

PVsyst - Simulation report

Grid-Connected System

Project: optimization_of_shedbased_pvsystems

Variant: Simulation

Unlimited sheds

System power: 9.00 kWp

Nagpur/Dhantoli - India



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Variant: Simulation

PVsyst V8.0.7

VC0, Simulation date:

28/02/25 09:00

with V8.0.7

Project summary

Geographical Site

Nagpur/Dhantoli

India

Situation

Latitude 21.09 °N

Longitude 79.05 °E

Altitude 313 m

Time zone UTC+6

Project settings

Albedo 0.20

Weather data

Nagpur/Dhantoli

MeteoNorm 8.2 station - Synthetic

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 25 °

Azimuth 0 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

30 units

Pnom total

9.00 kWp

Inverters

Nb. of units

1 unit

Pnom total

7.50 kWac

Pnom ratio

1.200

Results summary

Produced Energy 13548 kWh/year

Specific production

1505 kWh/kWp/year

Perf. Ratio PR

80.60 %

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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt 25 °

Azimuth 0 °

Sheds configuration

Nb. of sheds 5 units

Unlimited sheds

Shading limit angle

Limit profile angle 21.4 °

Sizes

Sheds spacing 6.00 m

Collector width 3.00 m

Average GCR 50.0 %

Top inactive band 0.02 m

Bottom inactive band 0.02 m

Models used

Transposition Perez

Diffuse Perez, Meteonorm

Circumsolar separate

Horizon

Free Horizon

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer

Generic

Model Mono 300 Wp 60 cells

(Original PVsyst database)

Unit Nom. Power 300 Wp

Number of PV modules 30 units

Nominal (STC) 9.00 kWp

Modules 2 string x 15 In series

At operating cond. (50°C)

Pmpp 8.10 kWp

U mpp 427 V

I mpp 19 A

Total PV power

Nominal (STC) 9 kWp

Total 30 modules

Module area 48.8 m²Cell area 42.7 m²

Inverter

Manufacturer

Generic

Model 7.5 kWac inverter

(Original PVsyst database)

Unit Nom. Power 7.50 kWac

Number of inverters 2 * MPPT 50% 1 unit

Total power 7.5 kWac

Operating voltage 150-750 V

Max. power (=>25°C) 8.00 kWac

Pnom ratio (DC:AC) 1.20

No power sharing between MPPTs

Total inverter power

Total power 7.5 kWac

Number of inverters 1 unit

Pnom ratio 1.20

Array losses

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 20.0 W/m²KUv (wind) 0.0 W/m²K/m/s

Module mismatch losses

Loss Fraction 2.0 % at MPP

DC wiring losses

Global array res.

378 mΩ

Loss Fraction

1.5 % at STC

Module Quality Loss

Loss Fraction

-0.8 %

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.963	0.892	0.814	0.679	0.438	0.000



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Main results

System Production

Produced Energy

13548 kWh/year

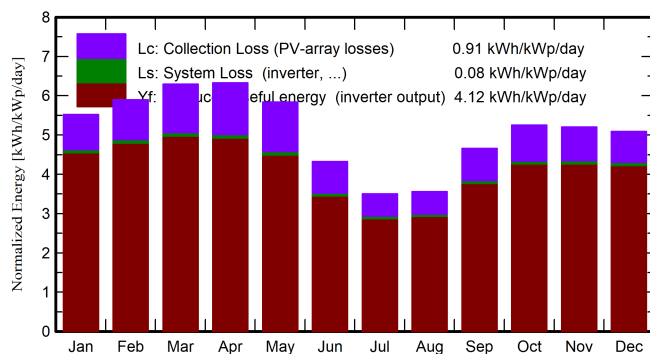
Specific production

1505 kWh/kWp/year

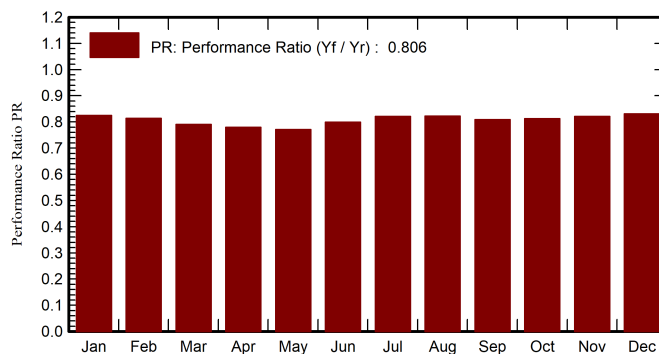
Perf. Ratio PR

80.60 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	134.5	54.10	22.30	171.3	166.5	1293	1271	0.824
February	139.5	60.40	25.20	165.1	160.6	1231	1209	0.813
March	179.9	73.90	29.40	195.1	189.3	1414	1388	0.790
April	192.6	81.20	32.50	189.8	183.4	1356	1331	0.779
May	196.8	93.60	35.60	181.0	173.8	1279	1255	0.770
June	144.1	91.10	31.20	129.8	123.5	952	934	0.799
July	119.8	74.20	28.10	108.7	103.3	820	803	0.821
August	115.5	79.60	27.30	110.4	105.0	834	818	0.823
September	135.6	76.30	27.30	139.8	134.2	1038	1018	0.809
October	144.5	72.60	26.90	162.9	157.4	1212	1191	0.812
November	125.8	54.10	24.00	156.1	151.6	1174	1153	0.821
December	121.2	49.00	20.79	157.7	153.4	1202	1179	0.831
Year	1749.8	860.10	27.56	1867.7	1802.0	13805	13548	0.806

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

E_Grid Energy injected into grid

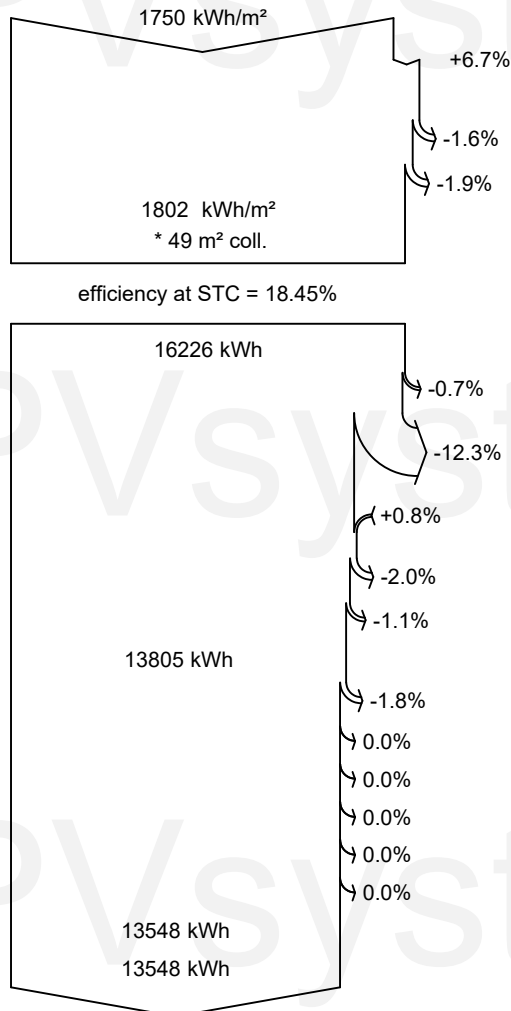
PR Performance Ratio



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

Module array mismatch loss

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Available Energy at Inverter Output

Energy injected into grid

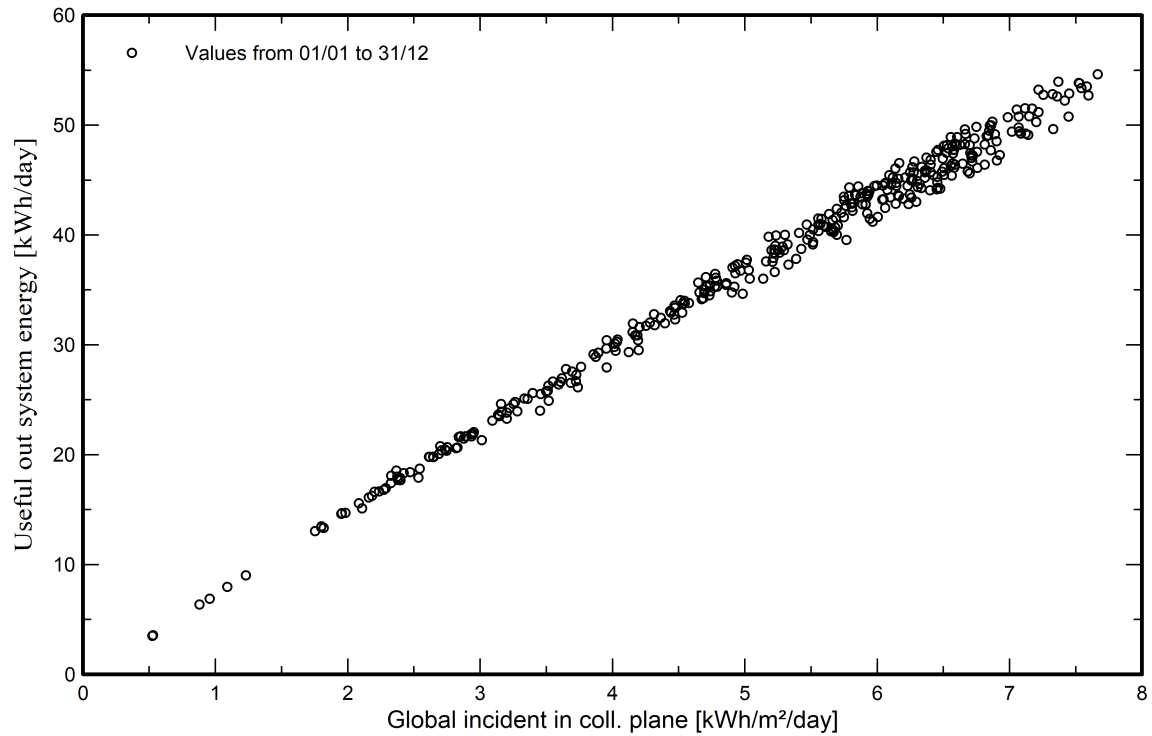


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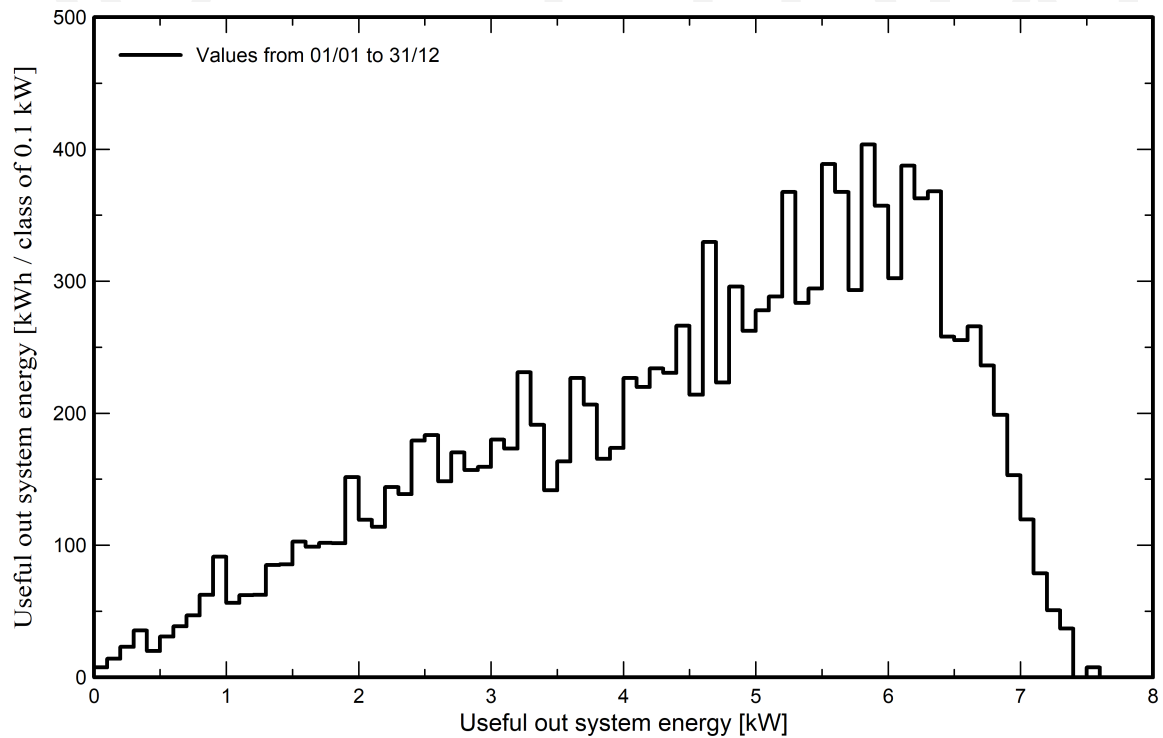
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Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

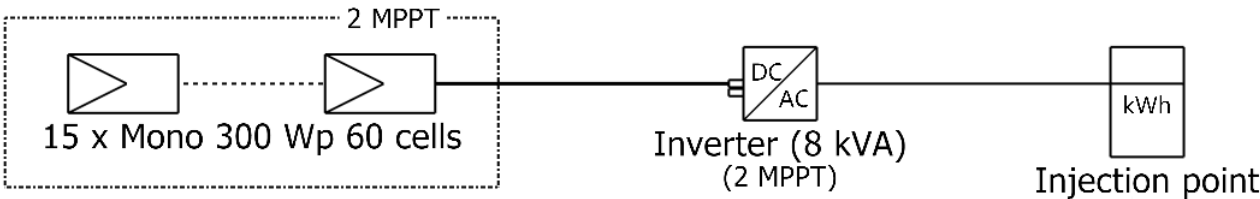




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Single-line diagram



PV module	Mono 300 Wp 60 cells
Inverter	7.5 kWac inverter
String	15 x Mono 300 Wp 60 cells

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VC0 : Simulation

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