

PVsyst - Simulation report

Grid-Connected System

Project: Medical College Etah

Variant: New simulation variant

Unlimited sheds

System power: 506 kWp

Nagla Puriāl - India

Author

Jakson Limited (India)

**PVsyst V8.0.2**

VC0, Simulation date:
17/12/24 09:53
with V8.0.2

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Jakson Limited (India)

Project summary**Geographical Site****Nagla Puriāl**

India

Situation

Latitude 27.61 °N

Longitude 78.63 °E

Altitude 171 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Nagla Puriāl

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

System summary**Grid-Connected System****Orientation #1****Sheds**

Tilt 10 °

Azimuth -31 °

Unlimited sheds**Near Shadings**

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information**PV Array**

Nb. of modules

872 units

Pnom total

506 kWp

Inverters

Nb. of units

6 units

Pnom total

430 kWac

Pnom ratio

1.176

Results summary

Produced Energy 777703 kWh/year Specific production 1538 kWh/kWp/year Perf. Ratio PR 92.94 %

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General parameters

Grid-Connected System

Unlimited sheds

Orientation #1

Sheds

Tilt	10 °
Azimuth	-31 °

Sheds configuration

Nb. of sheds	15 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	8.5 °

Sizes

Sheds spacing	6.50 m
Collector width	3.00 m
Average GCR	46.2 %
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	6.50 m
Sheds width	3.04 m
Limit profile angle	8.5 °
GCR	46.8 %
Height above ground	1.00 m
Nb. of sheds	15 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	60 units
Nominal (STC)	34.8 kWp
Modules	4 string x 15 In series

At operating cond. (50°C)

Pmpp	32.3 kWp
U mpp	616 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)	1.16
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 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

Array #3 - Sub-array #3

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules608 units
Nominal (STC)353 kWp
Modules32 string x 19 In series

At operating cond. (50°C)

Pmpp327 kWp
U mpp780 V
I mpp419 A

Total PV power

Nominal (STC)506 kWp
Total872 modules
Module area2251 m²

Inverter

Manufacturer

Growatt New Energy

Model

MAX 50KTL3 LV

(Original PVsyst database)

Unit Nom. Power50.0 kWac
Number of inverters2 units
Total power100 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.18
Power sharing within this inverter

Inverter

Manufacturer

Growatt New Energy

Model

MAX 100KTL3-X LV

(Original PVsyst database)

Unit Nom. Power100 kWac
Number of inverters3 units
Total power300 kWac
Operating voltage180-1000 V
Pnom ratio (DC:AC)1.18
Power sharing within this inverter

Total inverter power

Total power430 kWac
Number of inverters6 units
Pnom ratio1.18

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

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. 192 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 30 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 72 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 0.02 % at STC

Inverters: MID 30KTL3-X, MAX 100KTL3-X LV

Wire section (4 Inv.) Alu 4 x 3 x 95 mm²
Average wires length 11 m

Inverter: MAX 50KTL3 LV

Wire section (2 Inv.) Alu 2 x 3 x 35 mm²
Average wires length 0 m

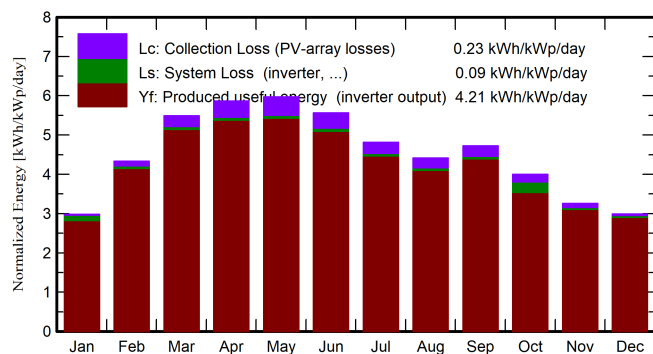


Main results

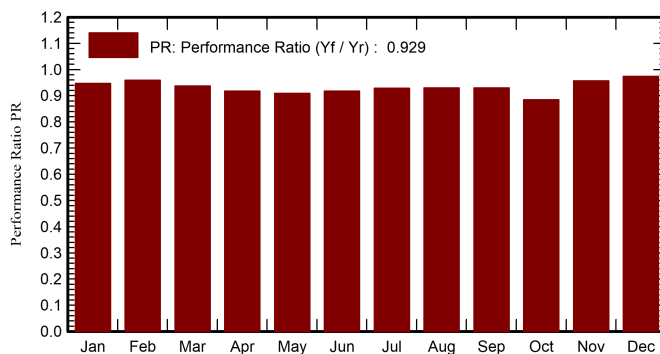
System Production

Produced Energy (P50)	777703 kWh/year	Specific production (P50)	1538 kWh/kWp/year	Perf. Ratio PR	92.94 %
Produced Energy (P90)	759725 kWh/year	Specific production (P90)	1502 kWh/kWp/year		
Produced Energy (P75)	768251 kWh/year	Specific production (P75)	1519 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

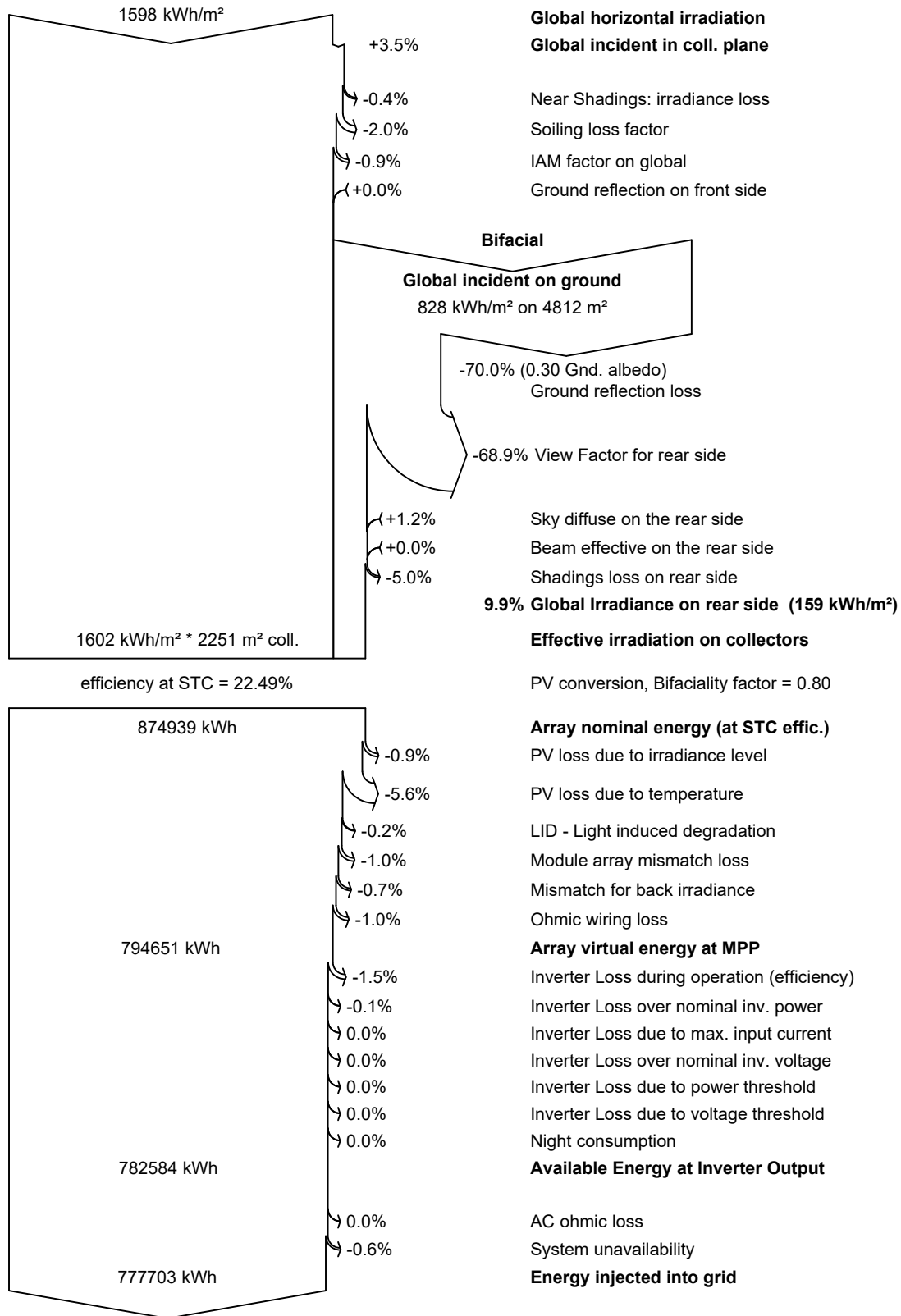
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	84.5	52.5	13.45	92.5	89.4	46483	44288	0.947
February	111.2	54.2	17.95	121.3	117.5	59755	58875	0.959
March	160.6	72.6	24.23	170.2	165.0	81852	80676	0.937
April	172.6	85.0	29.97	175.9	170.5	82870	81641	0.918
May	185.4	100.4	33.84	185.1	179.4	86394	85127	0.910
June	168.2	103.8	33.23	166.9	161.7	78575	77433	0.917
July	150.8	99.3	31.23	149.3	144.4	71152	70089	0.928
August	136.0	90.6	30.09	136.9	132.3	65412	64419	0.930
September	136.7	76.6	29.00	141.9	137.4	67705	66688	0.930
October	117.5	73.7	26.60	124.1	120.1	59755	55557	0.885
November	90.5	58.4	20.40	97.7	94.3	47945	47246	0.956
December	84.0	53.7	15.10	92.7	89.5	46351	45663	0.974
Year	1597.9	920.7	25.46	1654.5	1601.6	794250	777703	0.929

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		



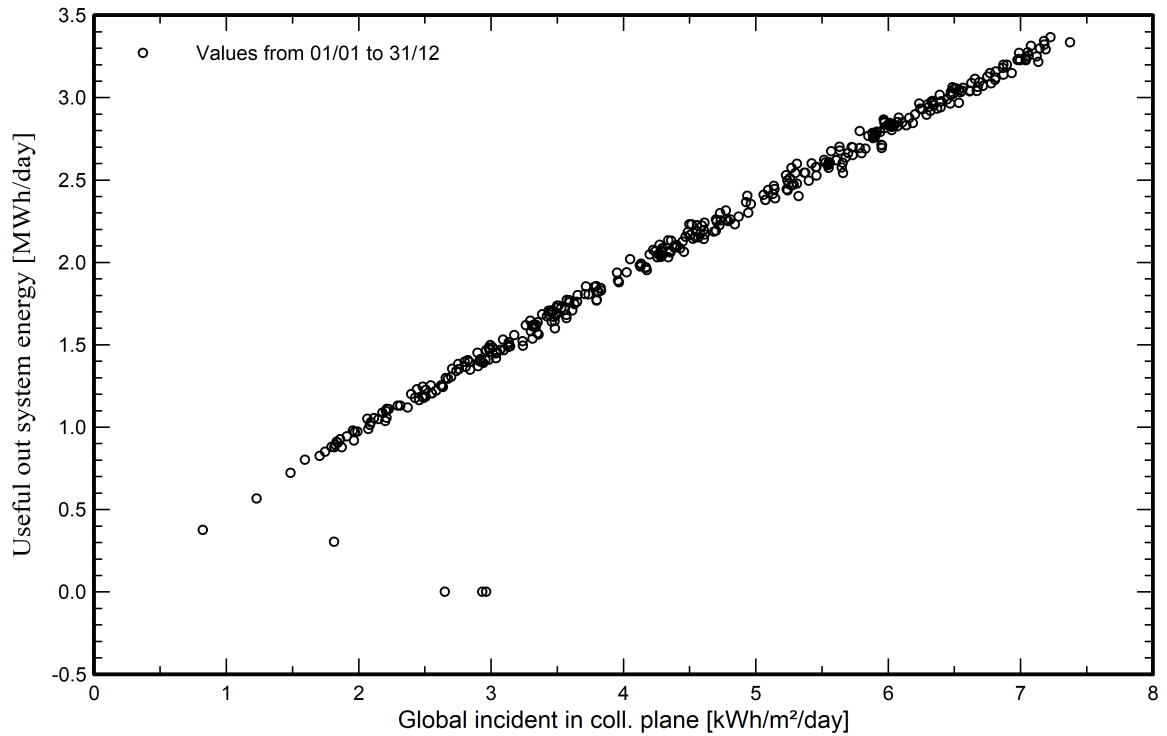
Loss diagram



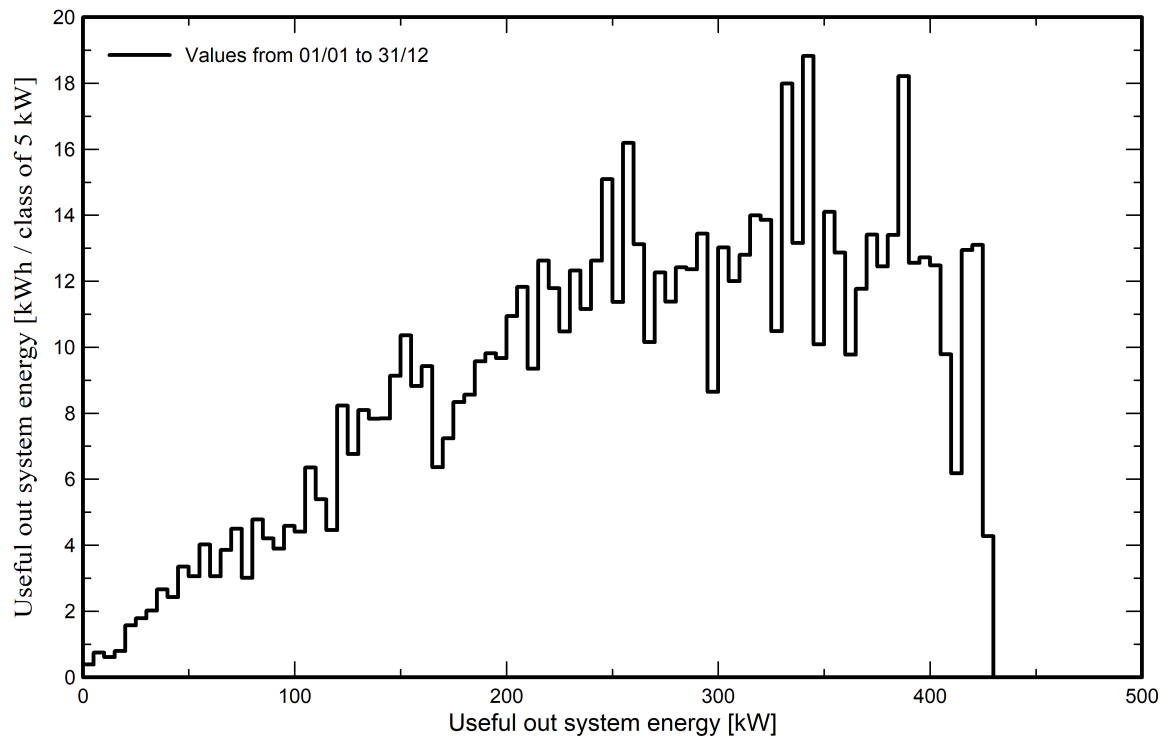


Predef. graphs

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 14.0 MWh
P50 777.7 MWh
P90 759.7 MWh
P75 768.3 MWh

Probability distribution

