

PVsyst - Simulation report

Grid-Connected System

Project: District Hospital Chandauli

Variant: New simulation variant

Unlimited sheds

System power: 214 kWp

Phutia - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC0, Simulation date:
16/12/24 16:49
with V8.0.2

Jakson Limited (India)

Project summary

Geographical Site

Phutia
India

Situation

Latitude 25.26 °N
Longitude 83.27 °E
Altitude 78 m
Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Phutia
Meteonorm 8.2 (2001-2020), Sat=100% - Synthetic

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °
Azimuth 5 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules 369 units
Pnom total 214 kWp

Inverters

Nb. of units 3 units
Pnom total 190 kWac
Pnom ratio 1.126

Results summary

Produced Energy 296254 kWh/year Specific production 1384 kWh/kWp/year Perf. Ratio PR 86.09 %

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General parameters

Grid-Connected System

Orientation #1

Sheds

Tilt	10 °
Azimuth	5 °

Unlimited sheds

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

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	80 units
Nominal (STC)	46.4 kWp
Modules	5 string x 16 In series

At operating cond. (50°C)

Pmpp	43.0 kWp
U mpp	657 V
I mpp	65 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)	0.93
Power sharing within this inverter	

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	289 units
Nominal (STC)	168 kWp
Modules	17 string x 17 In series

At operating cond. (50°C)

Pmpp	155 kWp
U mpp	698 V
I mpp	223 A

Inverter

Manufacturer Growatt New Energy
Model MAX 70KTL3 LV
(Original PVsyst database)

Unit Nom. Power	70.0 kWac
Number of inverters	2 units
Total power	140 kWac
Operating voltage	200-1000 V
Pnom ratio (DC:AC)	1.20
Power sharing within this inverter	

Total PV power

Nominal (STC)	214 kWp
Total	369 modules
Module area	952 m²

Total inverter power

Total power	190 kWac
Number of inverters	3 units
Pnom ratio	1.13



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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

Array #1 - PV Array

Loss Fraction 1.0 % at MPP

Array #2 - Sub-array #2

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

DC wiring losses

Global wiring resistance 10 mΩ

Loss Fraction 1.5 % at STC

Array #1 - PV Array

Global array res. 163 mΩ

Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 51 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 0.16 % at STC

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

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

Average wires length 13 m



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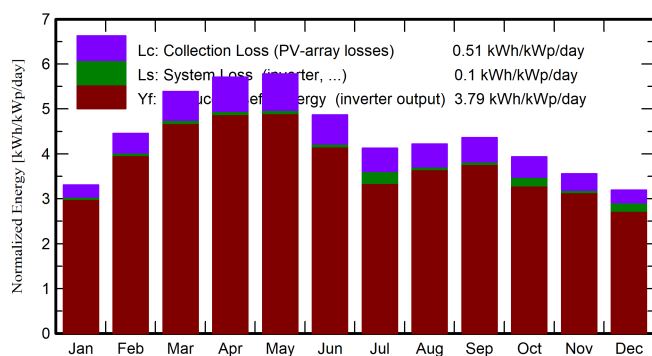
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Main results

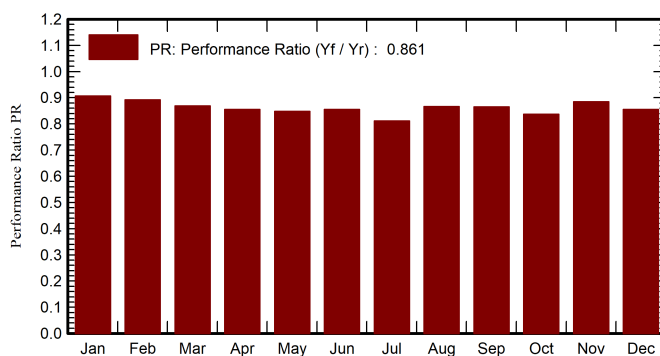
System Production

Produced Energy (P50)	296254 kWh/year	Specific production (P50)	1384 kWh/kWp/year	Perf. Ratio PR	86.09 %
Produced Energy (P90)	289406 kWh/year	Specific production (P90)	1352 kWh/kWp/year		
Produced Energy (P75)	292653 kWh/year	Specific production (P75)	1367 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

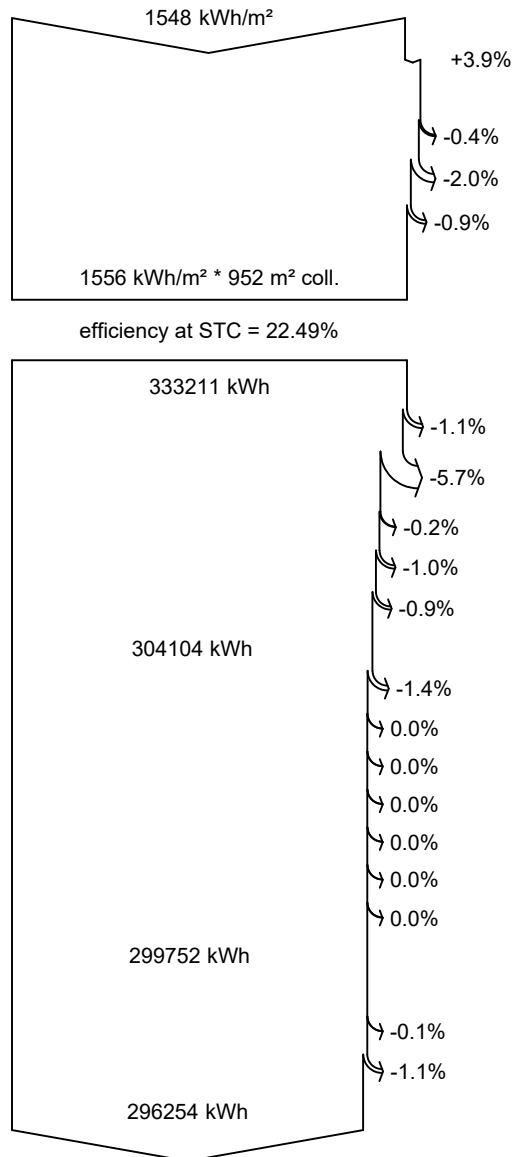
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	92.4	57.49	15.03	102.5	99.0	20182	19888	0.907
February	113.9	58.61	19.62	124.7	120.8	24153	23811	0.892
March	157.7	73.74	25.69	167.0	162.0	31518	31063	0.869
April	168.2	90.56	30.85	171.3	165.9	31801	31357	0.855
May	180.2	97.39	33.80	179.2	173.6	32999	32522	0.848
June	148.7	99.51	32.82	146.0	141.1	27154	26744	0.856
July	130.0	86.56	30.57	127.9	123.5	23985	22220	0.812
August	130.8	89.51	29.90	130.8	126.3	24618	24247	0.866
September	126.7	73.48	28.97	130.8	126.5	24595	24219	0.865
October	115.0	72.41	27.25	122.1	118.0	23118	21856	0.837
November	96.3	53.97	21.94	106.7	103.3	20517	20208	0.885
December	88.2	53.85	16.85	98.9	95.6	19367	18120	0.856
Year	1548.2	907.07	26.13	1607.9	1555.5	304008	296254	0.861

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



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

Soiling loss factor

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

LID - Light induced degradation

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

AC ohmic loss

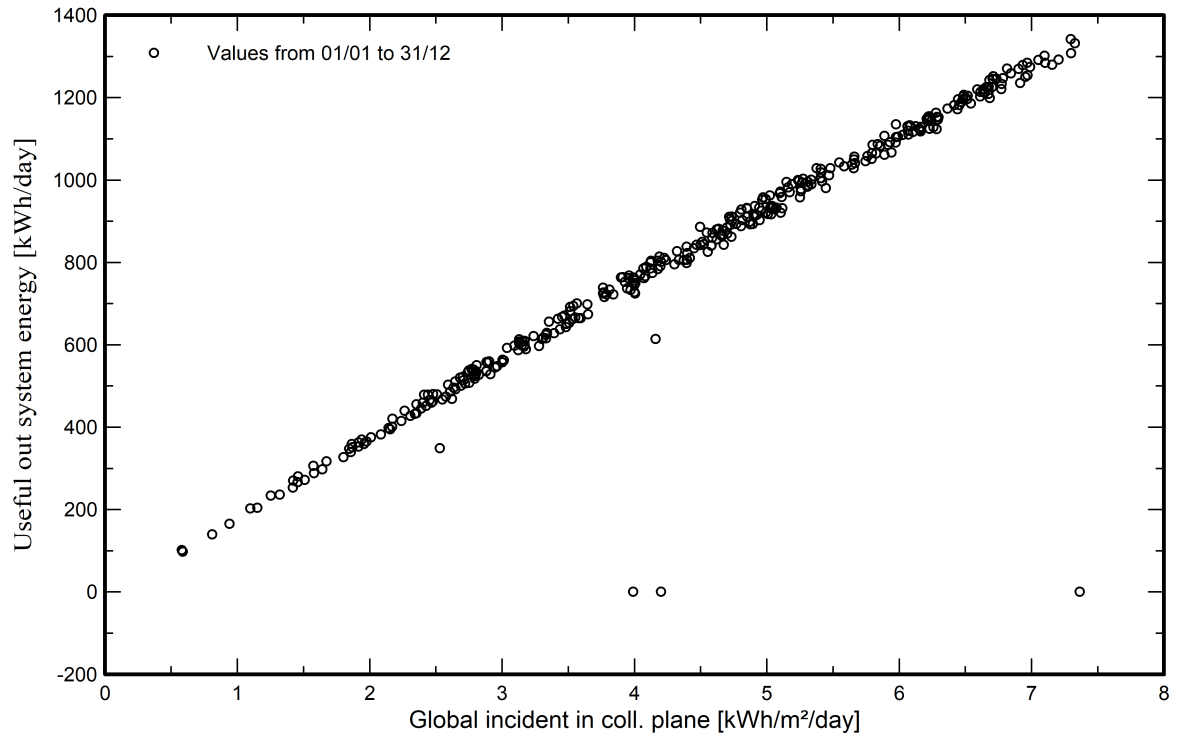
System unavailability

Energy injected into grid

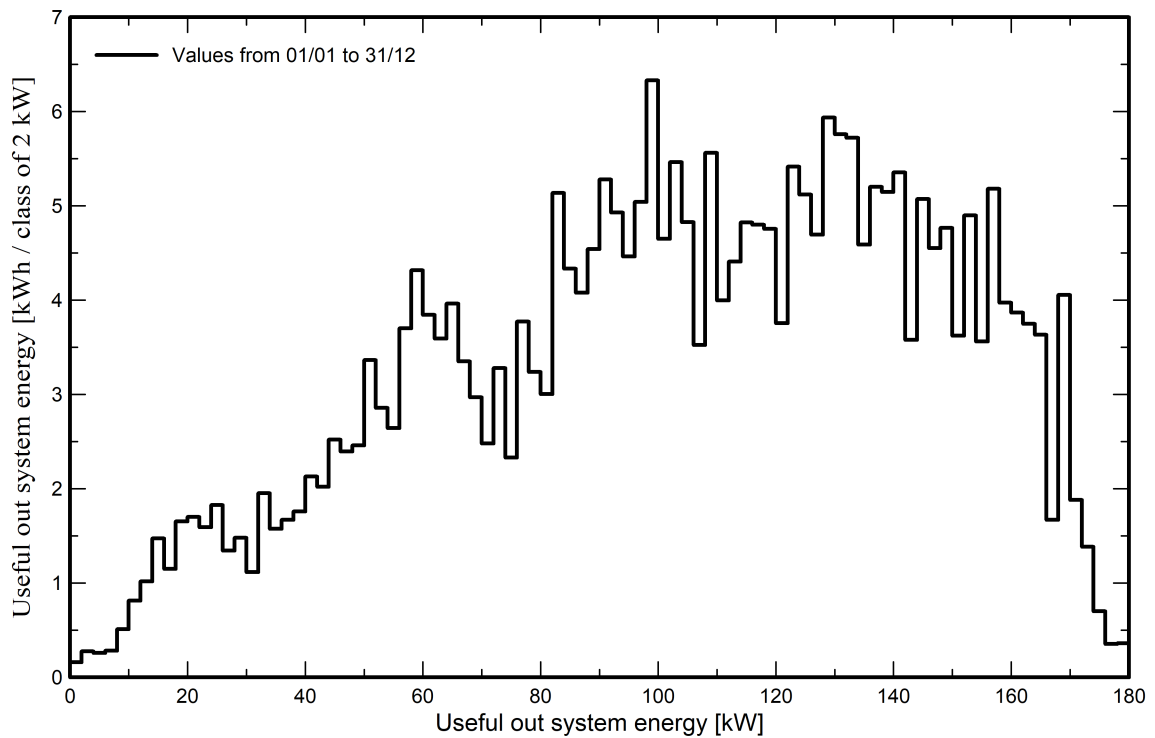


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





P50 - P90 evaluation

Weather data

Source Meteonorm 8.2 (2001-2020), 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 5.3 MWh
P50 296.3 MWh
P90 289.4 MWh
P75 292.7 MWh

Probability distribution

