-18:23/19
22	06:11	07:24-08:59/95		06:40	07:19-07:38/19	07:10	16:14-17:26/72
	20:48	18:44-20:07/83		20:12	07:45-08:40/55	19:22	17:39-17:47/8
23	06:11	07:23-09:00/97		06:41	07:22-07:35/13	07:11	16:11-17:26/75
	20:47	18:42-20:06/84		20:10	07:47-08:38/51	19:20	17:35-17:50/15
24	06:12	07:20-08:59/99		06:42	07:49-08:36/47	07:12	16:10-17:26/76
	20:46	18:42-20:06/84		20:09	18:39-19:18/39	19:19	17:33-17:51/18
25	06:13	07:19-08:59/100		06:43	07:51-08:33/42	07:13	16:08-17:27/79
	20:46	18:41-20:05/84		20:07	18:41-19:17/36	19:17	17:32-17:52/20
26	06:14	07:18-08:59/101		06:44	07:54-08:30/36	07:14	16:07-17:35/83
	20:45	18:41-20:05/84		20:06	18:41-19:14/33	19:15	16:06-17:27/81
27	06:15	07:17-08:59/102		06:45	07:57-08:24/27	07:15	16:04-17:33/86
	20:44	18:40-20:05/85		20:04	18:42-19:12/30	19:14	16:05-17:28/83
28	06:16	07:17-09:00/103		06:46	08:04-08:17/13	07:16	16:02-17:33/89
	20:43	18:40-20:04/84		20:03	18:44-19:10/26	19:12	16:03-17:53/110
29	06:17	07:16-09:00/104		06:47	18:46-19:07/21	07:17	16:01-17:33/94
	20:42	18:39-20:03/84		20:01		19:10	16:02-17:53/111
30	06:18	07:15-09:00/105		06:48	18:50-19:03/13	07:18	16:00-17:59/119
	20:41	18:39-20:02/83		20:00		19:09	16:00-17:43/103
31	06:19	07:15-09:00/105		06:49		07:19	
	20:40	18:37-20:00/83		19:58		17:22	
Potential sun hours	457		427	375	346	299	290
Sum of minutes with flicker	5166	4034	1821	3279	872	914	

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:
windpro Nuoro nord - flickering

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2023-12-12 12:11 / 11

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Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 6 - SG04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
3.87 4.61 5.62 6.73 8.36 10.04 11.06 9.91 8.03 6.21 4.80 3.87

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum
120 150 155 163 189 206 215 185 142 146 180 335 601 438 155 103 3,483
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 08:10-08:19/9 17:07 08:27-08:45/18	07:33 08:04-08:47/43 17:40 16:06-16:45/39	06:58 16:25-17:07/42 18:14	07:09 19:47	06:24 18:19-18:50/31 20:18	05:56 18:41-18:56/15 20:46 18:47-19:29/42
2	07:46 08:10-08:22/12 17:08 08:29-08:46/17	07:33 08:04-08:47/43 17:42 16:06-16:46/40	06:57 16:31-17:07/36 18:15	07:07 19:48	06:22 18:19-18:49/30 20:19	05:55 18:41-18:54/13 20:47 18:46-19:28/42
3	07:46 08:09-08:24/15 17:08 08:31-08:45/14	07:32 08:04-08:47/43 17:43 16:05-16:47/42	06:55 16:31-17:05/34 18:16	07:05 19:49	06:21 18:20-18:48/28 20:20	05:55 18:43-18:54/11 20:48 18:45-19:29/44
4	07:47 08:08-08:25/17 17:09 08:32-08:45/13	07:31 08:05-08:46/41 16:48-16:49/1 17:44 16:06-16:48/42	06:54 16:33-17:05/32 18:17	07:04 19:50	06:20 18:21-18:48/27 20:21	05:54 18:45-18:53/8 20:49 18:45-19:29/44
5	07:47 08:08-08:26/18 17:10 08:32-08:44/12	07:30 08:06-08:46/40 16:48-16:50/2 17:45 16:06-16:48/42	06:52 16:33-17:03/30 18:18	07:02 19:51	06:19 18:22-18:48/26 20:22 18:48-18:51/3	05:54 18:44-19:29/45 20:49 18:46-18:50/4
6	07:47 08:08-08:28/20 17:11 08:34-08:43/9	07:28 08:06-08:46/40 16:48-16:51/3 17:47 16:06-16:48/42	06:51 16:34-17:01/27 18:19	07:00 19:52	06:18 18:23-18:48/25 20:23 18:48-18:53/5	05:54 18:44-19:29/45 20:50
7	07:46 08:08-08:29/21 17:12 08:38-08:40/2	07:27 08:07-08:45/38 16:49-16:52/3 17:48 16:06-16:49/43	06:49 16:37-16:59/22 18:20	06:59 19:53	06:16 18:26-18:47/21 20:24 18:47-18:55/8	05:53 18:44-19:30/46 20:51
8	07:46 08:08-08:31/23 17:13	07:26 08:08-08:44/36 16:49-16:53/4 17:49 16:07-16:49/42	06:48 16:39-16:56/17 18:21	06:57 19:54	06:15 18:29-18:46/17 20:25 18:46-18:56/10	05:53 18:44-19:30/46 20:51
9	07:46 08:08-08:32/24 17:14	07:25 08:10-08:44/34 16:49-16:54/5 17:50 16:07-16:49/42	06:46 16:45-16:51/6 18:23	06:56 19:55	06:14 18:31-18:44/13 20:26 18:44-18:57/13	05:53 18:44-19:31/47 20:52
10	07:46 08:08-08:34/26 17:15	07:24 08:10-08:42/32 17:51 16:07-16:55/48	06:44 18:24	06:54 19:56	06:13 18:33-18:42/9 20:27 18:42-18:58/16	05:53 18:43-19:30/47 20:52
11	07:46 08:07-08:34/27 17:16	07:23 08:12-08:40/28 17:53 16:07-16:59/52	06:43 18:25	06:53 19:57	06:12 18:34-18:58/24 20:28	05:53 18:43-19:30/47 20:53
12	07:46 08:07-08:35/28 17:17	07:22 08:13-08:39/26 17:54 16:08-17:01/53	06:41 18:26	06:51 19:58	06:11 18:33-18:59/26 20:29	05:52 18:43-19:30/47 20:53
13	07:45 08:07-08:37/30 17:18	07:20 08:16-08:37/21 17:55 16:09-17:03/54	06:40 18:27	06:49 19:59	06:10 18:33-18:59/26 20:30	05:52 18:43-19:31/48 20:54
14	07:45 08:06-08:37/31 17:19	07:19 08:18-08:33/15 17:56 16:09-17:04/55	06:38 18:28	06:48 20:00	06:09 18:33-18:59/26 20:31	05:52 18:43-19:31/48 20:54
15	07:45 08:06-08:39/33 17:20	07:18 08:24-08:27/3 17:57 16:11-17:05/54	06:36 18:29	06:46 20:01	06:08 18:32-19:00/28 20:32	05:52 18:43-19:31/48 20:55
16	07:44 08:05-08:39/34 17:21	07:17 16:12-17:07/55 17:59	06:35 18:30	06:45 20:02	06:07 18:32-19:00/28 20:33	05:52 18:43-19:31/48 20:55
17	07:44 08:05-08:41/36 17:23	07:15 16:11-17:07/56 18:00	06:33 18:31	06:43 20:03	06:06 18:32-19:00/28 20:34	05:52 18:43-19:31/48 20:55
18	07:43 08:04-08:41/37 17:24	07:14 16:12-17:08/56 18:01	06:32 18:32	06:42 18:29-18:35/6 20:04	06:05 18:32-18:59/27 20:35	05:52 18:43-19:31/48 20:56
19	07:43 08:04-08:42/38 17:25	07:13 16:13-17:09/56 18:02	06:30 18:33	06:40 18:26-18:39/13 20:05	06:04 18:32-18:59/27 20:35	05:53 18:44-19:32/48 20:56
20	07:42 08:03-08:43/40 17:26	07:11 16:12-17:09/57 18:03	06:28 18:34	06:39 18:23-18:40/17 20:06	06:03 18:33-19:00/27 20:36 19:10-19:19/9	05:53 18:44-19:32/48 20:56
21	07:42 08:02-08:43/41 17:27	07:10 16:13-17:09/56 18:04	06:27 18:35	06:37 18:22-18:43/21 20:07	06:03 18:33-19:00/27 20:37 19:08-19:21/13	05:53 18:44-19:32/48 20:57
22	07:41 08:03-08:44/41 17:28	07:09 16:14-17:09/55 18:06	06:25 18:36	06:36 18:21-18:46/25 20:08	06:02 18:33-18:59/26 20:38 19:07-19:22/15	05:53 18:44-19:32/48 20:57
23	07:41 08:02-08:45/43 17:30	07:07 16:15-17:10/55 18:07	06:23 18:37	06:35 18:20-18:46/26 20:09	06:01 18:33-18:59/26 20:39 19:05-19:23/18	05:53 18:44-19:32/48 20:57
24	07:40 08:02-08:45/43 17:31	07:06 16:16-17:10/54 18:08	06:22 18:38	06:33 18:19-18:48/29 20:10	06:00 18:35-18:59/24 20:40 19:05-19:24/19	05:54 18:45-19:33/48 20:57
25	07:39 08:03-08:46/43 17:32	07:04 16:17-17:09/52 18:09	06:20 18:39	06:32 18:18-18:48/30 20:11	06:00 18:35-18:58/23 20:41 19:04-19:25/21	05:54 18:45-19:33/48 20:57
26	07:38 08:03-08:46/43 17:33	07:03 16:19-17:09/50 18:10	06:18 18:41	06:30 18:18-18:49/31 20:13	05:59 18:36-18:59/23 20:42 19:05-19:26/21	05:54 18:45-19:33/48 20:57
27	07:38 08:03-08:47/44 17:34	07:01 16:20-17:08/48 18:11	06:17 18:42	06:29 18:18-18:49/31 20:14	05:58 18:36-19:03/27 20:43 19:04-19:26/22	05:55 18:46-19:34/48 20:57
28	07:37 08:03-08:47/44 17:36	07:00 16:23-17:08/45 18:13	06:15 18:43	06:28 18:18-18:49/31 20:15	05:58 18:37-18:58/21 20:43 18:52-19:27/35	05:55 18:46-19:34/48 20:57
29	07:36 08:03-08:47/44 17:37	07:13 18:14	07:13 19:44	06:26 18:18-18:49/31 20:16	05:57 18:38-18:57/19 20:44 18:50-19:27/37	05:55 18:47-19:35/48 20:57
30	07:35 08:03-08:47/44 17:38	07:12 18:15	07:12 19:45	06:25 18:19-18:50/31 20:17	05:57 18:39-18:57/18 20:45 18:49-19:28/39	05:56 18:47-19:34/47 20:57
31	07:34 08:03-08:47/44 17:39	07:11 18:16	07:10 19:46	07:10 19:46	05:56 18:39-18:56/17 20:46 18:47-19:28/41	20:57
Potential sun hours	299	298	370	398	447	450
Sum of minutes with flicker	1449	1886	246	322	1069	1418

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:

windpro Nuoro nord - flickering

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2023-12-12 12:11 / 12

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 6 - SG04

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Table with 12 columns (Jan-Dec) and 1 row of values: 3.87, 4.61, 5.62, 6.73, 8.36, 10.04, 11.06, 9.91, 8.03, 6.21, 4.80, 3.87

Operational time

Table with 15 columns (N to Sum) and 1 row of values: 120, 150, 155, 163, 189, 206, 215, 185, 142, 146, 180, 335, 601, 438, 155, 103, 3,483

Idle start wind speed: Cut in wind speed from power curve

Main shadow calculation table with columns for months (July-December) and rows for days (1-31). Includes sub-headers for 'July', 'August', 'September', 'October', 'November', 'December' and data for 'Potential sun hours' and 'Sum of minutes with flicker'.

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

Matrix layout table with 2 rows and 3 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm); First time (hh:mm) with flicker, Last time (hh:mm) with flicker, Minutes with flicker.

Project:

windpro Nuoro nord - flickering

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2023-12-12 12:11 / 13

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Calculated:

2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 7 - SG07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	146	185	142	146	180	335	601	438	155	103	3,483		

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:46 08:08-08:21/13 12:08-13:35/87	07:33 12:26-13:07/41	06:58 13:24-14:13/49	07:08 07:27-07:44/17	06:24 06:43-06:49/26	05:56 07:19-08:53/94 17:57-18:03/6
17	07:08 08:58-09:46/48	17:07 13:12-14:14/62	18:14 15:49-16:33/44	19:47 07:55-08:56/60	20:18 17:08-17:50/42	20:46 17:11-17:57/46
2	07:46 08:08-08:21/13 12:08-13:36/88	07:32 12:28-13:05/37	06:57 13:27-14:12/45 16:33-16:34/1	07:07 07:25-07:44/19	06:22 06:43-08:50/127	05:55 07:18-08:52/94 17:56-18:02/6
17	08 08:59-09:47/48	17:42 13:11-14:15/64	18:15 15:50-16:33/43	19:48 07:55-08:53/68	20:19 17:07-17:50/43	20:47 17:11-17:56/45
3	07:46 08:08-08:21/14 12:08-13:36/88	07:31 12:30-13:04/34	06:55 13:30-14:09/39 16:32-16:35/3	07:05 07:24-07:45/21	06:21 06:42-08:49/127	05:55 07:19-08:52/93 17:56-18:02/6
17	08 09:00-09:47/47	17:43 13:11-14:16/65	18:16 15:50-16:32/42	19:49 07:57-08:53/66	20:20 17:06-17:51/45	20:48 17:12-17:56/44
4	07:46 08:08-08:21/14 12:09-13:36/87	07:30 12:33-13:01/28	06:54 13:34-14:06/32 16:31-16:35/4	07:04 07:22-07:45/23	06:20 06:42-08:50/128	05:54 07:19-08:53/94 17:56-18:03/7
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Project:

windpro Nuoro nord - flickering

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Licensed user:

Ing. Bruno Manca
Via Vittorio Veneto 231
IT-09028 Sestu
+390702358125
Bruno Manca / ingbrunomanca@gmail.com
Calculated:
2023-12-11 14:55/2.8.579

SHADOW - Calendar per WTG

Calculation: Nuoro Nord progettoWTG: 7 - SG07

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [OLBIA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.87	4.61	5.62	6.73	8.36	10.04	11.06	9.91	8.03	6.21	4.80	3.87

Operational time

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Sum
120	150	155	163	189	206	215	185	142	146	180	335	601	438	155	103	3,483

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:56 07:03-08:57/114 18:00-18:07/7	06:20 06:55-07:18/23 17:15-18:06/51	06:49 07:11-07:39/28	07:18 07:38-07:39/1 16:30-17:13/43	06:52 07:13-07:25/12	07:26 07:49-08:07/18 11:53-13:20/87
2	05:57 07:05-07:24/19 17:20-18:01/41	06:20 06:54-07:26/32 17:14-18:06/52	06:50 07:13-07:40/27	07:19 07:41-08:36/55 16:57-17:13/16	06:53 07:14-07:24/10	07:27 07:50-08:07/17 11:54-13:20/86
3	05:57 07:06-07:22/16 17:19-18:00/41	06:21 06:54-07:30/36 17:15-18:06/51	06:51 07:12-07:40/28	07:20 07:42-08:35/53 17:00-17:13/13	06:54 07:16-07:23/7	07:28 07:51-08:08/17 11:54-13:21/87
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25	06:13 07:28-09:03/95 18:07-18:11/4	06:43 07:04-07:37/33	07:13 07:32-08:44/72	07:44 07:05-07:29/24 15:24-15:59/35	07:19 07:43-08:04/21 11:52-13:26/94	07:54 08:07-08:17/11 12:06-13:33/87
26	06:14 07:29-09:03/94 18:07-18:11/4	06:44 07:04-07:35/31	07:14 07:33-08:44/71	07:45 07:06-07:28/22 15:25-15:57/32	07:20 07:44-08:05/21 11:52-13:22/90	07:55 08:07-08:17/11 12:06-13:33/87
27	06:15 07:29-09:03/94 18:07-18:11/4	06:45 07:05-07:34/29	07:15 07:34-08:43/69	07:46 07:07-07:27/21 15:26-15:58/30	07:22 07:45-08:05/20 11:52-13:17/85	07:56 08:07-08:17/11 12:06-13:33/87
28	06:16 07:01-07:13/12 17:16-18:07/51	06:46 07:06-07:34/28	07:16 16:35-17:12/37	07:47 12:38-13:51/73	07:23 07:46-08:06/20 11:52-13:18/86	07:57 08:07-08:17/11 12:06-13:33/87
29	06:17 06:59-07:15/16 17:16-18:07/51	06:47 07:07-07:32/25	07:17 16:33-17:12/39	07:48 07:08-07:27/19 15:28-15:53/25	07:24 07:47-08:06/19 11:53-13:18/85	07:58 08:07-08:17/11 12:06-13:33/87
30	06:18 06:58-07:17/19 17:16-18:07/51	06:48 07:08-07:37/23	07:18 16:32-17:13/41	07:49 07:11-07:27/16 15:34-15:49/15	07:25 07:48-08:07/19 11:53-13:19/86	07:59 08:08-08:20/12 12:07-13:35/88
31	06:19 06:56-07:17/21 17:15-18:06/51	06:49 07:09-07:39/30	07:19 16:31-17:13/42	07:50 07:12-07:26/14	07:26 06:47-09:30/43	08:00 08:08-08:20/12 12:08-13:35/87
	06:20 07:29-09:02/93 18:06-18:09/3	06:50 07:10-08:33/22		07:51 12:38-13:51/73		08:01 08:08-08:20/12 12:08-13:35/87
	Potential sun hours 1457	1427	1375	1346	299	290
	Sum of minutes with flicker 4658	3953	2438	3445	3591	4569

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