

PVsyst - Simulation report

Grid-Connected System

Project: Divisional District Hospital Azamgarh - Blood Bank

Variant: New simulation variant

Unlimited sheds

System power: 251 kWp

Salempur - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC0, Simulation date:
25/12/24 08:27
with V8.0.2

Jakson Limited (India)

Project summary

Geographical Site

Salempur

India

Situation

Latitude 26.08 °N

Longitude 83.19 °E

Altitude 87 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Salempur

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

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth 26 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

432 units

Pnom total

251 kWp

Inverters

Nb. of units

3 units

Pnom total

225 kWac

Pnom ratio

1.114

Results summary

Produced Energy 367199 kWh/year Specific production 1466 kWh/kWp/year Perf. Ratio PR 94.02 %

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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt	10 °
Azimuth	26 °

Sheds configuration

Nb. of sheds	10 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	7.8 °

Sizes

Sheds spacing	6.80 m
Collector width	3.00 m
Average GCR	44.1 %
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

Bifacial system definition

Orientation #1

Bifacial system

Model	Unlimited Sheds 2D Model
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Bifacial model geometry

Sheds spacing	6.80 m
Sheds width	3.04 m
Limit profile angle	7.8 °
GCR	44.7 %
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 %

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	75 units
Nominal (STC)	43.5 kWp
Modules	5 string x 15 In series

At operating cond. (50°C)

Pmpp	40.3 kWp
U mpp	616 V
I mpp	65 A

Inverter

Manufacturer	Growatt New Energy
Model	MID 40KTL3-X
(Original PVsyst database)	
Unit Nom. Power	40.0 kWac
Number of inverters	1 unit
Total power	40.0 kWac
Operating voltage	200-1000 V
Pnom ratio (DC:AC)	1.09
Power sharing within this inverter	



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PV Array Characteristics

Array #2 - Sub-array #2

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(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

Array #3 - Sub-array #3

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power 580 Wp
Number of PV modules 252 units
Nominal (STC) 146 kWp
Modules 14 string x 18 In series

At operating cond. (50°C)

Pmpp 136 kWp
U mpp 739 V
I mpp 183 A

Total PV power

Nominal (STC) 251 kWp
Total 432 modules
Module area 1115 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) 1.01
Power sharing within this inverter

Inverter

Manufacturer

Growatt New Energy

Model

MAX 125KTL3-X LV

(Original PVsyst database)

Unit Nom. Power 125 kWac
Number of inverters 1 unit
Total power 125 kWac
Operating voltage 180-1000 V
Pnom ratio (DC:AC) 1.17
Power sharing within this inverter

Total inverter power

Total power 225 kWac
Number of inverters 3 units
Pnom ratio 1.11

Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 29.0 W/m²KUv (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

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. 153 mΩ

Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 66 mΩ

Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 109 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 0.10 % at STC

Inverter: MID 40KTL3-X

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

Wires length 50 m

Inverter: MAX 125KTL3-X LV

Wire section (1 Inv.) Alu 1 x 3 x 120 mm²

Wires length 0 m

Inverter: MAX 60KTL3 LV

Wire section (1 Inv.) Alu 1 x 3 x 35 mm²

Wires length 0 m



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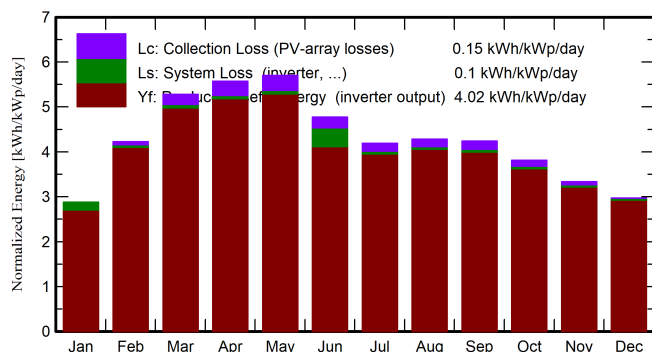
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Main results

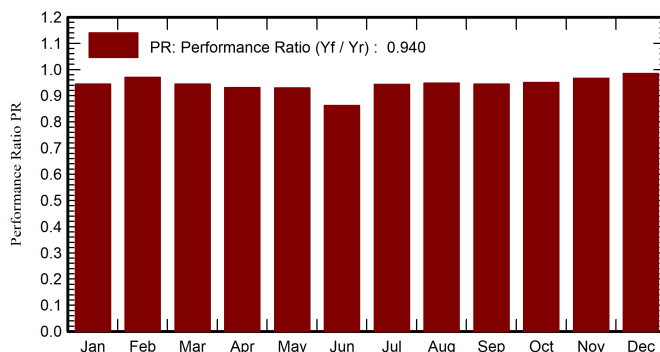
System Production

Produced Energy (P50)	367199 kWh/year	Specific production (P50)	1466 kWh/kWp/year	Perf. Ratio PR	94.02 %
Produced Energy (P90)	358711 kWh/year	Specific production (P90)	1432 kWh/kWp/year		
Produced Energy (P75)	362736 kWh/year	Specific production (P75)	1448 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

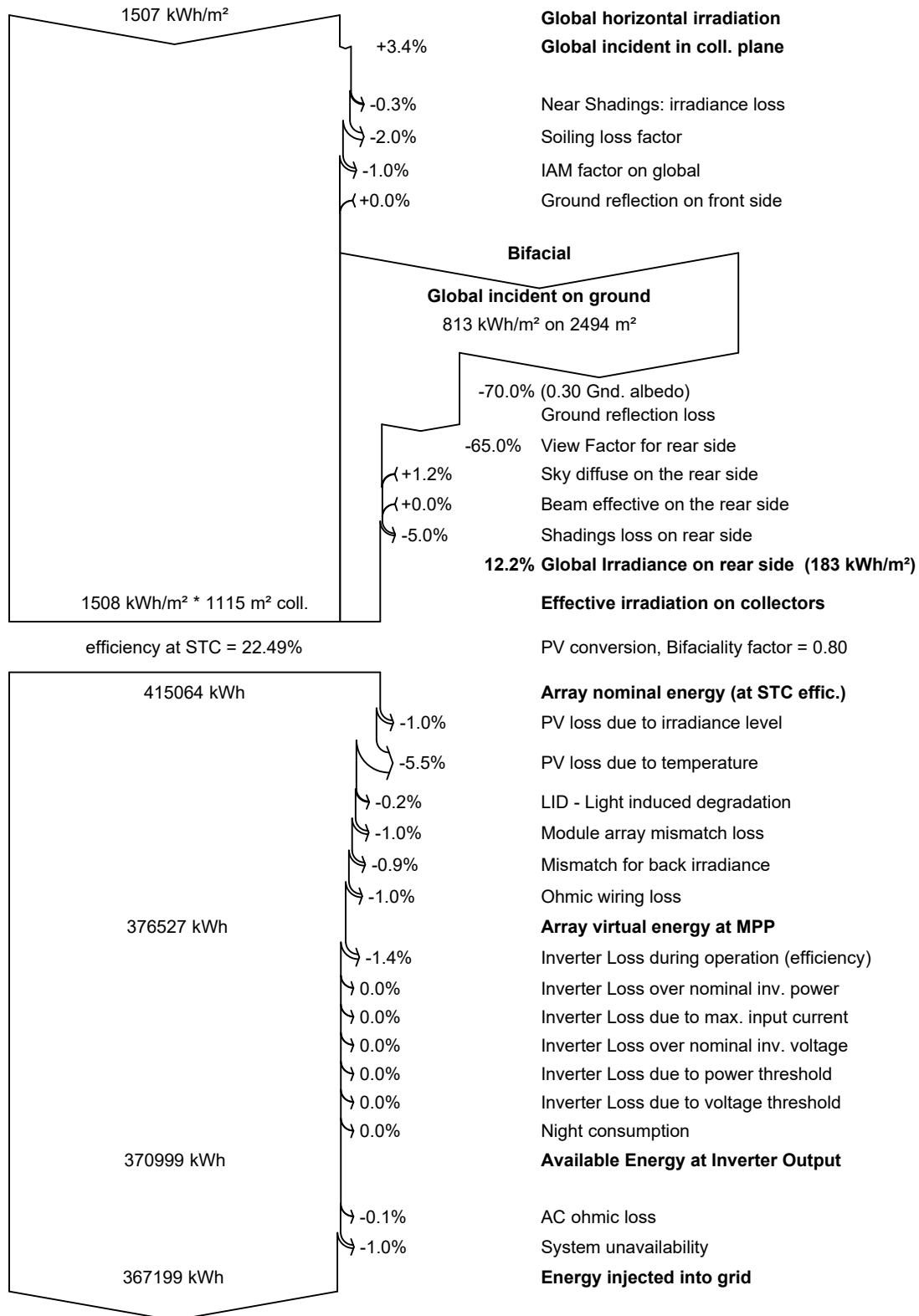
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	81.0	50.4	14.74	88.9	85.9	22359	21049	0.945
February	109.6	59.8	19.42	118.4	114.7	29218	28788	0.970
March	154.4	73.5	25.27	163.6	158.7	39305	38725	0.945
April	164.1	85.2	30.12	167.2	162.0	39556	38984	0.931
May	177.3	106.3	32.54	176.7	171.2	41765	41147	0.929
June	145.9	91.0	31.78	143.3	138.8	34143	30980	0.863
July	131.5	88.7	29.94	130.0	125.7	31236	30743	0.944
August	132.4	94.2	29.54	132.8	128.2	32022	31552	0.949
September	123.8	73.1	28.65	127.1	122.9	30537	30074	0.944
October	112.1	71.6	26.72	118.3	114.4	28605	28176	0.950
November	91.6	57.5	21.47	100.0	96.7	24604	24229	0.967
December	83.7	54.9	16.65	92.2	89.1	23094	22752	0.984
Year	1507.4	906.2	25.59	1558.7	1508.4	376444	367199	0.940

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		



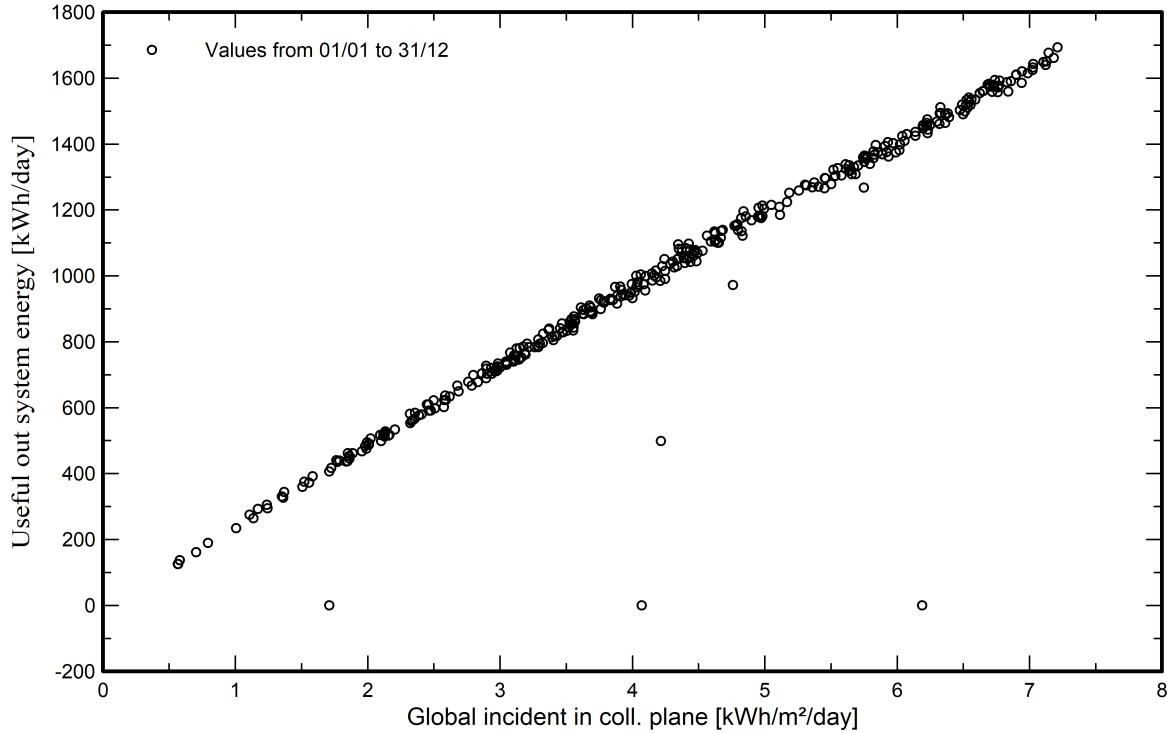
Loss diagram



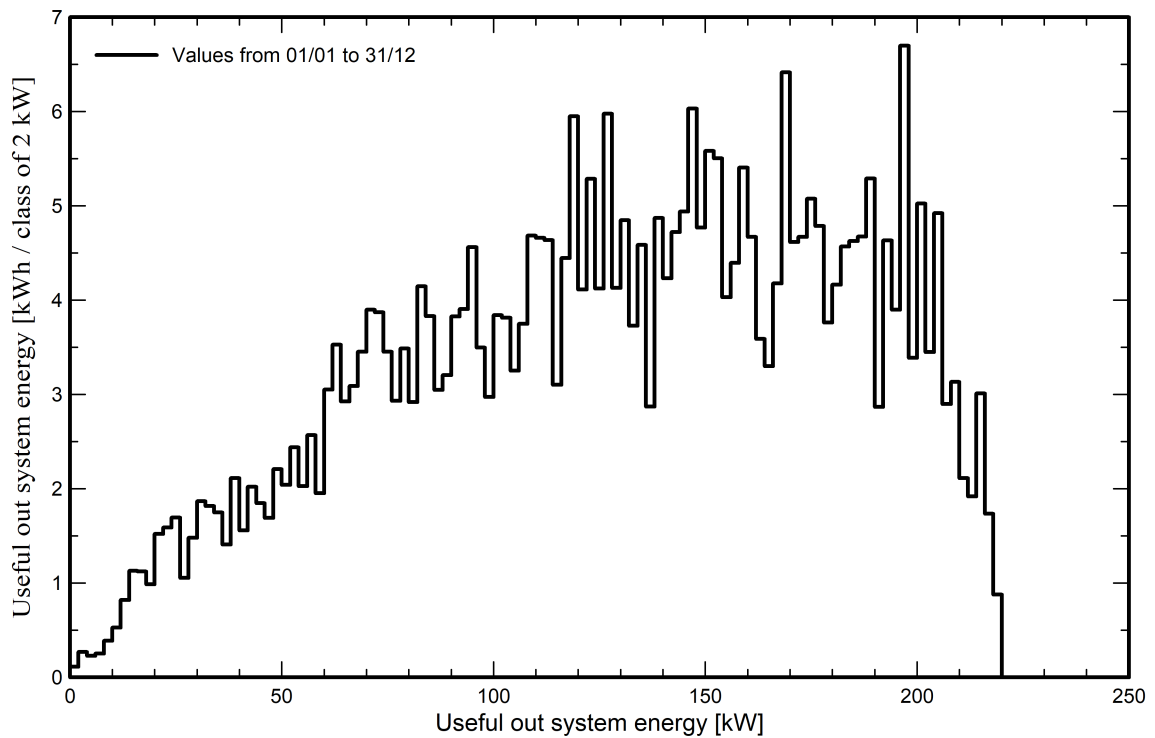


Predef. graphs

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 6.6 MWh
P50 367.2 MWh
P90 358.7 MWh
P75 362.7 MWh

Probability distribution

