

PVsyst - Simulation report

Grid-Connected System

Project: District Medical College Sultanpur

Variant: New simulation variant

Unlimited sheds

System power: 552 kWp

Khallābād - India

Author

Jakson Limited (India)



Project: District Medical College Sultanpur

Variant: New simulation variant

PVsyst V8.0.2

VC0, Simulation date:
17/12/24 10:30
with V8.0.2

Jakson Limited (India)

Project summary

Geographical Site

Khallābād

India

Situation

Latitude 26.26 °N

Longitude 82.07 °E

Altitude 105 m

Time zone UTC+5.5

Project settings

Albedo 0.20

Weather data

Khallābād

Meteonorm 8.2 (1996-2015), Sat=100% - Synthetic

System summary

Grid-Connected System

Orientation #1

Sheds

Tilt 10 °

Azimuth 40 °

Unlimited sheds

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

952 units

Pnom total

552 kWp

Inverters

Nb. of units

10 units

Pnom total

470 kWac

Pnom ratio

1.175

Results summary

Produced Energy 809110 kWh/year Specific production 1465 kWh/kWp/year Perf. Ratio PR 93.60 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Main results	7
Loss diagram	8
Predef. graphs	9
P50 - P90 evaluation	10



PVsyst V8.0.2

VC0, Simulation date:
17/12/24 10:30
with V8.0.2

Jakson Limited (India)

General parameters

Grid-Connected System

Orientation #1

Sheds

Tilt	10 °
Azimuth	40 °

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Bifacial system definition

Orientation #1

Bifacial system

Model	Unlimited Sheds 2D Model
-------	--------------------------

Bifacial model geometry

Sheds spacing	6.80 m
Sheds width	3.04 m
Limit profile angle	7.8 °
GCR	44.7 %
Height above ground	1.50 m
Nb. of sheds	5 units

Bifacial model definitions

Ground albedo	0.30
Bifaciality factor	80 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

Unlimited sheds

Sheds configuration

Nb. of sheds	5 units
Unlimited sheds	
Shading limit angle	
Limit profile angle	7.8 °

Sizes

Sheds spacing	6.80 m
Collector width	3.00 m
Average GCR	44.1 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m

Near Shadings

Mutual shadings of sheds

User's needs

Unlimited load (grid)

PV Array Characteristics

Array #1 - PV Array

PV module

Manufacturer	Panasonic Life Solutions India Pvt. Ltd
Model	AE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power	580 Wp
Number of PV modules	72 units
Nominal (STC)	41.8 kWp
Modules	6 string x 12 In series

At operating cond. (50°C)

Pmpp	38.7 kWp
U mpp	493 V
I mpp	79 A

Inverter

Manufacturer	Growatt New Energy
Model	MID 20KTL3-XL

(Original PVsyst database)

Unit Nom. Power	20.0 kWac
Number of inverters	2 units
Total power	40.0 kWac
Operating voltage	200-850 V
Pnom ratio (DC:AC)	1.04
Power sharing within this inverter	



PVsyst V8.0.2

VC0, Simulation date:
17/12/24 10:30
with V8.0.2

Jakson Limited (India)

PV Array Characteristics

Array #2 - Sub-array #2

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules120 units
Nominal (STC)69.6 kWp
Modules8 string x 15 In series

At operating cond. (50°C)

Pmpp64.5 kWp
U mpp616 V
I mpp105 A

Inverter

Manufacturer

Growatt New Energy

Model

MID 30KTL3-X

(Original PVsyst database)

Unit Nom. Power30.0 kWac
Number of inverters2 units
Total power60.0 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.16
Power sharing within this inverter

Array #3 - Sub-array #3

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules247 units
Nominal (STC)143 kWp
Modules13 string x 19 In series

At operating cond. (50°C)

Pmpp133 kWp
U mpp780 V
I mpp170 A

Inverter

Manufacturer

Growatt New Energy

Model

MID 40KTL3-X

(Original PVsyst database)

Unit Nom. Power40.0 kWac
Number of inverters3 units
Total power120 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.19
Power sharing within this inverter

Array #4 - Sub-array #4

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules128 units
Nominal (STC)74.2 kWp
Modules8 string x 16 In series

At operating cond. (50°C)

Pmpp68.8 kWp
U mpp657 V
I mpp105 A

Inverter

Manufacturer

Growatt New Energy

Model

MAX 70KTL3 LV

(Original PVsyst database)

Unit Nom. Power70.0 kWac
Number of inverters1 unit
Total power70.0 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.06
Power sharing within this inverter

Array #5 - Sub-array #5

PV module

ManufacturePanasonic Life Solutions India Pvt. Ltd

ModelAE14T580VHC16B5R

(Custom parameters definition)

Unit Nom. Power580 Wp
Number of PV modules160 units
Nominal (STC)92.8 kWp
Modules10 string x 16 In series

At operating cond. (50°C)

Pmpp86.1 kWp
U mpp657 V
I mpp131 A

Inverter

Manufacturer

Growatt New Energy

Model

MAX 80KTL3 LV

(Original PVsyst database)

Unit Nom. Power80.0 kWac
Number of inverters1 unit
Total power80.0 kWac
Operating voltage200-1000 V
Pnom ratio (DC:AC)1.16
Power sharing within this inverter



PV Array Characteristics

Array #6 - Sub-array #6

PV module

Manufacture Panasonic Life Solutions India Pvt. Ltd
Model AE14T580VHC16B5R
(Custom parameters definition)

Unit Nom. Power 580 Wp
Number of PV modules 225 units
Nominal (STC) 131 kWp
Modules 15 string x 15 In series

At operating cond. (50°C)

Pmpp 121 kWp
U mpp 616 V
I mpp 196 A

Total PV power

Nominal (STC) 552 kWp
Total 952 modules
Module area 2457 m²

Inverter

Manufacturer Growatt New Energy
Model MAX 100KTL3-X LV
(Original PVsyst database)

Unit Nom. Power 100 kWac
Number of inverters 1 unit
Total power 100 kWac
Operating voltage 180-1000 V
Pnom ratio (DC:AC) 1.31
Power sharing within this inverter

Total inverter power

Total power 470 kWac
Number of inverters 10 units
Pnom ratio 1.17

Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

Serie Diode Loss

Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

LID - Light Induced Degradation

Loss Fraction 0.3 %

Module Quality Loss

Loss Fraction 0.0 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.998	0.992	0.963	0.917	0.812	0.567	0.000

DC wiring losses

Global wiring resistance 10 mΩ
Loss Fraction 1.5 % at STC

Array #1 - PV Array

Global array res. 102 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Sub-array #3

Global array res. 75 mΩ
Loss Fraction 1.5 % at STC

Array #5 - Sub-array #5

Global array res. 82 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 96 mΩ
Loss Fraction 1.5 % at STC

Array #4 - Sub-array #4

Global array res. 102 mΩ
Loss Fraction 1.5 % at STC

Array #6 - Sub-array #6

Global array res. 51 mΩ
Loss Fraction 1.5 % at STC

System losses

Unavailability of the system

Time fraction 1.0 %
3.7 days,
3 periods



AC wiring losses

Inv. output line up to injection point

Inverter voltage 220 Vac tri
Loss Fraction 0.09 % at STC

Inverters: MID 20KTL3-XL, MAX 70KTL3 LV

Wire section (3 Inv.) Alu 3 x 3 x 50 mm²
Average wires length 30 m

Inverter: MID 40KTL3-X

Wire section (3 Inv.) Alu 3 x 3 x 25 mm²
Average wires length 0 m

Inverter: MAX 100KTL3-X LV

Wire section (1 Inv.) Alu 1 x 3 x 120 mm²
Wires length 0 m

Inverter: MID 30KTL3-X

Wire section (2 Inv.) Alu 2 x 3 x 16 mm²
Average wires length 0 m

Inverter: MAX 80KTL3 LV

Wire section (1 Inv.) Alu 1 x 3 x 70 mm²
Wires length 0 m



Project: District Medical College Sultanpur

Variant: New simulation variant

PVsyst V8.0.2

VC0, Simulation date:
17/12/24 10:30
with V8.0.2

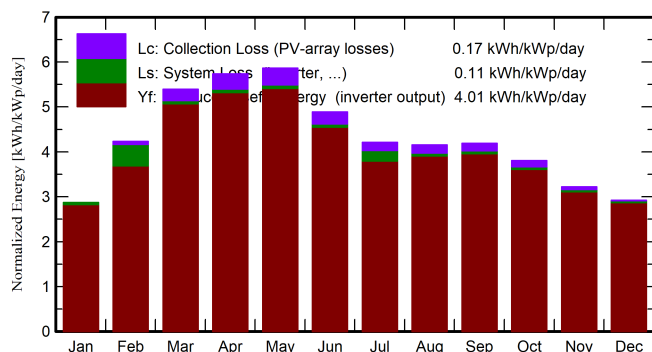
Jakson Limited (India)

Main results

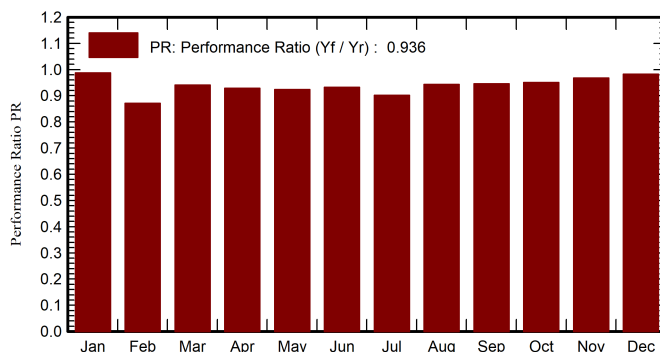
System Production

Produced Energy (P50)	809110 kWh/year	Specific production (P50)	1465 kWh/kWp/year	Perf. Ratio PR	93.60 %
Produced Energy (P90)	790406 kWh/year	Specific production (P90)	1431 kWh/kWp/year		
Produced Energy (P75)	799276 kWh/year	Specific production (P75)	1448 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

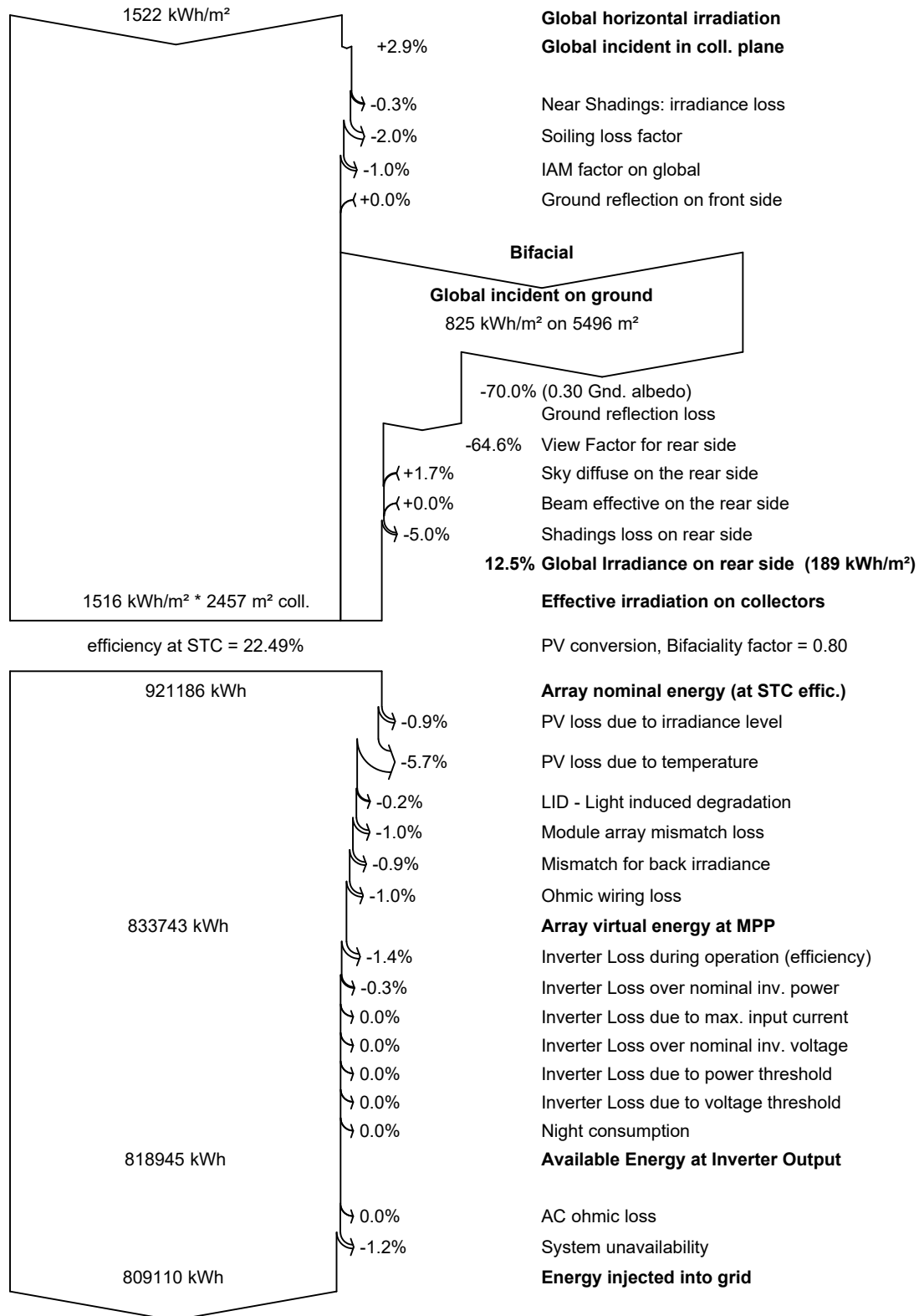
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	82.3	51.11	14.87	88.9	85.8	49208	48444	0.987
February	110.5	58.93	19.33	118.6	114.9	64466	57063	0.871
March	159.6	72.90	25.36	167.2	162.2	88135	86826	0.941
April	169.5	87.01	30.42	172.2	166.9	89519	88226	0.928
May	182.6	99.92	33.35	181.8	176.3	94102	92706	0.924
June	148.7	97.55	32.41	146.6	141.9	76593	75422	0.932
July	132.4	84.99	30.22	130.7	126.4	69109	65026	0.901
August	128.6	84.31	29.66	128.8	124.5	68067	67029	0.943
September	122.7	77.74	28.66	125.8	121.6	66704	65699	0.946
October	112.4	71.20	26.83	118.0	114.2	62880	61921	0.951
November	89.8	58.51	21.39	96.6	93.4	52397	51616	0.967
December	83.0	53.57	16.74	90.6	87.5	49876	49132	0.982
Year	1522.2	897.73	25.80	1565.6	1515.6	831056	809110	0.936

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		



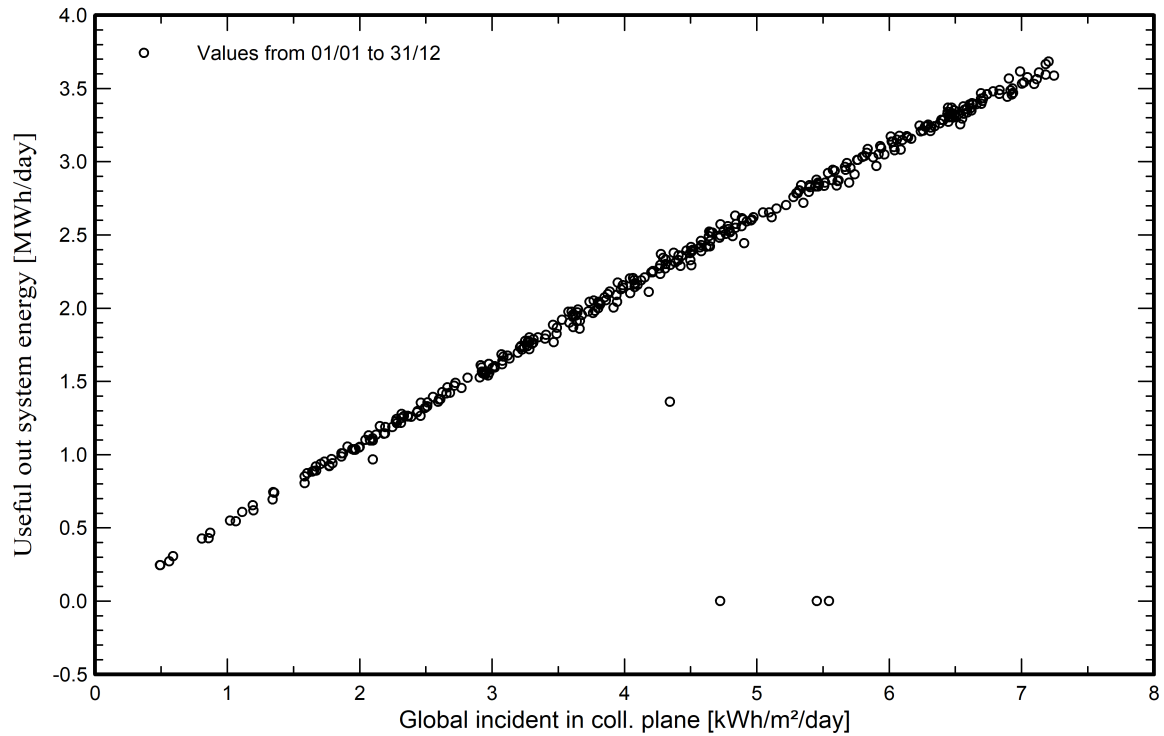
Loss diagram



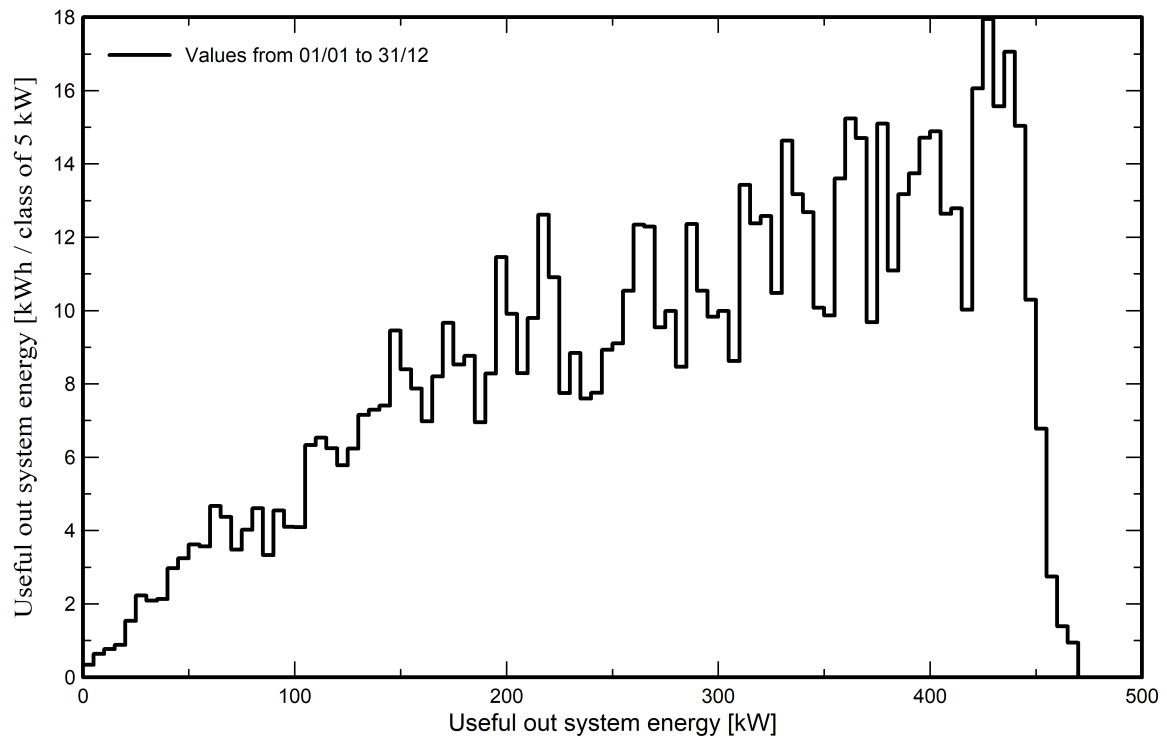


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





P50 - P90 evaluation

Weather data

Source Meteonorm 8.2 (1996-2015), Sat=100%
Kind Not defined
Year-to-year variability(Variance) 0.0 %

Specified Deviation

Global variability (weather data + system)

Variability (Quadratic sum) 1.8 %

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 14.6 MWh
P50 809.1 MWh
P90 790.4 MWh
P75 799.3 MWh

Probability distribution

