

Windpark Autena te Vianen
Slagschaduw onderzoek

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Contactpersoon
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Kenmerk
R068379aa.00002.dv
Versie
05_001
Datum
10 april 2017
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1 Inleiding en samenvatting

In opdracht van Eneco Wind B.V., de heer F. de Jong, is een prognose uitgevoerd naar de verwachte slagschaduwduur in de omgeving vanwege windpark Autena. Doel van het onderzoek is te bepalen of ter plaatse van de omliggende woningen voldaan wordt aan de norm voor slagschaduwhinder uit het Besluit algemene regels voor inrichtingen milieubeheer.

Windpark Autena bestaat uit drie windturbines van het type Nordex N131 3 MW met een ashoogte van 100 m en een rotordiameter van 131 m.

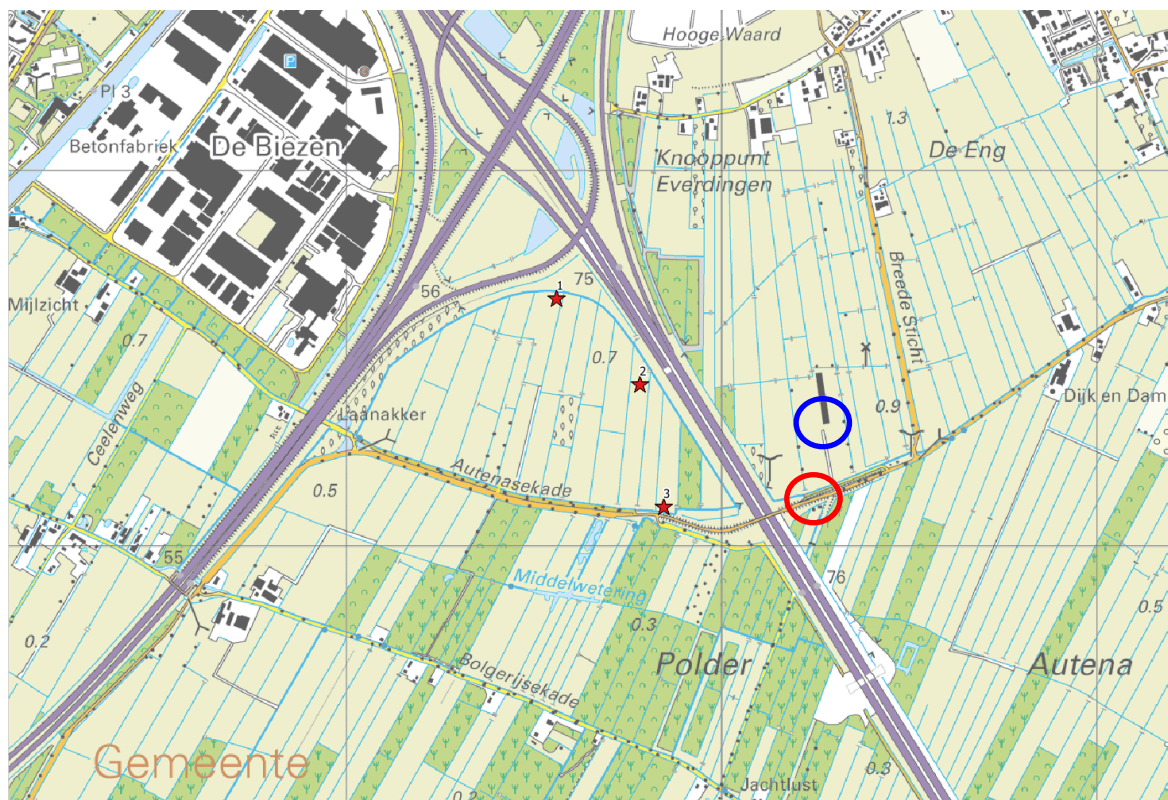
Uit de schaduwberekeningen blijkt dat gedurende meer dan 17 dagen meer dan 20 minuten per dag slagschaduw kan optreden bij enkele woningen in de omgeving van het windpark. De turbines dienen, ten behoeve van deze woningen, voorzien te worden van een automatische stilstandvoorziening.

2 Uitgangspunten

2.1 Locatie windturbines

In onderstaande figuur 2.1 wordt globaal de situatie weergegeven. De drie windturbines staan in een boogopstelling ten zuiden van de kruising tussen de A27 en A2, ten oosten van het gezoneerde industrieterrein De Biezen.

In de omgeving van het windpark zijn woningen van derden gelegen. De meest nabijgelegen woning betreft Autenasekade 9 op een afstand van circa 410 meter ten oosten van turbine 3 (rode cirkel). Daarnaast is er de mogelijkheid tot het bouwen van een woning ten zuiden van de kippenschuur die ten oosten van het windpark ligt (blauwe cirkel).



Figuur 2.1

Situatie met windturbines (bron achtergrond: topografische kaart kadaster).

2.2 Type windturbine

In het slagschaduwonderzoek is uitgegaan van de Nordex N131 3 MW met een ashoogte van 99 m en een rotordiameter van 131 m

2.3 Normstelling

Het windpark valt onder het Besluit algemene regels voor inrichtingen milieubeheer (Activiteitenbesluit). Bij de beoordeling van het slagschaduweffect wordt uitgegaan van artikel 3.14 lid 4 uit het Activiteitenbesluit, betreffende slagschaduw en lichtschittering. Hierin wordt verwezen naar de bij de ministeriële regeling¹ te stellen maatregelen. De betreffende tekst, artikel 3.12 lid 1, is als volgt.

Artikel 3.12

1. Ten behoeve van het voorkomen of beperken van slagschaduw en lichtschittering is de windturbine voorzien van een automatische stilstandvoorziening die de windturbine afschakelt indien slagschaduw optreedt ter plaatse van gevoelige objecten voorzover de afstand tussen de windturbine en de geluidgevoelige objecten minder dan 12 maal de rotordiameter bedraagt en gemiddeld meer dan 17 dagen per jaar gedurende meer dan 20 minuten per dag slagschaduw kan optreden en voorzover zich in de door de slagschaduw getroffen uitwendige scheidingsconstructie van geluidgevoelige gebouwen of woonwagens ramen bevinden. De afstand geldt van een punt op ashoogte van de windturbine tot de gevel van het geluidgevoelige object.

¹ Regeling van de Minister van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer van 9 november 2007, nr. DJZ 2007104180 houdende algemene regels voor inrichtingen (Regeling algemene regels voor inrichtingen milieubeheer)

3 Slagschaduw

3.1 Schaduweffecten en hinderaspecten

De schaduw van de draaiende wieken van een windturbine kan op bepaalde plaatsen en onder bepaalde omstandigheden een hinderlijke flikkering (wisseling van lichtsterkte) veroorzaken. Dit kan vooral hinderlijk zijn als de schaduw over ramen valt en zich bijvoorbeeld over een plek beweegt waar gewerkt of gelezen wordt. De mate van hinder wordt onder andere bepaald door de frequentie van de flikker (rotortoerental), door de blootstellingduur (tijdsduur op een dag en periode in een jaar) en door de intensiteit van de wisselingen in lichtsterkte (schaduwscherpte).

3.2 Flikkerfrequenties

Flikkerfrequenties tussen 2,5 en 14 Hz (flikkeringen per seconde) kunnen aanzienlijke hinder (ook psychische storingen) veroorzaken. Bij de huidige generatie windturbines is het toerental echter zo laag dat de flikkerfrequenties (aanzienlijk) lager dan 2,5 Hz liggen. In onderhavig geval bedraagt de de gezondheid kunnen daarbij niet optreden. Maar ook bij deze lage toerentallen kunnen de lichtsterkte-wisselingen (slagschaduw-hinder) hinderlijk zijn.

3.3 Schaduwgebied

Ten zuiden van elke turbine ligt een gebied waar de schaduw nooit kan komen, omdat de zon nooit in noordelijke richting staat. Ten noorden is een gebied waar de schaduw niet kan komen omdat de zon, als deze in het zuiden staat, te hoog staat. Door zonsopkomst en zonsondergang kan de schaduw van een windturbine ver reiken. Echter, bij afstanden groter dan twaalf maal de rotordiameter wordt slagschaduw niet meer als hinderlijk beoordeeld.

3.4 Afvang door beplanting

Beplanting kan ervoor zorgen dat er minder of geen slagschaduw van de windturbines op de omliggende woningen optreedt. Dit kan het geval zijn als er tussen de hindergevoelige gevels en het rotorvlak bomen(rijen) staan. Als deze dicht bebladerd zijn of als het gaat om groenblijvende coniferen, en de schaduw zich voordoet in een periode waarin de bladeren nog aan de bomen zitten, kan dit de schaduwscherpte verminderen of de schaduw zelfs geheel afvangen. Uiteraard moeten de bomen wel voldoende hoog zijn, hetgeen zich bij hogere ashoogten van de turbine alleen voor kan doen als de bomen vrij dichtbij de gevel staan.

Daarnaast moet rekening gehouden worden met de relatief lange levensduur van een windturbine (tot 20 jaar). Het is niet zeker of de bomen er gedurende al die tijd zullen staan. Bij schaduwperioden in de winter zal in het geval van bladverliezende loofbomen, de schaduw-hinder niet verminderd worden. De afvang door beplanting is om deze redenen niet in de berekeningen meegenomen. Hierdoor is sprake van een worst-case benadering.

4 Berekeningen

4.1 Variabelen op de slagschaduwberekening

4.1.1 Kans op zonneshijn

Als de zon niet schijnt is er geen slagschaduw en zal er dus geen hinder kunnen optreden. Hieronder staan de gemiddelde percentages per maand voor De Bilt over het tijdvak 1981-2010, die worden gehanteerd voor de zonneshijnduur in de betrokken periode op de berekende locatie.

Tabel 4.1

Gemiddelde zonuren per dag (De Bilt, bron KNMI).

	Jan	Febr	Mrt	Apr	Mei	Juni	Juli	Aug	Sept	Okt	Nov	Dec
Gemiddelde zonuren	2,0	3,0	3,9	5,8	6,7	6,5	6,6	6,1	4,6	3,6	2,1	1,6

4.1.2 Intensiteit zonlicht

De scherpte van de schaduw en dus de intensiteit van de lichtwisselingen is bij lage zonnestanden gemiddeld minder dan bij een hogere stand aan de hemel. Laag aan de horizon wordt het zonlicht immers relatief vaak getemperd door sluierbewolking, smog en nevel. Bovendien is de kans dan groot dat de zon achter bomen of bebouwing schuil gaat. Aangenomen mag worden dat bij een zonnestand van 3 graden of lager geen hinder veroorzaakt kan worden.

4.1.3 Rotorstilstand

Als de rotor stilstaat, is er geen wisseling van lichtsterkte en kan er dus geen schaduwhinder optreden. Stilstand treedt voornamelijk op door gebrek aan wind. Als uitgangspunt wordt gehanteerd dat de turbine in werking treedt bij windsnelheden vanaf 3 m/s op ashoogte. Uit windfrequentieverdelingen op ashoogte (KNMI gegevens) blijkt dat windsnelheden lager dan 3 m/s in De Bilt, gemiddeld over een jaar, circa 5% van de tijd voorkomen. Aangenomen wordt dat gedurende deze tijd de rotor stilstaat of zo langzaam draait dat niet van hinder gesproken kan worden. De tijdsduur van de potentiële schaduw tijden is dus met 5% verminderd, wat neerkomt op een bedrijfstijd van de windturbine van 95%. Er wordt niet gecorrigeerd voor het feit dat het 's winters vaker en gemiddeld harder waait dan 's zomers.

4.1.4 Windrichtingcorrectie

De duur van de schaduwwerking (op een bepaalde dag en per jaar) wordt ook bepaald door de stand van het rotorvlak ten opzichte van de zonrichting, waarbij de hinder zich kan voordoen. Als het rotorvlak loodrecht op de zonrichting staat, is de duur op een bepaalde dag maximaal.

Bij minder dan een loodrechte stand ten opzichte van de zonrichting wordt de duur van de schaduwpassage op een dag bekort, omdat niet de gehele diameter van de rotor over de gevel schuift, maar de projectie ervan. De stand van de rotor heeft te maken met de windrichting. De correctie voor de stand van het rotorvlak is meegenomen in de windrichtingcorrectie.

De oriëntatie van het rotorvlak is afhankelijk van de windrichting. Per sector van 30 graden is het aantal uren per jaar berekend dat de wind uit die richting komt. Hiervoor is gebruikgemaakt van frequentietabellen van het KNMI, gebaseerd op meerjarige meteo data (1981-2000) te De Bilt. Bij de berekening van de winddistributie is gebruikgemaakt van de eerder genoemde bedrijfstijd van 95% uit paragraaf 4.1.3.

Tabel 4.2

Distributie windrichtingen in sectoren van 30 graden (De Bilt, bron KNMI) uren per jaar.

Uren wind per jaar	N	NNO	ONO	O	OZO	ZZO	Z	ZZW	WZW	W	WNW	NNW
95%	366	637	526	516	436	729	819	1192	1173	804	576	523

4.2 Rekenmodel

Om te kunnen bepalen of er hinder door slagschaduw optreedt, is het allereerst nodig om te weten uit welke richting de zon moet schijnen en op welke hoogte hij moet staan, opdat de schaduw de te onderzoeken plek kan bereiken (zonoriëntatie en zonhoogte). Vervolgens wordt bepaald in welke perioden van het jaar deze situatie zich voordoet en op welk tijdstip van de dag. Met deze gegevens wordt de *potentiële* schaduwduur bepaald. Vervolgens wordt met de overige bepalende factoren voor de duur en intensiteit van de schaduwwerkingen (het aantal uren zonneshijn, draaiduur van de rotor, oriëntatie van de rotor en de intensiteit van het zonlicht) berekend tijdens welk gedeelte van de *potentiële* schaduwduur ook *werkelijk* hinder kan optreden.

De benodigde hoeken en oriëntaties kunnen voldoende nauwkeurig bepaald worden met behulp van een plattegrond van de locaties, de hoogte en de diameter van de rotor van de windturbines. Deze hoeken en oriëntaties leggen de tijdstippen vast van begin en eind van de schaduw (gedurende alle dagen van het jaar).

Met behulp van het computerprogramma Windpro kan worden bepaald op welke tijdstippen van de dag en in welke periode van het jaar de oriëntaties en hoogtes bereikt worden. Tenslotte wordt bepaald hoe lang de schaduw er maximaal over doet om de volledige gevel of het oppervlak te passeren en wat de gemiddelde tijdsduur van de passage is. Met het programma is per minuut de slagschaduw situatie berekend.

Beoordeling slagschaduwhinder

Bij de beoordeling van de slagschaduwhinder ter plaatse van de omliggende woningen en bij de berekening of een stilstandvoorziening noodzakelijk is, worden alleen die woningen geselecteerd waar de gemiddelde schaduwduur naar verwachting hoger is dan zes uur per jaar. Hiermee worden alle tijden dat er sprake is van slagschaduw meegenomen en niet alleen die dagen met meer dan 20 minuten. Vervolgens zal bij deze woningen onderzocht worden of naar verwachting gemiddeld meer dan zeventien dagen met meer dan 20 minuten slagschaduw op zal treden.

5 Rekenresultaten

5.1 Rekenresultaten bij woningen

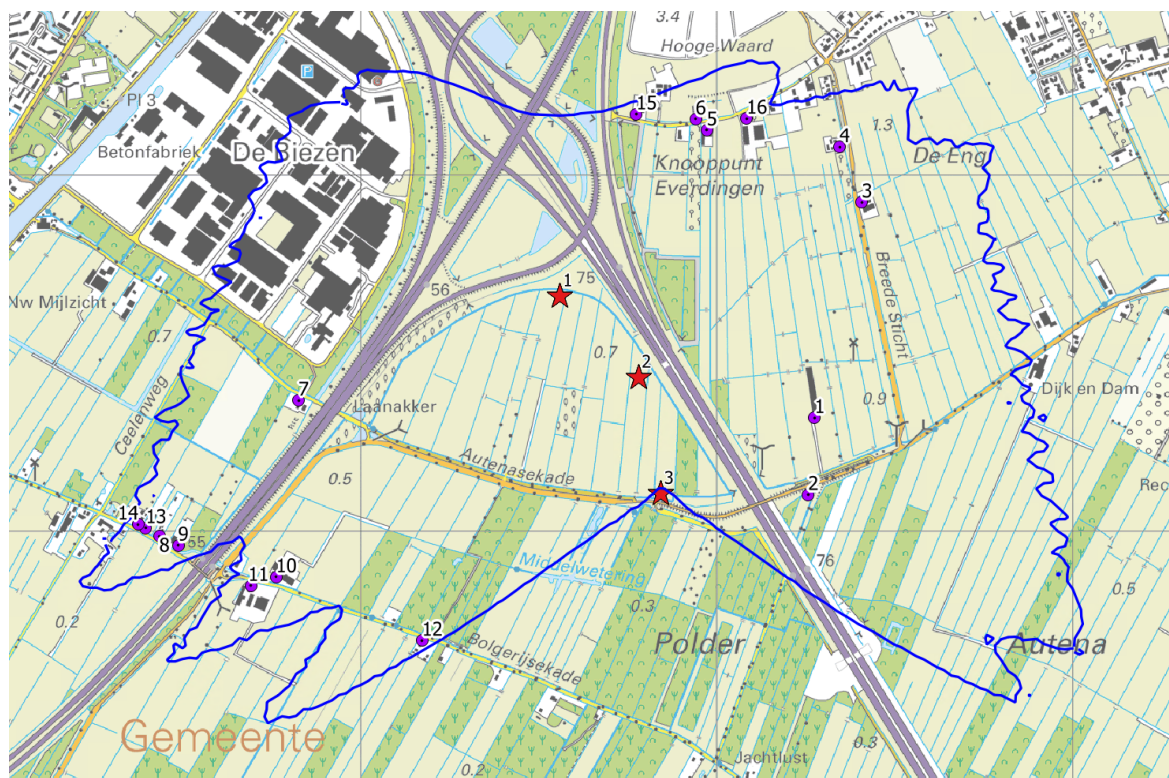
Met behulp van de correcties uit hoofdstuk 4 zijn de slagschaduwen berekend van de windturbines. In figuur 5.1 zijn de contouren opgenomen van de verwachte zes slagschaduwen per jaar. Binnen of op de contouren liggen enkele woningen waar mogelijk meer dan zeventien dagen met meer dan 20 minuten slagschaduw kan optreden. Voor deze woningen is het gemiddelde aantal dagen berekend met meer dan 20 minuten slagschaduw (zie tabel 5.1).

Bij de beoordeling ter plaatse van de woningen is uitgegaan van een gevel in de richting van de turbine die geheel uit ramen bestaat. Vanwege de afmetingen van dat vlak, duurt de schaduwpassage langs dit vlak wat langer dan de passage langs een punt (of enkel raam).

Er zijn op basis van waarnemingen met Google Earth en inschattingen meerdere type gevels en raamopeningen aangehouden (vanaf een hoogte van 1 meter):

- 4 meter breed en 4 meter hoog voor gevels met een begane grond en 1^{ste} verdieping;
- 4 meter breed en 2 meter hoog voor gevels met alleen een begane grond.

In bijlage I zijn de invoergegevens en uitvoer van het rekenmodel opgenomen.



Figuur 5.1

Contouren zes uur verwachte slagschaduw vanwege de Nordex N131.

Tabel 5.1

Berekend aantal dagen met meer dan 20 minuten slagschaduw bij omliggende woningen.

Variant 3: Nordex N131

punt	Omschrijving	Max uren	Verw acht uren	Max dagen	Verw acht dagen	Maximale stilstand
		per jaar [u:m]	per jaar [u:m]	per jaar [#]	per jaar >20 min. [#]	per jaar
1	Nieuw bouw Autenasekade	228:30	50:58	226	49	2,6%
2	Autenasekade 9	126:44	29:42	155	33	1,4%
3	Breede Sticht 1	69:16	11:52	157	20	0,8%
4	Breede Sticht 16	66:51	10:49	129	18	0,8%
5	Biezenweg 51	78:36	11:53	106	15	
6	Biezenweg 16	73:46	10:59	94	14	
7	Autenasekade 05	81:37	19:37	189	31	0,9%
8	Bolgerijsekade 16	35:35	8:58	128	12	
9	Bolgerijsekade 18	31:35	7:57	120	9	
10	Bolgerijsekade 24	42:16	10:45	121	21	0,5%
11	Bolgerijsekade 1	36:10	9:13	120	13	
12	Bolgerijsekade 9	35:33	9:04	67	14	
13	Bolgerijsekade 10	34:15	8:38	134	7	
14	Bolgerijsekade 11	29:43	7:30	127	5	
15	Bolgerijsekade 12	58:31	8:26	72	10	
16	Bolgerijsekade 13	58:06	8:49	107	14	

Uit bovenstaande tabellen blijkt dat ter plaatse van enkele woningen de norm van ten hoogste 17 dagen met meer dan 20 minuten slagschaduw wordt overschreden. Derhalve dienen, ten behoeve van deze woningen, de turbines van een automatische stilstandvoorziening te worden voorzien. Voor de berekening van de maximale stilstand per woning is uitgegaan van de maximaal mogelijke slagschaduwuren per jaar.

6 Conclusie

Uit de schaduwberekeningen blijkt dat gedurende meer dan 17 dagen meer dan 20 minuten per dag slagschaduw kan optreden bij enkele woningen in de omgeving van het windpark. De turbines dienen, ten behoeve van deze woningen, voorzien te worden van een automatische stilstandvoorziening.

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Bijlage I

Rekenmodel en resultaten

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SHADOW - Main Result

Calculation: Nordex N131

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) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,00	3,00	3,90	5,80	6,70	6,50	6,60	6,10	4,60	3,60	2,10	1,60

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
366	637	526	516	436	729	819	1.192	1.173	804	576	523	8.297

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

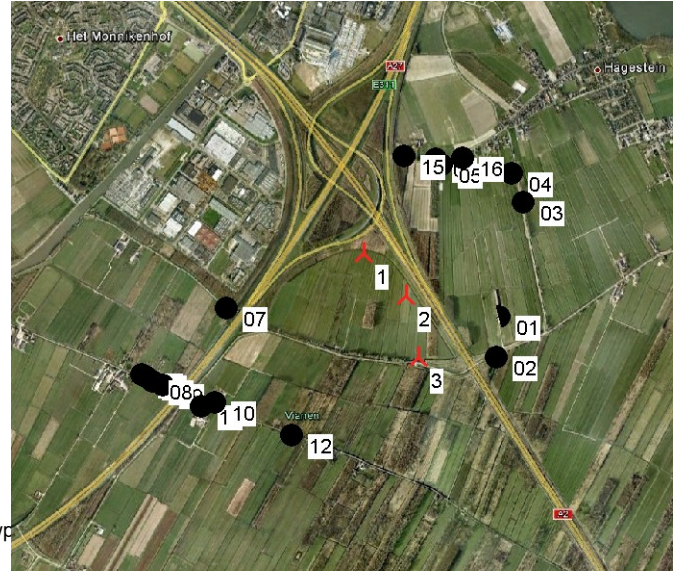
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.wp

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:40.000

▲ New WTG

● Shadow receptor

WTGs

Netherlands RD Amersfoort				WTG type				Shadow data			
East	North	Z	Row	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
			data/Description								
			[m]								
Netherlands RD Amersfoort											
1	135.561	442.659	0,0	Nordex N131	Yes	NORDEX N131/3000-3.000	3.000	131,0	99,0	1.724	10,3
2	135.782	442.431	0,0	Nordex N131	Yes	NORDEX N131/3000-3.000	3.000	131,0	99,0	1.724	10,3
3	135.845	442.105	0,0	Nordex N131	Yes	NORDEX N131/3000-3.000	3.000	131,0	99,0	1.724	10,3

Shadow receptor-Input

Netherlands RD Amersfoort										
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]	[°]	[°]	
01	Nieuwbouw Autenasekade	136.276	442.319	0,0	4,0	4,0	1,0	76,8	90,0	Fixed direction
02	Autenasekade 9	136.258	442.103	0,0	4,0	2,0	1,0	73,3	90,0	"Green house mode"
03	Breede Sticht 1	136.409	442.924	0,0	4,0	2,0	1,0	-180,0	90,0	"Green house mode"
04	Breede Sticht 16	136.346	443.079	0,0	4,0	4,0	1,0	77,0	90,0	"Green house mode"
05	Biezenweg 51	135.973	443.126	0,0	4,0	2,0	1,0	-180,0	90,0	"Green house mode"
06	Biezenweg 16	135.942	443.157	0,0	4,0	4,0	1,0	4,6	90,0	"Green house mode"
07	Autenasekade 05	134.826	442.368	0,0	4,0	2,0	1,0	-180,0	90,0	"Green house mode"
08	Bolgerijsekade 16	134.435	441.986	0,0	4,0	4,0	1,0	-180,0	90,0	"Green house mode"
09	Bolgerijsekade 18	134.488	441.961	0,0	4,0	2,0	1,0	-180,0	90,0	"Green house mode"
10	Bolgerijsekade 24	134.763	441.872	0,0	4,0	4,0	1,0	-153,9	90,0	"Green house mode"
11	Bolgerijsekade 1	134.692	441.848	0,0	4,0	4,0	1,0	-148,9	90,0	"Green house mode"
12	Bolgerijsekade 9	135.173	441.694	0,0	4,0	4,0	1,0	-156,1	90,0	"Green house mode"
13	Bolgerijsekade 8	134.397	442.010	0,0	4,0	4,0	1,0	-180,0	90,0	"Green house mode"
14	Bolgerijsekade 6	134.376	442.020	0,0	4,0	4,0	1,0	-180,0	90,0	"Green house mode"
15	Biezenweg 24	135.775	443.171	0,0	4,0	4,0	1,0	-180,0	90,0	"Green house mode"
16	Biezenweg 49	136.085	443.159	0,0	4,0	2,0	1,0	-180,0	90,0	"Green house mode"

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Calculated:

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SHADOW - Main Result**Calculation:** Nordex N131**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]
01	Nieuwbouw Autenasekade	228:30	226	1:36	50:58
02	Autenasekade 9	126:44	155	1:14	29:42
03	Breede Sticht 1	69:16	157	0:41	11:52
04	Breede Sticht 16	66:51	129	0:39	10:49
05	Biezenweg 51	78:36	106	0:52	11:53
06	Biezenweg 16	73:46	94	0:53	10:59
07	Autenasekade 05	81:37	189	0:41	19:37
08	Bolgerijsekade 16	35:35	128	0:25	8:58
09	Bolgerijsekade 18	31:35	120	0:24	7:57
10	Bolgerijsekade 24	42:16	121	0:29	10:45
11	Bolgerijsekade 1	36:10	120	0:27	9:13
12	Bolgerijsekade 9	35:33	67	0:42	9:04
13	Bolgerijsekade 8	34:15	134	0:25	8:38
14	Bolgerijsekade 6	29:43	127	0:24	7:30
15	Biezenweg 24	58:31	72	0:59	8:26
16	Biezenweg 49	58:06	107	0:45	8:49

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Nordex N131	363:35	69:46
2	Nordex N131	268:57	56:34
3	Nordex N131	259:58	58:07

Bijlage II

Slagschaduwkalender

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SHADOW - Calendar

Calculation: Nordex N131Shadow receptor: 01 - Nieuwbouw Autenasekade

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297

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

January	February	March	April	May	June	July	August	September	October	November	December								
1	08:48	08:21	07:28	16:28 (3)	07:17	06:12	19:18 (2)	05:27	19:32 (2)	05:24	19:47 (2)	06:00	19:28 (2)	06:50	07:39	17:10 (3)	07:33	16:22 (3)	08:24
2	08:48	08:21	07:28	16:28 (3)	07:17	06:12	19:18 (2)	05:27	19:32 (2)	05:24	19:47 (2)	06:00	19:28 (2)	06:50	07:39	17:10 (3)	07:33	16:22 (3)	08:24
3	08:48	08:21	07:28	16:28 (3)	07:17	06:12	19:18 (2)	05:27	19:32 (2)	05:24	19:47 (2)	06:00	19:28 (2)	06:50	07:39	17:10 (3)	07:33	16:22 (3)	08:24
4	08:48	08:21	07:28	16:28 (3)	07:17	06:12	19:18 (2)	05:27	19:32 (2)	05:24	19:47 (2)	06:00	19:28 (2)	06:50	07:39	17:10 (3)	07:33	16:22 (3)	08:24
5	08:48	08:21	07:28	16:28 (3)	07:17	06:12	19:18 (2)	05:27	19:32 (2)	05:24	19:47 (2)	06:00	19:28 (2)	06:50	07:39	17:10 (3)	07:33	16:22 (3)	08:24
6	08:47	08:13	07:17	16:28 (3)	07:06	06:03	19:17 (2)	05:23	19:36 (2)	05:28	19:43 (2)	06:08	19:27 (2)	06:58	07:48	17:04 (3)	07:42	16:23	08:31
7	08:47	08:13	07:17	16:28 (3)	07:06	06:03	19:17 (2)	05:23	19:36 (2)	05:28	19:43 (2)	06:08	19:27 (2)	06:58	07:48	17:04 (3)	07:42	16:23	08:31
8	08:46	08:10	07:12	16:27 (3)	07:01	05:59	19:18 (2)	05:22	19:39 (2)	05:30	19:41 (2)	06:13	19:26 (2)	07:03	07:51	17:03 (3)	07:44	16:23	08:34
9	08:46	08:10	07:12	16:27 (3)	07:01	05:59	19:18 (2)	05:22	19:39 (2)	05:30	19:41 (2)	06:13	19:26 (2)	07:03	07:51	17:03 (3)	07:44	16:23	08:34
10	08:45	08:06	07:08	16:26 (3)	06:59	05:58	19:17 (2)	05:22	19:40 (2)	05:30	19:42 (2)	06:16	19:26 (2)	07:07	07:56	17:02 (3)	07:49	16:23	08:36
11	08:45	08:06	07:08	16:26 (3)	06:59	05:58	19:17 (2)	05:22	19:40 (2)	05:30	19:42 (2)	06:16	19:26 (2)	07:07	07:56	17:02 (3)	07:49	16:23	08:36
12	08:44	08:03	07:03	16:25 (3)	06:52	05:57	19:16 (2)	05:20	19:42 (2)	05:34	19:39 (2)	06:18	19:27 (2)	07:08	07:58	17:02 (3)	07:53	16:23	08:38
13	08:43	08:01	07:01	16:24 (3)	06:50	05:56	19:15 (2)	05:19	19:44 (2)	05:35	19:38 (2)	06:19	19:26 (2)	07:10	08:00	17:01 (3)	07:55	16:23	08:39
14	08:43	08:01	07:01	16:24 (3)	06:50	05:56	19:15 (2)	05:19	19:44 (2)	05:35	19:38 (2)	06:19	19:26 (2)	07:10	08:00	17:01 (3)	07:55	16:23	08:39
15	08:42	07:57	06:56	16:20 (3)	06:46	05:54	19:14 (2)	05:18	19:46 (2)	05:37	19:37 (2)	06:23	19:27 (2)	07:13	08:03	17:01 (3)	07:58	16:23	08:41
16	08:41	07:55	06:54	16:20 (3)	06:43	05:53	19:13 (2)	05:17	19:47 (2)	05:38	19:36 (2)	06:24	19:27 (2)	07:15	08:05	17:02 (3)	08:00	16:23	08:42
17	08:40	07:53	06:52	16:19 (3)	06:41	05:52	19:12 (2)	05:16	19:48 (2)	05:39	19:35 (2)	06:25	19:27 (2)	07:16	18:46	17:02 (3)	08:02	16:23	08:43
18	08:39	07:51	06:50	16:18 (3)	06:39	05:51	19:11 (2)	05:15	19:49 (2)	05:40	19:34 (2)	06:26	19:27 (2)	07:17	18:44	17:03 (3)	08:03	16:23	08:44
19	08:38	07:49	06:48	16:17 (3)	06:37	05:50	19:10 (2)	05:14	19:50 (2)	05:41	19:33 (2)	06:27	19:27 (2)	07:18	18:42	17:04 (3)	08:04	16:23	08:45
20	08:37	07:47	06:46	16:16 (3)	06:35	05:49	19:09 (2)	05:13	19:51 (2)	05:42	19:32 (2)	06:28	19:27 (2)	07:19	18:39	17:05 (3)	08:05	16:23	08:46
21	08:36	07:45	06:44	16:15 (3)	06:33	05:48	19:08 (2)	05:12	19:52 (2)	05:43	19:31 (2)	06:29	19:27 (2)	07:20	18:37	17:06 (3)	08:06	16:23	08:47
22	08:35	07:43	06:42	16:14 (3)	06:31	05:47	19:07 (2)	05:11	19:53 (2)	05:44	19:30 (2)	06:30	19:27 (2)	07:21	18:35	17:07 (3)	08:07	16:23	08:48
23	08:34	07:41	06:40	16:13 (3)	06:29	05:46	19:06 (2)	05:10	19:54 (2)	05:45	19:29 (2)	06:31	19:27 (2)	07:22	18:33	17:08 (3)	08:08	16:23	08:49
24	08:33	07:39	06:38	16:12 (3)	06:27	05:45	19:05 (2)	05:09	19:55 (2)	05:46	19:28 (2)	06:32	19:27 (2)	07:23	18:31	17:09 (3)	08:09	16:23	08:50
25	08:31	07:36	06:36	16:11 (3)	06:25	05:44	19:04 (2)	05:08	19:56 (2)	05:47	19:27 (2)	06:33	19:27 (2)	07:24	18:29	17:10 (3)	08:10	16:23	08:51
26	08:30	07:34	06:34	16:10 (3)	06:23	05:43	19:03 (2)	05:07	19:57 (2)	05:48	19:26 (2)	06:34	19:27 (2)	07:25	18:27	17:11 (3)	08:11	16:23	08:52
27	08:29	07:32	06:32	16:09 (3)	06:21	05:42	19:02 (2)	05:06	19:58 (2)	05:49	19:25 (2)	06:35	19:27 (2)	07:26	18:25	17:12 (3)	08:12	16:23	08:53
28	08:27	07:30	06:29	16:08 (3)	06:19	05:41	19:01 (2)	05:05	19:59 (2)	05:50	19:24 (2)	06:36	19:27 (2)	07:27	18:23	17:13 (3)	08:13	16:23	08:54
29	08:26	07:28	06:27	16:07 (3)	06:17	05:40	19:00 (2)	05:04	20:00 (2)	05:51	19:23 (2)	06:37	19:27 (2)	07:28	18:21	17:14 (3)	08:14	16:23	08:55
30	08:24	07:22	06:21	16:06 (3)	06:15	05:39	18:59 (2)	05:03	20:01 (2)	05:52	19:22 (2)	06:38	19:27 (2)	07:29	18:19	17:15 (3)	08:15	16:23	08:56
31	08:23	07:19	06:19	16:05 (3)	06:13	05:38	18:58 (2)	05:02	20:02 (2)	05:53	19:21 (2)	06:39	19:27 (2)	07:30	18:17	17:16 (3)	08:16	16:23	08:57
Potential sun hours	259	277	367	416	465	499	502	454	381	401	1694	266	16	243	259	277	367	416	465
Total, worst case		920	1164	878	2614	1709	2541	1773	401	1694	266	16	243	259	277	367	416	465	499
Sun reduction		0.30	0.33	0.42	0.43	0.39	0.41	0.42	0.36	0.37	0.34	0.24	0.16	0.24	0.19	0.19	0.19	0.19	0.19
Oper. time red.		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Wind dir. red.		0.67	0.67	0.58	0.58	0.58	0.58	0.58	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Total reduction		0.19	0.21	0.23	0.24	0.22	0.23	0.23	0.23	0.23	0.21	0.15	0.10	0.15	0.13	0.13	0.13	0.13	0.13
Total, real		177	244	204	621	371	575	410	92	363	2	2	2	2	2	2	2	2	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)

Project:
068379aa - WP Autena

Printed/Page
15-5-2014 15:37 / 2
Licensed user:
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Kelvinbaan 40, PO box 1475
NL-3430BL Nieuwegein
+31 3023 11377
David Vrolijk / dv@lbsight.nl
Calculated:
15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131Shadow receptor: 02 - Autenasekade 9

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297

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

	January	February	March	April	May	June	July	August	September	October	November	December													
1	08:48	08:21	07:28	07:17	18:43 (3)	06:12	18:34 (3)	05:27	20:56 (2)	05:24	18:57 (3)	06:50	18:30 (3)	07:39	07:33	08:24									
2	08:48	08:20	07:26	07:15	56	19:39 (3)	21:03	62	18:36 (3)	21:49	20:12	22:03	36	21:30 (2)	21:31	19:34 (3)	20:29	19:42 (3)	19:20	17:13	16:33				
3	08:48	08:18	07:23	07:13	59	19:39 (3)	21:05	60	19:35 (3)	21:50	22	21:17 (2)	22:03	35	21:29 (2)	21:30	40	19:36 (3)	20:27	71	19:42 (3)	19:17	17:12	16:32	
4	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
5	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
6	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
7	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
8	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
9	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
10	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
11	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
12	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
13	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
14	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
15	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
16	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
17	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
18	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
19	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
20	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
21	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
22	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
23	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
24	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
25	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
26	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
27	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
28	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
29	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
30	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
31	08:48	08:17	07:21	07:10	20:16	61	19:40 (3)	21:07	58	19:34 (3)	21:51	25	21:18 (2)	22:03	34	21:29 (2)	21:28	42	19:36 (3)	20:25	71	19:42 (3)	19:15	17:10	16:32
Potential sun hours	259	277	367	416	485	499	502	502	476	454	1959	381	1029	331	266	243									
Total, worst case				293	2071	716	1060		476		1959		1029												
Sun reduction				0,33	0,42	0,43	0,39		0,41		0,42		0,36												
Oper. time red.				0,95	0,95	0,95	0,95		0,95		0,95		0,95												
Wind dir. red.				0,62	0,62	0,62	0,59		0,59		0,62		0,62												
Total reduction				0,19	0,25	0,25	0,22		0,23		0,24		0,21												
Total, real				57	509	180	230		109		479		219												

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

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

068379aa - WP Autena

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15-5-2014 15:37 / 3

Licensed user:

LBP SIGHT

Kelvinbaan 40, PO box 1475
NL-3430BL Nieuwegein
+31 3023 11377

David Vroljik / dv@lbsight.nl

Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 03 - Breede Sticht 1

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) []

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sunshine probability S	2,00	3,00	3,90	5,80	6,70	6,50	6,60	6,10	4,60	3,60	2,10	1,60

Operational time

	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
Operational time	366	637	526	516	436	729	819	1.192	1.173	804	576	523	8.297

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

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

Project: 068379aa - WP Autena

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Licensed user: LBP SIGHT
Kelvinbaan 40, PO box 1475
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+31 3023 11377
David Vrolijk / dv@lbsight.nl
Calculated: 15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 04 - Breede Sticht 16

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

Table with 12 columns for months (January to December) and multiple rows for daily sun hours and reduction factors (Sun reduction, Oper. time red., Wind dir. red., Total reduction, Total, real).

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

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

Project:
068379aa - WP Autena

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Calculated:
15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 05 - Biezenweg 51

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	08:48	15:15 (1) 08:21	15:25 (1) 07:28	07:17	06:12	05:27	05:24	06:00	06:50	07:39	07:33	15:07 (1) 08:24	14:59 (1)
2	08:48	15:59 (1) 17:27	16:11 (1) 18:18	20:12	21:03	21:49	22:03	21:31	20:29	19:20	17:13	15:31 (1) 16:33	15:48 (1)
3	08:48	15:15 (1) 08:20	15:25 (1) 07:26	07:15	06:10	05:26	05:25	06:02	06:52	07:41	07:35	15:04 (1) 08:26	14:59 (1)
4	08:48	15:59 (1) 17:28	16:11 (1) 18:20	20:14	21:05	21:50	22:03	21:30	20:27	19:17	17:12	15:33 (1) 16:32	15:48 (1)
5	08:48	15:15 (1) 08:18	15:26 (1) 07:24	07:13	06:08	05:25	05:25	06:04	06:54	07:43	07:37	15:02 (1) 08:27	15:00 (1)
6	08:48	16:00 (1) 17:30	16:10 (1) 18:22	20:16	21:07	21:52	22:03	21:28	20:25	19:15	17:10	15:35 (1) 16:32	15:49 (1)
7	08:48	15:16 (1) 08:17	15:27 (1) 07:21	07:10	06:07	05:25	05:26	06:05	06:55	07:44	07:39	15:01 (1) 08:29	15:01 (1)
8	08:48	16:01 (1) 17:32	16:09 (1) 18:24	20:18	21:08	21:53	22:02	21:26	20:22	19:13	17:08	15:36 (1) 16:31	15:48 (1)
9	08:48	15:15 (1) 08:15	15:29 (1) 07:19	07:08	06:05	05:24	05:27	06:07	06:57	07:46	07:40	14:59 (1) 08:30	15:01 (1)
10	08:48	16:01 (1) 17:34	16:09 (1) 18:25	20:19	21:10	21:54	22:02	21:25	20:20	19:10	17:06	15:38 (1) 16:31	15:48 (1)
11	08:48	15:16 (1) 08:13	15:30 (1) 07:17	07:06	06:03	05:23	05:28	06:08	06:58	07:48	07:42	14:58 (1) 08:31	15:02 (1)
12	08:48	16:03 (1) 17:36	16:08 (1) 18:27	20:21	21:12	21:55	22:01	21:23	20:18	19:08	17:04	15:39 (1) 16:30	15:49 (1)
13	08:48	15:16 (1) 08:12	15:31 (1) 07:15	07:03	06:01	05:23	05:29	06:10	07:00	07:49	07:44	14:57 (1) 08:32	15:02 (1)
14	08:48	16:03 (1) 17:38	16:06 (1) 18:29	20:23	21:13	21:55	22:01	21:21	20:16	19:06	17:03	15:40 (1) 16:30	15:49 (1)
15	08:48	15:16 (1) 08:10	15:33 (1) 07:12	07:01	05:59	05:22	05:29	06:11	07:02	07:51	07:46	14:57 (1) 08:34	15:03 (1)
16	08:48	16:04 (1) 17:40	16:05 (1) 18:31	20:24	21:15	21:56	22:00	21:19	20:13	19:04	17:01	15:41 (1) 16:29	15:48 (1)
17	08:48	15:16 (1) 08:08	15:35 (1) 07:10	06:59	05:58	05:22	05:30	06:13	07:03	07:53	07:48	14:56 (1) 08:35	15:04 (1)
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19	08:48	15:16 (1) 08:06	15:38 (1) 07:08	06:57	05:56	05:21	05:31	06:15	07:05	07:55	07:49	14:55 (1) 08:36	15:05 (1)
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21	08:48	15:17 (1) 08:04	15:41 (1) 07:06	06:54	05:54	05:21	05:32	06:16	07:07	07:56	07:51	14:55 (1) 08:37	15:05 (1)
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23	08:48	15:17 (1) 08:03	15:47 (1) 07:03	06:52	05:52	05:20	05:34	06:18	07:08	07:58	07:53	14:55 (1) 08:38	15:06 (1)
24	08:48	16:07 (1) 17:47	15:51 (1) 18:38	20:31	21:21	21:59	21:57	21:12	20:04	18:55	16:55	15:44 (1) 16:29	15:49 (1)
25	08:48	15:17 (1) 08:01	15:41 (1) 07:01	06:50	05:51	05:20	05:35	06:19	07:10	08:00	07:55	14:54 (1) 08:39	15:06 (1)
26	08:48	16:07 (1) 17:49	16:04 (1) 18:40	20:33	21:23	22:00	21:56	21:10	20:02	18:52	16:53	15:44 (1) 16:29	15:49 (1)
27	08:48	15:17 (1) 07:59	15:41 (1) 06:59	06:48	05:49	05:20	05:36	06:21	07:11	08:01	07:57	14:53 (1) 08:40	15:07 (1)
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29	08:48	15:17 (1) 07:57	15:46 (1) 06:46	06:46	05:48	05:20	05:37	06:23	07:13	08:03	07:58	14:53 (1) 08:41	15:08 (1)
30	08:48	16:08 (1) 17:53	16:03 (1) 18:43	20:36	21:26	22:01	21:54	21:06	19:57	18:48	16:50	15:44 (1) 16:29	15:49 (1)
31	08:48	15:18 (1) 07:55	15:46 (1) 06:43	06:43	05:46	05:20	05:38	06:24	07:15	08:05	08:00	14:53 (1) 08:42	15:09 (1)
32	08:48	16:09 (1) 17:54	16:04 (1) 18:45	20:38	21:28	22:02	21:53	21:04	19:55	18:46	16:49	15:45 (1) 16:29	15:49 (1)
33	08:48	15:18 (1) 07:53	15:46 (1) 06:41	06:41	05:45	05:20	05:39	06:26	07:16	08:07	08:02	14:53 (1) 08:43	15:09 (1)
34	08:48	16:09 (1) 17:56	16:04 (1) 18:47	20:40	21:29	22:02	21:52	21:02	19:52	18:44	16:47	15:45 (1) 16:29	15:49 (1)
35	08:48	15:18 (1) 07:51	15:46 (1) 06:39	06:39	05:43	05:19	05:41	06:27	07:18	08:08	08:04	14:54 (1) 08:43	15:09 (1)
36	08:48	16:07 (1) 17:58	16:02 (1) 18:48	20:41	21:31	22:03	21:51	21:00	19:50	18:42	16:46	15:46 (1) 16:29	15:49 (1)
37	08:48	15:19 (1) 07:49	15:47 (1) 06:37	06:37	05:42	05:20	05:42	06:29	07:20	08:10	08:05	14:54 (1) 08:44	15:10 (1)
38	08:48	16:11 (1) 18:00	16:05 (1) 18:50	20:43	21:32	22:03	21:50	20:58	19:48	18:39	16:45	15:46 (1) 16:29	15:49 (1)
39	08:48	15:18 (1) 07:47	15:46 (1) 06:35	06:35	05:40	05:20	05:43	06:31	07:21	08:12	08:07	14:54 (1) 08:45	15:11 (1)
40	08:48	16:10 (1) 18:02	16:04 (1) 18:52	20:45	21:34	22:03	21:49	20:55	19:45	18:37	16:44	15:46 (1) 16:30	15:49 (1)
41	08:48	15:19 (1) 07:45	15:47 (1) 06:33	06:33	05:39	05:20	05:45	06:32	07:23	08:14	08:09	14:55 (1) 08:45	15:11 (1)
42	08:48	16:11 (1) 18:04	16:05 (1) 18:54	20:47	21:35	22:04	21:47	20:53	19:43	18:35	16:42	15:47 (1) 16:30	15:49 (1)
43	08:48	15:19 (1) 07:43	15:47 (1) 06:30	06:30	05:38	05:20	05:46	06:34	07:25	08:15	08:10	14:54 (1) 08:46	15:12 (1)
44	08:48	16:11 (1) 18:06	16:05 (1) 18:55	20:48	21:37	22:04	21:46	20:51	19:41	18:33	16:41	15:46 (1) 16:31	15:49 (1)
45	08:48	15:19 (1) 07:41	15:47 (1) 06:28	06:28	05:36	05:20	05:47	06:36	07:26	08:17	08:12	14:55 (1) 08:46	15:12 (1)
46	08:48	16:11 (1) 18:07	16:05 (1) 18:57	20:50	21:38	22:04	21:45	20:49	19:38	18:31	16:40	15:47 (1) 16:31	15:49 (1)
47	08:48	15:20 (1) 07:39	15:48 (1) 06:26	06:26	05:35	05:20	05:49	06:37	07:28	08:19	08:14	14:55 (1) 08:47	15:12 (1)
48	08:48	16:12 (1) 18:09	16:06 (1) 18:59	20:52	21:39	22:04	21:43	20:47	19:36	18:29	16:39	15:47 (1) 16:32	15:49 (1)
49	08:48	15:20 (1) 07:36	15:48 (1) 06:23	06:23	05:34	05:21	05:50	06:39	07:29	08:21	08:15	14:56 (1) 08:47	15:13 (1)
50	08:48	16:12 (1) 18:11	16:06 (1) 19:00	20:53	21:41	22:04	21:42	20:45	19:34	18:27	16:38	15:47 (1) 16:32	15:49 (1)
51	08:48	15:20 (1) 07:34	15:48 (1) 06:21	06:21	05:33	05:21	05:52	06:41	07:31	08:23	08:17	14:56 (1) 08:48	15:13 (1)
52	08:48	16:12 (1) 18:13	16:07 (1) 19:02	20:55	21:42	22:04	21:41	20:43	19:31	18:25	16:37	15:47 (1) 16:33	15:49 (1)
53	08:48	15:21 (1) 07:32	15:49 (1) 06:29	06:29	05:32	05:22	05:53	06:42	07:33	08:24	08:18	14:56 (1) 08:48	15:13 (1)
54	08:48	16:12 (1) 18:15	16:07 (1) 19:04	20:57	21:43	22:04	21:39	20:40	19:29	18:23	16:36	15:47 (1) 16:34	15:49 (1)
55	08:48	15:21 (1) 07:30	15:49 (1) 06:26	06:26	05:31	05:22	05:54	06:44	07:34	08:26	08:20	14:57 (1) 08:48	15:14 (1)
56	08:48	16:12 (1) 18:16	16:07 (1) 19:06	20:58	21:45	22:04	21:38	20:38	19:27	18:21	16:35	15:48 (1) 16:35	15:49 (1)
57	08:48	15:23 (1) 07:31	15:50 (1) 07:24	06:16	05:30	05:23	05:56	06:45	07:36	08:28	08:21	14:57 (1) 08:48	15:14 (1)
58	08:48	16:12 (1) 18:11	16:07 (1) 19:07	21:00	21:46	22:04	21:36	20:36	19:24	18:19	16:34	15:47 (1) 16:36	15:49 (1)
59	08:48	15:23 (1) 07:31	15:51 (1) 07:22	06:14	05:29	05:23	05:57	06:47	07:38	08:30	08:24	14:58 (1) 08:48	15:14 (1)
60	08:48	16:12 (1) 18:11	16:07 (1) 19:09	21:02	21:47	22:04	21:35	20:34	19:22	18:17	16:34	15:48 (1) 16:34	15:49 (1)
61	08:48	15:23 (1) 07:31	15:51 (1) 07:19	06:14	05:28	05:21	05:59	06:49	07:40	08:32	08:26	14:58 (1) 08:48	15:15 (1)
62	08:48	16:11 (1) 18:11	16:06 (1) 19:01	20:11	21:48	22:03	21:33	20:31	19:24	18:17	16:37	15:48 (1) 16:33	15:49 (1)
Potential sun hours	259	277	367	416	485	499	502	454	381	331	266	243	1361
Total, worst case	1533	395									26	1401	1361
Sun reduction	0,24	0,30									0,34	0,24	0,20
Oper. time red.	0,95	0,95									0,95	0,95	0,95
Wind dir. red.	0,68	0,68									0,68	0,68	0,68
Total reduction	0,15	0,20									0,22	0,15	0,13
Total, real	237	77									6	214	179

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
--------------	------------------	----------------------	--

Project:

068379aa - WP Autena

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Licensed user:

LBP SIGHT

Kelvinbaan 40, PO box 1475

NL-3430BL Nieuwegein

+31 3023 11377

David Vrolijk / dv@lbsight.nl

Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 06 - Biezenweg 16

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum

366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297

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

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

Project:

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Licensed user:

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David Vrolijk / dv@lbsight.nl

Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131Shadow receptor: 07 - Autenasekade 05

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
 Idle start wind speed: Cut in wind speed from power curve

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

Project:
068379aa - WP Autena

Printed/Page
15-5-2014 15:37 / 8

Licensed user:
LBP SIGHT
Kelvinbaan 40, PO box 1475
NL-3430BL Nieuwegein
+31 3023 11377
David Vrolijk / dv@lbsight.nl
Calculated:
15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 08 - Bolgerijsekade 16

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December					
1	08:48	08:21	07:28	07:17	07:40 (3)	06:12	06:37 (2)	05:27	05:56 (1)	05:24	05:59 (1)	06:01	06:50	07:26 (3)	07:39	07:33	08:24
2	08:48	08:20	07:26	07:15	07:38 (3)	06:10	06:36 (2)	05:26	05:55 (1)	05:25	05:59 (1)	06:02	06:52	07:24 (3)	07:41	07:35	08:26
3	08:48	08:18	07:24	07:13	07:35 (3)	06:09	06:36 (2)	05:25	05:54 (1)	05:25	05:59 (1)	06:04	06:54	07:23 (3)	07:43	07:37	08:27
4	08:48	08:17	07:21	07:10	07:33 (3)	06:07	06:37 (2)	05:25	05:54 (1)	05:26	05:59 (1)	06:05	06:55	07:22 (3)	07:44	07:39	08:29
5	08:42	08:15	07:19	07:08	07:31 (3)	06:05	06:38 (2)	05:24	05:53 (1)	05:27	06:00 (1)	06:07	06:52	07:23 (3)	07:46	07:41	08:30
6	08:47	08:13	07:17	07:06	07:29 (3)	06:03	06:39 (2)	05:23	05:54 (1)	05:28	05:59 (1)	06:08	06:50	07:24 (3)	07:48	07:42	08:31
7	08:47	08:12	07:15	07:04	07:28 (3)	06:01	06:40 (2)	05:23	05:53 (1)	05:29	05:59 (1)	06:10	06:48	07:26 (3)	07:50	07:44	08:32
8	08:47	08:10	07:12	07:01	07:25 (3)	05:59	06:44 (2)	05:22	05:54 (1)	05:30	06:00 (1)	06:12	06:47	07:27 (3)	07:51	07:46	08:34
9	08:47	08:08	07:10	07:00	07:25 (3)	05:58	06:59 (2)	05:22	05:54 (1)	05:31	06:01 (1)	06:13	06:46	07:29 (3)	07:53	07:48	08:35
10	08:45	08:06	07:08	06:57	07:26 (3)	05:56	06:57 (2)	05:21	05:54 (1)	05:32	06:02 (1)	06:15	06:45	07:31 (3)	07:55	07:50	08:36
11	08:45	08:04	07:06	06:55	07:27 (3)	05:54	06:58 (2)	05:21	05:55 (1)	05:33	06:03 (1)	06:16	06:44	07:32 (3)	07:56	07:51	08:37
12	08:44	08:03	07:03	06:52	07:29 (3)	05:53	06:59 (2)	05:21	05:55 (1)	05:34	06:04 (1)	06:18	06:46	07:34 (3)	07:58	07:53	08:38
13	08:44	08:01	07:01	06:50	07:30 (3)	05:52	06:59 (2)	05:20	05:55 (1)	05:35	06:05 (1)	06:20	06:47	07:35 (3)	07:59	07:54	08:39
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15	08:42	07:57	06:57	06:46	07:32 (3)	05:50	06:59 (2)	05:20	05:57 (1)	05:37	06:07 (1)	06:23	06:50	07:37 (3)	07:58	07:53	08:41
16	08:41	07:55	06:54	06:36	07:33 (3)	05:49	06:59 (2)	05:20	05:58 (1)	05:38	06:08 (1)	06:24	06:52	07:38 (3)	07:58	07:53	08:42
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18	08:39	07:51	06:50	06:25	07:35 (3)	05:47	06:59 (2)	05:20	06:00 (1)	05:40	06:10 (1)	06:26	06:54	07:40 (3)	07:58	07:53	08:44
19	08:38	07:49	06:47	06:22	07:36 (3)	05:46	06:59 (2)	05:20	06:01 (1)	05:41	06:11 (1)	06:27	06:55	07:41 (3)	07:58	07:53	08:45
20	08:37	07:47	06:45	06:20	07:37 (3)	05:45	06:59 (2)	05:20	06:02 (1)	05:42	06:12 (1)	06:28	06:56	07:42 (3)	07:58	07:53	08:46
21	08:36	07:45	06:43	06:17	07:38 (3)	05:44	06:59 (2)	05:20	06:03 (1)	05:43	06:13 (1)	06:29	06:57	07:43 (3)	07:58	07:53	08:47
22	08:35	07:43	06:40	06:15	07:39 (3)	05:43	06:59 (2)	05:20	06:04 (1)	05:44	06:14 (1)	06:30	06:58	07:44 (3)	07:58	07:53	08:48
23	08:34	07:41	06:38	06:13	07:40 (3)	05:42	06:59 (2)	05:20	06:05 (1)	05:45	06:15 (1)	06:31	06:59	07:45 (3)	07:58	07:53	08:49
24	08:33	07:39	06:36	06:11	07:41 (3)	05:41	06:59 (2)	05:20	06:06 (1)	05:46	06:16 (1)	06:32	06:60	07:46 (3)	07:58	07:53	08:50
25	08:31	07:37	06:33	06:10	07:42 (3)	05:40	06:59 (2)	05:20	06:07 (1)	05:47	06:17 (1)	06:33	06:61	07:47 (3)	07:58	07:53	08:51
26	08:30	07:34	06:31	06:09	07:43 (3)	05:39	06:59 (2)	05:20	06:08 (1)	05:48	06:18 (1)	06:34	06:62	07:48 (3)	07:58	07:53	08:52
27	08:29	07:32	06:29	06:08	07:44 (3)	05:38	06:59 (2)	05:20	06:09 (1)	05:49	06:19 (1)	06:35	06:63	07:49 (3)	07:58	07:53	08:53
28	08:27	07:30	06:26	06:07	07:45 (3)	05:37	06:59 (2)	05:20	06:10 (1)	05:50	06:20 (1)	06:36	06:64	07:50 (3)	07:58	07:53	08:54
29	08:26	07:28	06:24	06:06	07:46 (3)	05:36	06:59 (2)	05:20	06:11 (1)	05:51	06:21 (1)	06:37	06:65	07:51 (3)	07:58	07:53	08:55
30	08:24	07:26	06:22	06:05	07:47 (3)	05:35	06:59 (2)	05:20	06:12 (1)	05:52	06:22 (1)	06:38	06:66	07:52 (3)	07:58	07:53	08:56
31	08:23	07:24	06:20	06:04	07:48 (3)	05:34	06:59 (2)	05:20	06:13 (1)	05:53	06:23 (1)	06:39	06:67	07:53 (3)	07:58	07:53	08:57
31	08:23	07:22	06:18	06:03	07:49 (3)	05:33	06:59 (2)	05:20	06:14 (1)	05:54	06:24 (1)	06:40	06:68	07:54 (3)	07:58	07:53	08:58
31	08:23	07:20	06:16	06:02	07:50 (3)	05:32	06:59 (2)	05:20	06:15 (1)	05:55	06:25 (1)	06:41	06:69	07:55 (3)	07:58	07:53	08:59
31	08:23	07:18	06:14	06:01	07:51 (3)	05:31	06:59 (2)	05:20	06:16 (1)	05:56	06:26 (1)	06:42	06:70	07:56 (3)	07:58	07:53	09:00
31	08:23	07:16	06:12	06:00	07:52 (3)	05:30	06:59 (2)	05:20	06:17 (1)	05:57	06:27 (1)	06:43	06:71	07:57 (3)	07:58	07:53	09:01
31	08:23	07:14	06:10	05:59	07:53 (3)	05:29	06:59 (2)	05:20	06:18 (1)	05:58	06:28 (1)	06:44	06:72	07:58 (3)	07:58	07:53	09:02
31	08:23	07:12	06:08	05:58	07:54 (3)	05:28	06:59 (2)	05:20	06:19 (1)	05:59	06:29 (1)	06:45	06:73	07:59 (3)	07:58	07:53	09:03
31	08:23	07:10	06:06	05:57	07:55 (3)	05:27	06:59 (2)	05:20	06:20 (1)	06:00	06:30 (1)	06:46	06:74	08:00 (3)	07:58	07:53	09:04
31	08:23	07:08	06:04	05:56	07:56 (3)	05:26	06:59 (2)	05:20	06:21 (1)	06:01	06:31 (1)	06:47	06:75	08:01 (3)	07:58	07:53	09:05
31	08:23	07:06	06:02	05:55	07:57 (3)	05:25	06:59 (2)	05:20	06:22 (1)	06:02	06:32 (1)	06:48	06:76	08:02 (3)	07:58	07:53	09:06
31	08:23	07:04	06:00	05:54	07:58 (3)	05:24	06:59 (2)	05:20	06:23 (1)	06:03	06:33 (1)	06:49	06:77	08:03 (3)	07:58	07:53	09:07
31	08:23	07:02	05:58	05:53	07:59 (3)	05:23	06:59 (2)	05:20	06:24 (1)	06:04	06:34 (1)	06:50	06:78	08:04 (3)	07:58	07:53	09:08
31	08:23	07:00	05:56	05:52	08:00 (3)	05:22	06:59 (2)	05:20	06:25 (1)	06:05	06:35 (1)	06:51	06:79	08:05 (3)	07:58	07:53	09:09
31	08:23	06:58	05:54	05:51	08:01 (3)	05:21	06:59 (2)	05:20	06:26 (1)	06:06	06:36 (1)	06:52	06:80	08:06 (3)	07:58	07:53	09:10
31	08:23	06:56	05:52	05:50	08:02 (3)	05:20	06:59 (2)	05:20	06:27 (1)	06:07	06:37 (1)	06:53	06:81	08:07 (3)	07:58	07:53	09:11
31	08:23	06:54	05:50	05:49	08:03 (3)	05:19	06:59 (2)	05:20	06:28 (1)	06:08	06:38 (1)	06:54	06:82	08:08 (3)	07:58	07:53	09:12
31	08:23	06:52	05:48	05:47	08:04 (3)	05:18	06:59 (2)	05:20	06:29 (1)	06:09	06:39 (1)	06:55	06:83	08:09 (3)	07:58	07:53	09:13
31	08:23	06:50	05:46	05:46	08:05 (3)	05:17	06:59 (2)	05:20	06:30 (1)	06:10	06:40 (1)	06:56	06:84	08:10 (3)	07:58	07:53	09:14
31	08:23	06:48	05:44	05:45	08:06 (3)	05:16	06:59 (2)	05:20	06:31 (1)	06:11	06:41 (1)	06:57	06:85	08:11 (3)	07:58	07:53	09:15
31	08:23	06:46	05:42	05:44	08:07 (3)	05:15	06:59 (2)	05:20	06:32 (1)	06:12	06:42 (1)	06:58	06:86	08:12 (3)	07:58	07:53	09:16
31	08:23	06:44	05:40	05:43	08:08 (3)	05:14	06:59 (2)	05:20	06:33 (1)	06:13	06:43 (1)	06:59	06:87	08:13 (3)	07:58	07:53	09:17
31	08:23	06:42	05:38	05:42	08:09 (3)	05:13	06:59 (2)	05:20	06:34 (1)	06:14	06:44 (1)	07:00	06:88	08:14 (3)	07:58	07:53	09:18
31	08:23	06:40	05:36	05:41	08:10 (3)	05:12	06:59 (2)	05:20	06:35 (1)	06:15	06:45 (1)	07:01	06:89	08:15 (3)	07:58	07:53	09:19
31	08:23	06:38	05:34	05:40	08:11 (3)	05:11	06:59 (2)	05:20	06:36 (1)	06:16	06:46 (1)	07:02	06:90	08:16 (3)	07:58	07:53	09:20
31	08:23	06:36	05:32	05:39	08:12 (3)	05:10	06:59 (2)	05:20	06:37 (1)	06:17	06:47 (1)	07:03	06:91	08:17 (3)	07:58	07:53	09:21
31	08:23	06:34	05:30	05:37	08:13 (3)	05:09	06:59 (2)	05:20	06:38 (1)	06:18	06:48 (1)	07:04	06:92	08:18 (3)	07:58	07:53	09:22
31	08:23	06:32	05:28	05:35	08:14 (3)	05:08	06:59 (2)	05:20	06:39 (1)	06:19	06:49 (1)	07:05	06:93	08:19 (3)	07:58	07:53	09:23
31	08:23	06:30	05:26	05:33	08:15 (3)	05:07	06:59 (2)	05:20	06:40 (1)	06:20	06:50 (1)	07:06	06:94	08:20 (3)	07:58	07:53	09:24
31	08:23	06:28	05:24	05:31	08:16 (3)	05:06	06:59 (2)	05:20	06:41 (1)	06:21	06:51 (1)	07:07	06:95	08:21 (3)	07:58	07:53	09:25
31	08:23	06:26	05:22	05:29	08:17 (3)	05:05	06:59 (2)	05:20	06:42 (1)	06:22	06:52 (1)						

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Calculated: 15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 09 - Bolgerijsekade 18

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

Table with columns for months (January to December) and rows for each day of the month, showing sun rise/set times, shadow reduction percentages, and total real shadow reduction.

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

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

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Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 10 - Bolgerijsekade 24

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum

366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297

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

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

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Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131Shadow receptor: 11 - Bolgerijsekade 1

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) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,00	3,00	3,90	5,80	6,70	6,50	6,60	6,10	4,60	3,60	2,10	1,60

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
366	637	526	516	436	729	819	1.192	1.173	804	576	523	8.297

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

	January	February	March	April	May	June	July	August	September	October	November	December
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Project:

068379aa - WP Autena

Printed/Page

15-5-2014 15:37 / 12

Licensed user:

LBP SIGHT

Kelvinbaan 40, PO box 1475
NL-3430BL Nieuwegein
+31 3023 11377

David Vrolijk / dv@lbsight.nl

Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 12 - Bolgerijsekade 9

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

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22	08:35	07:43	06:40	06:31	05:38	06:05 (3)	05:20	05:53 (3)	05:46	06:16 (3)	06:34	07:25	08:15	08:10	08:46			
	17:09	18:06	18:55	20:48	21:36	14	06:19 (3)	22:04	42	06:35 (3)	21:46	13	06:29 (3)	20:51	19:41	18:33	16:41	16:31
23	08:34	07:41	06:38	06:28	05:37	06:04 (3)	05:20	05:53 (3)	05:47	06:17 (3)	06:36	07:26	08:17	08:12	08:46			
	17:10	18:07	18:57	20:50	21:38	17	06:21 (3)	22:04	42	06:35 (3)	21:45	10	06:27 (3)	20:49	19:38	18:31	16:40	16:31
24	08:33	07:39	06:36	06:26	05:35	06:03 (3)	05:21	05:53 (3)	05:49	06:18 (3)	06:37	07:28	08:19	08:14	08:47			
	17:12	18:09	18:59	20:52	21:39	19	06:22 (3)	22:04	42	06:35 (3)	21:43	6	06:24 (3)	20:47	19:36	18:29	16:39	16:32
25	08:31	07:37	06:33	06:24	05:34	06:02 (3)	05:21	05:54 (3)	05:50	06:39	07:29	07:21	08:15	08:47				
	17:14	18:11	19:00	20:53	21:41	21	06:23 (3)	22:04	42	06:36 (3)	21:42	07:20	18:34	16:38	16:33			
26	08:30	07:34	06:31	06:22	05:33	06:01 (3)	05:21	05:54 (3)	05:52	06:41	07:31	07:23	08:17	08:48				
	17:16	18:13	19:02	20:55	21:42	23	06:24 (3)	22:04	41	06:35 (3)	21:41	07:20	18:31	16:37	16:33			
27	08:29	07:32	06:29	06:20	05:32	06:00 (3)	05:22	05:53 (3)	05:53	06:42	07:33	07:24	08:18	08:48				
	17:18	18:15	19:04	20:57	21:43	25	06:25 (3)	22:04	42	06:35 (3)	21:39	07:20	18:31	16:36	16:34			
28	08:27	07:30	06:26	06:18	05:31	05:59 (3)	05:22	05:54 (3)	05:55	06:44	07:34	07:26	08:20	08:48				
	17:19	18:17	19:06	20:58	21:45	26	06:25 (3)	22:04	42	06:36 (3)	21:38	07:18	18:31	16:35	16:35			
29	08:26	07:29	06:24	06:16	05:30	05:58 (3)	05:23	05:55 (3)	05:56	06:45	07:36	07:28	08:21	08:48				
	17:21	18:18	19:07	20:59	21:46	28	06:26 (3)	22:04	41	06:36 (3)	21:36	07:18	18:31	16:35	16:36			
30	08:24	07:27	06:22	06:14	05:29	05:57 (3)	05:23	05:55 (3)	05:58	06:47	07:38	07:30	08:23	08:48				
	17:23	18:20	19:09	21:02	21:47	29	06:26 (3)	22:04	41	06:36 (3)	21:35	07:18	18:31	16:37	16:37			
31	08:23	07:26	06:20	06:12	05:28	05:56 (3)	05:24	05:55 (3)	05:59	06:49	07:39	07:31	08:24	08:48				
	17:25	18:22	19:11	21:05	21:48	31	06:27 (3)	22:04	41	06:36 (3)	21:33	07:18	18:31	16:37	16:37			
Potential sun hours	259	277	367	416	485	499	1195	502	683	454	381	331	266	244				
Total, worst case					255		1195		683									
Sun reduction					0,43		0,39		0,41									
Oper. time red.					0,95		0,95		0,95									
Wind dir. red.					0,67		0,67		0,67									
Total reduction					0,27		0,25		0,26									
Total, real					70		298		177									

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

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

Project:

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LBP SIGHT

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Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 13 - Bolgerijsekade 8

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:48	08:21	07:28	07:17	07:40 (3)	06:12	06:42 (2)	05:27	05:59 (1)	05:24	06:08 (1)	06:01
2	08:48	08:20	07:26	07:15	07:51 (3)	06:10	06:43 (2)	05:26	06:00 (1)	05:25	06:08 (1)	06:02
3	08:48	08:18	07:24	07:13	07:35 (3)	06:09	06:44 (2)	05:25	06:00 (1)	05:25	06:08 (1)	06:04
4	08:48	08:17	07:21	07:10	07:33 (3)	06:07	06:45 (2)	05:25	06:01 (1)	05:26	06:08 (1)	06:05
5	08:42	08:15	07:24	07:18	07:50 (3)	06:08	06:54 (2)	05:53	06:22 (1)	05:22	06:27 (1)	06:26
6	08:48	08:15	07:19	07:08	07:31 (3)	06:05	06:24	06:01 (1)	05:27	06:08 (1)	06:07	06:07
7	08:47	08:13	07:17	07:06	07:29 (3)	06:03	06:23	06:02 (1)	05:28	06:07 (1)	06:08	06:08
8	08:47	08:10	07:12	07:01	07:49 (3)	06:12	06:52	06:22 (1)	05:29	06:07 (1)	06:10	06:10
9	08:46	08:08	07:10	07:04	07:30 (3)	06:09	06:22	06:03 (1)	05:30	06:07 (1)	06:12	06:12
10	08:45	08:06	07:08	07:04	07:46 (3)	06:15	06:59	06:22 (1)	05:31	06:07 (1)	06:13	06:13
11	08:45	08:06	07:08	07:04	07:34 (3)	06:15	06:57	06:21 (1)	05:32	06:07 (1)	06:15	06:15
12	08:44	08:03	07:03	07:01	07:42 (3)	06:18	06:55	06:21 (1)	05:33	06:07 (1)	06:16	06:16
13	08:44	08:01	07:01	06:50	07:44 (3)	06:17	06:52	06:21 (1)	05:34	06:07 (1)	06:18	06:18
14	08:43	07:58	06:59	06:48	07:59	06:16	06:15 (1)	06:20	06:05 (1)	05:36	06:07 (1)	06:21
15	08:42	07:57	06:57	06:46	08:08	06:14 (1)	06:16 (1)	06:20	06:06 (1)	05:37	06:07 (1)	06:23
16	08:41	07:55	06:54	06:36	08:19	06:18 (1)	06:21 (1)	06:20	06:08 (1)	05:38	06:08 (1)	06:24
17	08:40	07:53	06:52	06:28	08:30	06:19 (1)	06:22 (1)	06:20	06:09 (1)	05:39	06:09 (1)	06:25
18	08:39	07:51	06:50	06:26	08:41	06:20 (1)	06:23 (1)	06:20	06:10 (1)	05:40	06:10 (1)	06:26
19	08:38	07:49	06:47	06:24	08:52	06:21 (1)	06:24 (1)	06:20	06:11 (1)	05:41	06:11 (1)	06:27
20	08:37	07:47	06:45	06:22	09:03	06:22 (1)	06:25 (1)	06:20	06:12 (1)	05:42	06:12 (1)	06:28
21	08:36	07:45	06:43	06:20	09:14	06:23 (1)	06:26 (1)	06:20	06:13 (1)	05:43	06:13 (1)	06:29
22	08:35	07:43	06:40	06:18	09:25	06:24 (1)	06:27 (1)	06:20	06:14 (1)	05:44	06:14 (1)	06:30
23	08:34	07:41	06:38	06:16	09:36	06:25 (1)	06:28 (1)	06:20	06:15 (1)	05:45	06:15 (1)	06:31
24	08:33	07:39	06:36	06:14	09:47	06:26 (1)	06:29 (1)	06:20	06:16 (1)	05:46	06:16 (1)	06:32
25	08:31	07:37	06:33	06:12	09:58	06:27 (1)	06:30 (1)	06:20	06:17 (1)	05:47	06:17 (1)	06:33
26	08:30	07:34	06:31	06:10	10:09	06:28 (1)	06:31 (1)	06:20	06:18 (1)	05:48	06:18 (1)	06:34
27	08:29	07:32	06:29	06:08	10:20	06:29 (1)	06:32 (1)	06:20	06:19 (1)	05:49	06:19 (1)	06:35
28	08:27	07:30	06:26	06:06	10:31	06:30 (1)	06:33 (1)	06:20	06:20 (1)	05:50	06:20 (1)	06:36
29	08:26	07:28	06:24	06:04	10:42	06:31 (1)	06:34 (1)	06:20	06:21 (1)	05:51	06:21 (1)	06:37
30	08:24	07:26	06:22	06:02	10:53	06:32 (1)	06:35 (1)	06:20	06:22 (1)	05:52	06:22 (1)	06:38
31	08:23	07:25	06:21	06:01	11:04	06:33 (1)	06:36 (1)	06:20	06:23 (1)	05:53	06:23 (1)	06:39
Potential sun hours	259	277	367	416	485	499	502	454	381	331	266	243
Total, worst case			15	298	344	506	519	208	165			
Sun reduction			0,33	0,42	0,43	0,39	0,41	0,42	0,36			
Oper. time red.			0,95	0,95	0,95	0,95	0,95	0,95	0,95			
Wind dir. red.			0,63	0,63	0,67	0,67	0,67	0,64	0,63			
Total reduction			0,20	0,25	0,27	0,25	0,26	0,25	0,21			
Total, real			3	75	93	126	134	53	35			

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

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

Project:

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LBP SIGHT

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David Vrolijk / dv@lbsight.nl

Calculated:

15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 14 - Bolgerijsekade 6

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:48	08:21	07:28	07:17	07:40 (3)	06:12	06:46 (2)	05:27	06:04 (1)	05:24	06:15 (1)	06:01
2	08:48	08:20	07:26	07:15	07:38 (3)	06:10	06:47 (2)	05:26	06:04 (1)	05:25	06:14 (1)	06:02
3	08:48	08:18	07:24	07:13	07:35 (3)	06:09	06:50 (2)	05:25	06:04 (1)	05:25	06:13 (1)	06:04
4	08:48	08:17	07:21	07:10	07:33 (3)	06:07	06:52 (2)	05:25	06:05 (1)	05:26	06:13 (1)	06:05
5	08:48	08:15	07:19	07:08	07:31 (3)	06:05	06:54 (2)	05:27	06:05 (1)	05:27	06:13 (1)	06:07
6	08:47	08:13	07:17	07:06	07:19 (3)	06:10	06:52 (2)	05:28	06:07 (1)	05:28	06:12 (1)	06:08
7	08:47	08:12	07:15	07:04	07:31 (3)	06:01	06:53 (2)	05:29	06:07 (1)	05:29	06:12 (1)	06:10
8	08:47	08:10	07:12	07:01	07:48 (3)	05:59	06:52 (2)	05:30	06:22 (1)	05:30	06:12 (1)	06:12
9	08:47	08:08	07:10	07:00	07:35 (3)	05:58	06:59 (2)	05:31	06:22 (1)	05:31	06:12 (1)	06:13
10	08:45	08:06	07:08	06:57	07:43 (3)	05:56	06:57 (2)	05:32	06:21 (1)	05:32	06:11 (1)	06:15
11	08:45	08:04	07:06	06:55	07:43 (3)	05:54	06:58 (2)	05:33	06:21 (1)	05:33	06:11 (1)	06:16
12	08:44	08:03	07:03	06:52	07:43 (3)	05:53	06:59 (2)	05:34	06:21 (1)	05:34	06:11 (1)	06:18
13	08:44	08:01	07:01	06:50	07:43 (3)	05:51	06:60 (1)	05:35	06:21 (1)	05:35	06:11 (1)	06:20
14	08:43	07:59	06:59	06:48	07:43 (3)	05:49	06:61 (1)	05:36	06:21 (1)	05:36	06:11 (1)	06:22
15	08:42	07:57	06:57	06:46	07:43 (3)	05:47	06:62 (1)	05:37	06:21 (1)	05:37	06:11 (1)	06:23
16	08:41	07:55	06:54	06:43	07:43 (3)	05:45	06:63 (1)	05:38	06:21 (1)	05:38	06:11 (1)	06:24
17	08:40	07:53	06:52	06:41	07:43 (3)	05:43	06:64 (1)	05:39	06:21 (1)	05:39	06:11 (1)	06:25
18	08:39	07:51	06:50	06:39	07:43 (3)	05:41	06:65 (1)	05:40	06:21 (1)	05:40	06:11 (1)	06:26
19	08:38	07:49	06:47	06:37	07:43 (3)	05:39	06:66 (1)	05:41	06:21 (1)	05:41	06:11 (1)	06:27
20	08:37	07:47	06:45	06:35	07:43 (3)	05:37	06:67 (1)	05:42	06:21 (1)	05:42	06:11 (1)	06:28
21	08:36	07:45	06:43	06:33	07:43 (3)	05:35	06:68 (1)	05:43	06:21 (1)	05:43	06:11 (1)	06:29
22	08:35	07:43	06:40	06:31	07:43 (3)	05:33	06:69 (1)	05:44	06:21 (1)	05:44	06:11 (1)	06:30
23	08:34	07:41	06:38	06:28	07:43 (3)	05:31	06:70 (1)	05:45	06:21 (1)	05:45	06:11 (1)	06:31
24	08:33	07:39	06:36	06:26	07:43 (3)	05:29	06:71 (1)	05:46	06:21 (1)	05:46	06:11 (1)	06:32
25	08:31	07:37	06:33	06:24	07:43 (3)	05:27	06:72 (1)	05:47	06:21 (1)	05:47	06:11 (1)	06:33
26	08:30	07:34	06:31	06:22	07:43 (3)	05:25	06:73 (1)	05:48	06:21 (1)	05:48	06:11 (1)	06:34
27	08:29	07:32	06:29	06:20	07:43 (3)	05:23	06:74 (1)	05:49	06:21 (1)	05:49	06:11 (1)	06:35
28	08:27	07:30	06:26	06:18	07:43 (3)	05:21	06:75 (1)	05:50	06:21 (1)	05:50	06:11 (1)	06:36
29	08:26	07:24	06:24	06:16	07:43 (3)	05:19	06:76 (1)	05:51	06:21 (1)	05:51	06:11 (1)	06:37
30	08:24	07:22	06:22	06:14	07:43 (3)	05:17	06:77 (1)	05:52	06:21 (1)	05:52	06:11 (1)	06:38
31	08:23	07:20	06:20	06:12	07:43 (3)	05:15	06:78 (1)	05:53	06:21 (1)	05:53	06:11 (1)	06:39
Potential sun hours	259	277	367	416	485	499	502	454	381	331	266	243
Total, worst case			21	299	361	236	511	195	160			
Sun reduction			0,33	0,42	0,43	0,39	0,41	0,42	0,36			
Oper. time red.			0,95	0,95	0,95	0,95	0,95	0,95	0,95			
Wind dir. red.			0,63	0,63	0,67	0,67	0,67	0,64	0,63			
Total reduction			0,19	0,25	0,27	0,25	0,26	0,25	0,21			
Total, real			4	75	98	58	132	49	34			

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

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project: 068379aa - WP Autena

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Calculated: 15-5-2014 14:47/2.7.490

SHADOW - Calendar

Calculation: Nordex N131Shadow receptor: 15 - Biezenweg 24

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297

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

Table with columns for months (January to December) and rows for days (1-31). It contains sunrise and sunset times, potential sun hours, and reduction factors for various parameters like worst case, sun reduction, and wind direction.

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

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

Project:
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Calculated:
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SHADOW - Calendar

Calculation: Nordex N131 Shadow receptor: 16 - Biezenweg 49

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) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2,00 3,00 3,90 5,80 6,70 6,50 6,60 6,10 4,60 3,60 2,10 1,60

Operational time
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
366 637 526 516 436 729 819 1.192 1.173 804 576 523 8.297
Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:48	15:45 (1) 08:21	15:47 (1) 07:28	07:17	06:12	05:27	05:24	06:00	06:50	07:39	07:33	15:26 (1) 08:24	15:26 (1)	
	16:39	19 16:04 (1) 17:27	43 16:30 (1) 18:18	20:12	21:03	21:49	22:03	21:31	19:20		17:13	26 15:52 (1) 16:33	34 16:00 (1)	
2	08:48	15:44 (1) 08:20	15:47 (1) 07:26	07:15	06:10	05:26	05:25	06:02	06:52	07:41	07:35	15:24 (1) 08:26	15:27 (1)	
	16:40	20 16:04 (1) 17:28	42 16:29 (1) 18:20	20:14	21:05	21:50	22:03	21:30	19:17		17:12	30 15:54 (1) 16:32	32 15:59 (1)	
3	08:48	15:45 (1) 08:18	15:48 (1) 07:24	07:13	06:08	05:25	05:25	06:04	06:54	07:43	07:37	15:23 (1) 08:27	15:28 (1)	
	16:41	21 16:06 (1) 17:30	41 16:29 (1) 18:22	20:16	21:07	21:52	22:03	21:28	19:15		17:10	32 15:55 (1) 16:32	30 15:58 (1)	
4	08:48	15:45 (1) 08:17	15:48 (1) 07:21	07:10	06:07	05:25	05:26	06:05	06:55	07:44	07:39	15:21 (1) 08:29	15:28 (1)	
	16:42	22 16:07 (1) 17:32	40 16:28 (1) 18:24	20:18	21:08	21:53	22:02	21:26	19:13		17:08	35 15:56 (1) 16:31	29 15:57 (1)	
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	17:25	43 16:29 (1)	20:11	21:48	21:48	21:33	20:31		17:15	22 15:50 (1)	16:37	17 16:02 (1)		
Potential sun hours	259	277	367	416	485	499	502	454	381	331	266	243	712	
Total, worst case	1125	397									44	1208	0.20	
Sun reduction	0.24	0.30									0.34	0.24	0.20	
Oper. time red.	0.95	0.95									0.95	0.95	0.95	
Wind dir. red.	0.67	0.67									0.67	0.67	0.67	
Total reduction	0.15	0.19									0.21	0.15	0.13	
Total, real	171	76									9	181	92	

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)

Bijlage III

Grafische kalender

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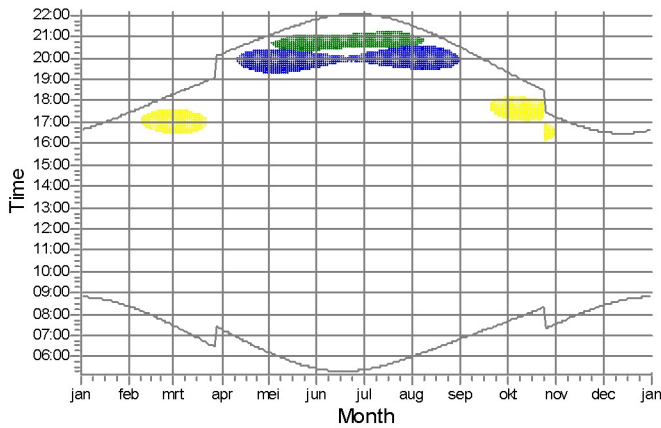
Calculated:

15-5-2014 14:47/2.7.490

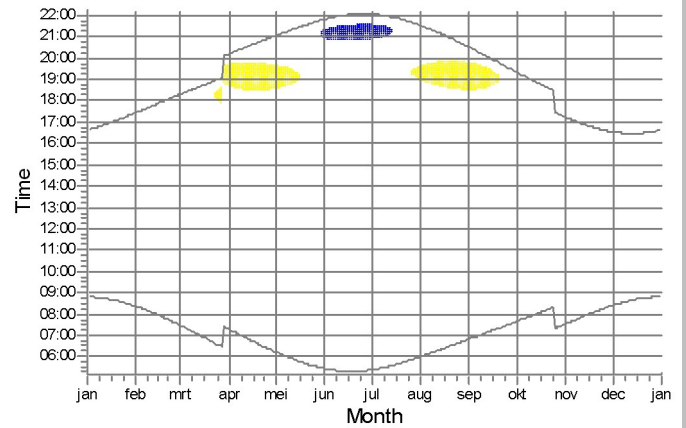
SHADOW - Calendar, graphical

Calculation: Nordex N131

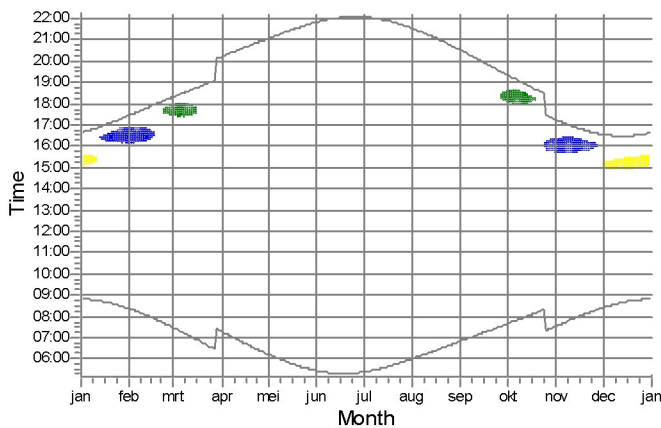
01: Nieuw bouw Autenasekade



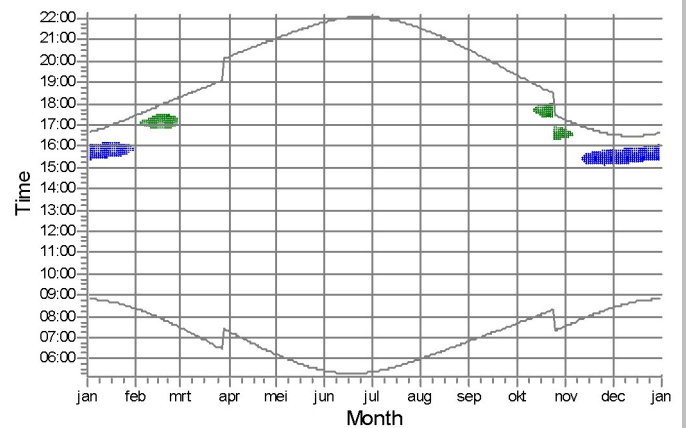
02: Autenasekade 9



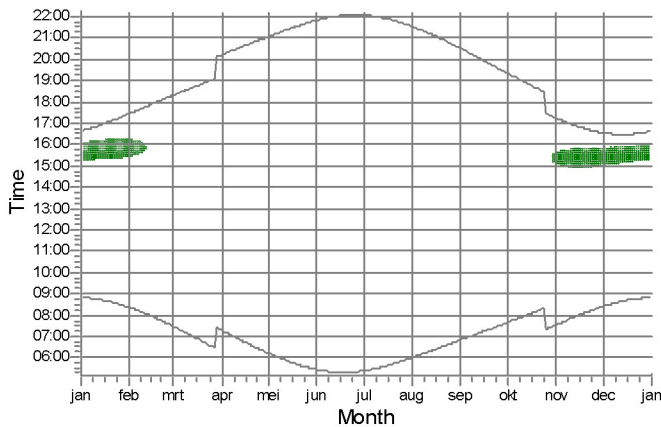
03: Breede Sticht 1



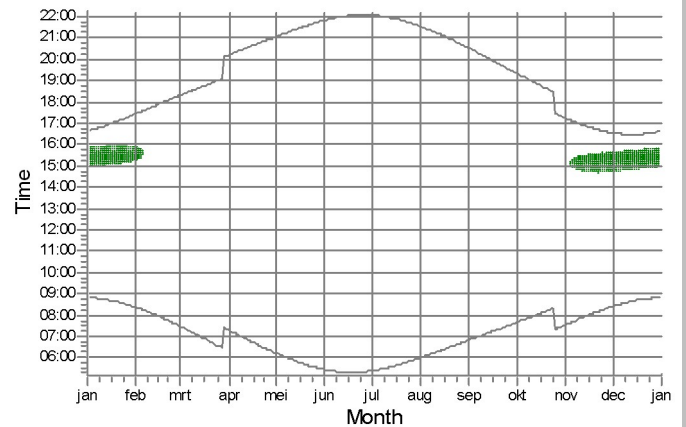
04: Breede Sticht 16



05: Biezenweg 51



06: Biezenweg 16



WTGs



1: Nordex N131



3: Nordex N131



2: Nordex N131

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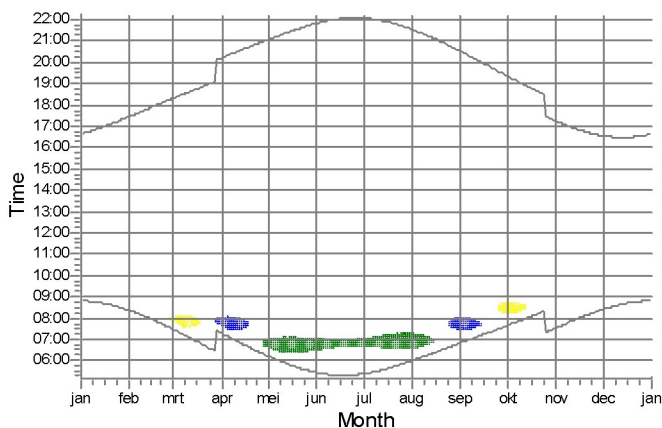
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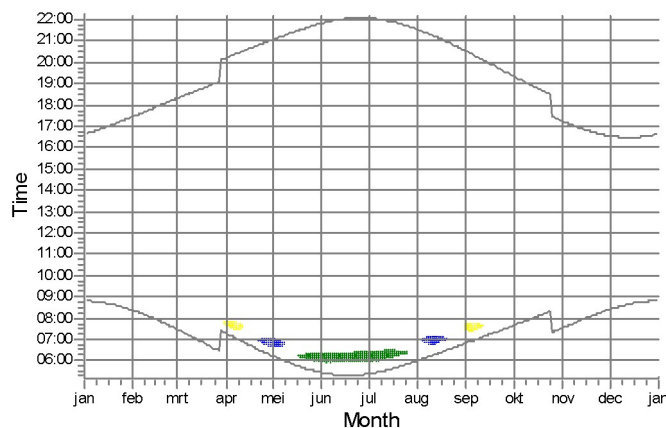
SHADOW - Calendar, graphical

Calculation: Nordex N131

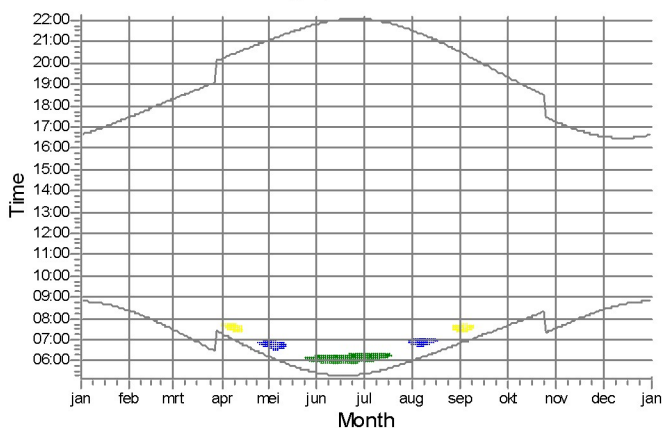
07: Autenasekade 05



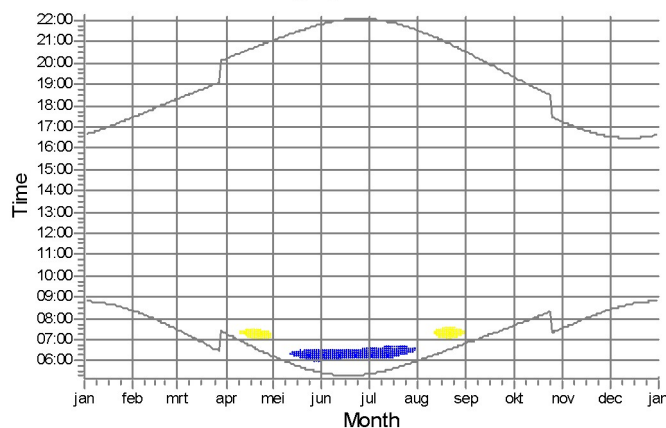
08: Bolgerijsekade 16



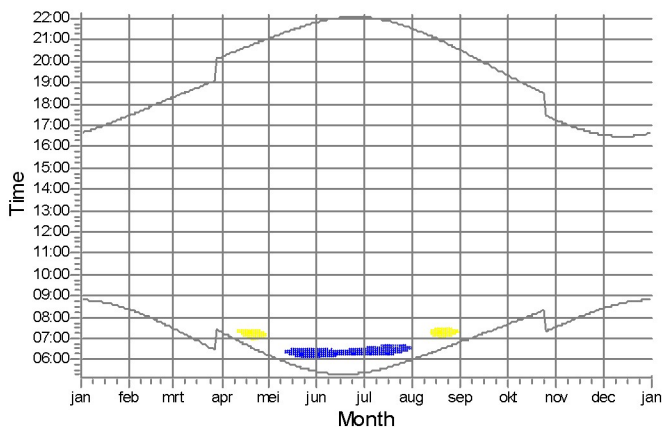
09: Bolgerijsekade 18



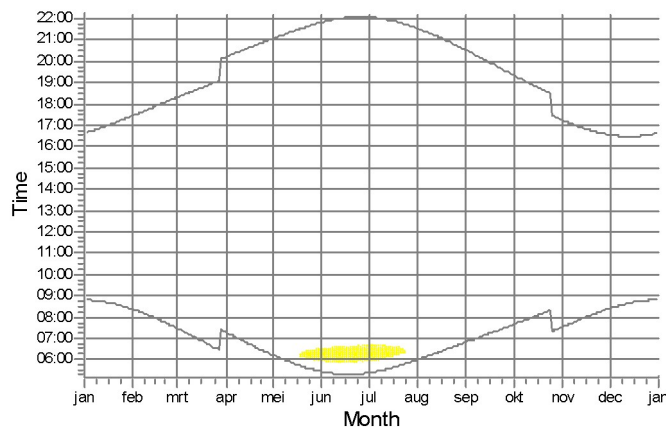
10: Bolgerijsekade 24



11: Bolgerijsekade 1



12: Bolgerijsekade 9



WTGs

1: Nordex N131

3: Nordex N131

2: Nordex N131

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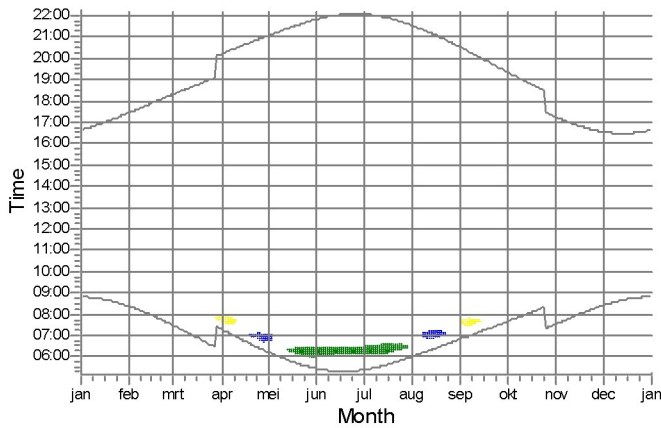
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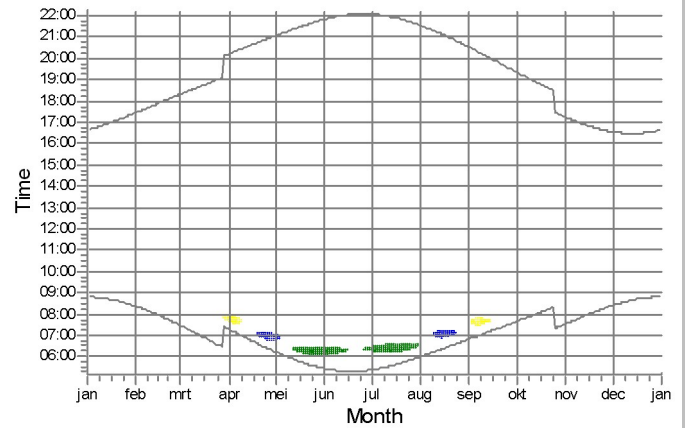
SHADOW - Calendar, graphical

Calculation: Nordex N131

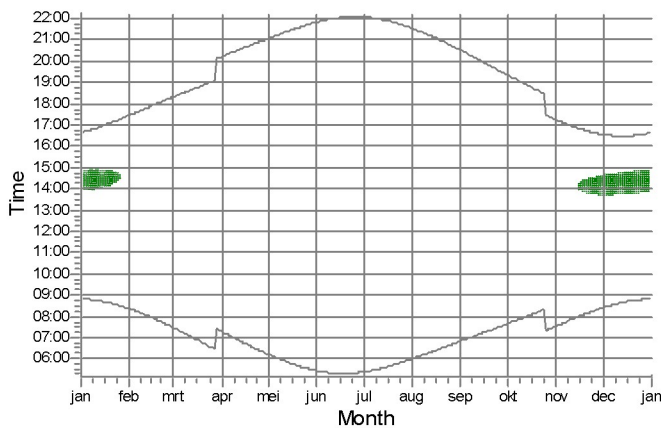
13: Bolgerijsekade 8



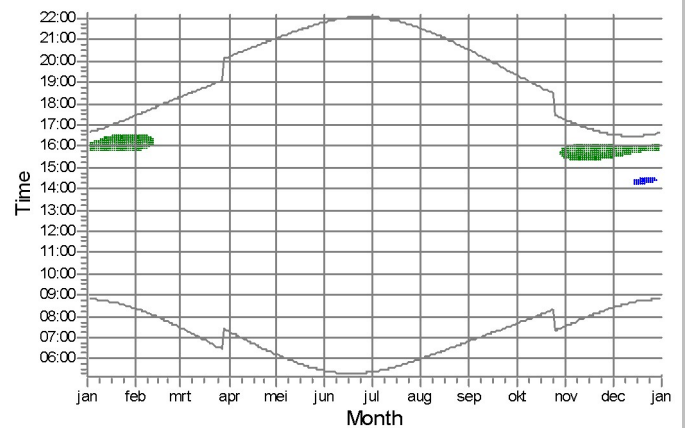
14: Bolgerijsekade 6



15: Biezenw eg 24



16: Biezenw eg 49



WTGs



1: Nordex N131



3: Nordex N131



2: Nordex N131