

PVSYST V5.74					15/01/20	Page 1/4
Grid-Connected System: Simulation parameters						
Project :		Oczyszczalnia Ścieków Połczyn Zdrój				
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 97,68 kWp				
		Simulation date	15/01/20 07h30			
Simulation parameters						
Collector Plane Orientation		Tilt	30°	Azimuth	0°	
Horizon		Average Height	4.5°			
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	8 strings
		Total number of PV modules	Nb. modules	152	Unit Nom. Power	330 Wp
		Array global power	Nominal (STC)	50.2 kWp	At operating cond.	48.2 kWp (50°C)
		Array operating characteristics (50°C)	U mpp	604 V	I mpp	80 A
Array#2:		Number of PV modules	In series	18 modules	In parallel	8 strings
		Total number of PV modules	Nb. modules	144	Unit Nom. Power	330 Wp
		Array global power	Nominal (STC)	47.5 kWp	At operating cond.	45.6 kWp (50°C)
		Array operating characteristics (50°C)	U mpp	572 V	I mpp	80 A
Total		Arrays global power	Nominal (STC)	98 kWp	Total	296 modules
			Module area	574 m _e	Cell area	843 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	2	Total Power	40 kW AC	
Array#2:		Number of Inverter	2	Total Power	40 kW AC	
Total		Number of Inverter	4	Total Power	80 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	121 mOhm	Loss Fraction	1.5 % at STC	
		Array#2	114 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 Połczyn Zdrój

Simulation variant : Wariant 97,68 kWp

Main system parameters

Horizon	System type	Grid-Connected		
PV Field Orientation	Average Height	4.5°		
PV modules	tilt	30°	azimuth	0°
PV Array	Model	330 MS-HC	Pnom	330 Wp
Inverter	Nb. of modules	296	Pnom total	97.7 kWp
Inverter pack	Model	Symo 20.0-3-M	Pnom	20.00 kW ac
User's needs	Nb. of units	4.0	Pnom total	80.0 kW ac
	Unlimited load (grid)			

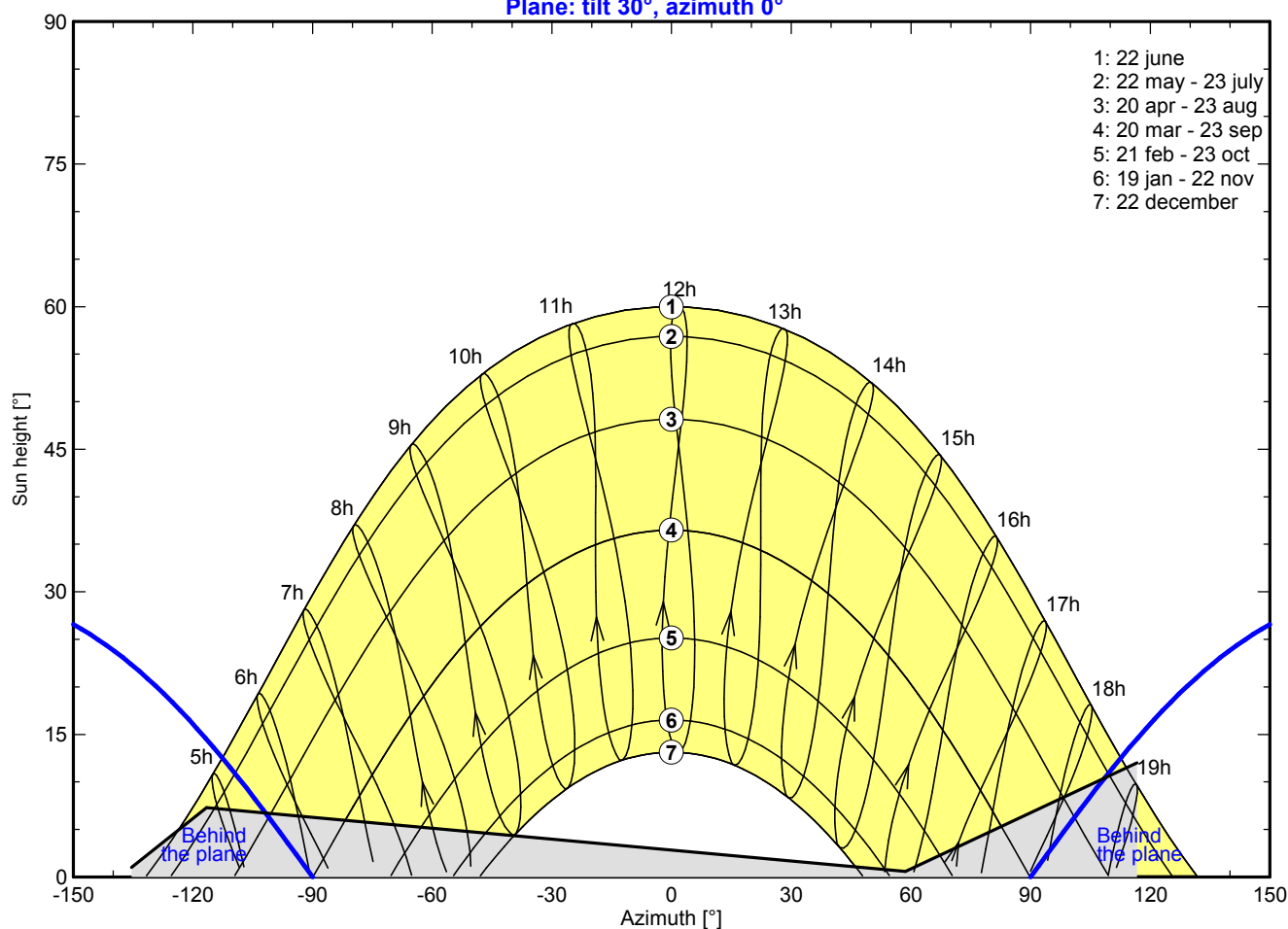
Horizon

Average Height	4.5°	Diffuse Factor	0.98
Albedo Factor	100 %	Albedo Fraction	0.85

Height [°]	1.0	7.3	0.6	12.0
Azimuth [°]	-135	-117	59	117

Horizon line at Szczecinek

Plane: tilt 30°, azimuth 0°



Grid-Connected System: Main results

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Simulation variant : Wariant 97,68 kWp

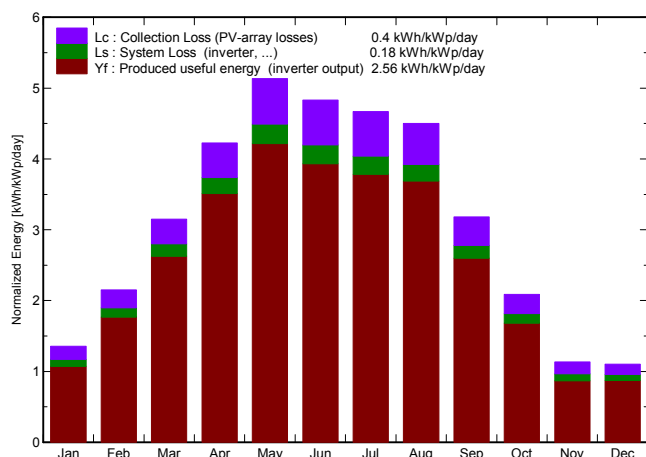
Main system parameters

Horizon	System type	Grid-Connected	
PV Field Orientation	Average Height	4.5°	
PV modules	tilt	30°	azimuth 0°
PV Array	Model	330 MS-HC	Pnom 330 Wp
Inverter	Nb. of modules	296	Pnom total 97.7 kWp
Inverter pack	Model	Symo 20.0-3-M	Pnom 20.00 kW ac
User's needs	Nb. of units	4.0	Pnom total 80.0 kW ac
	Unlimited load (grid)		

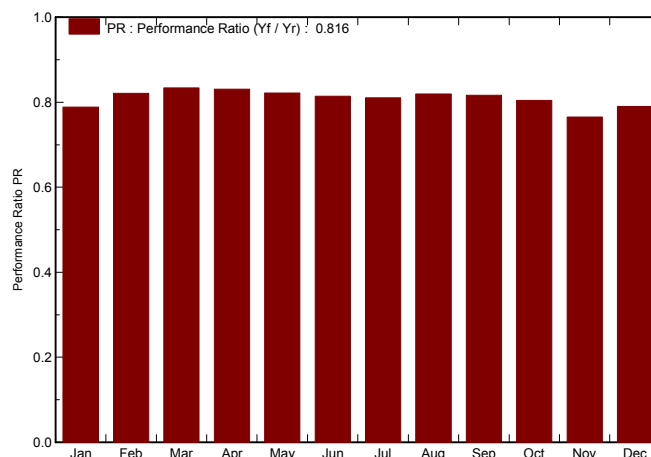
Main simulation results

System Production	Produced Energy	91132 kWh/year	Specific prod.	933 kWh/kWp/year
	Performance Ratio PR	81.6 %		

Normalized productions (per installed kWp): Nominal power 97.7 kWp



Performance Ratio PR



Wariant 97,68 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	39.3	3541	3240	14.66	13.41
February	40.6	0.10	60.2	57.1	5188	4830	15.00	13.96
March	76.6	2.90	97.7	93.2	8482	7953	15.12	14.18
April	111.6	8.30	126.8	121.3	10946	10289	15.03	14.13
May	152.2	13.70	159.1	152.6	13607	12771	14.89	13.98
June	144.9	16.60	144.9	138.5	12308	11526	14.79	13.85
July	143.8	19.00	144.7	138.1	12231	11456	14.71	13.78
August	129.3	18.90	139.5	133.6	11877	11172	14.82	13.94
September	81.0	14.10	95.5	91.0	8141	7620	14.84	13.89
October	47.4	9.40	64.7	61.5	5506	5088	14.81	13.69
November	22.5	3.30	34.0	31.9	2831	2544	14.49	13.02
December	17.7	-0.00	34.2	32.2	2896	2643	14.73	13.44
Year	990.6	8.83	1143.6	1090.5	97556	91132	14.85	13.87

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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Simulation variant :Wariant 97,68 kWp

Main system parameters	System type	Grid-Connected		
Horizon	Average Height	4.5°		
PV Field Orientation	tilt	30°	azimuth	0°
PV modules	Model	330 MS-HC	Pnom	330 Wp
PV Array	Nb. of modules	296	Pnom total	97.7 kWp
Inverter	Model	Symo 20.0-3-M	Pnom	20.00 kW ac
Inverter pack	Nb. of units	4.0	Pnom total	80.0 kW ac
User's needs	Unlimited load (grid)			

Loss diagram over the whole year

