

PVsyst - Simulation report

Grid-Connected System

Project: District Combined Hospital Maunathbhanjan

Variant: New simulation variant

Unlimited sheds

System power: 458 kWp

Amlia - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC0, Simulation date:
25/12/24 07:56
with V8.0.2

Jakson Limited (India)

Project summary

Geographical Site

Amlia

India

Situation

Latitude 25.92 °N

Longitude 83.56 °E

Altitude 69 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Amlia

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

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth 9 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

789 units

Pnom total

458 kWp

Inverters

Nb. of units

5 units

Pnom total

380 kWac

Pnom ratio

1.204

Results summary

Produced Energy 664948 kWh/year Specific production 1453 kWh/kWp/year Perf. Ratio PR 93.28 %

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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt	10 °
Azimuth	9 °

Sheds configuration

Nb. of sheds	10 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	9.5 °

Sizes

Sheds spacing	6.10 m
Collector width	3.00 m
Average GCR	49.2 %
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	6.10 m
Sheds width	3.04 m
Limit profile angle	9.5 °
GCR	49.8 %
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	165 units
Nominal (STC)	95.7 kWp
Modules	11 string x 15 In series

At operating cond. (50°C)

Pmpp	88.7 kWp
U mpp	616 V
I mpp	144 A

Inverter

Manufacturer	Growatt New Energy
Model	MAC 50KTL3-X LV
(Custom parameters definition)	
Unit Nom. Power	50.0 kWac
Number of inverters	2 units
Total power	100 kWac
Operating voltage	200-1000 V
Pnom ratio (DC:AC)	0.96
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. Power580 Wp
Number of PV modules168 units
Nominal (STC)97.4 kWp
Modules12 string x 14 In series

At operating cond. (50°C)

Pmpp90.4 kWp
U mpp575 V
I mpp157 A

Inverter

Manufacturer

Growatt New Energy

Model

MAX 80KTL3 LV

(Original PVsyst database)

Unit Nom. Power80.0 kWac
Number of inverters1 unit
Total power80.0 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.22
Power sharing within this inverter

Array #3 - Sub-array #3

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules456 units
Nominal (STC)264 kWp
Modules24 string x 19 In series

At operating cond. (50°C)

Pmpp245 kWp
U mpp780 V
I mpp314 A

Inverter

Manufacturer

Growatt New Energy

Model

MAX 100KTL3-X LV

(Original PVsyst database)

Unit Nom. Power100 kWac
Number of inverters2 units
Total power200 kWac
Operating voltage180-1000 V
Pnom ratio (DC:AC)1.32
Power sharing within this inverter

Total PV power

Nominal (STC)458 kWp
Total789 modules
Module area2036 m²

Total inverter power

Total power380 kWac
Number of inverters5 units
Pnom ratio1.20

Array losses

Array Soiling Losses

Loss Fraction2.0 %

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 drop0.7 V
Loss Fraction0.1 % at STC

LID - Light Induced Degradation

Loss Fraction0.3 %

Module Quality Loss

Loss Fraction0.0 %

Module mismatch losses

Array #1 - PV Array

Loss Fraction1.0 % at MPP

Array #2 - Sub-array #2

Loss Fraction1.0 % at MPP

Array #3 - Sub-array #3

Loss Fraction1.0 % 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. 70 mΩ

Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 40 mΩ

Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 60 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: MAC 50KTL3-X LV

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

Average wires length 50 m

Inverter: MAX 100KTL3-X LV

Wire section (2 Inv.) Alu 2 x 3 x 120 mm²

Average wires length 0 m

Inverter: MAX 80KTL3 LV

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

Wires length 0 m

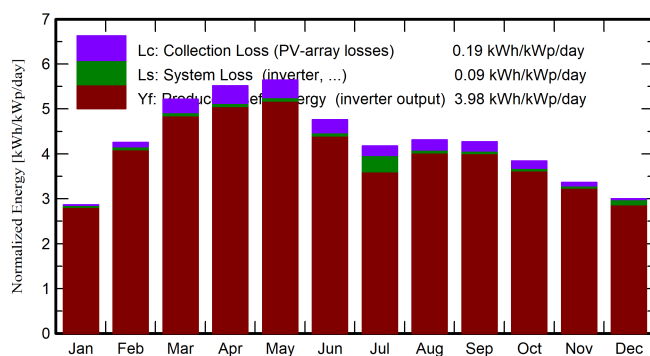


Main results

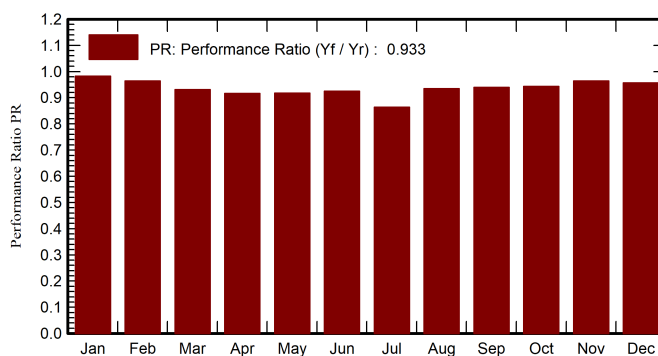
System Production

Produced Energy (P50)	664948 kWh/year	Specific production (P50)	1453 kWh/kWp/year	Perf. Ratio PR	93.28 %
Produced Energy (P90)	649577 kWh/year	Specific production (P90)	1419 kWh/kWp/year		
Produced Energy (P75)	656867 kWh/year	Specific production (P75)	1435 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

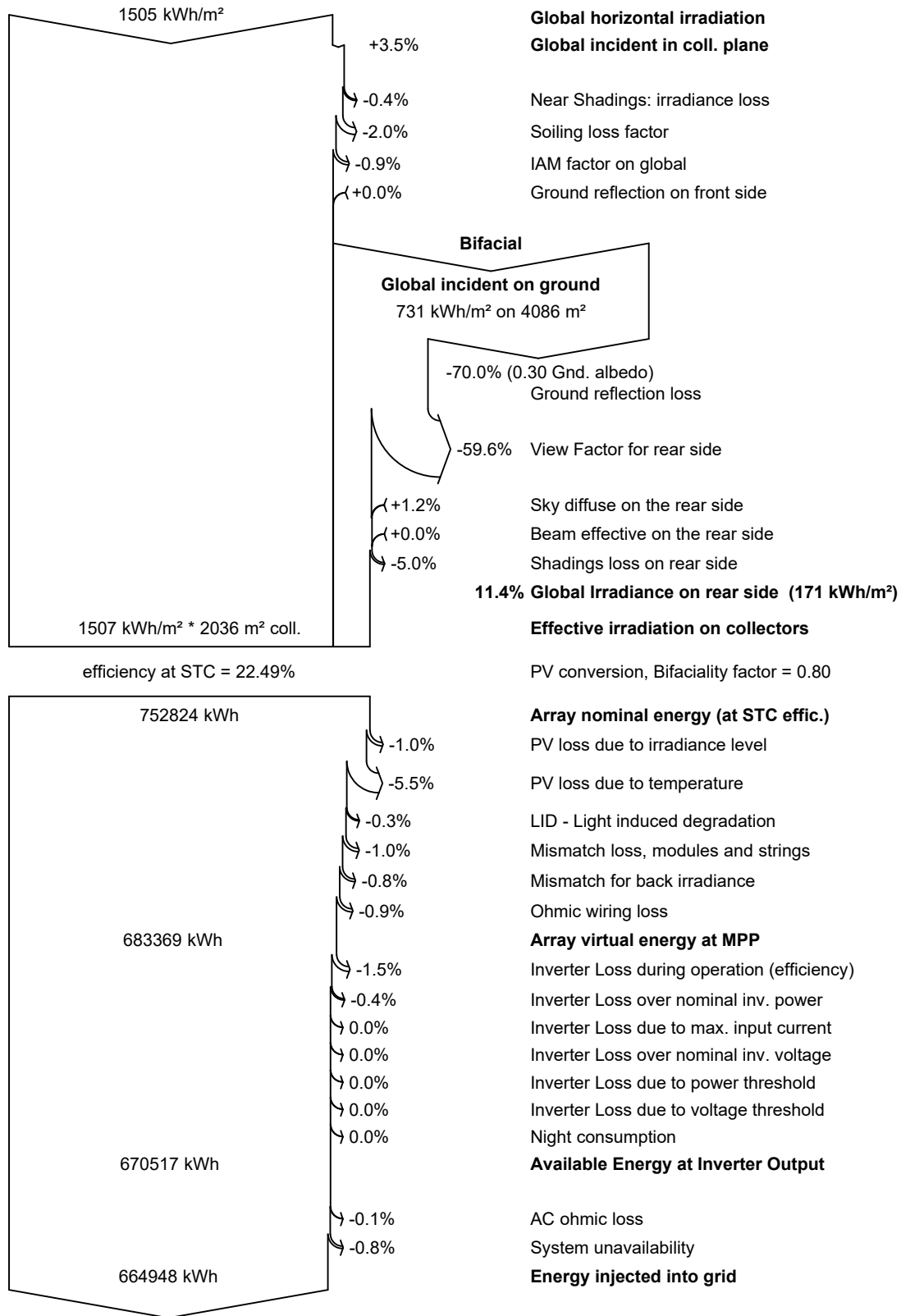
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	80.8	50.9	15.14	88.9	85.8	40588	39950	0.982
February	109.3	59.1	19.58	119.1	115.4	53310	52516	0.963
March	152.9	76.5	25.35	161.7	156.8	69905	68853	0.931
April	162.4	88.5	30.20	165.6	160.4	70495	69462	0.917
May	176.1	102.0	32.57	175.0	169.6	74623	73502	0.918
June	145.1	97.0	31.86	142.9	138.2	61453	60497	0.925
July	131.7	88.1	30.04	129.5	125.1	56304	51170	0.863
August	133.1	90.8	29.62	133.7	129.1	58029	57155	0.934
September	124.5	84.0	28.74	128.1	123.7	55892	55065	0.940
October	111.9	70.7	26.79	119.1	115.2	52241	51449	0.944
November	92.6	62.3	21.61	101.0	97.6	45248	44570	0.964
December	84.3	57.6	16.84	93.1	89.9	42363	40760	0.957
Year	1504.7	927.5	25.72	1557.7	1506.8	680450	664948	0.933

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		



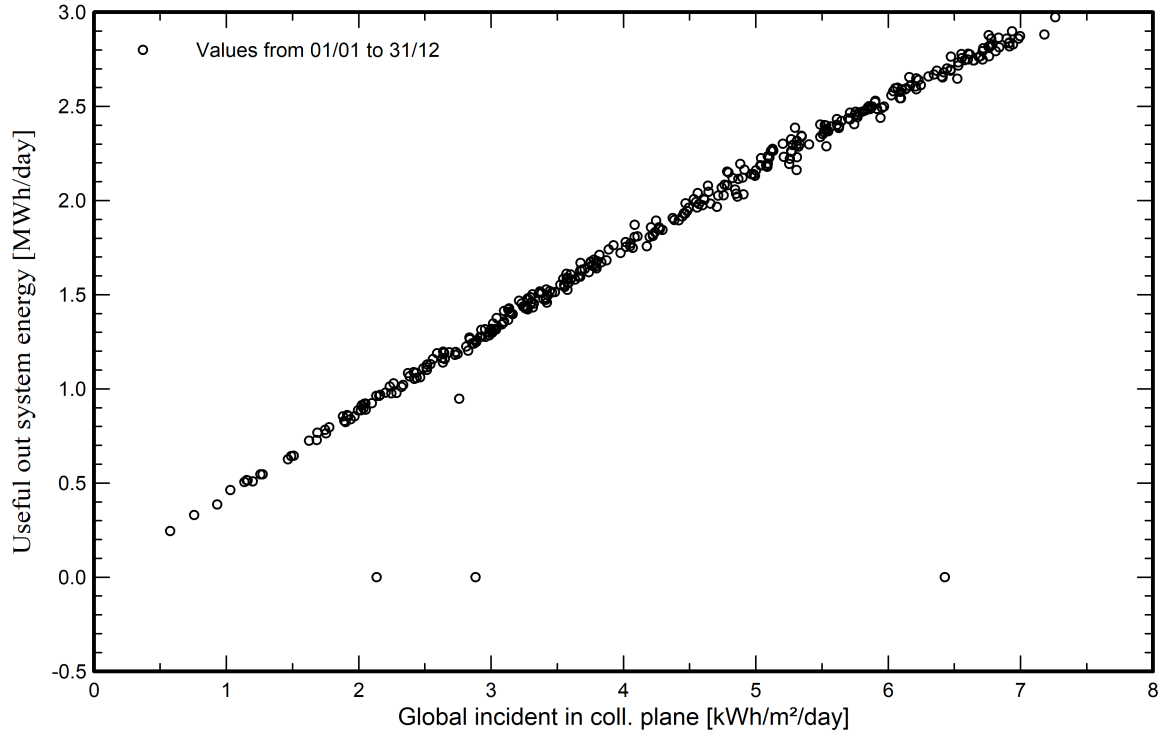
Loss diagram



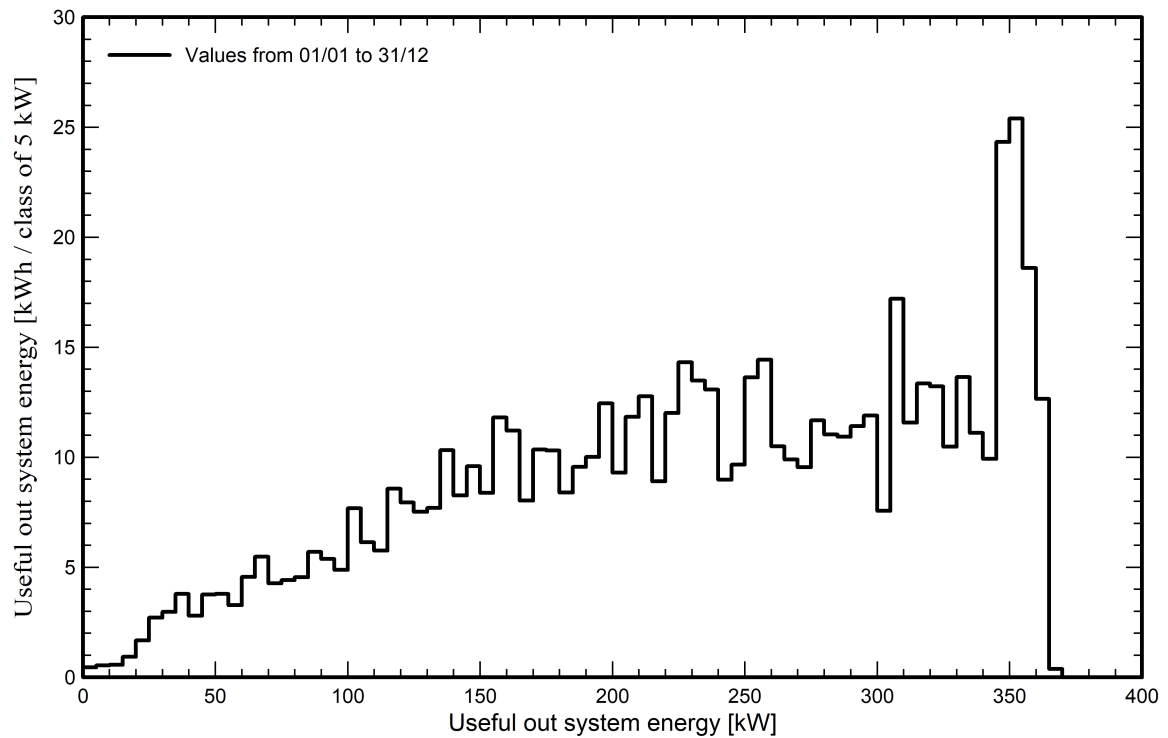


Predef. graphs

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 12.0 MWh
P50 664.9 MWh
P90 649.6 MWh
P75 656.9 MWh

Probability distribution

