

REGIONE BASILICATA
PROVINCIA DI POTENZA

Comuni di :

Castelgrande - Muro Lucano - Rapone - San Fele

LOCALITA' "Toppo Macchia"

PROGETTO DEFINITIVO PER LA REALIZZAZIONE DI UN IMPIANTO DI PRODUZIONE DI ENERGIA ELETTRICA DA FONTE EOLICA E RELATIVE OPERE DI CONNESSIONE - 16 AEROGENERATORI (potenza totale 88,2 MW)

Sezione A :

PROGETTO DEFINITIVO DELL'IMPIANTO, DELLE OPERE CONNESSE E DELLE INFRASTRUTTURE INDISPENSABILI

Titolo elaborato:

A.8 - STUDIO DEGLI EFFETTI DI SHADOW - FLICKERING

N. Elaborato: **A.8**

Scala:

Proponente

MIA WIND Srl

Via della Tecnica, 18 - 85100 - Potenza (PZ)

Amministratore Unico
Donato Macchia

Progettazione



sede legale e operativa

San Giorgio Del Sannio (BN) via de Gasperi 61

sede operativa

Lucera (FG) S.S.17 loc. Vaccarella snc c/o Villaggio Don Bosco

P.IVA 01465940623

Azienda con sistema gestione qualità Certificato N. 50 100 11873



Progettista

Dott. Ing. Nicola Forte



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1. PREMESSA

Il presente elaborato ha lo scopo di valutare in maniera tecnica l'eventuale impatto generato dall'evoluzione dell'ombra derivante dalla futura installazione di un impianto per la produzione di energia elettrica da fonte eolica costituito da 16 aerogeneratori di potenza complessiva pari a 88,2 MW costituiti da 15 turbine modello Vestas V150 con altezza al mozzo 105 m. e diametro rotore pari a 150 m, ed 1 turbina modello Vestas V136 con altezza al mozzo 112 m, diametro rotore pari a 136 m e potenza nominale pari a 4,2 MW (turbina B14), previsti in località "Toppo Macchia" ricadenti in agro dei territori dei comuni di San Fele (PZ), Rapone (PZ), Castelgrande (PZ) e Muro Lucano (PZ).

Lo Shadow-Flickering è l'espressione comunemente impiegata in ambito specialistico per descrivere l'effetto stroboscopico delle ombre proiettate dalle pale rotanti degli aerogeneratori eolici quando sussistono le condizioni meteorologiche opportune; infatti la possibilità e la durata di tali effetti dipendono da una serie di condizioni ambientali, tra cui : la posizione del sole, l'ora del giorno, il giorno dell'anno, le condizioni atmosferiche ambientali e la posizione della turbina eolica rispetto ad un recettore sensibile. La valutazione tecnica è eseguita con l'ausilio di un software di simulazione specifico per la progettazione degli impianti eolici WIND PRO®, costituito da un insieme di moduli di elaborazione orientati alla simulazione di una serie di aspetti che caratterizzano le diverse fasi progettuali. Il modulo SHADOW è quello specifico per la valutazione dell'evoluzione dell'ombra e del flickering. In tale report è riportata:

- La descrizione del caso studio con le posizioni delle turbine e loro caratteristiche tecniche
- Una breve descrizione tecnica del fenomeno di shadow flickering
- La descrizione dei recettori soggetti al fenomeno per i quali è stata richiesta questa analisi
- Sintesi della metodologia di analisi seguita per lo studio
- Sintesi dei risultati ottenuti, con allegati grafici ed analitici di dettaglio che descrivono il fenomeno su ognuno dei recettori e da parte di ognuna delle turbine per tutto l'anno solare.

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2. IL CASO STUDIO

Nello specifico, il presente elaborato ha lo scopo di valutare l'eventuale impatto generato dall'evoluzione dell'ombra di un impianto eolico costituito da 16 aerogeneratori di potenza complessiva pari a 88,2 MW costituiti da 15 turbine modello Vestas V150 con altezza al mozzo 105 m. e diametro rotore pari a 150 m, ed 1 turbina modello Vestas V136 con altezza al mozzo 112 m, diametro rotore pari a 136 m e potenza nominale pari a 4,2 MW (turbina B14), previsti in località "Toppo Macchia" ricadenti in agro dei territori dei comuni di San Fele (PZ), Rapone (PZ), Castelgrande (PZ) e Muro Lucano (PZ).

2.1. DESCRIZIONE DEL SITO DI INDAGINE

L'area oggetto dello sviluppo progettuale si presenta a carattere pedemontano con il suolo che evidenzia una variabilità topografica ed altimetrica nel complesso abbastanza omogenea. L'elevazione media dell'area di si attesta essere di circa 1140 m s.l.m. Nell'area interessata dalle turbine di progetto sono presenti sporadici singoli impianti di media e piccola taglia costituiti in particolare da 2 aerogeneratori di potenza nominale 800 kW Mod. Enercon E53 e tre aerogeneratori di piccola taglia (60 kW) costituiti da una Northern Power NPS 60-24 e da due Prowind 60.

Oltre le turbine citate, nell'area in oggetto sono previsti ulteriori 15 aerogeneratori relativi a due impianti autorizzati rispettivamente identificati come WKN (10 turbine) e COG.E.IN (5 turbine) che potrebbero apportare interferenze e sollecitazioni con in recettori interessati dal progetto in esame e pertanto debitamente considerati in tale studio ed individuate nell'immagine proposta di seguito in riferimento al layout di progetto nella sua interezza.

Al fine di effettuare una valutazione previsionale completa, si è tenuto conto pertanto di tutti gli aerogeneratori citati al fine di valutare al massimo le potenziali interferenze e sollecitazioni nei confronti dei recettori interessati dal progetto in esame. L'inquadramento territoriale dell'area di progetto, proposto a seguire su stralcio cartografico IGM 1:50000, evidenzia con icone di colore verde le turbine di progetto, con icone di colore ciano gli aerogeneratori già insistenti sul territorio e con icone di colore magenta e blu le turbine appartenenti alle due windfarm autorizzate.

Si riportano di seguito le immagini su cartografia IGM 1:50000 e a seguire l'individuazione dell'area di progetto e della disposizione di tutte le sorgenti sonore (turbine) su ortofoto planimetrica estratta da Google Earth. Le immagini citate saranno proposte poi in successione anche in assenza di base cartografica per una maggiore comprensione e rapidità di individuazione dei recettori considerati nel modello di elaborazione individuati da icone gialle e con etichetta "R" ad indicare il gruppo di recettori considerati come "Shadow Receptor" in riferimento alle porzioni di territorio interessate dalle turbine esistenti, autorizzate e di progetto, e a seguire su stralcio di ortofoto nelle versioni 2D e 3D estratte da Google Earth.



Figura 1: Localizzazione geografica dell' impianto "Toppo Macchia" su immagine google earth.

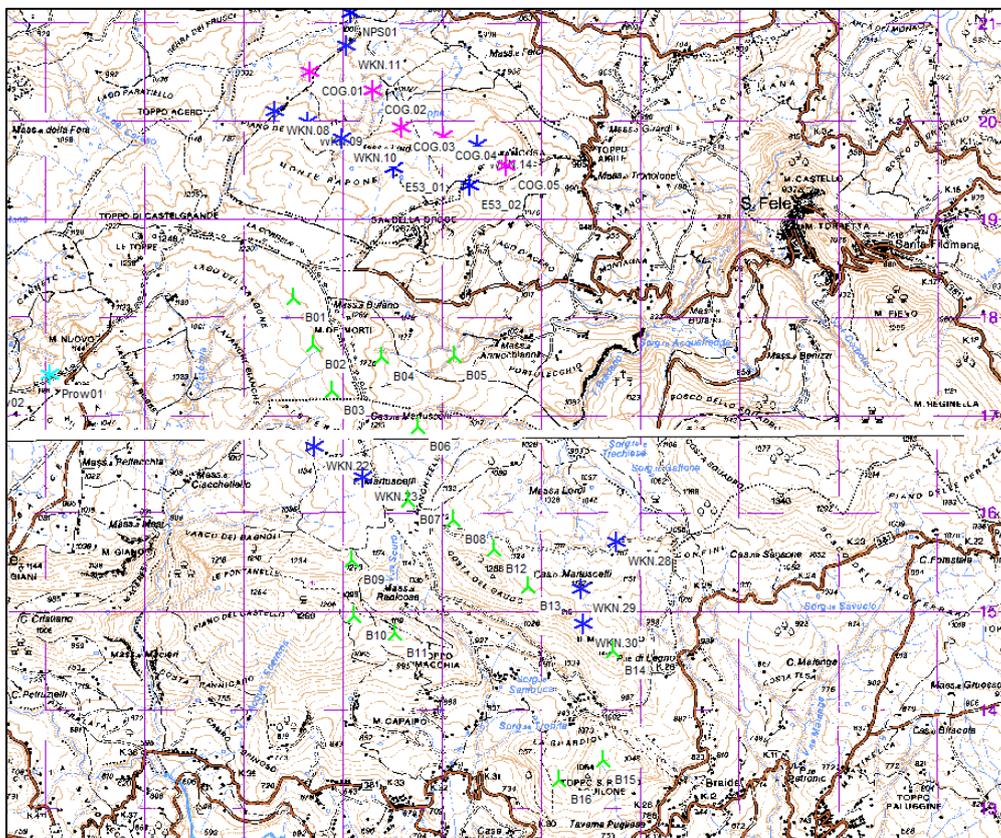
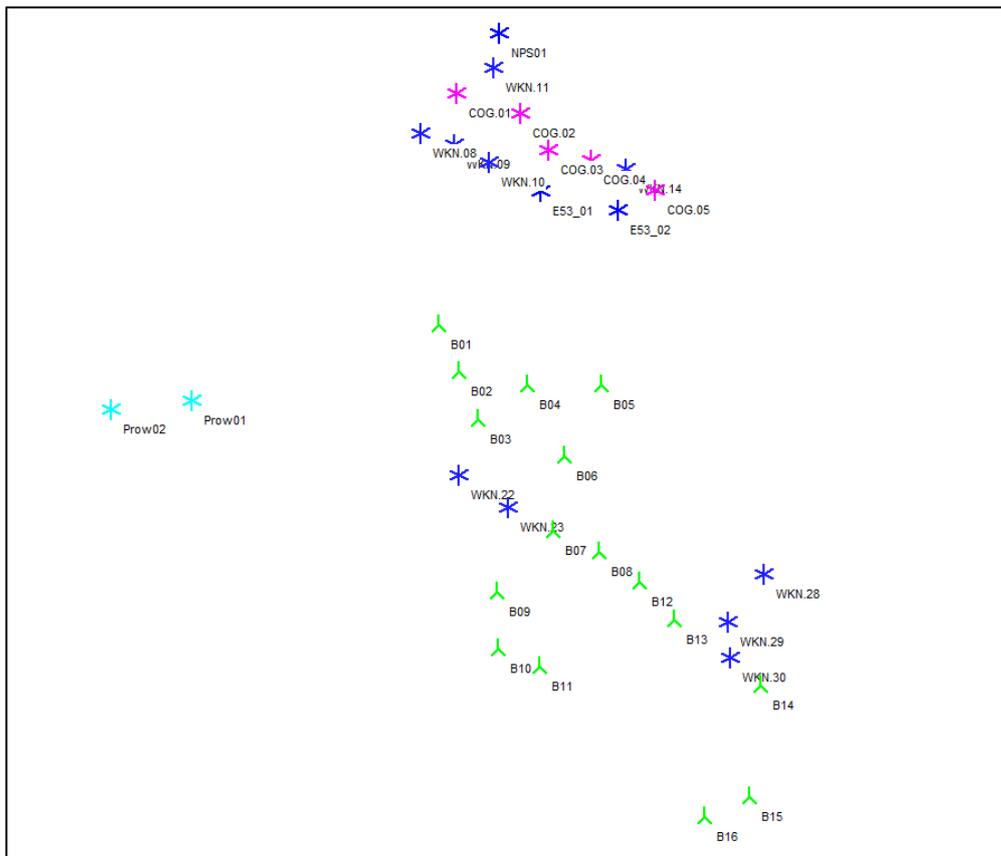


Figura 2: Inquadramento territoriale del parco eolico di progetto proposto nella versione con e senza stralcio di base cartografica IGM 1:50000. Le icone in verde individuano le turbine di progetto. In ciano le turbine esistenti ed in blu e magenta le turbine autorizzate ma non ancora presenti sul territorio.

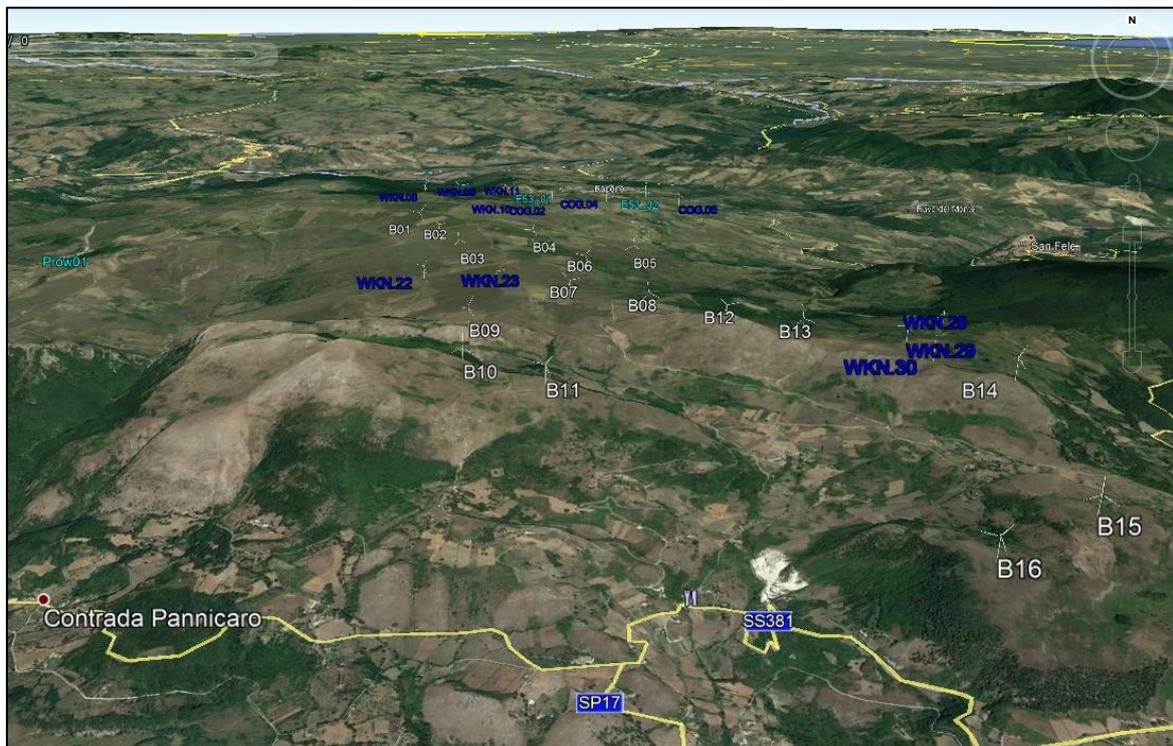


Figura 3: Inquadramento territoriale del parco eolico di progetto (etichette bianche), turbine esistenti (etichette color ciano) ed autorizzate (etichette color blu) su stralcio di ortofoto estratta da Google Earth proposta nella versione planimetrica 2D e 3D

2.2. DESCRIZIONE DEGLI AEROGENERATORI E CARATTERISTICHE GEOGRAFICHE DI POSIZIONE

Le macchine oggetto di studio sono costituite da 15 turbine modello Vestas V150 con altezza al mozzo 105 m. e diametro rotore pari a 150 m, ed 1 turbina modello Vestas V136 con altezza al mozzo 112 m, diametro rotore pari a 136 m e potenza nominale pari a 4,2 MW (turbina B14). L'area oggetto di indagine risulta essere interessata da installazioni eoliche di piccola e media taglia (benché distanti dai punti di interesse progettuale) che si concentrano in zone circoscritte e delineate e che, insieme ai citati aerogeneratori autorizzati, sono stati inseriti e considerati nel modello di simulazione elaborato ai fini della massima tutela possibile nei confronti dei recettori analizzati. A seguire saranno proposte pertanto le tabelle di sintesi di inquadramento territoriale riportante le coordinate e le caratteristiche tecniche di tutte le turbine di progetto, esistenti ed autorizzate considerate in tale studio.

Tabella 1: Inquadramento geografico –Coordinate e caratteristiche tecniche delle turbine di progetto

ID WTG	UTM WGS84 Long. Est [m]	UTM WGS 84 Lat. Nord [m]	Modello aerogeneratore	Potenza [KW]	Altitudine s.l.m. [m]	Altezza mozzo s.l.t. [m]
B01	540427	4517990	VESTAS V150	5600	1194,7	105,0
B02	540629	4517520	VESTAS V150	5600	1191,3	105,0
B03	540817	4517044	VESTAS V150	5600	1181,2	105,0
B04	541313	4517391	VESTAS V150	5600	1183,7	105,0
B05	542048	4517400	VESTAS V150	5600	1070,0	105,0
B06	541683	4516681	VESTAS V150	5600	1159,5	105,0
B07	541576	4515942	VESTAS V150	5600	1172,3	105,0
B08	542036	4515734	VESTAS V150	5600	1152,8	105,0
B09	541019	4515323	VESTAS V150	5600	1182,1	105,0
B10	541036	4514757	VESTAS V150	5600	1133,6	105,0
B11	541452	4514586	VESTAS V150	5600	1100,0	105,0
B12	542443	4515433	VESTAS V150	5600	1168,5	105,0
B13	542789	4515064	VESTAS V150	5600	1192,9	105,0
B14	543646	4514404	VESTAS V136	4200	1190,0	112,0
B15	543547	4513296	VESTAS V150	5600	1027,4	105,0
B16	543105	4513092	VESTAS V150	5600	954,0	105,0
MEDIA					1140,9	
TOTALE				88200		

Tabella 2: Inquadramento geografico –Coordinate e caratteristiche tecniche delle turbine esistenti ed autorizzate considerate nel modello di simulazione

ID WTG Esistenti	UTM WGS84 Long. Est [m]	UTM WGS 84 Lat. Nord [m]	Modello aerogeneratore	Potenza [KW]	Altezza mozzo s.l.t. [m]	Altitudine s.l.m. [m]
NPS01	541006	4520896	NORTHERN POWER NPS 60C-24	60	37,0	967,9
E53_01	541434	4519319	ENERCON E-53	800	73,3	1170,0
E53_02	542205	4519140	ENERCON E-53	800	73,3	1152,7
Prow01	537966	4517220	PROWIND 60	60	37,0	1086,1
Prow02	537173	4517131	PROWIND 60	60	37,0	1079,0

ID WTG Autorizzate	UTM WGS84 Long. Est [m]	UTM WGS 84 Lat. Nord [m]	Modello aerogeneratore	Potenza [KW]	Altezza mozzo s.l.t. [m]	Altitudine s.l.m. [m]
COG.01	540592	4520299	NORDEX N117	3000	91,0	1044,4
COG.02	541226	4520102	NORDEX N117	3000	91,0	1024,8
COG.03	541514	4519733	NORDEX N117	3000	91,0	1082,6
COG.04	541932	4519637	NORDEX N117	3000	91,0	1097,8
COG.05	542569	4519343	NORDEX N117	3000	91,0	1121,9
WKN.08	540233	4519896	NORDEX N117	3000	91,0	1108,7
WKN.09	540573	4519788	NORDEX N117	3000	91,0	1125,1
WKN.10	540914	4519615	NORDEX N117	3000	91,0	1132,4
WKN.11	540958	4520556	NORDEX N117	3000	91,0	1003,1
WKN.14	542286	4519550	NORDEX N117	3000	91,0	1120,5
WKN.22	540634	4516488	NORDEX N117	3000	91,0	1144,6
WKN.23	541123	4516167	NORDEX N117	3000	91,0	1187,6
WKN.28	543678	4515517	NORDEX N117	3000	91,0	1110,0
WKN.29	543328	4515041	NORDEX N117	3000	91,0	1180,0
WKN.30	543353	4514687	NORDEX N117	3000	91,0	1187,1

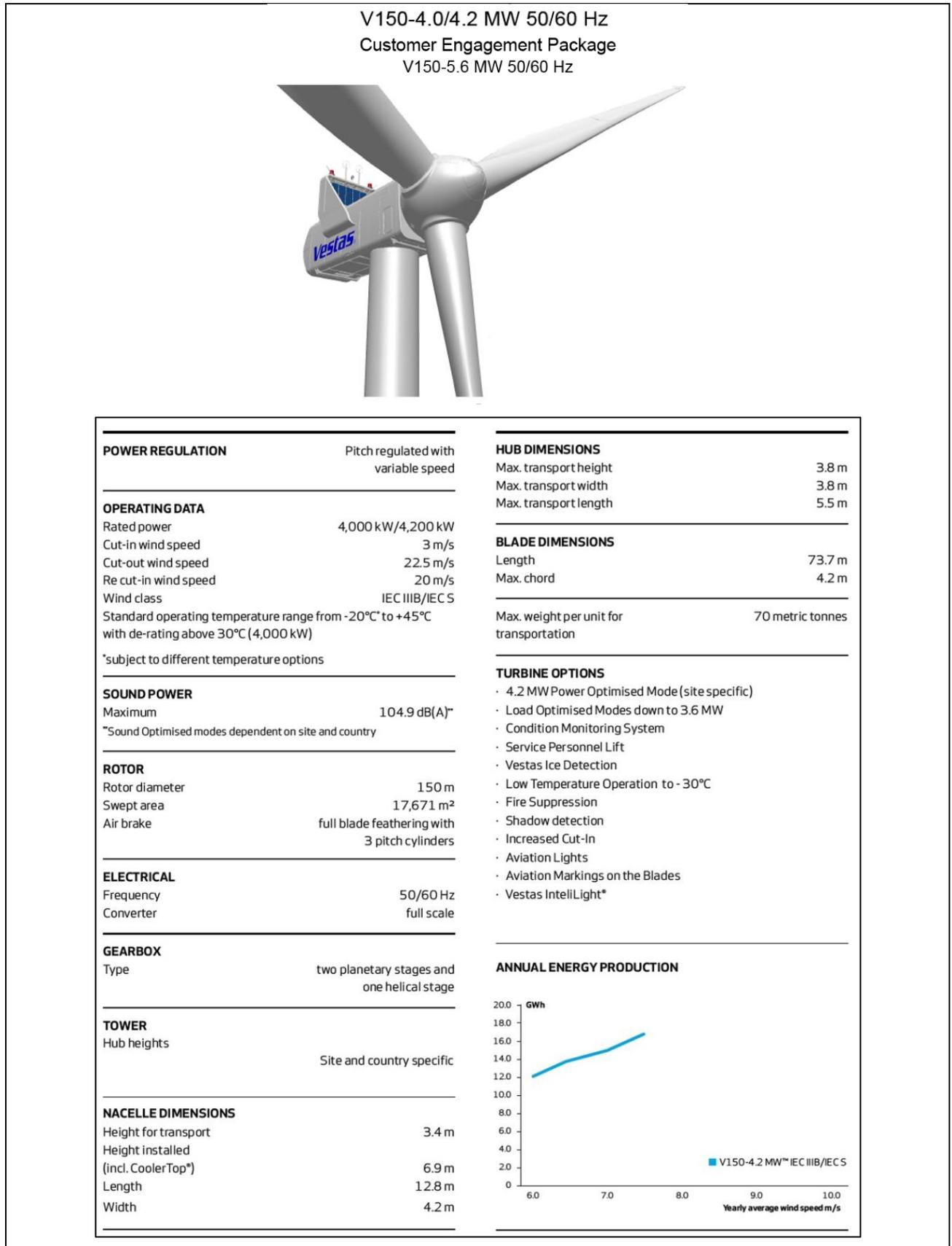
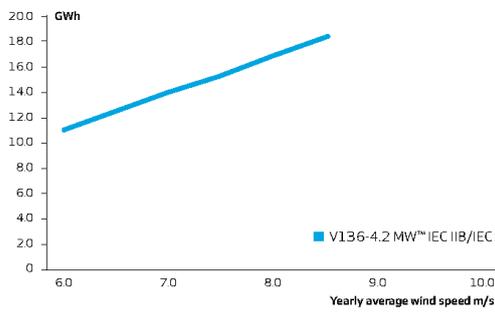
Tabella 3: Caratteristiche tecniche delle turbine di progetto Vestas-V150 di potenza nominale 4.0/4.2 MW disponibile anche nella versione di potenza nominale 5.6 MW


Tabella 4: Caratteristiche tecniche delle turbine di progetto Vestas-V136 di potenza nominale 4.2 MW

Performance Specification V136-4.0/4.2 MW 50/60 Hz													
<small>Document no.: 0057-7065 V136 2017-12-21</small>													
													
<h1 style="text-align: center;">V136-4.2 MW™ IEC IIB/IEC S Facts & figures</h1>													
POWER REGULATION	Pitch regulated with variable speed												
OPERATING DATA	Rated power 4,000 kW/4,200 kW Cut-in wind speed 3 m/s Cut-out wind speed 25 m/s Re cut-in wind speed 23 m/s Wind class IEC IIB/IEC S Standard operating temperature range from -20°C to +45°C with de-rating above 30°C (4,000 kW) *subject to different temperature options												
SOUND POWER	Maximum 103.9 dB(A)* *Sound Optimised modes dependent on site and country												
ROTOR	Rotor diameter 136 m Swept area 14,527 m² Air brake full blade feathering with 3 pitch cylinders												
ELECTRICAL	Frequency 50/60 Hz Converter full scale												
GEARBOX	Type two planetary stages and one helical stage												
TOWER	Hub heights Site and country specific												
NACELLE DIMENSIONS	Height for transport 3.4 m Height installed (incl. CoolerTop®) 6.9 m Length 12.8 m Width 4.2 m												
HUB DIMENSIONS	Max. transport height 3.8 m Max. transport width 3.8 m Max. transport length 5.5 m												
BLADE DIMENSIONS	Length 66.7 m Max. chord 4.1 m Max. weight per unit for transportation 70 metric tonnes												
TURBINE OPTIONS	<ul style="list-style-type: none"> · High Wind Operation · 4.2 MW Power Optimised Mode (site specific) · Load Optimised Modes down to 3.6 MW · Condition Monitoring System · Service Personnel Lift · Vestas Ice Detection · Low Temperature Operation to - 30°C · Fire Suppression · Shadow detection · Increased Cut-In · Aviation Lights · Aviation Markings on the Blades · Vestas IntelliLight® 												
ANNUAL ENERGY PRODUCTION	 <table border="1"> <caption>Annual Energy Production Data</caption> <thead> <tr> <th>Yearly average wind speed (m/s)</th> <th>Annual Energy Production (GWh)</th> </tr> </thead> <tbody> <tr> <td>6.0</td> <td>100</td> </tr> <tr> <td>7.0</td> <td>120</td> </tr> <tr> <td>8.0</td> <td>140</td> </tr> <tr> <td>9.0</td> <td>160</td> </tr> <tr> <td>10.0</td> <td>180</td> </tr> </tbody> </table>	Yearly average wind speed (m/s)	Annual Energy Production (GWh)	6.0	100	7.0	120	8.0	140	9.0	160	10.0	180
Yearly average wind speed (m/s)	Annual Energy Production (GWh)												
6.0	100												
7.0	120												
8.0	140												
9.0	160												
10.0	180												
Assumptions	One wind turbine, 100% availability, 0% losses, k factor = 2. Standard air density = 1.225, wind speed at hub height												

2.3. ANALISI DEI RECETTORI

L'analisi di shadow-flickering di cui al presente studio è stata elaborata per specifici 18 recettori nell'intorno dell'impianto; tuttavia alcune strutture inserite nel modello di simulazione potrebbero essere state escluse rappresentando ruderi non abitati e sostanzialmente privi di caratteristiche minime di abitabilità o agibilità.

A tal riguardo per eventuali approfondimenti, si faccia riferimento allo specifico elaborato di progetto "A.17.9 – Documentazione fotografica relativa ai fabbricati non considerati recettori ed esclusi dalle analisi" in merito ai criteri di selezione e scelta delle strutture.

Nelle tabelle a seguire sono riportati i riferimenti geografici (coordinate) di tutti i recettori oggetto di analisi e simulazione e, in successione, una tabella di riepilogo della matrice delle distanze minime intercorrenti tra recettori in oggetto e l'aerogeneratore più prossimo.

Tabella 5: Inquadramento geografico –Individuazione e coordinate delle strutture considerate come recettori sensibili-Shadow Receptor "R"

ID RECETTORE	Gauss Boaga Long. Est [m]	Gauss Boaga Lat. Nord [m]	Quota [m]
R04	541.166	4.516.745	1207,9
R05a	541.714	4.514.210	954,0
R05c	541.733	4.514.203	948,4
R06	542.656	4.516.311	1064,8
R08c	543.380	4.514.006	981,2
R10	541.484	4.517.844	1150,0
R11a	543.304	4.513.938	958,1
R11b	543.285	4.513.930	955,4
R15	543.233	4.513.666	939,8
R17	542.605	4.512.964	743,0
R18	542.679	4.512.876	750,0
R22b	541.670	4.514.150	935,4
R24a	542.698	4.514.207	914,8
R26	542.930	4.514.412	996,8
R30a	542.559	4.517.584	1009,8
R30b	542.551	4.517.598	1008,8
R30c	542.539	4.517.600	1008,9
R31b	542.111	4.517.991	1092,7

Tabella 6: Matrice delle distanze – Distanze intercorrenti tra gli aerogeneratori ed i recettori sensibili considerati. In evidenza le distanze minime intercorrenti con le turbine di progetto.

Matrice Distanze	R04	R05a	R05c	R06	R08c	R10	R11a	R11b	R15	R17	R18	R22b	R24a	R26	R30a	R30b	R30c	R31
B01	1448	3993	4006	2791	4959	1067	4970	4965	5155	5478	5588	4036	4412	4367	2170	2160	2148	1684
B02	943	3483	3496	2360	4463	914	4471	4466	4651	4966	5076	3527	3906	3867	1931	1924	1912	1555
B03	460	2973	2985	1980	3975	1042	3979	3973	4153	4455	4565	3017	3404	3375	1824	1820	1810	1603
B04	663	3206	3216	1723	3966	484	3986	3983	4191	4612	4717	3261	3472	3390	1261	1255	1244	998
B05	1099	3207	3213	1247	3646	718	3683	3684	3918	4471	4568	3272	3259	3115	543	541	530	594
B06	521	2471	2479	1041	3168	1180	3186	3183	3390	3830	3933	2531	2674	2589	1258	1263	1256	1378
B07	902	1738	1746	1141	2646	1904	2646	2640	2815	3151	3258	1794	2066	2043	1914	1922	1917	2118
B08	1334	1558	1561	847	2189	2181	2199	2194	2389	2828	2929	1626	1664	1596	1922	1934	1933	2258
B09	1430	1312	1328	1912	2703	2564	2672	2660	2765	2843	2957	1342	2016	2117	2736	2743	2738	2883
B10	1992	871	890	2245	2461	3119	2411	2396	2453	2383	2498	878	1751	1925	3211	3220	3216	3408
B11	2178	458	475	2104	2013	3258	1962	1947	2005	1990	2105	487	1302	1488	3196	3206	3204	3468
B12	1831	1424	1420	903	1707	2595	1725	1723	1936	2474	2568	1498	1252	1131	2154	2168	2169	2579
B13	2337	1373	1363	1254	1212	3071	1238	1238	1467	2108	2191	1445	862	667	2530	2545	2548	3004
B14	3408	1942	1924	2146	481	4060	580	598	848	1779	1811	1993	969	716	3358	3374	3379	3899
B15	4191	2048	2028	3144	729	4994	686	686	485	999	964	2062	1245	1275	4400	4416	4420	4910
B16	4136	1785	1765	3250	954	5021	869	857	588	516	478	1783	1187	1332	4525	4540	4543	4999
COG.01	3600	6192	6202	4490	6883	2612	6915	6915	7139	7606	7711	6243	6446	6334	3353	3337	3328	2763
COG.02	3358	5912	5921	4052	6465	2273	6505	6506	6742	7270	7371	5969	6076	5940	2849	2833	2826	2289
COG.03	3008	5527	5534	3608	6023	1889	6065	6067	6306	6856	6955	5585	5651	5506	2390	2374	2367	1841
COG.04	2992	5431	5438	3404	5814	1848	5862	5865	6111	6707	6802	5493	5484	5319	2147	2131	2126	1656
COG.05	2953	5204	5208	3033	5398	1850	5455	5460	5716	6379	6468	5270	5138	4944	1759	1745	1743	1427
E53_01	2588	5117	5125	3247	5658	1476	5697	5698	5932	6462	6562	5174	5266	5130	2068	2052	2044	1491
E53_02	2611	4954	4960	2865	5267	1483	5317	5321	5570	6189	6282	5019	4958	4783	1596	1580	1576	1153
NPS01	4154	6723	6732	4873	7288	3089	7328	7329	7565	8092	8193	6779	6900	6763	3658	3642	3635	3108
Prow01	3235	4807	4826	4777	6296	3573	6266	6254	6354	6296	6410	4811	5610	5703	4607	4601	4589	4216
Prow02	4012	5399	5419	5544	6949	4370	6913	6899	6981	6846	6959	5395	6251	6367	5405	5398	5386	5012
WKN.08	3286	5876	5887	4327	6678	2403	6703	6701	6915	7327	7434	5923	6200	6111	3280	3264	3254	2675
WKN.09	3100	5694	5704	4053	6427	2147	6456	6455	6675	7120	7226	5744	5972	5870	2967	2951	2942	2365
WKN.10	2881	5464	5474	3735	6127	1860	6160	6160	6385	6863	6966	5517	5695	5580	2614	2598	2589	2017
WKN.11	3817	6391	6400	4572	6983	2763	7022	7023	7256	7769	7870	6445	6583	6453	3376	3360	3352	2812
WKN.14	3020	5371	5376	3260	5651	1885	5704	5708	5960	6594	6686	5435	5359	5178	1985	1970	1966	1569
WKN.22	591	2521	2536	2030	3701	1600	3692	3684	3836	4038	4151	2557	3076	3095	2215	2215	2206	2107
WKN.23	580	2044	2057	1540	3125	1715	3119	3111	3272	3529	3640	2090	2514	2519	2017	2022	2015	2074
WKN.28	2796	2359	2347	1294	1540	3198	1623	1635	1904	2769	2824	2429	1636	1334	2350	2367	2374	2928
WKN.29	2753	1815	1802	1437	1036	3355	1103	1112	1378	2199	2260	1882	1045	744	2657	2672	2678	3191
WKN.30	3003	1707	1691	1767	682	3669	751	760	1028	1878	1932	1767	812	505	3004	3019	3025	3530

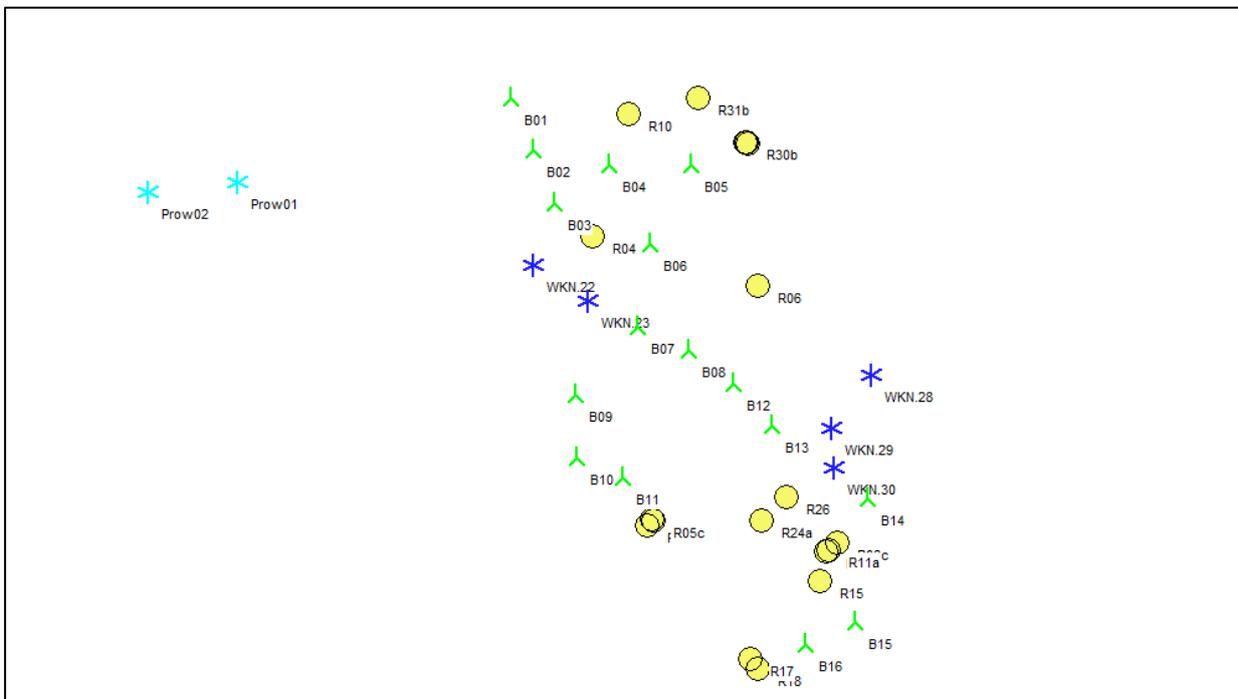
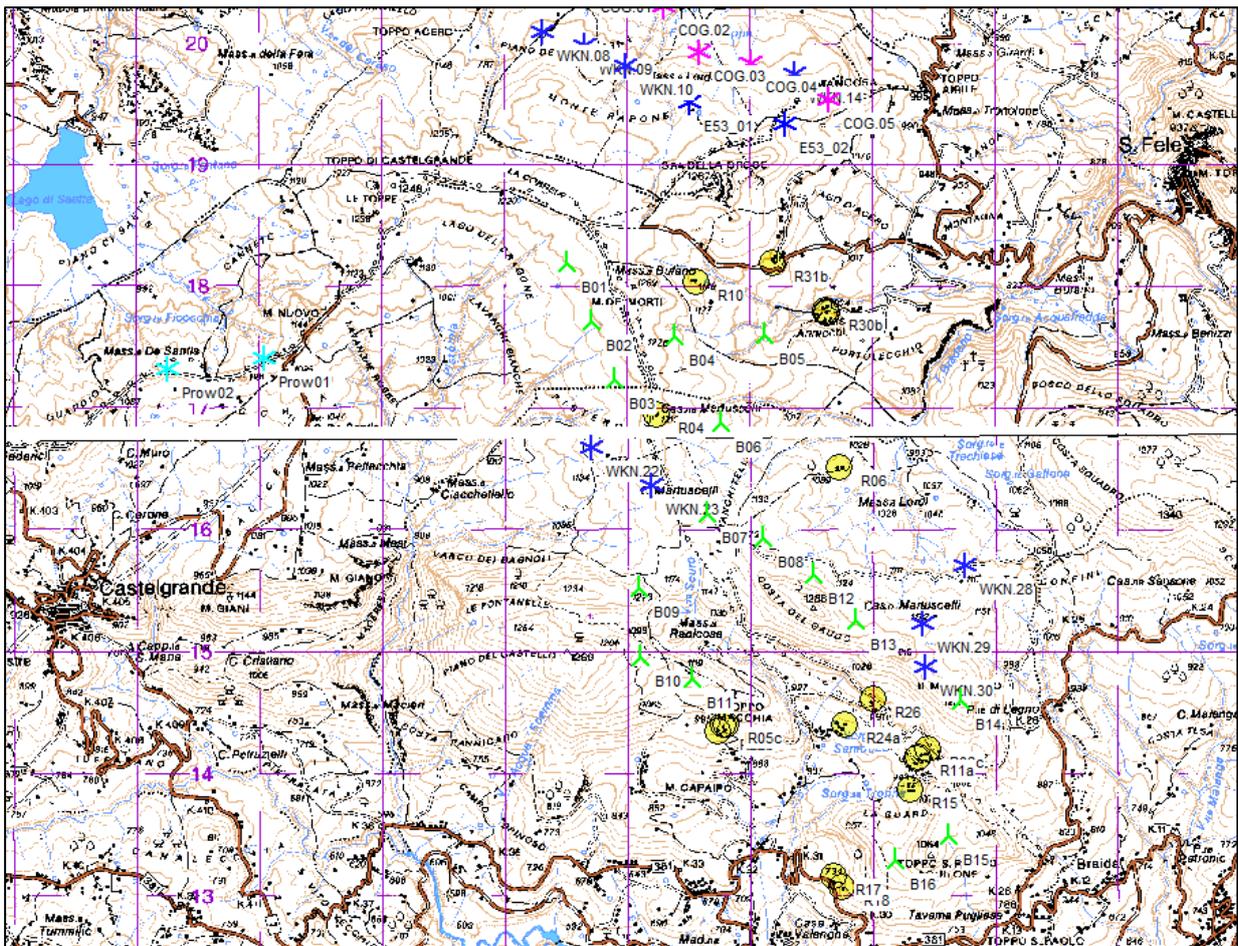


Figura 4: Inquadramento delle turbine inserite nel modello di simulazione e di tutti i recettori considerati proposti su stralcio cartografico IGM 1:50000 ed in assenza di cartografia di base (per una maggiore comprensione visiva): Turbine di progetto [▲]; turbine esistenti ed autorizzate [✱]; recettori analizzati – Shadow Receptor [●]

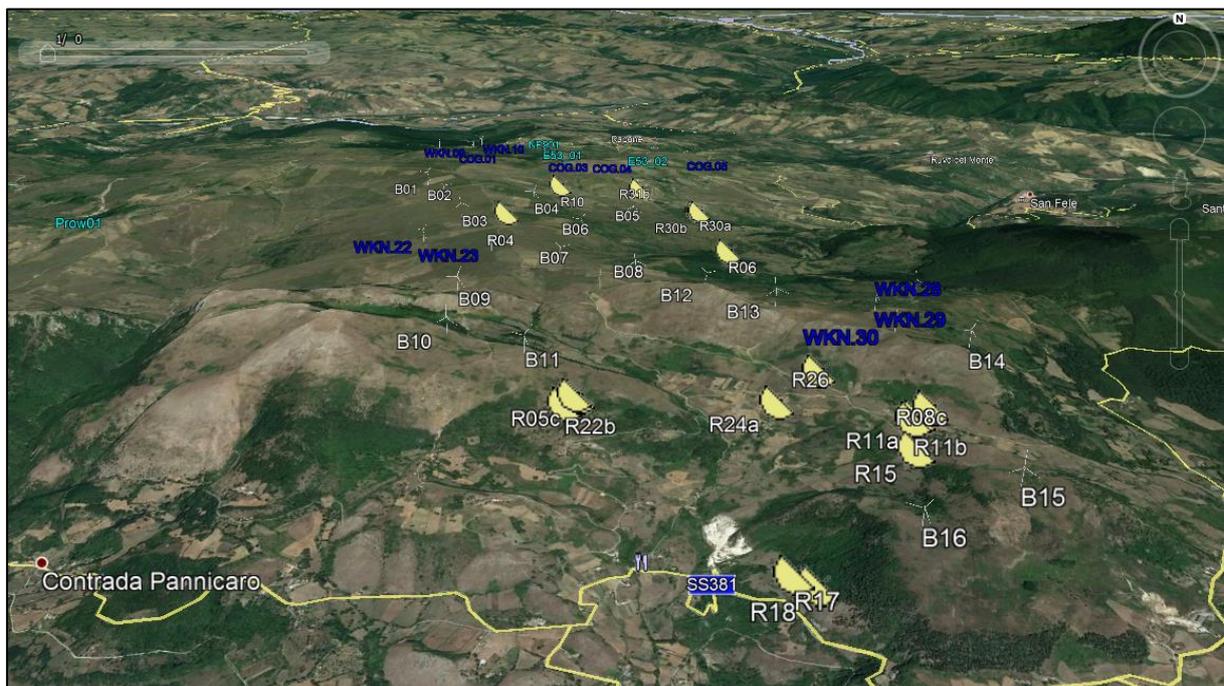
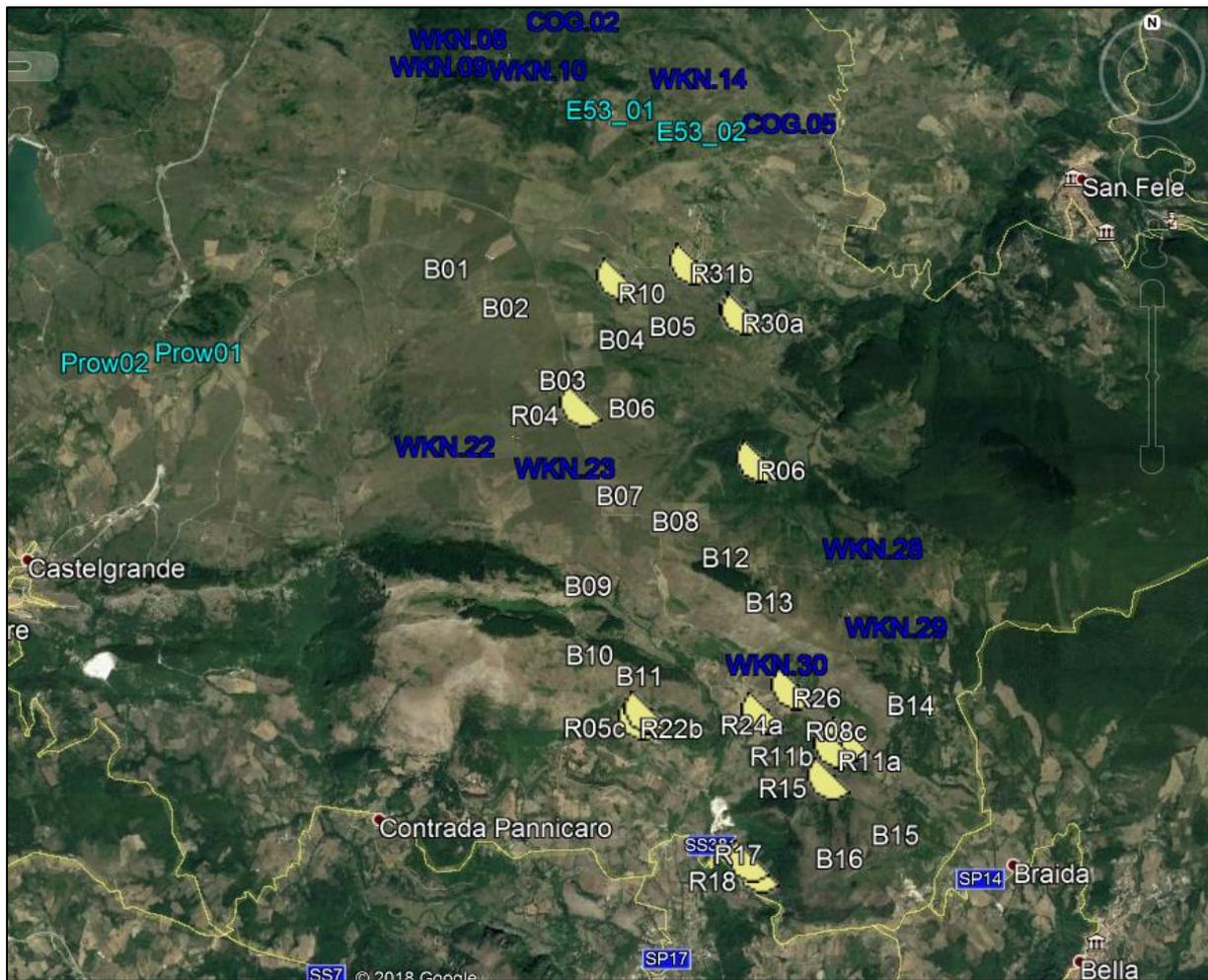


Figura 5: Inquadramento di tutti gli aerogeneratori di progetto, esistenti ed autorizzati inseriti nel modello di simulazione oltre alla evidenza dei recettori sensibili analizzati (icone in giallo "R") proposto su stralcio di ortofoto satellitare nel prospetto 2D e 3D estratto da Google Earth.

3. ANALISI DI SHADOW - FLICKERING

3.1. CENNI SUL FENOMENO DELL'EVOLUZIONE DELL'OMBRA GENERATA DAGLI AEROGENERATORI

Le turbine eoliche, come altre strutture fortemente sviluppate in altezza, proiettano un'ombra sulle aree adiacenti in presenza della luce solare diretta

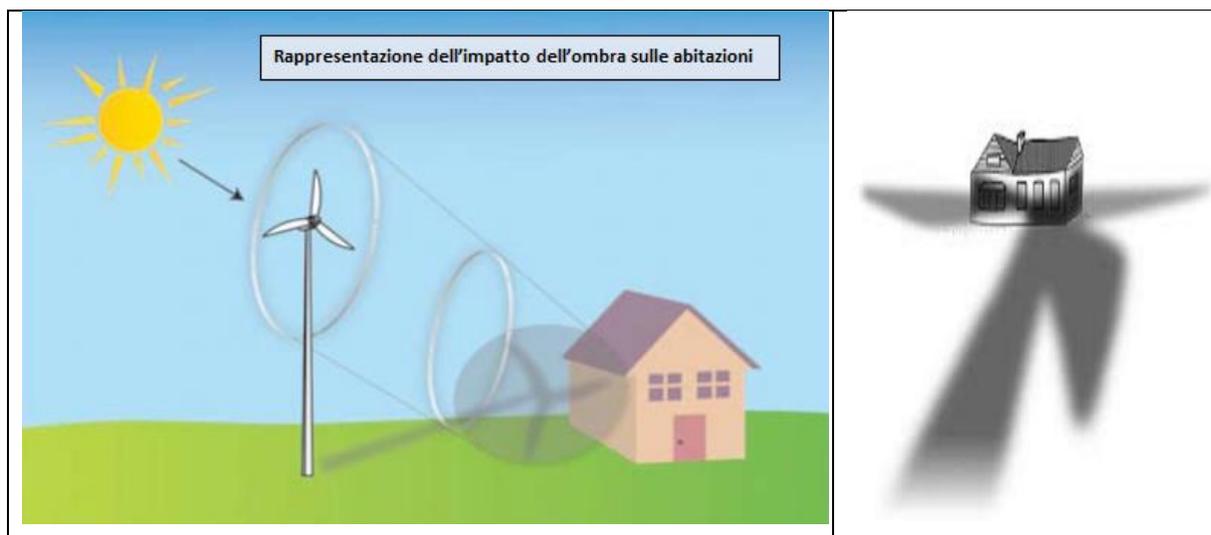


Figura 6: Rappresentazione grafica dell'impatto dell'ombra generata da una turbina eolica

Il cosiddetto fenomeno del "flickering", consiste in un effetto di lampeggiamento che si verifica quando le pale del rotore in movimento "tagliano" la luce solare in maniera intermittente. Il flickering si verifica solo in determinate condizioni e coinvolge solo un'area limitata che circonda un parco eolico, tuttavia esso può determinare disturbo per i residenti dei fabbricati situati nei pressi dell'impianto e pertanto è importante valutare e garantire che l'esposizione sia limitata.

Affinché il fenomeno si verifichi presso un recettore, il cielo deve essere chiaro e la turbina deve funzionare, altrimenti non vengono emesse ombre in movimento; inoltre il rotore della turbina deve essere situato lungo la linea di vista, senza ostacoli, dal recettore al sole. Poiché la posizione del sole cambia per tutto il giorno e per tutto l'anno, anche l'area interessata dall'ombra cambia. Il flickering è percepito come disturbante quando la variazione dell'intensità luminosa è superiore al livello di percezione dell'occhio umano.

La distanza tra una turbina eolica e un recettore influisce sull'intensità dello "sfarfallio" che diminuisce con la distanza dal recettore alla turbina, fino ad un punto in cui il cambiamento dell'intensità luminosa è inferiore a quello che l'occhio umano può distinguere. Le ombre proiettate vicino ad una turbina sono più intense, distinte e "focalizzate" perché una maggior parte del sole è bloccata intermittenemente dalle lame passanti. Quando aumenta la separazione tra il recettore e la turbina, la percentuale del sole oscurata diminuisce e le ombre diventano meno intense e meno discernibili. A una distanza di circa 10 volte il diametro del rotore, l'intensità del tremolio dell'ombra è significativamente ridotta e diventa meno percepibile all'occhio umano. L'intensità è anche ridotta se il piano del rotore è ad un angolo diverso da quello perpendicolare alla linea di vista dal recettore al sole, anche perché le lame passanti oscurano una parte minore di sole. Le condizioni di illuminazione ambientale influenzano anche la visibilità dello

sfarfallio: il flickering è più evidente in una stanza oscura con una finestra rivolta verso la turbina rispetto all'esterno dove i livelli di luce ambientale sono più alti. La frequenza o la velocità del tremolio dell'ombra è correlata alla velocità del rotore e al numero di lame sulla turbina. Alcune linee guida di paesi esteri, raccomandano una velocità di flicker non superiore a 3 "tagli" al secondo.

Per la classica turbina eolica provvista di tre pale, questo effetto corrisponde quindi ad una completa rotazione del rotore in un secondo, equivalente a 60 giri al minuto (60 RPM). Tali valori sono tipici di aerogeneratori di piccola taglia con piccoli rotori (circa 20 m) e più elevata velocità di rotazione. Le attuali turbine in commercio di grande taglia hanno una velocità di rotazione ben inferiore a tali valori, con velocità del rotore intorno ai 20 RPM. Ciò si traduce in bande che passano frequenze inferiori a 1 Hz o 1 ciclo al secondo. A queste basse frequenze, lo sfarfallio potrebbe essere motivo di fastidio, ma non costituisce una minaccia per la salute. Secondo l'Associazione britannica di epilessia, le frequenze inferiori a 3Hz non causano episodi di epilessia fotosensibile e le velocità di sfarfallio delle turbine eoliche moderne non sono in grado di innescare crisi epilettiche. Considerando la relazione spaziale tra le turbine e i recettori (localizzazioni geografiche e elevazioni del suolo) nonché la geometria delle turbine (altezza del mozzo e dimensioni del rotore), il verificarsi del fenomeno di flickering può essere accuratamente modellato e previsto con il dettaglio dei minuti. Una progettazione attenta è comunque fondamentale per evitare questo spiacevole fenomeno semplicemente prevedendo il luogo di incidenza dell'ombra e disponendo le turbine in maniera tale che l'ombra sulle zone sensibili non superi un certo numero di ore all'anno.

Il grafico che segue riporta l'evoluzione annuale tipica dell'ombra di una turbina considerando il caso peggiore di pale sempre in rotazione intorno al mozzo, e orientate sempre ortogonalmente al sole durante la sua evoluzione giornaliera. Come è evidente dal grafico e dalla legenda, le ore annue di ombra sono sempre minori con l'aumentare della distanza dal pilone secondo una particolare geometria dettata dalla posizione geografica; da osservare che l'ombra arriva a proiettarsi anche sino ad una distanza di 1 km, anche se solo per pochi minuti all'anno.

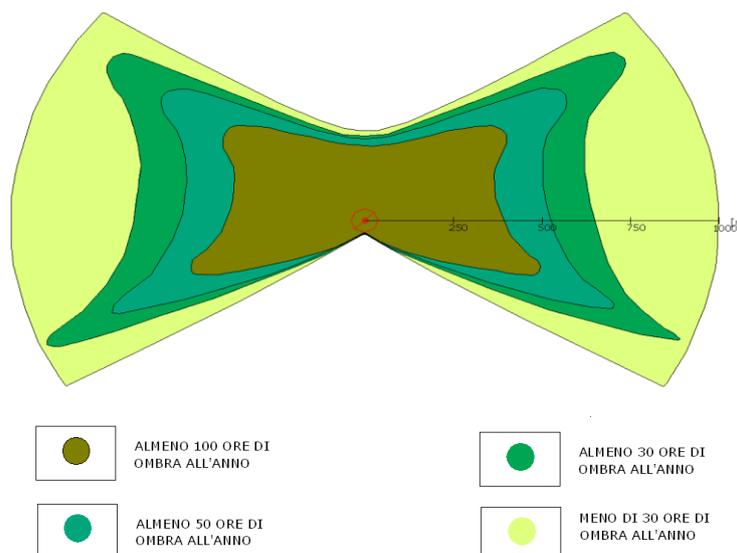


Figura 7: Evoluzione annuale tipo dell'ombra di un aerogeneratore

 TENPROJECT	RELAZIONE SULL'EVOLUZIONE DELL'OMBRA INDOTTA DALL'IMPIANTO	Codice Revisione Data di creazione Data revisione Pagina	GE.AGB01.P3.A.8 22/11/2018 04/12/2018 00 18 di 62
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In Italia, così come nella maggior parte dei paesi Europei ed extraeuropei non esiste una normativa specifica in relativa al disturbo generato dal fenomeno di Shadow – Flickering. Esistono delle regolamentazioni locali ma quasi mai comprendono limiti numerici specifici, quanto piuttosto delle raccomandazioni tese a sottolineare che il fenomeno non sia “unreasonable” o “significant”.

3.2. METODOLOGIA DI ANALISI

La valutazione tecnica è stata eseguita con l'ausilio di un software di simulazione specifico per la progettazione degli impianti eolici WIND PRO®, costituito da un insieme di moduli di elaborazione orientati alla simulazione di una moltitudine di aspetti che caratterizzano le diverse fasi progettuali. Il modulo SHADOW è quello specifico per la valutazione dell'evoluzione dell'ombra e del flickering.

I dati di input sono:

- modello DTM del terreno;
- la posizione degli aerogeneratori, il modello e le caratteristiche dimensionali;
- definizione di aree sensibili o recettori, posizione geografica e caratteristiche dimensionali dell'area disturbata; (finestra, patio, area esterna)
- definizione di caratteristiche anemologiche dell'area per il calcolo del "real case" basato sulla effettiva distribuzione statistica dei dati del vento in relazione alle ore di funzionamento ed al posizionamento della navicella per la proiezione del rotore.
- definizione di dati meteorologici storici di una stazione di riferimento per il calcolo probabilistico delle ore di soleggiamento

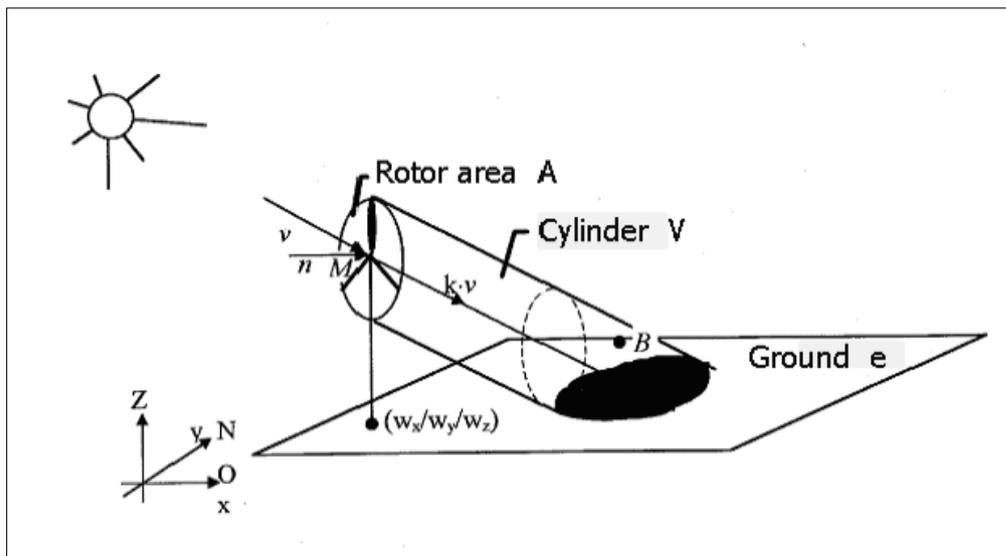
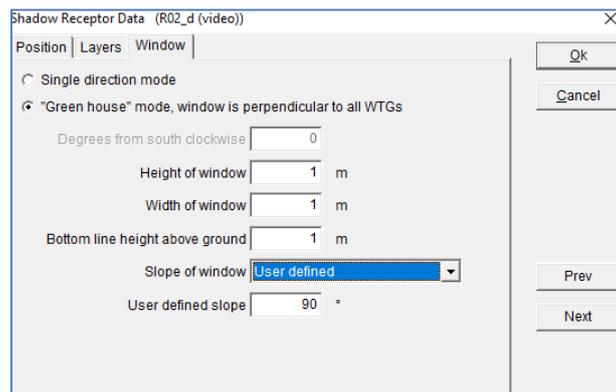
Nel modello di calcolo dell'ombra utilizzato da windPRO i seguenti parametri definiscono la propagazione dell'ombra dietro il disco del rotore:

- Il diametro del Sole, D: 1.390.000 km
- La distanza dal Sole, d: 150.000.000 km
- Angolo di attacco: 0.531 gradi

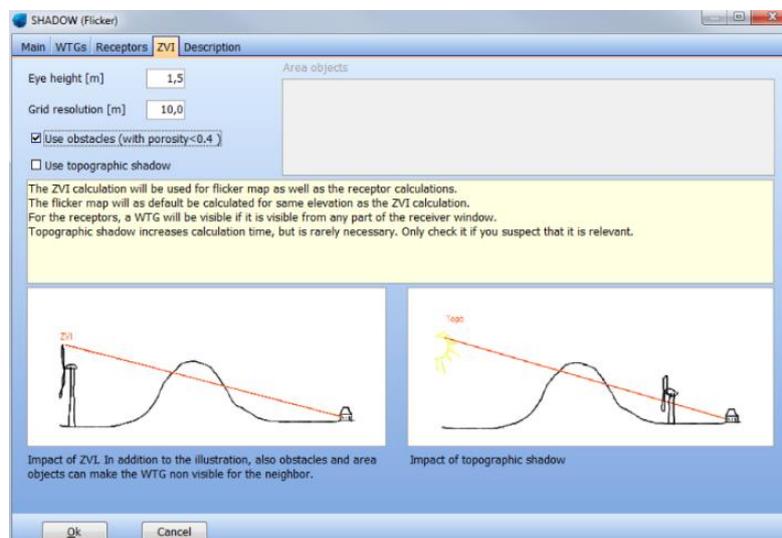
Teoricamente, ciò comporterebbe un impatto di ombra fino a 4,8 km con un rotore di 45 metri di diametro. In realtà, tuttavia, le ombre non raggiungono mai il massimo teorico a causa delle caratteristiche ottiche dell'atmosfera. Quando il Sole diventa troppo basso all'orizzonte e la distanza diventa troppo lunga, l'ombra si disperde prima che raggiunga il suolo (o il recettore).

I recettori dell'ombra sono invece definiti nel modello dalle seguenti informazioni:

- La posizione della "finestra" sopra il livello del suolo e la sua dimensione (altezza e larghezza).
- L'inclinazione della "finestra" rispetto all'orizzontale (si può scegliere tra finestra verticale, orizzontale e tetto [45 °]).
- L'orientamento direzionale della finestra rispetto al sud (in gradi, positivi, a ovest).
- In alternativa è possibile selezionare la modalità "Green house", ovvero il recettore è modellato con caratteristiche di una “serra” che riceve ombra da qualunque direzione in quanto completamente esposto al fenomeno dell'ombra intermittente.


Figura 8: Schema di calcolo del modulo Shadow

Figura 9: Finestra di input delle caratteristiche del recettore

Il software tiene conto dell'ostacolo naturale costituito dall'orografia e da eventuali ostacoli inputati specificatamente (ad es. foreste, barriere naturali o artificiali etc..), grazie all'opzione ZVI.


Figura 10: Finestra della opzione ZVI che tiene conto degli ostacoli naturali ed artificiali inputati nel software

 TENPROJECT	RELAZIONE SULL'EVOLUZIONE DELL'OMBRA INDOTTA DALL'IMPIANTO	Codice Revisione Data di creazione Data revisione Pagina	GE.AGB01.P3.A.8 22/11/2018 04/12/2018 00 20 di 62
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Nello studio viene comunque calcolato un " worst case" ovvero la condizione più sfavorevole possibile, in quanto si considera che:

- il sole splende per tutta la giornata, dall'alba al tramonto (cioè si è sempre in assenza di copertura nuvolosa);
- il piano di rotazione delle pale è sempre perpendicolare alla direttrice sole-aerogeneratore (l'aerogeneratore "insegue" il sole);
- l'aerogeneratore è sempre operativo.

Inoltre, per le simulazioni, ogni singolo ricettore viene considerato in modalità "green house", cioè come se tutte le pareti esterne fossero esposte al fenomeno, senza considerare la presenza di finestre e/o porte dalle quali l'effetto arriva realmente all'interno dell'abitazione. Allo stesso tempo, si è trascurata la presenza degli alberi e di altri ostacoli posti ai margini delle strade che, "intercettando" l'ombra degli aerogeneratori, potrebbero ridurre il fastidio del flickering. Ciò significa che i risultati ai quali si perverrà sono ampiamente sovrastimati.

Ai fini di una comprensione del reale effetto di disturbo, lo studio è stato effettuato anche nella cosiddetta modalità "Real Case", ovvero tenendo conto dei dati statistici ricavati da una stazione anemometrica sita nella stessa area, e di una stazione meteo che fornisce i dati di copertura nuvolosa della zona. In tal modo, viene ricavato il numero di ore di ombreggiamento più realistico poiché, a differenza del caso precedente, si tiene conto della reale presenza del sole e delle ore di funzionamento della turbina nell'arco di un anno anche in funzione della direzione del vento che influisce sull'orientamento delle pale rispetto al sole e dunque sull'ombra proiettate sui ricettori.

3.3. DATI DI INPUT E PARAMETRI DEL MODELLO

In base alla metodologia descritta nei paragrafi precedenti, sono stati utilizzati i seguenti dati di input per impostare il modello di simulazione per la valutazione del fenomeno di Shadow-Flickering degli aerogeneratori di Castelluccio dei Sauri:

DTM: Modello del terreno digitale per caratterizzare l'orografia, che svolge un ruolo importante nella mascheratura fisica dell'impatto dell'ombra

- Posizioni geografiche di recettori con dettaglio dimensionale delle aree più esposte.
- Posizioni geografiche di generatori di turbine eoliche e loro caratteristiche dimensionali
- Dati del vento di una stazione di misura locale per il calcolo dell'energia per stimare le ore operative e le probabilità associate alle diverse direzioni del vento
- Probabilità mensile della presenza del sole da una stazione meteo nazionale
- Nessun ostacolo naturale o artificiale è stato modellato.

3.4. DTM

Il modello digitale del terreno DTM (Digital Terrain Model) è stato estrapolato dal grid disponibile in download dal satellite, georeferenziato, sovrapposto, confrontato e adeguato con le curve di livello presenti sulla cartografia ufficiale CTR 1:10.000 con uno step di 10 m. Il modello digitale ottenuto copre un'area di 40x40 Km e trova un buon riscontro con l'andamento orografico verificato in sito.

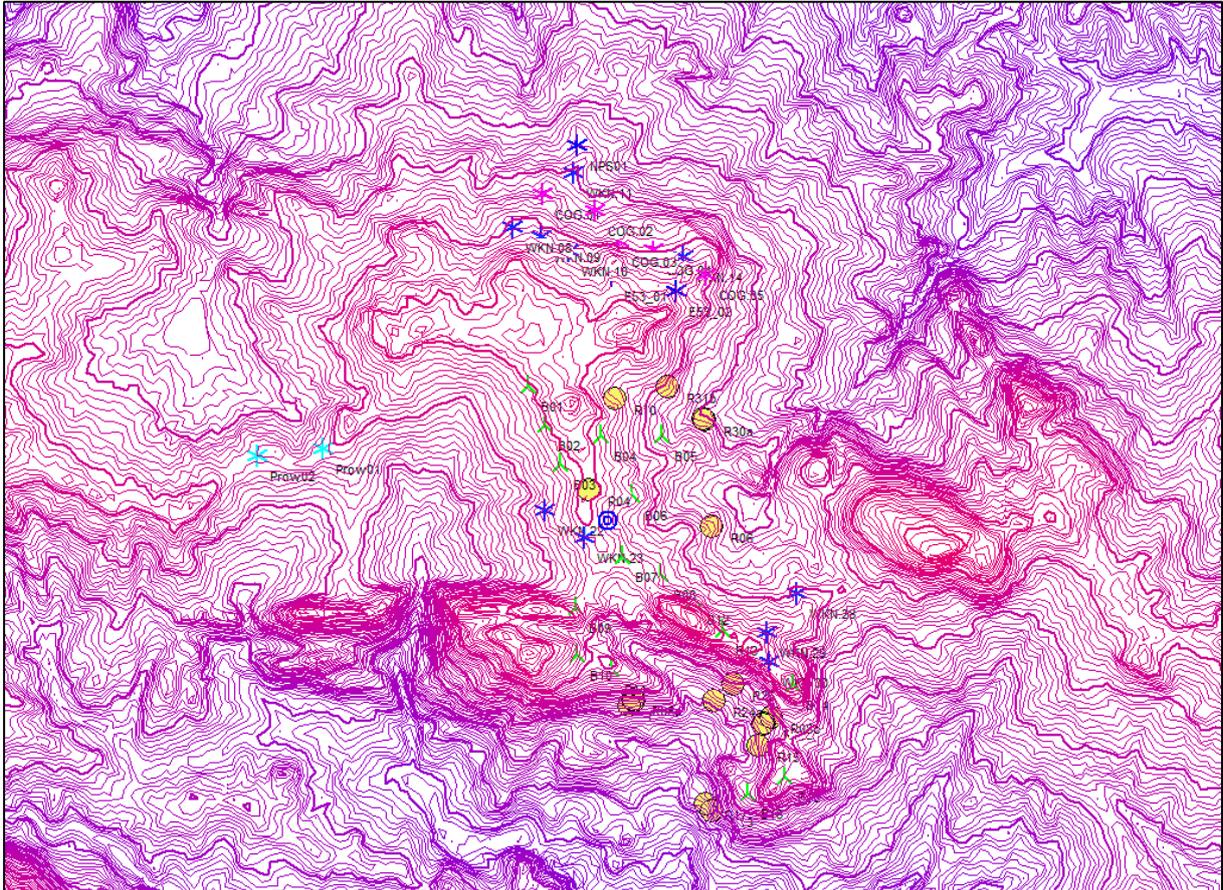


Figura 11: Stralcio del DTM di input con posizione di tutti gli aerogeneratori considerati nel modello di simulazione e dei recettori analizzati

3.5. AEROGENERATORI E RECETTORI

Le coordinate ed il relativo modello di turbina sono dettagliati al paragrafo 2.2.

Le caratteristiche e le coordinate dei recettori sono state dettagliate al paragrafo 2.3, ma è importante sottolineare che per tutti i recettori si è ritenuto opportuno usare l'ipotesi di cautela della modalità "green house mode". Questa scelta è stata operata poiché in talune circostanze anche lo spazio antistante le strutture può essere considerato o adibito a luogo di riposo e relax. La scelta di una singola finestra o di una facciata in alcune condizioni potrebbe risultare riduttiva allo scopo di una vera valutazione d'impatto.

Tabella 7: Coordinate geografiche dei recettori e caratteristiche dimensionali della tipologia di area considerata nell'analisi

ID RECETTORE	Gauss Boaga Long. Est [m]	Gauss Boaga Lat. Nord [m]	Quota [m]	Lunghezza [m]	Larghezza [m]	Altezza s.l.t. [m]
R04	541.166	4.516.745	1207,9	1	1	1,5
R05a	541.714	4.514.210	954,0	1	1	1,5
R05c	541.733	4.514.203	948,4	1	1	1,5
R06	542.656	4.516.311	1064,8	1	1	1,5
R08c	543.380	4.514.006	981,2	1	1	1,5
R10	541.484	4.517.844	1150,0	1	1	1,5
R11a	543.304	4.513.938	958,1	1	1	1,5
R11b	543.285	4.513.930	955,4	1	1	1,5
R15	543.233	4.513.666	939,8	1	1	1,5
R17	542.605	4.512.964	743,0	1	1	1,5
R18	542.679	4.512.876	750,0	1	1	1,5
R22b	541.670	4.514.150	935,4	1	1	1,5
R24a	542.698	4.514.207	914,8	1	1	1,5
R26	542.930	4.514.412	996,8	1	1	1,5
R30a	542.559	4.517.584	1009,8	1	1	1,5
R30b	542.551	4.517.598	1008,8	1	1	1,5
R30c	542.539	4.517.600	1008,9	1	1	1,5
R31b	542.111	4.517.991	1092,7	1	1	1,5

3.6. INPUT PER LA MODELLAZIONE DEL "REAL CASE"

Per un calcolo "REAL CASE" affidabile, sono richieste le probabilità mensili di presenza di sole in aggiunta ai dati locali sul vento. I dati meteo di copertura nuvolosa sono dedotti dalla stazione meteorologica di Amendola, che sebbene posta a circa 85 km circa possiede un database ampio e valido per lo scopo che risulta essere ampiamente cautelativo per il calcolo in quanto riferito ad area meno montuosa e coperta rispetto le condizioni locali.

[Main](#) | [WTGs](#) | [Receptors](#) | [Real case statistics](#) | [Flicker map](#) | [ZVI](#) | [Description](#)

Operational hours

Manual input for each sector
 Calculate from selected WTG's

Operational hours are calculated from the selected WTG's, using the wind distribution information in following Site data or Meteo data object.

User defined idle start wind speed
 m/s
 Default is cut in wind speed from power curve

Monthly sunshine probabilities

Station from database: [AMENDOLA]

Manual input of

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Figura 12: Valori di probabilità di soleggiamento mensile della stazione meteorologica di Amendola

I dati meteo utili al calcolo energetico e di funzionamento degli aerogeneratori è stato ricavato dai dati anemologici della stazione di misura di sito posta a circa 1600 m dall'aerogeneratore B05 dell'impianto e di altezza pari a 50 m s.l.t.

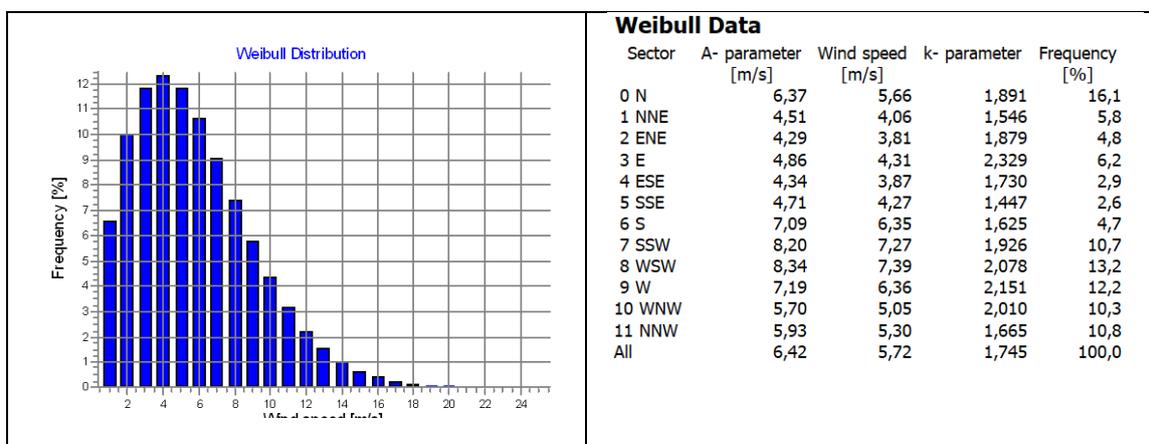


Figura 13: Informazioni sulla anemologia locale utili al calcolo dello shadow flickering - Caratteristiche anemologiche dell'area risultanti dalla stazione TP_211 a 50 m s.l.t.

4. RISULTATI

Si riportano di seguito sinteticamente in forma tabellare i risultati della simulazione per i recettori analizzati evidenziati per le condizioni di Worst e Real Case

Tabella 8: Risultati del calcolo

ID SHADOW RECEPTOR	"WORST CASE" VALORI ATTESI AL RECETTORE NELL'IPOTESI PEGGIORE POSSIBILE	"REAL CASE" VALORI REALI ATTESI AL RECETTORE
	Shadow ore/anno	Shadow ore/anno
R04	74:10	19:34
R05a	0:00	0:00
R05c	0:00	0:00
R06	127:02	35:09
R08c	0:00	0:00
R10	92:22	24:04
R11a	0:00	0:00
R11b	0:00	0:00
R15	120:34	27:52
R17	8:30	2:47
R18	0:00	0:00
R22b	12:10	2:33
R24a	81:17	25:05
R26	43:37	13:38
R30a	101:38	27:48
R30b	100:34	27:37
R30c	102:28	28:14
R31b	64:53	17:25

4.1. ANALISI DEI RISULTATI

Dalle simulazioni effettuate, si evince che gli aerogeneratori di progetto generano maggiormente il fenomeno di shadow/flickering sul recettore individuato nell'analisi come R06 che, nelle ipotesi di "Real case", subisce il fenomeno per un periodo molto modesto pari a circa 35 ore/anno. Per tutti gli altri rimanenti recettori considerati invece, l'effetto calcolato è addirittura ancor più esiguo o addirittura nullo. Tale caso ("Real case"), seppure più realistico, è comunque sovrastimato poiché non tiene conto della presenza di nubi e di vegetazione ad alto fusto.

E' stato elaborato un calendario dell'ombra riportato in appendice (rif. Appendice *Calendar*), che riporta in maniera grafica giorno per giorno, per tutto l'anno, la durata giornaliera del fenomeno, l'orario di inizio e di fine del fenomeno, nelle condizioni di caso reale. Dalla lettura del "*Calendar*" si legge che il fenomeno dell'ombreggiamento, si esplica sui recettori con intensità maggiore nel periodo compreso tra Gennaio, Marzo, Aprile, Settembre, Novembre e Dicembre nelle prime ore della giornata, oppure al primo pomeriggio. Nella figura che segue è riportato a titolo di esempio il grafico "calendar" di un recettore: le macchie individuano i momenti di shadow, la posizione nel grafico individua tempo e durata del fenomeno, il colore della macchia individua la turbina che causa il fenomeno.

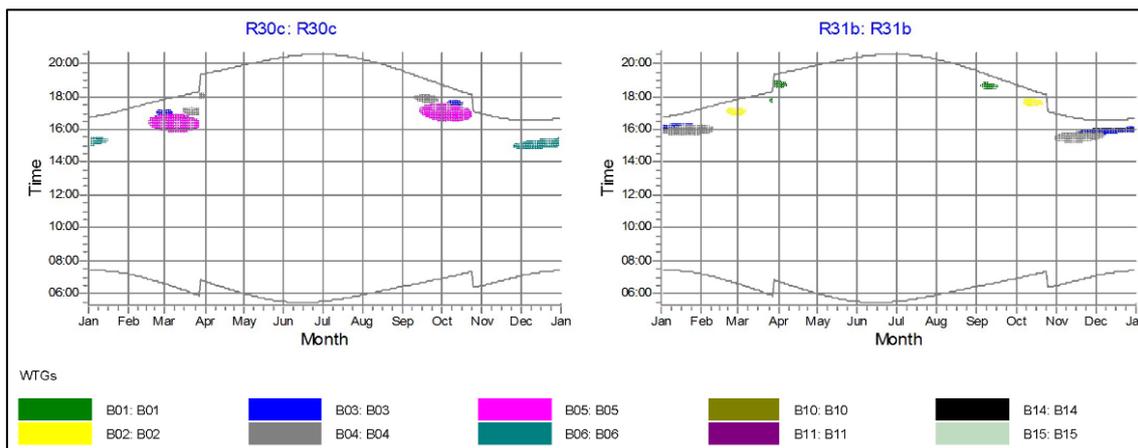


Figura 14: Rappresentazione grafica dell'ombreggiamento durante l'anno alle diverse fasce orarie e nei diversi mesi, i differenti colori sono utilizzati per distinguere le turbine che causano l'ombreggiamento.

L'allegato 2 riporta il dettaglio analitico di quanto espresso dal grafico precedente con gli specifici orari di inizio e di fine del fenomeno. A seguire è altresì riportata la sintesi grafica annuale (come mostra l'immagine precedente) dell'apporto di ombreggiamento a carico di ogni recettore ed il/gli aerogeneratore/i responsabile/i del fenomeno.

E' stata inoltre elaborata una mappa (report *Map*, Allegato 5) in cui vengono riportate, con diverse gradazioni di colore, le zone soggette ad una determinata durata del fenomeno dell'ombreggiamento oltre all'estensione areale nella quale il fenomeno risulta significativo.

Il fenomeno dell'ombreggiamento interessa marginalmente tratti di strade Provinciali, comunali e/o private per un numero di ore all'anno molto esiguo o del tutto irrilevanti e solo in alcuni tratti.

Preme tuttavia evidenziare che nelle simulazioni non si è tenuto conto della possibile presenza di vegetazione capace di offrire un effetto "barriera" ai recettori e/o alle strade limitrofe. Inoltre, la

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percezione dell'impianto dalla strada risulterebbe essere "in movimento" e quindi legata alla breve permanenza delle automobili in transito, per cui il fastidio indotto sarebbe temporalmente limitato. A questo si aggiunge che le simulazioni sono state effettuate assumendo le "condizioni peggiori", sovrastimando pertanto l'effetto di flickering.

5. CONCLUSIONI E RACCOMANDAZIONI

In conclusione, si può affermare che i risultati ottenuti della elaborazioni evidenziano, pur considerando le condizioni più sfavorevoli, che le turbine di progetto unitamente anche agli aerogeneratori di medie e piccola taglia già insistenti sul territorio oltre quelli di grande taglia autorizzati, considerati ed inclusi nel modello di simulazione, generano effetti di shadow flickering i cui impatti risultano essere nulli o del tutto trascurabili per molte strutture, e molto modesti per altre.

In via generale va comunque sottolineato che, anche laddove via siano le condizioni più sfavorevoli di esposizione, come nel caso del recettore individuato con R06 il fenomeno di ombreggiamento si manifesterebbe per un periodo massimo di circa **35 ore/anno (35 ore e 09')** per l'elaborazione effettuata nelle condizioni più verosimili ("Real Case").

In ogni caso è comunque da rimarcare l'effetto di sovrastima dovuto al grado di cautela utilizzato per la simulazione che non tiene in conto di tutte le possibili fonti di attenuazione dell'effetto cui ogni recettore è (o può essere) soggetto quali presenza di alberi, ostacoli, siepi e quant'altro possa attenuare il fenomeno dell'evoluzione giornaliera dell'ombra.

Si rimarca altresì che sono stati elaborati effetti cumulativi sui recettori interessati valutando l'apporto degli impianti esistenti sul territorio e già in esercizio oltre quelli autorizzati e quindi di potenziale futura installazione.

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BIBLIOGRAFIA

WindPRO Help, EMD International Co. Denmark, version 3.1.597

WindPRO, EMD International Co. Denmark, version 2.7.490

Photosensitive Epilepsy, Epilepsy Action (British Epilepsy Association), website:

<http://www.epilepsy.org.uk/info/photo.html> Leeds, UK, November 2009.

Wind Energy Handbook, Wiley Editions 2011, Burton Jenkins, Sharpe, Bossanyi

Richard Lampeter :Shadow Flicker Regulations and Guidance: New England and Beyond

**ALLEGATO 1: "MAIN RESULT": QUADRO SINTETICO DEI RISULTATI DI CALCOLO
nell'ipotesi elaborata di "Worst Case" e "Real Case"**
SHADOW - Main Result
Calculation: GE.AGB01.P3_SH-FL

Assumptions for shadow calculations

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

Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

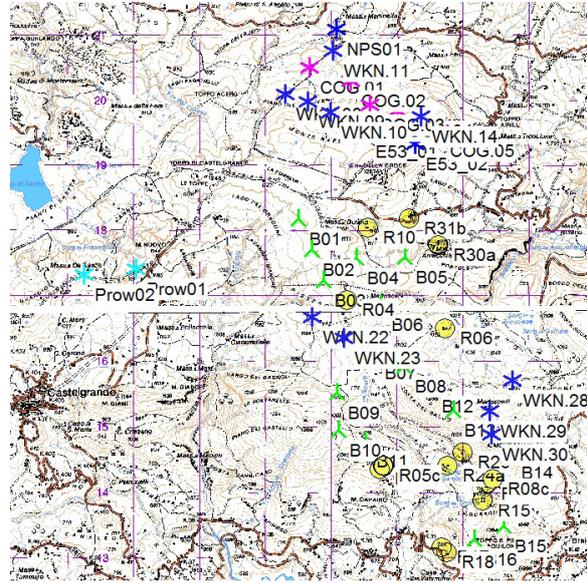
Sunshine probability S (Average daily sunshine hours) [AMENDOLA]
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4,12 4,66 5,30 6,72 8,25 9,35 10,16 9,45 7,64 5,82 4,65 3,82

Operational hours are calculated from WTGs in calculation and wind distribution:
SDP SDV_Ave

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
1.403 765 428 258 208 129 270 903 1.287 921 569 687 7.829

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

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: DTM
Obstacles used in calculation
Eye height: 1,5 m
Grid resolution: 10 m


WTGs

WTG ID	UTM WGS84 Zone: 33			Row data/Description	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
	East	North	Z		Valid	Manufact.					Calculation distance [m]	RPM [RPM]
UTM WGS84 Zone: 33 [m]												
B01	540.427	4.517.990	1.193,5	B01	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B02	540.629	4.517.520	1.191,3	B02	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B03	540.817	4.517.044	1.181,0	B03	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B04	541.313	4.517.391	1.183,7	B04	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B05	542.048	4.517.400	1.070,0	B05	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B06	541.683	4.516.681	1.159,5	B06	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B07	541.576	4.515.942	1.172,2	B07	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B08	542.036	4.515.734	1.152,7	B08	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B09	541.019	4.515.323	1.182,1	B09	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B10	541.036	4.514.757	1.133,6	B10	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B11	541.452	4.514.586	1.100,0	B11	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B12	542.443	4.515.433	1.168,5	B12	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B13	542.789	4.515.064	1.192,9	B13	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B14	543.646	4.514.407	1.190,0	B14	Yes	VESTAS	V136-4.2-4.200	4.200	136,0	112,0	1.802	10,4
B15	543.547	4.513.296	1.029,3	B15	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
B16	543.105	4.513.092	954,0	B16	Yes	VESTAS	V150-5.6-5.600	5.600	150,0	105,0	1.905	10,4
COG.01	540.592	4.520.299	1.044,4	COG.01	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
COG.02	541.226	4.520.102	1.024,8	COG.02	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
COG.03	541.514	4.519.733	1.084,6	COG.03	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
COG.04	541.932	4.519.637	1.097,8	COG.04	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
COG.05	542.569	4.519.343	1.121,9	COG.05	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
E53_01	541.434	4.519.319	1.170,0	E53_01	Yes	ENERCON	E-53-800	800	53,0	73,3	996	29,0
E53_02	542.205	4.519.140	1.152,7	E53_02	Yes	ENERCON	E-53-800	800	53,0	73,3	996	29,0
NPS01	541.006	4.520.896	967,9	NPS01	Yes	NORTHERN POWER	NPS 60C-24-60	60	24,0	37,0	2.000	43,0
Prow01	537.966	4.517.220	1.082,3	Prow01	Yes	NORTHERN POWER	NPS 60C-24-60	60	24,0	37,0	2.000	43,0
Prow02	537.173	4.517.131	1.079,0	Prow02	Yes	NORTHERN POWER	NPS 60C-24-60	60	24,0	37,0	2.000	43,0
WKN.08	540.233	4.519.896	1.108,7	WKN.08	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.09	540.573	4.519.788	1.125,4	WKN.09	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.10	540.914	4.519.615	1.133,3	WKN.10	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.11	540.958	4.520.556	1.000,0	WKN.11	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.14	542.286	4.519.550	1.120,5	WKN.14	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.22	540.634	4.516.488	1.145,4	WKN.22	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6

To be continued on next page...

SHADOW - Main Result
Calculation: GE.AGB01.P3_SH-FL

...continued from previous page

UTM WGS84 Zone: 33				WTG type		Shadow data					
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
UTM WGS84 Zone: 33											
WKN.23	541.123	4.516.167	1.187,6 WKN.23	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.28	543.678	4.515.517	1.110,0 WKN.28	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.29	543.328	4.515.041	1.180,0 WKN.29	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6
WKN.30	543.353	4.514.687	1.187,1 WKN.30	Yes	NORDEX	N117/3000-3.000	3.000	116,8	91,0	1.489	12,6

Shadow receptor-Input

UTM WGS84 Zone: 33										
No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
		[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
R04	R04	541.166	4.516.745	1.207,9	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R05a	R05a	541.714	4.514.210	954,0	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R05c	R05c	541.733	4.514.203	948,4	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R06	R06	542.656	4.516.311	1.064,8	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R08c	R08c	543.380	4.514.006	981,2	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R10	R10	541.484	4.517.844	1.150,0	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R11a	R11a	543.304	4.513.938	958,1	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R11b	R11b	543.285	4.513.930	955,4	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R15	R15	543.233	4.513.666	939,8	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R17	R17	542.605	4.512.964	743,0	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R18	R18	542.679	4.512.876	750,0	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R22b	R22b	541.670	4.514.150	935,4	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R24a	R24a	542.698	4.514.207	914,8	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R26	R26	542.930	4.514.412	996,8	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R30a	R30a	542.559	4.517.584	1.009,8	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R30b	R30b	542.551	4.517.598	1.008,8	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R30c	R30c	542.539	4.517.600	1.008,9	1,0	1,0	1,0	-180,0	90,0	"Green house mode"
R31b	R31b	542.111	4.517.991	1.092,7	1,0	1,0	1,0	-180,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case			Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
R04	R04	74:10	148	0:58	19:34	
R05a	R05a	0:00	0	0:00	0:00	
R05c	R05c	0:00	0	0:00	0:00	
R06	R06	127:02	203	1:02	35:09	
R08c	R08c	0:00	0	0:00	0:00	
R10	R10	92:22	153	1:15	24:04	
R11a	R11a	0:00	0	0:00	0:00	
R11b	R11b	0:00	0	0:00	0:00	
R15	R15	120:34	128	1:09	27:52	
R17	R17	8:30	26	0:25	2:47	
R18	R18	0:00	0	0:00	0:00	
R22b	R22b	12:10	44	0:20	2:33	
R24a	R24a	81:17	114	1:05	25:05	
R26	R26	43:37	74	0:56	13:38	
R30a	R30a	101:38	140	1:17	27:48	
R30b	R30b	100:34	140	1:14	27:37	
R30c	R30c	102:28	140	1:15	28:14	
R31b	R31b	64:53	160	0:41	17:25	

SHADOW - Main Result
Calculation: GE.AGB01.P3_SH-FL

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

No.	Name	Worst case [h/year]	Expected [h/year]
B01	B01	27:21	8:03
B02	B02	27:32	7:17
B03	B03	29:22	7:42
B04	B04	69:20	18:21
B05	B05	100:15	26:38
B06	B06	118:04	32:56
B07	B07	15:16	4:00
B08	B08	56:09	14:26
B09	B09	0:00	0:00
B10	B10	16:25	5:15
B11	B11	41:20	13:03
B12	B12	0:00	0:00
B13	B13	0:00	0:00
B14	B14	68:22	21:46
B15	B15	129:21	29:43
B16	B16	20:40	5:20
COG.01	COG.01	0:00	0:00
COG.02	COG.02	0:00	0:00
COG.03	COG.03	0:00	0:00
COG.04	COG.04	0:00	0:00
COG.05	COG.05	0:00	0:00
E53_01	E53_01	0:00	0:00
E53_02	E53_02	0:00	0:00
NPS01	NPS01	0:00	0:00
Prow01	Prow01	0:00	0:00
Prow02	Prow02	0:00	0:00
WKN.08	WKN.08	0:00	0:00
WKN.09	WKN.09	0:00	0:00
WKN.10	WKN.10	0:00	0:00
WKN.11	WKN.11	0:00	0:00
WKN.14	WKN.14	0:00	0:00
WKN.22	WKN.22	20:54	5:32
WKN.23	WKN.23	0:00	0:00
WKN.28	WKN.28	17:06	4:08
WKN.29	WKN.29	0:00	0:00
WKN.30	WKN.30	0:00	0:00



**RELAZIONE SULL'EVOLUZIONE
DELL'OMBRA INDOTTA
DALL'IMPIANTO**

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ALLEGATO 2: "CALENDAR":

DETTAGLIO ANALITICO GIORNALIERO DELL'EFFETTO "FLICKERING" PER OGNI RECETTORE

SHADOW - Calendar																		
Calculation: GE.AGB01.P3 SH-FLShadow receptor: R04 - R04																		
Assumptions for shadow calculations						Sunshine probability S (Average daily sunshine hours) [AMENDOLA]												
Maximum distance for influence			2.000 m			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Minimum sun height over horizon for influence			3 °			4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82	
Day step for calculation			1 days			Operational time												
Time step for calculation			1 minutes			N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
						1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829
Idle start wind speed: Cut in wind speed from power curve																		
January	February	March	April	May	June													
1 07.23	07.10	16.30 (WKN 22)	06.34	06.53 (B06)	06.44	07.17 (B06)	05.58	05.30										
16.41	17.15	21	16.51 (WKN 22)	17.49	18	07.11 (B06)	19.22	43	08.00 (B06)	19.54	20.23							
2 07.23	07.09	16.30 (WKN 22)	06.33	06.52 (B06)	06.42	07.19 (B06)	05.57	05.29										
16.42	17.16	23	16.53 (WKN 22)	17.50	21	07.13 (B06)	19.23	40	07.59 (B06)	19.55	20.24							
3 07.23	07.08	16.31 (WKN 22)	06.31	06.50 (B06)	06.40	07.21 (B06)	05.56	05.29										
16.43	17.17	23	16.54 (WKN 22)	17.51	23	07.13 (B06)	19.24	35	07.56 (B06)	19.56	20.25							
4 07.23	07.07	16.31 (WKN 22)	06.30	06.48 (B06)	06.39	07.22 (B06)	05.55	05.29										
16.44	17.19	25	16.56 (WKN 22)	17.52	26	07.14 (B06)	19.26	31	07.53 (B06)	19.57	20.25							
5 07.23	07.06	16.32 (WKN 22)	06.28	06.47 (B06)	06.37	07.26 (B06)	05.53	05.28										
16.44	17.20	25	16.57 (WKN 22)	17.53	28	07.15 (B06)	19.27	24	07.50 (B06)	19.58	20.26							
6 07.23	07.05	16.31 (WKN 22)	06.26	06.45 (B06)	06.36	07.30 (B06)	05.52	05.28										
16.45	17.21	26	16.57 (WKN 22)	17.54	31	07.16 (B06)	19.28	14	07.44 (B06)	19.59	20.27							
7 07.23	07.04	16.32 (WKN 22)	06.25	06.44 (B06)	06.34	07.17 (B06)	05.51	05.28										
16.46	17.22	27	16.59 (WKN 22)	17.56	33	07.17 (B06)	19.29	20.00										
8 07.23	07.02	16.33 (WKN 22)	06.23	06.42 (B06)	06.32	07.17 (B06)	05.50	05.27										
16.47	17.24	27	17.00 (WKN 22)	17.57	35	07.17 (B06)	19.30	20.01										
9 07.23	07.01	16.33 (WKN 22)	06.22	06.40 (B06)	06.31	07.17 (B06)	05.49	05.27										
16.48	17.25	29	17.02 (WKN 22)	17.58	37	07.17 (B06)	19.31	20.02										
10 07.23	07.00	16.35 (WKN 22)	06.20	06.39 (B06)	06.29	07.17 (B06)	05.47	05.27										
16.49	17.26	29	17.04 (WKN 22)	17.59	39	07.18 (B06)	19.32	20.03										
11 07.22	06.59	16.35 (WKN 22)	06.18	06.37 (B06)	06.28	07.18 (B06)	05.46	05.27										
16.50	17.27	29	17.04 (WKN 22)	18.00	41	07.18 (B06)	19.33	20.04										
12 07.22	06.58	16.36 (WKN 22)	06.17	06.35 (B06)	06.26	07.18 (B06)	05.45	05.27										
16.51	17.29	30	17.06 (WKN 22)	18.01	42	07.17 (B06)	19.34	20.05										
13 07.22	06.57	16.37 (WKN 22)	06.15	06.34 (B06)	06.24	07.18 (B06)	05.44	05.27										
16.52	17.30	30	17.07 (WKN 22)	18.02	44	07.18 (B06)	19.35	20.06										
14 07.22	06.55	16.39 (WKN 22)	06.14	06.32 (B06)	06.23	07.18 (B06)	05.43	05.26										
16.54	17.31	30	17.09 (WKN 22)	18.03	46	07.18 (B06)	19.36	20.07										
15 07.21	06.54	16.40 (WKN 22)	06.12	06.31 (B06)	06.21	07.18 (B06)	05.42	05.26										
16.55	17.32	29	17.09 (WKN 22)	18.04	47	07.18 (B06)	19.37	20.08										
16 07.21	06.53	16.43 (WKN 22)	06.10	06.29 (B06)	06.20	07.18 (B06)	05.41	05.26										
16.56	17.33	24	17.07 (WKN 22)	18.05	48	07.17 (B06)	19.38	20.09										
17 07.20	16.30 (WKN 22)	06.51	16.45 (WKN 22)	06.09	06.27 (B06)	06.18	05.40	05.26										
16.57	2	16.31 (WKN 22)	17.35	20	17.05 (WKN 22)	18.06	06.27 (B06)	06.18	05.39	05.27								
18 07.20	16.30 (WKN 22)	06.50	16.49 (WKN 22)	06.07	06.26 (B06)	06.17	05.39	05.27										
16.58	2	16.33 (WKN 22)	17.36	11	17.00 (WKN 22)	18.08	06.26 (B06)	06.17	05.39	05.27								
19 07.19	16.30 (WKN 22)	06.49	16.49 (WKN 22)	06.05	06.24 (B06)	06.15	05.39	05.27										
16.59	4	16.34 (WKN 22)	17.37	18.09	52	07.16 (B06)	19.41	20.12										
20 07.19	16.30 (WKN 22)	06.47	16.49 (WKN 22)	06.04	06.22 (B06)	06.14	05.38	05.27										
17.00	6	16.36 (WKN 22)	17.38	18.10	53	07.15 (B06)	19.42	20.13										
21 07.18	16.30 (WKN 22)	06.46	16.49 (WKN 22)	06.02	06.21 (B06)	06.12	05.37	05.27										
17.02	7	16.37 (WKN 22)	17.39	18.11	54	07.15 (B06)	19.43	20.14										
22 07.18	16.29 (WKN 22)	06.44	16.49 (WKN 22)	06.00	06.19 (B06)	06.11	05.36	05.27										
17.03	9	16.38 (WKN 22)	17.41	18.12	55	07.14 (B06)	19.44	20.15										
23 07.17	16.30 (WKN 22)	06.43	16.49 (WKN 22)	05.59	06.17 (B06)	06.09	05.35	05.27										
17.04	10	16.40 (WKN 22)	17.42	18.13	56	07.13 (B06)	19.45	20.16										
24 07.16	16.30 (WKN 22)	06.42	16.49 (WKN 22)	05.57	06.15 (B06)	06.08	05.35	05.28										
17.05	11	16.41 (WKN 22)	17.43	18.14	57	07.12 (B06)	19.47	20.17										
25 07.16	16.29 (WKN 22)	06.40	06.59 (B06)	05.55	06.14 (B06)	06.06	05.34	05.28										
17.06	13	16.42 (WKN 22)	17.44	4	07.03 (B06)	18.15	57	07.11 (B06)	19.48	20.17								
26 07.15	16.29 (WKN 22)	06.39	06.58 (B06)	05.54	06.12 (B06)	06.05	05.33	05.28										
17.08	14	16.43 (WKN 22)	17.45	8	07.06 (B06)	18.16	58	07.10 (B06)	19.49	20.18								
27 07.14	16.29 (WKN 22)	06.37	06.56 (B06)	05.52	06.12 (B06)	06.04	05.33	05.29										
17.09	15	16.44 (WKN 22)	17.46	12	07.08 (B06)	18.17	56	07.08 (B06)	19.50	20.19								
28 07.13	16.30 (WKN 22)	06.36	06.55 (B06)	05.50	06.13 (B06)	06.02	05.32	05.29										
17.10	16	16.46 (WKN 22)	17.48	15	07.10 (B06)	18.18	54	07.07 (B06)	19.51	20.20								
29 07.12	16.30 (WKN 22)	06.35	06.49 (WKN 22)	06.49	07.14 (B06)	06.01	05.31	05.29										
17.11	18	16.48 (WKN 22)	17.49	19.19	52	08.06 (B06)	19.52	20.21										
30 07.12	16.30 (WKN 22)	06.34	06.47 (WKN 22)	06.47	07.14 (B06)	06.00	05.31	05.30										
17.12	19	16.49 (WKN 22)	17.49	19.20	50	08.04 (B06)	19.53	20.22										
31 07.11	16.30 (WKN 22)	06.33	06.45 (WKN 22)	06.45	07.16 (B06)	06.00	05.30	05.30										
17.14	20	16.50 (WKN 22)	17.49	19.21	47	08.03 (B06)	19.54	20.22										
Potential sun hours	298	298	369	398	448	451												
Total, worst case	166	497	1361	187														
Sun reduction	0,43	0,44	0,44	0,51														
Oper. time red.	0,89	0,89	0,89	0,89														
Wind dir. red.	0,64	0,64	0,56	0,56														
Total reduction	0,25	0,25	0,23	0,26														
Total, real	41	125	306	48														

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R04 - R04
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December
1	05:30	05:54	06:24	06:54	07:14 (B06)	06:28
2	20:34	20:15	19:32	18:42	07:57 (B06)	16:56
3	05:31	05:55	06:25	06:55	07:15 (B06)	06:29
4	20:34	20:14	19:31	18:41	07:56 (B06)	16:55
5	05:31	05:56	06:26	06:56	07:16 (B06)	06:30
6	20:34	20:13	19:29	18:39	07:56 (B06)	16:54
7	05:32	05:57	06:27	06:57	07:17 (B06)	06:31
8	20:34	20:12	19:28	18:37	07:55 (B06)	16:52
9	05:32	05:58	06:28	06:58	07:18 (B06)	06:33
10	20:33	20:11	19:26	18:36	07:54 (B06)	16:51
11	05:33	05:59	06:29	07:26 (B06)	07:19 (B06)	06:34
12	20:33	20:10	19:24	18:34	07:53 (B06)	16:50
13	05:34	06:00	06:30	07:21 (B06)	07:20 (B06)	06:35
14	20:33	20:08	19:23	18:32	07:52 (B06)	16:49
15	05:34	06:01	06:31	07:18 (B06)	07:21 (B06)	06:36
16	20:33	20:07	19:21	18:31	07:51 (B06)	16:48
17	05:35	06:02	06:32	07:15 (B06)	07:22 (B06)	06:37
18	20:32	20:06	19:19	18:29	07:49 (B06)	16:47
19	05:36	06:03	06:33	07:12 (B06)	07:24 (B06)	06:39
20	20:32	20:05	19:18	18:28	07:49 (B06)	16:46
21	05:36	06:04	06:34	07:10 (B06)	07:25 (B06)	06:40
22	20:31	20:03	19:16	18:26	07:47 (B06)	16:45
23	05:37	06:05	06:35	07:07 (B06)	07:26 (B06)	06:41
24	20:31	20:02	19:14	18:24	07:46 (B06)	16:44
25	05:38	06:06	06:36	07:06 (B06)	07:27 (B06)	06:42
26	20:30	20:01	19:13	18:23	07:44 (B06)	16:43
27	05:38	06:07	06:37	07:04 (B06)	07:28 (B06)	06:43
28	20:30	19:59	19:11	18:21	07:42 (B06)	16:42
29	05:39	06:08	06:38	07:03 (B06)	07:29 (B06)	06:44
30	20:29	19:58	19:09	18:20	07:39 (B06)	16:41
31	05:40	06:09	06:39	07:01 (B06)	07:30 (B06)	06:46
32	20:29	19:57	19:08	18:18	07:36 (B06)	16:40
33	05:41	06:10	06:40	07:00 (B06)	07:31 (B06)	06:47
34	20:28	19:55	19:06	18:17	07:33 (B06)	16:40
35	05:41	06:11	06:41	07:01 (B06)	07:12	06:48
36	20:27	19:54	19:04	18:15	07:58 (B06)	16:39
37	05:42	06:12	06:42	07:02 (B06)	07:13	06:49
38	20:27	19:52	19:03	18:14	07:59 (B06)	16:38
39	05:43	06:13	06:43	07:03 (B06)	07:14	06:50
40	20:26	19:51	19:01	18:12	07:59 (B06)	16:37
41	05:44	06:14	06:44	07:04 (B06)	07:15	06:51
42	20:25	19:49	18:59	18:11	07:59 (B06)	16:37
43	05:45	06:15	06:45	07:05 (B06)	07:16	06:53
44	20:25	19:48	18:57	18:09	07:59 (B06)	16:36
45	05:46	06:16	06:46	07:06 (B06)	07:18	06:54
46	20:24	19:47	18:56	18:08	07:59 (B06)	16:35
47	05:47	06:17	06:47	07:07 (B06)	07:19	06:55
48	20:23	19:45	18:54	18:07	17:18 (WKN 22)	16:35
49	05:47	06:18	06:48	07:08 (B06)	07:20	06:56
50	20:22	19:43	18:52	18:05	17:32 (WKN 22)	16:34
51	05:48	06:19	06:49	07:09 (B06)	07:21	06:57
52	20:21	19:42	18:51	18:04	16:14 (WKN 22)	16:34
53	05:49	06:20	06:50	07:10 (B06)	07:22	06:58
54	20:20	19:40	18:49	18:02	16:38 (WKN 22)	16:33
55	05:50	06:21	06:51	07:11 (B06)	07:23	06:59
56	20:19	19:39	18:47	18:01	16:39 (WKN 22)	16:33
57	05:51	06:22	06:52	07:12 (B06)	07:24	07:00
58	20:18	19:37	18:46	18:00	16:07 (WKN 22)	16:33
59	05:52	06:23	06:53	07:13 (B06)	07:25	07:01
60	20:17	19:36	18:44	17:58 (B06)	16:35 (WKN 22)	16:32
61	05:53	06:24	06:54	07:14 (B06)	07:26	07:02
62	20:16	19:34	18:42	17:57 (B06)	16:34 (WKN 22)	16:31
Potential sun hours	458	427	375	346	299	289
Total, worst case			1171	648	420	
Sun reduction			0,61	0,52	0,47	
Oper. time red.			0,89	0,89	0,89	
Wind dir. red.			0,56	0,59	0,64	
Total reduction			0,31	0,28	0,27	
Total, real			362	179	113	

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R05a - R05a
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23	07:10	06:34	06:44	05:58	05:30	05:30	05:54	06:24	06:54	06:28	07:02
	16:41	17:15	17:49	19:22	19:54	20:23	20:34	20:15	19:32	18:42	16:56	16:32
2	07:23	07:09	06:33	06:42	05:57	05:29	05:31	05:55	06:25	06:55	06:29	07:03
	16:42	17:16	17:50	19:23	19:55	20:24	20:34	20:14	19:31	18:41	16:55	16:32
3	07:23	07:08	06:31	06:40	05:56	05:29	05:31	05:56	06:26	06:56	06:30	07:04
	16:43	17:17	17:51	19:24	19:56	20:24	20:34	20:13	19:29	18:39	16:54	16:31
4	07:23	07:07	06:30	06:39	05:55	05:29	05:32	05:57	06:27	06:57	06:31	07:05
	16:44	17:19	17:52	19:26	19:57	20:25	20:33	20:12	19:28	18:37	16:52	16:31
5	07:23	07:06	06:28	06:37	05:53	05:28	05:32	05:58	06:28	06:58	06:33	07:06
	16:44	17:20	17:53	19:27	19:58	20:26	20:33	20:11	19:26	18:36	16:51	16:31
6	07:23	07:05	06:26	06:36	05:52	05:28	05:33	05:59	06:29	06:59	06:34	07:07
	16:45	17:21	17:54	19:28	19:59	20:27	20:33	20:10	19:24	18:34	16:50	16:31
7	07:23	07:04	06:25	06:34	05:51	05:28	05:34	06:00	06:30	07:00	06:35	07:08
	16:46	17:22	17:55	19:29	20:00	20:27	20:33	20:08	19:23	18:32	16:49	16:31
8	07:23	07:02	06:23	06:32	05:50	05:27	05:34	06:01	06:31	07:01	06:36	07:09
	16:47	17:24	17:57	19:30	20:01	20:28	20:32	20:07	19:21	18:31	16:48	16:31
9	07:23	07:01	06:22	06:31	05:49	05:27	05:35	06:02	06:32	07:02	06:37	07:10
	16:48	17:25	17:58	19:31	20:02	20:28	20:32	20:06	19:19	18:29	16:47	16:31
10	07:23	07:00	06:20	06:29	05:48	05:27	05:36	06:03	06:33	07:03	06:38	07:11
	16:49	17:26	17:59	19:32	20:03	20:29	20:32	20:05	19:18	18:28	16:46	16:31
11	07:22	06:59	06:18	06:28	05:46	05:27	05:36	06:04	06:34	07:04	06:40	07:12
	16:50	17:27	18:00	19:33	20:04	20:29	20:31	20:03	19:16	18:26	16:45	16:31
12	07:22	06:58	06:17	06:26	05:45	05:27	05:37	06:05	06:35	07:05	06:41	07:13
	16:51	17:29	18:01	19:34	20:05	20:30	20:31	20:02	19:14	18:24	16:44	16:31
13	07:22	06:56	06:15	06:24	05:44	05:27	05:38	06:06	06:36	07:07	06:42	07:13
	16:53	17:30	18:02	19:35	20:06	20:30	20:30	20:01	19:13	18:23	16:43	16:31
14	07:22	06:55	06:14	06:23	05:43	05:27	05:38	06:07	06:37	07:08	06:43	07:14
	16:54	17:31	18:03	19:36	20:07	20:31	20:30	19:59	19:11	18:21	16:42	16:31
15	07:21	06:54	06:12	06:21	05:42	05:26	05:39	06:08	06:38	07:09	06:44	07:15
	16:55	17:32	18:04	19:37	20:08	20:31	20:29	19:58	19:09	18:20	16:41	16:32
16	07:21	06:53	06:10	06:20	05:41	05:26	05:40	06:09	06:39	07:10	06:46	07:16
	16:56	17:33	18:05	19:38	20:09	20:32	20:29	19:57	19:08	18:18	16:40	16:32
17	07:20	06:51	06:09	06:18	05:40	05:27	05:41	06:10	06:40	07:11	06:47	07:16
	16:57	17:35	18:06	19:39	20:10	20:32	20:28	19:55	19:06	18:17	16:40	16:32
18	07:20	06:50	06:07	06:17	05:39	05:27	05:42	06:11	06:41	07:12	06:48	07:17
	16:58	17:36	18:08	19:40	20:11	20:32	20:27	19:54	19:04	18:15	16:39	16:32
19	07:19	06:49	06:05	06:15	05:39	05:27	05:42	06:12	06:42	07:13	06:49	07:18
	16:59	17:37	18:09	19:41	20:12	20:33	20:27	19:52	19:02	18:14	16:38	16:33
20	07:19	06:47	06:04	06:14	05:38	05:27	05:43	06:13	06:43	07:14	06:50	07:18
	17:00	17:38	18:10	19:42	20:13	20:33	20:26	19:51	19:01	18:12	16:37	16:33
21	07:18	06:46	06:02	06:12	05:37	05:27	05:44	06:14	06:44	07:15	06:51	07:19
	17:02	17:39	18:11	19:43	20:14	20:33	20:25	19:49	18:59	18:11	16:37	16:34
22	07:18	06:44	06:00	06:11	05:36	05:27	05:45	06:15	06:45	07:16	06:53	07:19
	17:03	17:41	18:12	19:44	20:15	20:33	20:24	19:48	18:57	18:09	16:36	16:34
23	07:17	06:43	05:59	06:09	05:35	05:27	05:46	06:16	06:46	07:18	06:54	07:20
	17:04	17:42	18:13	19:45	20:16	20:34	20:24	19:46	18:56	18:08	16:35	16:35
24	07:16	06:42	05:57	06:08	05:35	05:28	05:47	06:17	06:47	07:19	06:55	07:20
	17:05	17:43	18:14	19:46	20:16	20:34	20:23	19:45	18:54	18:07	16:35	16:35
25	07:16	06:40	05:55	06:06	05:34	05:28	05:48	06:18	06:48	07:20	06:56	07:21
	17:06	17:44	18:15	19:48	20:17	20:34	20:22	19:43	18:52	17:05	16:34	16:36
26	07:15	06:39	05:54	06:05	05:33	05:28	05:48	06:19	06:49	07:21	06:57	07:21
	17:08	17:45	18:16	19:49	20:18	20:34	20:21	19:42	18:51	17:04	16:34	16:36
27	07:14	06:37	05:52	06:04	05:33	05:29	05:49	06:20	06:50	07:22	06:58	07:21
	17:09	17:46	18:17	19:50	20:19	20:34	20:20	19:40	18:49	17:02	16:33	16:37
28	07:13	06:36	05:50	06:02	05:32	05:29	05:50	06:20	06:51	07:23	06:59	07:22
	17:10	17:48	18:18	19:51	20:20	20:34	20:19	19:39	18:47	17:01	16:33	16:38
29	07:12		06:49	06:01	05:31	05:29	05:51	06:21	06:52	07:24	07:00	07:22
	17:11		19:19	19:52	20:21	20:34	20:18	19:37	18:46	17:00	16:33	16:38
30	07:12		06:47	06:00	05:31	05:30	05:52	06:22	06:53	07:25	07:01	07:22
	17:12		19:20	19:53	20:21	20:34	20:17	19:36	18:44	16:59	16:32	16:39
31	07:11		06:45		05:30		05:53	06:23		06:27		07:23
	17:14		19:21		20:22		20:16	19:34		16:57		16:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
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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**RELAZIONE SULL'EVOLUZIONE
DELL'OMBRA INDOTTA
DALL'IMPIANTO**

Codice
Revisione
Data di creazione
Data revisione
Pagina

GE.AGB01.P3.A.8
22/11/2018
04/12/2018
00
34 di 62

SHADOW - Calendar

Calculation: GE.AGB01.P3_SH-FLShadow receptor: R05c - R05c

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4,12 4,66 5,30 6,72 8,25 9,35 10,16 9,45 7,64 5,82 4,65 3,82

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
1.403 765 428 258 208 129 270 903 1.287 921 569 687 7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23	07:10	06:34	06:44	05:58	05:30	05:30	05:54	06:24	06:54	06:28	07:02
	16:41	17:15	17:49	19:22	19:54	20:23	20:34	20:15	19:32	18:42	16:56	16:32
2	07:23	07:09	06:33	06:42	05:57	05:29	05:31	05:55	06:25	06:55	06:29	07:03
	16:42	17:16	17:50	19:23	19:55	20:24	20:34	20:14	19:31	18:41	16:55	16:32
3	07:23	07:08	06:31	06:40	05:56	05:29	05:31	05:56	06:26	06:56	06:30	07:04
	16:43	17:17	17:51	19:24	19:56	20:24	20:34	20:13	19:29	18:39	16:54	16:31
4	07:23	07:07	06:30	06:39	05:55	05:29	05:32	05:57	06:27	06:57	06:31	07:05
	16:44	17:19	17:52	19:25	19:57	20:25	20:33	20:12	19:28	18:37	16:52	16:31
5	07:23	07:06	06:28	06:37	05:53	05:28	05:32	05:58	06:28	06:58	06:33	07:06
	16:44	17:20	17:53	19:27	19:58	20:26	20:33	20:11	19:26	18:36	16:51	16:31
6	07:23	07:05	06:26	06:36	05:52	05:28	05:33	05:59	06:29	06:59	06:34	07:07
	16:45	17:21	17:54	19:28	19:59	20:27	20:33	20:10	19:24	18:34	16:50	16:31
7	07:23	07:04	06:25	06:34	05:51	05:28	05:34	06:00	06:30	07:00	06:35	07:08
	16:46	17:22	17:55	19:29	20:00	20:27	20:33	20:08	19:23	18:32	16:49	16:31
8	07:23	07:02	06:23	06:32	05:50	05:27	05:34	06:01	06:31	07:01	06:36	07:09
	16:47	17:24	17:57	19:30	20:01	20:28	20:32	20:07	19:21	18:31	16:48	16:31
9	07:23	07:01	06:22	06:31	05:49	05:27	05:35	06:02	06:32	07:02	06:37	07:10
	16:48	17:25	17:58	19:31	20:02	20:28	20:32	20:06	19:19	18:29	16:47	16:31
10	07:23	07:00	06:20	06:29	05:48	05:27	05:36	06:03	06:33	07:03	06:38	07:11
	16:49	17:26	17:59	19:32	20:03	20:29	20:32	20:05	19:18	18:28	16:46	16:31
11	07:22	06:59	06:18	06:28	05:46	05:27	05:36	06:04	06:34	07:04	06:40	07:12
	16:50	17:27	18:00	19:33	20:04	20:29	20:31	20:03	19:16	18:26	16:45	16:31
12	07:22	06:58	06:17	06:26	05:45	05:27	05:37	06:05	06:35	07:05	06:41	07:13
	16:51	17:29	18:01	19:34	20:05	20:30	20:31	20:02	19:14	18:24	16:44	16:31
13	07:22	06:56	06:15	06:24	05:44	05:27	05:38	06:06	06:36	07:07	06:42	07:13
	16:53	17:30	18:02	19:35	20:06	20:30	20:30	20:01	19:13	18:23	16:43	16:31
14	07:22	06:55	06:14	06:23	05:43	05:27	05:38	06:07	06:37	07:08	06:43	07:14
	16:54	17:31	18:03	19:36	20:07	20:31	20:30	19:59	19:11	18:21	16:42	16:31
15	07:21	06:54	06:12	06:21	05:42	05:26	05:39	06:08	06:38	07:09	06:44	07:15
	16:55	17:32	18:04	19:37	20:08	20:31	20:29	19:58	19:09	18:20	16:41	16:32
16	07:21	06:53	06:10	06:20	05:41	05:26	05:40	06:09	06:39	07:10	06:46	07:16
	16:56	17:33	18:05	19:38	20:09	20:32	20:29	19:57	19:08	18:18	16:40	16:32
17	07:20	06:51	06:09	06:18	05:40	05:27	05:41	06:10	06:40	07:11	06:47	07:16
	16:57	17:35	18:06	19:39	20:10	20:32	20:28	19:55	19:06	18:17	16:40	16:32
18	07:20	06:50	06:07	06:17	05:39	05:27	05:42	06:11	06:41	07:12	06:48	07:17
	16:58	17:36	18:08	19:40	20:11	20:32	20:27	19:54	19:04	18:15	16:39	16:32
19	07:19	06:49	06:05	06:15	05:39	05:27	05:42	06:12	06:42	07:13	06:49	07:18
	16:59	17:37	18:09	19:41	20:12	20:33	20:27	19:52	19:02	18:14	16:38	16:33
20	07:19	06:47	06:04	06:14	05:38	05:27	05:43	06:13	06:43	07:14	06:50	07:18
	17:00	17:38	18:10	19:42	20:13	20:33	20:26	19:51	19:01	18:12	16:37	16:33
21	07:18	06:46	06:02	06:12	05:37	05:27	05:44	06:14	06:44	07:15	06:51	07:19
	17:02	17:39	18:11	19:43	20:14	20:33	20:25	19:49	18:59	18:11	16:37	16:34
22	07:18	06:44	06:00	06:11	05:36	05:27	05:45	06:15	06:45	07:16	06:53	07:19
	17:03	17:41	18:12	19:44	20:15	20:33	20:24	19:48	18:57	18:09	16:36	16:34
23	07:17	06:43	05:59	06:09	05:35	05:27	05:46	06:16	06:46	07:18	06:54	07:20
	17:04	17:42	18:13	19:45	20:16	20:34	20:24	19:46	18:56	18:08	16:35	16:35
24	07:16	06:42	05:57	06:08	05:35	05:28	05:47	06:17	06:47	07:19	06:55	07:20
	17:05	17:43	18:14	19:46	20:16	20:34	20:23	19:45	18:54	18:07	16:35	16:35
25	07:16	06:40	05:55	06:06	05:34	05:28	05:48	06:18	06:48	06:20	06:56	07:21
	17:06	17:44	18:15	19:48	20:17	20:34	20:22	19:43	18:52	17:05	16:34	16:36
26	07:15	06:39	05:54	06:05	05:33	05:28	05:48	06:19	06:49	06:21	06:57	07:21
	17:08	17:45	18:16	19:49	20:18	20:34	20:21	19:42	18:51	17:04	16:34	16:36
27	07:14	06:37	05:52	06:04	05:33	05:29	05:49	06:20	06:50	06:22	06:58	07:21
	17:09	17:46	18:17	19:50	20:19	20:34	20:20	19:40	18:49	17:02	16:33	16:37
28	07:13	06:36	05:50	06:02	05:32	05:29	05:50	06:20	06:51	06:23	06:59	07:22
	17:10	17:48	18:18	19:51	20:20	20:34	20:19	19:39	18:47	17:01	16:33	16:38
29	07:12		06:49	06:01	05:31	05:29	05:51	06:21	06:52	06:24	07:00	07:22
	17:11		19:19	19:52	20:21	20:34	20:18	19:37	18:46	17:00	16:33	16:38
30	07:12		06:47	06:00	05:31	05:30	05:52	06:22	06:53	06:26	07:01	07:22
	17:12		19:20	19:53	20:21	20:34	20:17	19:36	18:44	16:58	16:32	16:39
31	07:11		06:45		05:30		05:53	06:23		06:27		07:23
	17:14		19:21		20:22		20:16	19:34		16:57		16:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R06 - R06
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07:23 16:41	07:55 (WKN 28) 15:40 (B08)	07:10 15:19 (B08)	06:34 15:46 (B08)	06:44 17:04 (B07)	05:58 19:22
2	07:23 16:42	07:56 (WKN 28) 15:41 (B08)	07:09 15:21 (B08)	06:33 15:44 (B08)	06:42 17:04 (B07)	05:57 19:23
3	07:23 16:43	07:56 (WKN 28) 15:41 (B08)	07:08 15:24 (B08)	06:31 15:43 (B08)	06:40 17:05 (B07)	05:56 19:24
4	07:23 16:43	07:57 (WKN 28) 15:42 (B08)	07:07 15:27 (B08)	06:29 15:40 (B08)	06:39 17:04 (B07)	05:54 19:25
5	07:23 16:44	07:57 (WKN 28) 15:43 (B08)	07:06 15:28 (B08)	06:28 17:53	06:37 17:04 (B07)	05:53 19:27
6	07:23 16:45	07:58 (WKN 28) 15:43 (B08)	07:05 15:28 (B08)	06:26 17:54	06:36 17:03 (B07)	05:52 19:28
7	07:23 16:46	07:59 (WKN 28) 15:44 (B08)	07:04 15:27 (B08)	06:25 17:55	06:34 17:03 (B07)	05:51 19:29
8	07:23 16:47	08:00 (WKN 28) 15:45 (B08)	07:02 15:24 (B08)	06:23 17:57	06:32 17:01 (B07)	05:50 19:30
9	07:23 16:48	08:00 (WKN 28) 15:45 (B08)	07:01 15:23 (B08)	06:22 17:58	06:31 17:00 (B07)	05:49 19:31
10	07:23 16:49	08:01 (WKN 28) 15:46 (B08)	07:00 15:22 (B08)	06:20 17:59	06:29 18:38 (B07)	05:47 19:32
11	07:22 16:50	08:02 (WKN 28) 15:46 (B08)	06:59 15:21 (B08)	06:18 18:00	06:28 18:59 (B07)	05:46 19:33
12	07:22 16:51	08:03 (WKN 28) 15:47 (B08)	06:58 15:20 (B08)	06:17 18:01	06:26 18:42 (B07)	05:45 19:34
13	07:22 16:52	08:04 (WKN 28) 15:47 (B08)	06:56 15:19 (B08)	06:15 18:02	06:24 19:35	05:44 20:06
14	07:22 16:54	08:06 (WKN 28) 15:48 (B08)	06:55 15:18 (B08)	06:14 18:03	06:23 19:36	05:43 20:07
15	07:21 16:55	08:07 (WKN 28) 15:48 (B08)	06:54 15:17 (B08)	06:12 18:04	06:21 19:37	05:42 20:08
16	07:21 16:56	08:10 (WKN 28) 15:49 (B08)	06:53 15:16 (B08)	06:10 18:05	06:20 19:38	05:41 20:09
17	07:20 16:57	15:06 (B08) 15:49 (B08)	06:51 15:15 (B08)	06:09 18:06	06:18 19:39	11 20:10
18	07:20 16:58	15:07 (B08) 15:49 (B08)	06:50 15:14 (B08)	06:07 18:07	06:17 19:40	19 20:11
19	07:19 16:59	15:07 (B08) 15:49 (B08)	06:49 15:13 (B08)	06:05 18:09	06:15 19:41	22 20:12
20	07:19 17:00	15:08 (B08) 15:50 (B08)	06:47 15:12 (B08)	06:04 18:10	06:14 19:42	24 20:13
21	07:18 17:02	15:08 (B08) 15:50 (B08)	06:46 15:11 (B08)	06:02 18:11	06:12 19:43	25 20:14
22	07:18 17:03	15:09 (B08) 15:50 (B08)	06:44 15:10 (B08)	06:00 18:12	06:11 19:44	27 20:15
23	07:17 17:04	15:10 (B08) 15:50 (B08)	06:43 15:09 (B08)	05:59 18:13	06:09 19:45	28 20:16
24	07:16 17:05	15:10 (B08) 15:50 (B08)	06:42 15:08 (B08)	05:57 18:14	06:08 19:46	30 20:16
25	07:16 17:06	15:11 (B08) 15:50 (B08)	06:40 15:07 (B08)	05:55 18:15	06:06 19:48	30 20:17
26	07:15 17:08	15:12 (B08) 15:49 (B08)	06:39 15:06 (B08)	05:54 18:16	06:05 19:49	31 20:18
27	07:14 17:09	15:12 (B08) 15:49 (B08)	06:37 15:05 (B08)	05:52 18:17	06:04 19:50	32 20:19
28	07:13 17:10	15:13 (B08) 15:48 (B08)	06:36 15:04 (B08)	05:50 18:18	06:02 19:51	32 20:20
29	07:12 17:11	15:15 (B08) 15:48 (B08)	06:34 15:03 (B08)	05:49 18:19	06:01 19:52	33 20:21
30	07:12 17:12	15:16 (B08) 15:48 (B08)	06:32 15:02 (B08)	05:47 18:20	06:00 19:53	34 20:21
31	07:11 17:14	15:18 (B08) 15:47 (B08)	06:30 15:01 (B08)	05:45 18:21	05:30 20:22	34 19:34 (B06)
Potential sun hours	298	298	369	398	448	451
Total, worst case	1515	236	299		427	1050
Sun reduction	0,43	0,44	0,44		0,57	0,62
Oper. time red.	0,89	0,89	0,89		0,89	0,89
Wind dir. red.	0,67	0,64	0,61		0,55	0,55
Total reduction	0,26	0,25	0,25		0,29	0,31
Total, real	392	60	73		122	327

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R06 - R06
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December
1	05:30	19:06 (B06)	05:54	06:24	06:54	07:02
2	05:31	19:41 (B06)	05:55	06:25	06:55	07:03
3	05:31	19:07 (B06)	05:56	06:26	06:56	07:04
4	05:32	19:42 (B06)	05:57	06:27	06:57	07:05
5	05:32	19:41 (B06)	05:58	06:28	06:58	07:06
6	05:33	19:42 (B06)	05:59	06:29	06:59	07:07
7	05:34	19:07 (B06)	06:00	06:30	07:00	07:08
8	05:34	19:42 (B06)	06:01	06:31	07:01	07:09
9	05:35	19:43 (B06)	06:02	06:32	07:02	07:10
10	05:35	19:08 (B06)	06:03	06:33	07:03	07:11
11	05:36	19:42 (B06)	06:04	06:34	07:04	07:12
12	05:37	19:43 (B06)	06:05	06:35	07:05	07:13
13	05:38	19:09 (B06)	06:06	06:36	07:06	07:14
14	05:38	19:42 (B06)	06:07	06:37	07:07	07:15
15	05:39	19:43 (B06)	06:08	06:38	07:08	07:16
16	05:40	19:09 (B06)	06:09	06:39	07:09	07:17
17	05:41	19:42 (B06)	06:10	06:40	07:10	07:18
18	05:41	19:41 (B06)	06:11	06:41	07:11	07:19
19	05:42	19:42 (B06)	06:12	06:42	07:12	07:20
20	05:43	19:11 (B06)	06:13	06:43	07:13	07:21
21	05:44	19:41 (B06)	06:14	06:44	07:14	07:22
22	05:45	19:40 (B06)	06:15	06:45	07:15	07:23
23	05:46	19:13 (B06)	06:16	06:46	07:16	07:24
24	05:47	19:39 (B06)	06:17	06:47	07:17	07:25
25	05:47	19:14 (B06)	06:18	06:48	07:18	07:26
26	05:48	19:39 (B06)	06:19	06:49	07:19	07:27
27	05:49	19:15 (B06)	06:20	06:50	07:20	07:28
28	05:50	19:38 (B06)	06:21	06:51	07:21	07:29
29	05:51	19:17 (B06)	06:22	06:52	07:22	07:30
30	05:52	19:37 (B06)	06:23	06:53	07:23	07:31
31	05:53	19:18 (B06)	06:24	06:54	07:24	07:32
Potential sun hours	458	427	375	346	299	289
Total, worst case	834			463	929	1669
Sun reduction	0,69			0,52	0,47	0,41
Oper. time red.	0,89			0,89	0,89	0,89
Wind dir. red.	0,55			0,61	0,68	0,64
Total reduction	0,34			0,29	0,29	0,24
Total, real	287			133	268	448

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R08c - R08c
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23	07:10	06:34	06:44	05:58	05:30	05:30	05:54	06:24	06:54	06:28	07:02
	16:41	17:15	17:49	19:22	19:54	20:23	20:34	20:15	19:32	18:42	16:56	16:32
2	07:23	07:09	06:33	06:42	05:57	05:29	05:31	05:55	06:25	06:55	06:29	07:03
	16:42	17:16	17:50	19:23	19:55	20:24	20:34	20:14	19:31	18:41	16:55	16:32
3	07:23	07:08	06:31	06:40	05:56	05:29	05:31	05:56	06:26	06:56	06:30	07:04
	16:43	17:17	17:51	19:24	19:56	20:24	20:34	20:13	19:29	18:39	16:54	16:31
4	07:23	07:07	06:29	06:39	05:54	05:28	05:32	05:57	06:27	06:57	06:31	07:05
	16:44	17:19	17:52	19:25	19:57	20:25	20:33	20:12	19:28	18:37	16:52	16:31
5	07:23	07:06	06:28	06:37	05:53	05:28	05:32	05:58	06:28	06:58	06:32	07:06
	16:44	17:20	17:53	19:26	19:58	20:26	20:33	20:11	19:26	18:36	16:51	16:31
6	07:23	07:05	06:26	06:36	05:52	05:28	05:33	05:59	06:29	06:59	06:34	07:07
	16:45	17:21	17:54	19:28	19:59	20:26	20:33	20:09	19:24	18:34	16:50	16:31
7	07:23	07:03	06:25	06:34	05:51	05:28	05:34	06:00	06:30	07:00	06:35	07:08
	16:46	17:22	17:55	19:29	20:00	20:27	20:33	20:08	19:23	18:32	16:49	16:31
8	07:23	07:02	06:23	06:32	05:50	05:27	05:34	06:01	06:31	07:01	06:36	07:09
	16:47	17:24	17:57	19:30	20:01	20:28	20:32	20:07	19:21	18:31	16:48	16:31
9	07:23	07:01	06:22	06:31	05:49	05:27	05:35	06:02	06:32	07:02	06:37	07:10
	16:48	17:25	17:58	19:31	20:02	20:28	20:32	20:06	19:19	18:29	16:47	16:31
10	07:23	07:00	06:20	06:29	05:47	05:27	05:35	06:03	06:33	07:03	06:38	07:11
	16:49	17:26	17:59	19:32	20:03	20:29	20:32	20:05	19:18	18:28	16:46	16:31
11	07:22	06:59	06:18	06:27	05:46	05:27	05:36	06:04	06:34	07:04	06:40	07:12
	16:50	17:27	18:00	19:33	20:04	20:29	20:31	20:03	19:16	18:26	16:45	16:31
12	07:22	06:58	06:17	06:26	05:45	05:27	05:37	06:05	06:35	07:05	06:41	07:13
	16:51	17:28	18:01	19:34	20:05	20:30	20:31	20:02	19:14	18:24	16:44	16:31
13	07:22	06:56	06:15	06:24	05:44	05:26	05:38	06:06	06:36	07:06	06:42	07:13
	16:52	17:30	18:02	19:35	20:06	20:30	20:30	20:01	19:13	18:23	16:43	16:31
14	07:21	06:55	06:13	06:23	05:43	05:26	05:38	06:07	06:37	07:08	06:43	07:14
	16:54	17:31	18:03	19:36	20:07	20:31	20:30	19:59	19:11	18:21	16:42	16:31
15	07:21	06:54	06:12	06:21	05:42	05:26	05:39	06:08	06:38	07:09	06:44	07:15
	16:55	17:32	18:04	19:37	20:08	20:31	20:29	19:58	19:09	18:20	16:41	16:31
16	07:21	06:53	06:10	06:20	05:41	05:26	05:40	06:09	06:39	07:10	06:45	07:16
	16:56	17:33	18:05	19:38	20:09	20:32	20:29	19:57	19:07	18:18	16:40	16:32
17	07:20	06:51	06:09	06:18	05:40	05:26	05:41	06:10	06:40	07:11	06:47	07:16
	16:57	17:35	18:06	19:39	20:10	20:32	20:28	19:55	19:06	18:17	16:40	16:32
18	07:20	06:50	06:07	06:17	05:39	05:27	05:41	06:11	06:41	07:12	06:48	07:17
	16:58	17:36	18:07	19:40	20:11	20:32	20:27	19:54	19:04	18:15	16:39	16:32
19	07:19	06:49	06:05	06:15	05:39	05:27	05:42	06:12	06:42	07:13	06:49	07:18
	16:59	17:37	18:09	19:41	20:12	20:33	20:27	19:52	19:02	18:14	16:38	16:33
20	07:19	06:47	06:04	06:14	05:38	05:27	05:43	06:13	06:43	07:14	06:50	07:18
	17:00	17:38	18:10	19:42	20:13	20:33	20:26	19:51	19:01	18:12	16:37	16:33
21	07:18	06:46	06:02	06:12	05:37	05:27	05:44	06:14	06:44	07:15	06:51	07:19
	17:02	17:39	18:11	19:43	20:14	20:33	20:25	19:49	18:59	18:11	16:37	16:34
22	07:18	06:44	06:00	06:11	05:36	05:27	05:45	06:15	06:45	07:16	06:52	07:19
	17:03	17:40	18:12	19:44	20:15	20:33	20:24	19:48	18:57	18:09	16:36	16:34
23	07:17	06:43	05:59	06:09	05:35	05:27	05:46	06:15	06:46	07:17	06:54	07:20
	17:04	17:42	18:13	19:45	20:15	20:34	20:24	19:46	18:56	18:08	16:35	16:35
24	07:16	06:41	05:57	06:08	05:35	05:28	05:47	06:16	06:47	07:19	06:55	07:20
	17:05	17:43	18:14	19:46	20:16	20:34	20:23	19:45	18:54	18:06	16:35	16:35
25	07:15	06:40	05:55	06:06	05:34	05:28	05:47	06:17	06:48	07:20	06:56	07:21
	17:06	17:44	18:15	19:47	20:17	20:34	20:22	19:43	18:52	17:05	16:34	16:36
26	07:15	06:39	05:54	06:05	05:33	05:28	05:48	06:18	06:49	07:21	06:57	07:21
	17:08	17:45	18:16	19:49	20:18	20:34	20:21	19:42	18:51	17:04	16:34	16:36
27	07:14	06:37	05:52	06:04	05:32	05:29	05:49	06:19	06:50	07:22	06:58	07:21
	17:09	17:46	18:17	19:50	20:19	20:34	20:20	19:40	18:49	17:02	16:33	16:37
28	07:13	06:36	05:50	06:02	05:32	05:29	05:50	06:20	06:51	07:23	06:59	07:22
	17:10	17:47	18:18	19:51	20:20	20:34	20:19	19:39	18:47	17:01	16:33	16:38
29	07:12		06:49	06:01	05:31	05:29	05:51	06:21	06:52	07:24	07:00	07:22
	17:11		19:19	19:52	20:21	20:34	20:18	19:37	18:46	17:00	16:33	16:38
30	07:11		06:47	06:00	05:31	05:30	05:52	06:22	06:53	07:25	07:01	07:22
	17:12		19:20	19:53	20:21	20:34	20:17	19:36	18:44	16:58	16:32	16:39
31	07:11		06:45		05:30		05:53	06:23		06:27		07:22
	17:14		19:21		20:22		20:16	19:34		16:57		16:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
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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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R10 - R10
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07:23 16:41 68	07:45 (B05) 07:10 13:55 (B04) 17:15	06:34 17:49	16:31 (B02) 06:44 17:07 (B02) 19:22	05:58 18:47 (B01)	10:53 18:58 (B01)
2	07:23 16:42 65	07:45 (B05) 07:09 13:54 (B04) 17:16	06:33 17:50	16:32 (B02) 06:42 17:07 (B02) 19:23	05:57 19:55	10:52 20:24
3	07:23 16:43 65	07:45 (B05) 07:08 13:54 (B04) 17:17	06:31 17:51	16:33 (B02) 06:40 17:05 (B02) 19:24	05:56 19:56	10:51 20:25
4	07:23 16:43 62	07:45 (B05) 07:07 13:53 (B04) 17:19	06:30 17:52	16:33 (B02) 06:39 17:03 (B02) 19:26	05:54 19:57	10:50 20:25
5	07:23 16:44 59	07:45 (B05) 07:06 13:52 (B04) 17:20	06:28 17:53	16:35 (B02) 06:37 17:03 (B02) 19:27	05:53 19:58	10:49 20:26
6	07:23 16:45 57	07:45 (B05) 07:05 13:52 (B04) 17:21	06:26 17:54	16:36 (B02) 06:36 17:00 (B02) 19:28	05:52 19:59	10:48 20:27
7	07:23 16:46 52	07:45 (B05) 07:04 13:50 (B04) 17:22	06:25 17:55	16:38 (B02) 06:34 16:59 (B02) 19:29	05:51 20:00	10:47 20:27
8	07:23 16:47 47	07:45 (B05) 07:02 13:48 (B04) 17:24	06:23 17:57	16:40 (B02) 06:32 16:56 (B02) 19:30	05:50 20:01	10:46 20:28
9	07:23 16:48 37	07:45 (B05) 07:01 13:44 (B04) 17:25	06:22 17:58	16:46 (B02) 06:31 16:49 (B02) 19:31	05:49 20:02	10:45 20:28
10	07:23 16:49 31	07:45 (B05) 07:00 08:15 (B05) 17:26	06:20 17:59	16:49 (B02) 06:29 19:32	05:48 20:03	10:44 20:29
11	07:22 16:50 30	07:45 (B05) 06:59 08:15 (B05) 17:27	06:18 18:00	16:49 (B02) 06:28 19:33	05:47 20:04	10:43 20:30
12	07:22 16:51 28	07:47 (B05) 06:58 08:15 (B05) 17:29	16:46 (B02) 06:17 16:54 (B02) 18:01	06:26 19:34	05:45 20:05	10:42 20:30
13	07:22 16:52 25	07:48 (B05) 06:57 08:13 (B05) 17:30	16:42 (B02) 06:15 16:58 (B02) 18:02	06:24 19:35	05:44 20:06	10:41 20:31
14	07:22 16:54 23	07:50 (B05) 06:55 08:13 (B05) 17:31	16:40 (B02) 06:14 17:01 (B02) 18:03	06:23 19:36	05:43 20:07	10:40 20:31
15	07:21 16:55 20	07:51 (B05) 06:54 08:11 (B05) 17:32	16:38 (B02) 06:12 17:02 (B02) 18:04	06:21 19:37	05:42 20:08	10:39 20:31
16	07:21 16:56 14	07:55 (B05) 06:53 08:09 (B05) 17:33	16:36 (B02) 06:10 17:04 (B02) 18:05	06:20 19:38	05:41 20:09	10:38 20:32
17	07:20 16:57 6	07:59 (B05) 06:51 08:05 (B05) 17:35	16:36 (B02) 06:09 17:06 (B02) 18:06	06:18 19:39	05:40 20:10	10:37 20:32
18	07:20 16:58	06:50 17:36	16:34 (B02) 06:07 17:06 (B02) 18:08	06:17 19:40	05:39 20:11	10:36 20:33
19	07:19 16:59	06:49 17:37	16:33 (B02) 06:05 17:07 (B02) 18:09	06:15 19:41	05:39 20:12	10:35 20:33
20	07:19 17:00	06:47 17:38	16:32 (B02) 06:04 17:07 (B02) 18:10	06:14 19:42	05:38 20:13	10:34 20:33
21	07:18 17:02	06:46 17:39	16:32 (B02) 06:02 17:08 (B02) 18:11	06:12 19:43	05:37 20:14	10:33 20:33
22	07:18 17:03	06:44 17:41	16:32 (B02) 06:00 17:09 (B02) 18:12	06:11 19:44	05:36 20:15	10:32 20:34
23	07:17 17:04	06:43 17:42	16:31 (B02) 05:59 17:08 (B02) 18:13	06:09 19:46	05:35 20:16	10:31 20:34
24	07:16 17:05	06:42 17:43	16:31 (B02) 05:57 17:09 (B02) 18:14	06:08 19:47	05:35 20:17	10:30 20:34
25	07:16 17:06	06:40 17:44	16:31 (B02) 05:55 17:08 (B02) 18:15	06:06 19:48	05:34 20:17	10:29 20:34
26	07:15 17:08	06:39 17:45	16:31 (B02) 05:54 17:09 (B02) 18:16	06:05 19:49	05:33 20:18	10:28 20:34
27	07:14 17:09	06:37 17:46	16:31 (B02) 05:52 17:08 (B02) 18:17	06:04 19:50	05:32 20:19	10:27 20:34
28	07:13 17:10	06:36 17:48	16:31 (B02) 05:50 17:08 (B02) 18:18	06:02 19:51	05:32 20:20	10:26 20:34
29	07:12 17:11	06:35 17:49	16:31 (B02) 05:49 17:09 (B02) 18:19	06:01 19:52	05:31 20:21	10:25 20:34
30	07:12 17:12	06:34 17:50	16:31 (B02) 05:48 17:10 (B02) 18:20	06:00 19:53	05:31 20:22	10:24 20:34
31	07:11 17:14	06:33 17:51	16:31 (B02) 05:47 17:11 (B02) 18:21	05:59 19:54	05:30 20:23	10:23 20:34
Potential sun hours	298	297	369	398	448	451
Total, worst case	689	525	225	590	11	
Sun reduction	0,43	0,44	0,44	0,51	0,57	
Oper. time red.	0,89	0,89	0,89	0,89	0,89	
Wind dir. red.	0,62	0,62	0,62	0,56	0,56	
Total reduction	0,24	0,24	0,25	0,26	0,29	
Total, real	164	128	56	151	3	

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R10 - R10
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December
1	05.30 20.34	05.54 20.15	06.24 19.32	18.44 (B01) 19.06 (B01)	06.54 18.42	06.28 16.56
2	05.31 20.34	05.55 20.14	06.25 19.31	18.46 (B01) 19.04 (B01)	06.55 18.41	06.29 16.55
3	05.31 20.34	05.56 20.13	06.26 19.29	18.49 (B01) 19.01 (B01)	06.56 18.39	06.30 16.54
4	05.32 20.34	05.57 20.12	06.27 19.28	18.49 (B01) 19.01 (B01)	06.57 18.37	06.31 16.52
5	05.32 20.33	05.58 20.11	06.28 19.26	18.49 (B01) 19.01 (B01)	06.58 18.36	06.33 16.51
6	05.33 20.33	05.59 20.10	06.29 19.24	18.49 (B01) 19.01 (B01)	06.59 18.34	06.34 16.50
7	05.34 20.33	06.00 20.08	06.30 19.23	18.49 (B01) 19.01 (B01)	07.00 18.32	06.35 16.49
8	05.34 20.33	06.01 20.07	06.31 19.21	18.49 (B01) 19.01 (B01)	07.01 18.31	06.36 16.48
9	05.35 20.32	06.02 20.06	06.32 19.19	18.49 (B01) 19.01 (B01)	07.02 18.29	06.37 16.47
10	05.35 20.32	06.03 20.05	06.33 19.18	18.49 (B01) 19.01 (B01)	07.03 18.28	06.39 16.46
11	05.36 20.31	06.04 20.03	06.34 19.16	18.49 (B01) 19.01 (B01)	07.04 18.26	06.40 16.45
12	05.37 20.31	06.05 20.02	06.35 19.14	18.49 (B01) 19.01 (B01)	07.06 18.24	06.41 16.44
13	05.38 20.30	06.06 20.01	06.36 19.13	18.49 (B01) 19.01 (B01)	07.07 18.23	06.42 16.43
14	05.38 20.30	06.07 19.59	06.37 19.11	18.49 (B01) 19.01 (B01)	07.08 18.21	06.43 16.42
15	05.39 20.29	06.08 19.58	06.38 19.09	18.49 (B01) 19.01 (B01)	07.09 18.20	06.44 16.41
16	05.40 20.29	06.09 19.57	06.39 19.08	18.49 (B01) 19.01 (B01)	07.10 18.18	06.46 16.40
17	05.41 20.28	06.10 19.55	06.40 19.06	18.49 (B01) 19.01 (B01)	07.11 18.17	06.47 16.40
18	05.41 20.27	06.11 19.54	06.41 19.04	18.49 (B01) 19.01 (B01)	07.12 18.15	06.48 16.39
19	05.42 20.27	06.12 19.52	06.42 19.03	18.49 (B01) 19.01 (B01)	07.13 18.14	06.49 16.38
20	05.43 20.26	06.13 19.51	06.43 19.01	18.49 (B01) 19.01 (B01)	07.14 18.12	06.50 16.37
21	05.44 20.25	06.14 19.49	06.44 18.59	18.49 (B01) 19.01 (B01)	07.15 18.11	06.51 16.37
22	05.45 20.25	06.15 19.48	06.45 18.57	18.49 (B01) 19.01 (B01)	07.16 18.09	06.53 16.36
23	05.46 20.24	06.16 19.47	06.46 18.56	18.49 (B01) 19.01 (B01)	07.18 18.08	06.54 16.35
24	05.47 20.23	06.17 19.45	06.47 18.54	18.49 (B01) 19.01 (B01)	07.19 18.06	06.55 16.35
25	05.47 20.22	06.18 19.43	06.48 18.52	18.49 (B01) 19.01 (B01)	07.20 17.05	06.56 16.34
26	05.48 20.21	06.18 19.42	06.49 18.51	18.49 (B01) 19.01 (B01)	07.21 17.04	06.57 16.34
27	05.49 20.20	06.19 19.40	06.50 18.49	18.49 (B01) 19.01 (B01)	07.22 17.02	06.58 16.33
28	05.50 20.19	06.20 19.39	06.51 18.47	18.49 (B01) 19.01 (B01)	07.23 17.01	06.59 16.33
29	05.51 20.18	06.21 19.37	06.52 18.46	18.49 (B01) 19.01 (B01)	07.24 17.00	06.59 16.33
30	05.52 20.17	06.22 19.36	06.53 18.44	18.49 (B01) 19.01 (B01)	07.25 16.58	06.59 16.32
31	05.53 20.16	06.23 19.34	06.54 19.08 (B01)	18.49 (B01) 19.01 (B01)	07.26 16.57	06.59 16.32
Potential sun hours	458	427	375	345	299	289
Total, worst case		558	52	755	115	2022
Sun reduction		0,69	0,61	0,52	0,47	0,41
Oper. time red.		0,89	0,89	0,89	0,89	0,89
Wind dir. red.		0,56	0,56	0,62	0,57	0,65
Total reduction		0,35	0,31	0,29	0,24	0,24
Total, real		194	16	220	27	485

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R11a - R11a
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23	07:10	06:34	06:44	05:58	05:30	05:30	05:54	06:24	06:54	06:28	07:02
	16:41	17:15	17:49	19:22	19:54	20:23	20:34	20:15	19:32	18:42	16:56	16:32
2	07:23	07:09	06:33	06:42	05:57	05:29	05:31	05:55	06:25	06:55	06:29	07:03
	16:42	17:16	17:50	19:23	19:55	20:24	20:34	20:14	19:31	18:41	16:55	16:32
3	07:23	07:08	06:31	06:40	05:56	05:29	05:31	05:56	06:26	06:56	06:30	07:04
	16:43	17:17	17:51	19:24	19:56	20:24	20:34	20:13	19:29	18:39	16:54	16:31
4	07:23	07:07	06:29	06:39	05:54	05:28	05:32	05:57	06:27	06:57	06:31	07:05
	16:44	17:19	17:52	19:25	19:57	20:25	20:33	20:12	19:28	18:37	16:52	16:31
5	07:23	07:06	06:28	06:37	05:53	05:28	05:32	05:58	06:28	06:58	06:32	07:06
	16:44	17:20	17:53	19:26	19:58	20:26	20:33	20:11	19:26	18:36	16:51	16:31
6	07:23	07:05	06:26	06:36	05:52	05:28	05:33	05:59	06:29	06:59	06:34	07:07
	16:45	17:21	17:54	19:28	19:59	20:26	20:33	20:09	19:24	18:34	16:50	16:31
7	07:23	07:03	06:25	06:34	05:51	05:28	05:34	06:00	06:30	07:00	06:35	07:08
	16:46	17:22	17:55	19:29	20:00	20:27	20:33	20:08	19:23	18:32	16:49	16:31
8	07:23	07:02	06:23	06:32	05:50	05:27	05:34	06:01	06:31	07:01	06:36	07:09
	16:47	17:24	17:57	19:30	20:01	20:28	20:32	20:07	19:21	18:31	16:48	16:31
9	07:23	07:01	06:22	06:31	05:49	05:27	05:35	06:02	06:32	07:02	06:37	07:10
	16:48	17:25	17:58	19:31	20:02	20:28	20:32	20:06	19:19	18:29	16:47	16:31
10	07:23	07:00	06:20	06:29	05:47	05:27	05:35	06:03	06:33	07:03	06:38	07:11
	16:49	17:26	17:59	19:32	20:03	20:29	20:32	20:05	19:18	18:28	16:46	16:31
11	07:22	06:59	06:18	06:28	05:46	05:27	05:36	06:04	06:34	07:04	06:40	07:12
	16:50	17:27	18:00	19:33	20:04	20:29	20:31	20:03	19:16	18:26	16:45	16:31
12	07:22	06:58	06:17	06:26	05:45	05:27	05:37	06:05	06:35	07:05	06:41	07:13
	16:51	17:28	18:01	19:34	20:05	20:30	20:31	20:02	19:14	18:24	16:44	16:31
13	07:22	06:56	06:15	06:24	05:44	05:27	05:38	06:06	06:36	07:06	06:42	07:13
	16:52	17:30	18:02	19:35	20:06	20:30	20:30	20:01	19:13	18:23	16:43	16:31
14	07:21	06:55	06:13	06:23	05:43	05:26	05:38	06:07	06:37	07:08	06:43	07:14
	16:54	17:31	18:03	19:36	20:07	20:31	20:30	19:59	19:11	18:21	16:42	16:31
15	07:21	06:54	06:12	06:21	05:42	05:26	05:39	06:08	06:38	07:09	06:44	07:15
	16:55	17:32	18:04	19:37	20:08	20:31	20:29	19:58	19:09	18:20	16:41	16:31
16	07:21	06:53	06:10	06:20	05:41	05:26	05:40	06:09	06:39	07:10	06:45	07:16
	16:56	17:33	18:05	19:38	20:09	20:32	20:29	19:57	19:07	18:18	16:40	16:32
17	07:20	06:51	06:09	06:18	05:40	05:26	05:41	06:10	06:40	07:11	06:47	07:16
	16:57	17:35	18:06	19:39	20:10	20:32	20:28	19:55	19:06	18:17	16:40	16:32
18	07:20	06:50	06:07	06:17	05:39	05:27	05:41	06:11	06:41	07:12	06:48	07:17
	16:58	17:36	18:07	19:40	20:11	20:32	20:27	19:54	19:04	18:15	16:39	16:32
19	07:19	06:49	06:05	06:15	05:39	05:27	05:42	06:12	06:42	07:13	06:49	07:18
	16:59	17:37	18:09	19:41	20:12	20:33	20:27	19:52	19:02	18:14	16:38	16:33
20	07:19	06:47	06:04	06:14	05:38	05:27	05:43	06:13	06:43	07:14	06:50	07:18
	17:00	17:38	18:10	19:42	20:13	20:33	20:26	19:51	19:01	18:12	16:37	16:33
21	07:18	06:46	06:02	06:12	05:37	05:27	05:44	06:14	06:44	07:15	06:51	07:19
	17:02	17:39	18:11	19:43	20:14	20:33	20:25	19:49	18:59	18:11	16:37	16:34
22	07:18	06:44	06:00	06:11	05:36	05:27	05:45	06:15	06:45	07:16	06:52	07:19
	17:03	17:40	18:12	19:44	20:15	20:33	20:24	19:48	18:57	18:09	16:36	16:34
23	07:17	06:43	05:59	06:09	05:35	05:27	05:46	06:15	06:46	07:17	06:54	07:20
	17:04	17:42	18:13	19:45	20:15	20:34	20:24	19:46	18:56	18:08	16:35	16:35
24	07:16	06:41	05:57	06:08	05:35	05:28	05:47	06:16	06:47	07:19	06:55	07:20
	17:05	17:43	18:14	19:46	20:16	20:34	20:23	19:45	18:54	18:06	16:35	16:35
25	07:15	06:40	05:55	06:06	05:34	05:28	05:47	06:17	06:48	07:20	06:56	07:21
	17:06	17:44	18:15	19:47	20:17	20:34	20:22	19:43	18:52	17:05	16:34	16:36
26	07:15	06:39	05:54	06:05	05:33	05:28	05:48	06:18	06:49	07:21	06:57	07:21
	17:08	17:45	18:16	19:49	20:18	20:34	20:21	19:42	18:51	17:04	16:34	16:36
27	07:14	06:37	05:52	06:04	05:32	05:29	05:49	06:19	06:50	07:22	06:58	07:21
	17:09	17:46	18:17	19:50	20:19	20:34	20:20	19:40	18:49	17:02	16:33	16:37
28	07:13	06:36	05:50	06:02	05:32	05:29	05:50	06:20	06:51	07:23	06:59	07:22
	17:10	17:47	18:18	19:51	20:20	20:34	20:19	19:39	18:47	17:01	16:33	16:38
29	07:12		06:49	06:01	05:31	05:29	05:51	06:21	06:52	07:24	07:00	07:22
	17:11		19:19	19:52	20:21	20:34	20:18	19:37	18:46	17:00	16:33	16:38
30	07:11		06:47	06:00	05:31	05:30	05:52	06:22	06:53	07:25	07:01	07:22
	17:12		19:20	19:53	20:21	20:34	20:17	19:36	18:44	16:58	16:32	16:39
31	07:11		06:45		05:30		05:53	06:23		06:27		07:22
	17:14		19:21		20:22		20:16	19:34		16:57		16:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
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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**RELAZIONE SULL'EVOLUZIONE
DELL'OMBRA INDOTTA
DALL'IMPIANTO**

Codice
Revisione
Data di creazione
Data revisione
Pagina

GE.AGB01.P3.A.8
22/11/2018
04/12/2018
00
41 di 62

SHADOW - Calendar

Calculation: GE.AGB01.P3_SH-FLShadow receptor: R11b - R11b

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4,12 4,66 5,30 6,72 8,25 9,35 10,16 9,45 7,64 5,82 4,65 3,82

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
1.403 765 428 258 208 129 270 903 1.287 921 569 687 7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23 16:41	07:10 17:15	06:34 17:49	06:44 19:22	05:58 19:54	05:30 20:23	05:30 20:34	05:54 20:15	06:24 19:32	06:54 18:42	06:28 16:56	07:02 16:32
2	07:23 16:42	07:09 17:16	06:33 17:50	06:42 19:23	05:57 19:55	05:29 20:24	05:31 20:34	05:55 20:14	06:25 19:31	06:55 18:41	06:29 16:55	07:03 16:32
3	07:23 16:43	07:08 17:17	06:31 17:51	06:40 19:24	05:56 19:56	05:29 20:24	05:31 20:34	05:56 20:13	06:26 19:29	06:56 18:39	06:30 16:54	07:04 16:31
4	07:23 16:44	07:07 17:19	06:29 17:52	06:39 19:25	05:54 19:57	05:28 20:25	05:32 20:33	05:57 20:12	06:27 19:28	06:57 18:37	06:31 16:52	07:05 16:31
5	07:23 16:44	07:06 17:20	06:28 17:53	06:37 19:26	05:53 19:58	05:28 20:26	05:32 20:33	05:58 20:11	06:28 19:26	06:58 18:36	06:32 16:51	07:06 16:31
6	07:23 16:45	07:05 17:21	06:26 17:54	06:36 19:28	05:52 19:59	05:28 20:26	05:33 20:33	05:59 20:09	06:29 19:24	06:59 18:34	06:34 16:50	07:07 16:31
7	07:23 16:46	07:03 17:22	06:25 17:55	06:34 19:29	05:51 20:00	05:28 20:27	05:34 20:33	06:00 20:08	06:30 19:23	07:00 18:32	06:35 16:49	07:08 16:31
8	07:23 16:47	07:02 17:24	06:23 17:57	06:32 19:30	05:50 20:01	05:27 20:28	05:34 20:32	06:01 20:07	06:31 19:21	07:01 18:31	06:36 16:48	07:09 16:31
9	07:23 16:48	07:01 17:25	06:22 17:58	06:31 19:31	05:49 20:02	05:27 20:28	05:35 20:32	06:02 20:06	06:32 19:19	07:02 18:29	06:37 16:47	07:10 16:31
10	07:23 16:49	07:00 17:26	06:20 17:59	06:29 19:32	05:47 20:03	05:27 20:29	05:35 20:32	06:03 20:05	06:33 19:18	07:03 18:28	06:38 16:46	07:11 16:31
11	07:22 16:50	06:59 17:27	06:18 18:00	06:28 19:33	05:46 20:04	05:27 20:29	05:36 20:31	06:04 20:03	06:34 19:16	07:04 18:26	06:40 16:45	07:12 16:31
12	07:22 16:51	06:58 17:28	06:17 18:01	06:26 19:34	05:45 20:05	05:27 20:30	05:37 20:31	06:05 20:02	06:35 19:14	07:05 18:24	06:41 16:44	07:13 16:31
13	07:22 16:52	06:56 17:30	06:15 18:02	06:24 19:35	05:44 20:06	05:27 20:30	05:38 20:30	06:06 20:01	06:36 19:13	07:06 18:23	06:42 16:43	07:13 16:31
14	07:21 16:54	06:55 17:31	06:13 18:03	06:23 19:36	05:43 20:07	05:26 20:31	05:38 20:30	06:07 19:59	06:37 19:11	07:08 18:21	06:43 16:42	07:14 16:31
15	07:21 16:55	06:54 17:32	06:12 18:04	06:21 19:37	05:42 20:08	05:26 20:31	05:39 20:29	06:08 19:58	06:38 19:09	07:09 18:20	06:44 16:41	07:15 16:31
16	07:21 16:56	06:53 17:33	06:10 18:05	06:20 19:38	05:41 20:09	05:26 20:32	05:40 20:29	06:09 19:57	06:39 19:07	07:10 18:18	06:45 16:40	07:16 16:32
17	07:20 16:57	06:51 17:35	06:09 18:06	06:18 19:39	05:40 20:10	05:26 20:32	05:41 20:28	06:10 19:55	06:40 19:06	07:11 18:17	06:47 16:40	07:16 16:32
18	07:20 16:58	06:50 17:36	06:07 18:07	06:17 19:40	05:39 20:11	05:27 20:32	05:41 20:27	06:11 19:54	06:41 19:04	07:12 18:15	06:48 16:39	07:17 16:32
19	07:19 16:59	06:49 17:37	06:05 18:09	06:15 19:41	05:39 20:12	05:27 20:33	05:42 20:27	06:12 19:52	06:42 19:02	07:13 18:14	06:49 16:38	07:18 16:33
20	07:19 17:00	06:47 17:38	06:04 18:10	06:14 19:42	05:38 20:13	05:27 20:33	05:43 20:26	06:13 19:51	06:43 19:01	07:14 18:12	06:50 16:37	07:18 16:33
21	07:18 17:02	06:46 17:39	06:02 18:11	06:12 19:43	05:37 20:14	05:27 20:33	05:44 20:25	06:14 19:49	06:44 18:59	07:15 18:11	06:51 16:37	07:19 16:34
22	07:18 17:03	06:44 17:40	06:00 18:12	06:11 19:44	05:36 20:15	05:27 20:33	05:45 20:24	06:15 19:48	06:45 18:57	07:16 18:09	06:52 16:36	07:19 16:34
23	07:17 17:04	06:43 17:42	05:59 18:13	06:09 19:45	05:35 20:15	05:27 20:34	05:46 20:24	06:15 19:46	06:46 18:56	07:17 18:08	06:54 16:35	07:20 16:35
24	07:16 17:05	06:41 17:43	05:57 18:14	06:08 19:46	05:35 20:16	05:28 20:34	05:47 20:23	06:16 19:45	06:47 18:54	07:19 18:06	06:55 16:35	07:20 16:35
25	07:15 17:06	06:40 17:44	05:55 18:15	06:06 19:47	05:34 20:17	05:28 20:34	05:47 20:22	06:17 19:43	06:48 18:52	07:20 17:05	06:56 16:34	07:21 16:36
26	07:15 17:08	06:39 17:45	05:54 18:16	06:05 19:49	05:33 20:18	05:28 20:34	05:48 20:21	06:18 19:42	06:49 18:51	07:21 17:04	06:57 16:34	07:21 16:36
27	07:14 17:09	06:37 17:46	05:52 18:17	06:04 19:50	05:32 20:19	05:29 20:34	05:49 20:20	06:19 19:40	06:50 18:49	07:22 17:02	06:58 16:33	07:21 16:37
28	07:13 17:10	06:36 17:47	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34	05:50 20:19	06:20 19:39	06:51 18:47	07:23 17:01	06:59 16:33	07:22 16:38
29	07:12 17:11	06:35 19:19	05:49 19:19	06:01 19:52	05:31 20:21	05:29 20:34	05:51 20:18	06:21 19:37	06:52 18:46	07:24 17:00	07:00 16:33	07:22 16:38
30	07:11 17:12	06:47 19:20	06:00 19:20	06:00 19:53	05:31 20:21	05:30 20:34	05:52 20:17	06:22 19:36	06:53 18:44	07:25 16:58	07:01 16:32	07:22 16:39
31	07:11 17:14	06:45 19:21	06:00 19:21	06:00 19:53	05:30 20:22	05:30 20:34	05:53 20:16	06:23 19:34	06:54 16:57	07:26 16:57	07:02 16:40	07:22 16:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R15 - R15
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June	
1	07:23 16:41	09:01 (B15) 09:51 (B15)	10:7:10 11:15	09:02 (B15) 10:10 (B15)	06:34 17:49	06:44 19:22	05:58 19:54
2	07:23 16:42	09:01 (B15) 09:52 (B15)	10:7:09 11:16	09:02 (B15) 10:10 (B15)	06:33 17:50	06:42 19:23	05:57 19:55
3	07:23 16:43	09:01 (B15) 09:53 (B15)	10:7:08 11:17	09:02 (B15) 10:10 (B15)	06:31 17:51	06:40 19:24	05:56 19:56
4	07:23 16:44	09:01 (B15) 09:54 (B15)	10:7:07 11:19	09:02 (B15) 10:09 (B15)	06:29 17:52	06:39 19:25	05:54 19:57
5	07:23 16:44	09:01 (B15) 09:54 (B15)	10:7:06 11:20	09:02 (B15) 10:09 (B15)	06:28 17:53	06:37 19:26	05:53 19:58
6	07:23 16:45	09:01 (B15) 09:55 (B15)	10:7:05 11:21	09:02 (B15) 10:09 (B15)	06:26 17:54	06:36 19:28	05:52 19:59
7	07:23 16:46	09:01 (B15) 09:56 (B15)	10:7:03 11:22	09:03 (B15) 10:08 (B15)	06:25 17:55	06:34 19:29	05:51 20:00
8	07:23 16:47	09:02 (B15) 09:57 (B15)	10:7:02 11:24	09:04 (B15) 10:08 (B15)	06:23 17:57	06:32 19:30	05:50 20:01
9	07:23 16:48	09:01 (B15) 09:57 (B15)	10:7:01 11:25	09:04 (B15) 10:07 (B15)	06:22 17:58	06:31 19:31	05:49 20:02
10	07:23 16:49	09:01 (B15) 09:59 (B15)	10:7:00 11:26	09:05 (B15) 10:07 (B15)	06:20 17:59	06:29 19:32	05:47 20:03
11	07:22 16:50	09:01 (B15) 10:00 (B15)	10:6:59 11:27	09:05 (B15) 10:05 (B15)	06:18 18:00	06:28 19:33	05:46 20:04
12	07:22 16:51	09:00 (B15) 10:00 (B15)	10:6:58 11:28	09:06 (B15) 10:05 (B15)	06:17 18:01	06:26 19:34	05:45 20:05
13	07:22 16:52	09:01 (B15) 10:01 (B15)	10:6:56 11:30	09:07 (B15) 10:04 (B15)	06:15 18:02	06:24 19:35	05:44 20:06
14	07:21 16:54	09:01 (B15) 10:02 (B15)	10:6:55 11:31	09:07 (B15) 10:02 (B15)	06:13 18:03	06:23 19:36	05:43 20:07
15	07:21 16:55	09:01 (B15) 10:02 (B15)	10:6:54 11:32	09:08 (B15) 10:01 (B15)	06:12 18:04	06:21 19:37	05:42 20:08
16	07:21 16:56	09:01 (B15) 10:04 (B15)	10:6:53 11:33	09:09 (B15) 10:00 (B15)	06:10 18:05	06:20 19:38	05:41 20:09
17	07:20 16:57	09:00 (B15) 10:04 (B15)	10:6:51 11:35	09:10 (B15) 09:57 (B15)	06:09 18:06	06:18 19:39	05:40 20:10
18	07:20 16:58	09:01 (B15) 10:05 (B15)	10:6:50 11:36	09:12 (B15) 09:56 (B15)	06:07 18:07	06:17 19:40	05:39 20:11
19	07:19 16:59	09:01 (B15) 10:05 (B15)	10:6:49 11:37	09:14 (B15) 09:54 (B15)	06:05 18:09	06:15 19:41	05:39 20:12
20	07:19 17:00	09:00 (B15) 10:05 (B15)	10:6:47 11:38	09:15 (B15) 09:51 (B15)	06:04 18:10	06:14 19:42	05:38 20:13
21	07:18 17:02	09:01 (B15) 10:07 (B15)	10:6:46 11:39	09:17 (B15) 09:48 (B15)	06:02 18:11	06:12 19:43	05:37 20:14
22	07:18 17:03	09:00 (B15) 10:07 (B15)	10:6:44 11:41	09:20 (B15) 09:44 (B15)	06:00 18:12	06:11 19:44	05:36 20:15
23	07:17 17:04	09:00 (B15) 10:07 (B15)	10:6:43 11:42	09:25 (B15) 09:39 (B15)	05:59 18:13	06:09 19:45	05:35 20:15
24	07:16 17:05	09:01 (B15) 10:08 (B15)	10:6:41 11:43		05:57 18:14	06:08 19:46	05:35 20:16
25	07:15 17:06	09:01 (B15) 10:09 (B15)	10:6:40 11:44		05:55 18:15	06:06 19:47	05:34 20:17
26	07:15 17:08	09:01 (B15) 10:09 (B15)	10:6:39 11:45		05:54 18:16	06:05 19:49	05:33 20:18
27	07:14 17:09	09:00 (B15) 10:09 (B15)	10:6:37 11:46		05:52 18:17	06:04 19:50	05:33 20:19
28	07:13 17:10	09:00 (B15) 10:09 (B15)	10:6:36 11:47		05:50 18:18	06:02 19:51	05:32 20:20
29	07:12 17:11	09:00 (B15) 10:09 (B15)			06:49 19:19	06:01 19:52	05:31 20:21
30	07:11 17:12	09:01 (B15) 10:10 (B15)			06:47 19:20	06:00 19:53	05:31 20:21
31	07:11 17:14	09:02 (B15) 10:10 (B15)			06:45 19:21		05:30 20:22
Potential sun hours	298	298	369	398	448	451	
Total, worst case	1905	1230					
Sun reduction	0,43	0,44					
Oper. time red.	0,89	0,89					
Wind dir. red.	0,58	0,58					
Total reduction	0,22	0,23					
Total, real	425	281					

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R15 - R15
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December
1	05.30	05.54	06.24	06.54	06.28	08.34 (B15)
	20.34	20.15	19.32	18.42	16.56	09.36 (B15)
2	05.31	05.55	06.25	06.55	06.29	08.33 (B15)
	20.34	20.14	19.31	18.41	16.55	09.36 (B15)
3	05.31	05.56	06.26	06.56	06.30	08.33 (B15)
	20.34	20.13	19.29	18.39	16.54	09.38 (B15)
4	05.32	05.57	06.27	06.57	06.31	08.33 (B15)
	20.33	20.12	19.28	18.37	16.52	09.38 (B15)
5	05.32	05.58	06.28	06.58	06.32	08.32 (B15)
	20.33	20.11	19.26	18.36	16.51	09.38 (B15)
6	05.33	05.59	06.29	06.59	06.34	08.33 (B15)
	20.33	20.09	19.24	18.34	16.50	09.40 (B15)
7	05.34	06.00	06.30	07.00	06.35	08.32 (B15)
	20.33	20.08	19.23	18.32	16.49	09.40 (B15)
8	05.34	06.01	06.31	07.01	06.36	08.32 (B15)
	20.32	20.07	19.21	18.31	16.48	09.40 (B15)
9	05.35	06.02	06.32	07.02	06.37	08.32 (B15)
	20.32	20.06	19.19	18.29	16.47	09.40 (B15)
10	05.35	06.03	06.33	07.03	06.38	08.33 (B15)
	20.32	20.05	19.18	18.28	16.46	09.41 (B15)
11	05.36	06.04	06.34	07.04	06.40	08.33 (B15)
	20.31	20.03	19.16	18.26	16.45	09.41 (B15)
12	05.37	06.05	06.35	07.05	06.41	08.32 (B15)
	20.31	20.02	19.14	18.24	16.44	09.41 (B15)
13	05.38	06.06	06.36	07.06	06.42	08.32 (B15)
	20.30	20.01	19.13	18.23	16.43	09.41 (B15)
14	05.38	06.07	06.37	07.07	06.43	08.33 (B15)
	20.30	19.59	19.11	18.21	16.42	09.42 (B15)
15	05.39	06.08	06.38	07.09	06.44	08.33 (B15)
	20.29	19.58	19.09	18.20	16.41	09.42 (B15)
16	05.40	06.09	06.39	07.10	06.45	08.34 (B15)
	20.29	19.57	19.07	18.18	16.40	09.42 (B15)
17	05.41	06.10	06.40	07.11	06.47	08.34 (B15)
	20.28	19.55	19.06	18.17	16.40	09.41 (B15)
18	05.41	06.11	06.41	07.12	06.48	08.35 (B15)
	20.27	19.54	19.04	18.15	16.39	09.42 (B15)
19	05.42	06.12	06.42	07.13	06.49	08.35 (B15)
	20.27	19.52	19.02	18.14	16.38	09.42 (B15)
20	05.43	06.13	06.43	07.14	06.50	08.35 (B15)
	20.26	19.51	19.01	18.12	16.37	09.42 (B15)
21	05.44	06.14	06.44	07.15	06.51	08.36 (B15)
	20.25	19.49	18.59	18.11	16.37	09.42 (B15)
22	05.45	06.15	06.45	07.16	06.52	08.37 (B15)
	20.24	19.48	18.57	18.09	16.36	09.42 (B15)
23	05.46	06.16	06.46	07.17	06.54	08.38 (B15)
	20.24	19.46	18.56	18.08	16.35	09.42 (B15)
24	05.47	06.16	06.47	07.19	06.55	08.38 (B15)
	20.23	19.45	18.54	18.06	16.35	09.42 (B15)
25	05.47	06.17	06.48	07.20	06.56	08.38 (B15)
	20.22	19.43	18.52	17.05	16.34	09.42 (B15)
26	05.48	06.18	06.49	07.21	06.57	08.39 (B15)
	20.21	19.42	18.51	17.04	16.34	09.42 (B15)
27	05.49	06.19	06.50	07.22	06.58	08.40 (B15)
	20.20	19.40	18.49	17.02	16.33	09.41 (B15)
28	05.50	06.20	06.51	07.23	06.59	08.41 (B15)
	20.19	19.39	18.47	17.01	16.33	09.42 (B15)
29	05.51	06.21	06.52	07.24	06.60	08.42 (B15)
	20.18	19.37	18.46	17.00	16.33	09.42 (B15)
30	05.52	06.22	06.53	07.25	06.61	08.43 (B15)
	20.17	19.36	18.44	16.58	16.32	09.42 (B15)
31	05.53	06.23	06.54	07.26	06.62	08.44 (B15)
	20.16	19.34	18.42	16.57	16.31	09.43 (B15)
Potential sun hours	458	427	375	346	299	269
Total, worst case				587	1967	1545
Sun reduction				0,52	0,47	0,41
Oper. time red.				0,89	0,89	0,89
Wind dir. red.				0,58	0,58	0,58
Total reduction				0,27	0,24	0,21
Total, real				160	478	330

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R17 - R17
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23	07:10	06:34	06:44	05:58	05:30	05:30					
	16:41	17:15	17:49	19:22	19:54	20:23	20:34					
2	07:23	07:09	06:33	06:42	05:57	05:29	05:31	08:05 (B16)	05:54	06:24	06:54	06:28
	16:42	17:16	17:50	19:23	19:55	20:24	20:34	08:22 (B16)	20:15	19:32	18:42	16:56
3	07:23	07:08	06:31	06:40	05:56	05:29	05:31	08:06 (B16)	05:55	06:25	06:55	06:29
	16:43	17:17	17:51	19:24	19:56	20:24	20:34	08:20 (B16)	20:14	19:31	18:41	16:55
4	07:23	07:07	06:29	06:39	05:55	05:29	05:32	08:08 (B16)	05:56	06:26	06:56	06:30
	16:44	17:19	17:52	19:25	19:57	20:25	20:33	08:19 (B16)	20:13	19:29	18:39	16:54
5	07:23	07:06	06:28	06:37	05:53	05:28	05:32	08:11 (B16)	05:57	06:27	06:57	06:31
	16:44	17:20	17:53	19:26	19:58	20:26	20:33	08:16 (B16)	20:12	19:28	18:37	16:52
6	07:23	07:05	06:26	06:36	05:52	05:28	05:33		05:58	06:29	06:59	06:34
	16:45	17:21	17:54	19:28	19:59	20:26	20:33		20:09	19:24	18:34	16:50
7	07:23	07:03	06:25	06:34	05:51	05:28	05:34		06:00	06:30	07:00	06:35
	16:46	17:22	17:55	19:29	20:00	20:27	20:33		20:08	19:23	18:32	16:49
8	07:23	07:02	06:23	06:32	05:50	05:27	05:34		06:01	06:31	07:01	06:36
	16:47	17:24	17:57	19:30	20:01	20:28	20:32		20:07	19:21	18:31	16:48
9	07:23	07:01	06:22	06:31	05:49	05:27	05:35	08:04 (B16)	06:02	06:32	07:02	06:37
	16:48	17:25	17:58	19:31	20:02	20:28	9 08:13 (B16)	20:32	20:06	19:19	18:29	16:47
10	07:23	07:00	06:20	06:29	05:47	05:27	05:36	08:03 (B16)	06:03	06:33	07:03	06:38
	16:49	17:26	17:59	19:32	20:03	20:29	12 08:15 (B16)	20:32	20:05	19:18	18:28	16:46
11	07:22	06:59	06:18	06:28	05:46	05:27	05:37	08:01 (B16)	06:04	06:34	07:04	06:40
	16:50	17:27	18:00	19:33	20:04	20:29	16 08:17 (B16)	20:31	20:03	19:16	18:26	16:45
12	07:22	06:58	06:17	06:26	05:45	05:27	05:37	08:01 (B16)	06:05	06:35	07:05	06:41
	16:51	17:29	18:01	19:34	20:05	20:30	17 08:18 (B16)	20:31	20:02	19:14	18:24	16:44
13	07:22	06:56	06:15	06:24	05:44	05:27	05:38	08:00 (B16)	06:06	06:36	07:06	06:42
	16:53	17:30	18:02	19:35	20:06	20:30	19 08:19 (B16)	20:30	20:01	19:13	18:23	16:43
14	07:21	06:55	06:14	06:23	05:43	05:27	05:38	08:00 (B16)	06:07	06:37	07:08	06:43
	16:54	17:31	18:03	19:36	20:07	20:31	20 08:20 (B16)	20:30	06:08	06:38	07:09	06:44
15	07:21	06:54	06:12	06:21	05:42	05:26	05:39	07:59 (B16)	06:08	06:38	07:09	06:44
	16:55	17:32	18:04	19:37	20:08	20:31	22 08:21 (B16)	20:29	06:08	06:38	07:09	06:44
16	07:21	06:53	06:10	06:20	05:41	05:26	05:40	07:59 (B16)	06:09	06:39	07:10	06:45
	16:56	17:33	18:05	19:38	20:09	20:32	23 08:22 (B16)	20:29	06:09	06:39	07:10	06:45
17	07:20	06:51	06:09	06:18	05:40	05:27	05:41	07:59 (B16)	06:10	06:40	07:11	06:47
	16:57	17:35	18:06	19:39	20:10	20:32	23 08:22 (B16)	20:28	06:10	06:40	07:11	06:47
18	07:20	06:50	06:07	06:17	05:39	05:27	05:42	07:58 (B16)	06:11	06:41	07:12	06:48
	16:58	17:36	18:07	19:40	20:11	20:32	24 08:23 (B16)	20:27	06:11	06:41	07:12	06:48
19	07:19	06:49	06:05	06:15	05:39	05:27	05:42	07:58 (B16)	06:12	06:42	07:13	06:49
	16:59	17:37	18:09	19:41	20:12	20:33	25 08:23 (B16)	20:27	06:12	06:42	07:13	06:49
20	07:19	06:47	06:04	06:14	05:38	05:27	05:43	07:58 (B16)	06:13	06:43	07:14	06:50
	17:00	17:38	18:10	19:42	20:13	20:33	25 08:23 (B16)	20:26	06:13	06:43	07:14	06:50
21	07:18	06:46	06:02	06:12	05:37	05:27	05:44	07:58 (B16)	06:14	06:44	07:15	06:51
	17:02	17:39	18:11	19:43	20:14	20:33	25 08:23 (B16)	20:25	06:14	06:44	07:15	06:51
22	07:18	06:44	06:00	06:11	05:36	05:27	05:45	07:59 (B16)	06:15	06:45	07:16	06:52
	17:03	17:41	18:12	19:44	20:15	20:33	25 08:24 (B16)	20:24	06:15	06:45	07:16	06:52
23	07:17	06:43	05:59	06:09	05:35	05:27	05:46	07:59 (B16)	06:16	06:46	07:17	06:54
	17:04	17:42	18:13	19:45	20:15	20:34	25 08:24 (B16)	20:24	06:16	06:46	07:17	06:54
24	07:16	06:42	05:57	06:08	05:35	05:28	05:47	07:59 (B16)	06:17	06:47	07:19	06:55
	17:05	17:43	18:14	19:46	20:16	20:34	24 08:23 (B16)	20:23	06:17	06:47	07:19	06:55
25	07:16	06:40	05:55	06:06	05:34	05:28	05:48	08:00 (B16)	06:18	06:48	07:20	06:56
	17:06	17:44	18:15	19:47	20:17	20:34	23 08:23 (B16)	20:22	06:18	06:48	07:20	06:56
26	07:15	06:39	05:54	06:05	05:33	05:28	05:48	08:01 (B16)	06:19	06:49	07:21	06:57
	17:08	17:45	18:16	19:49	20:18	20:34	23 08:24 (B16)	20:21	06:19	06:49	07:21	06:57
27	07:14	06:37	05:52	06:04	05:33	05:29	05:49	08:01 (B16)	06:20	06:50	07:22	06:58
	17:09	17:46	18:17	19:50	20:19	20:34	22 08:23 (B16)	20:20	06:20	06:50	07:22	06:58
28	07:13	06:36	05:50	06:02	05:32	05:29	05:50	08:01 (B16)	06:21	06:51	07:23	06:59
	17:10	17:48	18:18	19:51	20:20	20:34	22 08:23 (B16)	20:19	06:21	06:51	07:23	06:59
29	07:12		06:49	06:01	05:31	05:29	05:51	08:03 (B16)	06:21	06:52	07:24	07:00
	17:11		19:19	19:52	20:21	20:34	20 08:23 (B16)	20:18	06:21	06:52	07:24	07:00
30	07:11		06:47	06:00	05:31	05:30	05:52	08:03 (B16)	06:22	06:53	07:25	07:01
	17:12		19:20	19:53	20:21	20:34	19 08:22 (B16)	20:17	06:22	06:53	07:25	07:01
31	07:11		06:45		05:30		05:53		06:23	06:54	07:26	07:02
	17:14		19:21		20:22		20:16		06:23	06:54	07:26	07:02
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
Total, worst case						463						
Sun reduction						0,62						
Oper. time red.						0,89						
Wind dir. red.						0,59						
Total reduction						0,33						
Total, real						151						

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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**RELAZIONE SULL'EVOLUZIONE
DELL'OMBRA INDOTTA
DALL'IMPIANTO**

Codice
Revisione
Data di creazione
Data revisione
Pagina

GE.AGB01.P3.A.8
22/11/2018
04/12/2018
00
45 di 62

SHADOW - Calendar

Calculation: GE.AGB01.P3_SH-FLShadow receptor: R18 - R18

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4,12 4,66 5,30 6,72 8,25 9,35 10,16 9,45 7,64 5,82 4,65 3,82

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
1.403 765 428 258 208 129 270 903 1.287 921 569 687 7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23 16:41	07:10 17:15	06:34 17:49	06:44 19:22	05:58 19:54	05:30 20:23	05:30 20:34	05:54 20:15	06:24 19:32	06:54 18:42	06:28 16:56	07:02 16:32
2	07:23 16:42	07:09 17:16	06:33 17:50	06:42 19:23	05:57 19:55	05:29 20:24	05:31 20:34	05:55 20:14	06:25 19:31	06:55 18:41	06:29 16:55	07:03 16:32
3	07:23 16:43	07:08 17:17	06:31 17:51	06:40 19:24	05:56 19:56	05:29 20:24	05:31 20:34	05:56 20:13	06:26 19:29	06:56 18:39	06:30 16:54	07:04 16:31
4	07:23 16:44	07:07 17:19	06:29 17:52	06:39 19:25	05:55 19:57	05:29 20:25	05:32 20:33	05:57 20:12	06:27 19:28	06:57 18:37	06:31 16:52	07:05 16:31
5	07:23 16:44	07:06 17:20	06:28 17:53	06:37 19:26	05:53 19:58	05:28 20:26	05:32 20:33	05:58 20:11	06:28 19:26	06:58 18:36	06:32 16:51	07:06 16:31
6	07:23 16:45	07:05 17:21	06:26 17:54	06:36 19:28	05:52 19:59	05:28 20:26	05:33 20:33	05:59 20:09	06:29 19:24	06:59 18:34	06:34 16:50	07:07 16:31
7	07:23 16:46	07:03 17:22	06:25 17:55	06:34 19:29	05:51 20:00	05:28 20:27	05:34 20:33	06:00 20:08	06:30 19:23	07:00 18:32	06:35 16:49	07:08 16:31
8	07:23 16:47	07:02 17:24	06:23 17:57	06:32 19:30	05:50 20:01	05:27 20:28	05:34 20:32	06:01 20:07	06:31 19:21	07:01 18:31	06:36 16:48	07:09 16:31
9	07:23 16:48	07:01 17:25	06:22 17:58	06:31 19:31	05:49 20:02	05:27 20:28	05:35 20:32	06:02 20:06	06:32 19:19	07:02 18:29	06:37 16:47	07:10 16:31
10	07:23 16:49	07:00 17:26	06:20 17:59	06:29 19:32	05:47 20:03	05:27 20:29	05:36 20:32	06:03 20:05	06:33 19:18	07:03 18:28	06:38 16:46	07:11 16:31
11	07:22 16:50	06:59 17:27	06:18 18:00	06:28 19:33	05:46 20:04	05:27 20:29	05:36 20:31	06:04 20:03	06:34 19:16	07:04 18:26	06:40 16:45	07:12 16:31
12	07:22 16:51	06:58 17:29	06:17 18:01	06:26 19:34	05:45 20:05	05:27 20:30	05:37 20:31	06:05 20:02	06:35 19:14	07:05 18:24	06:41 16:44	07:13 16:31
13	07:22 16:53	06:56 17:30	06:15 18:02	06:24 19:35	05:44 20:06	05:27 20:30	05:38 20:30	06:06 20:01	06:36 19:13	07:06 18:23	06:42 16:43	07:13 16:31
14	07:21 16:54	06:55 17:31	06:14 18:03	06:23 19:36	05:43 20:07	05:27 20:31	05:38 20:30	06:07 19:59	06:37 19:11	07:08 18:21	06:43 16:42	07:14 16:31
15	07:21 16:55	06:54 17:32	06:12 18:04	06:21 19:37	05:42 20:08	05:26 20:31	05:39 20:29	06:08 19:58	06:38 19:09	07:09 18:20	06:44 16:41	07:15 16:32
16	07:21 16:56	06:53 17:33	06:10 18:05	06:20 19:38	05:41 20:09	05:26 20:32	05:40 20:29	06:09 19:57	06:39 19:08	07:10 18:18	06:45 16:40	07:16 16:32
17	07:20 16:57	06:51 17:35	06:09 18:06	06:18 19:39	05:40 20:10	05:27 20:32	05:41 20:28	06:10 19:55	06:40 19:06	07:11 18:17	06:47 16:40	07:16 16:32
18	07:20 16:58	06:50 17:36	06:07 18:07	06:17 19:40	05:39 20:11	05:27 20:32	05:42 20:27	06:11 19:54	06:41 19:04	07:12 18:15	06:48 16:39	07:17 16:32
19	07:19 16:59	06:49 17:37	06:05 18:09	06:15 19:41	05:39 20:12	05:27 20:33	05:42 20:27	06:12 19:52	06:42 19:02	07:13 18:14	06:49 16:38	07:18 16:33
20	07:19 17:00	06:47 17:38	06:04 18:10	06:14 19:42	05:38 20:13	05:27 20:33	05:43 20:26	06:13 19:51	06:43 19:01	07:14 18:12	06:50 16:37	07:18 16:33
21	07:18 17:02	06:46 17:39	06:02 18:11	06:12 19:43	05:37 20:14	05:27 20:33	05:44 20:25	06:14 19:49	06:44 18:59	07:15 18:11	06:51 16:37	07:19 16:34
22	07:18 17:03	06:44 17:41	06:00 18:12	06:11 19:44	05:36 20:15	05:27 20:33	05:45 20:24	06:15 19:48	06:45 18:57	07:16 18:09	06:52 16:36	07:19 16:34
23	07:17 17:04	06:43 17:42	05:59 18:13	06:09 19:45	05:35 20:15	05:27 20:34	05:46 20:24	06:16 19:46	06:46 18:56	07:17 18:08	06:54 16:35	07:20 16:35
24	07:16 17:05	06:42 17:43	05:57 18:14	06:08 19:46	05:35 20:16	05:28 20:34	05:47 20:23	06:17 19:45	06:47 18:54	07:19 18:06	06:55 16:35	07:20 16:35
25	07:15 17:06	06:40 17:44	05:55 18:15	06:06 19:47	05:34 20:17	05:28 20:34	05:48 20:22	06:18 19:43	06:48 18:52	07:20 17:05	06:56 16:34	07:21 16:36
26	07:15 17:08	06:39 17:45	05:54 18:16	06:05 19:49	05:33 20:18	05:28 20:34	05:48 20:21	06:18 19:42	06:49 18:51	07:21 17:04	06:57 16:34	07:21 16:36
27	07:14 17:09	06:37 17:46	05:52 18:17	06:04 19:50	05:33 20:19	05:29 20:34	05:49 20:20	06:19 19:40	06:50 18:49	07:22 17:02	06:58 16:33	07:21 16:37
28	07:13 17:10	06:36 17:48	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34	05:50 20:19	06:20 19:39	06:51 18:47	07:23 17:01	06:59 16:33	07:22 16:38
29	07:12 17:11	06:35 19:19	05:49 19:19	06:01 19:52	05:31 20:21	05:29 20:34	05:51 20:18	06:21 19:37	06:52 18:46	07:24 17:00	07:00 16:33	07:22 16:38
30	07:11 17:12	06:34 19:20	05:48 19:20	06:00 19:53	05:31 20:21	05:30 20:34	05:52 20:17	06:22 19:36	06:53 18:44	07:25 16:58	07:01 16:32	07:22 16:39
31	07:11 17:14	06:34 19:21	05:48 19:21	06:00 19:53	05:31 20:21	05:30 20:34	05:53 20:16	06:23 19:34	06:54 16:57	07:26 16:57	07:02 16:40	07:22 16:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R22b - R22b
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:23	07:46 (B18)	07:10	06:34	06:44	05:59	05:30	05:54	06:24	06:54	06:28	07:02
1	16:41	19 08:05 (B18)	17:15	17:49	19:22	19:54	20:23	20:34	20:15	19:32	18:42	18:58
2	07:23	07:47 (B18)	07:09	06:33	06:42	05:57	05:29	05:31	05:55	06:25	06:55	06:29
1	16:42	19 08:06 (B18)	17:16	17:50	19:23	19:55	20:24	20:34	20:14	19:31	18:41	18:55
3	07:23	07:47 (B18)	07:08	06:31	06:40	05:56	05:28	05:31	05:56	06:26	06:56	06:30
1	16:43	19 08:06 (B18)	17:17	17:51	19:24	19:56	20:24	20:34	20:13	19:29	18:39	18:54
4	07:23	07:48 (B18)	07:07	06:30	06:39	05:55	05:28	05:32	05:57	06:27	06:57	06:31
1	16:44	18 08:06 (B18)	17:19	17:52	19:26	19:57	20:25	20:33	20:12	19:28	18:37	18:52
5	07:23	07:49 (B18)	07:06	06:28	06:37	05:53	05:28	05:32	05:58	06:28	06:58	06:33
1	16:44	17 08:06 (B18)	17:20	17:53	19:27	19:58	20:26	20:33	20:11	19:26	18:36	18:51
6	07:23	07:50 (B18)	07:05	06:26	06:36	05:52	05:28	05:33	05:59	06:29	06:59	06:34
1	16:45	16 08:06 (B18)	17:21	17:54	19:28	19:59	20:27	20:33	20:10	19:24	18:34	18:50
7	07:23	07:51 (B18)	07:04	06:25	06:34	05:51	05:28	05:34	06:00	06:30	07:00	06:35
1	16:46	15 08:06 (B18)	17:22	17:55	19:29	20:00	20:27	20:33	20:08	19:23	18:32	18:48
8	07:23	07:52 (B18)	07:02	06:23	06:32	05:50	05:27	05:34	06:01	06:31	07:01	06:36
1	16:47	14 08:06 (B18)	17:24	17:57	19:30	20:01	20:28	20:32	20:07	19:21	18:31	18:48
9	07:23	07:53 (B18)	07:01	06:22	06:31	05:49	05:27	05:35	06:02	06:32	07:02	06:37
1	16:48	12 08:05 (B18)	17:25	17:58	19:31	20:02	20:28	20:32	20:06	19:19	18:29	18:47
10	07:23	07:54 (B18)	07:00	06:20	06:29	05:48	05:27	05:36	06:03	06:33	07:03	06:38
1	16:48	11 08:05 (B18)	17:26	17:59	19:32	20:03	20:29	20:32	20:05	19:18	18:28	18:46
11	07:22	07:56 (B18)	06:59	06:18	06:28	05:46	05:27	05:36	06:04	06:34	07:04	06:40
1	16:50	9 08:05 (B18)	17:27	18:00	19:33	20:04	20:29	20:31	20:03	19:16	18:26	18:45
12	07:22	07:59 (B18)	06:58	06:17	06:26	05:45	05:27	05:37	06:05	06:35	07:05	06:41
1	16:51	4 08:03 (B18)	17:29	18:01	19:34	20:05	20:30	20:31	20:02	19:14	18:24	18:44
13	07:22	06:58	06:15	06:24	06:44	05:44	05:27	05:39	06:06	06:36	07:07	06:42
1	16:53	17:30	18:02	19:35	20:06	20:30	20:30	20:01	19:13	18:23	18:43	18:31
14	07:22	06:55	06:14	06:23	06:43	05:43	05:27	05:38	06:07	06:37	07:08	06:43
1	16:54	17:31	18:03	19:36	20:07	20:31	20:30	20:01	19:11	18:21	18:42	18:31
15	07:21	06:54	06:12	06:21	06:42	05:42	05:26	05:39	06:08	06:38	07:09	06:44
1	16:55	17:32	18:04	19:37	20:08	20:31	20:29	20:01	19:09	18:20	18:41	18:32
16	07:21	06:53	06:10	06:20	06:41	05:41	05:26	06:04	06:09	06:39	07:10	06:46
1	16:56	17:33	18:05	19:38	20:09	20:32	20:29	20:01	19:07	18:18	18:40	18:32
17	07:20	06:51	06:09	06:18	06:40	05:40	05:27	05:41	06:10	06:40	07:11	06:47
1	16:57	17:35	18:06	19:39	20:10	20:32	20:28	20:01	19:06	18:17	18:40	18:32
18	07:20	06:50	06:07	06:17	06:39	05:39	05:27	05:42	06:11	06:41	07:12	06:48
1	16:58	17:36	18:08	19:40	20:11	20:32	20:27	20:01	19:04	18:15	18:39	18:32
19	07:19	06:49	06:05	06:15	06:39	05:37	05:27	06:02	06:12	06:42	07:13	06:49
1	16:59	17:37	18:09	19:41	20:12	20:33	20:27	20:01	19:02	18:14	18:38	18:33
20	07:19	06:47	06:04	06:14	06:38	05:37	05:43	06:13	06:43	07:14	06:50	07:18
1	17:00	17:38	18:10	19:42	20:13	20:33	20:26	20:01	19:01	18:12	18:37	18:33
21	07:18	06:46	06:02	06:12	06:37	05:37	05:44	06:14	06:44	07:15	06:51	07:19
1	17:02	17:39	18:11	19:43	20:14	20:33	20:25	20:01	19:01	18:11	18:37	18:34
22	07:18	06:44	06:00	06:11	06:36	05:37	05:45	06:15	06:45	07:16	06:53	07:19
1	17:03	17:41	18:12	19:44	20:15	20:33	20:24	20:01	19:01	18:11	18:37	18:34
23	07:17	06:43	06:00	06:11	06:35	05:37	05:46	06:16	06:46	07:18	06:54	07:20
1	17:04	17:42	18:13	19:45	20:16	20:34	20:24	20:01	19:01	18:11	18:37	18:35
24	07:16	06:42	06:00	06:11	06:35	05:36	05:47	06:17	06:47	07:19	06:55	07:20
1	17:05	17:43	18:14	19:46	20:16	20:34	20:23	20:01	19:01	18:11	18:37	18:35
25	07:16	06:40	06:00	06:11	06:34	05:36	05:48	06:18	06:48	07:20	06:56	07:21
1	17:06	17:44	18:15	19:48	20:17	20:34	20:22	20:01	19:01	18:11	18:37	18:36
26	07:15	06:39	06:00	06:11	06:33	05:36	05:48	06:19	06:49	07:21	06:57	07:21
1	17:08	17:45	18:16	19:49	20:18	20:34	20:21	20:01	19:01	18:11	18:37	18:36
27	07:14	06:37	06:00	06:11	06:33	05:35	05:49	06:20	06:50	07:22	06:58	07:21
1	17:09	17:46	18:17	19:50	20:19	20:34	20:20	20:01	19:01	18:11	18:37	18:37
28	07:13	06:36	06:00	06:11	06:32	05:35	05:50	06:21	06:51	07:23	06:59	07:22
1	17:10	17:48	18:18	19:51	20:20	20:34	20:19	20:01	19:01	18:11	18:37	18:38
29	07:12	06:49	06:01	06:11	06:31	05:35	05:51	06:21	06:52	07:24	07:00	07:22
1	17:11	17:49	18:19	19:52	20:21	20:34	20:18	20:01	19:01	18:11	18:37	18:38
30	07:12	06:47	06:00	06:11	06:31	05:35	05:52	06:22	06:53	07:25	07:01	07:22
1	17:12	17:50	18:20	19:53	20:21	20:34	20:17	20:01	19:01	18:11	18:37	18:39
31	07:11	06:45	06:00	06:11	06:30	05:35	06:23	06:54	07:26	07:57	07:33	07:46
1	17:14	17:51	18:21	19:54	20:22	20:34	20:16	20:01	19:01	18:11	18:37	18:40
Potential sun hours	298	298	369	398	448	451	458	427	375	346	299	289
Total, worst case	173									4		553
Sun reduction	0,43									0,47		0,41
Oper. time red.	0,89									0,89		0,89
Wind dir. red.	0,57									0,57		0,57
Total reduction	0,22									0,24		0,21
Total, real	38									1		115

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R24a - R24a
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07:23 16:41	08:40 (B15) 08:56 (B15)	07:10 17:15	06:34 17:49	06:44 19:22	05:58 19:54
2	07:23 16:42	08:41 (B15) 08:56 (B15)	07:09 17:16	06:33 17:50	06:42 19:23	05:57 19:55
3	07:23 16:43	08:43 (B15) 08:56 (B15)	07:08 17:17	06:31 17:51	06:40 19:24	05:56 19:56
4	07:23 16:44	08:44 (B15) 08:55 (B15)	07:07 17:19	06:29 17:52	06:39 19:25	05:54 19:57
5	07:23 16:44	08:46 (B15) 08:54 (B15)	07:06 17:20	06:28 17:53	06:37 19:27	05:53 19:58
6	07:23 16:45	08:49 (B15) 08:53 (B15)	07:05 17:21	06:26 17:54	06:36 19:28	05:52 19:59
7	07:23 16:46	07:03 17:22	06:25 17:55	06:34 19:29	05:51 20:00	05:28 20:27
8	07:23 16:47	07:02 17:24	06:23 17:57	06:32 19:30	05:50 20:01	05:27 20:28
9	07:23 16:48	07:01 17:25	06:22 17:58	06:31 19:31	05:49 20:02	05:27 20:28
10	07:23 16:49	07:00 17:26	06:20 17:59	06:29 19:32	05:47 20:03	05:27 20:29
11	07:22 16:50	06:59 17:27	06:18 18:00	06:28 19:33	05:46 20:04	05:27 20:29
12	07:22 16:51	06:58 17:29	06:17 18:01	06:26 19:34	05:45 20:05	05:27 20:30
13	07:22 16:52	06:56 17:30	06:15 18:02	06:24 19:35	05:44 20:06	05:27 20:30
14	07:21 16:54	06:55 17:31	06:14 18:03	06:23 19:36	05:43 20:07	05:26 20:31
15	07:21 16:55	06:54 17:32	06:12 18:04	06:21 19:37	05:42 20:08	05:26 20:31
16	07:21 16:56	06:53 17:33	06:10 18:05	06:20 19:38	05:41 20:09	05:26 20:32
17	07:20 16:57	06:51 17:35	06:09 18:06	06:18 19:39	05:40 20:10	05:26 20:32
18	07:20 16:58	06:50 17:36	06:07 18:07	06:17 19:40	05:39 20:11	05:27 20:32
19	07:19 16:59	06:49 17:37	06:05 18:09	06:15 19:41	05:39 20:12	05:27 20:33
20	07:19 17:00	06:47 17:38	06:04 18:10	06:14 19:42	05:38 20:13	05:27 20:33
21	07:18 17:02	06:46 17:39	06:02 18:11	06:12 19:43	05:37 20:14	05:27 20:33
22	07:18 17:03	06:44 17:41	06:00 18:12	06:11 19:44	05:36 20:15	05:27 20:33
23	07:17 17:04	06:43 17:42	05:59 18:13	06:09 19:45	05:35 20:16	05:27 20:34
24	07:16 17:05	06:42 17:43	05:57 18:14	06:08 19:46	05:35 20:16	05:28 20:34
25	07:16 17:06	06:40 17:44	05:55 18:15	06:06 19:47	05:34 20:17	05:28 20:34
26	07:15 17:08	06:39 17:45	05:54 18:16	06:05 19:49	05:33 20:18	05:28 20:34
27	07:14 17:09	06:37 17:46	05:52 18:17	06:04 19:50	05:33 20:19	05:29 20:34
28	07:13 17:10	06:36 17:48	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34
29	07:12 17:11		06:49 19:19	06:01 19:52	05:31 20:21	05:29 20:34
30	07:11 17:12		06:47 19:20	06:00 19:53	05:31 20:21	05:30 20:34
31	07:11 17:14		06:45 19:21	05:30 20:22	05:30 19:21 (B10)	05:30 19:20 (B10)
Potential sun hours	298	298	369	398	448	451
Total, worst case	67				1010	1635
Sun reduction	0,43				0,57	0,62
Oper. time red.	0,89				0,89	0,89
Wind dir. red.	0,57				0,56	0,57
Total reduction	0,22				0,29	0,32
Total, real	15				289	516

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R24a - R24a
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December
1	05.30	07.25 (B14) 05.54	19.06 (B11) 06.24	06.54	06.28	07.02
	20.34	19.22 (B10) 20.15	19.32	18.42	16.56	16.32
2	05.31	07.25 (B14) 05.55	06.25	06.55	06.29	07.03
	20.34	19.22 (B10) 20.14	19.31	18.41	16.55	16.32
3	05.31	07.25 (B14) 05.56	06.26	06.56	06.30	07.04
	20.34	19.24 (B10) 20.13	19.29	18.39	16.54	16.31
4	05.32	07.25 (B14) 05.57	06.27	06.57	06.31	07.05
	20.33	19.24 (B10) 20.12	19.28	18.37	16.52	16.31
5	05.32	07.25 (B14) 05.58	06.28	06.58	06.33	07.06
	20.33	19.25 (B10) 20.11	19.26	18.36	16.51	16.31
6	05.33	07.25 (B14) 05.59	06.29	06.59	06.34	07.07
	20.33	19.25 (B10) 20.09	19.24	18.34	16.50	16.31
7	05.34	07.26 (B14) 06.00	06.30	07.00	06.35	07.08
	20.33	19.26 (B10) 20.08	19.23	18.32	16.49	16.31
8	05.34	07.26 (B14) 06.01	06.31	07.01	06.36	07.09
	20.32	19.27 (B10) 20.07	19.21	18.31	16.48	16.31
9	05.35	07.26 (B14) 06.02	06.32	07.02	06.37	07.10
	20.32	19.27 (B10) 20.06	19.19	18.29	16.47	16.31
10	05.36	07.26 (B14) 06.03	06.33	07.03	06.38	07.11
	20.32	19.28 (B10) 20.05	19.18	18.28	16.46	16.31
11	05.36	07.27 (B14) 06.04	06.34	07.04	06.40	07.12
	20.31	19.29 (B10) 20.03	19.16	18.26	16.45	16.31
12	05.37	07.26 (B14) 06.05	06.35	07.05	06.41	07.13
	20.31	19.29 (B10) 20.02	19.14	18.24	16.44	16.31
13	05.38	07.27 (B14) 06.06	06.36	07.06	06.42	07.13
	20.30	19.29 (B10) 20.01	19.13	18.23	16.43	16.31
14	05.38	07.28 (B14) 06.07	06.37	07.08	06.43	07.14
	20.30	19.30 (B10) 19.59	19.11	18.21	16.42	16.31
15	05.39	07.28 (B14) 06.08	06.38	07.09	06.44	07.15
	20.29	19.30 (B10) 19.58	19.09	18.20	16.41	16.32
16	05.40	07.28 (B14) 06.09	06.39	07.10	06.46	07.16
	20.29	19.30 (B10) 19.57	19.08	18.18	16.40	16.32
17	05.41	07.28 (B14) 06.10	06.40	07.11	06.47	07.16
	20.28	19.30 (B10) 19.55	19.06	18.17	16.40	16.32
18	05.41	07.29 (B14) 06.11	06.41	07.12	06.48	07.17
	20.27	19.31 (B10) 19.54	19.04	18.15	16.39	16.32
19	05.42	07.30 (B14) 06.12	06.42	07.13	06.49	07.18
	20.27	19.31 (B10) 19.52	19.02	18.14	16.38	16.33
20	05.43	07.30 (B14) 06.13	06.43	07.14	06.50	07.18
	20.26	19.30 (B10) 19.51	19.01	18.12	16.37	16.33
21	05.44	07.30 (B14) 06.14	06.44	07.15	06.51	07.19
	20.25	19.30 (B10) 19.49	18.59	18.11	16.37	16.34
22	05.45	07.31 (B14) 06.15	06.45	07.16	06.52	07.19
	20.24	19.31 (B10) 19.48	18.57	18.09	16.36	16.34
23	05.46	07.32 (B14) 06.16	06.46	07.17	06.54	07.20
	20.24	19.30 (B10) 19.46	18.56	18.08	16.35	16.35
24	05.47	07.33 (B14) 06.17	06.47	07.19	06.55	07.20
	20.23	19.30 (B10) 19.45	18.54	18.06	16.35	16.35
25	05.47	07.34 (B14) 06.17	06.48	06.20	06.56	07.21
	20.22	19.30 (B10) 19.43	18.52	17.05	16.34	16.36
26	05.48	07.36 (B14) 06.18	06.49	06.21	06.57	07.21
	20.21	19.29 (B10) 19.42	18.51	17.04	16.34	16.36
27	05.49	07.37 (B14) 06.19	06.50	06.22	06.58	07.21
	20.20	19.28 (B10) 19.40	18.49	17.02	16.33	16.37
28	05.50	07.39 (B14) 06.20	06.51	06.23	06.59	07.22
	20.19	19.27 (B10) 19.39	18.47	17.01	16.33	16.38
29	05.51	19.01 (B11) 06.21	06.52	06.24	07.00	07.22
	20.18	19.26 (B10) 19.37	18.46	17.00	16.33	16.38
30	05.52	19.02 (B11) 06.22	06.53	06.25	07.01	07.22
	20.17	19.23 (B10) 19.36	18.44	16.58	16.32	16.39
31	05.53	19.04 (B11) 06.23	06.54	06.27	07.02	07.23
	20.16	19.16 (B11) 19.34	18.43	16.57	16.31	16.40
Potential sun hours	458	427	375	346	299	269
Total, worst case	1697	8				460
Sun reduction	0,69	0,69				0,41
Oper. time red.	0,89	0,89				0,89
Wind dir. red.	0,56	0,54				0,57
Total reduction	0,35	0,33				0,21
Total, real	587	3				96

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R26 - R26
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07.23	07.10	06.34	06.44	05.58	07.47 (B14) 05.30
	16.41	17.15	17.49	19.22	19.54	39 08.26 (B14) 20.23
2	07.23	07.09	06.33	06.42	05.57	07.47 (B14) 05.29
	16.42	17.16	17.50	19.23	19.55	38 08.25 (B14) 20.24
3	07.23	07.08	06.31	06.40	05.56	07.47 (B14) 05.29
	16.43	17.17	17.51	19.24	19.56	38 08.25 (B14) 20.24
4	07.23	07.07	06.29	06.39	05.54	07.48 (B14) 05.28
	16.44	17.19	17.52	19.25	19.57	37 08.25 (B14) 20.25
5	07.23	07.06	06.28	06.37	05.53	07.48 (B14) 05.28
	16.44	17.20	17.53	19.26	19.58	36 08.24 (B14) 20.26
6	07.23	07.05	06.26	06.36	05.52	07.49 (B14) 05.28
	16.45	17.21	17.54	19.28	19.59	34 08.23 (B14) 20.26
7	07.23	07.03	06.25	06.34	05.51	07.48 (B14) 05.28
	16.46	17.22	17.55	19.29	20.00	34 08.22 (B14) 20.27
8	07.23	07.02	06.23	06.32	05.50	07.49 (B14) 05.27
	16.47	17.24	17.57	19.30	20.01	32 08.21 (B14) 20.28
9	07.23	07.01	06.22	06.31	05.49	07.50 (B14) 05.27
	16.48	17.25	17.58	19.31	20.02	30 08.20 (B14) 20.28
10	07.23	07.00	06.20	06.29	18.48 (B11) 05.47	07.51 (B14) 05.27
	16.49	17.26	17.59	19.32	11 18.59 (B11) 20.03	28 08.19 (B14) 20.29
11	07.22	06.59	06.18	06.28	18.45 (B11) 05.46	07.52 (B14) 05.27
	16.50	17.27	18.00	19.33	16 19.01 (B11) 20.04	26 08.18 (B14) 20.29
12	07.22	06.58	06.17	06.26	18.43 (B11) 05.45	07.53 (B14) 05.27
	16.51	17.28	18.01	19.34	18 19.01 (B11) 20.05	23 08.16 (B14) 20.30
13	07.22	06.56	06.15	06.24	18.42 (B11) 05.44	07.54 (B14) 05.27
	16.52	17.30	18.02	19.35	21 19.03 (B11) 20.06	21 08.15 (B14) 20.30
14	07.21	06.55	06.13	06.23	08.08 (B14) 05.43	07.56 (B14) 05.26
	16.54	17.31	18.03	19.36	29 19.03 (B11) 20.07	17 08.13 (B14) 20.31
15	07.21	06.54	06.12	06.21	08.03 (B14) 05.42	07.58 (B14) 05.26
	16.55	17.32	18.04	19.37	39 19.03 (B11) 20.08	13 08.11 (B14) 20.31
16	07.21	06.53	06.10	06.20	08.00 (B14) 05.41	08.01 (B14) 05.26
	16.56	17.33	18.05	19.38	45 19.03 (B11) 20.09	6 08.07 (B14) 20.32
17	07.20	06.51	06.09	06.18	07.58 (B14) 05.40	05.26
	16.57	17.35	18.06	19.39	49 19.03 (B11) 20.10	20.32
18	07.20	06.50	06.07	06.17	07.56 (B14) 05.39	05.27
	16.58	17.36	18.07	19.40	53 19.03 (B11) 20.11	20.32
19	07.19	06.49	06.05	06.15	07.55 (B14) 05.39	05.27
	16.59	17.37	18.09	19.41	54 19.03 (B11) 20.12	20.33
20	07.19	06.47	06.04	06.14	07.53 (B14) 05.38	05.27
	17.00	17.38	18.10	19.42	54 19.01 (B11) 20.13	20.33
21	07.18	06.46	06.02	06.12	07.52 (B14) 05.37	05.27
	17.02	17.39	18.11	19.43	56 19.01 (B11) 20.14	20.33
22	07.18	06.44	06.00	06.11	07.51 (B14) 05.36	05.27
	17.03	17.41	18.12	19.44	54 18.59 (B11) 20.15	20.33
23	07.17	06.43	05.59	06.09	07.50 (B14) 05.35	05.27
	17.04	17.42	18.13	19.45	54 18.58 (B11) 20.16	20.34
24	07.16	06.42	05.57	06.08	07.50 (B14) 05.35	05.28
	17.05	17.43	18.14	19.46	51 18.57 (B11) 20.16	20.34
25	07.16	06.40	05.55	06.06	07.49 (B14) 05.34	05.28
	17.06	17.44	18.15	19.47	46 18.53 (B11) 20.17	20.34
26	07.15	06.39	05.54	06.05	07.48 (B14) 05.33	05.28
	17.08	17.45	18.16	19.49	40 08.28 (B14) 20.18	20.34
27	07.14	06.37	05.52	06.04	07.48 (B14) 05.33	05.29
	17.09	17.46	18.17	19.50	40 08.28 (B14) 20.19	20.34
28	07.13	06.36	05.50	06.02	07.47 (B14) 05.32	05.29
	17.10	17.47	18.18	19.51	40 08.27 (B14) 20.20	20.34
29	07.12		06.49	06.01	07.47 (B14) 05.31	05.29
	17.11		19.19	19.52	40 08.27 (B14) 20.21	20.34
30	07.11		06.47	06.00	07.48 (B14) 05.31	05.30
	17.12		19.20	19.53	39 08.27 (B14) 20.21	20.34
31	07.11		06.45		05.30	
	17.14		19.21		20.22	
Potential sun hours	298	298	369	398	448	451
Total, worst case				849	452	
Sun reduction				0,51	0,57	
Oper. time red.				0,89	0,89	
Wind dir. red.				0,57	0,58	
Total reduction				0,26	0,30	
Total, real				221	134	

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R26 - R26
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December
1	05:30	05:54	08:03 (B14) 06:24	18:44 (B11) 06:54	06:28	07:02
	20:34	20:15	08:27 (B14) 19:32	19:00 (B11) 18:42	16:56	16:32
2	05:31	05:55	08:02 (B14) 06:25	18:46 (B11) 06:55	06:29	07:03
	20:34	20:14	08:29 (B14) 19:31	18:57 (B11) 18:41	16:55	16:32
3	05:31	05:56	08:01 (B14) 06:26	18:56	06:30	07:04
	20:34	20:13	08:30 (B14) 19:29	18:39	16:54	16:31
4	05:32	05:57	08:00 (B14) 06:27	18:37	06:31	07:05
	20:33	20:12	08:31 (B14) 19:28	18:37	16:52	16:31
5	05:32	05:58	08:00 (B14) 06:28	18:58	06:32	07:06
	20:33	20:11	08:32 (B14) 19:26	18:36	16:51	16:31
6	05:33	05:59	07:59 (B14) 06:29	18:59	06:34	07:07
	20:33	20:09	08:33 (B14) 19:24	18:34	16:50	16:31
7	05:34	06:00	07:58 (B14) 06:30	18:32	06:35	07:08
	20:33	20:08	08:33 (B14) 19:23	18:32	16:49	16:31
8	05:34	06:01	07:57 (B14) 06:31	18:32	06:36	07:09
	20:32	20:07	08:33 (B14) 19:21	18:31	16:48	16:31
9	05:35	06:02	07:56 (B14) 06:32	18:31	06:37	07:10
	20:32	20:06	08:33 (B14) 19:19	18:29	16:47	16:31
10	05:35	06:03	07:56 (B14) 06:33	18:29	06:38	07:11
	20:32	20:05	08:34 (B14) 19:18	18:28	16:46	16:31
11	05:36	06:04	07:56 (B14) 06:34	18:28	06:40	07:12
	20:31	20:03	08:34 (B14) 19:16	18:26	16:45	16:31
12	05:37	06:05	07:55 (B14) 06:35	18:26	06:41	07:13
	20:31	20:02	08:35 (B14) 19:14	18:24	16:44	16:31
13	05:38	06:06	07:55 (B14) 06:36	18:24	06:42	07:13
	20:30	20:01	08:35 (B14) 19:13	18:23	16:43	16:31
14	05:38	06:07	07:55 (B14) 06:37	18:23	06:43	07:14
	20:30	19:59	08:35 (B14) 19:11	18:21	16:42	16:31
15	05:39	06:08	07:55 (B14) 06:38	18:21	06:44	07:15
	20:29	19:58	08:35 (B14) 19:09	18:20	16:41	16:31
16	05:40	06:09	07:55 (B14) 06:39	18:20	06:46	07:16
	20:29	19:57	08:35 (B14) 19:08	18:18	16:40	16:32
17	05:41	06:10	07:55 (B14) 06:40	18:18	06:47	07:16
	20:28	19:55	08:35 (B14) 19:06	18:17	16:40	16:32
18	05:41	06:11	07:55 (B14) 06:41	18:17	06:48	07:17
	20:27	19:54	19:01 (B11) 19:04	18:15	16:39	16:32
19	05:42	06:12	07:56 (B14) 06:42	18:15	06:49	07:18
	20:27	19:52	19:03 (B11) 19:02	18:14	16:38	16:33
20	05:43	06:13	07:56 (B14) 06:43	18:14	06:50	07:18
	20:26	19:51	19:04 (B11) 19:01	18:12	16:37	16:33
21	05:44	06:14	07:57 (B14) 06:44	18:12	06:51	07:19
	20:25	19:49	19:05 (B11) 18:59	18:11	16:37	16:34
22	05:45	06:15	07:57 (B14) 06:45	18:11	06:52	07:19
	20:24	19:48	19:06 (B11) 18:57	18:09	16:36	16:34
23	05:46	06:16	07:58 (B14) 06:46	18:09	06:54	07:20
	20:24	19:46	19:06 (B11) 18:56	18:08	16:35	16:35
24	05:47	06:16	07:59 (B14) 06:47	18:08	06:55	07:20
	20:23	19:45	19:06 (B11) 18:54	18:06	16:35	16:35
25	05:47	06:17	08:00 (B14) 06:48	18:06	06:56	07:21
	20:22	19:43	19:06 (B11) 18:52	17:05	16:34	16:36
26	05:48	06:18	08:00 (B14) 06:49	17:04	06:57	07:21
	20:21	19:42	19:05 (B11) 18:51	17:04	16:34	16:36
27	05:49	06:19	08:02 (B14) 06:50	17:02	06:58	07:21
	20:20	19:40	19:05 (B11) 18:49	17:02	16:33	16:37
28	05:50	08:10 (B14) 06:20	08:05 (B14) 06:51	16:59	06:59	07:22
	20:19	9 08:19 (B14) 19:39	19:04 (B11) 18:47	17:01	16:33	16:38
29	05:51	08:07 (B14) 06:21	08:09 (B14) 06:52	17:00	07:00	07:22
	20:18	15 08:22 (B14) 19:37	19:04 (B11) 18:46	17:00	16:33	16:38
30	05:52	08:06 (B14) 06:22	18:42 (B11) 06:53	16:59	07:01	07:22
	20:17	18 08:24 (B14) 19:36	21 19:03 (B11) 18:44	16:58	16:32	16:39
31	05:53	08:04 (B14) 06:23	18:43 (B11) 06:54	16:57		07:22
	20:16	22 08:26 (B14) 19:34	18 19:01 (B11) 18:43	16:57		16:40
Potential sun hours	458	427	375	346	299	289
Total, worst case	64	1225	27			
Sun reduction	0,69	0,69	0,61			
Oper. time red.	0,89	0,89	0,89			
Wind dir. red.	0,58	0,58	0,57			
Total reduction	0,36	0,35	0,31			
Total, real	23	433	8			

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R30a - R30a
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07:23 16:41 29	15:00 (B06) 15:29 (B06) 17:15	07:10 06:34	17:49 16:04 (B05) 06:44	17:55 (B04) 18:10 (B04) 05:58	05:30 20:23
2	07:23 16:42 28	15:01 (B06) 15:29 (B06) 17:16	07:09 06:33	17:50 16:03 (B05) 06:42	17:57 (B04) 18:07 (B04) 05:57	05:29 20:24
3	07:23 16:43 28	15:01 (B06) 15:29 (B06) 17:17	07:08 06:31	17:51 16:02 (B05) 06:40	18:07 (B04) 18:17 (B04) 05:56	05:29 20:25
4	07:23 16:43 28	15:02 (B06) 15:30 (B06) 17:19	07:07 06:30	17:52 16:01 (B05) 06:39	18:08 (B04) 18:18 (B04) 05:54	05:28 20:25
5	07:23 16:44 28	15:02 (B06) 15:30 (B06) 17:20	07:06 06:28	17:53 16:01 (B05) 06:37	18:09 (B04) 18:19 (B04) 05:53	05:28 20:26
6	07:23 16:45 27	15:03 (B06) 15:30 (B06) 17:21	07:05 06:26	17:54 15:59 (B05) 06:36	18:10 (B04) 18:20 (B04) 05:52	05:28 20:27
7	07:23 16:46 27	15:04 (B06) 15:31 (B06) 17:22	07:04 06:25	17:55 15:59 (B05) 06:34	18:21 (B04) 18:31 (B04) 05:51	05:27 20:27
8	07:23 16:47 26	15:05 (B06) 15:31 (B06) 17:24	07:02 06:23	17:57 15:58 (B05) 06:32	18:22 (B04) 18:32 (B04) 05:50	05:27 20:28
9	07:23 16:48 26	15:06 (B06) 15:32 (B06) 17:25	07:01 06:22	17:58 15:58 (B05) 06:31	18:23 (B04) 18:33 (B04) 05:49	05:27 20:28
10	07:23 16:49 25	15:06 (B06) 15:31 (B06) 17:26	07:00 06:20	17:59 15:58 (B05) 06:29	18:24 (B04) 18:34 (B04) 05:47	05:27 20:29
11	07:22 16:50 24	15:07 (B06) 15:31 (B06) 17:27	06:59 06:18	18:00 15:57 (B05) 06:28	18:25 (B04) 18:35 (B04) 05:46	05:27 20:29
12	07:22 16:51 23	15:08 (B06) 15:31 (B06) 17:28	06:58 06:17	18:01 15:57 (B05) 06:26	18:26 (B04) 18:36 (B04) 05:45	05:27 20:30
13	07:22 16:52 22	15:09 (B06) 15:31 (B06) 17:30	06:56 06:15	18:02 15:57 (B05) 06:24	18:27 (B04) 18:37 (B04) 05:44	05:26 20:30
14	07:22 16:53 21	15:10 (B06) 15:31 (B06) 17:31	06:55 06:14	18:03 15:57 (B05) 06:23	18:28 (B04) 18:38 (B04) 05:43	05:26 20:31
15	07:21 16:55 19	15:11 (B06) 15:30 (B06) 17:32	06:54 06:12	18:04 15:56 (B05) 06:21	18:29 (B04) 18:39 (B04) 05:42	05:26 20:31
16	07:21 16:56 17	15:13 (B06) 15:30 (B06) 17:33	06:53 06:10	18:05 15:57 (B05) 06:20	18:30 (B04) 18:40 (B04) 05:41	05:26 20:32
17	07:20 16:57 14	15:14 (B06) 15:28 (B06) 17:35	06:51 06:09	18:06 15:57 (B05) 06:18	18:31 (B04) 18:41 (B04) 05:40	05:26 20:32
18	07:20 16:58 10	15:17 (B06) 15:27 (B06) 17:36	06:50 06:07	18:07 15:57 (B05) 06:17	18:32 (B04) 18:42 (B04) 05:39	05:26 20:32
19	07:19 16:59 4	15:20 (B06) 15:24 (B06) 17:37	06:49 06:05	18:08 15:58 (B05) 06:15	18:33 (B04) 18:43 (B04) 05:38	05:27 20:33
20	07:19 17:00	06:47 17:38	06:48 18:10	18:09 17:17 (B04) 19:42	18:34 (B04) 18:44 (B04) 05:38	05:27 20:33
21	07:18 17:01	06:46 17:39	06:47 16:26 (B05) 18:11	18:10 15:59 (B05) 17:17 (B04) 19:43	18:35 (B04) 18:45 (B04) 05:37	05:27 20:33
22	07:18 17:03	06:44 17:40	06:46 16:20 (B05) 18:12	18:11 16:40 (B05) 18:12 17:18 (B04) 19:44	18:36 (B04) 18:46 (B04) 05:36	05:27 20:33
23	07:17 17:04	06:43 17:42	06:45 16:16 (B05) 18:13	18:12 16:43 (B05) 18:13 17:18 (B04) 19:45	18:37 (B04) 18:47 (B04) 05:35	05:27 20:34
24	07:16 17:05	06:42 17:43	06:44 16:14 (B05) 18:14	18:13 16:46 (B05) 18:14 17:18 (B04) 19:46	18:38 (B04) 18:48 (B04) 05:34	05:28 20:34
25	07:16 17:06	06:40 17:44	06:43 16:11 (B05) 18:15	18:14 17:04 (B03) 18:15 17:18 (B04) 19:48	18:39 (B04) 18:49 (B04) 05:33	05:28 20:34
26	07:15 17:07	06:39 17:45	06:42 16:09 (B05) 18:16	18:15 17:07 (B03) 18:16 17:17 (B04) 19:49	18:40 (B04) 18:50 (B04) 05:32	05:29 20:34
27	07:14 17:09	06:37 17:46	06:41 16:07 (B05) 18:17	18:16 17:08 (B03) 18:17 17:17 (B04) 19:50	18:41 (B04) 18:51 (B04) 05:31	05:29 20:34
28	07:13 17:10	06:36 17:47	06:40 16:06 (B05) 18:18	18:17 17:09 (B03) 18:18 17:16 (B04) 19:51	18:42 (B04) 18:52 (B04) 05:30	05:29 20:34
29	07:12 17:11		06:39 16:05 (B05) 18:19	18:18 17:10 (B03) 18:19 17:15 (B04) 19:52	18:43 (B04) 18:53 (B04) 05:29	05:30 20:34
30	07:12 17:12		06:38 16:04 (B05) 18:20	18:19 17:11 (B03) 18:20 17:14 (B04) 19:53	18:44 (B04) 18:54 (B04) 05:28	05:30 20:34
31	07:11 17:14		06:37 16:03 (B05) 18:21	18:20 17:12 (B03) 18:21 17:13 (B04) 19:54	18:45 (B04) 18:55 (B04) 05:27	05:30 20:34
Potential sun hours	298	297	369	398	448	451
Total, worst case	426	306	1989	25		
Sun reduction	0,43	0,44	0,44	0,51		
Oper. time red.	0,89	0,89	0,89	0,89		
Wind dir. red.	0,69	0,61	0,61	0,59		
Total reduction	0,27	0,24	0,24	0,27		
Total, real	114	74	483	7		

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R30a - R30a
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December	
1	05.30	05.54	06.24	06.54	16.36 (B05)	06.28	
	20.34	20.15	19.32	18.42	17.36 (B05)	16.56	
2	05.31	05.55	06.25	06.55	16.36 (B05)	06.29	
	20.34	20.14	19.31	18.41	17.36 (B05)	16.55	
3	05.31	05.56	06.26	06.56	16.35 (B05)	06.30	
	20.34	20.13	19.29	18.39	17.35 (B05)	16.53	
4	05.32	05.57	06.27	06.57	16.35 (B05)	06.31	
	20.34	20.12	19.28	18.37	17.35 (B05)	16.52	
5	05.32	05.58	06.28	06.58	16.35 (B05)	06.33	
	20.33	20.11	19.26	18.36	17.39 (B03)	16.51	
6	05.33	05.59	06.29	06.59	16.35 (B05)	06.34	
	20.33	20.10	19.24	18.34	17.41 (B03)	16.50	
7	05.33	06.00	06.30	07.00	16.35 (B05)	06.35	
	20.33	20.08	19.23	18.32	17.42 (B03)	16.49	
8	05.34	06.01	06.31	07.01	16.35 (B05)	06.36	
	20.32	20.07	19.21	18.31	17.43 (B03)	16.48	
9	05.35	06.02	06.32	07.02	16.35 (B05)	06.37	
	20.32	20.06	19.19	18.29	17.43 (B03)	16.47	
10	05.35	06.03	06.33	17.52 (B04)	07.03	16.36 (B05)	06.38
	20.32	20.05	19.18	18.00 (B04)	18.28	17.43 (B03)	16.46
11	05.36	06.04	06.34	17.48 (B04)	07.04	16.37 (B05)	06.40
	20.31	20.03	19.16	18.02 (B04)	18.26	17.43 (B03)	16.45
12	05.37	06.05	06.35	17.08 (B05)	07.05	16.38 (B05)	06.41
	20.31	20.02	19.14	18.04 (B04)	18.24	17.43 (B03)	16.44
13	05.38	06.06	06.36	17.03 (B05)	07.07	16.38 (B05)	06.42
	20.30	20.01	19.13	18.05 (B04)	18.23	17.42 (B03)	16.43
14	05.38	06.07	06.37	17.00 (B05)	07.08	16.39 (B05)	06.43
	20.30	19.59	19.11	18.05 (B04)	18.21	17.41 (B03)	16.42
15	05.39	06.08	06.38	16.57 (B05)	07.09	16.40 (B05)	06.44
	20.29	19.58	19.09	18.06 (B04)	18.20	17.39 (B03)	16.41
16	05.40	06.09	06.39	16.55 (B05)	07.10	16.42 (B05)	06.46
	20.29	19.57	19.08	18.06 (B04)	18.18	17.37 (B03)	16.40
17	05.41	06.10	06.40	16.52 (B05)	07.11	16.43 (B05)	06.47
	20.28	19.55	19.06	18.06 (B04)	18.17	17.33 (B03)	16.39
18	05.41	06.11	06.41	16.51 (B05)	07.12	16.45 (B05)	06.48
	20.27	19.54	19.04	18.05 (B04)	18.15	17.16 (B05)	16.39
19	05.42	06.12	06.42	16.49 (B05)	07.13	16.49 (B05)	06.49
	20.27	19.52	19.02	18.05 (B04)	18.14	17.14 (B05)	16.38
20	05.43	06.13	06.43	16.47 (B05)	07.14	16.52 (B05)	06.50
	20.26	19.51	19.01	18.04 (B04)	18.12	17.09 (B05)	16.37
21	05.44	06.14	06.44	16.46 (B05)	07.15	06.51	06.51
	20.25	19.49	18.59	18.04 (B04)	18.11	16.37	16.37
22	05.45	06.14	06.45	16.44 (B05)	07.16	06.53	06.53
	20.25	19.48	18.57	18.03 (B04)	18.09	16.36	16.36
23	05.46	06.15	06.46	16.43 (B05)	07.18	06.54	06.54
	20.24	19.46	18.56	18.01 (B04)	18.08	16.35	4 15.01 (B06)
24	05.47	06.16	06.47	16.42 (B05)	07.19	06.55	14.54 (B06)
	20.23	19.45	18.54	18.00 (B04)	18.06	16.35	10 15.04 (B06)
25	05.47	06.17	06.48	16.41 (B05)	07.20	06.56	14.52 (B06)
	20.22	19.43	18.52	17.58 (B04)	17.05	16.34	14 15.06 (B06)
26	05.48	06.18	06.49	16.40 (B05)	07.21	06.57	14.51 (B06)
	20.21	19.42	18.51	17.55 (B04)	17.04	16.34	17 15.08 (B06)
27	05.49	06.19	06.50	16.39 (B05)	07.22	06.58	14.51 (B06)
	20.20	19.40	18.49	17.37 (B05)	17.02	16.33	19 15.10 (B06)
28	05.50	06.20	06.51	16.38 (B05)	07.23	06.59	14.50 (B06)
	20.19	19.39	18.47	17.37 (B05)	17.01	16.33	21 15.11 (B06)
29	05.51	06.21	06.52	16.37 (B05)	07.24	07.00	14.50 (B06)
	20.18	19.37	18.46	17.37 (B05)	17.00	16.32	22 15.12 (B06)
30	05.52	06.22	06.53	16.37 (B05)	07.25	07.01	14.49 (B06)
	20.17	19.36	18.44	17.37 (B05)	16.58	16.32	23 15.12 (B06)
31	05.53	06.23		06.27		07.23	
	20.16	19.34		16.57		16.40	29 15.28 (B06)
Potential sun hours	458	427	375	346	299	289	
Total, worst case			1232	1113	130	877	
Sun reduction			0,61	0,52	0,47	0,41	
Oper. time red.			0,89	0,89	0,89	0,89	
Wind dir. red.			0,61	0,61	0,69	0,69	
Total reduction			0,33	0,29	0,29	0,26	
Total, real			410	319	38	224	

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R30b - R30b
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07:23 16:41 28	14:58 (B06) 07:10 15:26 (B06) 17:15	06:34 17:49	15:57 (B05) 06:44 17:08 (B03) 19:22	17:57 (B04) 05:58 18:05 (B04)	05:30 20:23
2	07:23 16:42 27	14:59 (B06) 07:09 15:26 (B06) 17:16	06:33 17:50	15:55 (B05) 06:42 17:07 (B03) 19:23	05:57 19:55	05:29 20:24
3	07:23 16:43 27	14:59 (B06) 07:08 15:26 (B06) 17:17	06:31 17:51	15:55 (B05) 06:40 17:07 (B03) 19:24	05:56 19:56	05:29 20:25
4	07:23 16:43 27	15:00 (B06) 07:07 15:27 (B06) 17:19	06:30 17:52	15:54 (B05) 06:39 17:06 (B03) 19:25	05:54 19:57	05:28 20:25
5	07:23 16:44 26	15:01 (B06) 07:06 15:27 (B06) 17:20	06:28 17:53	15:54 (B05) 06:37 17:06 (B03) 19:27	05:53 19:58	05:28 20:26
6	07:23 16:45 26	15:01 (B06) 07:05 15:27 (B06) 17:21	06:26 17:54	15:53 (B05) 06:36 17:04 (B03) 19:28	05:52 19:59	05:28 20:27
7	07:23 16:46 26	15:02 (B06) 07:04 15:28 (B06) 17:22	06:25 17:55	15:54 (B05) 06:34 17:03 (B03) 19:29	05:51 20:00	05:27 20:27
8	07:23 16:47 25	15:03 (B06) 07:02 15:28 (B06) 17:24	06:23 17:57	15:53 (B05) 06:32 16:58 (B03) 19:30	05:50 20:01	05:27 20:28
9	07:23 16:48 24	15:04 (B06) 07:01 15:28 (B06) 17:25	06:22 17:58	15:52 (B05) 06:31 16:53 (B05) 19:31	05:49 20:02	05:27 20:28
10	07:23 16:49 22	15:05 (B06) 07:00 15:27 (B06) 17:26	06:20 17:59	15:53 (B05) 06:29 16:53 (B05) 19:32	05:47 20:03	05:27 20:29
11	07:22 16:50 21	15:06 (B06) 06:59 15:27 (B06) 17:27	06:18 18:00	15:52 (B05) 06:28 16:52 (B05) 19:33	05:46 20:04	05:27 20:29
12	07:22 16:51 20	15:07 (B06) 06:58 15:27 (B06) 17:28	06:17 18:01	15:52 (B05) 06:26 16:52 (B05) 19:34	05:45 20:05	05:27 20:30
13	07:22 16:52 18	15:08 (B06) 06:56 15:26 (B06) 17:30	06:15 18:02	15:53 (B05) 06:24 16:52 (B05) 19:35	05:44 20:06	05:26 20:30
14	07:22 16:53 16	15:10 (B06) 06:55 15:26 (B06) 17:31	06:14 18:03	15:53 (B05) 06:23 16:51 (B05) 19:36	05:43 20:07	05:26 20:31
15	07:21 16:55 14	15:11 (B06) 06:54 15:25 (B06) 17:32	06:12 18:04	15:52 (B05) 06:21 16:50 (B05) 19:37	05:42 20:08	05:26 20:31
16	07:21 16:56 11	15:13 (B06) 06:53 15:24 (B06) 17:33	06:10 18:05	15:54 (B05) 06:20 17:10 (B04) 19:38	05:41 20:09	05:26 20:32
17	07:20 16:57 5	15:16 (B06) 06:51 15:21 (B06) 17:35	06:09 18:06	15:54 (B05) 06:18 17:12 (B04) 19:39	05:40 20:10	05:26 20:32
18	07:20 16:58	06:50 17:36	16:22 (B05) 06:07 16:28 (B05) 18:07	15:54 (B05) 06:17 17:14 (B04) 19:40	05:39 20:11	05:26 20:32
19	07:19 16:59	06:49 17:37	16:15 (B05) 06:05 16:35 (B05) 18:09	15:55 (B05) 06:15 17:15 (B04) 19:41	05:38 20:12	05:27 20:33
20	07:19 17:00	06:47 17:38	16:11 (B05) 06:04 16:38 (B05) 18:10	15:56 (B05) 06:14 17:16 (B04) 19:42	05:38 20:13	05:27 20:33
21	07:18 17:01	06:46 17:39	16:09 (B05) 06:02 16:41 (B05) 18:11	15:56 (B05) 06:12 17:16 (B04) 19:43	05:37 20:14	05:27 20:33
22	07:18 17:03	06:44 17:40	16:07 (B05) 06:00 16:43 (B05) 18:12	15:58 (B05) 06:11 17:17 (B04) 19:44	05:36 20:15	05:27 20:33
23	07:17 17:04	06:43 17:42	16:04 (B05) 05:59 16:45 (B05) 18:13	15:59 (B05) 06:09 17:16 (B04) 19:45	05:35 20:16	05:27 20:34
24	07:16 17:05	06:42 17:43	16:03 (B05) 05:57 17:02 (B03) 18:14	16:00 (B05) 06:08 17:16 (B04) 19:46	05:34 20:17	05:28 20:34
25	07:16 17:06	06:40 17:44	16:01 (B05) 05:55 17:05 (B03) 18:15	16:02 (B05) 06:06 17:16 (B04) 19:48	05:34 20:17	05:28 20:34
26	07:15 17:07	06:39 17:45	16:00 (B05) 05:54 17:07 (B03) 18:16	16:04 (B05) 06:05 17:15 (B04) 19:49	05:33 20:18	05:28 20:34
27	07:14 17:09	06:37 17:46	15:59 (B05) 05:52 17:07 (B03) 18:17	16:06 (B05) 06:04 17:14 (B04) 19:50	05:32 20:19	05:29 20:34
28	07:13 17:10	06:36 17:47	15:58 (B05) 05:50 17:08 (B03) 18:18	16:10 (B05) 06:02 17:14 (B04) 19:51	05:31 20:20	05:29 20:34
29	07:12 17:11		06:49 19:19	17:17 (B05) 06:01 18:12 (B04) 19:52	05:31 20:21	05:29 20:34
30	07:12 17:12		06:47 19:20	17:52 (B04) 06:00 18:10 (B04) 19:53	05:31 20:22	05:30 20:34
31	07:11 17:14		06:45 19:21	17:54 (B04) 05:59 18:08 (B04) 19:54	05:30 20:22	05:30 20:34
Potential sun hours	298	297	369	398	448	451
Total, worst case	363	470	1882	8		
Sun reduction	0,43	0,44	0,44	0,51		
Oper. time red.	0,89	0,89	0,89	0,89		
Wind dir. red.	0,70	0,62	0,62	0,59		
Total reduction	0,27	0,24	0,25	0,27		
Total, real	97	115	462	2		

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)



**RELAZIONE SULL'EVOLUZIONE
DELL'OMBRA INDOTTA
DALL'IMPIANTO**

Codice
Revisione
Data di creazione
Data revisione
Pagina

GE.AGB01.P3.A.8
22/11/2018
04/12/2018
00
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SHADOW - Calendar

Calculation: GE.AGB01.P3_SH-FLShadow receptor: R30b - R30b

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
Minimum sun height over horizon for influence 3 °
Day step for calculation 1 days
Time step for calculation 1 minutes

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4,12 4,66 5,30 6,72 8,25 9,35 10,16 9,45 7,64 5,82 4,65 3,82

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
1.403 765 428 258 208 129 270 903 1.287 921 569 687 7.829

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

	July	August	September	October	November	December
1	05.30 20.34	05.54 20.15	06.24 19.32	06.54 18.42	16.32 (B05) 16.56	06.28 16.32
2	05.31 20.34	05.55 20.14	06.25 19.31	06.55 18.41	16.31 (B05) 16.55	06.29 16.32
3	05.31 20.34	05.56 20.13	06.26 19.29	06.56 18.39	16.30 (B05) 16.53	06.30 16.31
4	05.32 20.34	05.57 20.12	06.27 19.28	06.57 18.37	16.30 (B05) 16.52	06.31 16.31
5	05.32 20.33	05.58 20.11	06.28 19.26	06.58 18.36	16.29 (B05) 16.51	06.33 16.31
6	05.33 20.33	05.59 20.10	06.29 19.24	06.59 18.34	16.29 (B05) 16.50	06.34 16.31
7	05.33 20.33	06.00 20.08	06.30 19.23	07.00 18.32	16.29 (B05) 16.49	06.35 16.31
8	05.34 20.32	06.01 20.07	06.31 19.21	07.01 18.31	16.29 (B05) 16.48	06.36 16.31
9	05.35 20.32	06.02 20.06	06.32 19.19	07.02 18.29	16.29 (B05) 16.47	06.37 16.31
10	05.35 20.32	06.03 20.05	06.33 19.18	07.03 18.28	16.29 (B05) 16.46	06.38 16.31
11	05.36 20.31	06.04 20.03	06.34 19.16	07.04 18.26	16.30 (B05) 16.45	06.40 16.31
12	05.37 20.31	06.05 20.02	06.35 19.14	07.05 18.24	16.30 (B05) 16.44	06.41 16.31
13	05.38 20.30	06.06 20.01	06.36 19.13	07.07 18.23	16.30 (B05) 16.43	06.42 16.31
14	05.38 20.30	06.07 19.59	06.37 19.11	07.08 18.21	16.31 (B05) 16.42	06.43 16.31
15	05.39 20.29	06.08 19.58	06.38 19.09	07.09 18.20	16.32 (B05) 16.41	06.44 16.31
16	05.40 20.29	06.09 19.57	06.39 19.08	07.10 18.18	16.32 (B05) 16.40	06.46 16.32
17	05.41 20.28	06.10 19.55	06.40 19.06	07.11 18.17	16.33 (B05) 16.39	06.47 16.32
18	05.41 20.27	06.11 19.54	06.41 19.04	07.12 18.15	16.33 (B05) 16.39	06.47 16.32
19	05.42 20.27	06.12 19.52	06.42 19.02	07.13 18.14	16.34 (B05) 16.38	06.48 16.33
20	05.43 20.26	06.13 19.51	06.43 19.01	07.14 18.12	16.35 (B05) 16.37	06.49 16.33
21	05.44 20.25	06.14 19.49	06.44 18.59	07.15 18.11	16.40 (B05) 16.37	06.51 16.34
22	05.45 20.25	06.14 19.48	06.45 18.57	07.16 18.09	16.43 (B05) 16.36	06.53 16.34
23	05.46 20.24	06.15 19.46	06.46 18.56	07.18 18.08	16.46 (B05) 16.35	06.54 16.35
24	05.47 20.23	06.16 19.45	06.47 18.54	07.19 18.06	17.03 (B05) 16.35	06.54 16.35
25	05.47 20.22	06.17 19.43	06.48 18.52	07.19 17.05	16.35 16.34	14.55 (B06) 16.36
26	05.48 20.21	06.18 19.42	06.49 18.51	07.21 17.04	16.36 16.34	14.59 (B06) 15.02 (B06)
27	05.49 20.20	06.19 19.40	06.50 18.49	07.22 17.02	16.37 16.33	14.52 (B06) 15.05 (B06)
28	05.50 20.19	06.20 19.39	06.51 18.47	07.23 17.01	16.38 16.33	14.51 (B06) 15.06 (B06)
29	05.51 20.18	06.21 19.37	06.52 18.46	07.24 17.00	16.39 16.32	14.50 (B06) 15.07 (B06)
30	05.52 20.17	06.22 19.36	06.53 18.44	07.26 17.00	16.39 16.32	14.49 (B06) 15.08 (B06)
31	05.53 20.16	06.23 19.34	06.54 18.44	07.27 16.57	16.40 16.35	14.48 (B06) 15.25 (B06)
Potential sun hours	458	427	375	346	299	289
Total, worst case			1075	1309	82	845
Sun reduction			0,61	0,52	0,47	0,41
Oper. time red.			0,89	0,89	0,89	0,89
Wind dir. red.			0,61	0,62	0,70	0,70
Total reduction			0,34	0,29	0,29	0,26
Total, real			360	380	24	217

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R30c - R30c
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June
1	07:23 16:41	14:57 (B06) 15:24 (B06)	07:10 17:15	06:34 17:49	06:44 17:07 (B03)	05:58 19:22
2	07:23 16:42	14:57 (B06) 15:24 (B06)	07:09 17:16	06:33 17:50	06:42 17:07 (B03)	05:57 19:23
3	07:23 16:43	14:58 (B06) 15:24 (B06)	07:08 17:17	06:31 17:51	06:40 17:07 (B03)	05:56 19:24
4	07:23 16:43	14:59 (B06) 15:25 (B06)	07:07 17:19	06:30 17:52	06:39 17:06 (B03)	05:54 19:25
5	07:23 16:44	14:59 (B06) 15:25 (B06)	07:06 17:20	06:28 17:53	06:37 17:05 (B03)	05:53 19:27
6	07:23 16:45	15:00 (B06) 15:25 (B06)	07:05 17:21	06:26 17:54	06:36 17:04 (B03)	05:52 19:28
7	07:23 16:46	15:01 (B06) 15:25 (B06)	07:04 17:22	06:25 17:55	06:34 17:02 (B03)	05:51 19:29
8	07:23 16:47	15:02 (B06) 15:26 (B06)	07:02 17:24	06:23 17:57	06:32 16:51 (B05)	05:50 19:30
9	07:23 16:48	15:03 (B06) 15:26 (B06)	07:01 17:25	06:22 17:58	06:31 16:50 (B05)	05:49 19:31
10	07:23 16:49	15:04 (B06) 15:25 (B06)	07:00 17:26	06:20 17:59	06:29 16:51 (B05)	05:47 19:32
11	07:22 16:50	15:05 (B06) 15:25 (B06)	06:59 17:27	06:18 18:00	06:28 16:50 (B05)	05:46 19:33
12	07:22 16:51	15:07 (B06) 15:25 (B06)	06:58 17:28	06:17 18:01	06:26 16:49 (B05)	05:45 19:34
13	07:22 16:52	15:07 (B06) 15:24 (B06)	06:56 17:30	06:15 18:02	06:24 16:50 (B05)	05:44 19:35
14	07:22 16:53	15:09 (B06) 15:23 (B06)	06:55 17:31	06:14 18:03	06:23 16:49 (B05)	05:43 19:36
15	07:21 16:55	15:11 (B06) 15:21 (B06)	06:54 17:32	06:12 18:04	06:21 16:48 (B05)	05:42 19:37
16	07:21 16:56	15:15 (B06) 15:19 (B06)	06:53 17:33	06:10 18:05	06:20 17:10 (B04)	05:41 19:38
17	07:20 16:57	06:51 17:35	16:19 (B05) 18:06	06:09 18:06	06:18 17:12 (B04)	05:40 19:39
18	07:20 16:58	06:50 17:36	16:12 (B05) 18:07	06:07 18:07	06:17 17:13 (B04)	05:39 19:40
19	07:19 16:59	06:49 17:37	16:09 (B05) 18:09	06:05 18:09	06:15 17:15 (B04)	05:38 19:41
20	07:19 17:00	06:47 17:38	16:05 (B05) 18:10	06:04 18:10	06:14 17:15 (B04)	05:38 19:42
21	07:18 17:01	06:46 17:39	16:04 (B05) 18:11	06:02 18:11	06:12 17:15 (B04)	05:37 19:43
22	07:18 17:03	06:44 17:40	16:02 (B05) 18:12	06:00 18:12	06:11 17:16 (B04)	05:36 19:44
23	07:17 17:04	06:43 17:42	16:00 (B05) 18:13	05:59 18:13	06:09 17:16 (B04)	05:35 19:45
24	07:16 17:05	06:42 17:43	15:59 (B05) 18:14	05:57 18:14	06:08 17:15 (B04)	05:34 19:46
25	07:16 17:06	06:40 17:44	15:57 (B05) 18:15	05:55 18:15	06:06 17:15 (B04)	05:34 19:48
26	07:15 17:07	06:39 17:45	15:56 (B05) 18:16	05:54 18:16	06:05 17:14 (B04)	05:33 19:49
27	07:14 17:09	06:37 17:46	15:55 (B05) 18:17	05:52 18:17	06:04 17:13 (B04)	05:32 19:50
28	07:13 17:10	06:36 17:47	15:54 (B05) 18:18	05:50 18:18	06:02 17:13 (B04)	05:31 19:51
29	07:12 17:11		06:49 19:19	06:01 19:19	06:01 18:11 (B04)	05:29 19:52
30	07:12 17:12		06:47 19:20	06:00 19:20	06:00 18:09 (B04)	05:31 19:53
31	07:11 17:14		06:45 19:21	06:00 19:21	06:00 18:08 (B04)	05:30 19:53
Potential sun hours	298	297	369	398	448	451
Total, worst case	332	539	1895	8		
Sun reduction	0,43	0,44	0,44	0,51		
Oper. time red.	0,89	0,89	0,89	0,89		
Wind dir. red.	0,70	0,62	0,62	0,59		
Total reduction	0,27	0,25	0,25	0,27		
Total, real	89	132	467	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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SHADOW - Calendar
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 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	July	August	September	October	November	December						
1	05.30	05.54	06.24	06.54	16.29 (B05)	06.28						
	20.34	20.15	19.32	18.42	60	17.29 (B05)	16.56	16.32	20	15.07 (B06)		
2	05.31	05.55	06.25	06.55	16.28 (B05)	06.29	07.03	14.47 (B06)				
	20.34	20.14	19.31	18.41	61	17.29 (B05)	16.55	16.32	21	15.08 (B06)		
3	05.31	05.56	06.26	06.56	16.27 (B05)	06.30	07.05	14.46 (B06)				
	20.34	20.13	19.29	18.39	61	17.28 (B05)	16.53	16.31	23	15.09 (B06)		
4	05.32	05.57	06.27	06.57	16.27 (B05)	06.31	07.06	14.46 (B06)				
	20.34	20.12	19.28	18.37	61	17.28 (B05)	16.52	16.31	24	15.10 (B06)		
5	05.32	05.58	06.28	06.58	16.26 (B05)	06.33	07.06	14.46 (B06)				
	20.33	20.11	19.26	18.36	62	17.28 (B05)	16.51	16.31	24	15.10 (B06)		
6	05.33	05.59	06.29	06.59	16.26 (B05)	06.34	07.07	14.46 (B06)				
	20.33	20.10	19.24	18.34	67	17.36 (B03)	16.50	16.31	25	15.11 (B06)		
7	05.33	06.00	06.30	07.00	16.26 (B05)	06.35	07.08	14.46 (B06)				
	20.33	20.08	19.23	18.32	72	17.38 (B03)	16.49	16.31	26	15.12 (B06)		
8	05.34	06.01	06.31	07.01	16.25 (B05)	06.36	07.09	14.47 (B06)				
	20.32	20.07	19.21	18.31	75	17.40 (B03)	16.48	16.31	26	15.13 (B06)		
9	05.35	06.02	06.32	07.02	16.25 (B05)	06.37	07.10	14.47 (B06)				
	20.32	20.06	19.19	18.29	75	17.40 (B03)	16.47	16.31	26	15.13 (B06)		
10	05.35	06.03	06.33	07.03	16.25 (B05)	06.38	07.11	14.47 (B06)				
	20.32	20.05	19.18	18.28	75	17.40 (B03)	16.46	16.31	27	15.14 (B06)		
11	05.36	06.04	06.34	07.04	16.26 (B05)	06.40	07.12	14.47 (B06)				
	20.31	20.03	19.16	17.49 (B04)	18.26	75	17.41 (B03)	16.45	16.31	27	15.14 (B06)	
12	05.37	06.05	06.35	07.05	17.45 (B04)	06.41	07.13	14.47 (B06)				
	20.31	20.02	19.14	17.58 (B04)	18.24	75	17.41 (B03)	16.44	16.31	28	15.15 (B06)	
13	05.38	06.06	06.36	07.07	17.42 (B04)	06.42	07.14	14.48 (B06)				
	20.30	20.01	19.13	18.00 (B04)	18.23	74	17.41 (B03)	16.43	16.31	27	15.15 (B06)	
14	05.38	06.07	06.37	07.08	17.41 (B04)	06.43	07.14	14.48 (B06)				
	20.30	19.59	19.11	18.01 (B04)	18.21	72	17.40 (B03)	16.42	16.31	28	15.16 (B06)	
15	05.39	06.08	06.38	07.09	16.59 (B05)	06.44	07.15	14.49 (B06)				
	20.29	19.58	19.09	18.02 (B04)	18.20	69	17.39 (B03)	16.41	16.31	28	15.17 (B06)	
16	05.40	06.09	06.39	07.10	16.55 (B05)	06.46	07.16	14.49 (B06)				
	20.29	19.57	19.08	18.02 (B04)	18.18	65	17.37 (B03)	16.40	16.32	28	15.17 (B06)	
17	05.41	06.10	06.40	07.11	16.51 (B05)	06.47	07.16	14.49 (B06)				
	20.28	19.55	19.06	18.03 (B04)	18.17	59	17.35 (B03)	16.39	16.32	29	15.18 (B06)	
18	05.41	06.11	06.41	07.12	16.48 (B05)	06.48	07.17	14.49 (B06)				
	20.27	19.54	19.04	18.03 (B04)	18.15	51	17.32 (B03)	16.39	16.32	29	15.18 (B06)	
19	05.42	06.12	06.42	07.13	16.46 (B05)	06.49	07.18	14.50 (B06)				
	20.27	19.52	19.02	18.02 (B04)	18.14	43	17.15 (B05)	16.38	16.33	28	15.18 (B06)	
20	05.43	06.13	06.43	07.14	16.43 (B05)	06.50	07.18	14.51 (B06)				
	20.26	19.51	19.01	18.02 (B04)	18.12	40	17.13 (B05)	16.37	16.33	28	15.19 (B06)	
21	05.44	06.14	06.44	07.15	16.42 (B05)	06.51	07.19	14.51 (B06)				
	20.25	19.49	18.59	18.02 (B04)	18.11	36	17.11 (B05)	16.37	16.34	28	15.19 (B06)	
22	05.45	06.14	06.45	07.16	16.40 (B05)	06.53	07.19	14.52 (B06)				
	20.25	19.48	18.57	18.01 (B04)	18.09	31	17.08 (B05)	16.36	16.34	28	15.20 (B06)	
23	05.46	06.15	06.46	07.18	16.38 (B05)	06.54	07.20	14.52 (B06)				
	20.24	19.46	18.56	18.00 (B04)	18.08	26	17.05 (B05)	16.35	16.35	28	15.20 (B06)	
24	05.47	06.16	06.47	07.19	16.36 (B05)	06.55	07.20	14.52 (B06)				
	20.23	19.45	18.54	18.06	17.59 (B04)	18.06	18	17.02 (B05)	16.35	16.35	28	15.20 (B06)
25	05.47	06.17	06.48	07.20	16.35 (B05)	06.56	07.21	14.53 (B06)				
	20.22	19.43	18.52	17.57 (B04)	17.05	16.34	16.36	29	15.22 (B06)			
26	05.48	06.18	06.49	07.21	16.34 (B05)	06.57	07.21	14.53 (B06)				
	20.21	19.42	18.51	17.55 (B04)	17.04	16.34	4	14.57 (B06)	16.36	29	15.22 (B06)	
27	05.49	06.19	06.50	07.22	16.33 (B05)	06.58	07.22	14.54 (B06)				
	20.20	19.40	18.49	17.53 (B04)	17.02	16.33	10	15.01 (B06)	16.37	28	15.22 (B06)	
28	05.50	06.20	06.51	07.23	16.31 (B05)	06.59	07.22	14.55 (B06)				
	20.19	19.39	18.47	17.48 (B04)	17.01	16.33	13	15.03 (B06)	16.38	28	15.23 (B06)	
29	05.51	06.21	06.52	07.24	16.30 (B05)	06.54	07.22	14.55 (B06)				
	20.18	19.37	18.46	17.29 (B05)	17.00	16.32	17	15.05 (B06)	16.38	28	15.23 (B06)	
30	05.52	06.22	06.53	07.25	16.30 (B05)	06.56	07.22	14.56 (B06)				
	20.17	19.36	18.44	17.29 (B05)	16.58	16.32	18	15.06 (B06)	16.39	27	15.23 (B06)	
31	05.53	06.23	06.54	07.26	16.29 (B05)	06.57	07.23	14.56 (B06)				
	20.16	19.34	18.43	16.57	16.40	28	15.24 (B06)					
Potential sun hours	458	427	375	346	299	289						
Total, worst case			1078	1403	62	831						
Sun reduction			0,61	0,52	0,47	0,41						
Oper. time red.			0,89	0,89	0,89	0,89						
Wind dir. red.			0,61	0,62	0,70	0,70						
Total reduction			0,34	0,29	0,29	0,26						
Total, real			363	410	18	214						

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R31b - R31b
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

	January	February	March	April	May	June				
1	07:23 16:41	15:50 (B03) 16:08 (B03)	07:10 17:15	15:39 (B04) 16:13 (B04)	06:34 17:49	16:51 (B02) 17:13 (B02)	06:44 19:22	18:31 (B01) 18:52 (B01)	05:58 19:54	05:30 20:23
2	07:23 16:42	15:50 (B03) 16:08 (B03)	07:09 17:16	15:40 (B04) 16:12 (B04)	06:33 17:50	16:51 (B02) 17:12 (B02)	06:42 19:23	18:31 (B01) 18:51 (B01)	05:57 19:55	05:29 20:24
3	07:23 16:43	15:50 (B03) 16:09 (B03)	07:08 17:17	15:41 (B04) 16:12 (B04)	06:31 17:51	16:52 (B02) 17:12 (B02)	06:40 19:24	18:31 (B01) 18:51 (B01)	05:56 19:56	05:29 20:25
4	07:23 16:43	15:43 (B04) 16:10 (B03)	07:07 17:19	15:42 (B04) 16:11 (B04)	06:30 17:52	16:52 (B02) 17:11 (B02)	06:39 19:26	18:31 (B01) 18:50 (B01)	05:54 19:57	05:28 20:25
5	07:23 16:44	15:41 (B04) 16:11 (B03)	07:06 17:20	15:43 (B04) 16:11 (B04)	06:28 17:53	16:54 (B02) 17:10 (B02)	06:37 19:27	18:32 (B01) 18:50 (B01)	05:53 19:58	05:28 20:26
6	07:23 16:45	15:41 (B04) 16:12 (B03)	07:05 17:21	15:44 (B04) 16:09 (B04)	06:26 17:54	16:55 (B02) 17:07 (B02)	06:36 19:28	18:33 (B01) 18:48 (B01)	05:52 19:59	05:28 20:27
7	07:23 16:46	15:40 (B04) 16:12 (B03)	07:04 17:22	15:45 (B04) 16:08 (B04)	06:25 17:55	17:00 (B02) 17:04 (B02)	06:34 19:29	18:34 (B01) 18:45 (B01)	05:51 20:00	05:27 20:27
8	07:23 16:47	15:39 (B04) 16:13 (B03)	07:02 17:24	15:48 (B04) 16:06 (B04)	06:23 17:57	06:32 19:30	18:37 (B01) 18:43 (B01)	05:50 20:01	05:27 20:28	
9	07:23 16:48	15:39 (B04) 16:14 (B03)	07:01 17:25	15:50 (B04) 16:04 (B04)	06:22 17:58	06:31 19:31	05:49 20:02	05:27 20:28		
10	07:23 16:49	15:38 (B04) 16:14 (B03)	07:00 17:26	15:57 (B04) 15:58 (B04)	06:20 17:59	06:29 19:32	05:47 20:03	05:27 20:29		
11	07:22 16:50	15:38 (B04) 16:15 (B03)	06:59 17:27	06:18 18:00	06:28 19:33	06:28 19:33	05:46 20:04	05:27 20:30		
12	07:22 16:51	15:38 (B04) 16:16 (B03)	06:58 17:28	06:17 18:01	06:26 19:34	06:26 19:34	05:45 20:05	05:27 20:30		
13	07:22 16:52	15:37 (B04) 16:15 (B03)	06:57 17:30	06:15 18:02	06:24 19:35	06:24 19:35	05:44 20:06	05:26 20:31		
14	07:22 16:54	15:37 (B04) 16:16 (B03)	06:55 17:31	06:14 18:03	06:23 19:36	06:23 19:36	05:43 20:07	05:26 20:31		
15	07:21 16:55	15:36 (B04) 16:16 (B03)	06:54 17:32	06:12 18:04	06:21 19:37	06:21 19:37	05:42 20:08	05:26 20:31		
16	07:21 16:56	15:36 (B04) 16:17 (B03)	06:53 17:33	06:10 18:05	06:20 19:38	06:20 19:38	05:41 20:09	05:26 20:32		
17	07:20 16:57	15:36 (B04) 16:16 (B03)	06:51 17:35	06:09 18:06	06:18 19:39	06:18 19:39	05:40 20:10	05:26 20:32		
18	07:20 16:58	15:36 (B04) 16:17 (B03)	06:50 17:36	06:07 18:08	06:17 19:40	06:17 19:40	05:39 20:11	05:26 20:32		
19	07:19 16:59	15:36 (B04) 16:17 (B03)	06:49 17:37	06:05 18:09	06:15 19:41	06:15 19:41	05:38 20:12	05:27 20:33		
20	07:19 17:00	15:36 (B04) 16:17 (B03)	06:47 17:38	06:04 18:10	06:14 19:42	06:14 19:42	05:38 20:13	05:27 20:33		
21	07:18 17:01	15:36 (B04) 16:17 (B03)	06:46 17:39	16:59 (B02) 17:07 (B02)	06:02 18:11	06:12 19:43	05:37 20:14	05:27 20:33		
22	07:18 17:03	15:36 (B04) 16:16 (B03)	06:44 17:41	16:57 (B02) 17:10 (B02)	06:00 18:12	06:11 19:44	05:36 20:15	05:27 20:34		
23	07:17 17:04	15:36 (B04) 16:16 (B03)	06:43 17:42	16:55 (B02) 17:11 (B02)	05:59 18:13	06:09 19:45	05:35 20:16	05:27 20:34		
24	07:16 17:05	15:36 (B04) 16:15 (B03)	06:42 17:43	16:54 (B02) 17:13 (B02)	05:57 18:14	06:08 19:47	05:34 20:17	05:28 20:34		
25	07:16 17:06	15:36 (B04) 16:14 (B03)	06:40 17:44	16:52 (B02) 17:13 (B02)	05:55 18:15	06:06 19:48	05:34 20:17	05:28 20:34		
26	07:15 17:07	15:36 (B04) 16:12 (B03)	06:39 17:45	16:52 (B02) 17:14 (B02)	05:54 18:16	06:05 19:49	05:33 20:18	05:28 20:34		
27	07:14 17:09	15:36 (B04) 16:12 (B04)	06:37 17:46	16:51 (B02) 17:13 (B02)	05:52 18:17	06:04 19:50	05:32 20:19	05:29 20:34		
28	07:13 17:10	15:38 (B04) 16:13 (B04)	06:36 17:48	16:52 (B02) 17:14 (B02)	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34		
29	07:12 17:11	15:38 (B04) 16:13 (B04)	06:36 17:48	16:52 (B02) 17:14 (B02)	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34		
30	07:12 17:12	15:38 (B04) 16:13 (B04)	06:36 17:48	16:52 (B02) 17:14 (B02)	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34		
31	07:11 17:14	15:39 (B04) 16:13 (B04)	06:36 17:48	16:52 (B02) 17:14 (B02)	05:50 18:18	06:02 19:51	05:32 20:20	05:29 20:34		
Potential sun hours	298	297	369	398	448	451				
Total, worst case	1083	379	198	130						
Sun reduction	0,43	0,44	0,44	0,51						
Oper. time red.	0,89	0,89	0,89	0,89						
Wind dir. red.	0,68	0,65	0,59	0,58						
Total reduction	0,26	0,26	0,24	0,26						
Total, real	283	97	47	34						

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

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

SHADOW - Calendar
Calculation: GE.AGB01.P3_SH-FLShadow receptor: R31b - R31b
Assumptions for shadow calculations

 Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4,12	4,66	5,30	6,72	8,25	9,35	10,16	9,45	7,64	5,82	4,65	3,82

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1.403	765	428	258	208	129	270	903	1.287	921	569	687	7.829

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

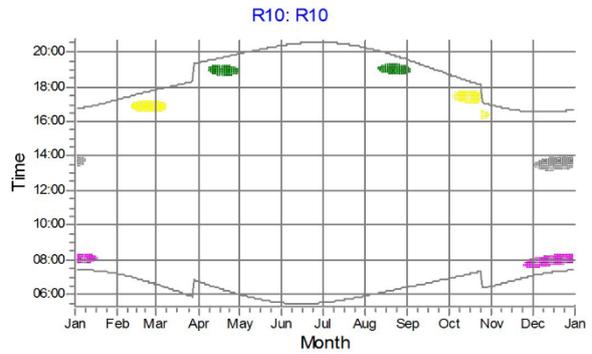
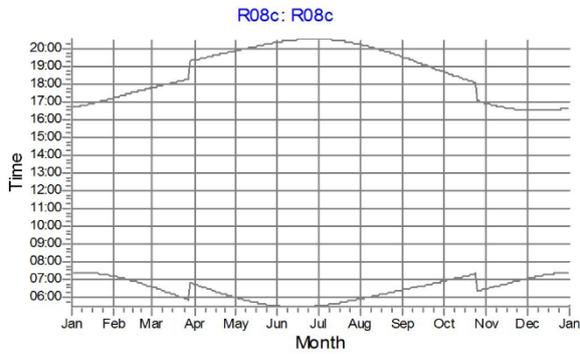
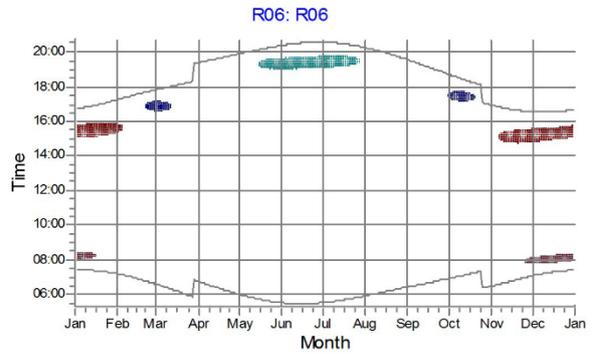
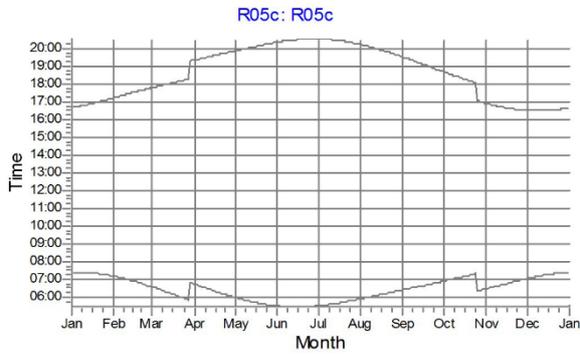
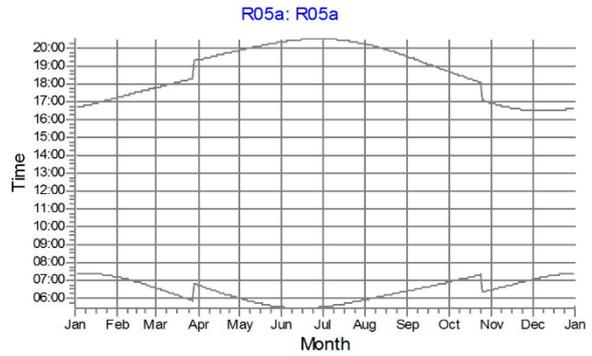
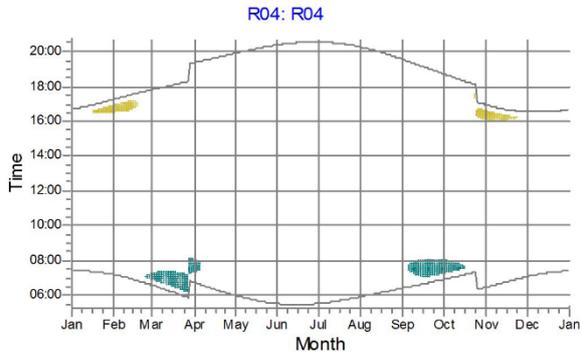
	July	August	September	October	November	December
1	05.30	05.54	06.24	06.54	06.28	07.02
	20.34	20.15	19.32	18.42	16.56	15.29 (B04)
2	05.31	05.55	06.25	06.55	06.29	07.04
	20.34	20.14	19.31	18.41	16.55	15.34 (B04)
3	05.31	05.56	06.26	06.56	06.30	07.05
	20.34	20.13	19.29	18.39	16.53	15.36 (B04)
4	05.32	05.57	06.27	18:34 (B01)	06.57	06.31
	20.34	20.12	19.28	18:39 (B01)	18.37	16.52
5	05.32	05.58	06.28	18:31 (B01)	06.58	06.33
	20.33	20.11	19.26	18:42 (B01)	18.36	16.51
6	05.33	05.59	06.29	18:29 (B01)	06.59	06.34
	20.33	20.10	19.24	18:44 (B01)	18.34	16.50
7	05.33	06.00	06.30	18:27 (B01)	07.00	06.35
	20.33	20.08	19.23	18:45 (B01)	18.32	16.49
8	05.34	06.01	06.31	18:26 (B01)	07.01	06.36
	20.32	20.07	19.21	18:45 (B01)	18.31	16.48
9	05.35	06.02	06.32	18:25 (B01)	07.02	06.37
	20.32	20.06	19.19	18:45 (B01)	18.29	16.47
10	05.35	06.03	06.33	18:25 (B01)	07.03	06.39
	20.32	20.05	19.18	18:45 (B01)	18.28	16.46
11	05.36	06.04	06.34	18:24 (B01)	07.04	06.40
	20.31	20.03	19.16	18:44 (B01)	18.26	16.45
12	05.37	06.05	06.35	18:23 (B01)	07.05	06.41
	20.31	20.02	19.14	18:43 (B01)	18.24	16.44
13	05.38	06.06	06.36	18:24 (B01)	07.07	06.42
	20.30	20.01	19.13	18:43 (B01)	18.23	16.43
14	05.38	06.07	06.37	18:24 (B01)	07.08	06.43
	20.30	19.59	19.11	18:42 (B01)	18.21	16.42
15	05.39	06.08	06.38	18:25 (B01)	07.09	06.44
	20.29	19.58	19.09	18:40 (B01)	18.20	16.41
16	05.40	06.09	06.39	18:26 (B01)	07.10	06.46
	20.29	19.57	19.08	18:38 (B01)	18.18	16.40
17	05.41	06.10	06.40	18:29 (B01)	07.11	06.47
	20.28	19.55	19.06	18:34 (B01)	18.17	16.40
18	05.41	06.11	06.41	07.12	06.48	06.48
	20.27	19.54	19.04	18:15	16.39	15.10 (B04)
19	05.42	06.12	06.42	07.13	06.49	15.10 (B04)
	20.27	19.52	19.02	18:14	16.38	15.11 (B04)
20	05.43	06.13	06.43	07.14	06.50	15.11 (B04)
	20.26	19.51	19.01	18:12	16.37	15.11 (B04)
21	05.44	06.14	06.44	07.15	06.51	15.11 (B04)
	20.25	19.49	18.59	18:11	16.37	15.11 (B04)
22	05.45	06.15	06.45	07.16	06.53	15.12 (B04)
	20.25	19.48	18.57	18:09	16.36	15.12 (B04)
23	05.46	06.15	06.46	07.18	06.54	15.13 (B04)
	20.24	19.46	18.56	18:08	16.35	15.13 (B04)
24	05.47	06.16	06.47	07.19	06.55	15.13 (B04)
	20.23	19.45	18.54	18:06	16.35	15.14 (B04)
25	05.47	06.17	06.48	06.20	06.56	15.14 (B04)
	20.22	19.43	18.52	17:05	16.34	15.14 (B04)
26	05.48	06.18	06.49	06.21	06.57	15.14 (B04)
	20.21	19.42	18.51	17:04	16.34	15.14 (B04)
27	05.49	06.19	06.50	06.22	06.58	15.16 (B04)
	20.20	19.40	18.49	17:02	16.33	15.16 (B04)
28	05.50	06.20	06.51	06.23	06.59	15.17 (B04)
	20.19	19.39	18.47	17:01	16.33	15.17 (B04)
29	05.51	06.21	06.52	06.24	07.00	15.18 (B04)
	20.18	19.37	18.46	17:00	16.32	15.18 (B04)
30	05.52	06.22	06.53	06.26	07.01	15.19 (B04)
	20.17	19.36	18.44	16:58	16.32	15.19 (B04)
31	05.53	06.23	06.54	06.27		07.23
	20.16	19.34	18.43	16:57		16.40
Potential sun hours	458	427	375	345	299	289
Total, worst case			217	258	1012	616
Sun reduction			0,61	0,52	0,47	0,41
Oper. time red.			0,89	0,89	0,89	0,89
Wind dir. red.			0,58	0,60	0,68	0,68
Total reduction			0,32	0,28	0,29	0,25
Total, real			69	73	289	154

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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ALLEGATO 4: "CALENDAR GRAPHICAL" DETTAGLIO GRAFICO GIORNALIERO DELL'EFFETTO "FLICKERING" GENERATO SUL SINGOLO RECETTORE DA OGNI TURBINA INSERITA NEL MODELLO DI SIMULAZIONE
SHADOW - Calendar, graphical

Calculation: GE.AGB01.P3_SH-FL



WTGs

 B01: B01
 B02: B02

 B04: B04
 B05: B05

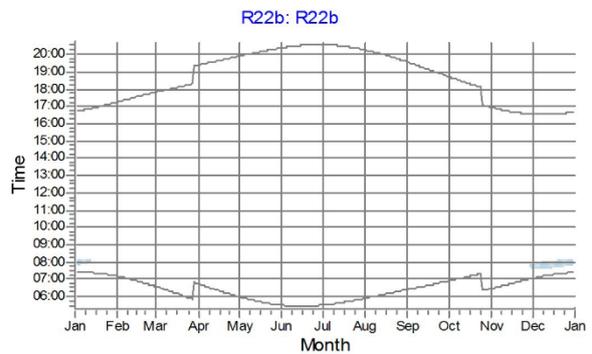
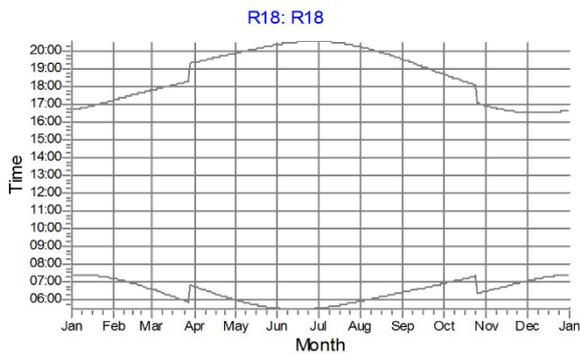
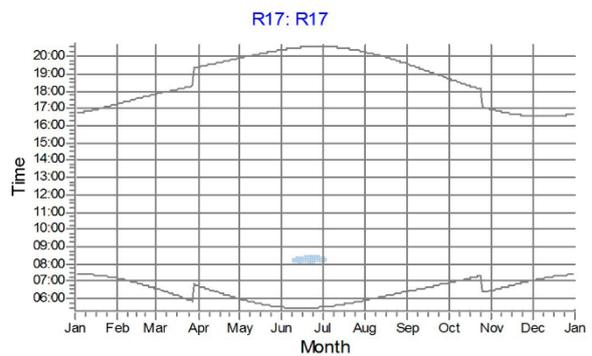
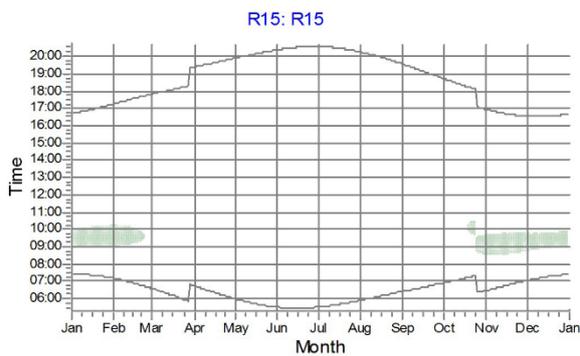
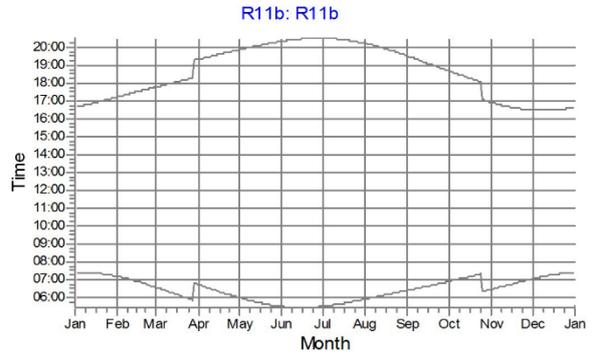
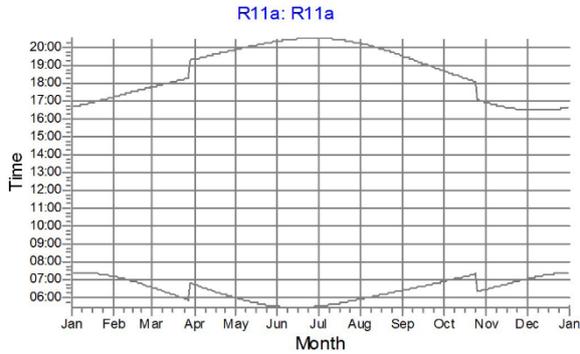
 B06: B06
 B07: B07

 B08: B08
 WKN.22: WKN.22

 WKN.28: WKN.28

SHADOW - Calendar, graphical

Calculation: GE.AGB01.P3_SH-FL

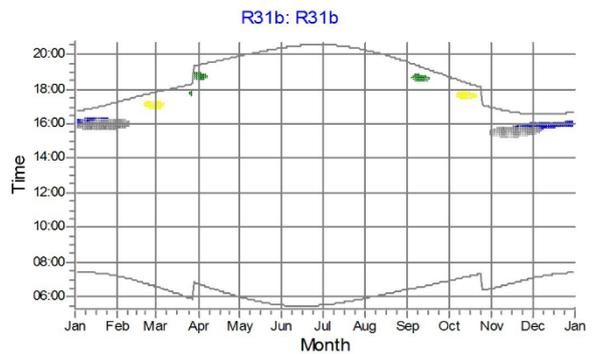
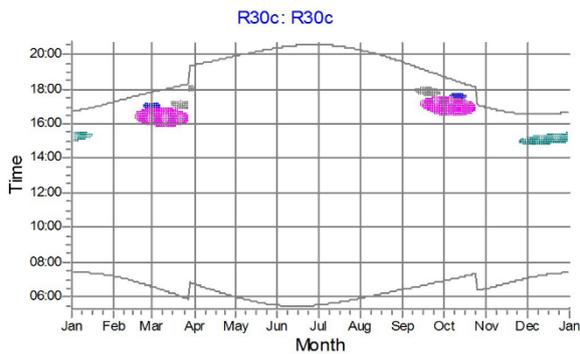
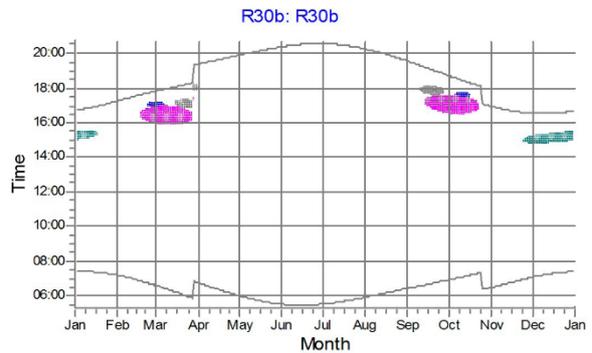
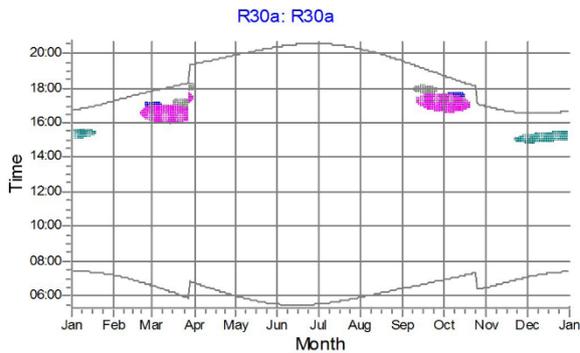
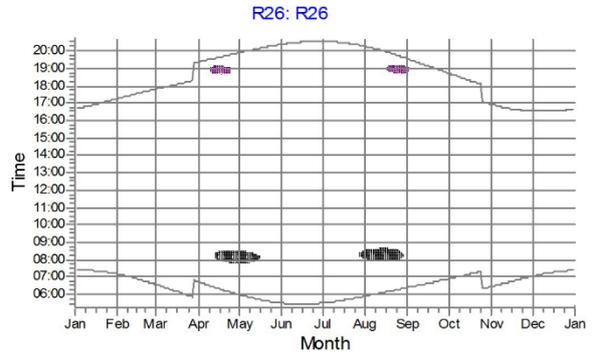
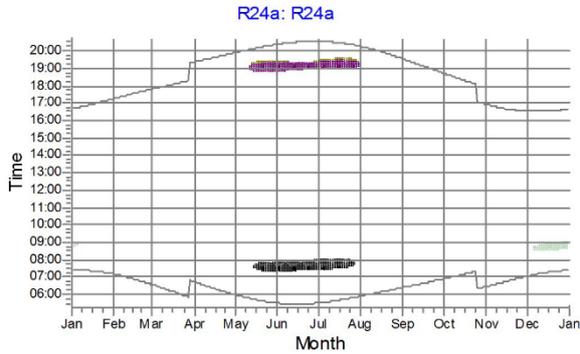


WTGs

 B15: B15  B16: B16

SHADOW - Calendar, graphical

Calculation: GE.AGB01.P3_SH-FL



WTGs



ALLEGATO 5: "SHADOW MAP"

MAPPA CHE RAPPRESENTA LE ORE DI OMBREGGIAMENTO ("WORST CASE") PER LE AREE LIMITROFE ALLE TURBINE DI PROGETTO ED A TUTTI GLI AEROGENERATORI INSERITI NEL MODELLO DI SIMULAZIONE.

