

PVsyst - Simulation report

Grid-Connected System

Project: Rico India Pathredi

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 1001 kWp

Jorlah - India

Author





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PVsyst V7.3.1

VC0, Simulation date:
02/09/24 13:07
with v7.3.1

Project summary

Geographical Site

Jorlah
India

Situation

Latitude 28.15 °N
Longitude 76.87 °E
Altitude 287 m
Time zone UTC+5.5

Project settings

Albedo 0.20

Meteo data

Jorlah
PVGIS api TMY

System summary

Grid-Connected System

No 3D scene defined, no shadings

PV Field Orientation

Fixed planes 2 orientations
Tilts/azimuths 5 / -72 °
5 / 108 °

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules 1820 units
Pnom total 1001 kWp

Inverters

Nb. of units 7 units
Pnom total 770 kWac
Pnom ratio 1.300

Results summary

Produced Energy 1629189 kWh/year Specific production 1628 kWh/kWp/year Perf. Ratio PR 81.99 %

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General parameters

Grid-Connected System

No 3D scene defined, no shadings

PV Field Orientation

Orientation

Fixed planes 2 orientations
Tilts/azimuths 5 / -72 °
5 / 108 °

Sheds configuration

No 3D scene defined

Models used

Transposition Perez
Diffuse Imported
Circumsolar separate

Horizon

Free Horizon

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer RenewSys India Private Limited
Model DESERV SGALACTIC-550

(Custom parameters definition)

Unit Nom. Power 550 Wp
Number of PV modules 1820 units
Nominal (STC) 1001 kWp

Array #1 - PV Array east side

Orientation #1
Tilt/Azimuth 5/-72 °
Number of PV modules 1260 units
Nominal (STC) 693 kWp
Modules 63 Strings x 20 In series

At operating cond. (50°C)

Pmpp 645 kWp
U mpp 778 V
I mpp 830 A

Array #2 - Sub-array #2 east

Orientation #1
Tilt/Azimuth 5/-72 °
Number of PV modules 80 units
Nominal (STC) 44.0 kWp
Modules 4 Strings x 20 In series

At operating cond. (50°C)

Pmpp 41.0 kWp
U mpp 778 V
I mpp 53 A

Array #3 - Sub-array #3

Orientation #2
Tilt/Azimuth 5/108 °
Number of PV modules 400 units
Nominal (STC) 220 kWp
Modules 20 Strings x 20 In series

At operating cond. (50°C)

Pmpp 205 kWp
U mpp 778 V
I mpp 263 A

Inverter

Manufacturer Ginlong Technologies
Model Solis-110K-5G-PRO

(Custom parameters definition)

Unit Nom. Power 110 kWac
Number of inverters 7 units
Total power 770 kWac

Number of inverters 37 * MPPT 13% 4.6 units
Total power 509 kWac

Operating voltage 160-1000 V
Max. power (=>45°C) 121 kWac
Pnom ratio (DC:AC) 1.36

Number of inverters 3 * MPPT 13% 0.4 unit
Total power 41.3 kWac

Operating voltage 160-1000 V
Max. power (=>45°C) 121 kWac
Pnom ratio (DC:AC) 1.07

Number of inverters 13 * MPPT 13% 1.6 units
Total power 179 kWac

Operating voltage 160-1000 V
Max. power (=>45°C) 121 kWac
Pnom ratio (DC:AC) 1.23



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PV Array Characteristics

Array #4 - Sub-array #4

Orientation	#1		
Tilt/Azimuth	5/-72 °		
Number of PV modules	80 units	Number of inverters	3 * MPPT 13% 0.4 unit
Nominal (STC)	44.0 kWp	Total power	41.3 kWac
Modules	5 Strings x 16 In series		
At operating cond. (50°C)		Operating voltage	160-1000 V
Pmpp	41.0 kWp	Max. power (=>45°C)	121 kWac
U mpp	622 V	Pnom ratio (DC:AC)	1.07
I mpp	66 A		
Total PV power		Total inverter power	
Nominal (STC)	1001 kWp	Total power	770 kWac
Total	1820 modules	Number of inverters	7 units
Module area	4726 m²	Pnom ratio	1.30
		Power sharing defined	

Array losses

Array Soiling Losses

Loss Fraction 1.0 %

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 20.0 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 -0.3 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.6 %

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.920	0.860	0.750	0.600	0.000

DC wiring losses

Global wiring resistance 6.4 mΩ
Loss Fraction 0.9 % at STC

Array #1 - PV Array east side

Global array res. 8.0 mΩ
Loss Fraction 0.8 % at STC

Array #2 - Sub-array #2 east

Global array res. 239 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 48 mΩ
Loss Fraction 1.5 % at STC

Array #4 - Sub-array #4

Global array res. 153 mΩ
Loss Fraction 1.5 % at STC

AC wiring losses

Inv. output line up to injection point

Inverter voltage 380 Vac tri
Loss Fraction 0.71 % at STC

Global System

Wire section Alu 3 x 1500 mm²
Wires length 50 m



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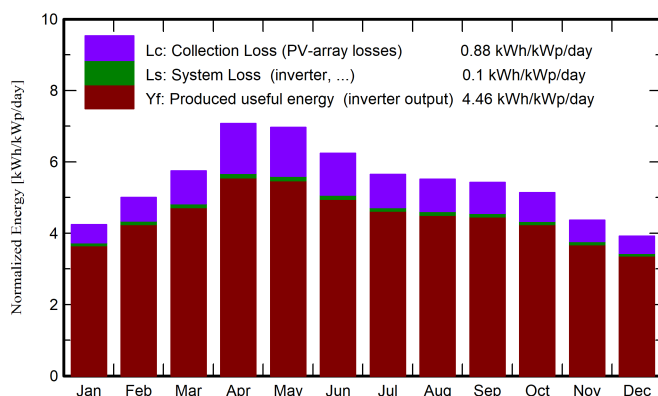
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Main results

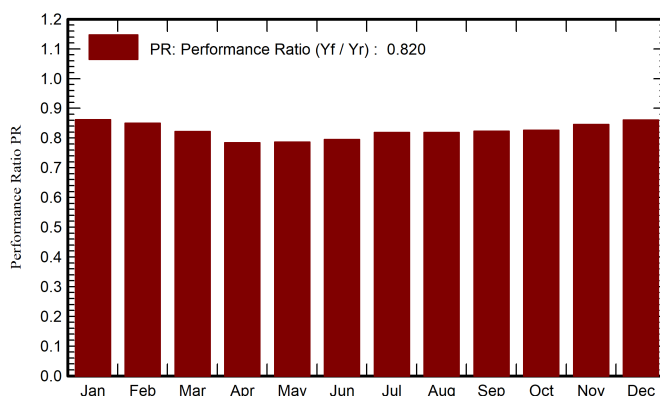
System Production

Produced Energy (P50) 1629189 kWh/year Specific production (P50) 1628 kWh/kWp/year Performance Ratio PR 81.99 %
Produced Energy (P90) 1586121 kWh/year Produced Energy (P90) 1585 kWh/kWp/year
Produced Energy (P75) 1606546 kWh/year Produced Energy (P75) 1605 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/m²	kWh/m²	°C	kWh/m²	kWh/m²	kWh	kWh	ratio
January	129.3	43.48	14.39	131.5	127.4	115923	113422	0.861
February	138.3	45.14	17.98	140.0	136.3	121819	119131	0.850
March	177.0	61.66	23.25	178.1	174.0	149901	146515	0.822
April	211.4	70.99	29.55	212.3	208.0	170665	166773	0.785
May	215.4	88.20	32.90	216.0	211.9	173925	169952	0.786
June	187.3	95.88	34.53	187.1	183.3	152396	148930	0.795
July	175.1	99.98	30.77	175.1	171.2	146688	143391	0.818
August	170.5	83.05	28.50	170.9	167.2	143306	140018	0.818
September	161.7	66.59	27.58	162.8	159.2	137121	134036	0.823
October	157.5	59.27	26.58	159.1	155.2	134653	131688	0.827
November	128.7	46.76	21.54	130.8	126.9	113174	110723	0.846
December	119.1	42.44	15.36	121.4	117.3	106853	104609	0.861
Year	1971.4	803.46	25.27	1985.1	1937.9	1666423	1629189	0.820

Legends

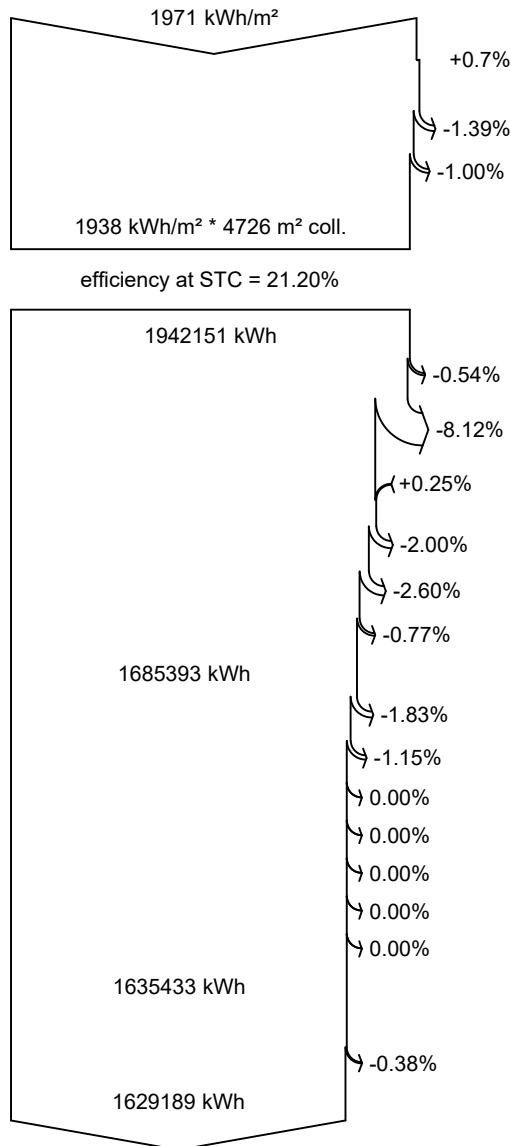
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

IAM factor on global

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

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

Energy injected into grid

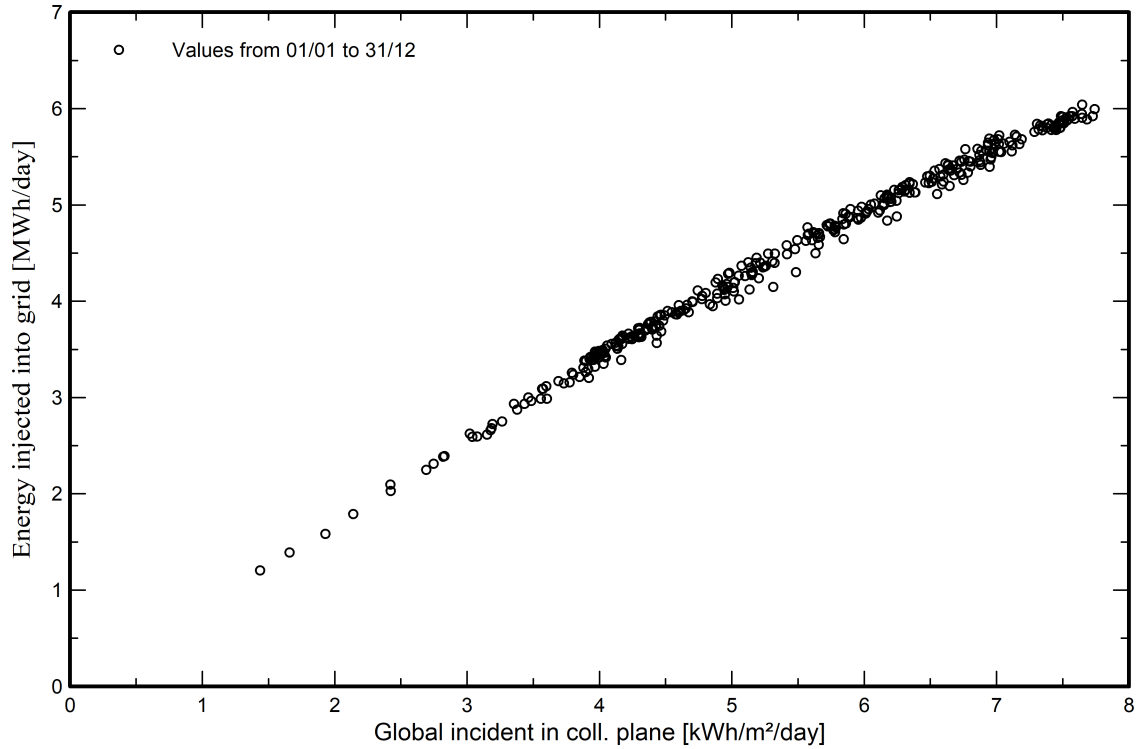


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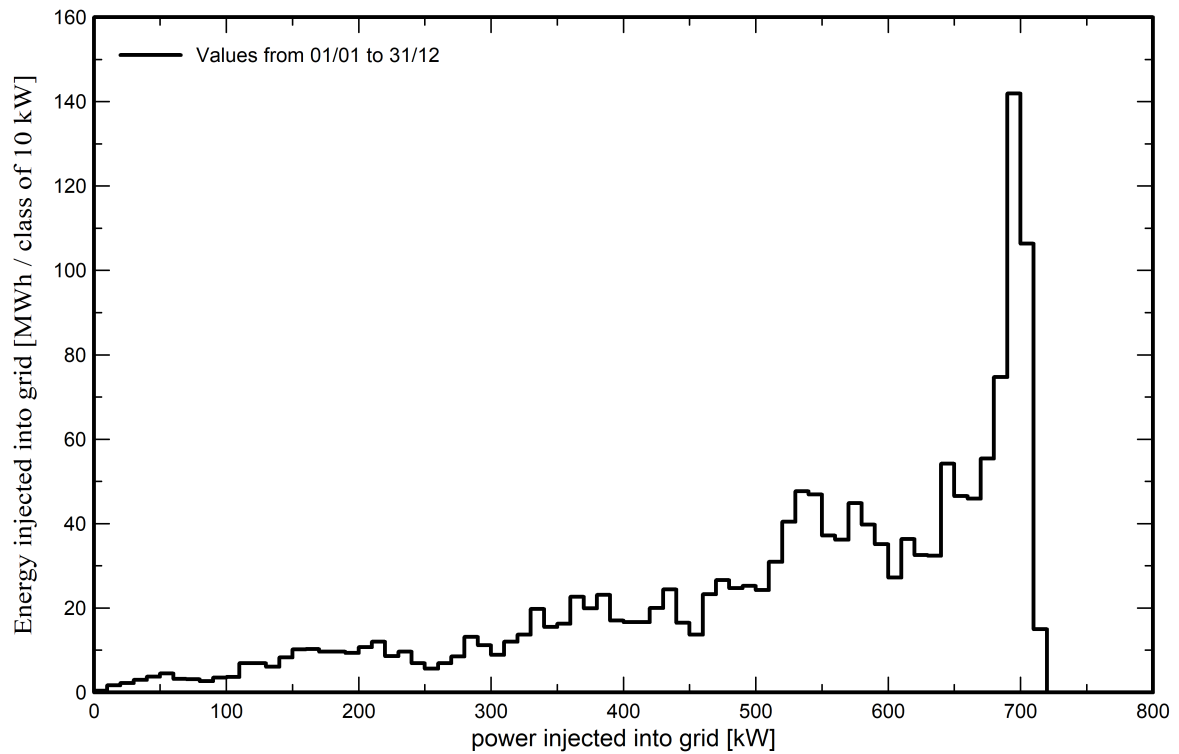
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Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





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P50 - P90 evaluation

Meteo data

Source PVGIS api TMY
Kind Not defined
Year-to-year variability(Variance) -1.0 %

Specified Deviation

Global variability (meteo + 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 33.6 MWh
P50 1629.2 MWh
P90 1586.1 MWh
P75 1606.5 MWh

Probability distribution

