

PVSYST V5.4											29/08/11	Page 1/4
-------------	--	--	--	--	--	--	--	--	--	--	----------	----------

Grid-Connected System: Simulation parameters

Project :

Plewen

Geographical Site

Pleven

Country

Bulgaria

Situation

Latitude 43.2°N

Longitude 25.4°E

Time defined as Legal Time

Time zone UT+1

Altitude 118 m

Monthly albedo values

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.75	0.50	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.50

Meteo data :

Михалци, Synthetic Hourly data

Simulation variant :

New simulation variant

Simulation date 29/08/11 11h01

Simulation parameters

Collector Plane Orientation

Tilt 30°

Azimuth 0°

Horizon

Free Horizon

Near Shadings

Linear shadings

PV Array Characteristics

PV module

Si-mono

Model

Chaori 190S-Mono

Manufacturer

Chaori Solar

In series

18 modules

In parallel

144 strings

Nb. modules

2592

Unit Nom. Power

190 Wp

Nominal (STC)

492 kWp

At operating cond.

443 kWp (50°C)

U mpp

601 V

I mpp

737 A

Module area

3309 ml

Inverter

Model

RefuSol 20K

Manufacturer

REFU Elektronik GmbH

Operating Voltage

480-800 V

Unit Nom. Power

19.2 kW AC

Number of Inverter

24 units

Total Power

460.8 kW AC

PV Array loss factors

Thermal Loss factor

Uc (const) 20.0 W/mlK

Uv (wind) 0.0 W/mlK / m/s

=> Nominal Oper. Coll. Temp. (G=800 W/ml, Tamb=20°C, Wind velocity = 1m/s.)

NOCT 56 °C

Wiring Ohmic Loss

Global array res. 14 mOhm

Loss Fraction 1.5 % at STC

Module Quality Loss

Loss Fraction 0.2 %

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: Near shading definition

Project : Plewen

Simulation variant : New simulation variant

Main system parameters

Near Shadings

PV Field Orientation

PV modules

PV Array

Inverter

Inverter pack

User's needs

System type

Linear shadings

tilt

Model

Nb. of modules

Model

Nb. of units

Unlimited load (grid)

Grid-Connected

30°

Chaori 190S-Mono

2592

RefuSol 20K

24.0

azimuth 0°

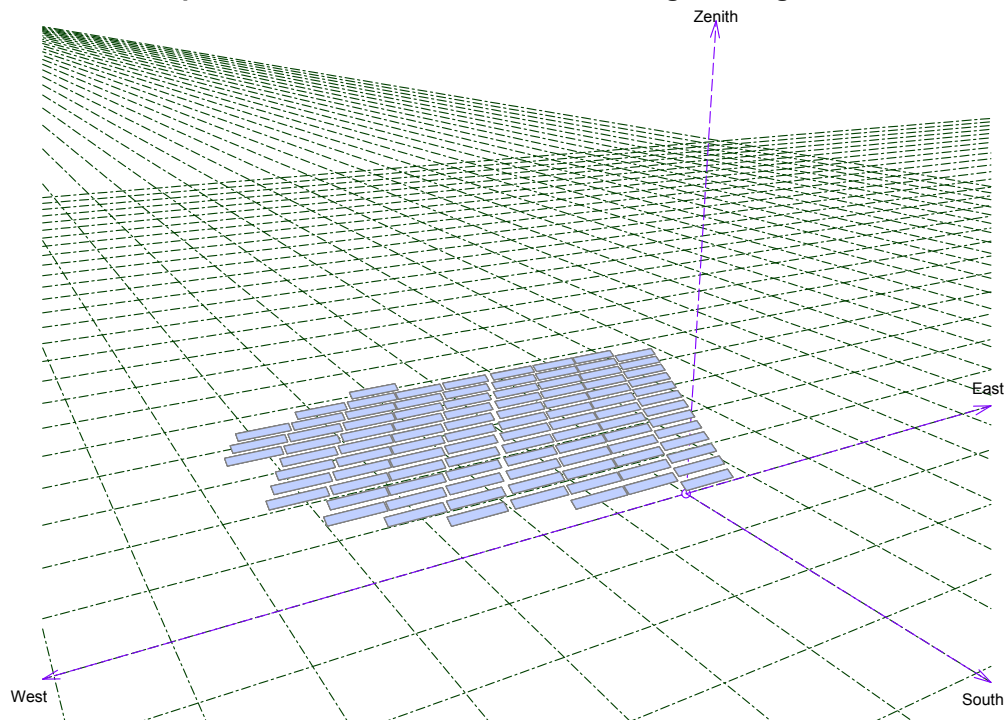
Pnom 190 Wp

Pnom total **492 kWp**

Pnom 19 kW ac

Pnom total **461 kW ac**

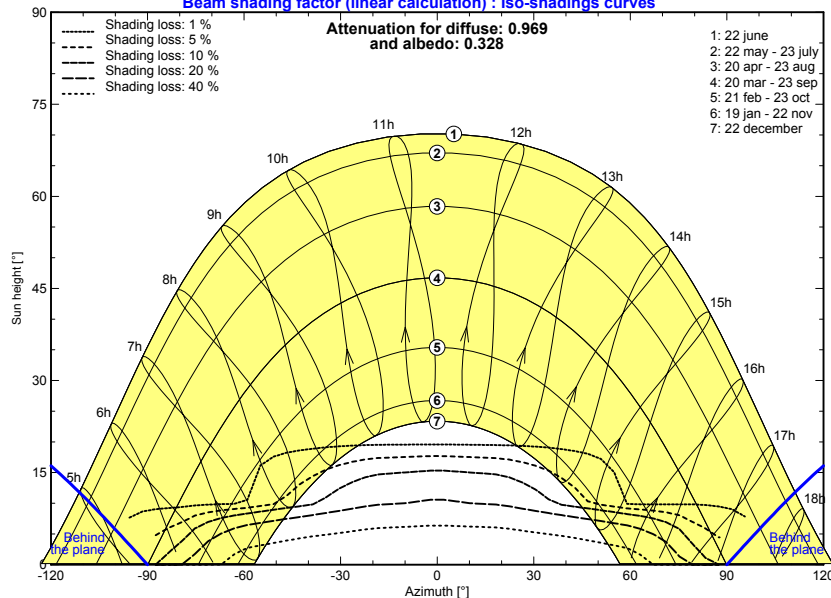
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Plewen: 500 kW Mihalci

Beam shading factor (linear calculation) : Iso-shadings curves



Grid-Connected System: Main results

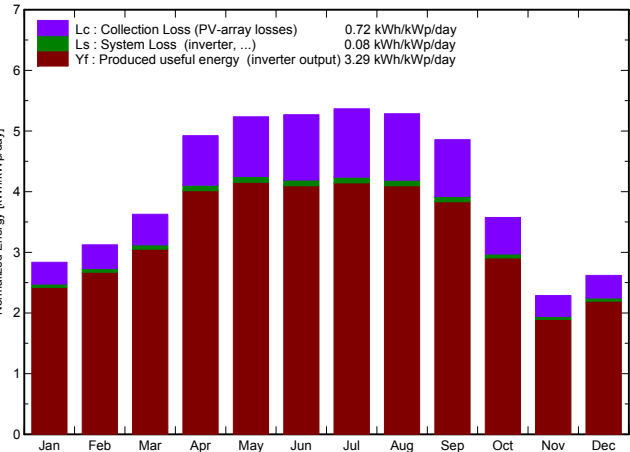
Project :Plewen

Simulation variant :New simulation variant

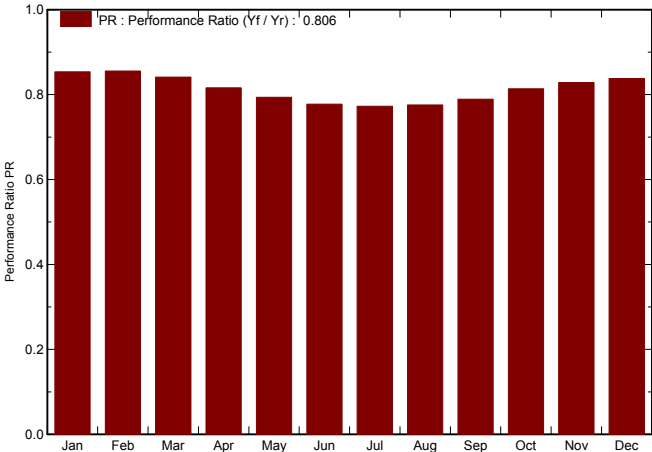
Main system parameters	System type	Grid-Connected		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	30°	azimuth	0°
PV modules	Model	Chaori 190S-Mono	Pnom	190 Wp
PV Array	Nb. of modules	2592	Pnom total	492 kWp
Inverter	Model	RefuSol 20K	Pnom	19 kW ac
Inverter pack	Nb. of units	24.0	Pnom total	461 kW ac
User's needs	Unlimited load (grid)			

Main simulation results				
System Production	Produced Energy	592 MWh/year	Specific prod.	1202 kWh/kWp/year
	Performance Ratio PR	80.6 %		

Normalized productions (per installed kWp): Nominal power 492 kWp



Performance Ratio PR



New simulation variant

Balances and main results

	GlobHor	T Amb	GlobInc	GlobEff	EArray	E_Grid	EffArrR	EffSysR
	kWh/ml	°C	kWh/ml	kWh/ml	kWh	kWh	%	%
January	54.1	-2.10	87.9	81.1	37824	36978	13.00	12.71
February	64.3	-0.80	87.4	82.0	37699	36849	13.03	12.73
March	95.9	5.30	112.5	106.2	47678	46604	12.81	12.52
April	138.8	10.80	147.7	139.3	60686	59340	12.42	12.14
May	164.3	16.50	162.3	152.9	64888	63446	12.08	11.82
June	164.7	20.80	158.1	148.5	61928	60532	11.84	11.57
July	170.2	23.00	166.3	156.8	64734	63286	11.76	11.50
August	157.5	23.20	163.8	154.9	63947	62565	11.80	11.54
September	125.0	19.80	145.7	138.2	57902	56639	12.01	11.75
October	85.3	13.80	110.8	105.0	45411	44401	12.38	12.11
November	48.9	6.40	68.6	64.1	28692	27985	12.64	12.33
December	46.0	1.30	81.2	74.5	34302	33501	12.77	12.47
Year	1315.0	11.57	1492.3	1403.5	605692	592127	12.27	11.99

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

Project :Plewen

Simulation variant :New simulation variant

Main system parameters	System type	Grid-Connected		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	30°	azimuth	0°
PV modules	Model	Chaori 190S-Mono	Pnom	190 Wp
PV Array	Nb. of modules	2592	Pnom total	492 kWp
Inverter	Model	RefuSol 20K	Pnom	19 kW ac
Inverter pack	Nb. of units	24.0	Pnom total	461 kW ac
User's needs	Unlimited load (grid)			

Loss diagram over the whole year

