Version 7.4.5

PVsyst - Simulation report

Grid-Connected System

Project: Cavendish Industries Limited Laksar, Haridwar, Uttrakhand 6.2 MWp

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 6006 kWp

CAVENDISH JK TYRE 6.2MWp - India

Author

Oriana power private limited (India)

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Project summary

Geographical Site
CAVENDISH JK TYRE 6.2MWp
India

Situation

Latitude	29.73 °N
Longitude	78.02 °E
Altitude	231 m
Time zone	UTC+5.5

Project settings

Albedo	0.20

Meteo data
CAVENDISH JK TYRE 6.2MWp
Meteonorm 8.1 (1996-2015), Sat=100% - Synthetic

System summary

Grid-Connected System
Simulation for year no 1

No 3D scene defined, no shadings

PV Field Orientation

Fixed planes	2 orientations
Tilts/azimuths	5 / 42 °
	5 / 138 °

Near Shadings
No Shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	10920 units
Pnom total	6006 kWp

Inverters

Nb. of units	1 unit
Pnom total	4400 kWac
Pnom ratio	1.365

Results summary

Produced Energy	7229869 kWh/year	Specific production	1204 kWh/kWp/year	Perf. Ratio PR	76.61 %

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General parameters

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

PV Field Orientation

Orientation		Sheds configuration	Models used	
Fixed planes	2 orientations	No 3D scene defined	Transposition	Perez
Tilts/azimuths	5 / 42 ° 5 / 138 °		Diffuse	Perez, Meteonorm
			Circumsolar	separate

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

PV Array Characteristics

PV module

Manufacturer	GOLDI SUN PRIVATE LIMITED
Model	GS10-M144-WF-550
(Custom parameters definition)	
Unit Nom. Power	550 Wp
Number of PV modules	10920 units
Nominal (STC)	6006 kWp

Inverter

Manufacturer	Sungrow
Model	SG4400UD-20
(Custom parameters definition)	
Unit Nom. Power	4400 kWac
Number of inverters	1 unit
Total power	4400 kWac

Array #1 - PV Array

Orientation	#1		
Tilt/Azimuth	5/42 °		
Number of PV modules	6580 units	Number of inverters	2 * MPPT 25% 0.5 unit
Nominal (STC)	3619 kWp	Total power	2200 kWac
Modules	235 string x 28 In series		
At operating cond. (50°C)		Operating voltage	938-1500 V
Pmpp	3314 kWp	Max. power (=>12°C)	5280 kWac
U mpp	1108 V	Pnom ratio (DC:AC)	1.65
I mpp	2991 A		

Array #2 - Sub-array #2

Orientation	#2		
Tilt/Azimuth	5/138 °		
Number of PV modules	4340 units	Number of inverters	2 * MPPT 25% 0.5 unit
Nominal (STC)	2387 kWp	Total power	2200 kWac
Modules	155 string x 28 In series		
At operating cond. (50°C)		Operating voltage	938-1500 V
Pmpp	2186 kWp	Max. power (=>12°C)	5280 kWac
U mpp	1108 V	Pnom ratio (DC:AC)	1.09
I mpp	1973 A		

Total PV power

Nominal (STC)	6006 kWp
Total	10920 modules
Module area	28197 m²
Cell area	26040 m²

Total inverter power

Total power	4400 kWac
Number of inverters	1 unit
Pnom ratio	1.37
No power sharing	

Array losses

Array Soiling Losses
Loss Fraction 2.0 %

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 15.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

LID - Light Induced Degradation
Loss Fraction 1.5 %

Module Quality Loss
Loss Fraction 0.4 %

Module mismatch losses
Loss Fraction 0.5 % at MPP

Strings Mismatch loss
Loss Fraction 0.5 %

Module average degradation
Year no 1
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	0.996	0.986	0.945	0.888	0.770	0.522	0.000

DC wiring losses

Global wiring resistance 3.6 mΩ
Loss Fraction 1.5 % at STC

Array #1 - PV Array
Global array res. 6.0 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2
Global array res. 9.1 mΩ
Loss Fraction 1.5 % at STC

System losses

Unavailability of the system
Time fraction 2.0 %
7.3 days,
3 periods

Auxiliaries loss
constant (fans) 1000 W
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 660 Vac tri
Loss Fraction 0.02 % at STC

Inverter: SG4400UD-20
Wire section (1 Inv.) Alu 1 x 3 x 20000 mm²
Wires length 15 m

Inverter: SG4400UD-20
Wire section (1 Inv.) Alu 1 x 3 x 4000 mm²
Wires length 0 m

MV line up to Injection
MV Voltage 6.6 kV
Wires Alu 3 x 400 mm²
Length 500 m
Loss Fraction 0.53 % at STC

AC losses in transformers

MV transfo

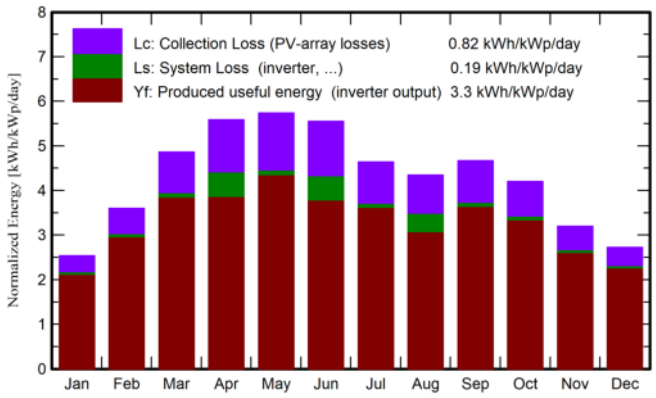
Medium voltage	6.6 kV
Transformer from Datasheets	
Nominal power	4400 kVA
Iron Loss (night disconnect)	4.40 kVA
Iron loss fraction	0.10 % of PNom
Copper loss	44.00 kVA
Copper loss fraction	1.00 % at PNom
Coils equivalent resistance	3 x 0.99 mΩ

Main results

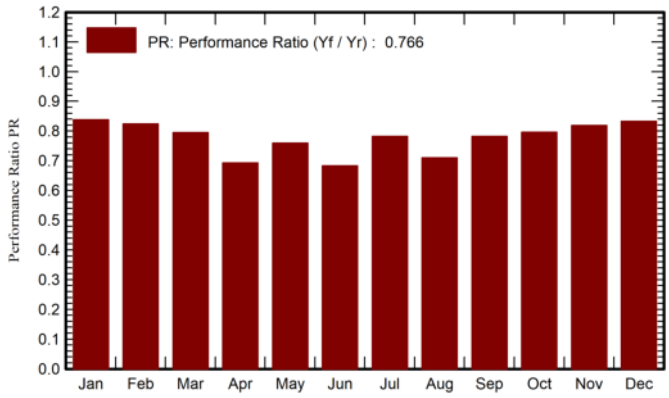
System Production

Produced Energy	7229869 kWh/year	Specific production	1204 kWh/kWp/year
		Perf. Ratio PR	76.61 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_Grid kWh	PR ratio
January	78.2	42.4	12.73	78.7	75.4	406284	396199	0.838
February	99.6	55.5	16.51	100.7	96.9	511221	498558	0.824
March	149.8	70.2	22.27	150.6	145.5	737592	718852	0.795
April	167.5	84.8	27.95	167.7	162.3	797309	697593	0.693
May	178.2	99.7	32.06	177.9	172.2	832282	811269	0.759
June	166.6	98.2	31.77	166.4	161.1	781611	682843	0.683
July	144.3	101.9	30.37	143.9	138.8	692560	675786	0.782
August	135.3	92.8	29.34	134.6	129.8	650748	574165	0.710
September	138.9	69.1	27.88	140.0	135.2	674543	657126	0.782
October	129.4	69.7	25.04	130.3	125.6	638866	623195	0.796
November	95.1	53.0	19.07	95.9	92.0	483186	471960	0.819
December	83.3	43.6	14.32	84.5	80.8	432782	422322	0.832
Year	1566.1	881.0	24.14	1571.4	1515.6	7638984	7229869	0.766

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

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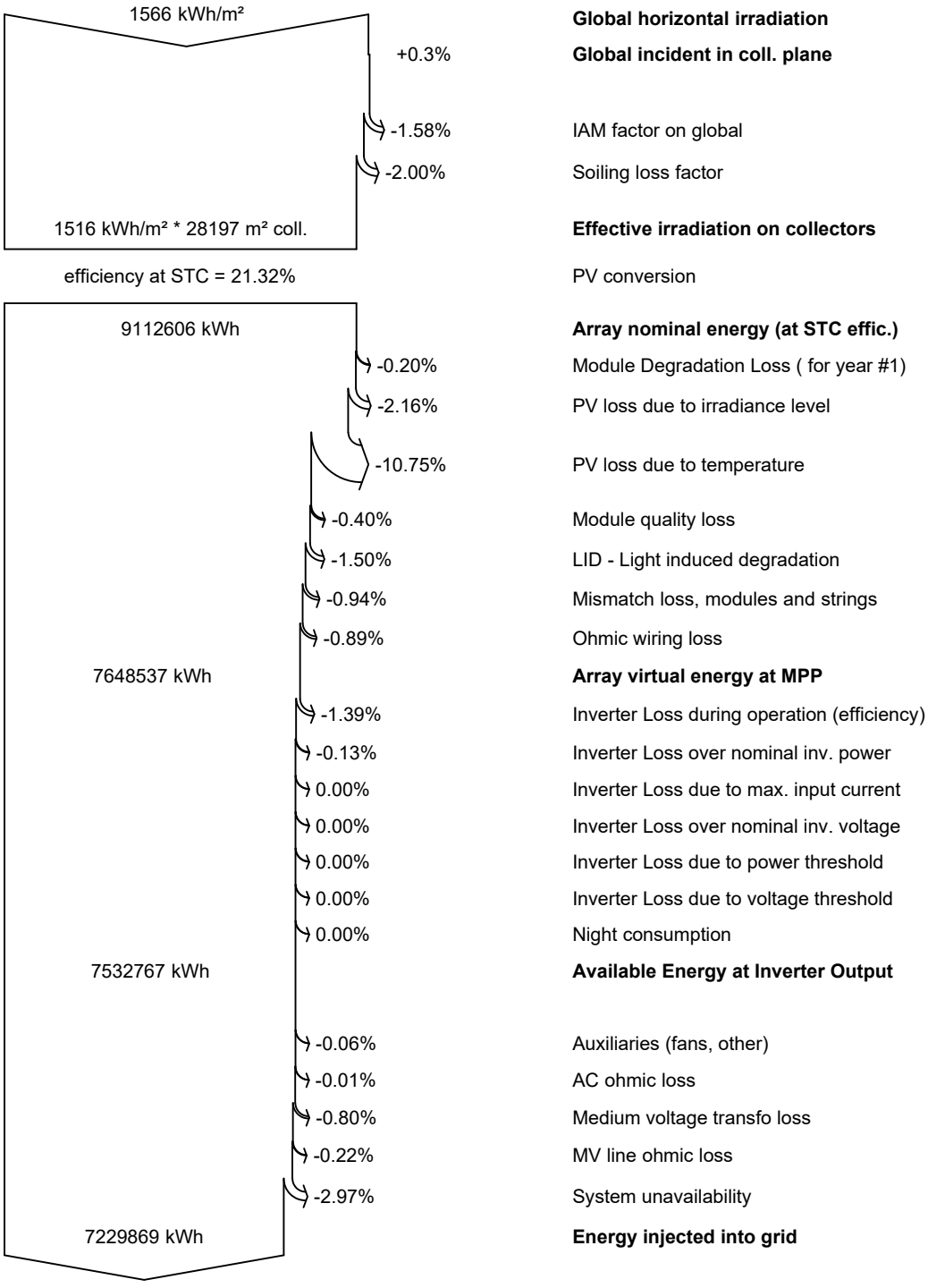
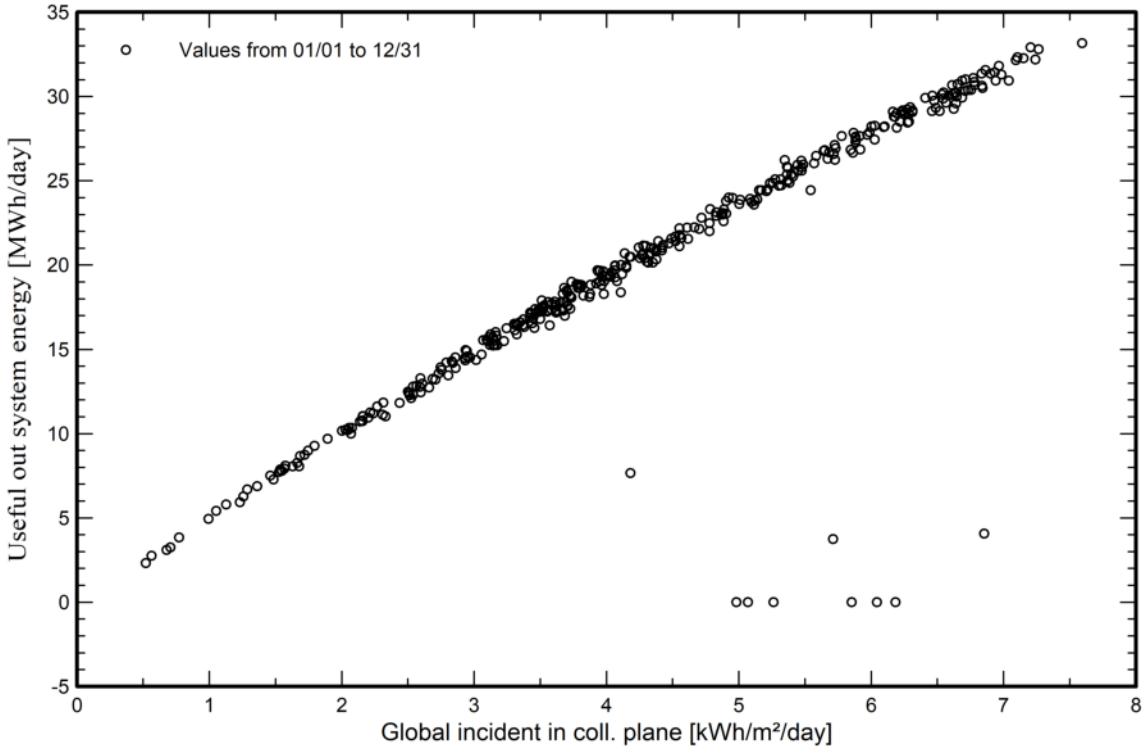
Loss diagram

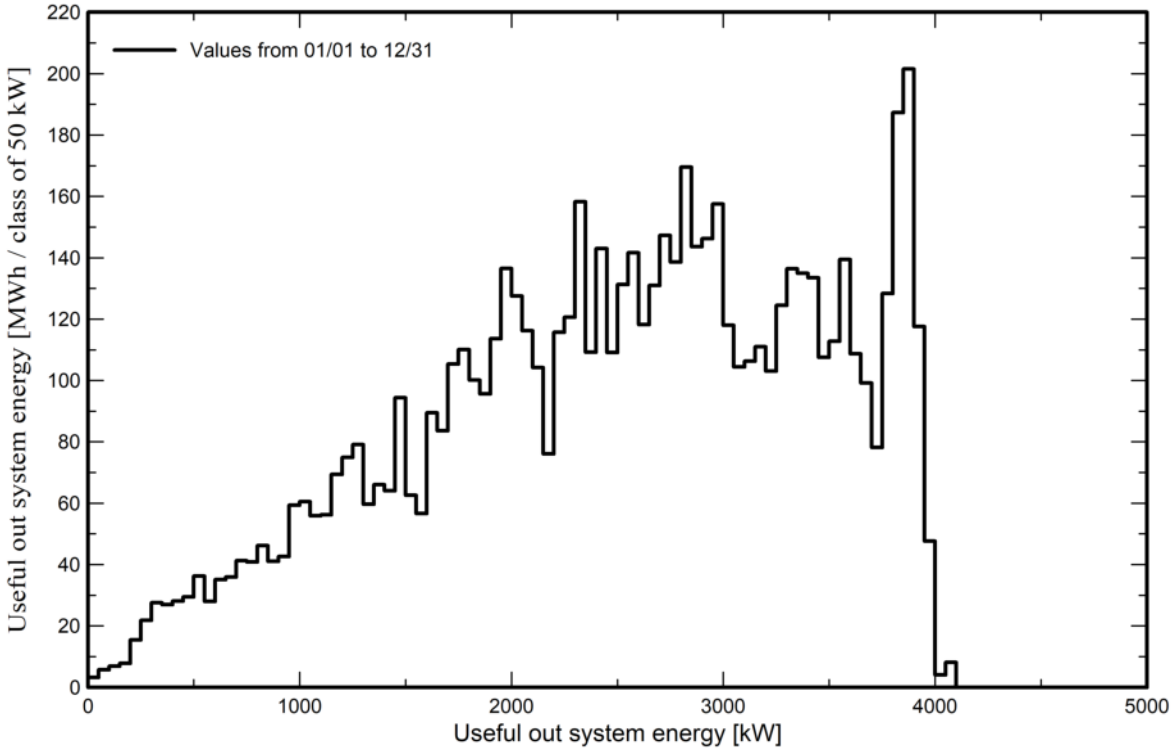


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



P50 - P90 evaluation

Meteo data

Source	Meteonorm 8.1 (1996-2015), Sat=100%
Kind	Not defined
Year-to-year variability(Variance)	0.0 %
Specified Deviation	

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 %

Global variability (meteo + system)

Variability (Quadratic sum)	1.8 %

Annual production probability

Variability	130 MWh
P50	7230 MWh
P90	7063 MWh
P75	7142 MWh

Probability distribution