



SHADOW - Main Result

Calculation: Bijvanck Ondervariant

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 5 °
Day step for calculation 1 days
Time step for calculation 1 minutes

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.18	0.26	0.29	0.36	0.40	0.35	0.36	0.40	0.34	0.31	0.21	0.16

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
286	416	580	586	479	466	610	1,170	1,177	649	488	377	7,284

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

All coordinates are in
Dutch Stereo-RD/NAP 2000



New WTG

Scale 1:50,000
Shadow receptor

WTGs

X (east)	Y (north)	Z	Row data/Description	WTG type						Shadow data	
				Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
		[m]					[kW]	[m]	[m]	[m]	[RPM]
1	205,544	443,288	0.0	E-101 - 1	Yes	ENERCON	E-101-3,050	3,050	101.0	99.0	2,216 14.5
2	205,880	443,574	0.0	E-101 - 2	Yes	ENERCON	E-101-3,050	3,050	101.0	99.0	2,216 14.5
3	206,304	443,742	0.0	E-101 - 3	Yes	ENERCON	E-101-3,050	3,050	101.0	99.0	2,216 14.5
4	206,733	443,849	0.0	E-101 - 4	Yes	ENERCON	E-101-3,050	3,050	101.0	99.0	2,216 14.5

Shadow receptor-Input

No.	Name	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
		[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
A		204,496	443,526	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
B		207,483	442,910	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
C		207,592	443,031	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
D		207,264	443,175	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
E		205,635	443,973	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
F		205,722	443,988	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
G		205,775	444,068	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
H		205,342	443,865	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
I		205,602	444,034	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
J		205,256	443,902	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
K		204,944	443,894	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
L		205,917	444,347	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
M		206,418	444,848	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
N		206,106	444,448	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
O		206,038	444,327	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
P		205,157	444,525	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
Q		205,230	444,543	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
R		205,351	444,456	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
S		206,553	444,969	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
T		204,943	442,854	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
U		205,002	444,115	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
V		207,012	443,357	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
W		206,340	443,122	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
X		205,892	442,951	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
Y		205,861	442,941	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
Z		205,350	442,698	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AA		205,317	442,146	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AB		205,277	442,257	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AC		205,277	442,257	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"

To be continued on next page...

Project:

Bijvanck Vergunning

Licensed user:

Bosch & Van Rijn
Groenmarktstraat 56
NL-3521 AV Utrecht
+31 6 51 71 04 93



Calculated:

23-7-2015 16:33/3.0.619

SHADOW - Main Result

Calculation: Bijvanck Ondervariant

...continued from previous page

No.	Name	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
AD		207,021	443,363	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AE		205,766	442,855	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AF		206,404	442,617	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AG		205,277	442,257	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"
AH		206,475	443,170	0.0	8.0	5.0	0.5	0.0	90.0	"Green house mode"

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case			Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
A		5:51	39	0:19	0:53	
B		0:00	0	0:00	0:00	
C		1:58	29	0:06	0:20	
D		10:20	66	0:16	1:43	
E		104:31	162	0:57	10:40	
F		104:12	158	1:01	10:55	
G		68:39	138	0:47	7:40	
H		51:06	129	0:42	6:16	
I		80:40	147	0:51	8:04	
J		41:18	124	0:36	4:50	
K		29:14	115	0:31	2:57	
L		38:45	91	0:37	3:36	
M		0:00	0	0:00	0:00	
N		18:08	59	0:31	1:35	
O		34:56	88	0:35	3:22	
P		6:23	39	0:15	0:32	
Q		2:16	22	0:11	0:13	
R		4:48	34	0:16	0:29	
S		0:00	0	0:00	0:00	
T		1:31	22	0:06	0:18	
U		12:06	65	0:22	1:20	
V		30:44	102	0:33	5:13	
W		15:05	45	0:31	2:43	
X		0:00	0	0:00	0:00	
Y		0:00	0	0:00	0:00	
Z		0:00	0	0:00	0:00	
AA		0:00	0	0:00	0:00	
AB		0:00	0	0:00	0:00	
AC		0:00	0	0:00	0:00	
AD		33:21	105	0:33	5:40	
AE		0:00	0	0:00	0:00	
AF		0:00	0	0:00	0:00	
AG		0:00	0	0:00	0:00	
AH		11:32	59	0:25	2:03	

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

No.	Name	Worst case	Expected
		[h/year]	[h/year]
1	E-101 - 1	82:35	9:25
2	E-101 - 2	215:28	21:37
3	E-101 - 3	150:24	18:42
4	E-101 - 4	49:43	5:48

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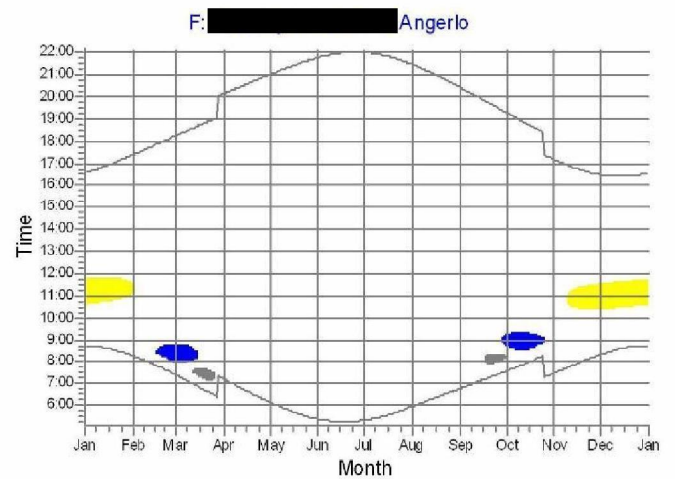
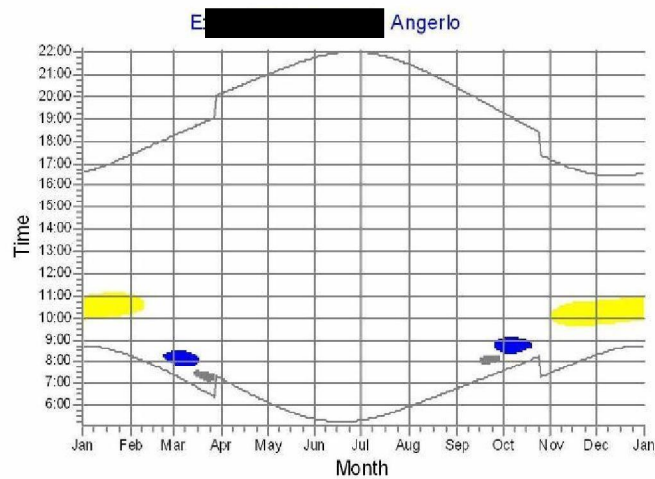
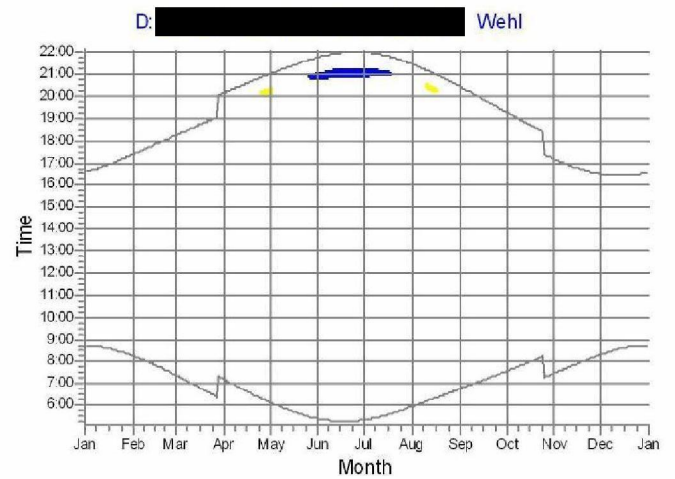
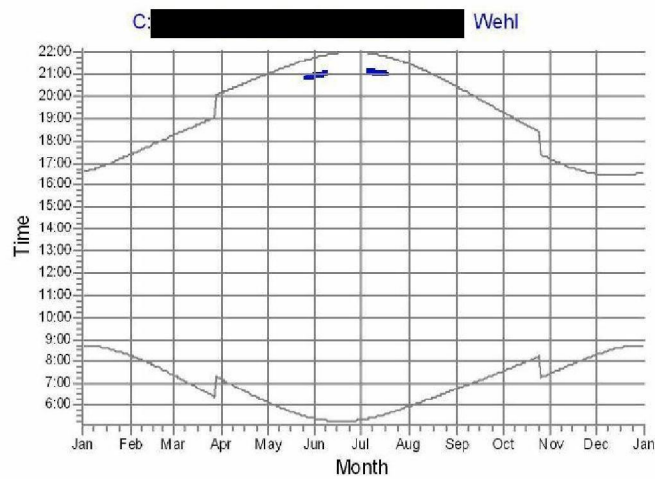
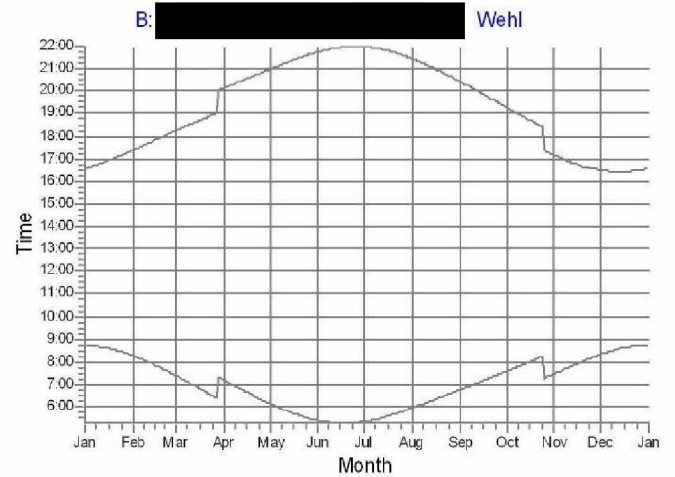
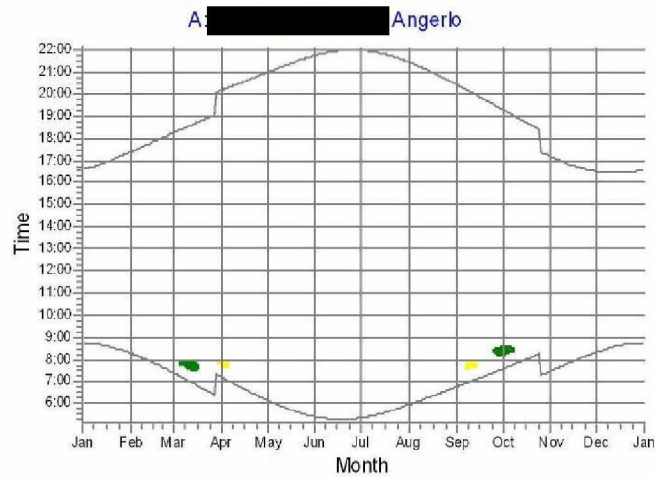


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SHADOW - Calendar, graphical

Calculation: Bijvanck Ondervariant



WTGs

1: E-101 - 1

2: E-101 - 2

3: E-101 - 3

4: E-101 - 4

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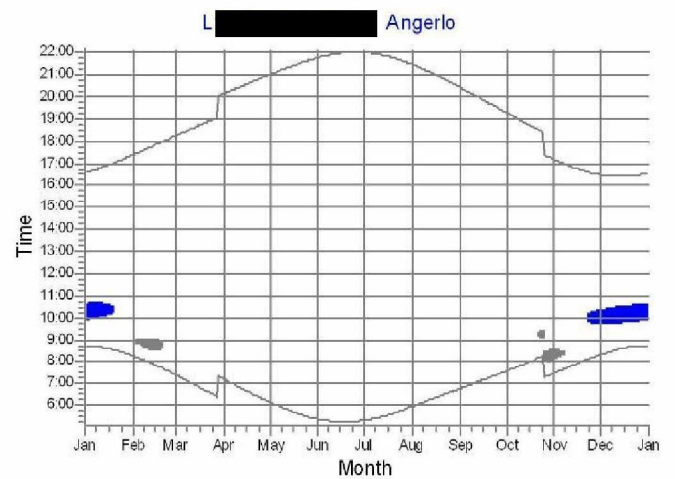
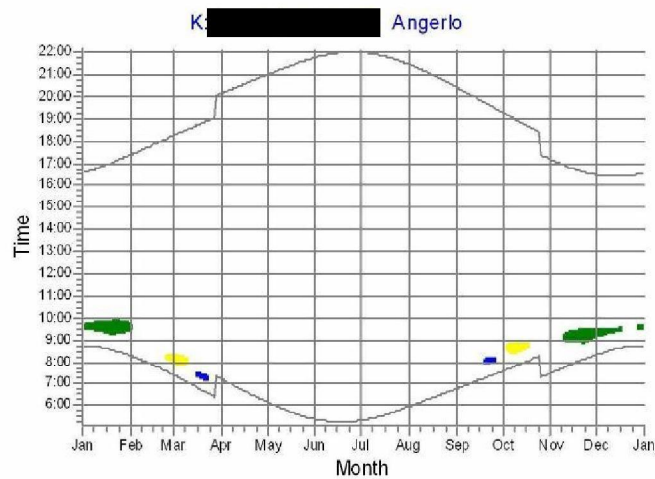
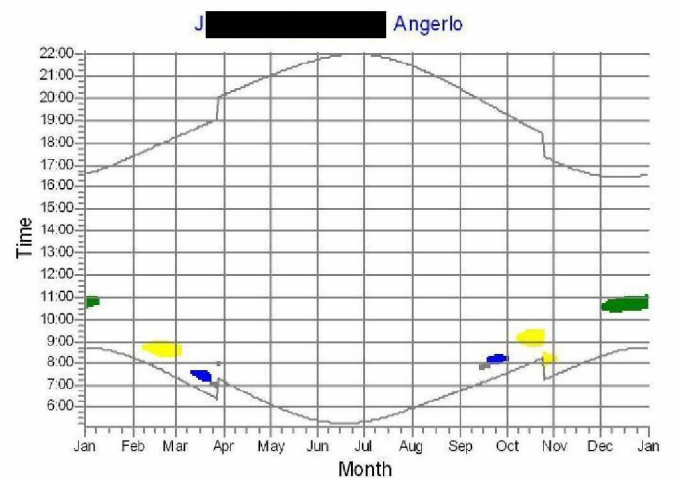
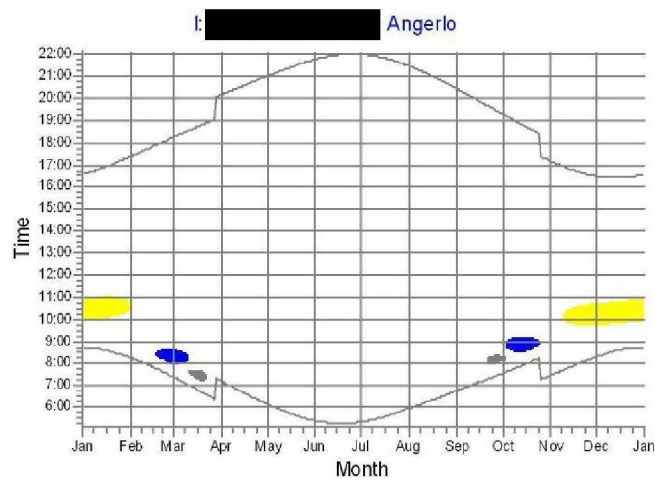
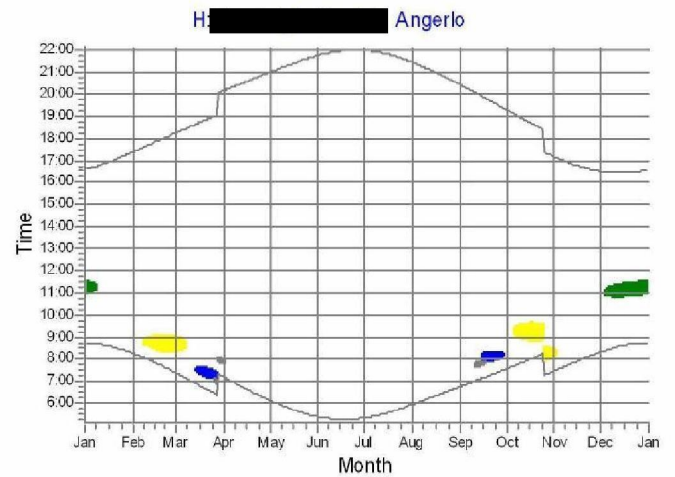
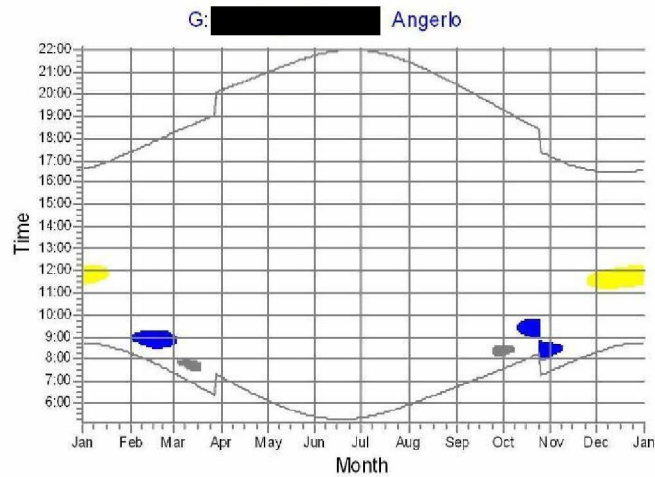


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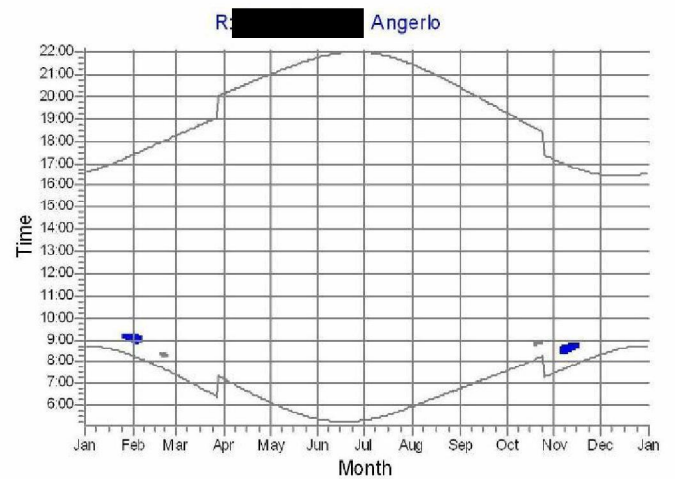
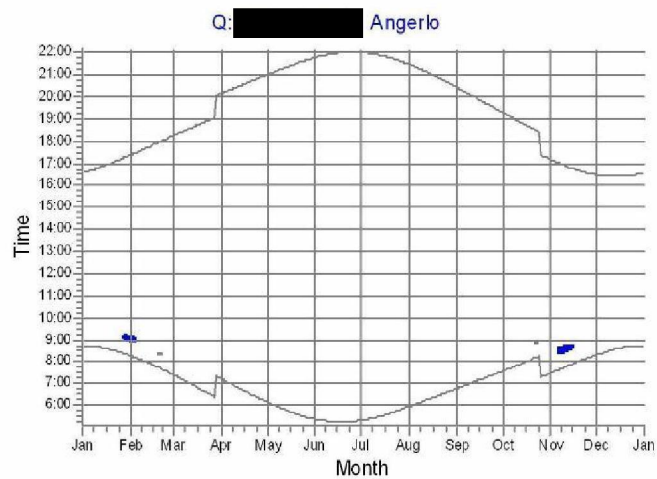
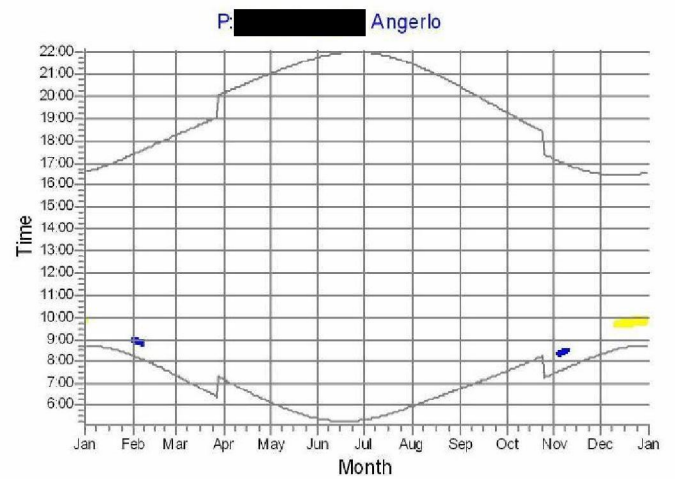
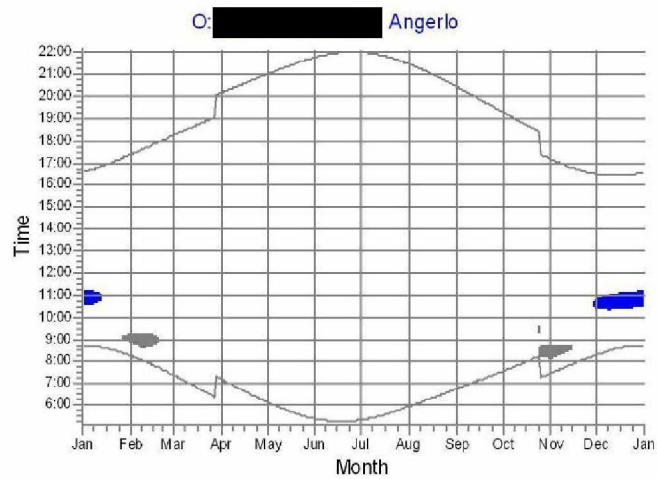
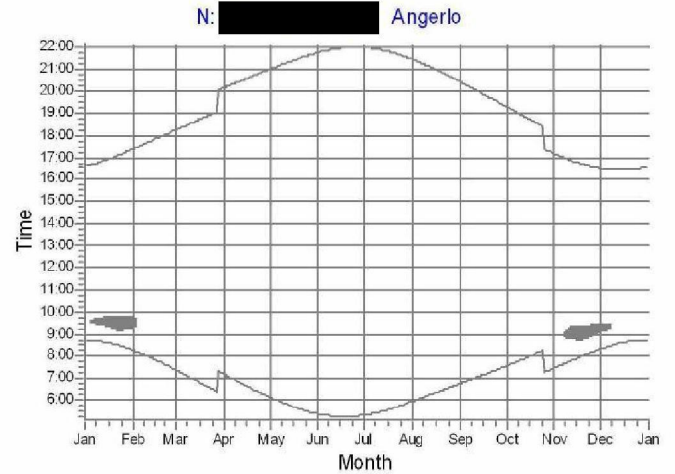
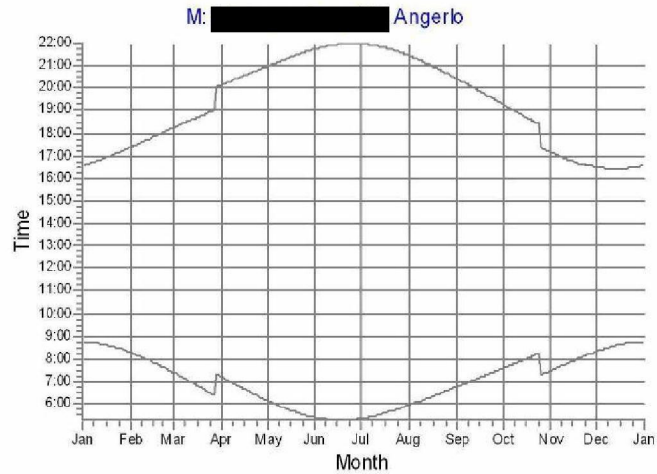


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SHADOW - Calendar, graphical

Calculation: Bijvanck Ondervariant



WTGs

2: E-101 - 2

3: E-101 - 3

4: E-101 - 4

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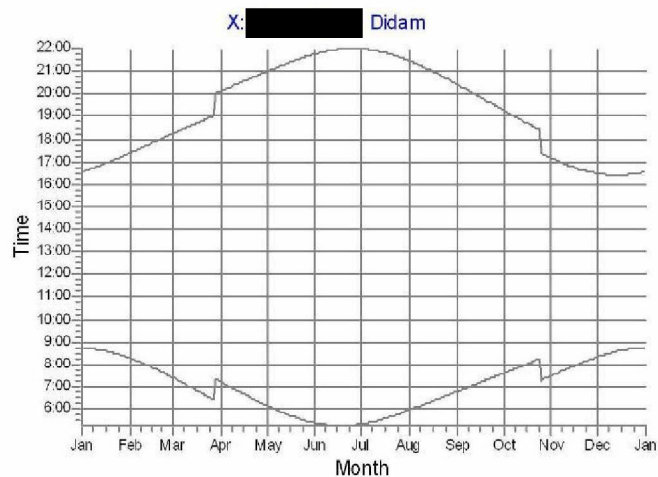
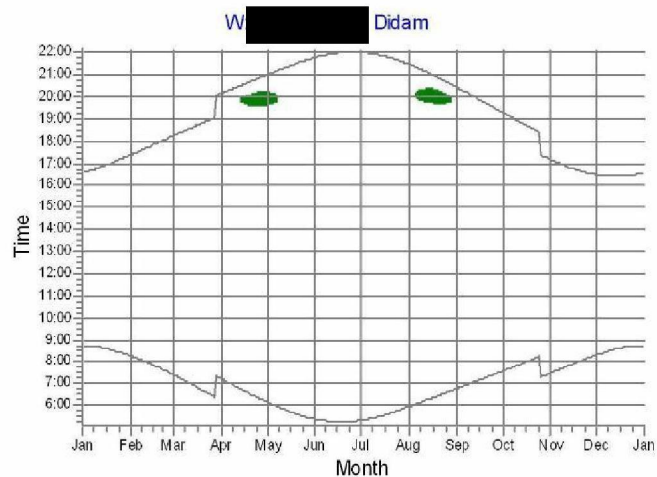
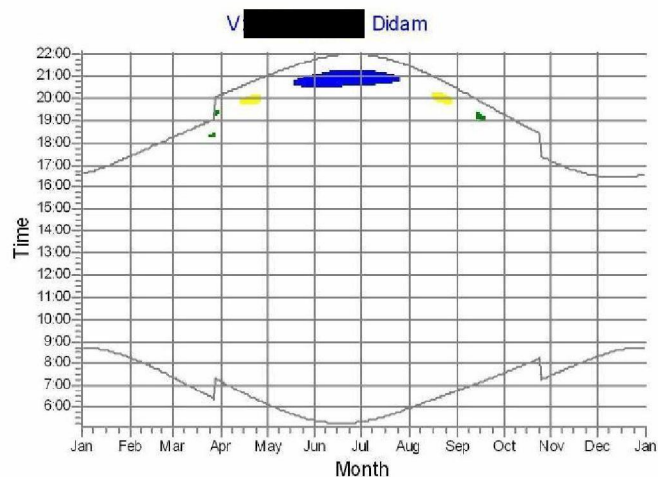
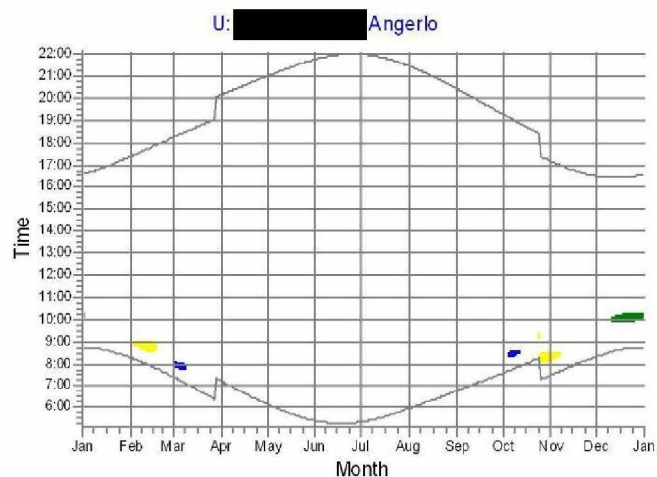
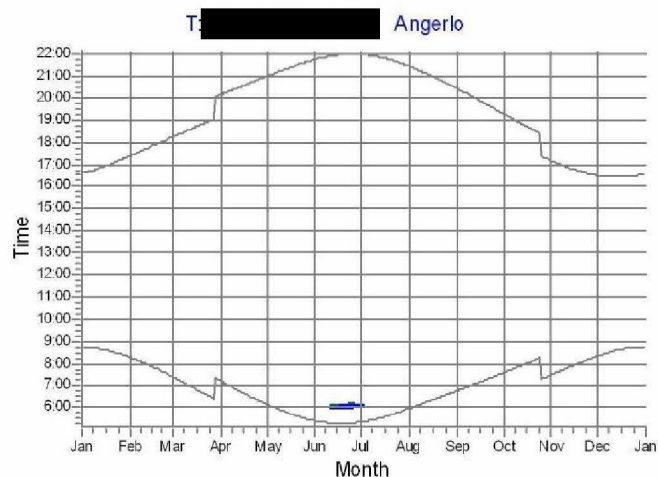
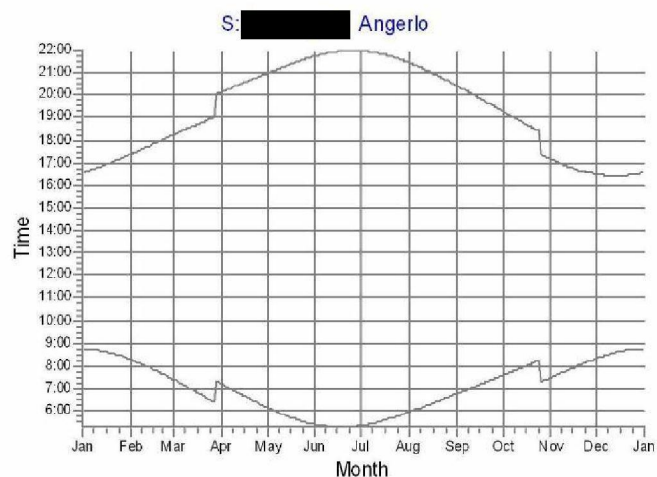


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SHADOW - Calendar, graphical

Calculation: Bijvanck Ondervariant



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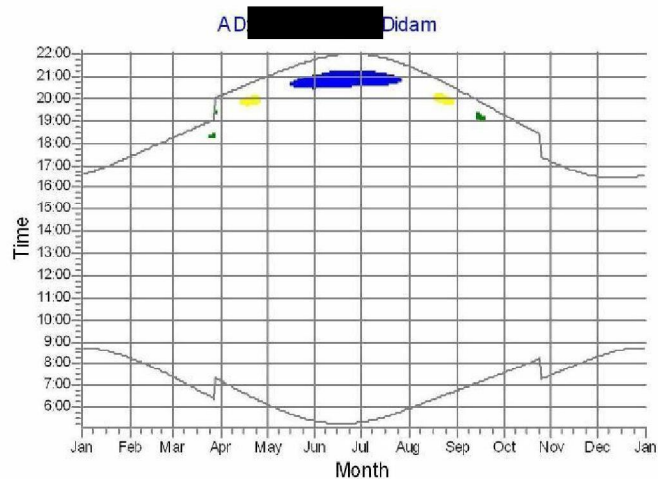
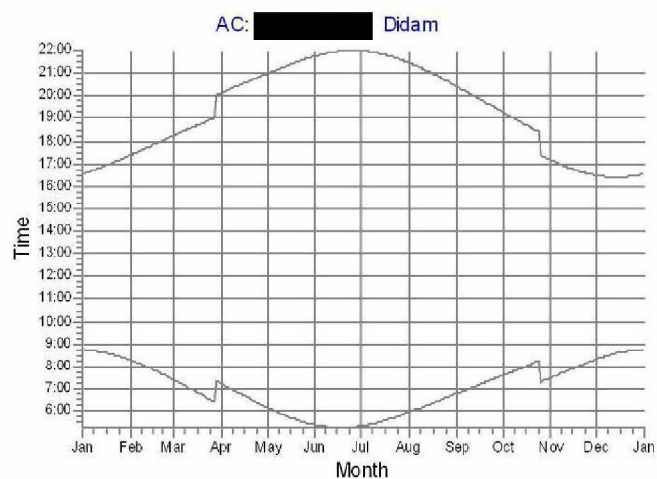
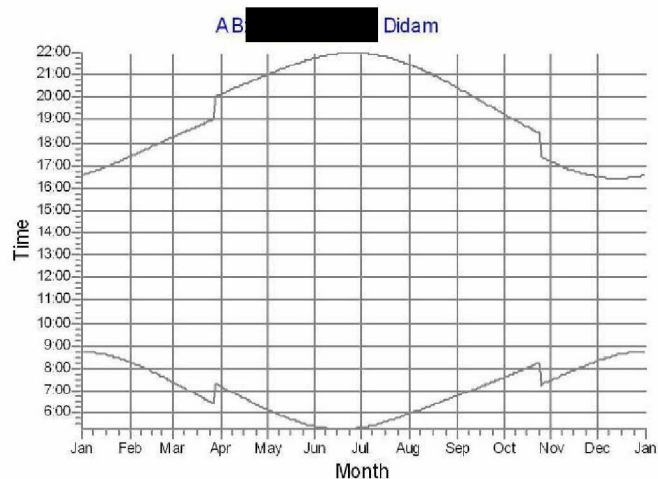
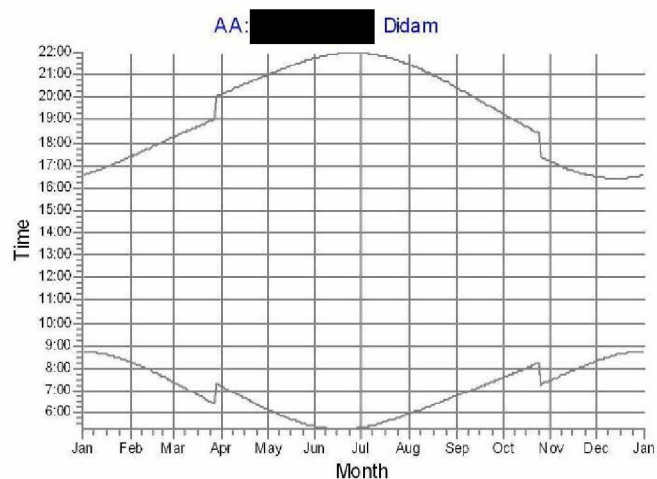
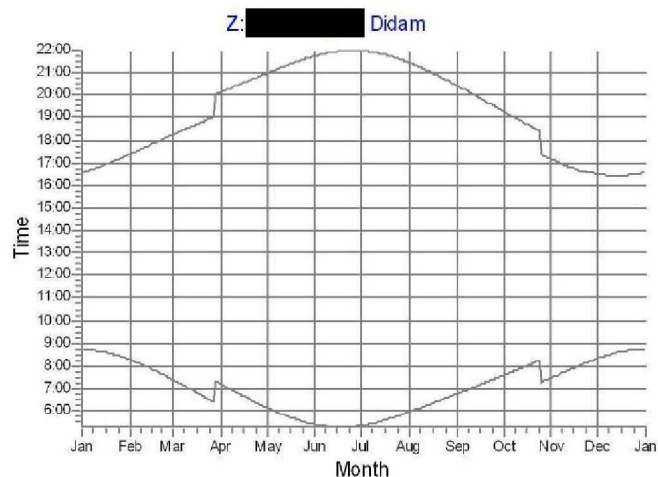
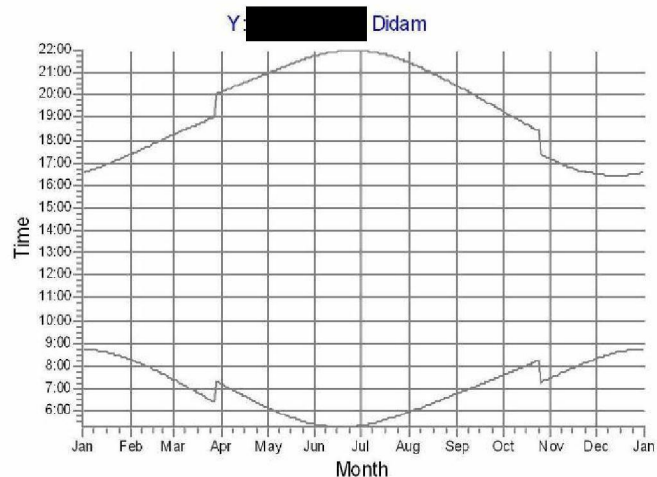


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SHADOW - Calendar, graphical

Calculation: Bijvanck Ondervariant



WTGs



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2: E-101 - 2



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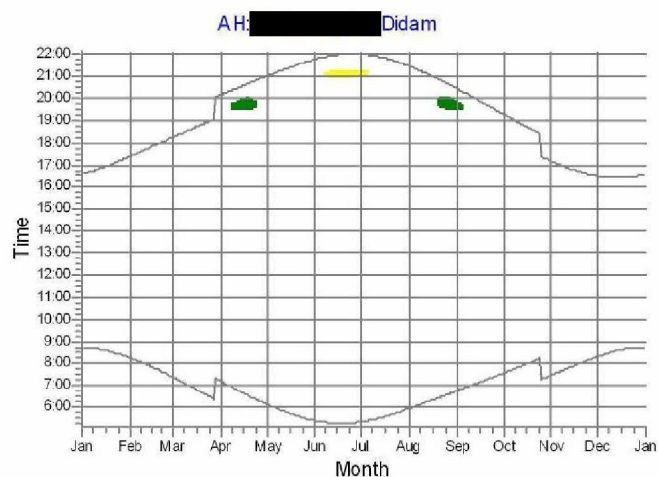
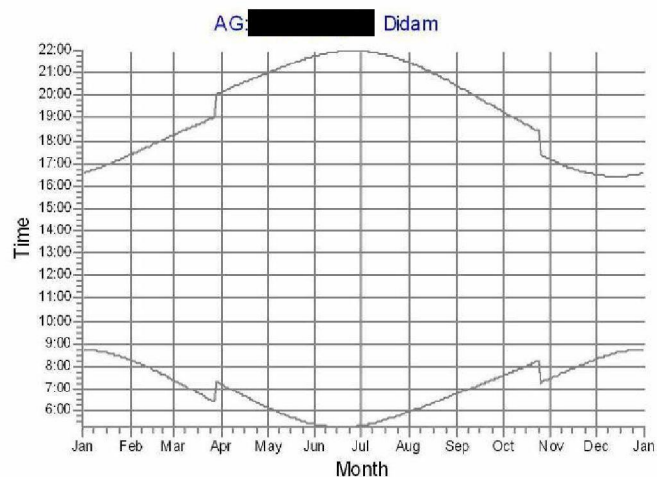
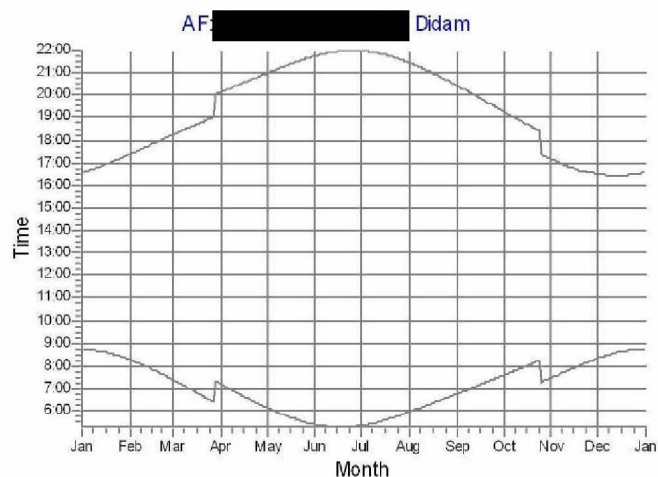
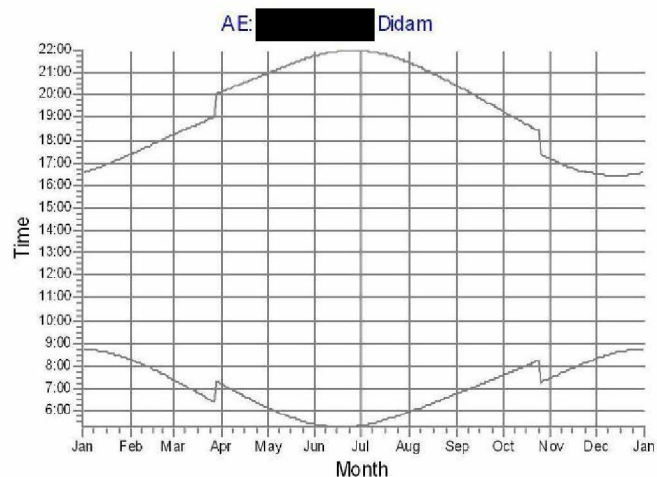


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SHADOW - Calendar, graphical

Calculation: Bijvanck Ondervariant



WTGs



1: E-101 - 1



2: E-101 - 2

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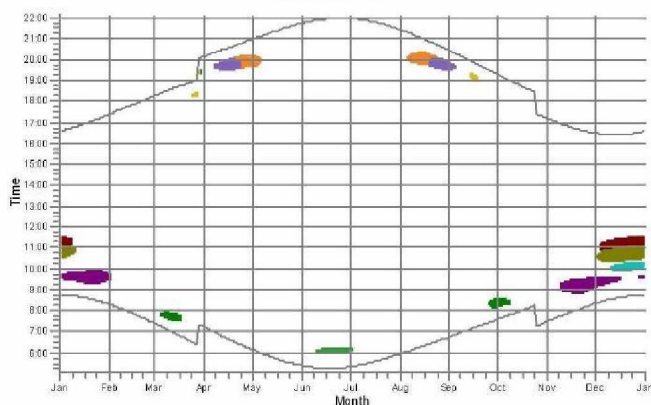
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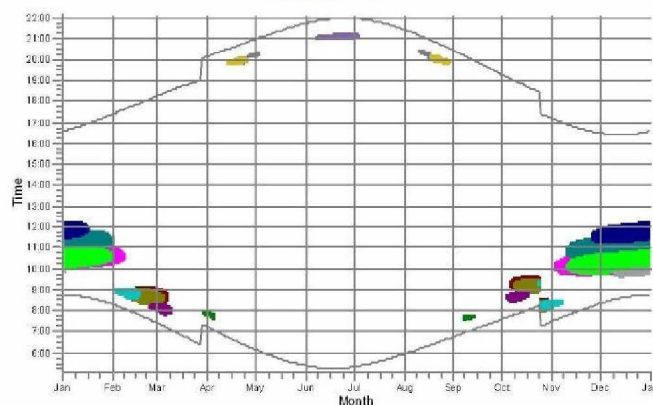
SHADOW - Calendar per WTG, graphical

Calculation: Bijvanck Ondervariant

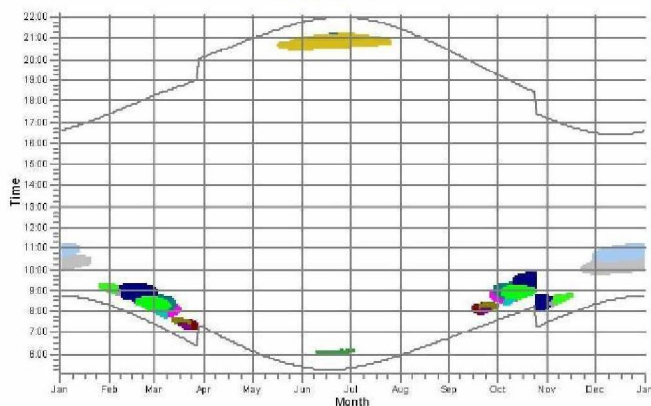
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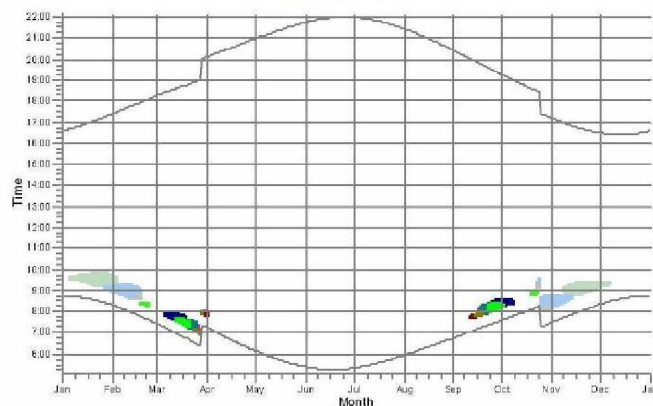
2: E-101 - 2



3: E-101 - 3



4: E-101 - 4



Shadow: receptors

A: Broekzijdestraat 5 Angerlo	H: Broekzijdestraat 3 Angerlo
C: Monseigneur Hendriksenstraat 24 Wehl	I: Broekzijdestraat 4 Angerlo
D: Monseigneur Hendriksenstraat 31 Wehl	J: Broekzijdestraat 6 Angerlo
E: Broekzijdestraat 1 Angerlo	K: Broekzijdestraat 8 Angerlo
F: Broekzijdestraat 1 A Angerlo	L: Didamseweg 19 Angerlo
G: Broekzijdestraat 2 Angerlo	N: Ganzepoelweg 7 Angerlo

O: Ganzepoelweg 9 Angerlo
P: Kruisstraat 3 Angerlo
Q: Kruisstraat 5 Angerlo
R: Kruisstraat 7 Angerlo
T: Kleine Veldstraat 7 Angerlo
U: Kruisstraat 8 Angerlo

V: Truisweg 2 Didam
W: Truisweg 4 Didam
AD: Truisweg 2 b Didam
AH: Truisweg 2 a Didam



SHADOW - Map

Calculation: Bijvanck Ondervariant

