

PVsyst - Simulation report

Grid-Connected System

Project: Smarttask1

Variant: New simulation variant

Sheds on ground

System power: 101 kWp

Delhi - India

Author



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PVsyst V7.3.4

VC0, Simulation date:
15/06/23 00:29
with v7.3.4

Project summary

Geographical Site

Delhi
India

Situation

Latitude 28.65 °N
Longitude 77.23 °E
Altitude 238 m
Time zone UTC+5.5

Project settings

Albedo 0.20

Meteo data

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

System summary

Grid-Connected System

Simulation for year no 10

PV Field Orientation

Fixed plane
Tilt/Azimuth 30 / 0 °

Sheds on ground

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules 315 units
Pnom total 101 kWp

Inverters

Nb. of units 4 units
Pnom total 100 kWac
Pnom ratio 1.008

Results summary

Produced Energy 137368 kWh/year Specific production 1363 kWh/kWp/year Perf. Ratio PR 78.18 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Near shading definition - Iso-shadings diagram	5
Main results	6
Loss diagram	7
Predef. graphs	8
Single-line diagram	9



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General parameters

Grid-Connected System

PV Field Orientation

Orientation

Fixed plane

Tilt/Azimuth 30 / 0 °

Sheds on ground

Sheds configuration

Nb. of sheds 20 units

Sizes

Sheds spacing 5.00 m

Collector width 2.00 m

Ground Cov. Ratio (GCR) 40.0 %

Shading limit angle

Limit profile angle 17.1 °

Models used

Transposition Perez

Diffuse Perez, Meteonorm

Circumsolar separate

Horizon

Free Horizon

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer

Generic

Model

STP-320-A60-Wnhb

(Original PVsyst database)

Unit Nom. Power

320 Wp

Number of PV modules

315 units

Nominal (STC)

101 kWp

Modules

15 Strings x 21 In series

At operating cond. (50°C)

Pmpp

91.6 kWp

U mpp

641 V

I mpp

143 A

Total PV power

Nominal (STC)

101 kWp

Total

315 modules

Module area

532 m²

Cell area

469 m²

Inverter

Manufacturer

Generic

Model

SG25CX-P2

(Original PVsyst database)

Unit Nom. Power

25.0 kWac

Number of inverters

4 units

Total power

100 kWac

Operating voltage

160-1000 V

Max. power (=>40°C)

27.5 kWac

Pnom ratio (DC:AC)

1.01

Power sharing within this inverter

Total inverter power

Total power

100 kWac

Max. power

110 kWac

Number of inverters

4 units

Pnom ratio

1.01

Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 29.0 W/m²KUv (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 75 mΩ

Loss Fraction 1.5 % at STC

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.2 %

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



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Array losses

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

System losses

Auxiliaries loss

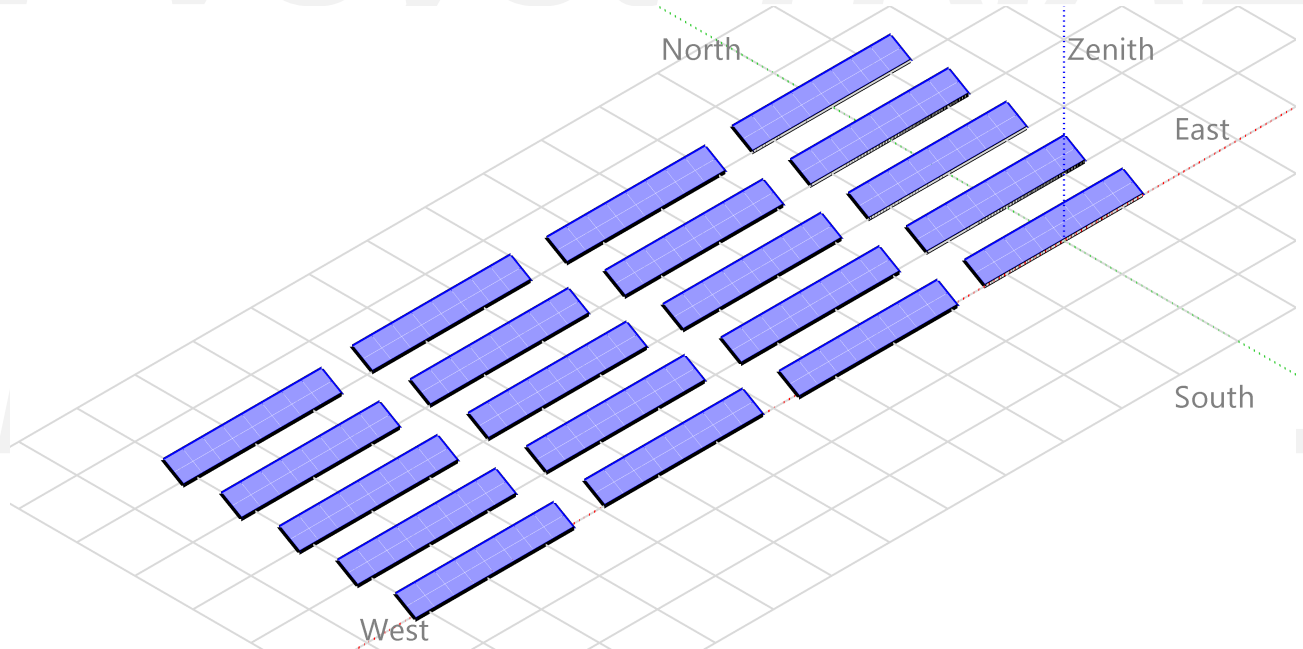


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Near shadings parameter

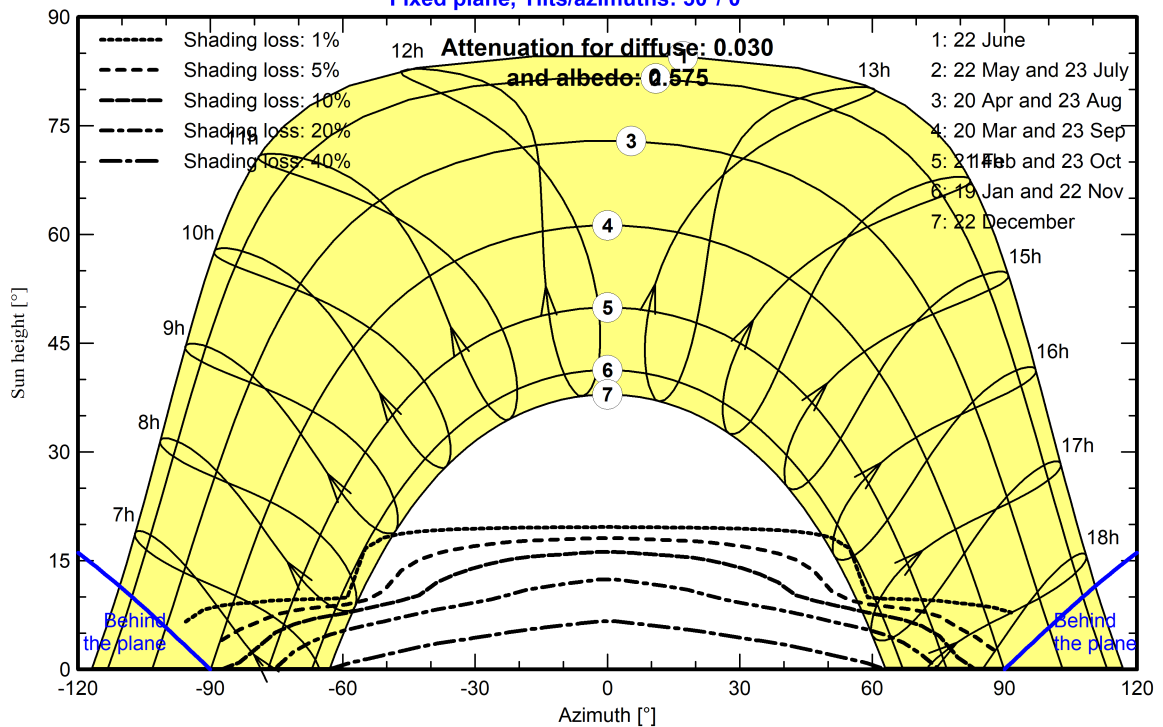
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 30°/ 0°





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Main results

System Production

Produced Energy 137368 kWh/year

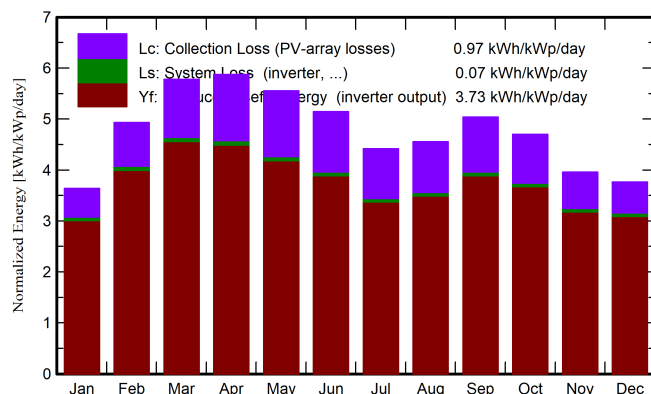
Specific production

1363 kWh/kWp/year

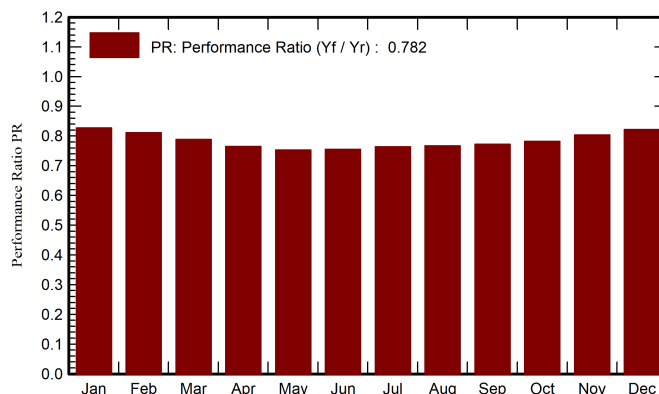
Perf. Ratio PR

78.18 %

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	87.1	50.9	13.27	112.9	106.6	9618	9413	0.827
February	110.6	53.8	17.51	138.1	130.7	11509	11282	0.811
March	157.1	71.8	23.66	179.2	169.3	14517	14246	0.789
April	173.2	87.0	29.65	176.2	165.7	13851	13594	0.765
May	183.6	96.5	33.41	172.2	161.2	13325	13073	0.753
June	170.9	105.0	33.05	154.4	143.7	11986	11755	0.755
July	148.9	98.9	31.45	137.0	127.4	10766	10549	0.764
August	145.1	88.5	30.41	141.1	131.8	11133	10912	0.767
September	141.8	79.3	29.18	151.1	141.8	12001	11772	0.773
October	124.4	69.4	26.40	145.7	137.6	11710	11486	0.782
November	93.3	55.5	20.12	118.7	112.0	9822	9621	0.804
December	85.6	47.1	14.91	116.6	110.4	9871	9665	0.822
Year	1621.7	903.6	25.28	1743.2	1638.1	140110	137368	0.782

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

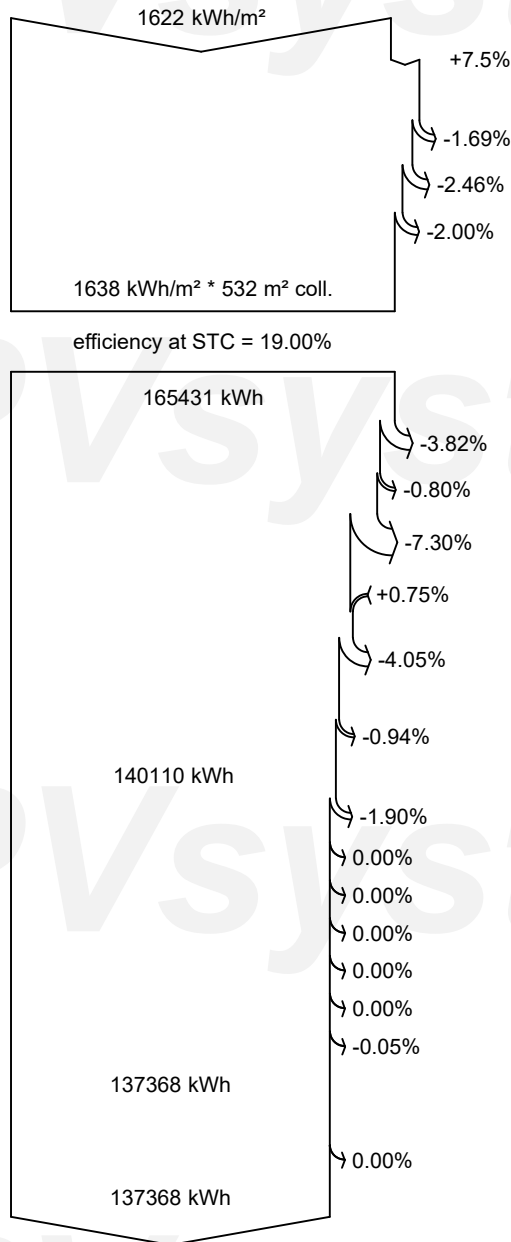
PR Performance Ratio



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

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

Mismatch loss, modules and strings
(including 1.9% 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)

Energy injected into grid

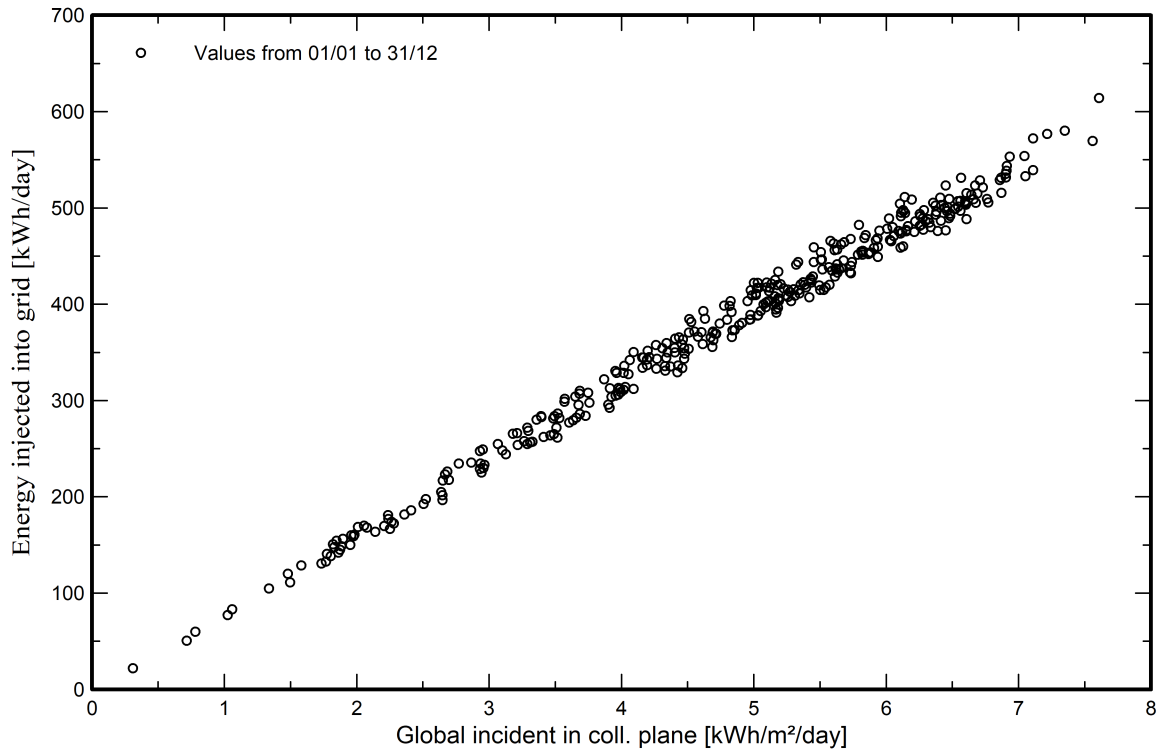


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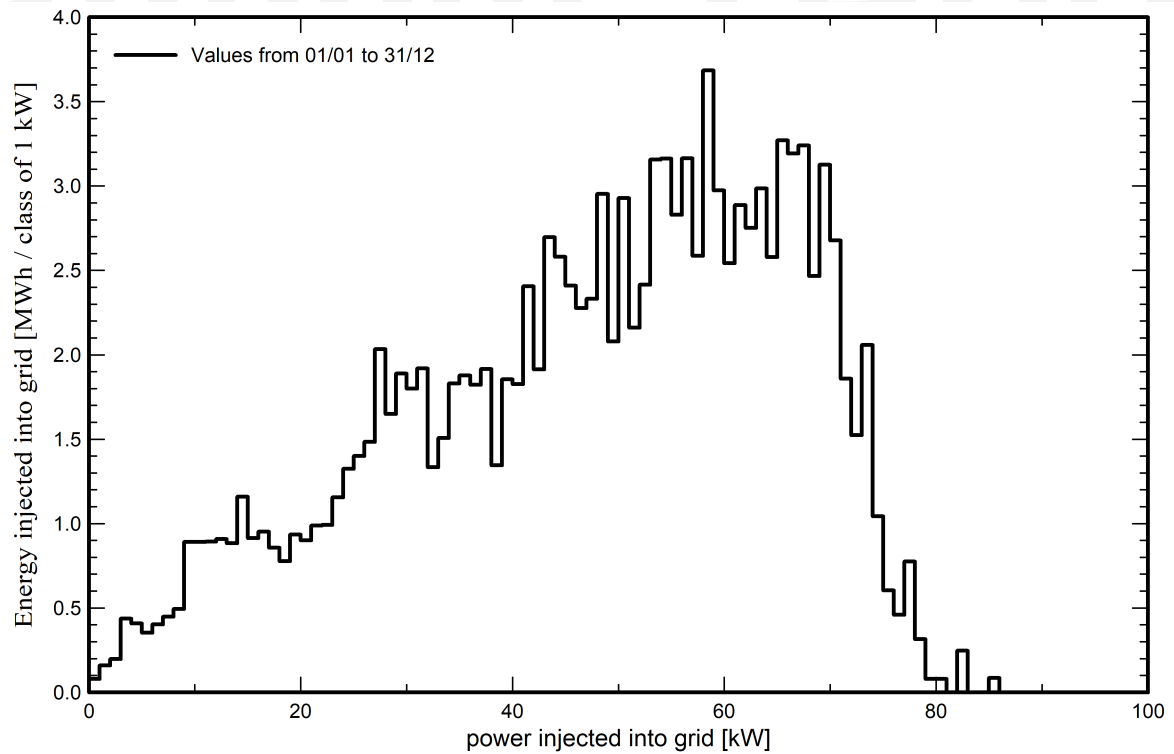
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Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

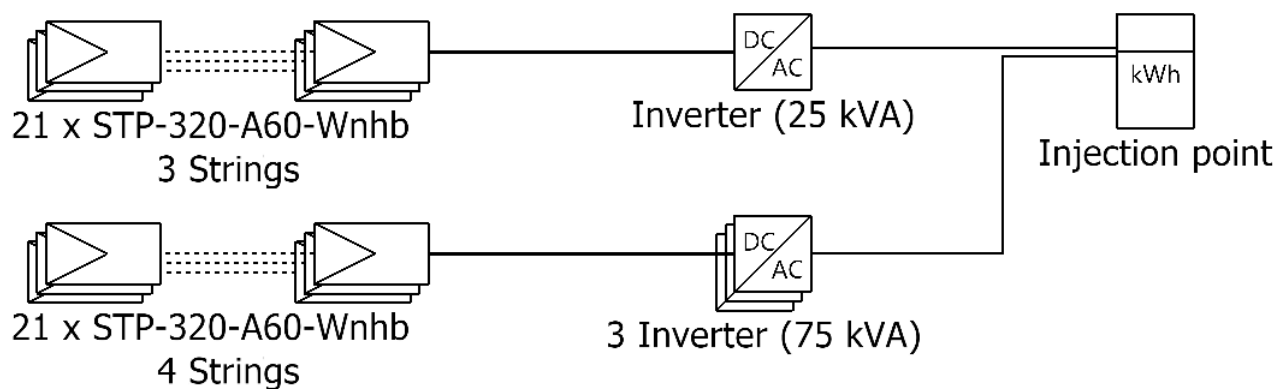




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Single-line diagram



PV module	STP-320-A60-Wnhb
Inverter	SG25CX-P2
String	21 x STP-320-A60-Wnhb

Smarttask1

VC0 : New simulation variant

15/06/23