

PVsyst - Simulation report

Grid-Connected System

Project: Trauma Center Dh Azamgarh

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 08:33
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 10 °

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

220 kWac

Pnom ratio

1.139

Results summary

Produced Energy 366135 kWh/year Specific production 1461 kWh/kWp/year Perf. Ratio PR 93.45 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Main results	6
Loss diagram	7
Predef. graphs	8
P50 - P90 evaluation	9



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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt	10 °
Azimuth	10 °

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

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	6.20 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 %

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	108 units
Nominal (STC)	62.6 kWp
Modules	6 string x 18 In series

At operating cond. (50°C)

Pmpp	58.1 kWp
U mpp	739 V
I mpp	79 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)	1.25
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 modules120 units
Nominal (STC)69.6 kWp
Modules10 string x 12 In series

At operating cond. (50°C)

Pmpp64.5 kWp
U mpp493 V
I mpp131 A

Array #3 - Sub-array #3

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules204 units
Nominal (STC)118 kWp
Modules12 string x 17 In series

At operating cond. (50°C)

Pmpp110 kWp
U mpp698 V
I mpp157 A

Total PV power

Nominal (STC)251 kWp
Total432 modules
Module area1115 m²

Inverter

Manufacturer

Growatt New Energy

Model

MAX 70KTL3 LV

(Original PVsyst database)

Unit Nom. Power70.0 kWac
Number of inverters1 unit
Total power70.0 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)0.99
Power sharing within this inverter

Inverter

Manufacturer

Growatt New Energy

Model

MAX 100KTL3-X LV

(Original PVsyst database)

Unit Nom. Power100 kWac
Number of inverters1 unit
Total power100 kWac
Operating voltage180-1000 V
Pnom ratio (DC:AC)1.18
Power sharing within this inverter

Total inverter power

Total power220 kWac
Number of inverters3 units
Pnom ratio1.14

Array losses

Array Soiling Losses

Loss Fraction2.0 %

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 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. 153 mΩ

Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 72 mΩ

Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 61 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 0.30 % at STC

Inverters: MAC 50KTL3-X LV, MAX 70KTL3 LV

Wire section (2 Inv.) Alu 2 x 3 x 50 mm²

Average wires length 25 m

Inverter: MAX 100KTL3-X LV

Wire section (1 Inv.) Alu 1 x 3 x 95 mm²

Wires length 0 m



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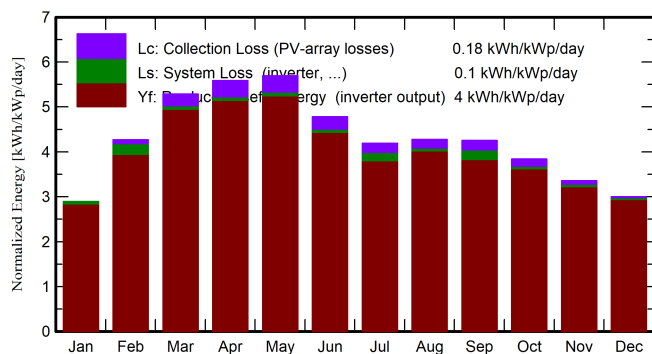
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Main results

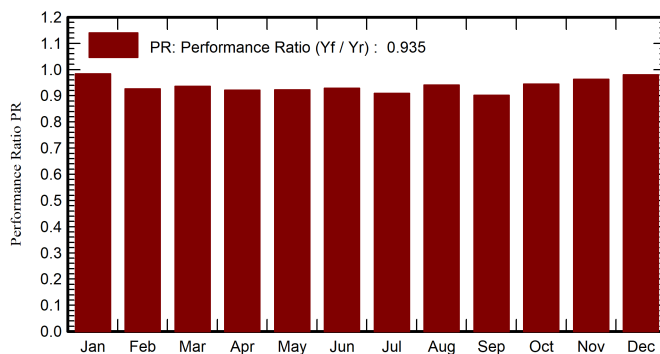
System Production

Produced Energy (P50)	366135 kWh/year	Specific production (P50)	1461 kWh/kWp/year	Perf. Ratio PR	93.45 %
Produced Energy (P90)	357671 kWh/year	Specific production (P90)	1427 kWh/kWp/year		
Produced Energy (P75)	361685 kWh/year	Specific production (P75)	1444 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

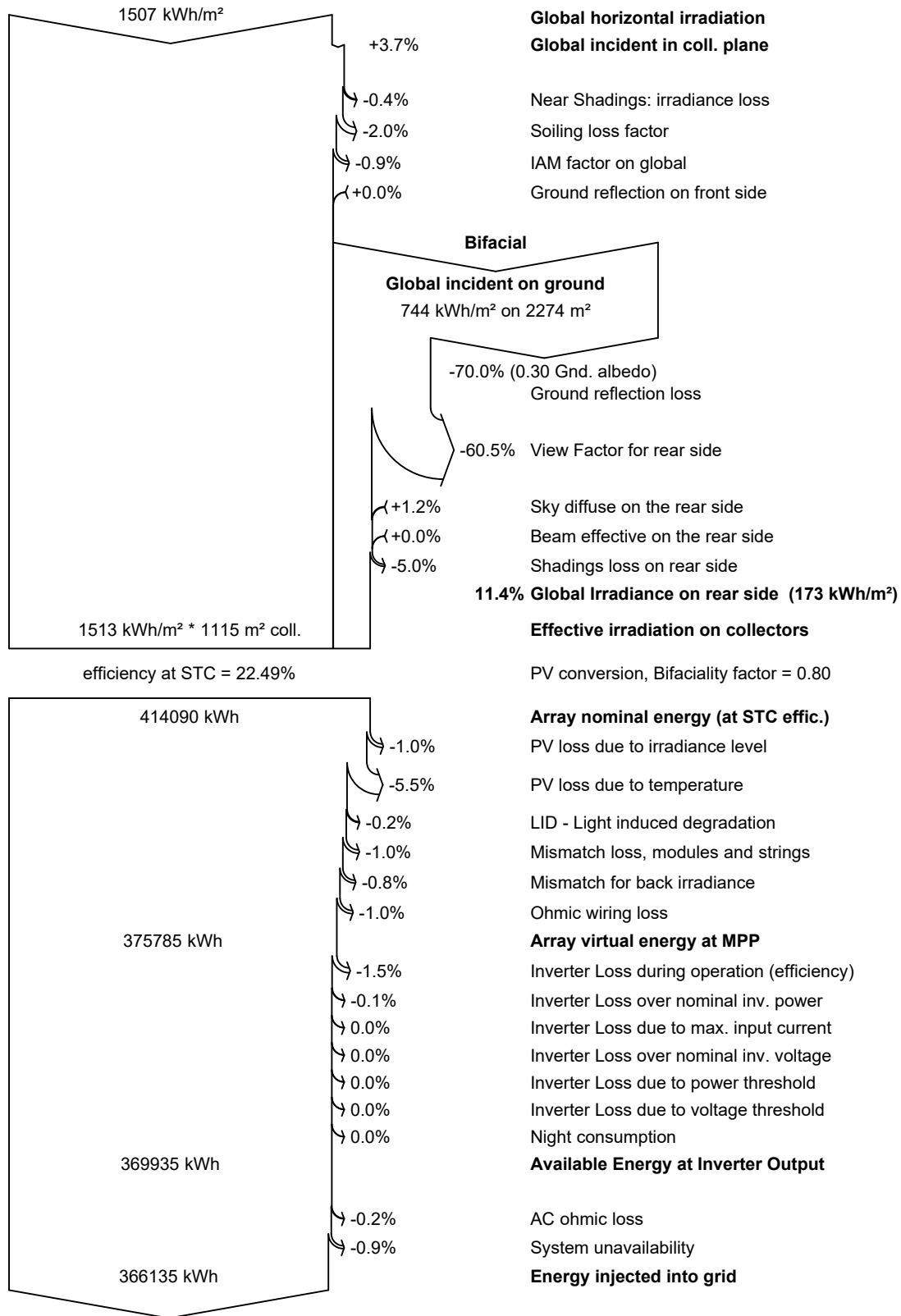
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	81.0	50.4	14.74	89.6	86.6	22462	22091	0.984
February	109.6	59.8	19.42	119.5	115.8	29383	27705	0.926
March	154.4	73.5	25.27	164.0	159.1	39109	38484	0.936
April	164.1	85.2	30.12	167.6	162.4	39331	38716	0.922
May	177.3	106.3	32.54	176.6	171.0	41460	40802	0.922
June	145.9	91.0	31.78	143.5	138.9	33938	33370	0.928
July	131.5	88.7	29.94	129.9	125.5	31004	29562	0.908
August	132.4	94.2	29.54	132.7	128.1	31771	31272	0.941
September	123.8	73.1	28.65	127.7	123.4	30417	28828	0.901
October	112.1	71.6	26.72	119.0	115.0	28637	28177	0.945
November	91.6	57.5	21.47	100.6	97.3	24684	24285	0.963
December	83.7	54.9	16.65	93.0	89.8	23208	22842	0.980
Year	1507.4	906.2	25.59	1563.7	1512.9	375401	366135	0.935

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		



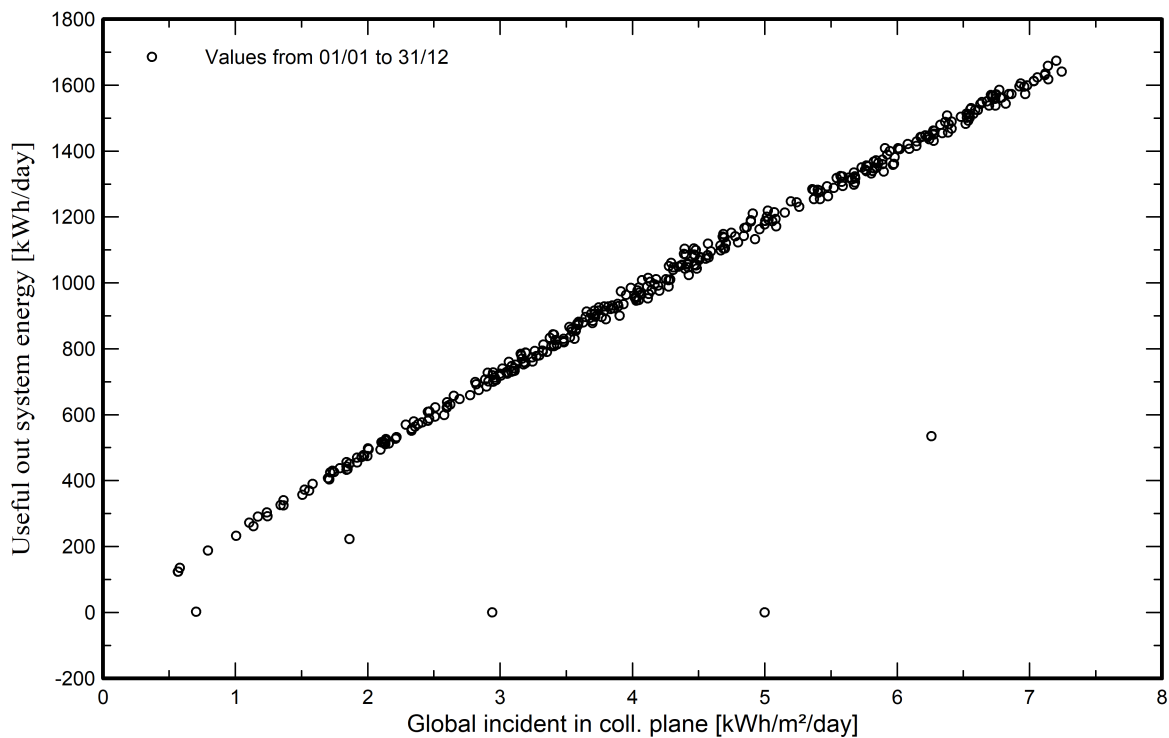
Loss diagram



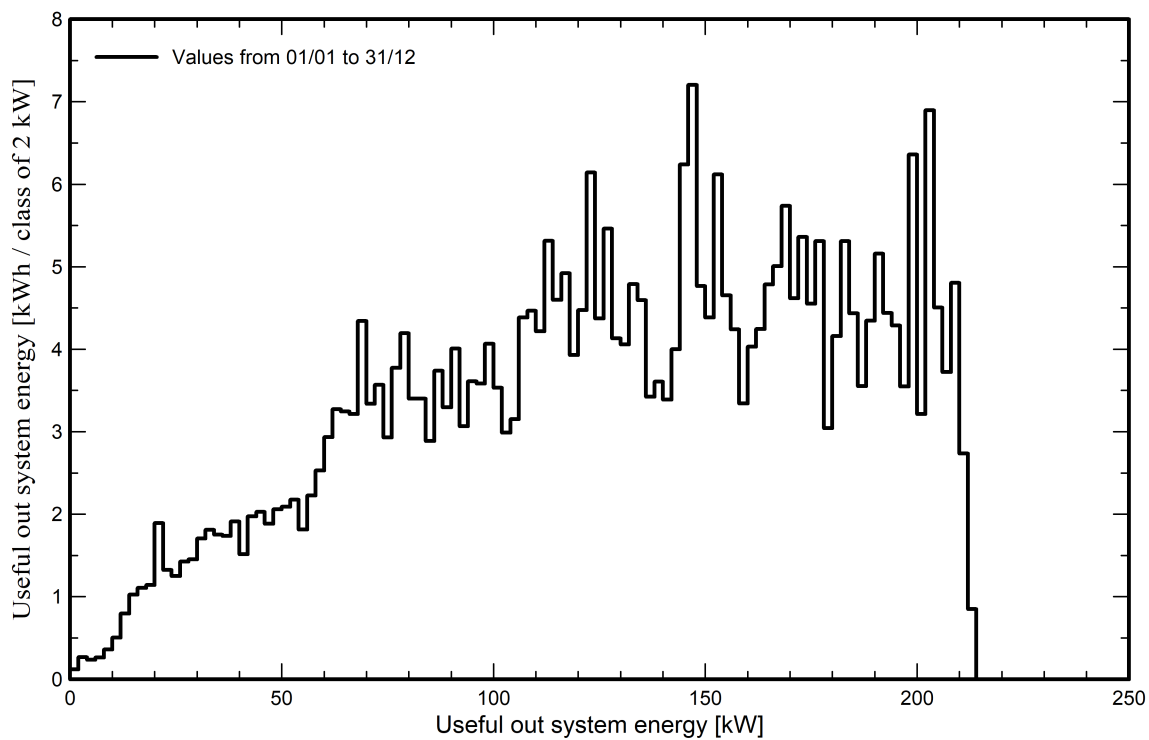


Predef. graphs

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 366.1 MWh
P90 357.7 MWh
P75 361.7 MWh

Probability distribution

