

PVsyst - Simulation report

Grid-Connected System

Project: District Hospital Lalitpur

Variant: New simulation variant

Unlimited sheds

System power: 387 kWp

Lalitpur - India

Author

Jakson Limited (India)

**PVsyst V8.0.2**

VC0, Simulation date:
16/12/24 15:14
with V8.0.2

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Project summary**Geographical Site**

Lalitpur

India

Situation

Latitude 24.70 °N

Longitude 78.41 °E

Altitude 355 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Lalitpur

Meteonorm 8.2 (1996-2015), 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

668 units

Pnom total

387 kWp

Inverters

Nb. of units

4 units

Pnom total

320 kWac

Pnom ratio

1.211

Results summary

Produced Energy 637534 kWh/year Specific production 1646 kWh/kWp/year Perf. Ratio PR 90.61 %

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General parameters**Grid-Connected System****Unlimited sheds****Orientation #1****Sheds**

Tilt 10 °
Azimuth 5 °

Sheds configuration

Nb. of sheds 10 units
Unlimited sheds
Shading limit angle
Limit profile angle 9.8 °

Sizes

Sheds spacing 6.00 m
Collector width 3.00 m
Average GCR 50.0 %
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

Bifacial model geometry

Sheds spacing 6.00 m
Sheds width 3.04 m
Limit profile angle 9.8 °
GCR 50.7 %
Height above ground 1.00 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 288 units
Nominal (STC) 167 kWp
Modules 16 string x 18 In series

At operating cond. (50°C)

Pmpp 155 kWp
U mpp 739 V
I mpp 210 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) 1.19
Power sharing within this inverter



PV Array Characteristics

Array #2 - Sub-array #2

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power 580 Wp
 Number of PV modules 170 units
 Nominal (STC) 98.6 kWp
 Modules 10 string x 17 In series

At operating cond. (50°C)

Pmpp 91.4 kWp
 U mpp 698 V
 I mpp 131 A

Array #3 - Sub-array #3

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power 580 Wp
 Number of PV modules 210 units
 Nominal (STC) 122 kWp
 Modules 14 string x 15 In series

At operating cond. (50°C)

Pmpp 113 kWp
 U mpp 616 V
 I mpp 183 A

Total PV power

Nominal (STC) 387 kWp
 Total 668 modules
 Module area 1724 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) 1.23
 Power sharing within this inverter

Inverter

Manufacturer

Growatt New Energy

Model

MAX 100KTL3-X LV

(Original PVsyst database)

Unit Nom. Power 100 kWac
 Number of inverters 1 unit
 Total power 100 kWac
 Operating voltage 180-1000 V
 Pnom ratio (DC:AC) 1.22
 Power sharing within this inverter

Total inverter power

Total power 320 kWac
 Number of inverters 4 units
 Pnom ratio 1.21

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 2.0 %

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



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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. 57 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 55 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 87 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 0.45 % at STC

Inverters: MAX 70KTL3 LV, MAX 80KTL3 LV

Wire section (3 Inv.) Alu 3 x 3 x 70 mm²
Average wires length 30 m

Inverter: MAX 100KTL3-X LV

Wire section (1 Inv.) Alu 1 x 3 x 95 mm²
Wires length 0 m



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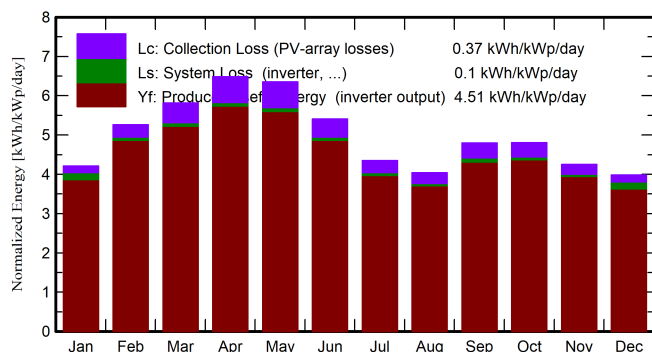
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Main results

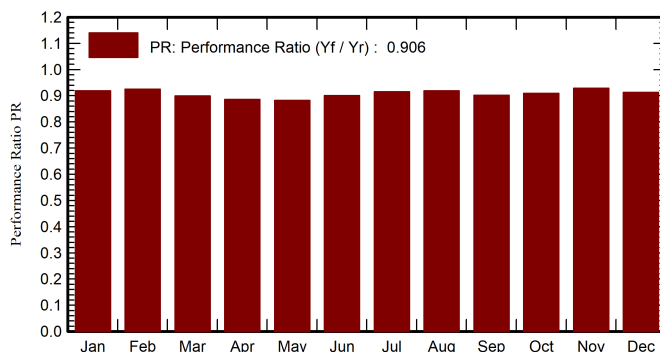
System Production

Produced Energy (P50)	637534 kWh/year	Specific production (P50)	1646 kWh/kWp/year	Perf. Ratio PR	90.61 %
Produced Energy (P90)	620681 kWh/year	Specific production (P90)	1602 kWh/kWp/year		
Produced Energy (P75)	628674 kWh/year	Specific production (P75)	1623 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

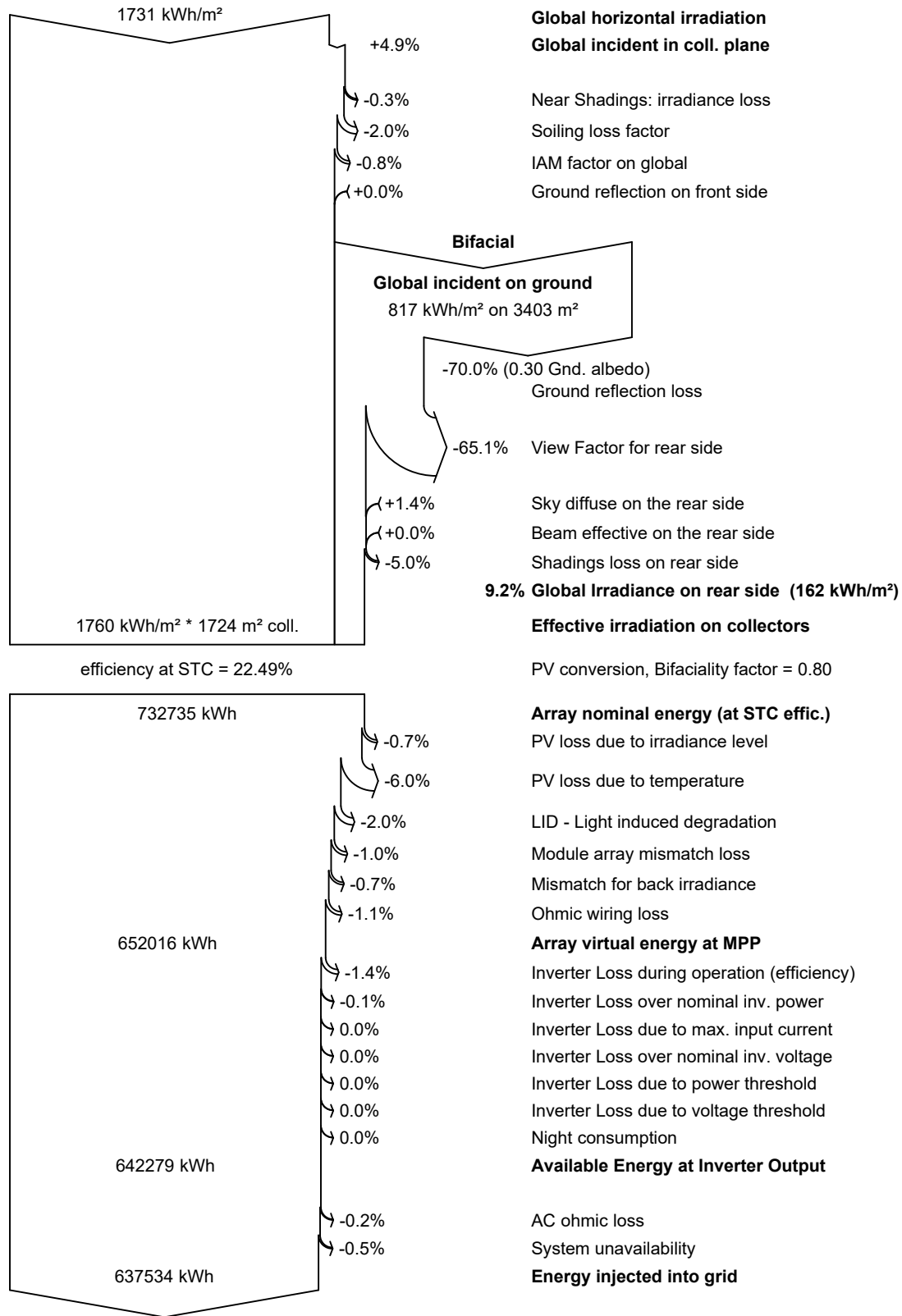
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	114.5	47.8	16.53	130.6	126.7	48649	46523	0.919
February	132.2	48.4	20.20	147.4	143.0	53712	52847	0.925
March	170.4	70.4	26.07	180.3	175.0	63842	62817	0.899
April	190.2	79.3	30.82	194.5	188.9	67834	66726	0.885
May	198.5	95.0	34.93	197.0	191.0	68471	67356	0.883
June	165.4	103.4	32.24	162.2	156.9	57532	56631	0.901
July	136.9	92.2	28.36	134.8	130.1	48589	47788	0.915
August	125.5	86.3	26.95	125.3	120.9	45348	44592	0.919
September	138.8	76.0	27.31	143.8	139.3	51428	50229	0.901
October	137.9	67.2	26.69	149.0	144.6	53392	52518	0.909
November	113.7	54.1	22.04	127.6	123.6	46602	45886	0.928
December	107.2	47.9	17.89	123.4	119.5	45774	43622	0.912
Year	1731.2	868.1	25.86	1816.0	1759.6	651173	637534	0.906

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		



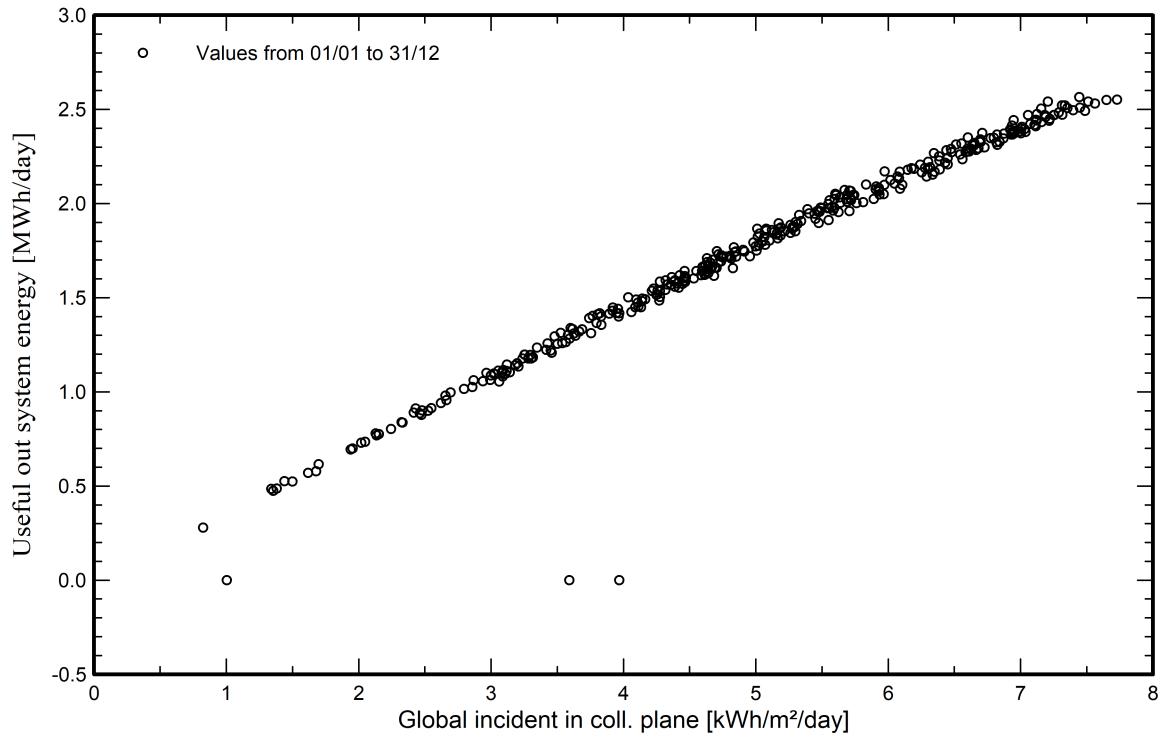
Loss diagram



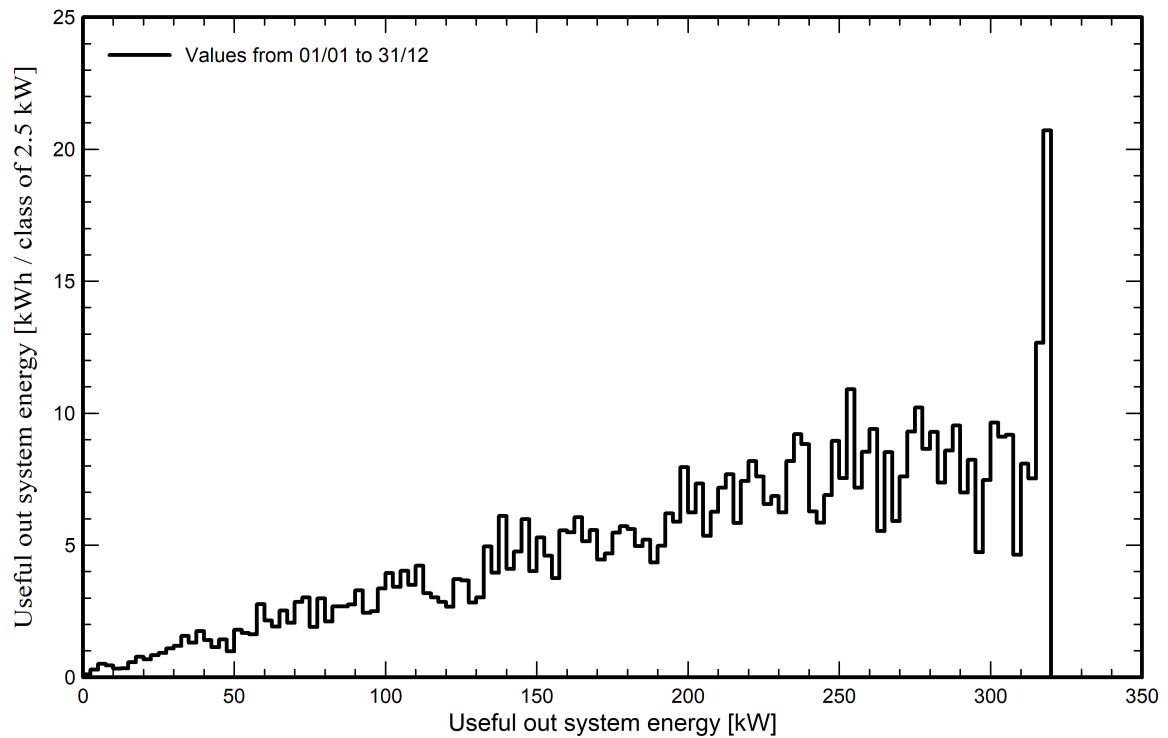


Predef. graphs

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) -1.0 %

Specified Deviation

Global variability (weather data + system)

Variability (Quadratic sum) 2.1 %

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 13.1 MWh
P50 637.5 MWh
P90 620.7 MWh
P75 628.7 MWh

Probability distribution

