PVsyst

PHOTOVOLTAIC SOFTWARE

PVsyst - Simulation report

Grid-Connected System

Project: kanpur_pv_simulation

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 824 kWp

Kanpur - India

Author

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Project summary

Geographical Site	Situation		Project settings	
Kanpur	Latitude	26.45 °N	Albedo	0.20
India	Longitude	80.33 °E		
	Altitude	135 m		
	Time zone	UTC+5.5		

Weather data

Kanpur

Meteonorm 8.1 (1996-2015), Sat=100% - Synthetic

System summary

Grid-Connected System   **No 3D scene defined, no shadings**

PV Field Orientation	Near Shadings	User's needs
Fixed plane	No Shadings	Unlimited load (grid)
Tilt/Azimuth 26 / 0 °		

System information

PV Array		Inverters	
Nb. of modules	3297 units	Nb. of units	1 unit
Pnom total	824 kWp	Pnom total	900 kWac
		Pnom ratio	0.916

Results summary

Produced Energy	1117547 kWh/year	Specific production	1356 kWh/kWp/year	Perf. Ratio PR	81.83 %

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General parameters

Grid-Connected System   **No 3D scene defined, no shadings**

PV Field Orientation
Orientation	Sheds configuration	Models used	
Fixed plane	No 3D scene defined	Transposition	Hay
Tilt/Azimuth	26 / 0 °	Diffuse	Perez, Meteonorm
		Circumsolar	separate

Horizon   **Near Shadings**   **User's needs**
Free Horizon   No Shadings   Unlimited load (grid)

PV Array Characteristics

PV module
		Inverter	
Manufacturer	Generic	Manufacturer	Generic
Model	Mono 250 Wp 60 cells	Model	CIS 900
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	250 Wp	Unit Nom. Power	900 kWac
Number of PV modules	3297 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	824 kWp	Total power	900 kWac
Modules	157 string x 21 In series	Operating voltage	530-800 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	0.92
Pmpp	741 kWp	No power sharing between MPPTs	
U mpp	577 V		
I mpp	1284 A		

Total PV power
		Total inverter power	
Nominal (STC)	824 kWp	Total power	900 kWac
Total	3297 modules	Number of inverters	1 unit
Module area	5364 m²	Pnom ratio	0.92
Cell area	4688 m²		

Array losses

Thermal Loss factor   **DC wiring losses**   **Module Quality Loss**
Module temperature according to irradiance   Global array res.   7.6 mΩ   Loss Fraction   -0.8 %
Uc (const)   20.0 W/m²K   Loss Fraction   1.5 % at STC
Uv (wind)   0.0 W/m²K/m/s

Module mismatch losses   **Strings Mismatch loss**
Loss Fraction   2.0 % at MPP   Loss Fraction   0.2 %

IAM loss factor
Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000

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Main results

System Production

Produced Energy	1117547 kWh/year	Specific production	1356 kWh/kWp/year
		Perf. Ratio PR	81.83 %

Normalized productions (per installed kWp)

Lc: Collection Loss (PV-array losses)   0.74 kWh/kWp/day
Ls: System Loss (inverter, ...)   0.08 kWh/kWp/day
Yf: Produced useful energy (inverter output) 3.71 kWh/kWp/day

Performance Ratio PR

PR: Performance Ratio (Yf / Yr) : 0.818
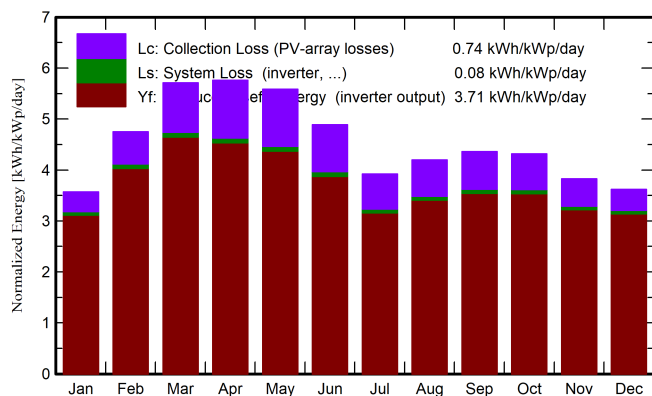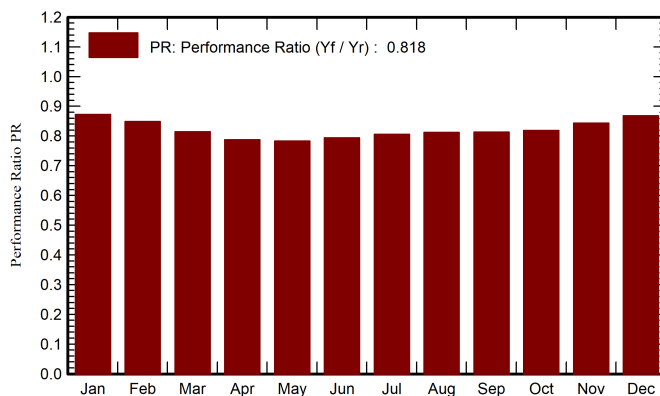
Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	kWh	kWh	ratio
January	92.0	55.3	13.86	110.7	107.8	81403	79600	0.873
February	113.9	60.3	18.39	133.0	129.7	95091	93134	0.849
March	163.5	76.7	24.34	177.0	172.4	121205	118749	0.814
April	173.4	87.9	29.96	172.8	167.8	114524	112193	0.788
May	185.0	102.5	32.84	173.1	167.5	114198	111773	0.783
June	159.5	97.9	32.35	146.7	141.6	98170	95945	0.794
July	130.9	82.7	30.12	121.6	117.3	82793	80777	0.806
August	135.4	92.2	29.59	130.2	125.6	89202	87168	0.812
September	127.8	81.7	28.62	130.8	126.5	89665	87672	0.813
October	121.5	71.8	26.41	133.9	130.4	92430	90401	0.819
November	95.6	54.5	20.57	114.7	111.9	81494	79764	0.843
December	89.8	52.3	15.55	112.3	109.5	82139	80371	0.868
Year	1588.4	915.8	25.24	1656.9	1607.9	1142314	1117547	0.818

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
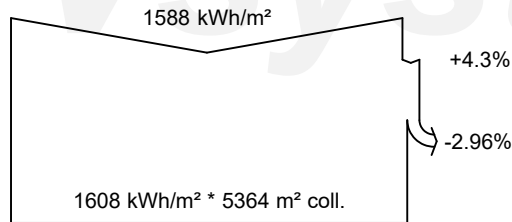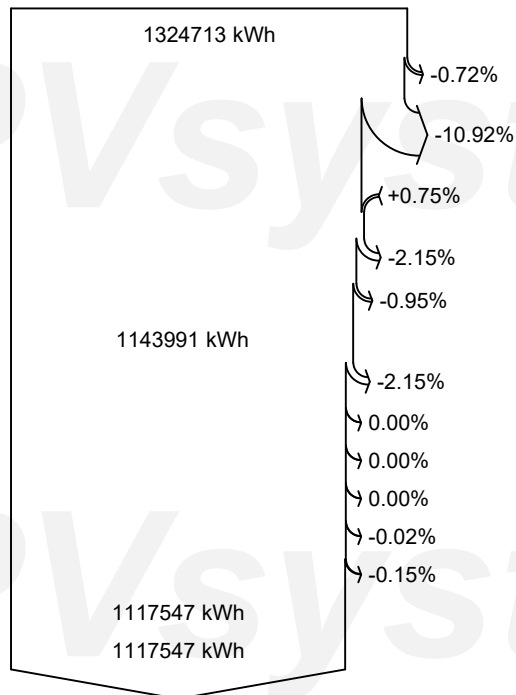
1588 kWh/m²	**Global horizontal irradiation**
+4.3%	**Global incident in coll. plane**
-2.96%	IAM factor on global
1608 kWh/m² * 5364 m² coll.	**Effective irradiation on collectors**
efficiency at STC = 15.36%	PV conversion
1324713 kWh	**Array nominal energy (at STC effic.)**
-0.72%	PV loss due to irradiance level
-10.92%	PV loss due to temperature
+0.75%	Module quality loss
-2.15%	Mismatch loss, modules and strings
-0.95%	Ohmic wiring loss
1143991 kWh	**Array virtual energy at MPP**
-2.15%	Inverter Loss during operation (efficiency)
0.00%	Inverter Loss over nominal inv. power
0.00%	Inverter Loss due to max. input current
0.00%	Inverter Loss over nominal inv. voltage
-0.02%	Inverter Loss due to power threshold
-0.15%	Inverter Loss due to voltage threshold
1117547 kWh	**Available Energy at Inverter Output**
1117547 kWh	**Energy injected into grid**

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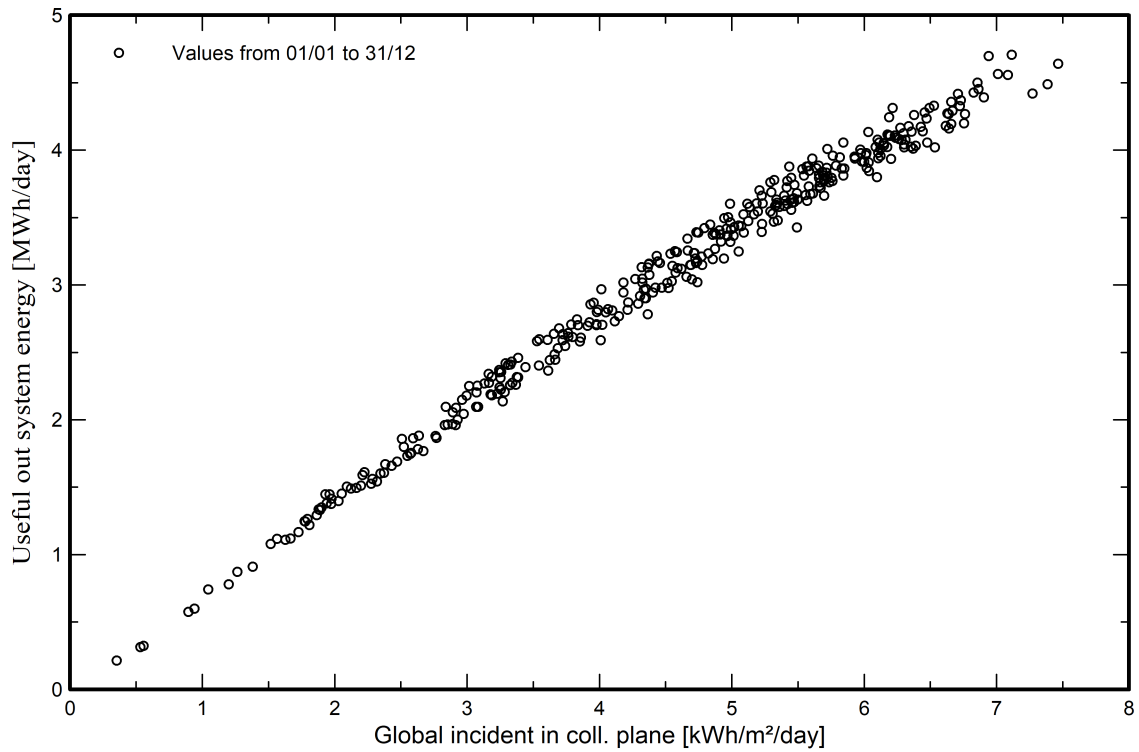VC0, Simulation date:
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Predef. graphs

Daily Input/Output diagram

System Output Power Distribution