

PVsyst - Simulation report

Grid-Connected System

Project: Mahatama Vidur svashai district hopital and college

Variant: New simulation variant

Unlimited sheds

System power: 350 kWp

Bijnor - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC0, Simulation date:
17/12/24 09:19
with V8.0.2

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Project summary

Geographical Site

Bijnor

India

Situation

Latitude 29.38 °N

Longitude 78.14 °E

Altitude 251 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Bijnor

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

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth 22 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

604 units

Pnom total

350 kWp

Inverters

Nb. of units

4 units

Pnom total

300 kWac

Pnom ratio

1.168

Results summary

Produced Energy 521177 kWh/year Specific production 1488 kWh/kWp/year Perf. Ratio PR 93.46 %

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General parameters

Grid-Connected System

Orientation #1

Sheds

Tilt	10 °
Azimuth	22 °

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	6.60 m
Sheds width	3.04 m
Limit profile angle	8.2 °
GCR	46.1 %
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	8.2 °

Sizes

Sheds spacing	6.60 m
Collector width	3.00 m
Average GCR	45.5 %
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	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

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules322 units
Nominal (STC)187 kWp
Modules23 string x 14 In series

At operating cond. (50°C)

Pmpp173 kWp
U mpp575 V
I mpp301 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 modules198 units
Nominal (STC)115 kWp
Modules11 string x 18 In series

At operating cond. (50°C)

Pmpp106 kWp
U mpp739 V
I mpp144 A

Total PV power

Nominal (STC)350 kWp
Total604 modules
Module area1559 m²

Inverter

Manufacturer

Growatt New Energy

Model

MAX 80KTL3 LV

(Original PVsyst database)

Unit Nom. Power80.0 kWac
Number of inverters2 units
Total power160 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.17
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)1.15
Power sharing within this inverter

Total inverter power

Total power300 kWac
Number of inverters4 units
Pnom ratio1.17

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. 119 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 84 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 31 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 0.06 % at STC

Inverters: MID 40KTL3-X, MAX 100KTL3-X LV

Wire section (2 Inv.) Alu 2 x 3 x 95 mm²
Average wires length 23 m

Inverter: MAX 80KTL3 LV

Wire section (2 Inv.) Alu 2 x 3 x 70 mm²
Average wires length 0 m



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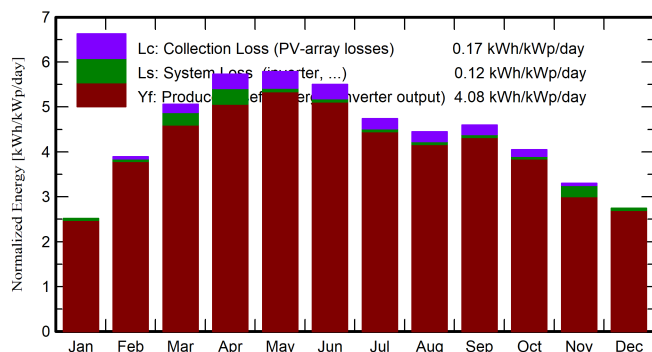
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Main results

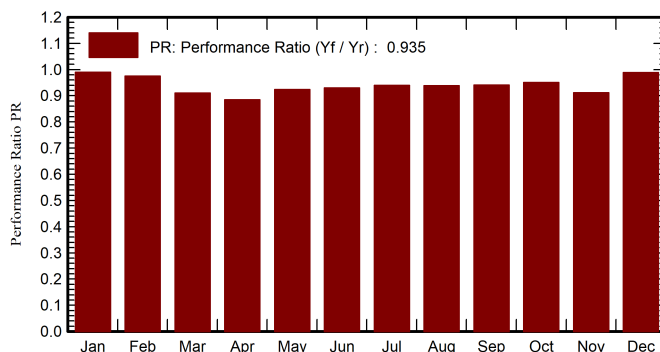
System Production

Produced Energy (P50)	521177 kWh/year	Specific production (P50)	1488 kWh/kWp/year	Perf. Ratio PR	93.46 %
Produced Energy (P90)	509129 kWh/year	Specific production (P90)	1453 kWh/kWp/year		
Produced Energy (P75)	514843 kWh/year	Specific production (P75)	1470 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

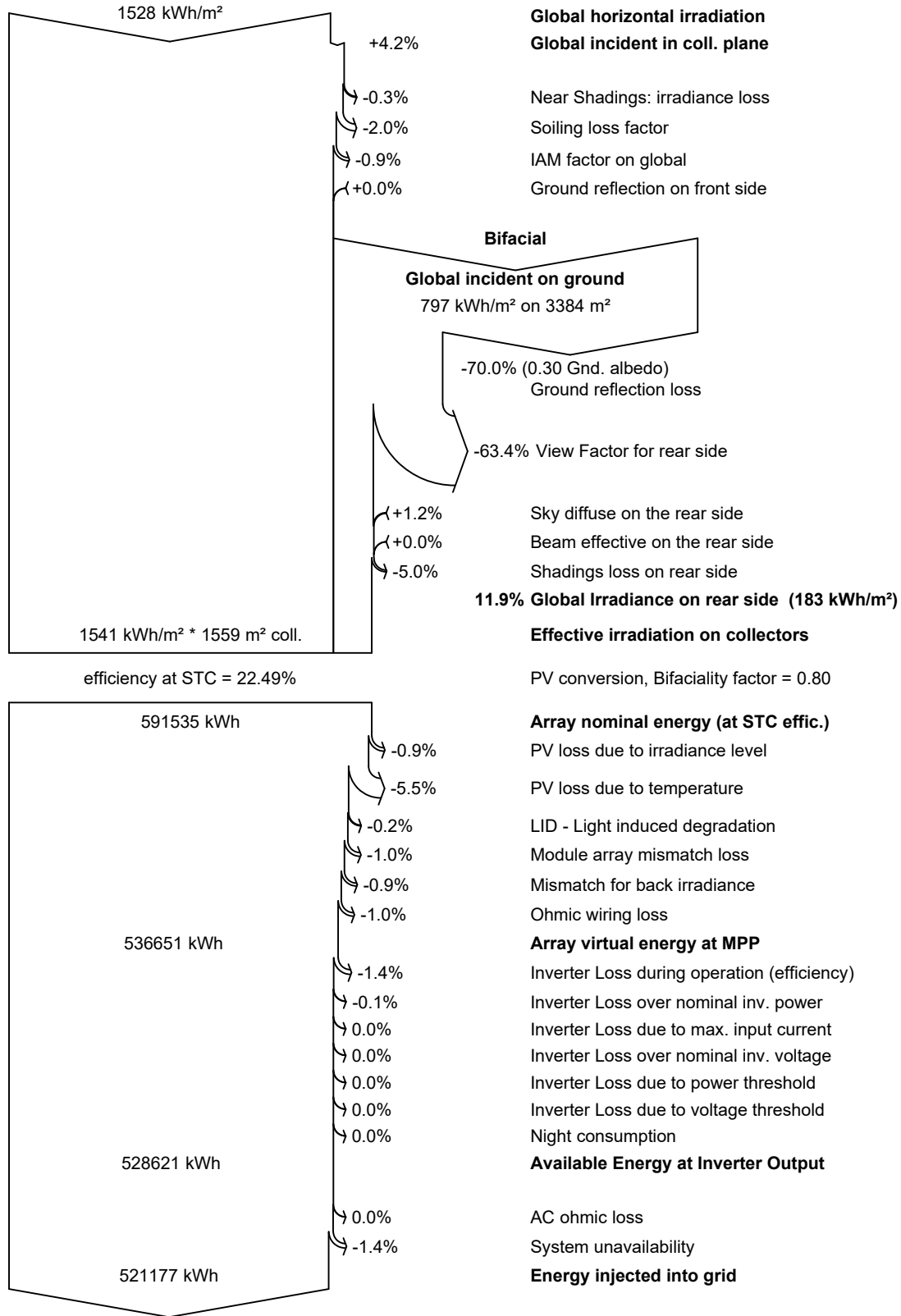
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	69.9	40.5	13.26	77.6	75.1	27359	26919	0.990
February	99.1	52.2	17.30	108.9	105.4	37743	37201	0.975
March	148.0	75.1	23.25	156.9	152.0	53032	50001	0.910
April	166.8	83.0	29.07	171.9	166.7	56895	53280	0.885
May	179.1	100.5	32.91	179.5	173.9	58922	58090	0.924
June	166.7	101.4	32.62	165.1	159.9	54539	53768	0.930
July	147.9	103.9	31.02	146.9	141.9	49067	48378	0.940
August	136.1	87.5	30.02	137.8	133.3	46006	45319	0.939
September	132.4	76.0	28.77	138.0	133.6	46153	45495	0.941
October	116.9	68.2	26.05	125.4	121.5	42388	41781	0.951
November	89.2	54.4	19.96	98.9	95.6	34222	31590	0.912
December	75.5	46.6	14.87	84.8	81.9	29805	29355	0.988
Year	1527.6	889.3	24.96	1591.8	1540.9	536131	521177	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		



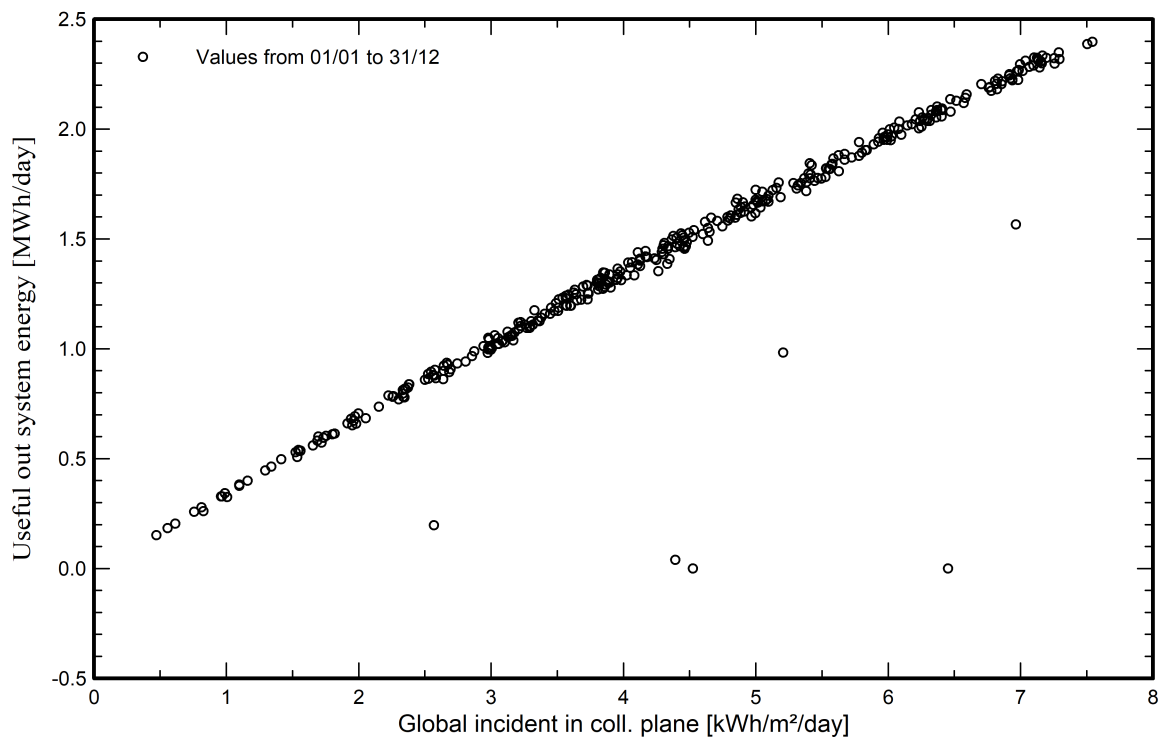
Loss diagram



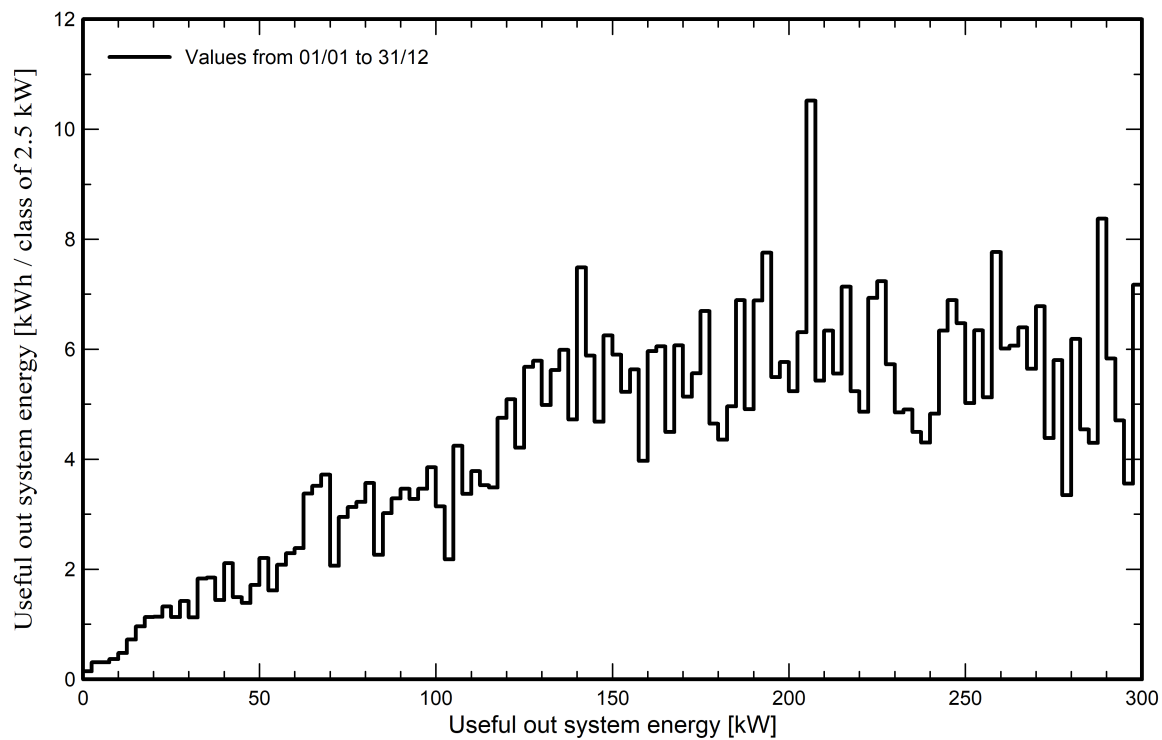


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





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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 9.4 MWh
P50 521.2 MWh
P90 509.1 MWh
P75 514.8 MWh

Probability distribution

