

Project:

Pawlowo_Golancz_miasto_07102010

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Calculated:

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SHADOW - Main Result**Calculation:** Miasto Golancz - Shadow Flickering - 08.10.2010 - Normal**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
 The calculated times are "worst case" given by the following assumptions:
 The sun is shining all the day, from sunrise to sunset
 The rotor plane is always perpendicular to the line from the WTG to the sun
 The WTG is always operating

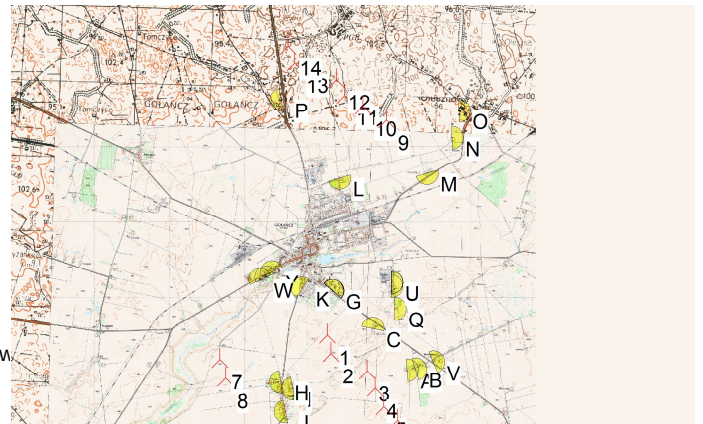
To avoid flicker from WTGs not visible a ZVI calculation is performed before the flicker calculation. The ZVI calculation is based on the following assumptions

Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_1.w

Obstacles used in calculation

Eye height: 1.5 m

Grid resolution: 10 m



New WTG

Shadow receptor

WTGs**Poland CS 92**

	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM
	Poland CS 92		[m]								[RPM]
1	386,099	564,497	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
2	386,143	564,254	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
3	386,625	564,024	97.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
4	386,734	563,799	98.7	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
5	386,846	563,558	98.1	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
6	387,028	563,380	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
7	384,669	564,176	90.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
8	384,746	563,930	90.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
9	386,882	567,353	91.1	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
10	386,568	567,534	93.8	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
11	386,329	567,680	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
12	386,215	567,889	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
13	385,664	568,108	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0
14	385,575	568,337	95.0	Acciona AW 82/1500 IEC IIIb 1500 82	Yes	Acciona	AW 82/1500 IEC IIIb-1,500	1,500	82.0	80.0	0.0

Shadow receptor-Input**Poland CS 92**

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
						a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
A	387,155	564,031	107.6	1.5	1.5	1.5	83.6	90.0	Fixed direction
B	387,266	564,045	109.8	1.5	1.5	1.5	69.8	90.0	Fixed direction
C	386,701	564,580	100.0	1.5	1.5	1.5	10.6	90.0	Fixed direction
D	386,168	565,086	94.4	1.5	1.5	1.5	38.1	90.0	Fixed direction
E	386,165	565,086	94.5	1.5	1.5	4.5	38.1	90.0	Fixed direction
F	386,167	565,086	94.5	1.5	1.5	7.5	38.1	90.0	Fixed direction
G	386,162	565,088	94.5	1.5	1.5	10.5	38.1	90.0	Fixed direction
H	385,480	563,881	95.0	1.5	1.5	1.5	-102.8	90.0	Fixed direction
I	385,641	563,793	95.0	1.5	1.5	1.5	-102.8	90.0	Fixed direction
J	385,540	563,491	95.0	1.5	1.5	1.5	-102.8	90.0	Fixed direction
K	385,767	565,120	95.0	1.5	1.5	1.5	-59.7	90.0	Fixed direction
L	386,259	566,583	95.0	1.5	1.5	1.5	-197.7	90.0	Fixed direction

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SHADOW - Main Result**Calculation:** Miasto Golancz - Shadow Flickering - 08.10.2010 - Normal

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Poland CS 92

No.	East	North	Z	Width	Height	Height	Degrees from	Slope of	Direction mode
						a.g.l.	south cw	window	
			[m]	[m]	[m]	[m]	[°]	[°]	
M	387,420	566,647	90.0	1.5	1.5	1.5	-197.7	90.0	Fixed direction
N	387,753	567,118	91.3	1.5	1.5	1.5	-273.5	90.0	Fixed direction
O	387,845	567,476	95.0	1.5	1.5	1.5	-273.5	90.0	Fixed direction
P	385,485	567,622	97.7	1.5	1.5	1.5	-102.2	90.0	Fixed direction
Q	386,997	564,844	96.8	1.5	1.5	1.5	88.3	90.0	Fixed direction
R	386,949	565,196	94.5	1.5	1.5	1.5	88.3	90.0	Fixed direction
S	386,947	565,147	95.0	1.5	1.5	1.5	88.3	90.0	Fixed direction
T	386,951	565,195	94.5	1.5	1.5	4.5	88.3	90.0	Fixed direction
U	386,949	565,196	94.5	1.5	1.5	7.5	88.3	90.0	Fixed direction
V	387,505	564,138	109.7	1.5	1.5	1.5	65.5	90.0	Fixed direction
W	385,205	565,236	90.0	1.5	1.5	4.5	-27.8	90.0	Fixed direction
X	385,286	565,264	90.0	1.5	1.5	4.5	-27.8	90.0	Fixed direction
Y	385,364	565,338	90.0	1.5	1.5	1.5	-28.5	90.0	Fixed direction

Calculation Results

Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	87:34	201	0:41
B	70:55	192	0:33
C	33:06	84	0:31
D	1:08	20	0:06
E	0:57	19	0:05
F	0:44	17	0:04
G	0:34	15	0:03
H	36:36	134	0:28
I	15:32	82	0:20
J	13:46	86	0:17
K	11:48	32	0:32
L	0:00	0	0:00
M	0:00	0	0:00
N	14:05	55	0:31
O	9:43	64	0:20
P	28:43	110	0:26
Q	12:31	56	0:21
R	12:07	62	0:18
S	16:09	72	0:19
T	11:11	60	0:18
U	9:57	56	0:18
V	28:04	129	0:23
W	11:44	74	0:18
X	16:17	76	0:18
Y	16:00	56	0:26

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

No.	Name	Worst case [h/year]
1	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (1)	75:27
2	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (2)	80:49
3	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (3)	51:30

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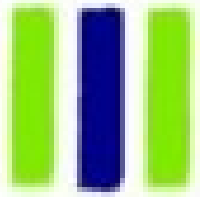
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No.	Name	Worst case [h/year]
4	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (4)	49:36
5	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (5)	80:58
6	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (6)	3:22
7	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (7)	0:38
8	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (8)	0:30
9	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (9)	14:58
10	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (10)	9:45
11	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (11)	11:24
12	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (12)	17:07
13	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (13)	0:00
14	Acciona AW 82/1500 IEC IIIb 1500 82.0 !O! hub: 80.0 m (14)	0:00