

PVsyst - Simulation report

Grid-Connected System

Project: 4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New Delhi

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 3998 kWp

Delhi Ground Mounted Project(VNM) - India

**PVsyst V7.2.4**

VC0, Simulation date:
19/08/23 19:20
with v7.2.4

Project: 4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New Delhi

Variant: New simulation variant

Project summary**Geographical Site**

Delhi Ground Mounted Project(VNM)
India

Situation

Latitude 28.83 °N
Longitude 77.00 °E
Altitude 214 m
Time zone UTC+5.5

Project settings

Albedo 0.20

Meteo data

Delhi_Ground_Mounted_Project (VNM)
Meteonorm 8.0 (1981-2010), Sat=3% - Synthetic

System summary**Grid-Connected System**

Simulation for year no 10

No 3D scene defined, no shadings**PV Field Orientation**

Fixed plane
Tilt/Azimuth 10 / 0 °

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

System information**PV Array**

Nb. of modules 7336 units
Pnom total 3998 kWp

Inverters

Nb. of units 12 units
Pnom total 2640 kWac
Pnom ratio 1.514

Results summary

Produced Energy 6037 MWh/year Specific production 1510 kWh/kWp/year Perf. Ratio PR 78.44 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Main results	5
Loss diagram	6
Special graphs	7
P50 - P90 evaluation	8

**PVsyst V7.2.4**

VC0, Simulation date:
19/08/23 19:20
with v7.2.4

Project: 4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New Delhi

Variant: New simulation variant

General parameters**Grid-Connected System**

No 3D scene defined, no shadings

PV Field Orientation**Orientation**

Fixed plane

Tilt/Azimuth 10 / 0 °

Sheds configuration

No 3D scene defined

Models used

Transposition Perez

Diffuse Perez, Meteonorm

Circumsolar separate

Horizon

Free Horizon

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

PV Array Characteristics**PV module**

Manufacturer

Jinkosolar

Model

JKM545M-72HL4-V

(Custom parameters definition)

Unit Nom. Power

545 Wp

Number of PV modules

7336 units

Nominal (STC)

3998 kWp

Modules

262 Strings x 28 In series

At operating cond. (40°C)

Pmpp

3794 kWp

U mpp

1086 V

I mpp

3494 A

Total PV power

Nominal (STC)

3998 kWp

Total

7336 modules

Module area

18917 m²

Cell area

17441 m²

Inverter

Manufacturer

Solis

Model

Solis-255K-EHV-5G-NEW

(Custom parameters definition)

Unit Nom. Power

220 kWac

Number of inverters

12 unit

Total power

2640 kWac

Operating voltage

600-1500 V

Max. power (=>30°C)

255 kWac

Pnom ratio (DC:AC)

1.51

Total inverter power

Total power

2640 kWac

Nb. of inverters

12 units

Pnom ratio

1.51

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

DC wiring losses

Global array res. 3.3 mΩ

Loss Fraction 1.0 % at STC

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 -0.8 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

Module average degradation

Year no 10

Loss factor 0.4 %/year

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year

Vmp RMS dispersion 0.4 %/year

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.999	0.988	0.965	0.925	0.743	0.000



PVsyst V7.2.4

VC0, Simulation date:
19/08/23 19:20
with v7.2.4

Project:
**4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New
Delhi**

Variant: New simulation variant

System losses

Unavailability of the system

Time fraction 1.0 %
 3.7 days,
 3 periods

Auxiliaries loss

Proportionnal to Power 2.0 W/kW
0.0 kW from Power thresh.



PVsyst V7.2.4

VCO, Simulation date:
19/08/23 19:20
with v7.2.4

Project:
4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New
Delhi

Variant: New simulation variant

Main results

System Production

Produced Energy

6037 MWh/year

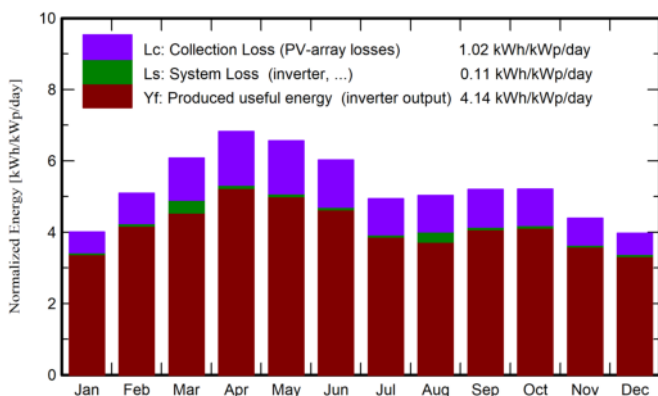
Specific production

1510 kWh/kWp/year

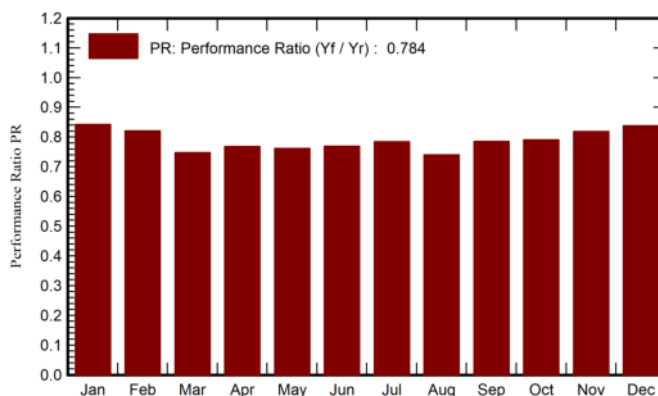
Performance Ratio PR

78.44 %

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	MWh	MWh	ratio
January	106.7	43.9	13.34	124.3	122.6	425.7	418.7	0.843
February	126.3	48.8	17.68	142.5	140.7	475.3	467.6	0.821
March	174.7	65.2	23.80	188.4	185.9	607.1	562.7	0.747
April	197.7	75.5	29.77	204.6	202.0	639.1	628.2	0.768
May	203.2	100.3	33.66	203.5	200.8	630.1	619.7	0.762
June	182.6	103.5	33.28	180.7	178.2	564.6	555.3	0.769
July	154.4	99.9	31.48	153.1	150.8	488.0	480.0	0.784
August	154.0	91.7	30.43	155.9	153.7	497.6	461.6	0.740
September	148.8	78.3	29.16	155.8	153.7	497.9	489.5	0.786
October	147.1	66.3	26.72	161.5	159.4	519.3	510.6	0.791
November	114.3	49.9	20.50	131.6	129.8	437.5	430.6	0.818
December	104.1	42.7	15.08	123.1	121.5	419.2	412.4	0.838
Year	1813.9	865.9	25.44	1925.0	1899.1	6201.3	6036.9	0.784

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio



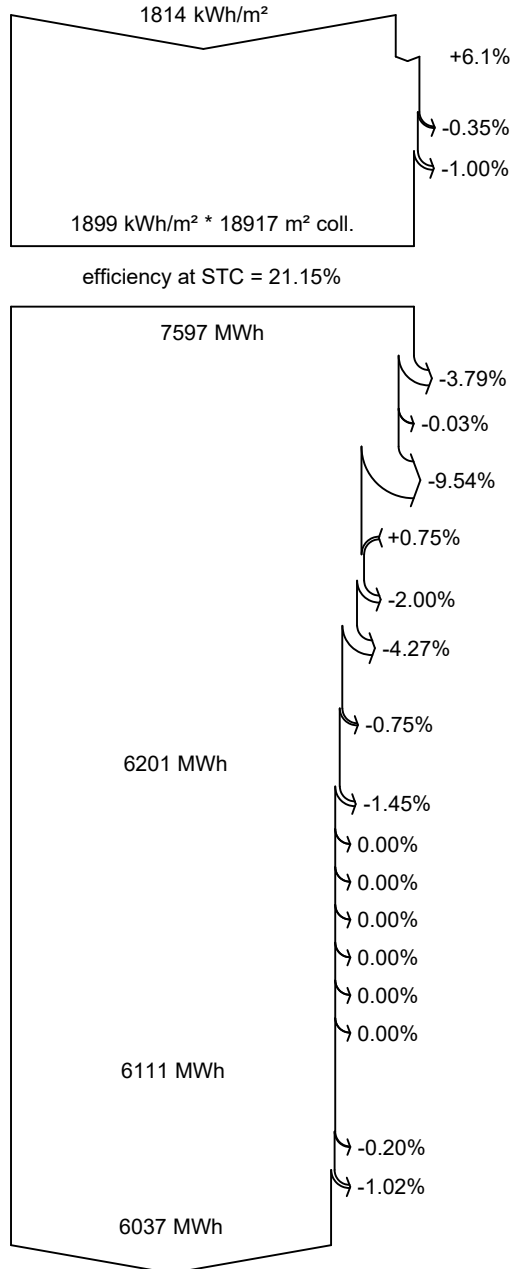
PVsyst V7.2.4

VC0, Simulation date:
19/08/23 19:20
with v7.2.4

Project:
**4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New
Delhi**

Variant: New simulation variant

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.)

Module Degradation Loss (for year #10)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

LID - Light induced degradation

Mismatch loss, modules and strings
(including 2.2% for degradation dispersion)

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

Auxiliaries (fans, other)

System unavailability

Energy injected into grid



PVsyst V7.2.4

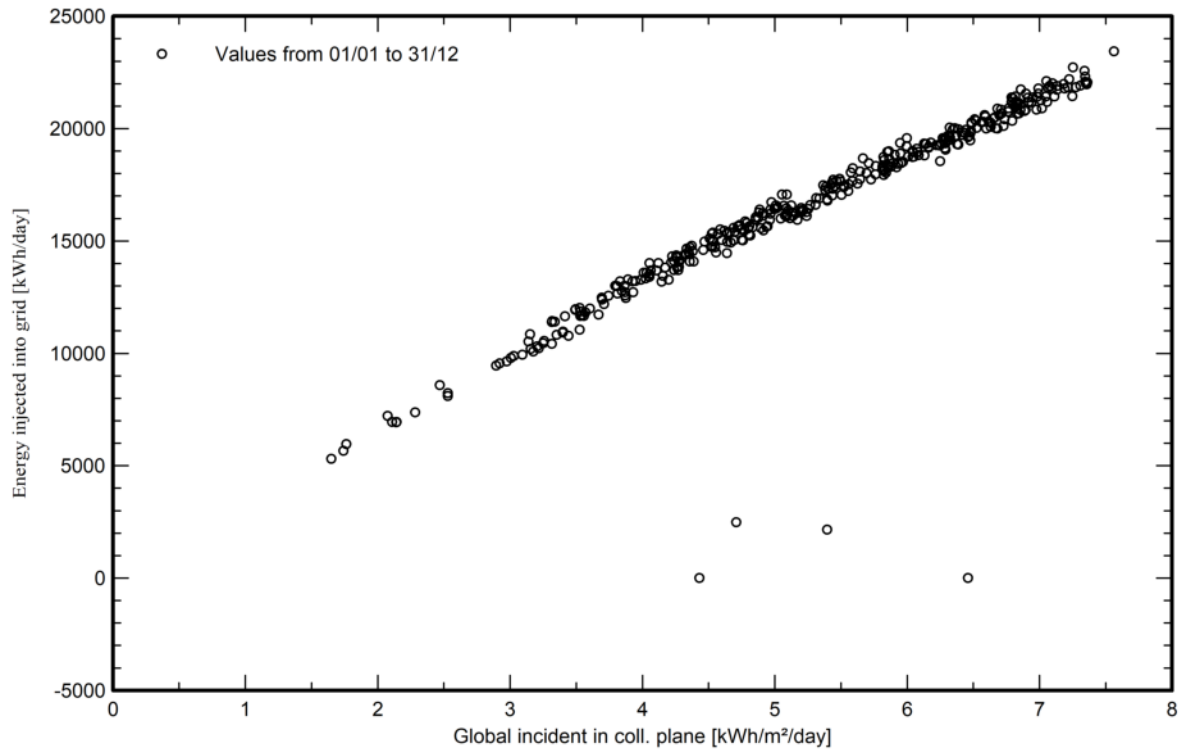
VC0, Simulation date:
19/08/23 19:20
with v7.2.4

Project:
**4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New
Delhi**

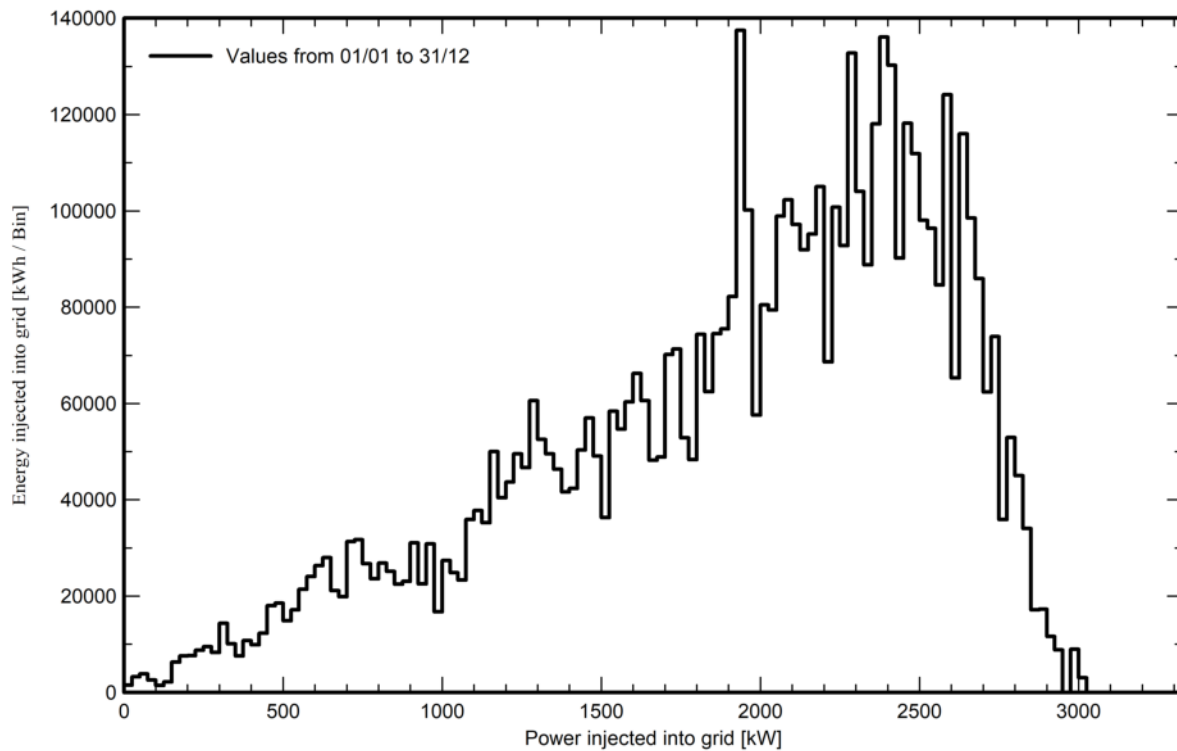
Variant: New simulation variant

Special graphs

Daily Input/Output diagram



System Output Power Distribution





PVsyst V7.2.4

VC0, Simulation date:
19/08/23 19:20
with v7.2.4

Project: 4MW_Delhi_Ground_Mounted_Project_(VNM)_Auchandi_New Delhi

Variant: New simulation variant

P50 - P90 evaluation

Meteo data

Meteo data source: Meteonorm 8.0 (1981-2010), Sat=3%
Kind: Not defined
Year-to-year variability(Variance): 2.5 %

Specified Deviation

Global variability (meteo + system)

Variability (Quadratic sum): 3.1 %

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	186 MWh
P50	6037 MWh
P90	5798 MWh
P75	5911 MWh

Probability distribution

