

PVsyst - Simulation report

Grid-Connected System

Project: Hind Terminals

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 486 kWp

Hind Terminals - India

Author

Oriana power private limited (India)

**PVsyst V7.3.4**

VC0, Simulation date:
25/10/23 17:43
with v7.3.4

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Project summary**Geographical Site****Hind Terminals**

India

Situation

Latitude 28.20 °N

Longitude 77.33 °E

Altitude 192 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Meteo data

Baghola

SolarGIS Monthly aver. , period not spec. - Synthetic

System summary**Grid-Connected System****No 3D scene defined, no shadings****PV Field Orientation**

Fixed plane

Tilt/Azimuth 20 / 0 °

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

System information**PV Array**

Nb. of modules

900 units

Pnom total

486 kWp

Inverters

Nb. of units

4 units

Pnom total

400 kWac

Pnom ratio

1.215

Results summary

Produced Energy 723669 kWh/year Specific production 1489 kWh/kWp/year Perf. Ratio PR 77.89 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Main results	4
Loss diagram	5
Predef. graphs	6
P50 - P90 evaluation	7
Single-line diagram	8

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General parameters**Grid-Connected System**

No 3D scene defined, no shadings

PV Field Orientation**Orientation**

Fixed plane

Tilt/Azimuth 20 / 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 GOLDI SUN PRIVATE LIMITED

Model GS10-M144-WF-540

(Custom parameters definition)

Unit Nom. Power 540 Wp

Number of PV modules 900 units

Nominal (STC) 486 kWp

Modules 45 Strings x 20 In series

At operating cond. (50°C)

Pmpp 445 kWp

U mpp 777 V

I mpp 572 A

Total PV power

Nominal (STC) 486 kWp

Total 900 modules

Module area 2324 m²

Cell area 2146 m²

Inverter

Manufacturer

Growatt New Energy

Model

MAX 100KTL3-X LV

(Original PVsyst database)

Unit Nom. Power 100 kWac

Number of inverters 4 units

Total power 400 kWac

Operating voltage 180-1000 V

Pnom ratio (DC:AC) 1.22

Power sharing within this inverter

Total inverter power

Total power 400 kWac

Number of inverters 4 units

Pnom ratio 1.22

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

DC wiring losses

Global array res. 22 mΩ

Loss Fraction 1.5 % at STC

LID - Light Induced Degradation

Loss Fraction 2.5 %

Module Quality Loss

Loss Fraction 0.5 %

Module mismatch losses

Loss Fraction 1.5 % at MPP

Strings Mismatch loss

Loss Fraction 1.5 %

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



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Main results

System Production

Produced Energy

723669 kWh/year

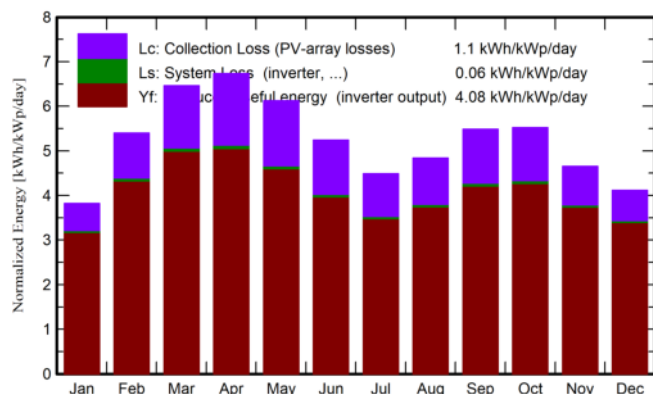
Specific production

1489 kWh/kWp/year

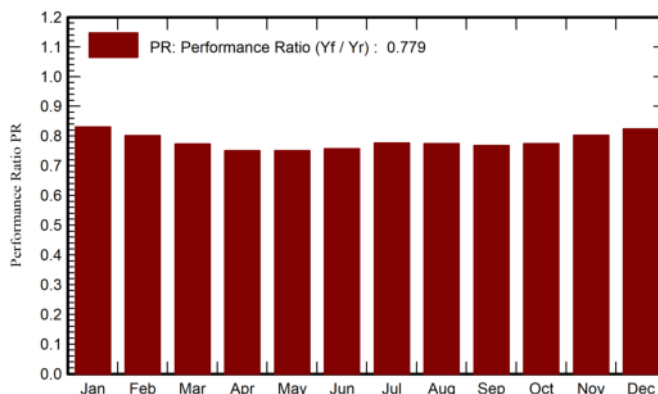
Perf. Ratio PR

77.89 %

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	96.2	54.6	13.40	118.5	115.0	48531	47806	0.830
February	126.0	57.4	17.30	151.2	146.9	59784	58935	0.802
March	178.9	76.3	23.20	200.3	194.5	76389	75331	0.774
April	195.0	88.8	29.60	202.1	196.1	74857	73757	0.751
May	194.1	106.0	33.00	189.9	184.0	70359	69349	0.751
June	164.4	100.5	33.40	157.3	152.3	58769	57895	0.757
July	144.6	95.8	30.90	139.1	134.4	53299	52483	0.776
August	150.2	91.5	29.70	150.1	145.3	57391	56522	0.775
September	153.3	78.3	29.10	164.7	159.7	62388	61477	0.768
October	148.3	74.4	25.90	171.1	166.2	65358	64418	0.775
November	113.4	60.9	20.30	139.7	135.6	55285	54533	0.803
December	99.8	53.6	15.09	127.7	123.9	51894	51163	0.825
Year	1764.2	938.1	25.10	1911.8	1853.8	734305	723669	0.779

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



Project: Hind Terminals

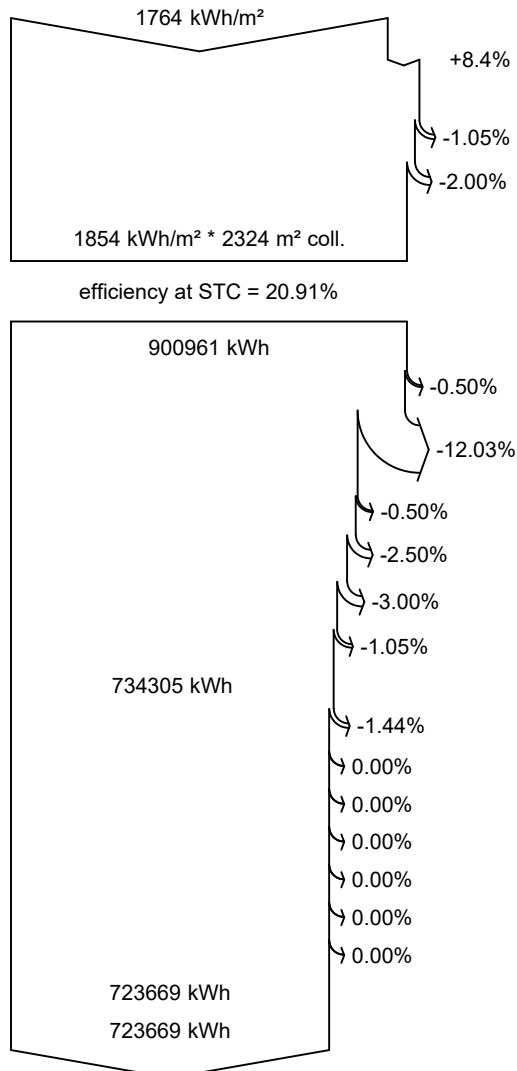
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Loss diagram



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

Energy injected into grid



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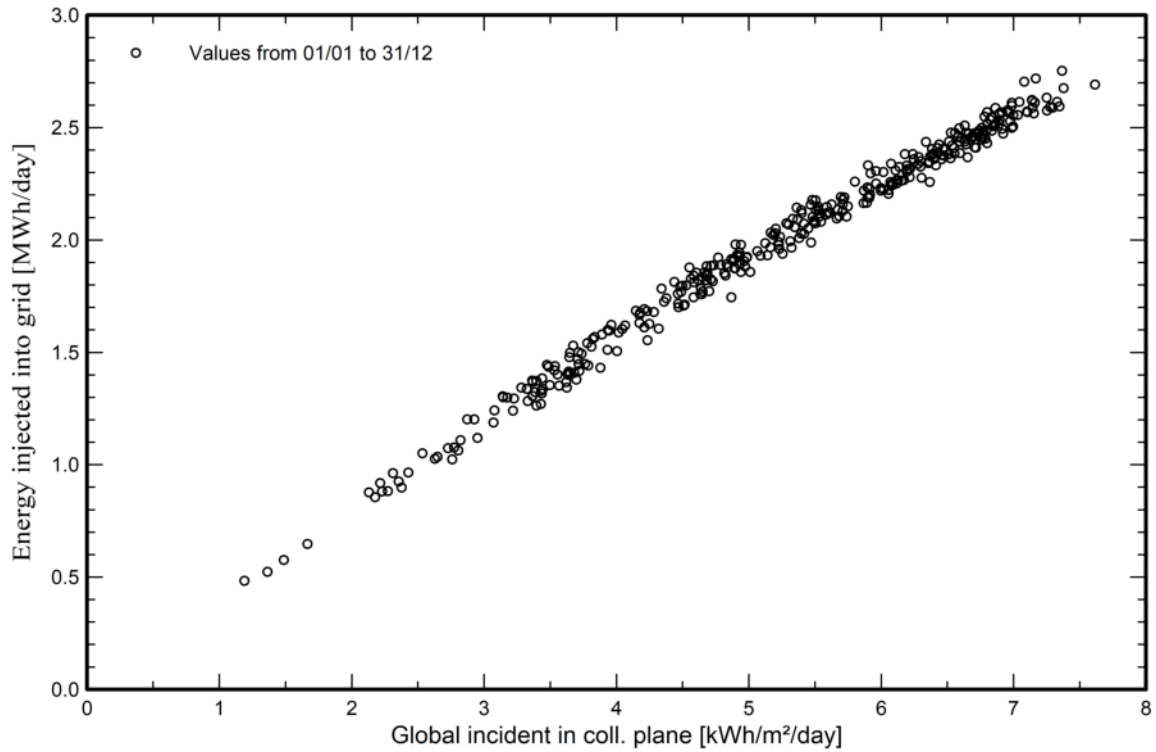
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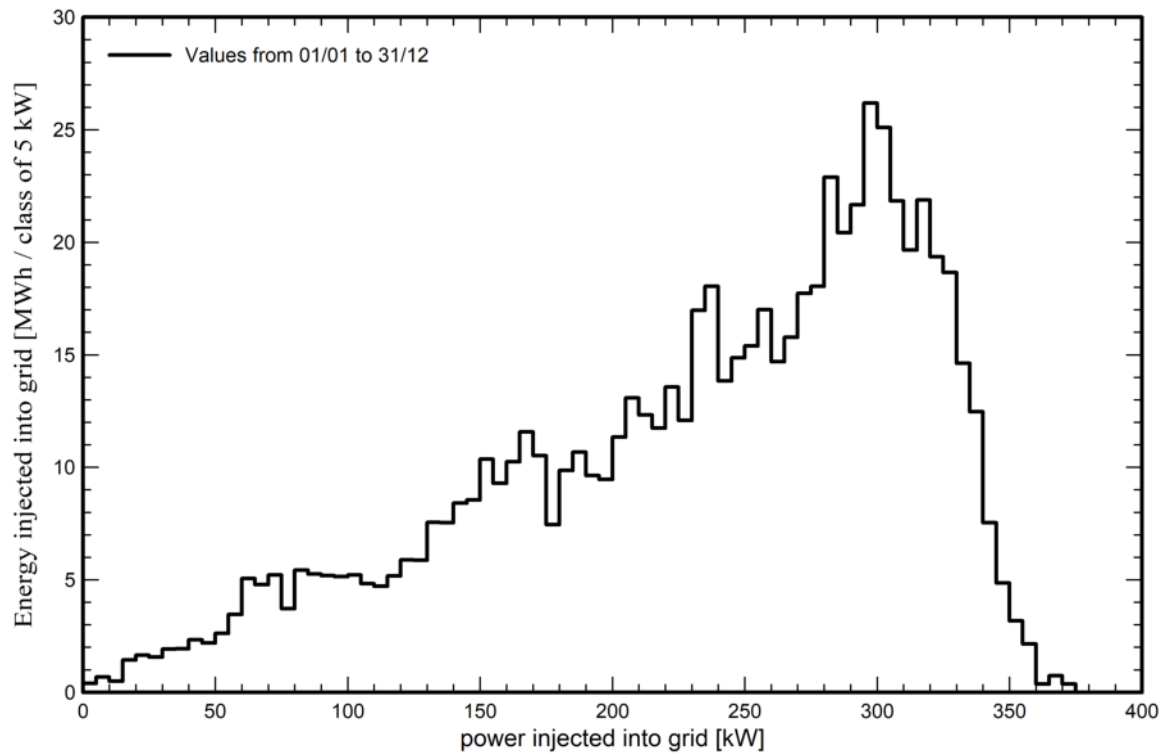
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Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





P50 - P90 evaluation

Meteo data

Source SolarGIS Monthly aver. , period not spec.
Kind Not defined
Year-to-year variability(Variance) -1.0 %

Specified Deviation

Global variability (meteo + system)

Variability (Quadratic sum) 2.1 %

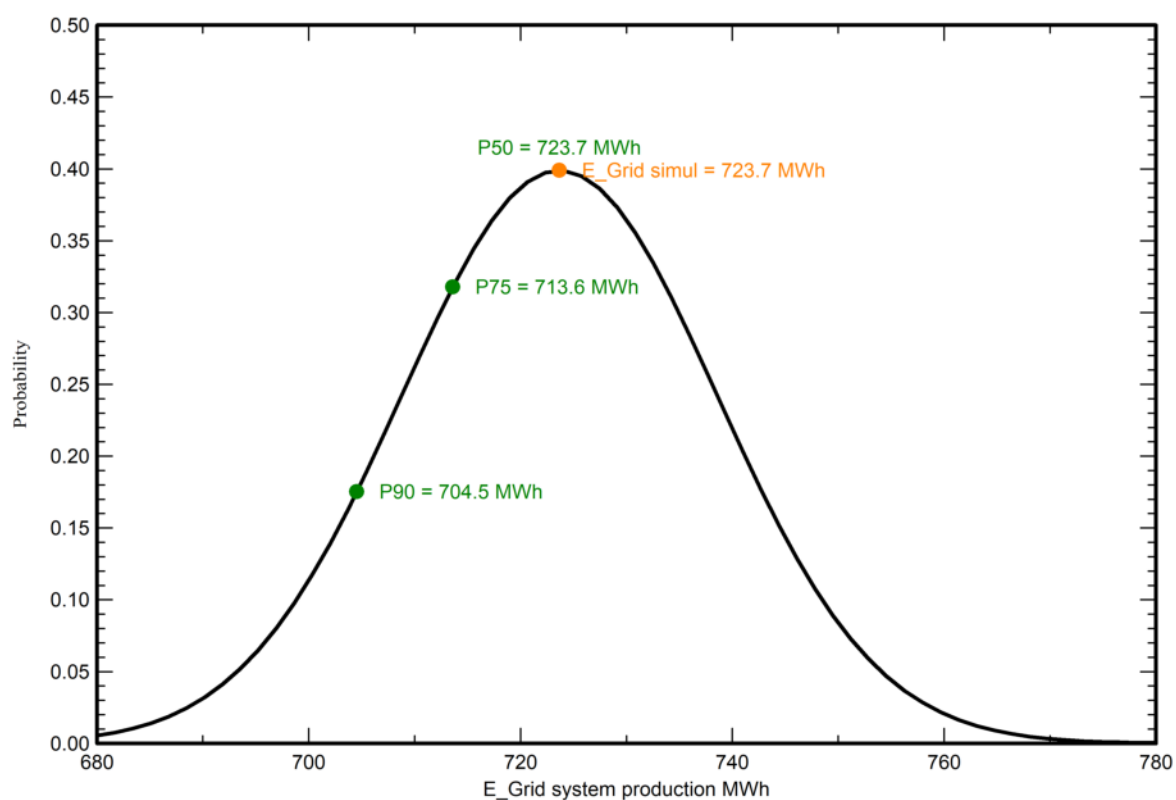
Simulation and parameters uncertainties

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	14.9 MWh
P50	723.7 MWh
P90	704.5 MWh
P75	713.6 MWh

Probability distribution

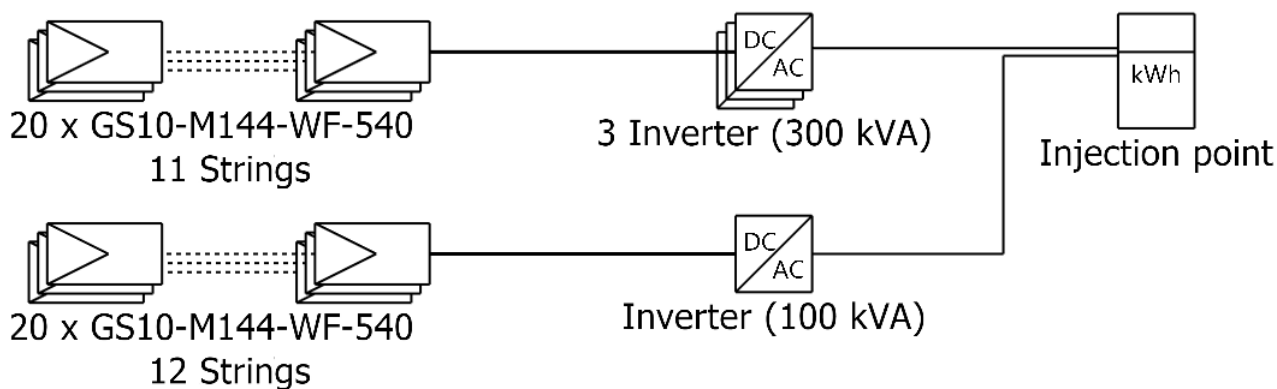




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Single-line diagram



PV module	GS10-M144-WF-540
Inverter	MAX 100KTL3-X LV
String	20 x GS10-M144-WF-540

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