

PVsyst - Simulation report

Grid-Connected System

Project: District Combined Hospital Shamli

Variant: New simulation variant

Unlimited sheds

System power: 430 kWp

Mundeth - India

Author

Jakson Limited (India)



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PVsyst V8.0.2

VC0, Simulation date:
25/12/24 08:03
with V8.0.2

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Project summary

Geographical Site

Mundeth

India

Situation

Latitude 29.46 °N

Longitude 77.30 °E

Altitude 239 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Mundeth

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

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth 8 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

742 units

Pnom total

430 kWp

Inverters

Nb. of units

4 units

Pnom total

405 kWac

Pnom ratio

1.063

Results summary

Produced Energy 662580 kWh/year Specific production 1540 kWh/kWp/year Perf. Ratio PR 93.84 %

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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt	10 °
Azimuth	8 °

Sheds configuration

Nb. of sheds	10 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	9 °

Sizes

Sheds spacing	6.30 m
Collector width	3.00 m
Average GCR	47.6 %
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	6.30 m
Sheds width	3.04 m
Limit profile angle	9.0 °
GCR	48.3 %
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	40 units
Nominal (STC)	23.20 kWp
Modules	4 string x 10 In series

At operating cond. (50°C)

Pmpp	21.51 kWp
U mpp	411 V
I mpp	52 A

Inverter

Manufacturer	Growatt New Energy
Model	MID 30KTL3-X
(Original PVsyst database)	
Unit Nom. Power	30.0 kWac
Number of inverters	1 unit
Total power	30.0 kWac
Operating voltage	200-1000 V
Pnom ratio (DC:AC)	0.77
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 702 units
Nominal (STC) 407 kWp
Modules 39 string x 18 In series

At operating cond. (50°C)

Pmpp 378 kWp
U mpp 739 V
I mpp 511 A

Total PV power

Nominal (STC) 430 kWp
Total 742 modules
Module area 1915 m²

Inverter

Manufacturer Growatt New Energy
Model MAX 125KTL3-X LV
(Original PVsyst database)

Unit Nom. Power 125 kWac
Number of inverters 3 units
Total power 375 kWac
Operating voltage 180-1000 V
Pnom ratio (DC:AC) 1.09
Power sharing within this inverter

Total inverter power

Total power 405 kWac
Number of inverters 4 units
Pnom ratio 1.06

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 0.2 % at STC

LID - Light Induced Degradation

Loss Fraction 0.3 %

Module Quality Loss

Loss Fraction 0.0 %

Module mismatch losses

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. 128 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 24 mΩ
Loss Fraction 1.5 % at STC

System losses

Unavailability of the system

Time fraction 1.0 %
3.7 days,
3 periods



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AC wiring losses

Inv. output line up to injection point

Inverter voltage	400 Vac tri
Loss Fraction	0.01 % at STC

Inverters: MID 30KTL3-X, MAX 125KTL3-X LV

Wire section (4 Inv.)	Alu 4 x 3 x 120 mm ²
Average wires length	15 m



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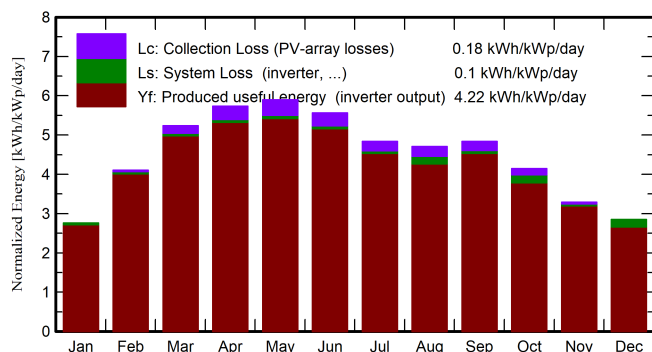
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Main results

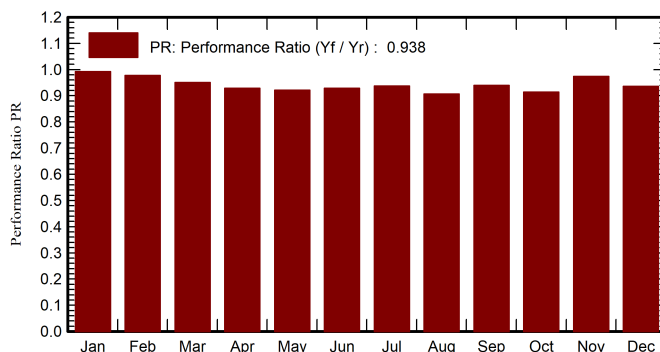
System Production

Produced Energy (P50)	662580 kWh/year	Specific production (P50)	1540 kWh/kWp/year	Perf. Ratio PR	93.84 %
Produced Energy (P90)	647263 kWh/year	Specific production (P90)	1504 kWh/kWp/year		
Produced Energy (P75)	654527 kWh/year	Specific production (P75)	1521 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	75.1	41.8	13.12	85.0	82.2	36855	36286	0.992
February	104.1	53.7	17.03	115.1	111.5	49083	48385	0.977
March	151.7	70.6	23.02	162.4	157.5	67392	66458	0.951
April	166.9	81.3	28.94	172.0	166.8	69741	68731	0.929
May	182.4	96.0	33.06	182.7	177.1	73438	72400	0.921
June	168.4	105.6	32.77	166.9	161.6	67654	66713	0.929
July	151.1	102.5	31.21	150.1	145.1	61445	60568	0.938
August	143.6	85.3	30.17	145.9	141.3	59532	56949	0.907
September	138.4	76.1	28.70	145.1	140.5	59499	58636	0.939
October	119.1	66.9	25.95	128.6	124.6	53273	50585	0.914
November	88.7	54.9	19.76	98.7	95.4	41946	41357	0.973
December	77.6	46.9	14.74	88.1	85.2	38032	35512	0.936
Year	1567.1	881.5	24.91	1640.7	1588.8	677891	662580	0.938

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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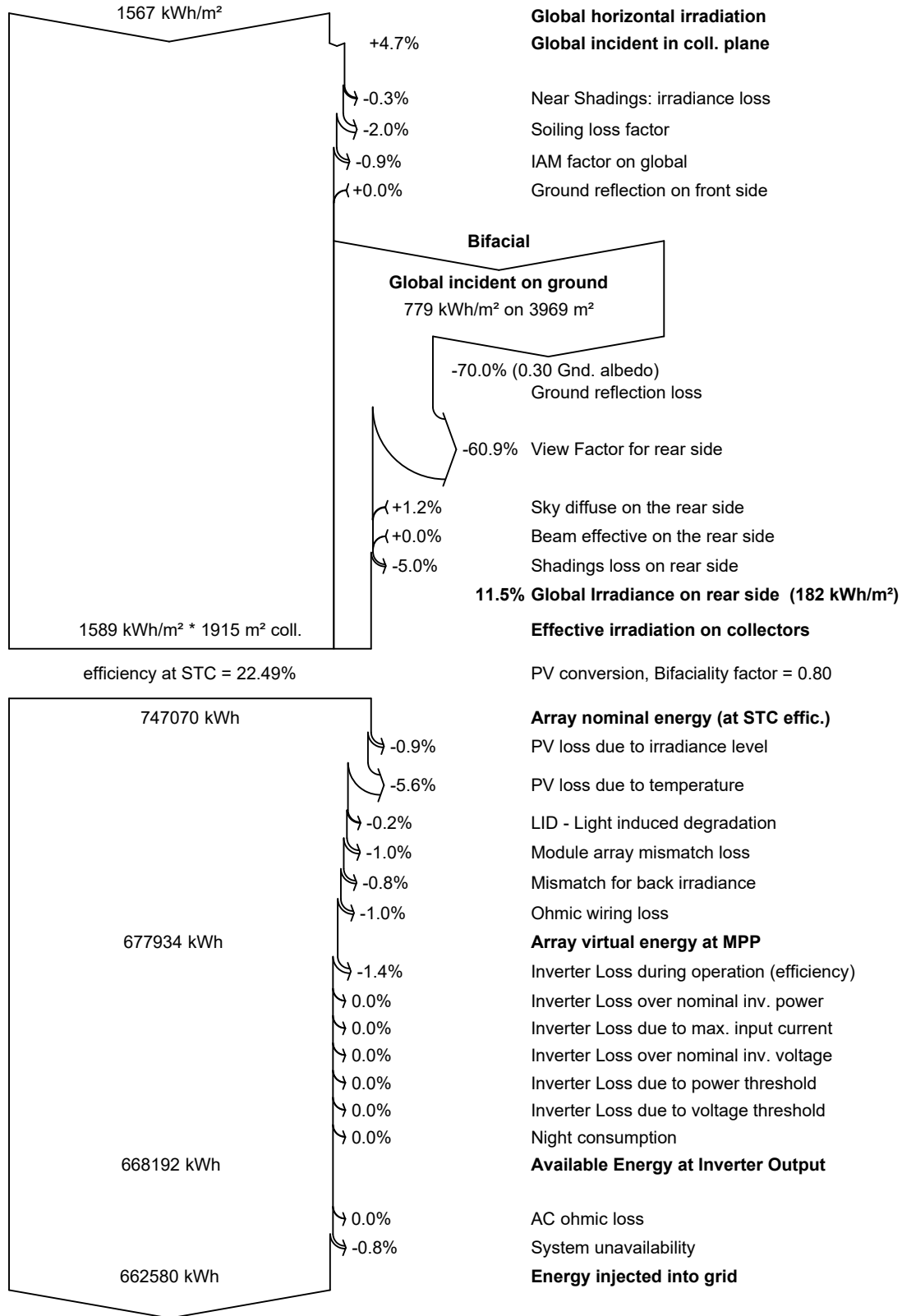
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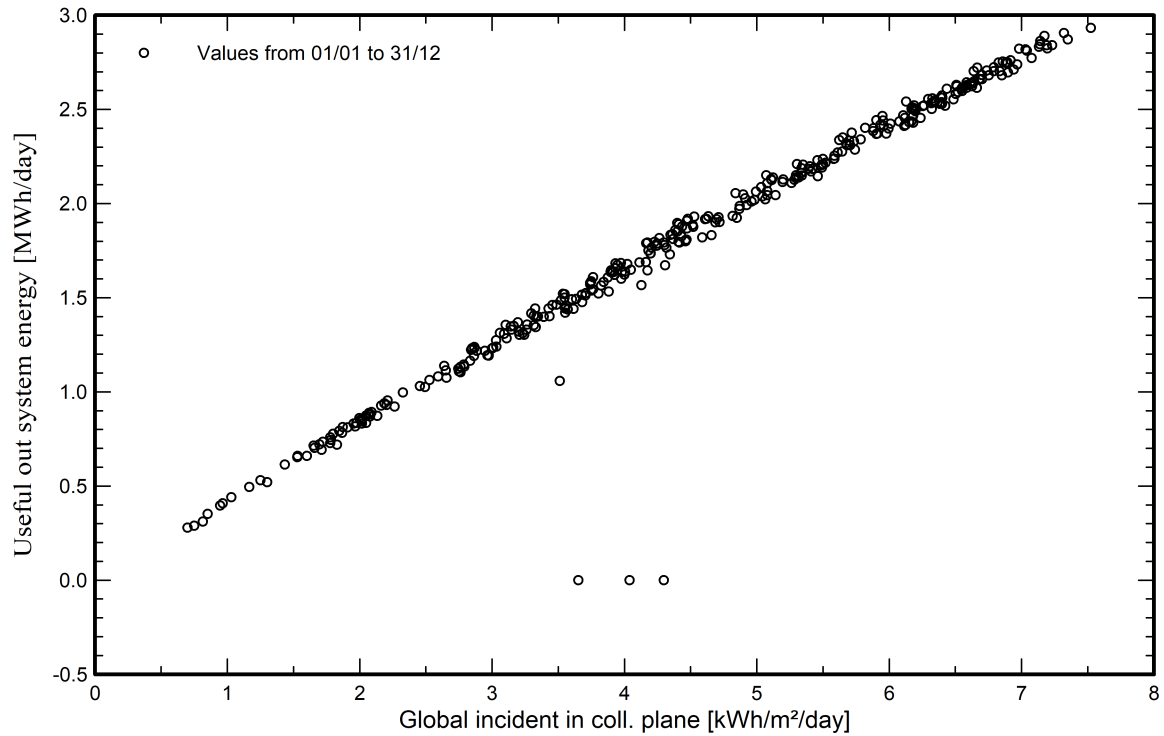
Loss diagram



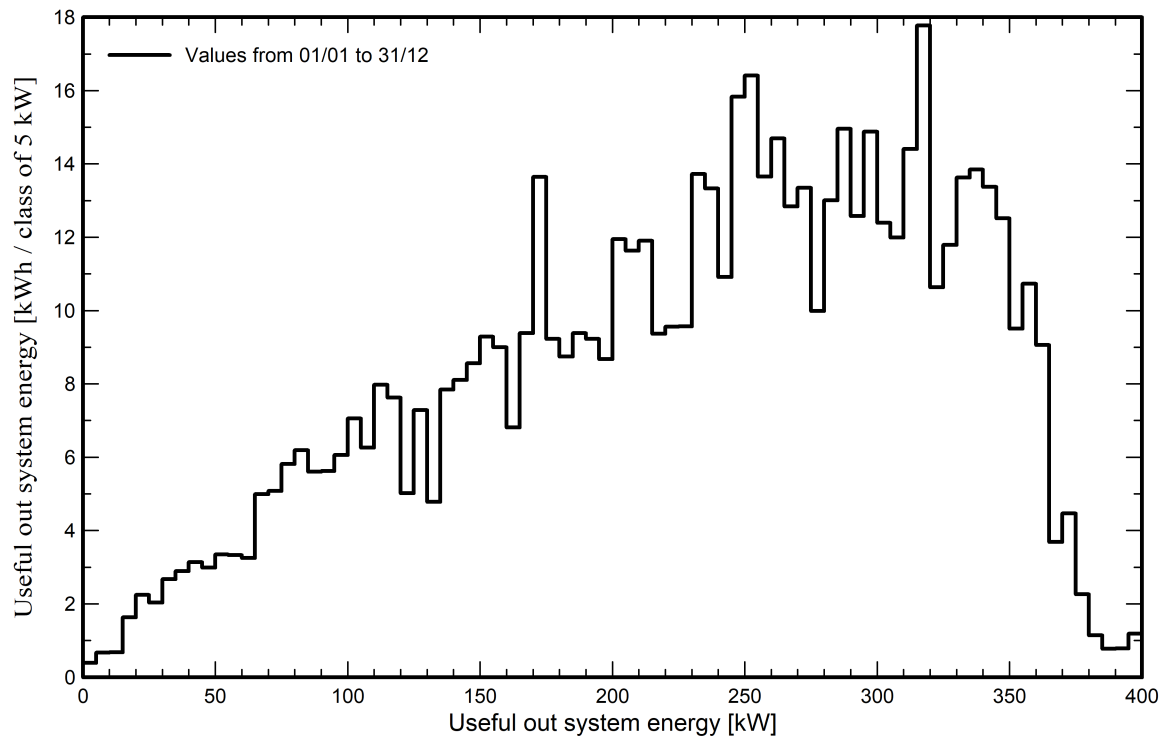


Predef. graphs

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) 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 11.9 MWh
P50 662.6 MWh
P90 647.3 MWh
P75 654.5 MWh

Probability distribution

