

# PVsyst - Simulation report

## Grid-Connected System

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Project: Pratapgrh medical College

Variant: New simulation variant

Multiple Orientation

System power: 521 kWp

Pure Musalmān - India

**Author**

Jakson Limited (India)



# Project: Pratapgrh medical College

Variant: New simulation variant

## PVsyst V8.0.2

VC0, Simulation date:  
17/12/24 11:10  
with V8.0.2

Jakson Limited (India)

### Project summary

#### Geographical Site

Pure Musalmān

India

#### Situation

Latitude 25.94 °N

Longitude 81.97 °E

Altitude 92 m

Time zone UTC+5.5

#### Project settings

Albedo 0.20

#### Weather data

Pure Musalmān

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

### System summary

#### Grid-Connected System

##### Orientation #1

##### Sheds

Tilt 10 °

Azimuth 21 °

##### Near Shadings

no Shadings

#### System information

##### PV Array

Nb. of modules

Pnom total

#### Multiple Orientation

##### Orientation #2

##### Fixed plane

Tilt/Azimuth 6 / 111 °

##### User's needs

Unlimited load (grid)

##### Orientation #3

##### Fixed plane

Tilt/Azimuth 6 / -66 °

##### Inverters

Nb. of units

Pnom total

Pnom ratio

4 units

455 kWac

1.145

### Results summary

Produced Energy 755088 kWh/year Specific production 1450 kWh/kWp/year Perf. Ratio PR 91.68 %

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## General parameters

## Grid-Connected System

## Orientation #1

## Sheds

Tilt	10 °
Azimuth	21 °

## Orientation #2

## Fixed plane

Tilt/Azimuth	6 / 111 °
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## Orientation #3

## Fixed plane

Tilt/Azimuth	6 / -66 °
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## Near Shadings

no Shadings

## Multiple Orientation

## Sheds configuration

Nb. of sheds	10 units
Unlimited sheds	
<b>Shading limit angle</b>	
Limit profile angle	8.5 °

## Sheds configuration

No 3D scene defined

## Sheds configuration

No 3D scene defined

## Bifacial system definition

## Orientation #1

## Bifacial system

Model Unlimited Sheds 2D Model

## Bifacial model geometry

Sheds spacing	6.50 m
Sheds width	3.04 m
Limit profile angle	8.5 °
GCR	46.8 %
Height above ground	1.50 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 %

## 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

## User's needs

Unlimited load (grid)

## PV Array Characteristics

## Array #1 - PV Array

Orientation	#1
Tilt/Azimuth	10/21 °

## PV module

Manufacture Panasonic Life Solutions India Pvt. Ltd  
Model AE14T580VHC16B5R  
(Custom parameters definition)

Unit Nom. Power	580 Wp
Number of PV modules	736 units
Nominal (STC)	427 kWp
Modules	46 string x 16 In series

## At operating cond. (50°C)

Pmpp	396 kWp
U mpp	657 V
I mpp	602 A

## 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)	1.14
Power sharing within this inverter	



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## PV Array Characteristics

## Array #2 - Sub-array #2

Mixed orient.

#3/2: 4/5 strings

Tilt/Azimuth 6/-66 °  
6/111 °

## PV module

Manufacture Panasonic Life Solutions India Pvt. Ltd

Model AE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power 580 Wp  
Number of PV modules 162 units  
Nominal (STC) 94.0 kWp  
Modules 9 string x 18 In series

## At operating cond. (50°C)

Pmpp 87.1 kWp  
U mpp 739 V  
I mpp 118 A

## Total PV power

Nominal (STC) 521 kWp  
Total 898 modules  
Module area 2318 m²

## Inverter

Manufacturer

Growatt New Energy

Model

MAX 80KTL3 LV

(Original PVsyst database)

Unit Nom. Power 80.0 kWac  
Number of inverters 1 unit  
Total power 80.0 kWac  
Operating voltage 200-1000 V  
Pnom ratio (DC:AC) 1.17  
Power sharing within this inverter

## Total inverter power

Total power 455 kWac  
Number of inverters 4 units  
Pnom ratio 1.14

## 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 0.1 % 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. 18 mΩ  
Loss Fraction 1.5 % at STC

## Array #2 - Sub-array #2

Global array res. 102 mΩ  
Loss Fraction 1.5 % at STC



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**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 1.07 % at STC

**Inverter: MAX 125KTL3-X LV**

Wire section (3 Inv.) Alu 3 x 3 x 95 mm<sup>2</sup>  
Average wires length 45 m

**Inverter: MAX 80KTL3 LV**

Wire section (1 Inv.) Alu 1 x 3 x 70 mm<sup>2</sup>  
Wires length 0 m



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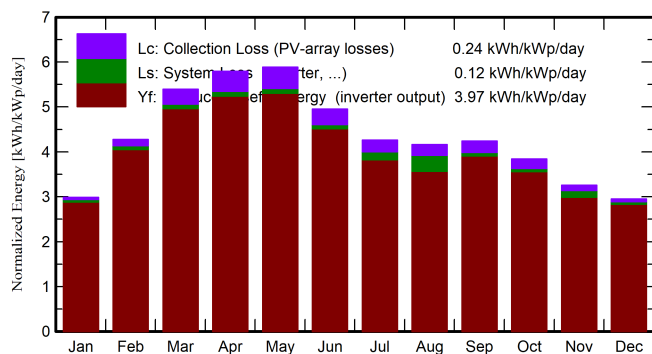
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## Main results

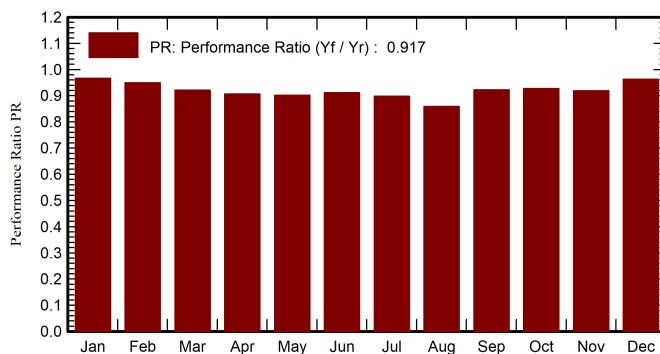
## System Production

Produced Energy (P50)	755088 kWh/year	Specific production (P50)	1450 kWh/kWp/year	Perf. Ratio PR	91.68 %
Produced Energy (P90)	737633 kWh/year	Specific production (P90)	1416 kWh/kWp/year		
Produced Energy (P75)	745911 kWh/year	Specific production (P75)	1432 kWh/kWp/year		

## Normalized productions (per installed kWp)



## Performance Ratio PR



## Balances and main results

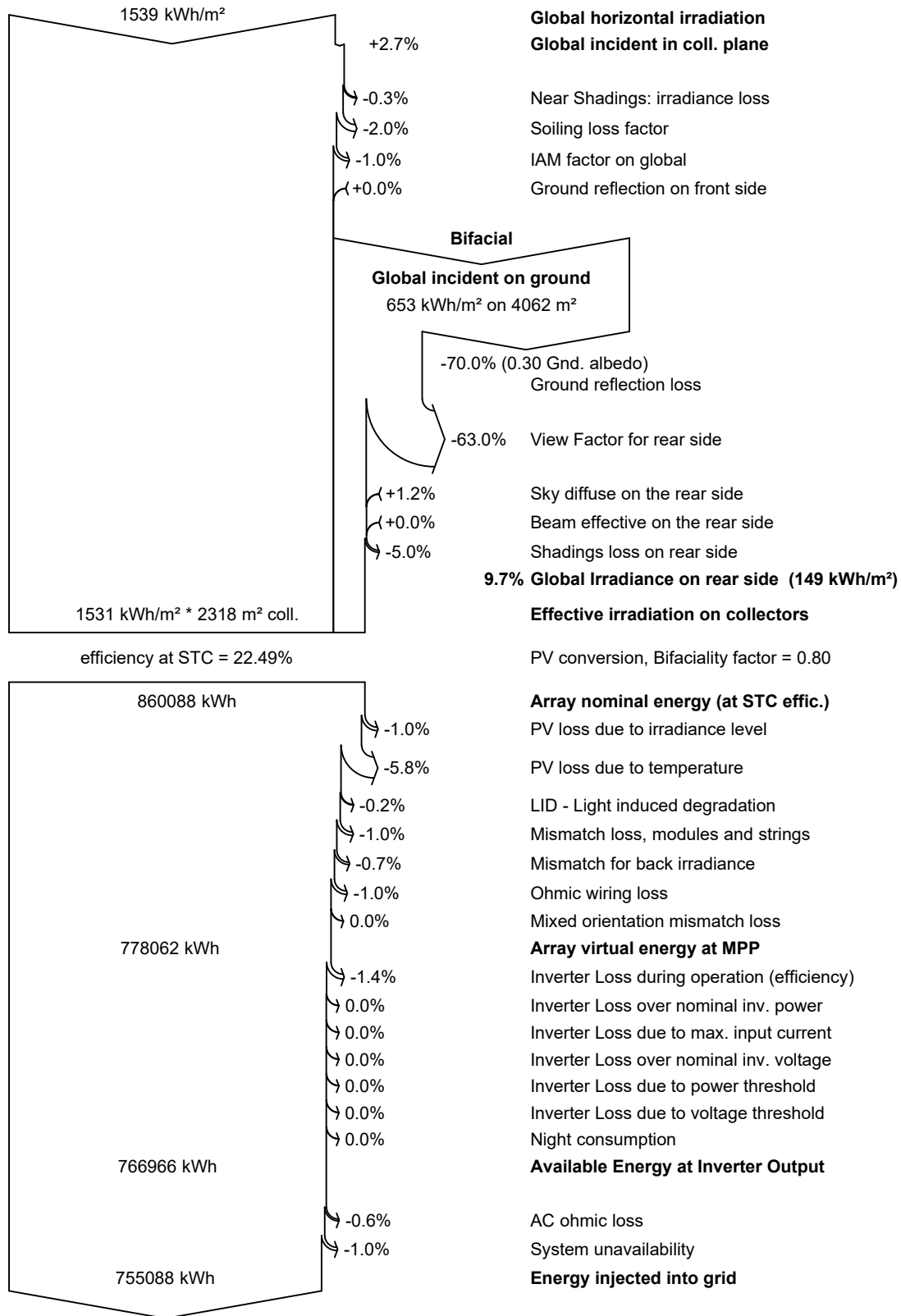
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	kWh	kWh	ratio
January	85.4	52.65	15.10	92.5	89.4	47513	46593	0.967
February	112.2	61.69	19.70	119.7	115.9	60368	59193	0.949
March	159.8	74.74	25.99	167.2	162.2	81848	80186	0.921
April	171.0	88.60	31.15	173.8	168.5	83691	82021	0.906
May	183.6	99.92	34.37	182.6	177.1	87477	85718	0.901
June	150.8	98.16	33.04	148.7	143.9	72023	70574	0.911
July	133.7	86.43	30.58	132.1	127.8	64723	61786	0.898
August	129.3	87.43	29.93	129.0	124.7	63375	57717	0.859
September	124.4	75.70	29.01	127.3	123.1	62404	61160	0.922
October	113.6	69.15	27.29	119.2	115.4	58697	57539	0.927
November	91.1	58.03	21.83	97.8	94.6	49150	46788	0.918
December	84.1	55.59	17.09	91.4	88.2	46677	45814	0.963
Year	1539.1	908.09	26.28	1581.3	1530.7	777947	755088	0.917

## 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		



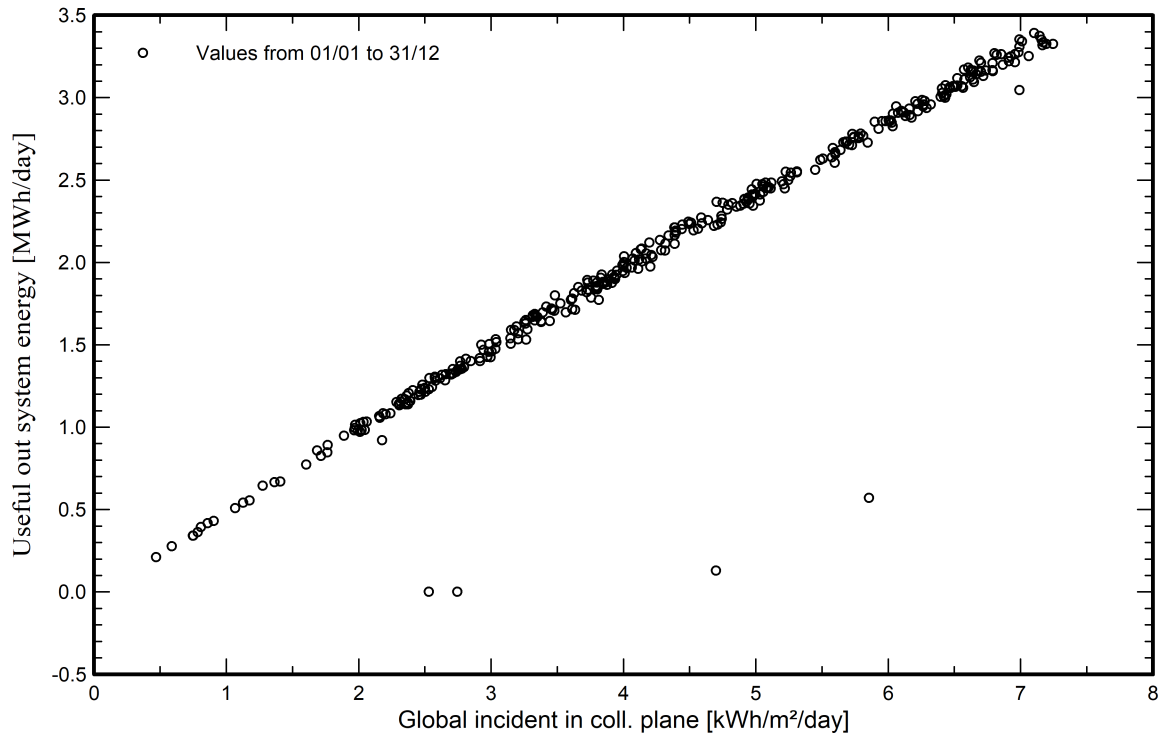
### Loss diagram



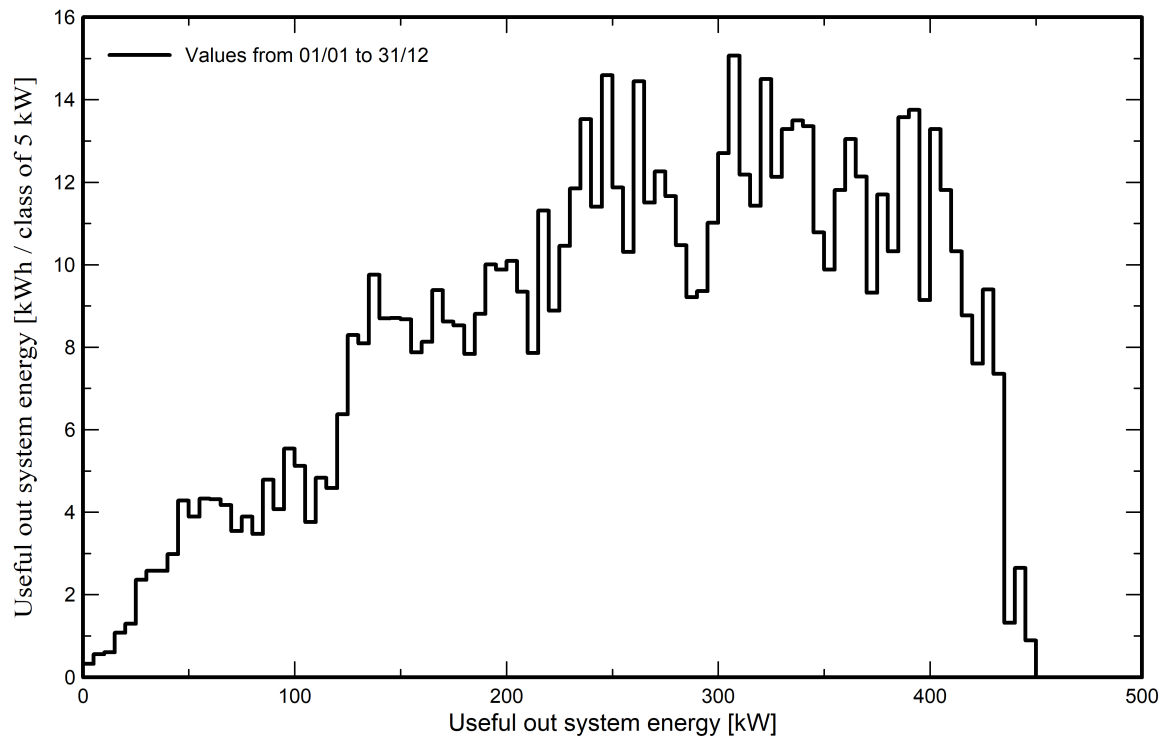


Predef. graphs

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 13.6 MWh  
P50 755.1 MWh  
P90 737.6 MWh  
P75 745.9 MWh

### Probability distribution

