Grid-Connected System: Simulation parameters

Project : **SUW Dębczyno**

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 89,76 kWp**

Simulation date 10/01/20 22h10

Simulation parameters

Collector Plane Orientation	Tilt	30°	Azimuth	12°
Horizon	Average Height	13.3°		
Near Shadings	No Shadings			

PV Array Characteristics

PV module	Si-mono	Model	**330 MS-HC**		
		Manufacturer			
Number of PV modules		In series	17 modules	In parallel	16 strings
Total number of PV modules		Nb. modules	272	Unit Nom. Power	330 Wp
Array global power		Nominal (STC)	**89.8 kWp**	At operating cond.	86.2 kWp (50°C)
Array operating characteristics (50°C)		U mpp	540 V	I mpp	160 A
Total area		Module area	**528 m¸**	Cell area	775 m¸
Inverter		Model	**20.0 kW**		
		Manufacturer			
Characteristics		Operating Voltage	420-800 V	Unit Nom. Power	20.0 kW AC
Inverter pack		Number of Inverter	4 units	Total Power	80.0 kW AC

PV Array loss factors

Thermal Loss factor	Uc (const)	20.0 W/m¸K	Uv (wind)	0.0 W/m¸K / m/s
=> Nominal Oper. Coll. Temp. (G=800 W/m¸, Tamb=20°C, Wind=1 m/s.)			NOCT	56 °C
Wiring Ohmic Loss	Global array res.	54 mOhm	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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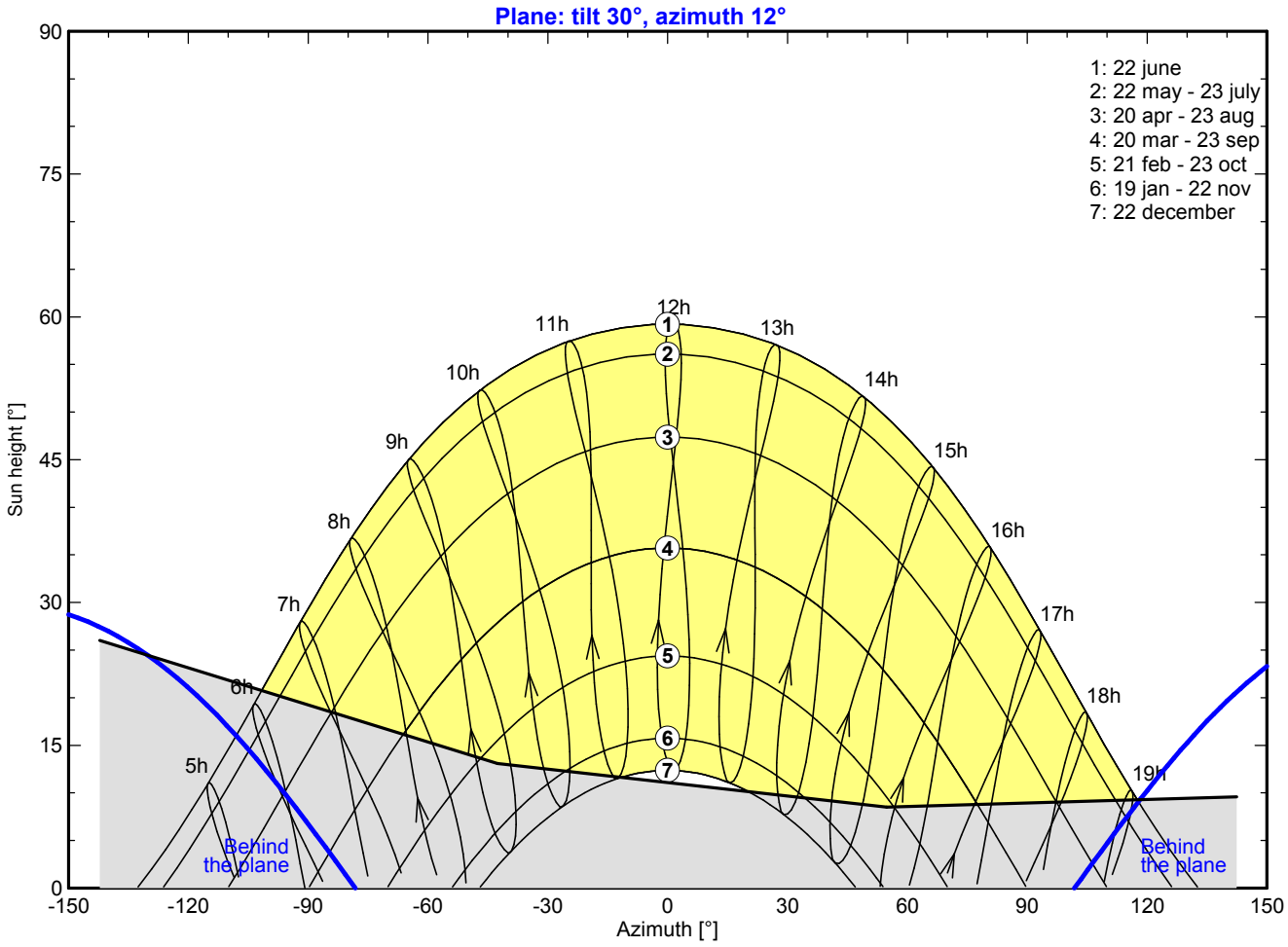
Main system parameters	System type	**Grid-Connected**		
Horizon	Average Height	13.3°		
PV Field Orientation	tilt	30°	azimuth	12°
PV modules	Model	330 MS-HC	Pnom	330 Wp
PV Array	Nb. of modules	272	Pnom total	**89.8 kWp**
Inverter	Model	20.0 **kW**	Pnom	20.00 kW ac
Inverter pack	Nb. of units	4.0	Pnom total	**80.0 kW ac**
User's needs	Unlimited load (grid)			

Horizon	Average Height	13.3°	Diffuse Factor	0.92
	Albedo Factor	100 %	Albedo Fraction	0.47

Height [°]	26.0	13.1	8.5	9.6
Azimuth [°]	-142	-43	55	142

Horizon line at Koszalin



Grid-Connected System: Main results

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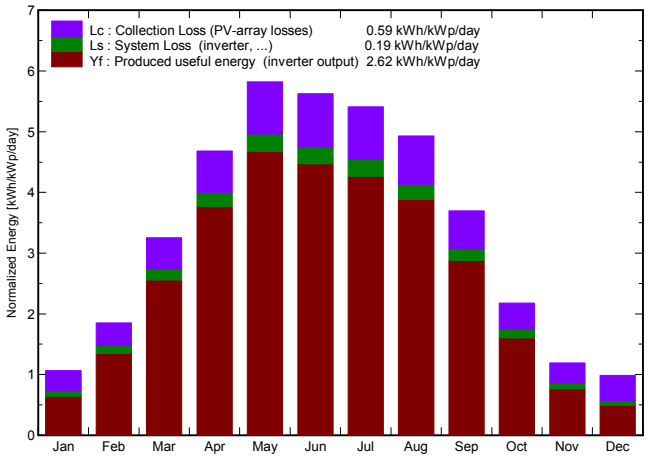
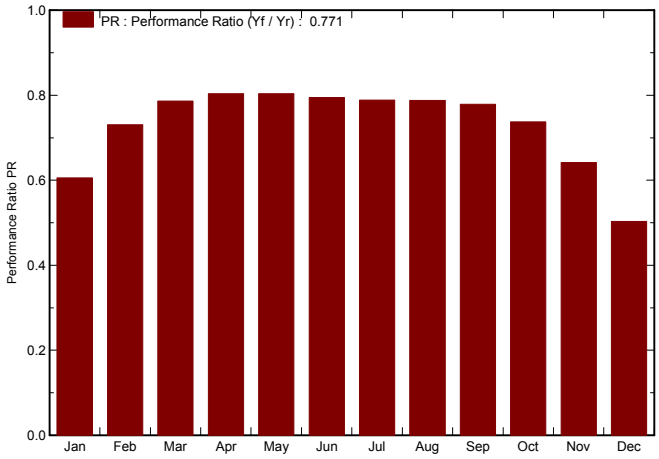
Main simulation results

System Production	**Produced Energy**	**85836 kWh/year**	Specific prod.	956 kWh/kWp/year
	Performance Ratio PR	77.1 %		

Normalized productions (per installed kWp): Nominal power 89.8 kWp



Performance Ratio PR



Wariant 89,76 kWp

Balances and main results

	GlobHor kWh/m²	T Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	19.5	1.00	33.0	25.3	2045	1792	11.75	10.30
February	34.7	1.10	51.7	44.9	3713	3392	13.60	12.42
March	78.7	3.00	100.9	91.4	7627	7121	14.33	13.38
April	121.8	7.00	140.4	129.6	10777	10131	14.54	13.67
May	172.0	11.50	180.4	166.7	13802	13015	14.50	13.67
June	168.3	14.90	168.8	155.8	12811	12045	14.38	13.52
July	164.6	17.70	167.8	154.9	12649	11871	14.29	13.41
August	140.1	18.20	152.9	140.7	11498	10815	14.25	13.40
September	88.8	14.40	110.8	100.8	8284	7750	14.16	13.25
October	47.7	10.30	67.5	59.6	4876	4466	13.69	12.54
November	21.9	5.00	35.8	28.8	2334	2060	12.36	10.91
December	16.1	2.00	30.5	20.0	1602	1378	9.94	8.55
Year	1074.3	8.89	1240.5	1118.4	92016	85836	14.05	13.11

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