

PVSYST V5.74					11/01/20	Page 1/4
Grid-Connected System: Simulation parameters						
Project :		Oczyszczalnia Ścieków Białogard				
Geographical Site		Koszalin		Country	Poland	
Situation		Latitude	54.2°N	Longitude	16.2°E	
Time defined as		Legal Time	Time zone UT+1	Altitude	32 m	
		Albedo	0.20			
Meteo data :		Koszalin, Synthetic Hourly data				
Simulation variant :		Wariant 97,68 kWp (2x 48,84kWp)				
		Simulation date	11/01/20 16h46			
Simulation parameters						
Collector Plane Orientation		Tilt	30°	Azimuth	0°	
Horizon		Average Height	14.6°			
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

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Simulation variant : Wariant 97,68 kWp (2x 48,84kWp)

Main system parameters

Horizon	System type	Grid-Connected		
PV Field Orientation	Average Height	14.6°		
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)			

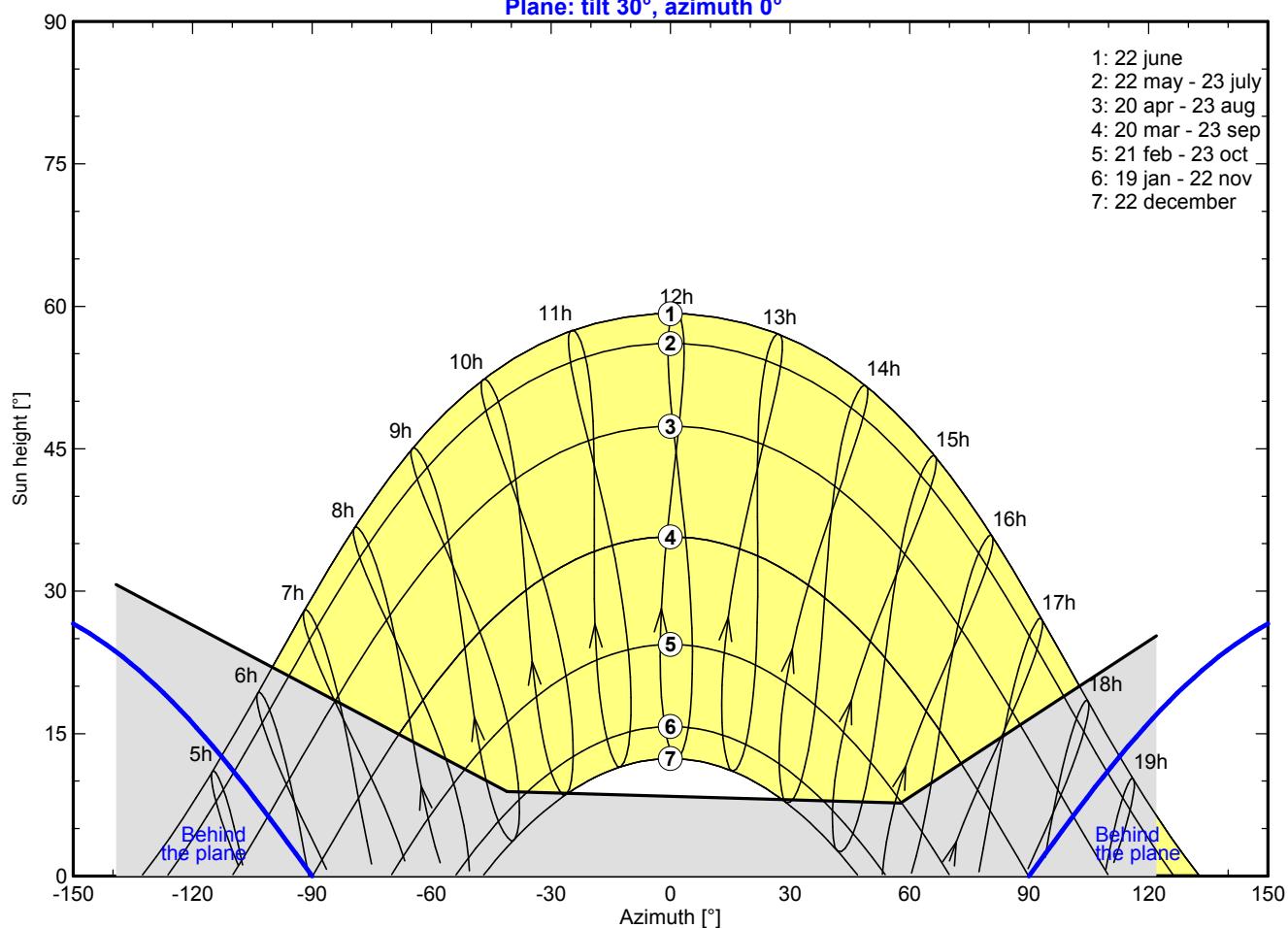
Horizon

Average Height	14.6°	Diffuse Factor	0.91
Albedo Factor	100 %	Albedo Fraction	0.56

Height [°]	30.7	8.9	7.7	25.3
Azimuth [°]	-139	-41	58	122

Horizon line at Koszalin

Plane: tilt 30°, azimuth 0°



Grid-Connected System: Main results

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Simulation variant : Wariant 97,68 kWp (2x 48,84kWp)

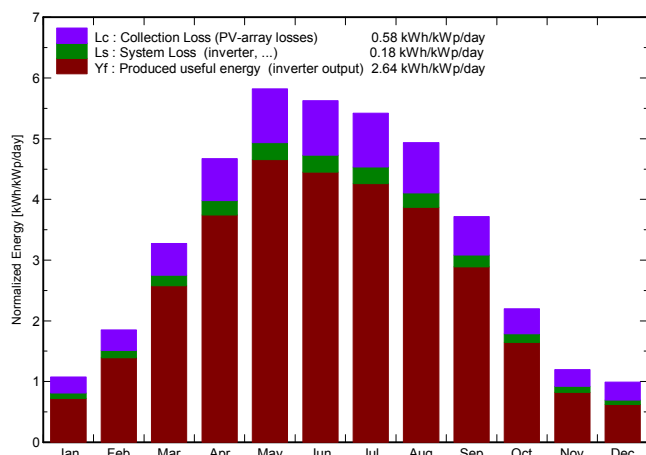
Main system parameters

Horizon	System type	Grid-Connected	
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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)		

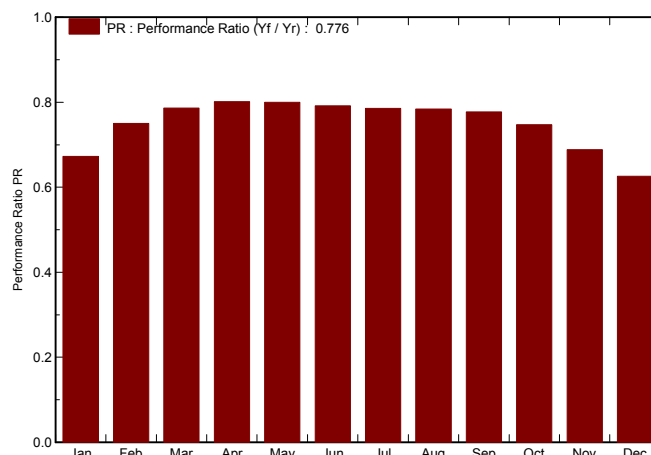
Main simulation results

System Production	Produced Energy	94257 kWh/year	Specific prod.	965 kWh/kWp/year
	Performance Ratio PR	77.6 %		

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



Performance Ratio PR



Wariant 97,68 kWp (2x 48,84kWp)

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	19.5	1.00	33.4	27.7	2453	2192	12.80	11.44
February	34.7	1.10	51.9	45.9	4136	3803	13.88	12.76
March	78.7	3.00	101.5	91.8	8336	7801	14.29	13.38
April	121.8	7.00	140.1	128.9	11664	10974	14.49	13.64
May	172.0	11.50	180.5	165.8	14947	14100	14.42	13.60
June	168.3	14.90	168.7	154.9	13864	13042	14.31	13.46
July	164.6	17.70	168.1	154.5	13732	12898	14.22	13.36
August	140.1	18.20	153.0	139.8	12440	11713	14.16	13.33
September	88.8	14.40	111.6	101.0	9038	8468	14.10	13.22
October	47.7	10.30	68.2	60.7	5404	4975	13.80	12.70
November	21.9	5.00	35.9	30.5	2698	2415	13.08	11.71
December	16.1	2.00	30.7	23.9	2109	1877	11.96	10.65
Year	1074.3	8.89	1243.6	1125.5	100822	94257	14.12	13.20

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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User's needs	Unlimited load (grid)			

Loss diagram over the whole year

