

PVsyst - Simulation report

Grid-Connected System

Project: Uma Shanker Dixit District Women Hospital Unnao

Variant: New simulation variant

Unlimited sheds

System power: 350 kWp

Bīghāpur Khurd.1 - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC0, Simulation date:
25/12/24 08:56
with V8.0.2

Jakson Limited (India)

Project summary

Geographical Site

Bīghāpur Khurd.1

India

Situation

Latitude 26.35 °N

Longitude 80.67 °E

Altitude 112 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Bīghāpur Khurd.1

Meteonorm 8.2 (1996-2015), Sat=100% - Synthetic

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth 5 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

603 units

Pnom total

350 kWp

Inverters

Nb. of units

4 units

Pnom total

310 kWac

Pnom ratio

1.128

Results summary

Produced Energy 529556 kWh/year Specific production 1514 kWh/kWp/year Perf. Ratio PR 93.24 %

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General parameters

Grid-Connected System

Orientation #1

Sheds

Tilt	10 °
Azimuth	5 °

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Bifacial system definition

Orientation #1

Bifacial system

Model	Unlimited Sheds 2D Model
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Bifacial model geometry

Sheds spacing	6.20 m
Sheds width	3.04 m
Limit profile angle	9.2 °
GCR	49.0 %
Height above ground	1.50 m
Nb. of sheds	10 units

Bifacial model definitions

Ground albedo	0.30
Bifaciality factor	80 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

Unlimited sheds

Sheds configuration

Nb. of sheds	10 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	9.2 °

Sizes

Sheds spacing	6.20 m
Collector width	3.00 m
Average GCR	48.4 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

PV Array Characteristics

Array #1 - PV Array

PV module

Manufacturer	Panasonic Life Solutions India Pvt. Ltd
Model	AE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power	580 Wp
Number of PV modules	105 units
Nominal (STC)	60.9 kWp
Modules	7 string x 15 In series

At operating cond. (50°C)

Pmpp	56.5 kWp
U mpp	616 V
I mpp	92 A

Inverter

Manufacturer	Growatt New Energy
Model	MAC 50KTL3-X LV

(Custom parameters definition)

Unit Nom. Power	50.0 kWac
Number of inverters	1 unit
Total power	50.0 kWac
Operating voltage	200-1000 V
Pnom ratio (DC:AC)	1.22
Power sharing within this inverter	



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PV Array Characteristics

Array #2 - Sub-array #2

PV module

Manufacture Panasonic Life Solutions India Pvt. Ltd
Model AE14T580VHC16B5R
(Custom parameters definition)

Unit Nom. Power 580 Wp
Number of PV modules 120 units
Nominal (STC) 69.6 kWp
Modules 8 string x 15 In series

At operating cond. (50°C)

Pmpp 64.5 kWp
U mpp 616 V
I mpp 105 A

Array #3 - Sub-array #3

PV module

Manufacture Panasonic Life Solutions India Pvt. Ltd
Model AE14T580VHC16B5R
(Custom parameters definition)

Unit Nom. Power 580 Wp
Number of PV modules 378 units
Nominal (STC) 219 kWp
Modules 21 string x 18 In series

At operating cond. (50°C)

Pmpp 203 kWp
U mpp 739 V
I mpp 275 A

Total PV power

Nominal (STC) 350 kWp
Total 603 modules
Module area 1556 m²

Inverter

Manufacturer Growatt New Energy
Model MAX 60KTL3 LV
(Original PVsyst database)

Unit Nom. Power 60.0 kWac
Number of inverters 1 unit
Total power 60.0 kWac
Operating voltage 200-1000 V
Pnom ratio (DC:AC) 1.16
Power sharing within this inverter

Inverter

Manufacturer Growatt New Energy
Model MAX 100KTL3-X LV
(Original PVsyst database)

Unit Nom. Power 100 kWac
Number of inverters 2 units
Total power 200 kWac
Operating voltage 180-1000 V
Pnom ratio (DC:AC) 1.10
Power sharing within this inverter

Total inverter power

Total power 310 kWac
Number of inverters 4 units
Pnom ratio 1.13

Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

Serie Diode Loss

Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

LID - Light Induced Degradation

Loss Fraction 0.3 %

Module Quality Loss

Loss Fraction 0.0 %

Module mismatch losses

Array #1 - PV Array

Loss Fraction 1.0 % at MPP

Array #2 - Sub-array #2

Loss Fraction 1.0 % at MPP

Array #3 - Sub-array #3

Loss Fraction 1.0 % at MPP

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.998	0.992	0.963	0.917	0.812	0.567	0.000



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DC wiring losses

Global wiring resistance 10 mΩ

Loss Fraction 1.5 % at STC

Array #1 - PV Array

Global array res. 109 mΩ

Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 44 mΩ

Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 96 mΩ

Loss Fraction 1.5 % at STC

System losses

Unavailability of the system

Time fraction 1.0 %

3.7 days,
3 periods

AC wiring losses

Inv. output line up to injection point

Inverter voltage 400 Vac tri

Loss Fraction 0.18 % at STC

Inverter: MAC 50KTL3-X LV

Wire section (1 Inv.) Alu 1 x 3 x 70 mm²

Wires length 60 m

Inverter: MAX 100KTL3-X LV

Wire section (2 Inv.) Alu 2 x 3 x 95 mm²

Average wires length 0 m

Inverter: MAX 60KTL3 LV

Wire section (1 Inv.) Alu 1 x 3 x 50 mm²

Wires length 0 m



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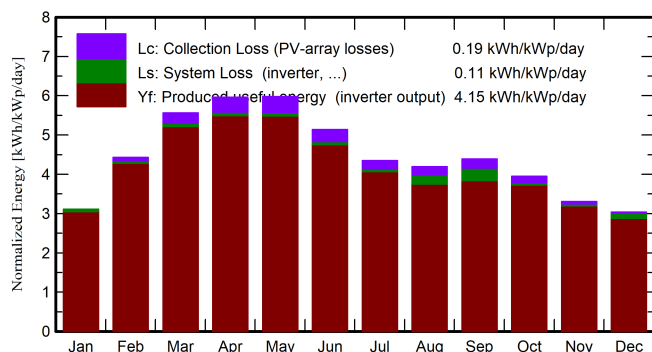
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Main results

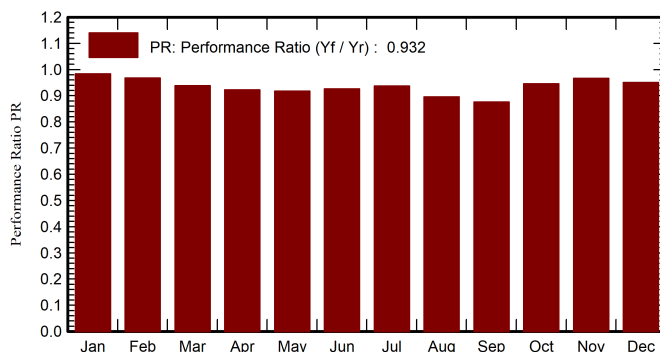
System Production

Produced Energy (P50)	529556 kWh/year	Specific production (P50)	1514 kWh/kWp/year	Perf. Ratio PR	93.24 %
Produced Energy (P90)	517315 kWh/year	Specific production (P90)	1479 kWh/kWp/year		
Produced Energy (P75)	523120 kWh/year	Specific production (P75)	1496 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

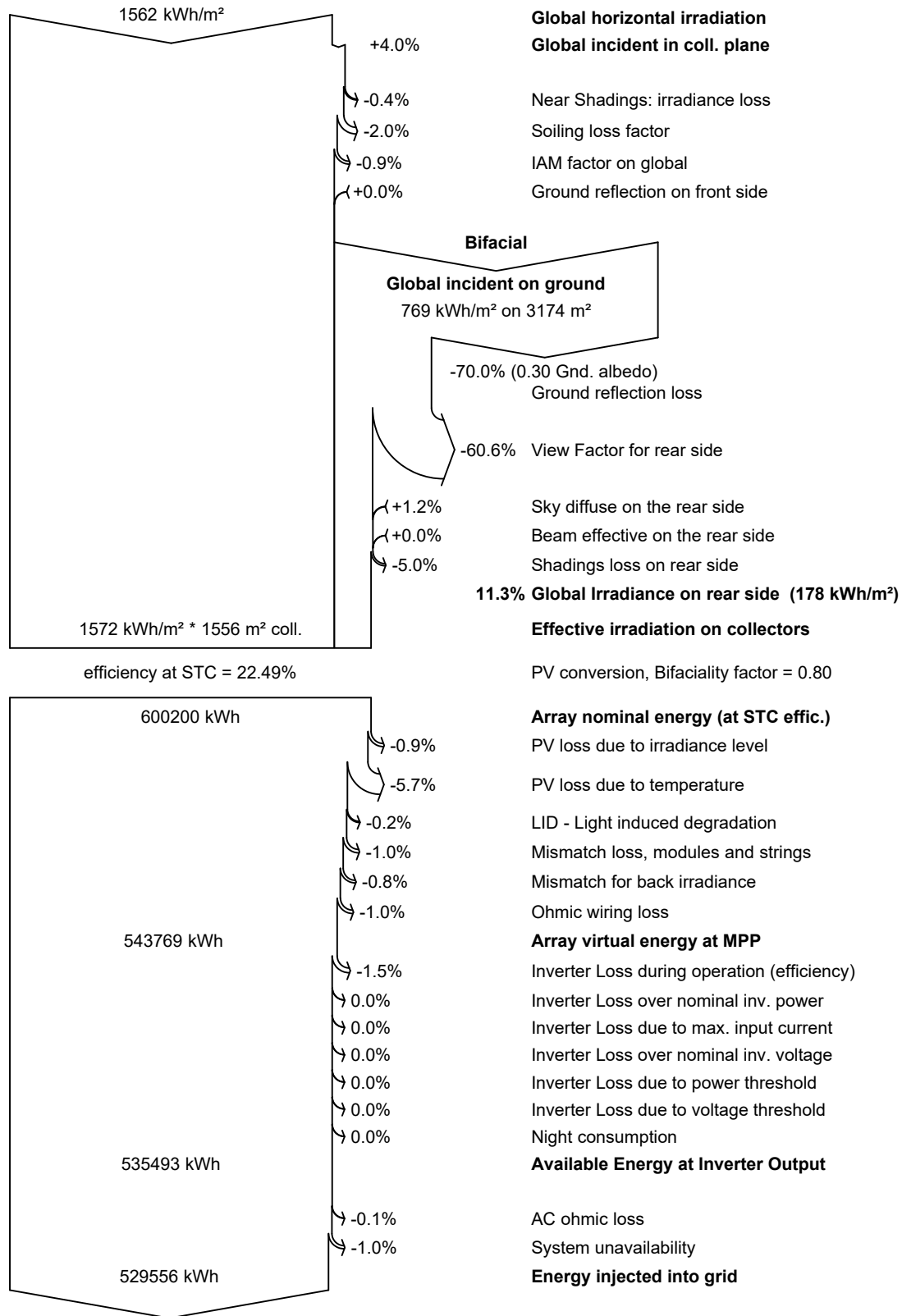
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	86.0	47.03	14.08	96.4	93.2	33712	33163	0.984
February	113.1	57.93	18.52	124.1	120.2	42656	41998	0.968
March	162.1	71.37	24.31	172.5	167.4	57494	56599	0.938
April	174.9	87.94	30.03	179.0	173.5	58613	57719	0.922
May	185.8	99.41	32.82	185.4	179.8	60473	59520	0.918
June	156.6	96.19	32.32	154.2	149.3	50751	49932	0.926
July	136.7	91.35	30.09	134.8	130.2	44928	44201	0.937
August	129.4	87.15	29.55	130.1	125.7	43262	40709	0.895
September	127.4	72.30	28.59	131.7	127.5	43654	40368	0.876
October	115.0	73.62	26.47	122.4	118.4	41157	40499	0.946
November	90.8	59.86	20.68	99.3	96.0	34092	33565	0.966
December	83.9	52.18	15.73	94.1	90.9	32805	31283	0.950
Year	1561.7	896.34	25.29	1624.0	1572.2	543596	529556	0.932

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		



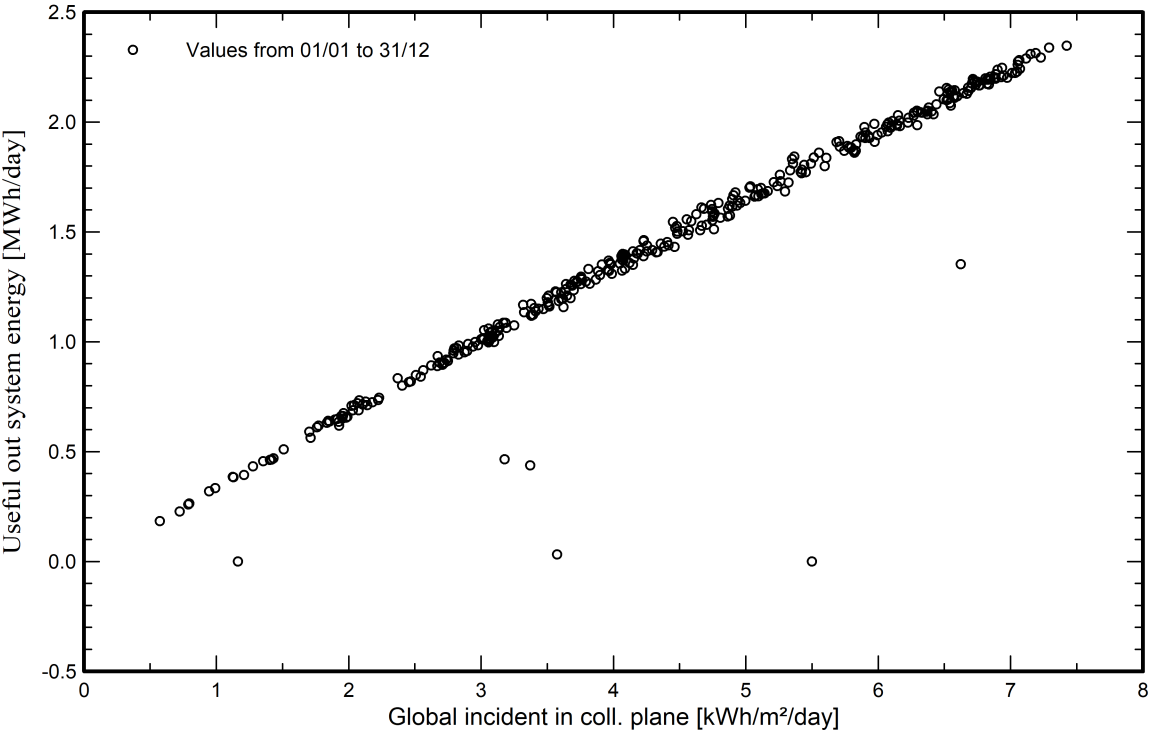
Loss diagram



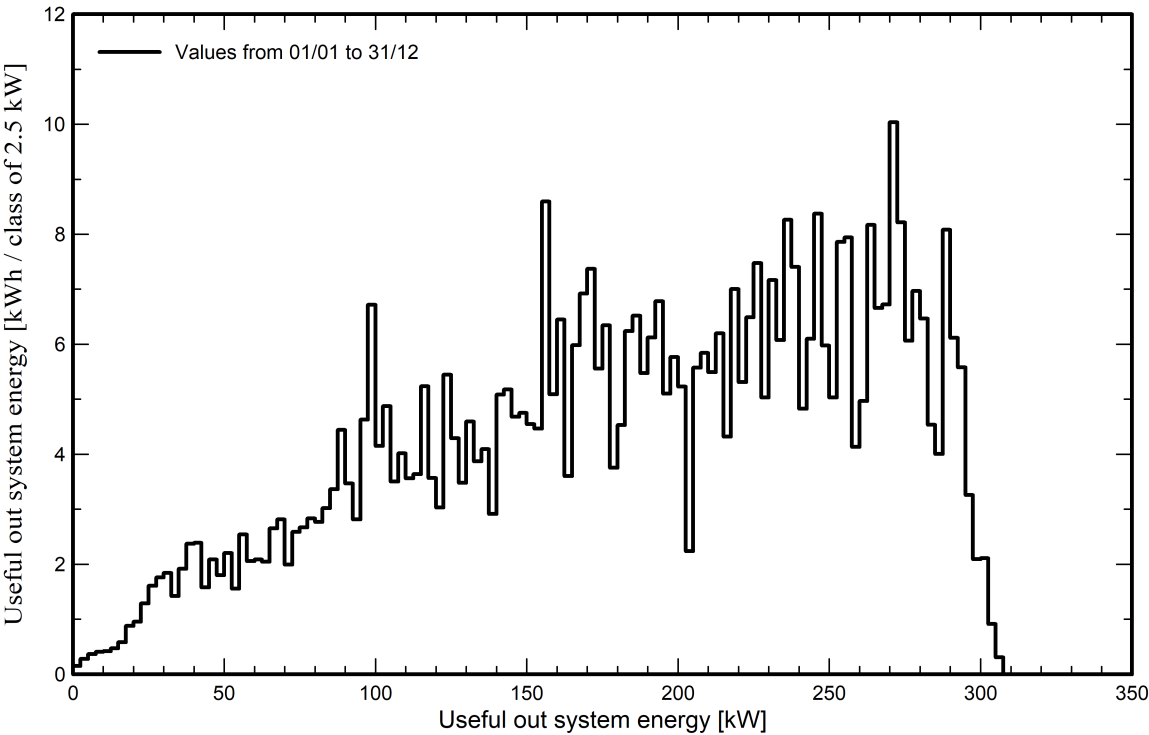


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





P50 - P90 evaluation

Weather data

Source Meteonorm 8.2 (1996-2015), Sat=100%
Kind Not defined
Year-to-year variability(Variance) 0.0 %

Specified Deviation

Global variability (weather data + system)

Variability (Quadratic sum) 1.8 %

Simulation and parameters uncertainties

PV module modelling/parameters 1.0 %
Inverter efficiency uncertainty 0.5 %
Soiling and mismatch uncertainties 1.0 %
Degradation uncertainty 1.0 %

Annual production probability

Variability 9.5 MWh
P50 529.6 MWh
P90 517.3 MWh
P75 523.1 MWh

Probability distribution

