

PVsyst - Simulation report

Grid-Connected System

Project: District man hospital barabanki

Variant: 100KWp

Unlimited sheds

System power: 101 kWp

Nawābganj - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC1, Simulation date:
05/12/24 11:08
with V8.0.2

Jakson Limited (India)

Project summary

Geographical Site

Nawābganj

India

Situation

Latitude 26.93 °N

Longitude 81.20 °E

Altitude 110 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Nawābganj

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

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth -13 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

174 units

Pnom total

101 kWp

Inverters

Nb. of units

2 units

Pnom total

90.0 kWac

Pnom ratio

1.121

Results summary

Produced Energy 151474 kWh/year Specific production 1501 kWh/kWp/year Perf. Ratio PR 94.50 %

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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt	10 °
Azimuth	-13 °

Sheds configuration

Nb. of sheds	5 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	6.1 °

Sizes

Sheds spacing	7.90 m
Collector width	3.00 m
Average GCR	38.0 %
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

Bifacial system definition

Orientation #1

Bifacial system

Model	Unlimited Sheds 2D Model
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Bifacial model geometry

Sheds spacing	7.90 m
Sheds width	3.04 m
Limit profile angle	6.1 °
GCR	38.5 %
Height above ground	1.50 m
Nb. of sheds	5 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	84 units
Nominal (STC)	48.7 kWp
Modules	6 string x 14 In series

At operating cond. (50°C)

Pmpp	45.2 kWp
U mpp	575 V
I mpp	79 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)	1.22
Power sharing within this inverter	



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PV Array Characteristics

Array #2 - Sub-array #2

PV module

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

Unit Nom. Power 580 Wp
Number of PV modules 90 units
Nominal (STC) 52.2 kWp
Modules 6 string x 15 In series

At operating cond. (50°C)

Pmpp 48.4 kWp
U mpp 616 V
I mpp 79 A

Total PV power

Nominal (STC) 101 kWp
Total 174 modules
Module area 449 m²

Inverter

Manufacturer Growatt New Energy
Model MAX 50KTL3 LV
(Original PVsyst database)

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) 1.04
Power sharing within this inverter

Total inverter power

Total power 90 kWac
Number of inverters 2 units
Pnom ratio 1.12

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

Loss Fraction 0.5 % 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

DC wiring losses

Global wiring resistance 10 mΩ
Loss Fraction 1.5 % at STC

Array #1 - PV Array

Global array res. 119 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 128 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 0.26 % at STC

Inverter: MID 40KTL3-X

Wire section (1 Inv.) Alu 1 x 3 x 70 mm²
Wires length 40 m

Inverter: MAX 50KTL3 LV

Wire section (1 Inv.) Alu 1 x 3 x 35 mm²
Wires length 0 m

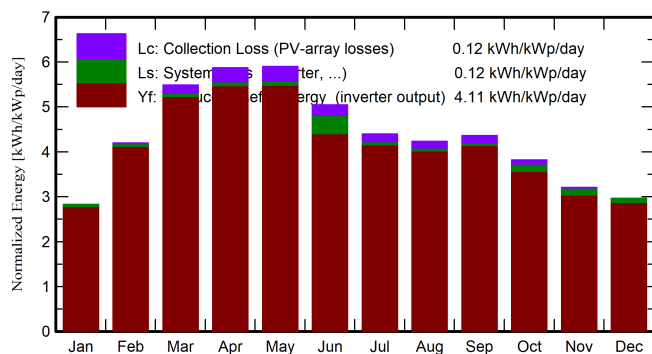


Main results

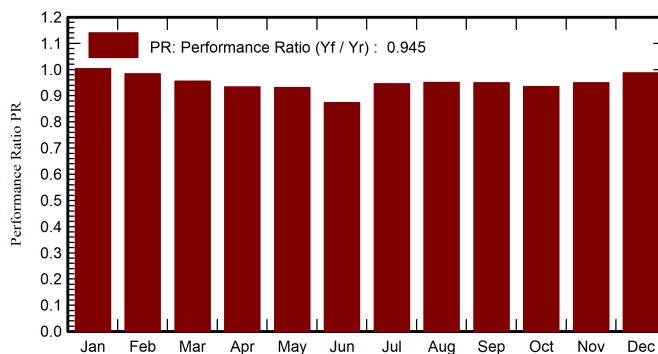
System Production

Produced Energy (P50)	151474 kWh/year	Specific production (P50)	1501 kWh/kWp/year	Perf. Ratio PR	94.50 %
Produced Energy (P90)	147470 kWh/year	Specific production (P90)	1461 kWh/kWp/year		
Produced Energy (P75)	149369 kWh/year	Specific production (P75)	1480 kWh/kWp/year		

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	78.5	51.4	14.06	86.1	83.2	8864	8718	1.003
February	107.7	59.8	18.43	117.5	113.9	11845	11659	0.983
March	160.3	78.0	24.12	170.1	165.1	16660	16399	0.955
April	172.0	87.4	29.84	176.3	171.0	16859	16597	0.933
May	183.4	101.1	32.64	182.9	177.5	17458	17180	0.931
June	153.6	96.3	32.14	151.4	146.7	14583	13359	0.874
July	137.2	87.4	29.97	136.4	132.1	13239	13018	0.946
August	130.6	88.2	29.44	131.3	127.0	12803	12595	0.950
September	126.6	75.8	28.47	131.0	126.7	12753	12549	0.950
October	112.2	74.5	26.25	118.5	114.7	11676	11171	0.934
November	88.1	58.6	20.54	96.3	93.1	9700	9218	0.949
December	80.9	51.2	15.71	90.5	87.5	9270	9011	0.987
Year	1531.1	909.5	25.16	1588.3	1538.6	155711	151474	0.945

Legends

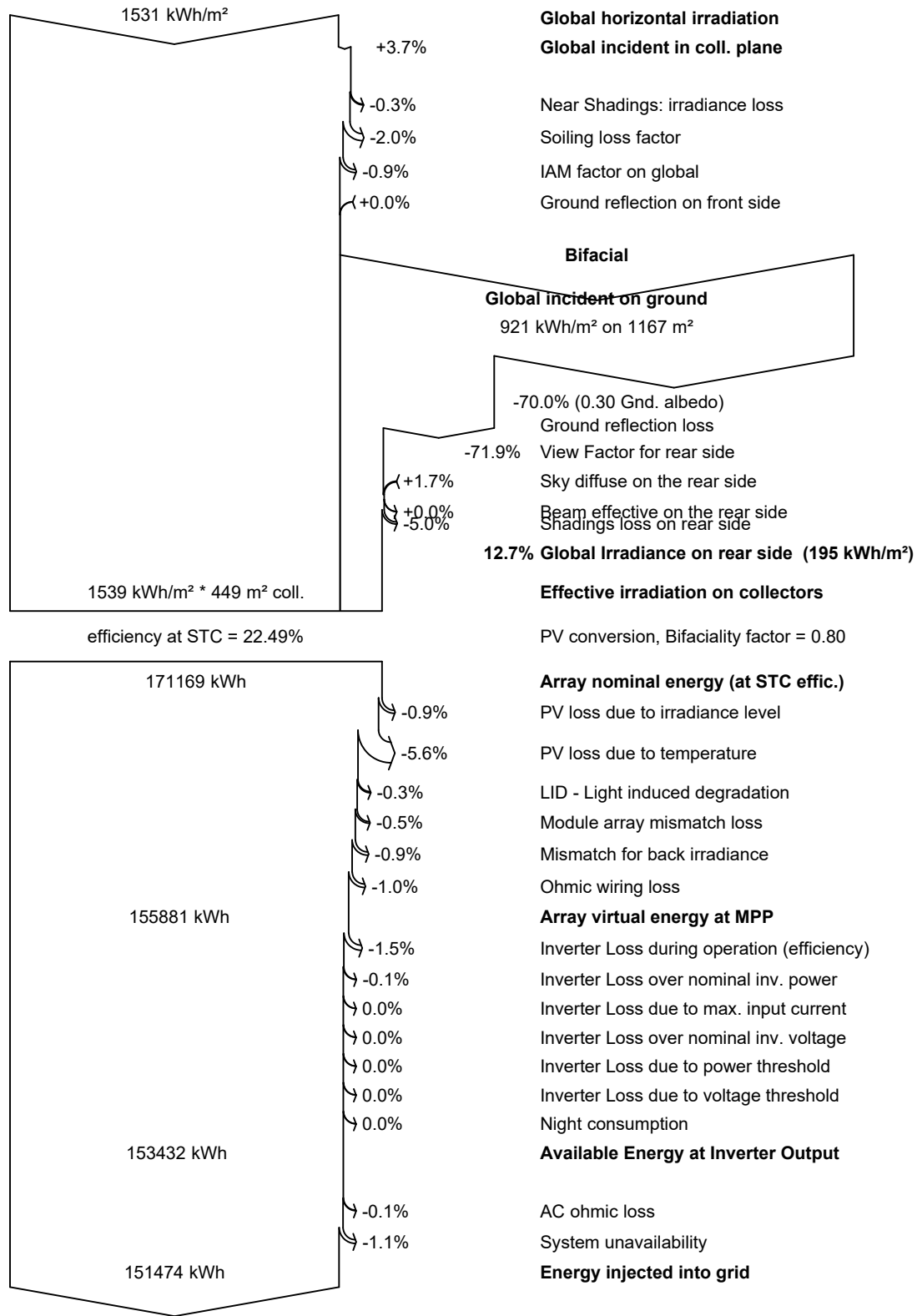
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		



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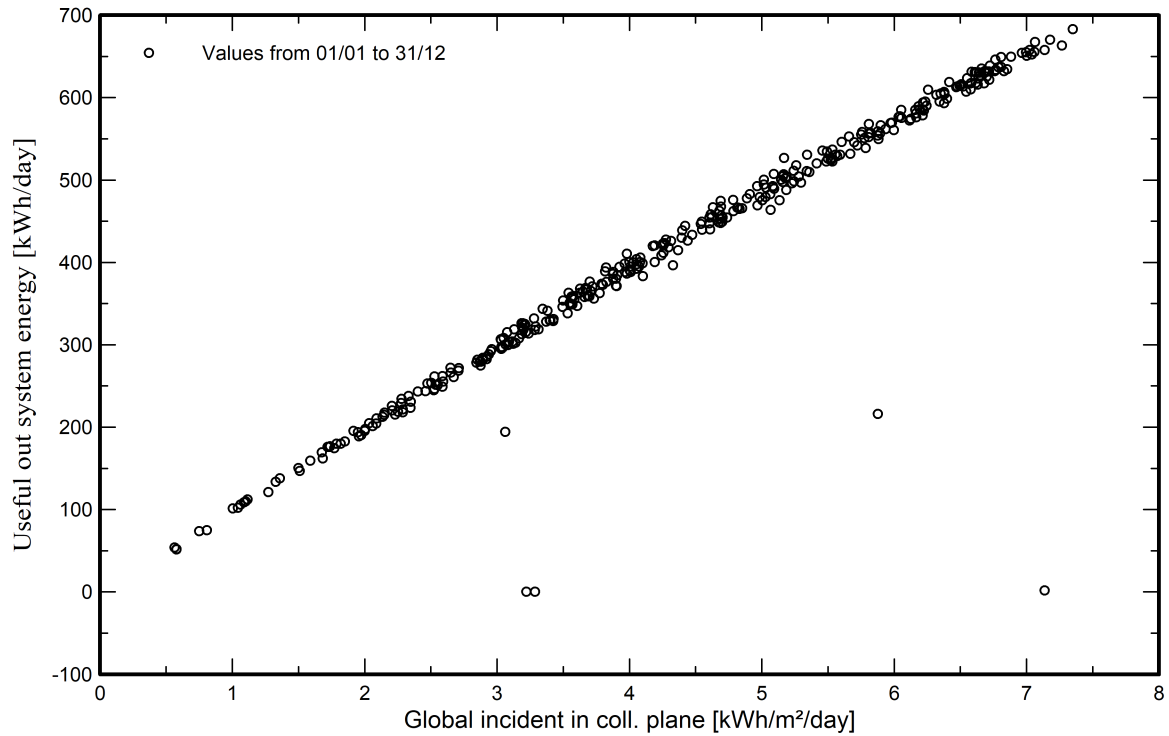
Loss diagram



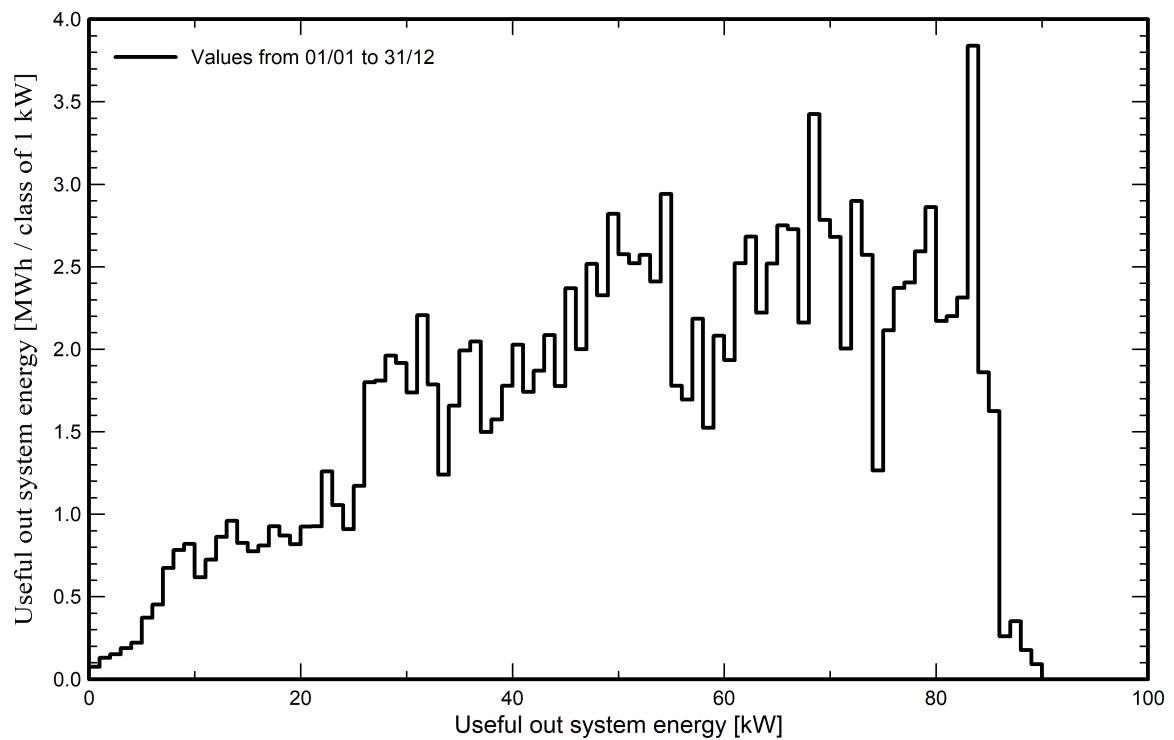


Predef. graphs

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) -1.0 %

Specified Deviation

Global variability (weather data + system)

Variability (Quadratic sum) 2.1 %

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 3.12 MWh
P50 151.47 MWh
P90 147.47 MWh
P75 149.37 MWh

Probability distribution

