PVsyst - Simulation report

Grid-Connected System

Project: 25_08_25_Bomen PVSyst - 2021 - per inverter

Variant: 24_10_08_Match_measured_inv_2_1_mono

Tracking system with backtracking

System power: 2285 kWp

Wagga Wagga - Australia

Author
Sijin Wang (Australia)

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VPI, Simulation date:
10/09/25 14:44
with V8.0.15

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Project summary

Geographical Site
Wagga Wagga
Australia

Situation

Latitude	-35.13 °(S)
Longitude	147.32 °(E)
Altitude	213 m
Time zone	UTC+10

Weather data
Bomen Solar Farm 2021 wind
Custom file - Imported

Monthly albedo values

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.20	0.20	0.19	0.20	0.17	0.14	0.13	0.16	0.19	0.20	0.17	0.21

System summary

Grid-Connected System
Simulation for year no 2

Tracking system with backtracking

Orientation #1
Tracking plane, horizontal N-S axis

Axis azimuth	0 °
Phi min / max.	-/+ 60 °
Diffuse shading	all trackers

Tracking algorithm
Astronomic calculation
Backtracking activated

Near Shadings
Linear shadings : Slow (simul.)

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	5936 units
Pnom total	2285 kWp

Inverters

Nb. of units	1 unit
Total power	2750 kWac
Pnom ratio	0.83

Results summary

Produced Energy	2966.2 MWh/year	Specific production	1298 kWh/kWp/year	Perf. Ratio PR	61.86 %
				Bifacial perf. ratio	0.00 %

Table of contents

PVsyst V8.0.15
VPI, Simulation date:
10/09/25 14:44
with V8.0.15

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General parameters

Grid-Connected System

Tracking system with backtracking

Orientation #1

Tracking plane, horizontal N-S axis

Axis azimuth	0 °
Phi min / max.	-/+ 60 °
Diffuse shading	all trackers

Tracking algorithm

Astronomic calculation	
Backtracking activated	

Field properties

Nb. of trackers	72 units
Tracking plane, horizontal N-S axis	

Sizes

Tracker Spacing	4.95 m
Sensitive width	2.03 m
GCR Shading	41.0 %

Backtracking limit angle

Phi limits	+/- 65.8 °

Backtracking parameters

Backtracking pitch	4.95 m
Backtracking width	2.03 m
Left inactive band	0.00 m
Right inactive band	0.00 m
GCR Backtracking	41.0 %
Parameters choice	Automatic

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Linear shadings : Slow (simul.)

User's needs
Unlimited load (grid)

Bifacial system definition

Orientation #1

Bifacial system

Model	Unlimited Trackers 2D model

Bifacial model geometry

Tracker Spacing	4.95 m
Tracker width	2.03 m
Axis height above ground	2.10 m
Nb. of sheds	72 units

Bifacial model definitions

Ground albedo	0.30
Bifaciality factor	0 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

PV Array Characteristics

PV module

Manufacturer	Generic
Model	JKM-385M-72H-TV-Bifacial
(Custom parameters definition)	
Jinko_JKM_385M_72H_TV_Monofacial.PAN	
Unit Nom. Power	385 Wp
Number of PV modules	5936 units
Nominal (STC)	2285 kWp
Modules	212 string x 28 In series

At operating cond. (50°C)

Pmpp	2096 kWp
U mpp	1023 V
I mpp	2048 A

Inverter

Manufacturer	Generic
Model	Sunny Central 2750-EV
(Original PVsyst database)	
Unit Nom. Power	2750 kWac
Number of inverters	1 unit
Total power	2750 kWac
Operating voltage	875-1425 V
Pnom ratio (DC:AC)	0.83

PVsyst V8.0.15
VPI, Simulation date:
10/09/25 14:44
with V8.0.15

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PV Array Characteristics

Total PV power

Nominal (STC)	2285 kWp
Total	5936 modules
Module area	12152 m²
Cell area	10495 m²

Total inverter power

Total power	2750 kWac
Number of inverters	1 unit
Pnom ratio	0.83

Array losses

Array Soiling Losses

Average loss Fraction 0.3 %

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0.3%	0.2%	0.7%	0.6%	0.2%	0.1%	0.2%	0.2%	0.2%	0.1%	0.1%	0.2%

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 18.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 3.5 mΩ
Loss Fraction 0.63 % at STC

Serie Diode Loss

Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

LID - Light Induced Degradation

Loss Fraction 2.5 %

Module Quality Loss

Loss Fraction 0.70 %

Module mismatch losses

Loss Fraction 2.00 % at MPP

Strings Mismatch loss

Loss Fraction 0.15 %

Module average degradation

Year no 2
Loss factor 0.4 %/year
Imp / Vmp contributions 80% / 20%

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year
Vmp RMS dispersion 0.4 %/year

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.963	0.892	0.814	0.679	0.438	0.000

Spectral correction

FirstSolar model

Coefficient Set	C0	C1	C2	C3	C4	C5
Monocrystalline Si	0.85914	-0.02088	-0.0058853	0.12029	0.026814	-0.001781

System losses

Unavailability of the system

Time fraction 2.0 %
7.3 days,
3 periods

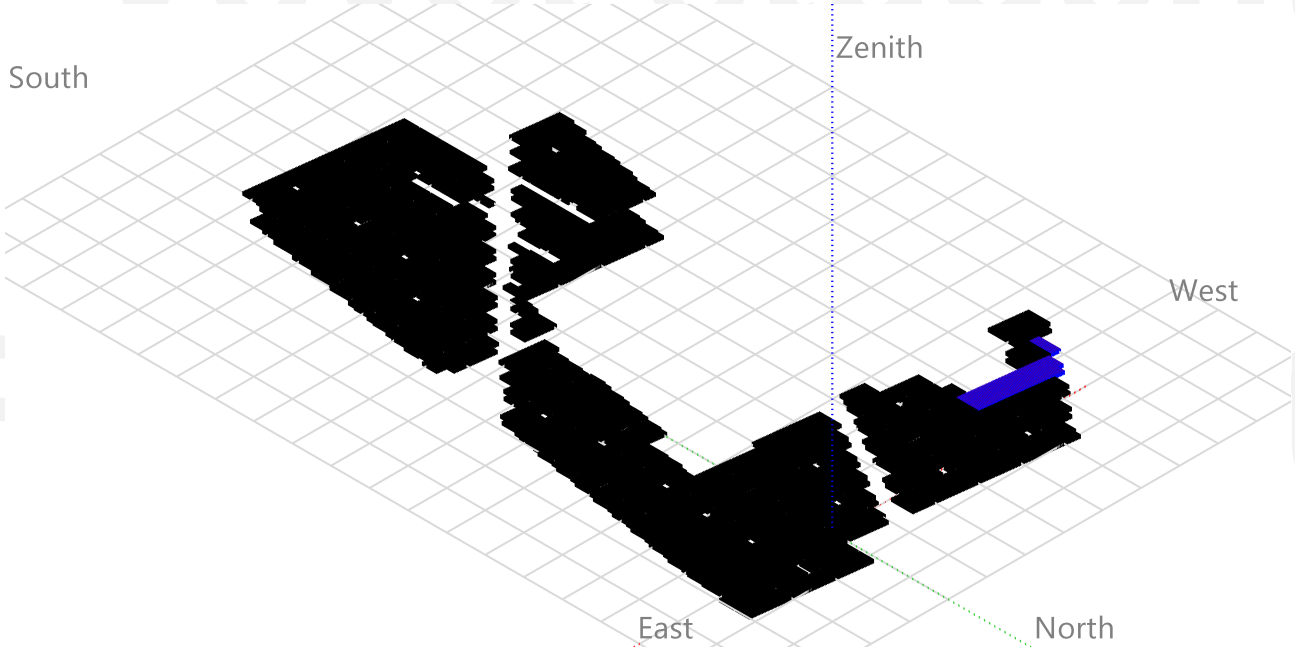
Auxiliary losses

constant (fans) 88.0 kW
0.0 kW from Power thresh.
Night aux. cons. 88.0 kW

PVsyst V8.0.15
VPI, Simulation date:
10/09/25 14:44
with V8.0.15

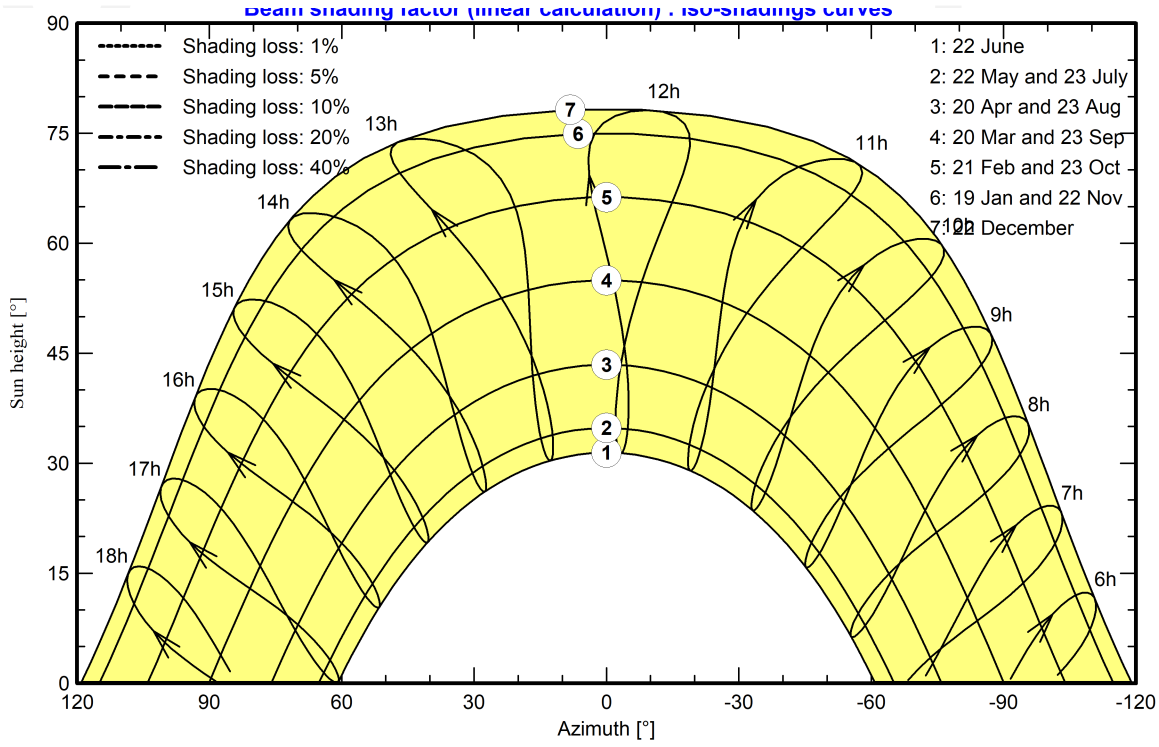
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1 -



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VPI, Simulation date:
10/09/25 14:44
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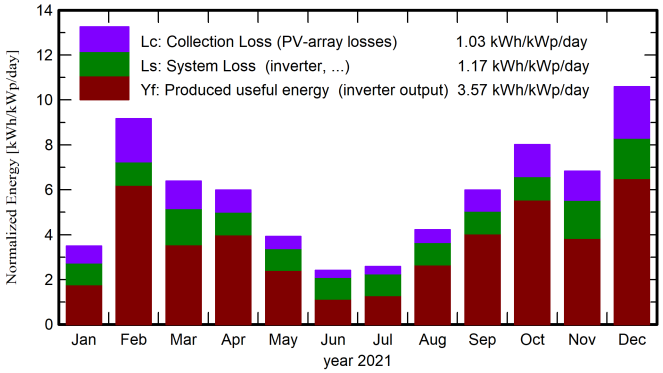
Main results

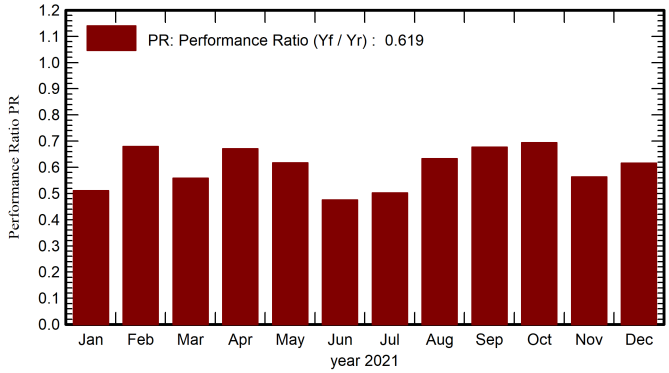
System Production

Produced Energy	2966.2 MWh/year	Specific production	1298 kWh/kWp/year
		Perf. Ratio PR	61.86 %
		Bifacial perf. ratio	0.00 %

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 MWh	E_Grid MWh	PR ratio	PRBifi ratio
Jan. 21	84.3	30.31	8.56	108.2	105.0	194.9	126.3	0.511	0.000
Feb. 21	195.8	54.18	21.84	256.5	250.9	464.5	397.9	0.679	0.000
Mar. 21	154.0	53.66	18.49	198.0	191.5	367.0	252.5	0.558	0.000
Apr. 21	134.4	38.38	13.81	179.6	173.6	344.2	275.1	0.670	0.000
May 21	92.7	32.50	10.91	121.7	117.0	240.2	171.6	0.617	0.000
June 21	58.7	28.34	8.55	72.5	69.2	145.2	78.8	0.476	0.000
July 21	64.9	30.26	7.96	80.2	76.7	160.8	92.1	0.503	0.000
Aug. 21	101.7	40.08	8.68	131.0	126.6	259.5	189.3	0.632	0.000
Sep. 21	138.8	47.34	11.01	179.6	174.6	347.4	278.0	0.677	0.000
Oct. 21	194.0	60.62	13.74	248.3	242.5	467.2	393.9	0.694	0.000
Nov. 21	164.9	65.05	17.08	204.9	199.7	380.2	263.5	0.563	0.000
Dec. 21	243.8	65.31	21.50	317.7	310.7	570.0	447.1	0.616	0.000
Year	1628.0	546.05	13.43	2098.1	2037.9	3940.9	2966.2	0.619	0.000

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	PRBifi	Bifacial Performance Ratio
GlobEff	Effective Global, corr. for IAM and shadings		

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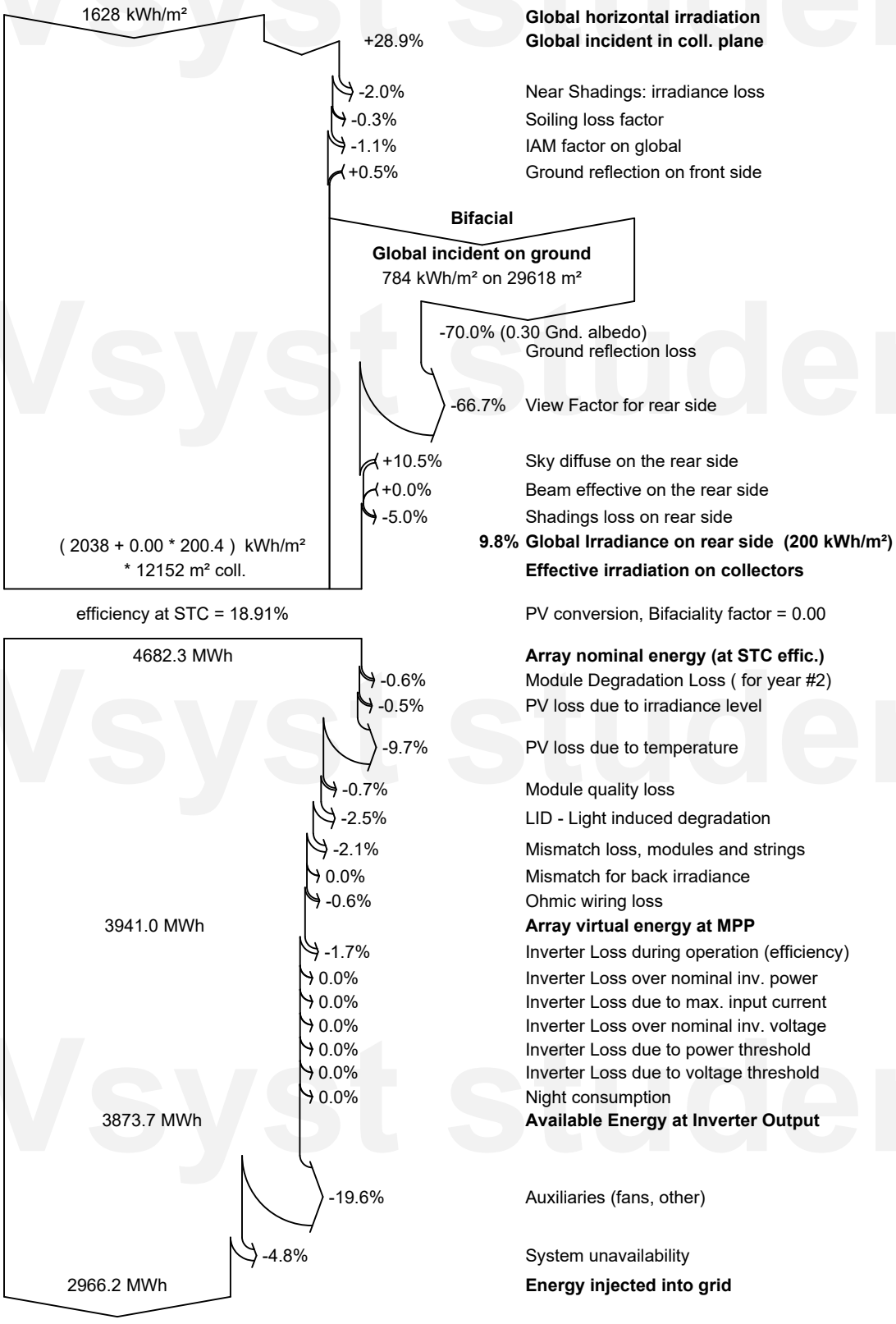
VPI, Simulation date:
10/09/25 14:44
with V8.0.15

Loss diagram



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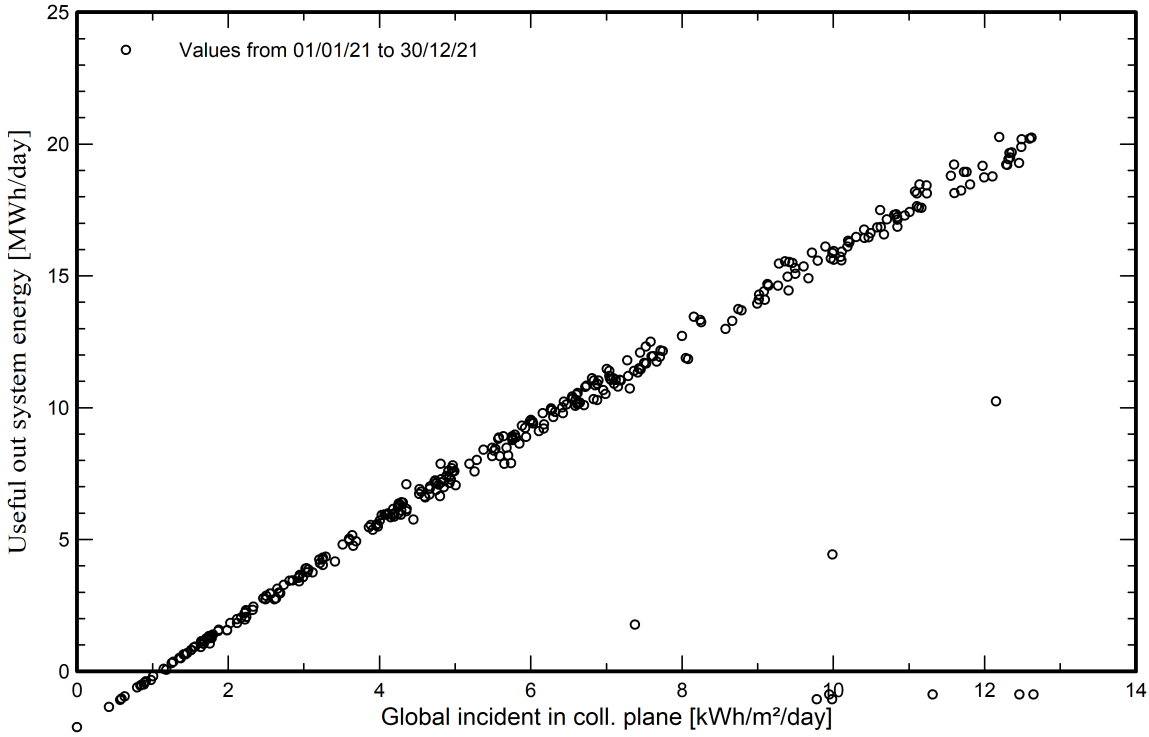
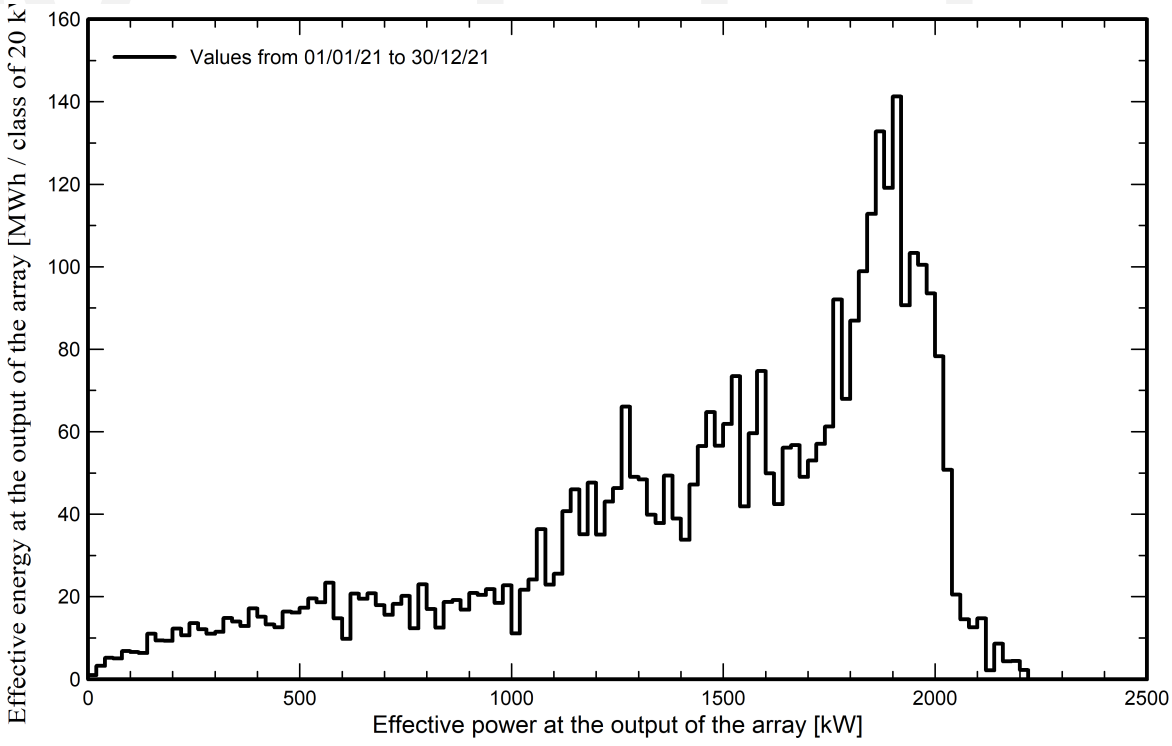
Predef. graphs

Daily Input/Output diagram



Array Power Distribution



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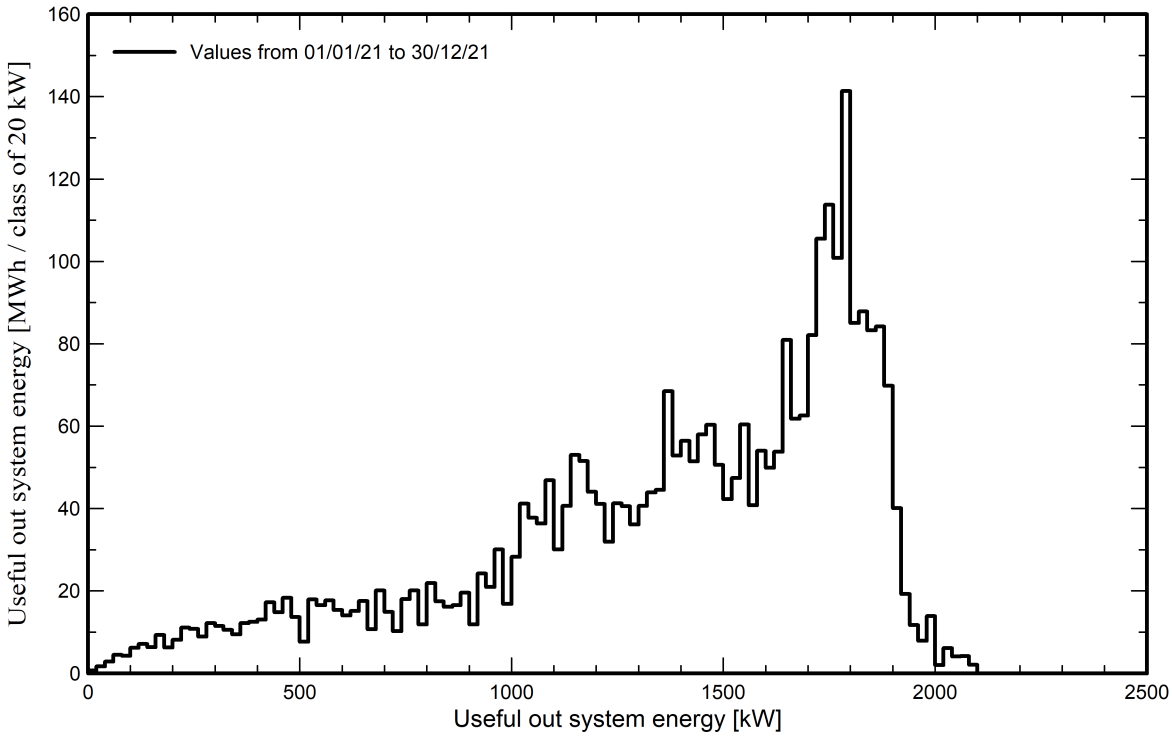
VPI, Simulation date:
10/09/25 14:44
with V8.0.15

Predef. graphs

System Output Power Distribution



Single-line diagram

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VPI, Simulation date:
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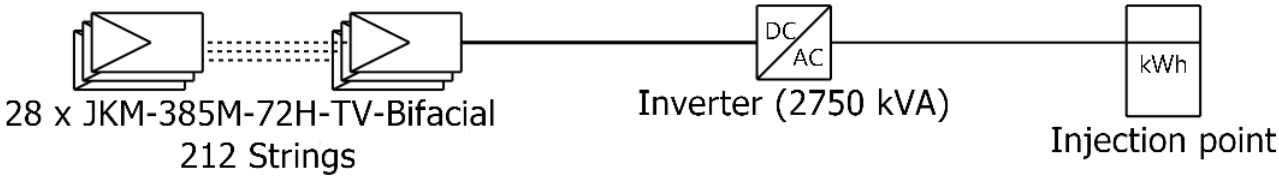
with V8.0.15



PV module	JKM-385M-72H-TV-Bifacial
Inverter	Sunny Central 2750-EV
String	28 x JKM-385M-72H-TV-Bifacial

	25_08_25_Bomen PVSyst - 2021 - per inverter	Sijin Wang (Australia)
	VPI : 24_10_08_Match_measured_inv_2_1_mono	10/09/25

CO_2 Emission Balance

Total: -223148.0 tCO_2

Generated emissions

Total: 288725.12 tCO_2

Source: Detailed calculation from table below

Replaced Emissions

Total: 75578.8 tCO_2

System production: 2974.37 MWh/yr

Grid Lifecycle Emissions: 847 gCO_2/kWh

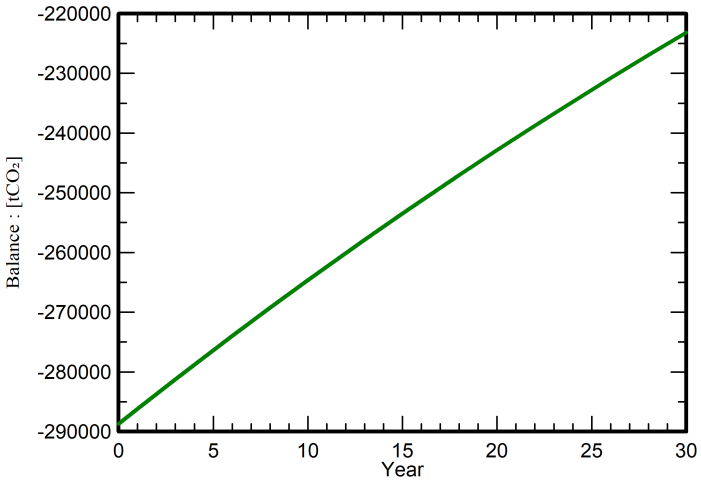
Source: IEA List

Country: Australia

Lifetime: 30 years

Annual degradation: 1.0 %

Saved CO_2 Emission vs. Time



System Lifecycle Emissions Details

Item	LCE	Quantity	Subtotal
			[$kgCO_2$]
Modules	1713 kgCO2/kWp	118019 kWp	202134255
Supports	5.65 kgCO2/kg	15327200 kg	86590863