Grid-Connected System: Simulation parameters

Project : **Solar Plant 3MW**

Geographical Site	**Melitopol**		**Country**	**Ukrainia**
Situation	Latitude	46.9°N	Longitude	35.4°E
Time defined as	Legal Time	Time zone UT+2	Altitude	150 m
	Albedo	0.20		

Meteo data : Melitopol, Synthetic Hourly data

Simulation variant : **New simulation variant**

Simulation date 13/02/14 11h24

Simulation parameters

Collector Plane Orientation	Tilt	30°	Azimuth	0°
Horizon	Free Horizon			
Near Shadings	No Shadings			

PV Arrays Characteristics (3 kinds of array defined)

PV module	Si-poly	Model	**SYP250P**		
		Manufacturer	Risen Energy		
Array#1: Number of PV modules		In series	22 modules	In parallel	200 strings
Total number of PV modules		Nb. modules	4400	Unit Nom. Power	250 Wp
Array global power		Nominal (STC)	**1100 kWp**	At operating cond.	1012 kWp (50°C)
Array operating characteristics (50°C)		U mpp	614 V	I mpp	1649 A
Array#2: Number of PV modules		In series	20 modules	In parallel	200 strings
Total number of PV modules		Nb. modules	4000	Unit Nom. Power	250 Wp
Array global power		Nominal (STC)	**1000 kWp**	At operating cond.	920 kWp (50°C)
Array operating characteristics (50°C)		U mpp	558 V	I mpp	1649 A
Array#3: Number of PV modules		In series	20 modules	In parallel	200 strings
Total number of PV modules		Nb. modules	4000	Unit Nom. Power	250 Wp
Array global power		Nominal (STC)	**1000 kWp**	At operating cond.	920 kWp (50°C)
Array operating characteristics (50°C)		U mpp	558 V	I mpp	1649 A
Total Arrays global power		Nominal (STC)	**3100 kWp**	Total	12400 modules
		Module area	**20813 ml**	Cell area	108654 ml

Inverter	Model	**SolarLake 17000TL-PM**		
	Manufacturer	Samil Power		
	Operating Voltage	440-800 V	Unit Nom. Power	17.0 kW AC
Array#1:	Number of Inverter	60	Total Power	1020 kW AC
Array#2:	Number of Inverter	50	Total Power	850 kW AC
Array#3:	Number of Inverter	50	Total Power	850 kW AC
Total	Number of Inverter	160	Total Power	2720 kW AC

PV Array loss factors

Thermal Loss factor	Uc (const)	20.0 W/mIK	Uv (wind)	0.0 W/mIK / m/s
=> Nominal Oper. Coll. Temp. (G=800 W/ml, Tamb=20°C, Wind=1 m/s.)			NOCT	56 °C
Wiring Ohmic Loss	Array#1	5.5 mOhm	Loss Fraction	1.4 % at STC
	Array#2	5.5 mOhm	Loss Fraction	1.5 % at STC
	Array#3	5.5 mOhm	Loss Fraction	1.5 % at STC
	Global		Loss Fraction	1.4 % at STC

Grid-Connected System: Simulation parameters (continued)

Module Quality Loss			Loss Fraction	0.1 %
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: Main results

Project : **Solar Plant 3MW**

Simulation variant : **New simulation variant**

Main system parameters					
	System type	**Grid-Connected**			
PV Field Orientation	tilt	30°	azimuth	0°	
PV modules	Model	SYP250P	Pnom	250 Wp	
PV Array	Nb. of modules	12400	Pnom total	**3100 kWp**	
Inverter	Model	SolarLake 17000TL-PM	Pnom	17.00 kW ac	
Inverter pack	Nb. of units	160.0	Pnom total	**2720 kW ac**	
User's needs	Unlimited load (grid)				

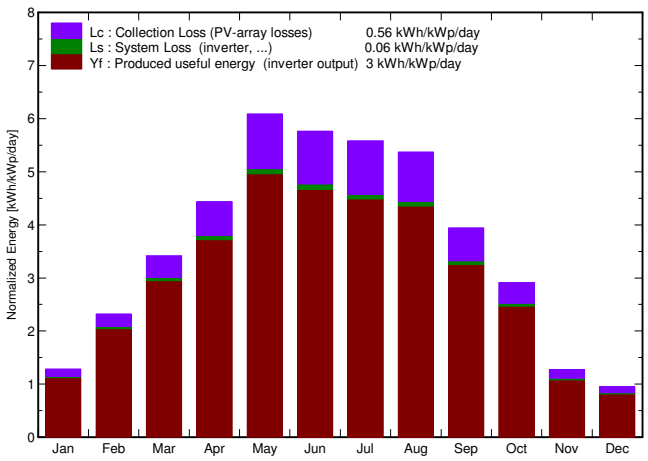
Main simulation results

System Production

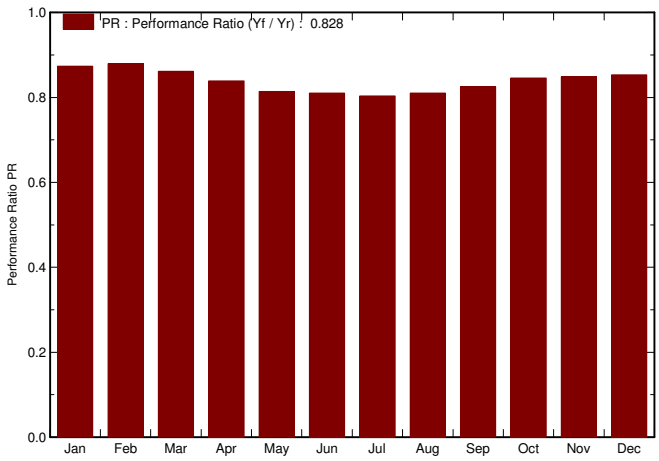
Produced Energy **3394098 kWh/year** Specific prod. 1095 kWh/kWp/year

Performance Ratio PR 82.8 %

Normalized productions (per installed kWp): Nominal power 3100 kWp



Performance Ratio PR



New simulation variant

Balances and main results

	GlobHor kWh/ml	T Amb °C	GlobInc kWh/ml	GlobEff kWh/ml	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	28.0	-4.20	39.8	38.4	110464	107713	13.34	13.01
February	48.0	-3.70	65.1	63.0	181359	177436	13.39	13.10
March	88.0	1.90	106.1	102.6	289286	283323	13.11	12.84
April	122.0	8.50	133.2	128.8	353399	346279	12.75	12.49
May	185.0	15.20	188.8	183.0	486382	476655	12.38	12.13
June	178.0	18.00	173.0	167.3	443337	434617	12.31	12.07
July	176.0	19.10	173.2	167.5	440038	431223	12.21	11.96
August	156.0	18.50	166.6	161.5	427004	418555	12.32	12.07
September	101.0	14.10	118.4	114.7	309209	302918	12.55	12.29
October	67.0	8.00	90.4	87.6	241968	236873	12.86	12.59
November	29.0	1.30	38.2	36.9	103212	100483	12.99	12.64
December	21.0	-2.00	29.5	28.5	80323	78024	13.08	12.71
Year	1199.0	7.96	1322.1	1279.7	3465982	3394098	12.60	12.33

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