

PVSYST V5.74					14/01/20	Page 1/4
Grid-Connected System: Simulation parameters						
Project :		Oczyszczalnia Ścieków Bobolice				
Geographical Site		Szczecinek		Country	Poland	
Situation		Latitude	53.4°N	Longitude	16.4°E	
Time defined as		Legal Time	Time zone UT+1	Altitude	135 m	
		Albedo	0.20			
Meteo data :		Szczecinek, Synthetic Hourly data				
Simulation variant :		Wariant 48,84 kWp				
		Simulation date	14/01/20 18h49			
Simulation parameters						
Collector Plane Orientation		Tilt	30°	Azimuth	0°	
Horizon		Average Height	7.2°			
Near Shadings		No Shadings				
PV Arrays Characteristics (2 kinds of array defined)						
PV module		Si-mono	Model	330 MS-HC		
			Manufacturer	IBC Solar		
Array#1:		Number of PV modules	In series	19 modules	In parallel	4 strings
		Total number of PV modules	Nb. modules	76	Unit Nom. Power	330 Wp
		Array global power	Nominal (STC)	25.08 kWp	At operating cond.	24.08 kWp (50°C)
		Array operating characteristics (50°C)	U mpp	604 V	I mpp	40 A
Array#2:		Number of PV modules	In series	18 modules	In parallel	4 strings
		Total number of PV modules	Nb. modules	72	Unit Nom. Power	330 Wp
		Array global power	Nominal (STC)	23.76 kWp	At operating cond.	22.81 kWp (50°C)
		Array operating characteristics (50°C)	U mpp	572 V	I mpp	40 A
Total		Arrays global power	Nominal (STC)	49 kWp	Total	148 modules
			Module area	287 m _e	Cell area	422 m _e
Inverter			Model	Symo 20.0-3-M		
			Manufacturer	Fronius		
			Operating Voltage	420-800 V	Unit Nom. Power	20.0 kW AC
Array#1:		Number of Inverter	1	Total Power	20 kW AC	
Array#2:		Number of Inverter	1	Total Power	20 kW AC	
Total		Number of Inverter	2	Total Power	40 kW AC	
PV Array loss factors						
Thermal Loss factor		Uc (const)	20.0 W/m _e K	Uv (wind)	0.0 W/m _e K / m/s	
=> Nominal Oper. Coll. Temp. (G=800 W/m _e , Tamb=20°C, Wind=1 m/s.)				NOCT	56 °C	
Wiring Ohmic Loss		Array#1	242 mOhm	Loss Fraction	1.5 % at STC	
		Array#2	229 mOhm	Loss Fraction	1.5 % at STC	
		Global		Loss Fraction	1.5 % at STC	
Module Quality Loss				Loss Fraction	1.5 %	
Module Mismatch Losses				Loss Fraction	2.0 % at MPP	
Incidence effect, ASHRAE parametrization		IAM =	1 - bo (1/cos i - 1)	bo Parameter	0.05	
User's needs :		Unlimited load (grid)				

Grid-Connected System: Horizon definition

Project : Oczyszczalnia Ścieków Bobolice

Simulation variant : Wariant 48,84 kWp

Main system parameters

Horizon

PV Field Orientation

PV modules

PV Array

Inverter

Inverter pack

User's needs

System type **Grid-Connected**
 Average Height 7.2°
 tilt 30°
 Model 330 MS-HC
 Nb. of modules 148
 Model Symo 20.0-3-M
 Nb. of units 2.0
 Unlimited load (grid)

azimuth 0°
 Pnom 330 Wp
 Pnom total **48.8 kWp**
 Pnom 20.00 kW ac
 Pnom total **40.0 kW ac**

Horizon

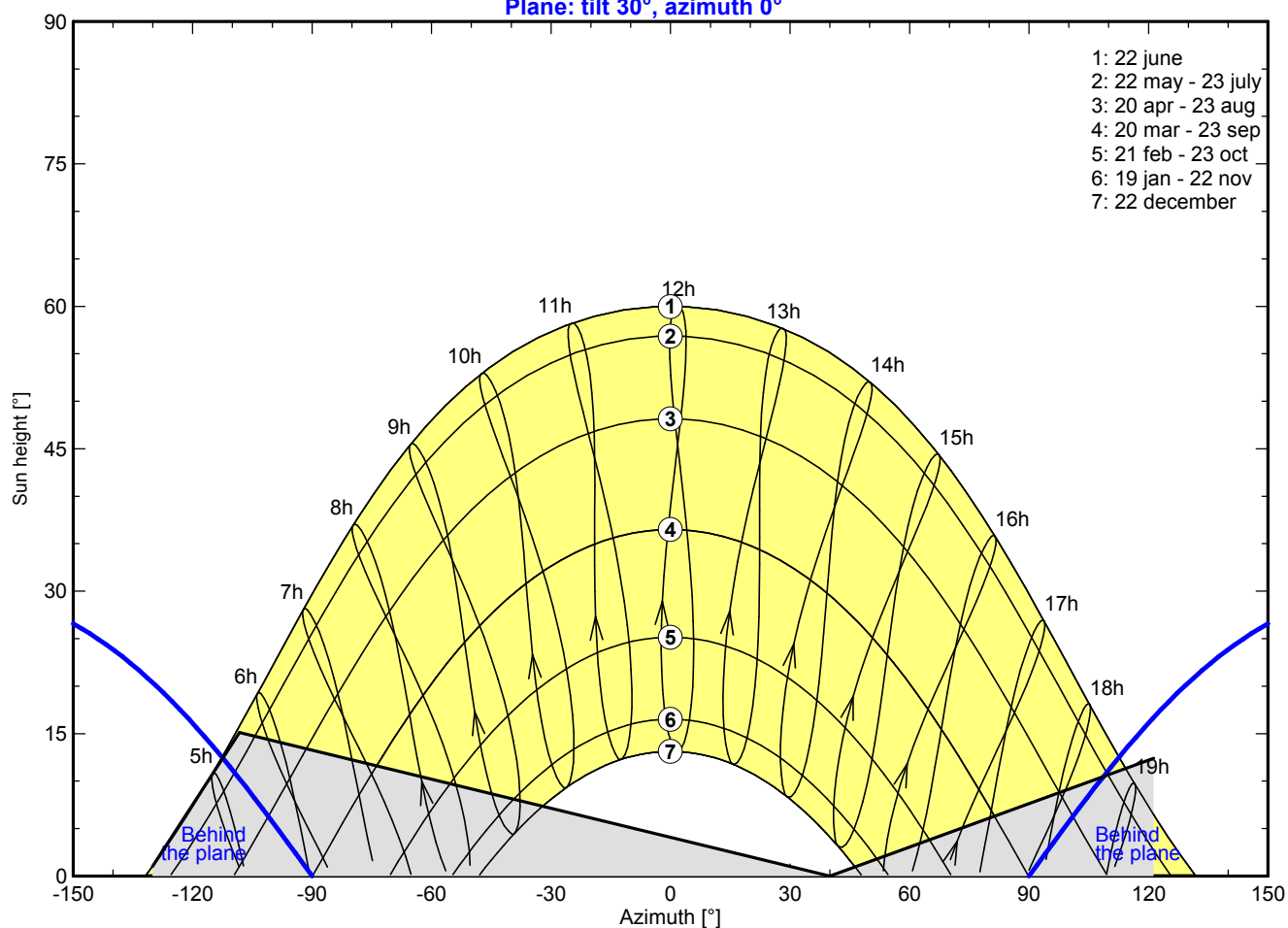
Average Height 7.2°
 Albedo Factor 100 %

Diffuse Factor 0.96
 Albedo Fraction 0.78

Height [°]	1.0	15.1	0.0	12.4
Azimuth [°]	-130	-108	40	121

Horizon line at Szczecinek

Plane: tilt 30°, azimuth 0°



Grid-Connected System: Main results

Project : Oczyszczalnia Ścieków Bobolice

Simulation variant : Wariant 48,84 kWp

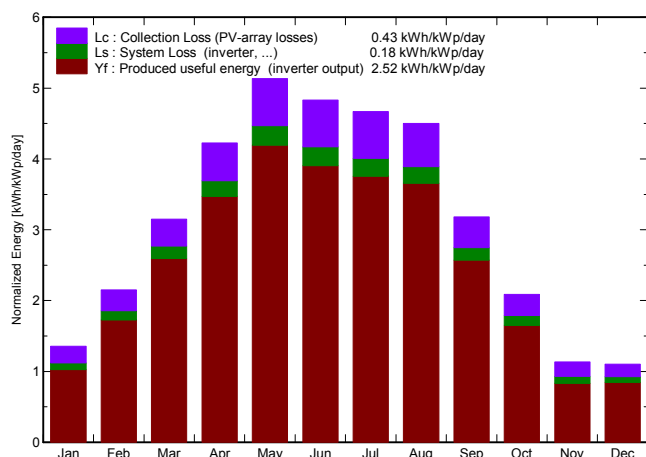
Main system parameters

Horizon	System type	Grid-Connected	
PV Field Orientation	Average Height	7.2°	
PV modules	tilt	30°	azimuth 0°
PV Array	Model	330 MS-HC	Pnom 330 Wp
Inverter	Nb. of modules	148	Pnom total 48.8 kWp
Inverter pack	Model	Symo 20.0-3-M	Pnom 20.00 kW ac
User's needs	Nb. of units	2.0	Pnom total 40.0 kW ac
	Unlimited load (grid)		

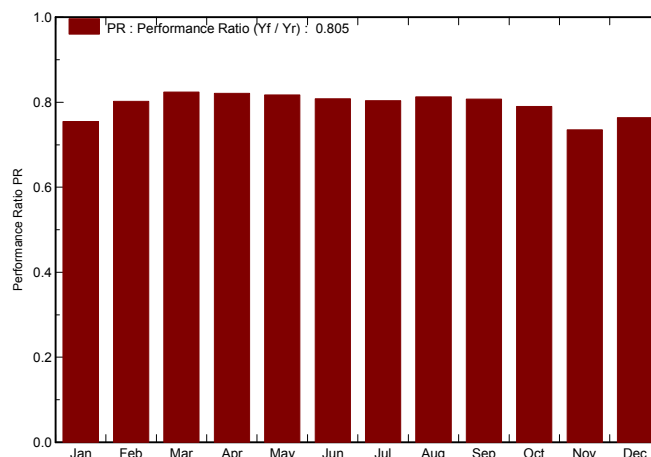
Main simulation results

System Production	Produced Energy	44980 kWh/year	Specific prod.	921 kWh/kWp/year
	Performance Ratio PR	80.5 %		

Normalized productions (per installed kWp): Nominal power 48.8 kWp



Performance Ratio PR



Wariant 48,84 kWp

Balances and main results

	GlobHor kWh/m _t	T Amb °C	GlobInc kWh/m _t	GlobEff kWh/m _t	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	22.9	-0.90	42.1	37.8	1700	1551	14.07	12.84
February	40.6	0.10	60.2	56.0	2539	2360	14.68	13.64
March	76.6	2.90	97.7	92.2	4194	3930	14.95	14.01
April	111.6	8.30	126.8	119.9	5411	5084	14.86	13.96
May	152.2	13.70	159.1	151.7	6765	6348	14.80	13.89
June	144.9	16.60	144.9	137.5	6110	5720	14.68	13.74
July	143.8	19.00	144.7	137.1	6071	5685	14.60	13.68
August	129.3	18.90	139.5	132.4	5889	5537	14.70	13.82
September	81.0	14.10	95.5	90.1	4027	3767	14.68	13.73
October	47.4	9.40	64.7	60.6	2708	2499	14.57	13.44
November	22.5	3.30	34.0	30.9	1365	1221	13.97	12.50
December	17.7	-0.00	34.2	31.3	1404	1277	14.28	12.99
Year	990.6	8.83	1143.6	1077.5	48180	44980	14.67	13.70

Legends:	GlobHor	Horizontal global irradiation	EArray	Effective energy at the output of the array
	T Amb	Ambient Temperature	E_Grid	Energy injected into grid
	GlobInc	Global incident in coll. plane	EffArrR	Effic. Eout array / rough area
	GlobEff	Effective Global, corr. for IAM and shadings	EffSysR	Effic. Eout system / rough area

Grid-Connected System: Loss diagram

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Loss diagram over the whole year

