Version 7.4.8

PVsyst - Simulation report

Grid-Connected System

Project: PRERAK WIND ENERGY

Variant: PRERAK WIND ENERGY_

Sheds, single array

System power: 5506 kWp

Ghator - India

Author

AVENGERS RAYS SOLAR PRIVATE LIMITED (India)

PVsyst V7.4.8
VC1, Simulation date:
05/08/24 13:25
with V7.4.8

Project summary

Geographical Site
Ghator
India

Situation

Latitude	27.40 °N
Longitude	72.28 °E
Altitude	183 m
Time zone	UTC+5.5

Project settings
Albedo 0.20

Weather data
Ghator
SolarGIS Monthly aver. , period not spec. - Synthetic

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 22 / 0 °

Near Shadings
Linear shadings : Fast (table)

User's needs
Unlimited load (grid)

System information

PV Array		Inverters	
Nb. of modules	9576 units	Nb. of units	1 unit
Pnom total	5506 kWp	Pnom total	4400 kWac
		Pnom ratio	1.251

Results summary

Produced Energy	10099204 kWh/year	Specific production	1834 kWh/kWp/year	Perf. Ratio PR	82.43 %

Table of contents

PVsyst V7.4.8
VC1, Simulation date:
05/08/24 13:25
with V7.4.8

General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	22 / 0 °

Sheds configuration		
Nb. of sheds	30	units
Single array		
Sizes		
Sheds spacing	7.75	m
Collector width	4.58	m
Ground Cov. Ratio (GCR)	59.0	%
Top inactive band	0.02	m
Bottom inactive band	0.02	m
Shading limit angle		
Limit profile angle	26.3	°

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Linear shadings : Fast (table)

User's needs
Unlimited load (grid)

Bifacial system

Model	2D Calculation unlimited sheds

Bifacial model geometry		
Sheds spacing	7.75	m
Sheds width	4.62	m
Limit profile angle	26.3	°
GCR	59.6	%
Height above ground	0.75	m

Bifacial model definitions	
Ground albedo	0.25
Bifaciality factor	81 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

PV Array Characteristics

PV module

Manufacturer	Waaree Energies Ltd.
Model	BiN-08-575
(Custom parameters definition)	
Unit Nom. Power	575 Wp
Number of PV modules	9576 units
Nominal (STC)	5506 kWp
Modules	342 string x 28 In series
At operating cond. (50°C)	
Pmpp	5090 kWp
U mpp	1097 V
I mpp	4638 A

Inverter

Manufacturer	Sungrow
Model	SG4400UD-20
(Custom parameters definition)	
Unit Nom. Power	4400 kWac
Number of inverters	1 unit
Total power	4400 kWac
Operating voltage	938-1500 V
Max. power (=>23°C)	5280 kWac
Pnom ratio (DC:AC)	1.25
Power sharing within this inverter	

Total PV power

Nominal (STC)	5506 kWp
Total	9576 modules
Module area	24737 m²

Total inverter power

Total power	4400 kWac
Max. power	5280 kWac
Number of inverters	1 unit
Pnom ratio	1.25

PVsyst V7.4.8
VC1, Simulation date:
05/08/24 13:25
with V7.4.8

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

DC wiring losses
Global array res. 3.9 mΩ
Loss Fraction 1.5 % at STC

Serie Diode Loss
Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

LID - Light Induced Degradation
Loss Fraction 0.5 %

Module Quality Loss
Loss Fraction 0.5 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.2 %

IAM loss factor
Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.999	0.993	0.979	0.946	0.855	0.615	0.000

System losses

Unavailability of the system
Time fraction 1.0 %
3.7 days,
3 periods

Auxiliaries loss
Proportional to Power 24.0 W/kW
0.0 kW from Power thresh.
Night aux. cons. 24.0 kW

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 660 Vac tri
Loss Fraction 0.29 % at STC

Global System
Wire section Alu 3 x 4000 mm²
Wires length 30 m

MV line up to Injection
MV Voltage 33 kV
Wires Alu 3 x 185 mm²
Length 550 m
Loss Fraction 0.05 % at STC

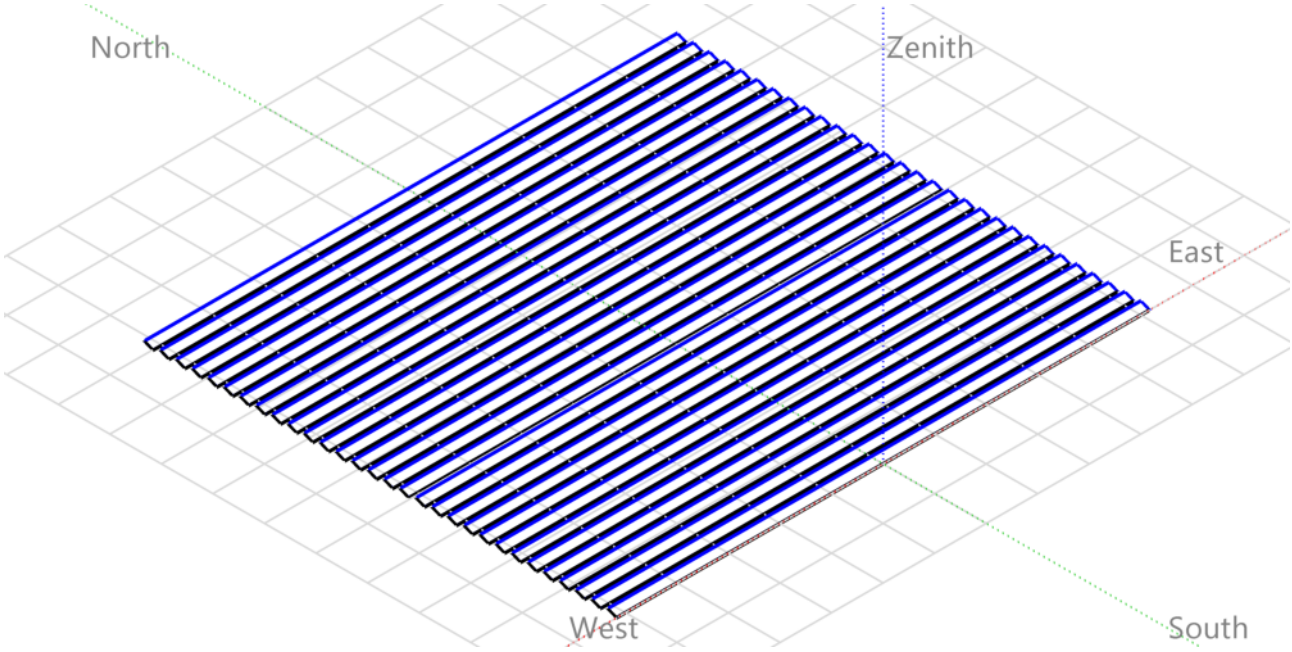
AC losses in transformers

MV transfo
Medium voltage 33 kV

Transformer from Datasheets
Nominal power 4400 kVA
Iron Loss (24/24 Connexion) 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

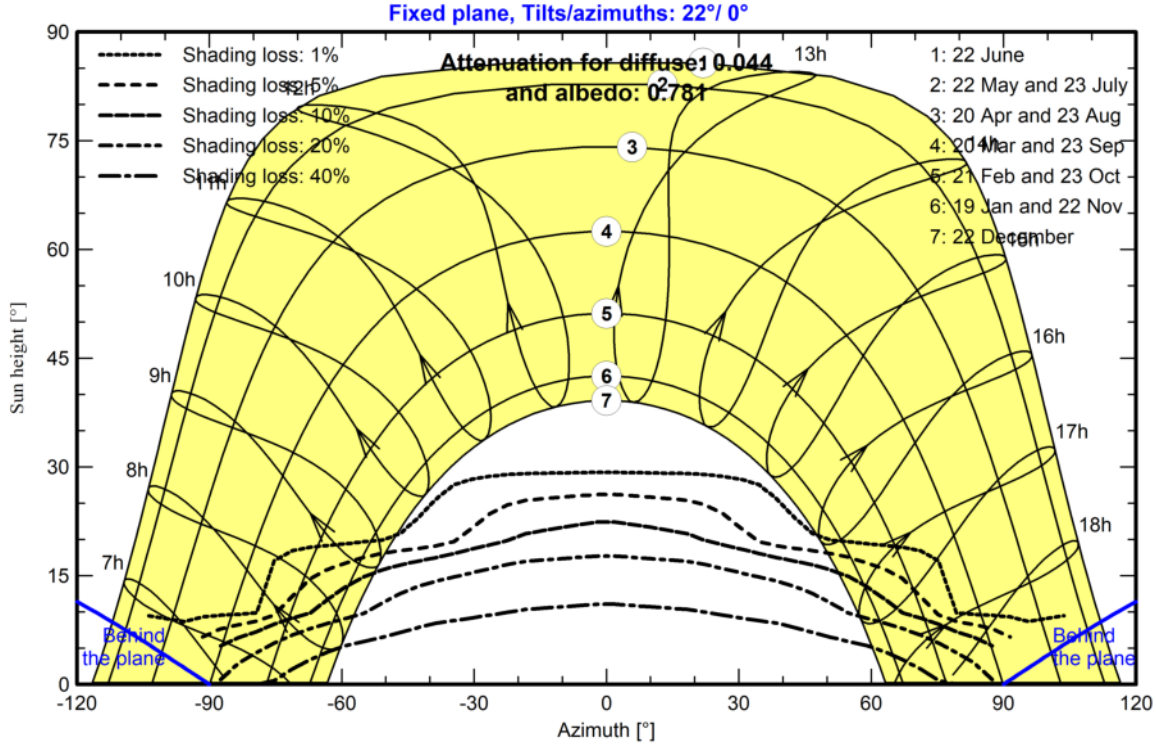
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1



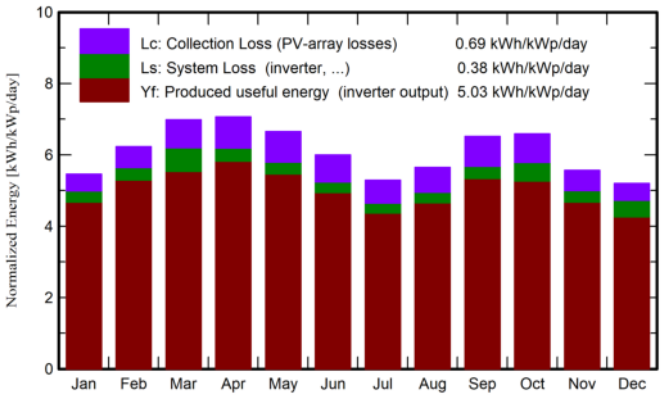
PVsyst V7.4.8
VC1, Simulation date:
05/08/24 13:25
with V7.4.8

Main results

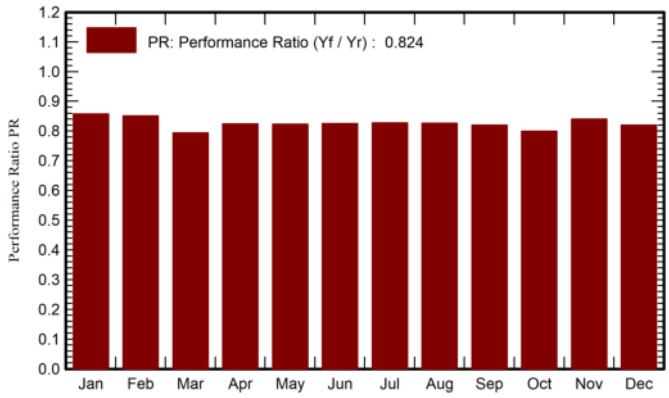
System Production

Produced Energy (P50)	10099204 kWh/year	Specific production (P50)	1834 kWh/kWp/year	Perf. Ratio PR	82.43 %
Produced Energy (P90)	9700056 kWh/year	Specific production (P90)	1762 kWh/kWp/year		
Produced Energy (P95)	9587751 kWh/year	Specific production (P95)	1741 kWh/kWp/year		

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	127.0	48.0	13.90	169.1	161.9	852459	798883	0.858
February	141.0	50.0	17.70	174.3	167.9	870425	816423	0.850
March	192.0	69.0	24.00	216.5	208.9	1059064	946314	0.794
April	205.0	86.0	29.90	212.0	204.0	1022898	962017	0.824
May	213.0	108.0	34.40	206.1	197.6	990463	933493	0.823
June	191.0	104.0	36.00	179.8	171.9	866164	816796	0.825
July	172.0	103.0	34.50	163.9	156.2	793698	747001	0.828
August	175.0	92.0	33.40	175.0	167.5	846406	796200	0.826
September	180.0	74.0	32.20	195.5	188.1	938556	882247	0.820
October	171.0	60.0	27.10	204.3	197.0	988865	899308	0.799
November	130.0	53.0	20.20	167.0	160.3	825745	772875	0.840
December	119.0	46.0	15.09	161.3	154.2	807647	727647	0.820
Year	2016.0	893.0	26.57	2225.0	2135.6	10862391	10099204	0.824

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

PVsyst V7.4.8
VC1, Simulation date:
05/08/24 13:25
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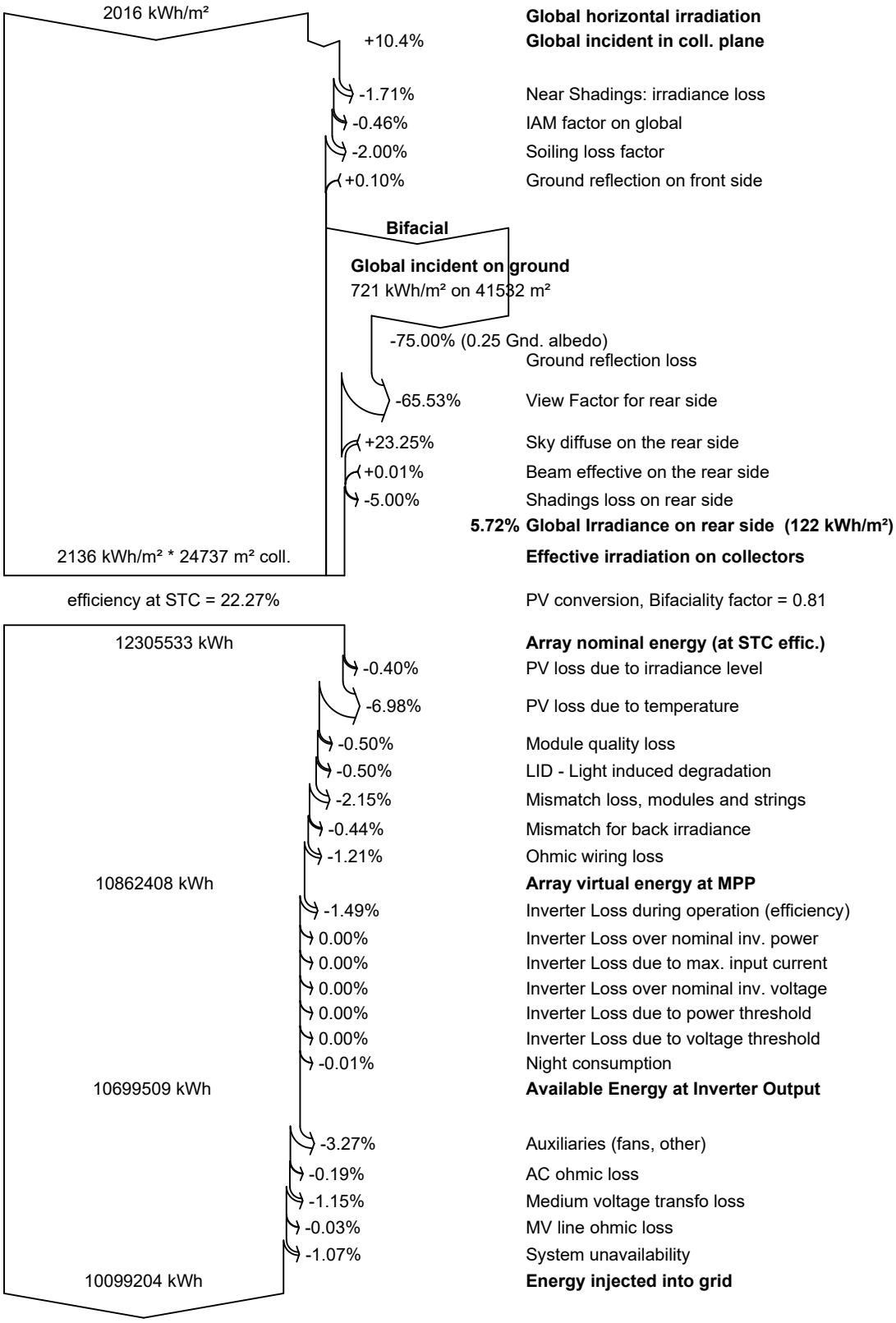
Loss diagram



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VC1, Simulation date:
05/08/24 13:25
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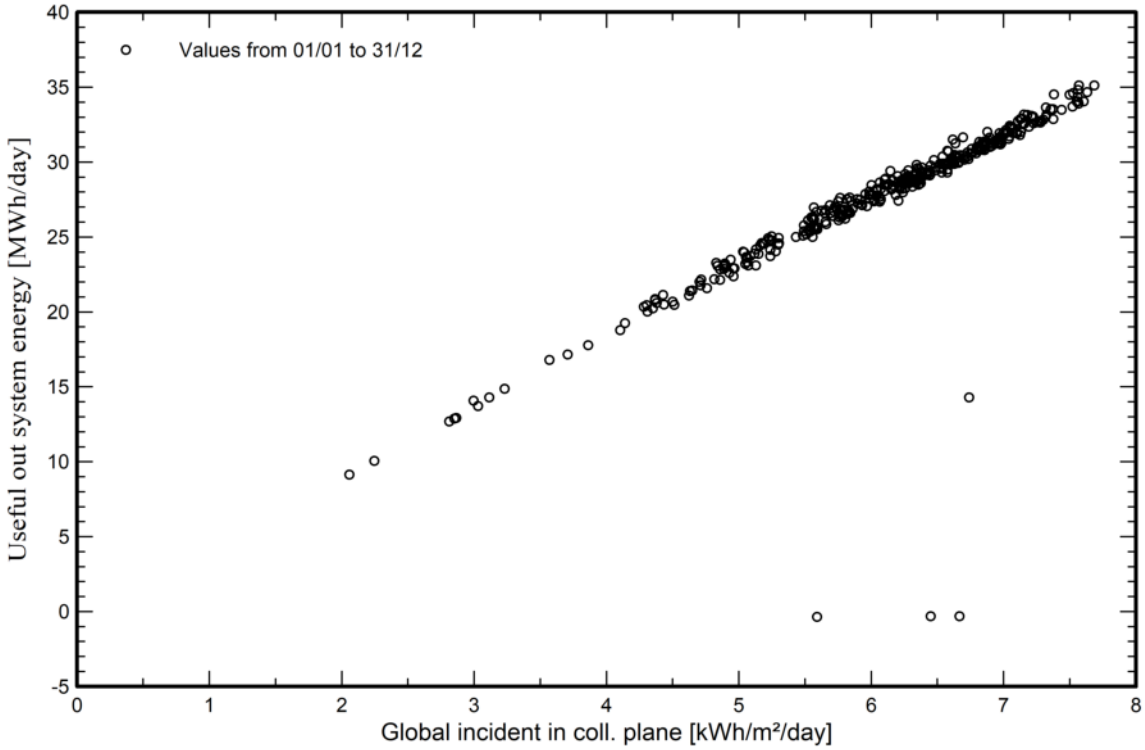
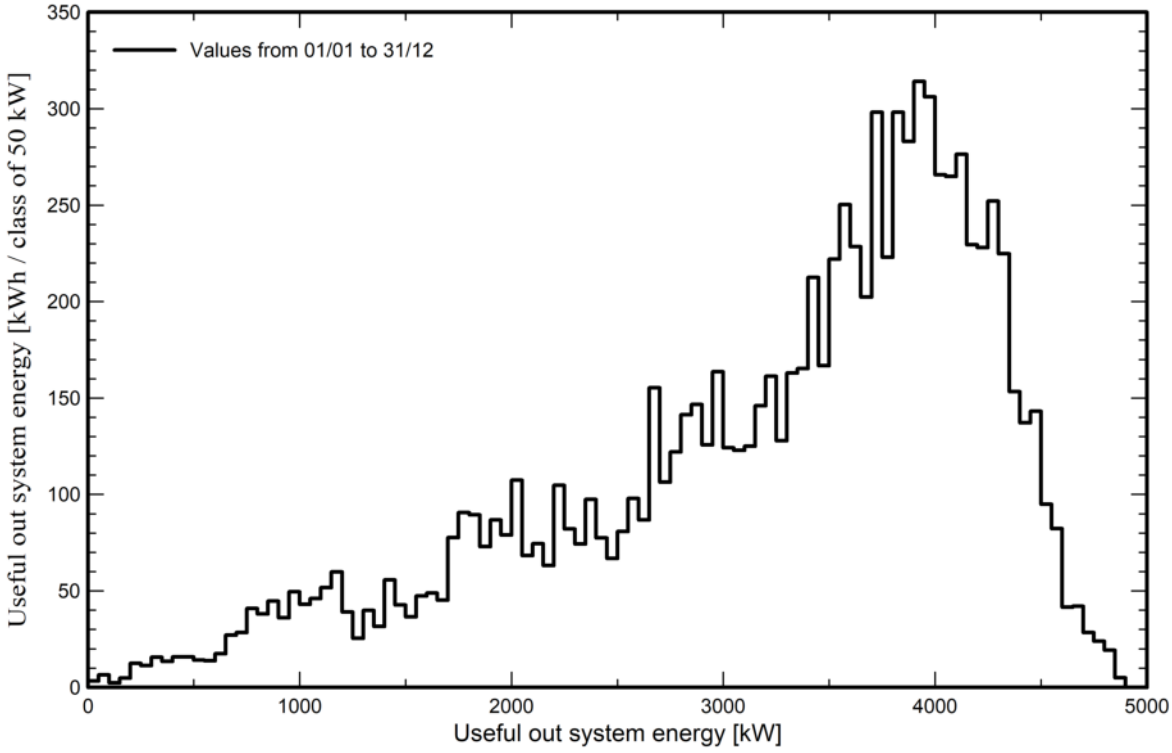
Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



Single-line diagram

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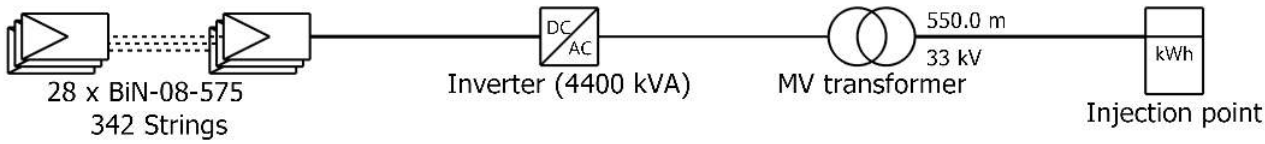
VC1, Simulation date:
05/08/24 13:25
with V7.4.8



PV module	BiN-08-575
Inverter	SG4400UD-20
String	28 x BiN-08-575

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