

PVsyst - Simulation report

Grid-Connected System

Project: 25_08_25_Bomen PVsyst - 2021 - per inverter

Variant: 24_10_08_Match_measured_inv_2_1

Tracking system with backtracking

System power: 2285 kWp

Wagga Wagga - Australia

Author

Sijin Wang (Australia)

**PVsyst V8.0.15**

VC1, Simulation date:
10/09/25 14:47
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

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

Tracking system with backtracking**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	3108.7 MWh/year	Specific production	1360 kWh/kWp/year	Perf. Ratio PR	64.83 %
				Bifacial perf. ratio	61.98 %

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General parameters**Grid-Connected System****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

Tracking system with backtracking**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 3972 units

Bifacial model definitions

Ground albedo average 0.18
Bifaciality factor 70 %
Rear shading factor 6.5 %
Rear mismatch loss 10.0 %
Shed transparent fraction 0.0 %

Monthly ground albedo values

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
0.20	0.20	0.19	0.20	0.17	0.14	0.13	0.16	0.19	0.20	0.17	0.21	0.18

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PV Array Characteristics**PV module**

Manufacturer Generic
Model JKM-385M-72H-TV-Bifacial
(Original PVsyst database)

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

Total PV power

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

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

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

Series 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



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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



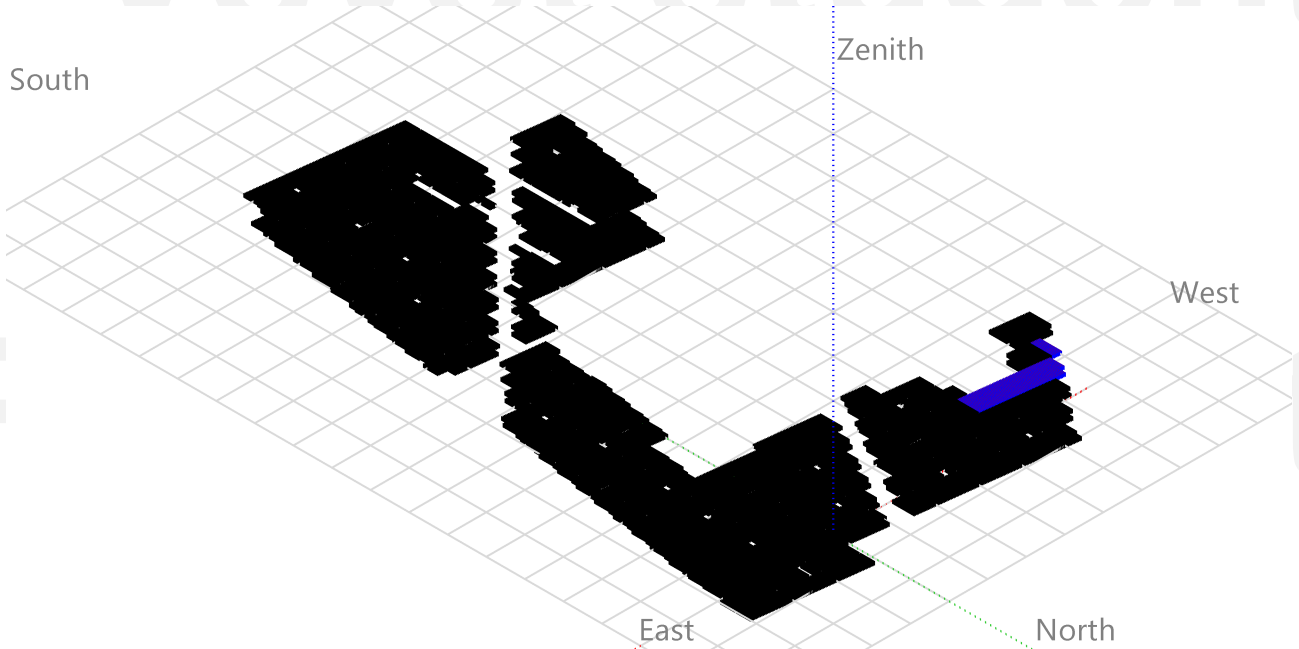
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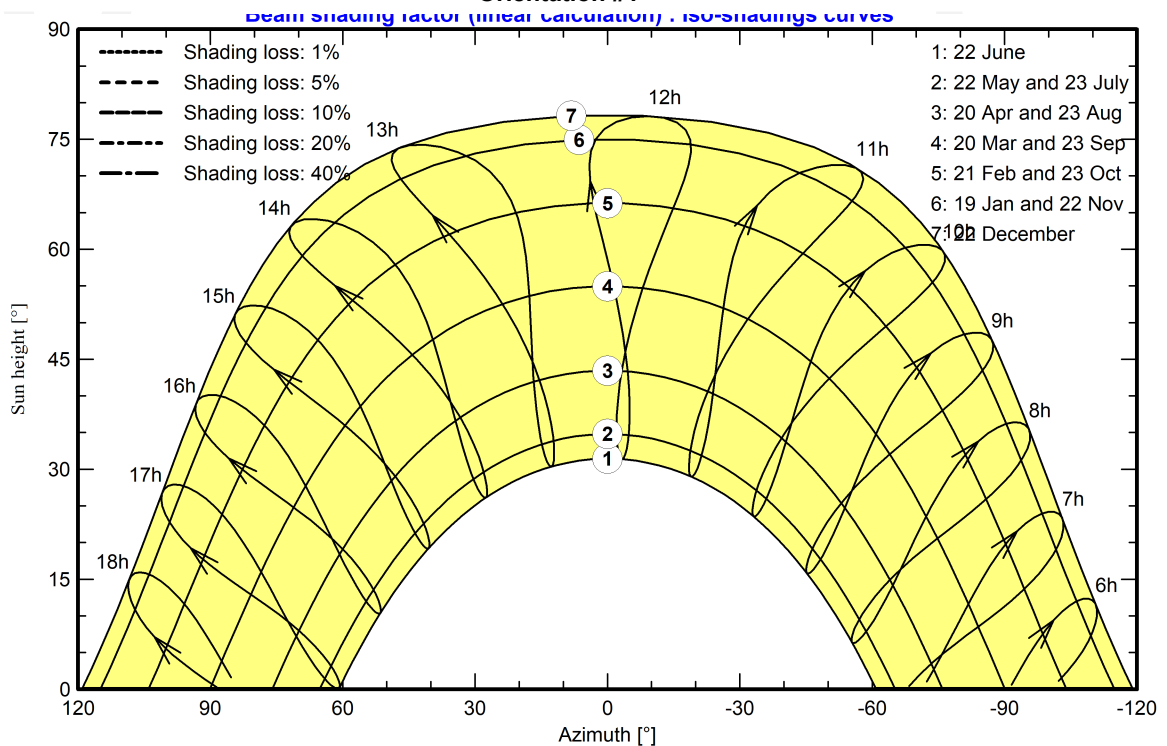
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1 -





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Main results

System Production

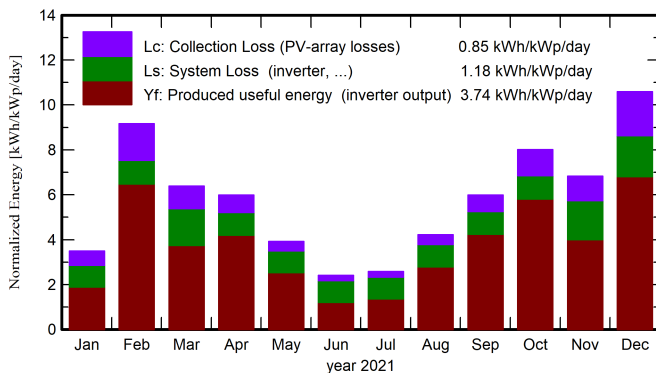
Produced Energy 3108.7 MWh/year

Specific production 1360 kWh/kWp/year

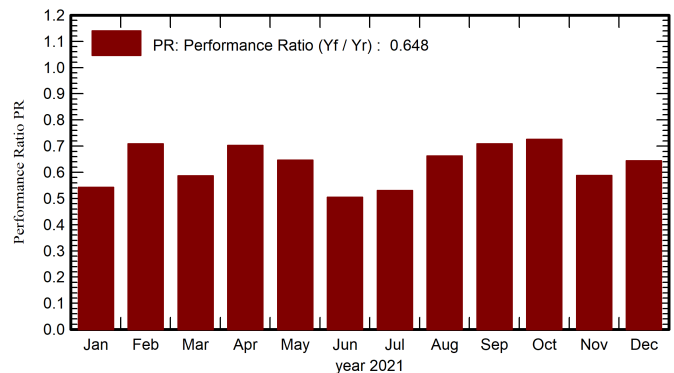
Perf. Ratio PR 64.83 %

Bifacial perf. ratio 61.98 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR ratio	PRBifi ratio
Jan. 21	84.3	30.31	8.56	108.2	104.8	202.9	134.2	0.543	0.517
Feb. 21	195.8	54.18	21.84	256.5	250.5	482.4	415.5	0.709	0.677
Mar. 21	154.0	53.66	18.49	198.0	191.1	381.8	265.5	0.587	0.560
Apr. 21	134.4	38.38	13.81	179.6	173.3	357.7	288.4	0.703	0.672
May 21	92.7	32.50	10.91	121.7	116.8	248.6	179.9	0.647	0.621
June 21	58.7	28.34	8.55	72.5	69.0	150.0	83.6	0.505	0.485
July 21	64.9	30.26	7.96	80.2	76.4	166.0	97.1	0.530	0.510
Aug. 21	101.7	40.08	8.68	131.0	126.3	268.7	198.4	0.663	0.636
Sep. 21	138.8	47.34	11.01	179.6	174.2	360.8	291.2	0.709	0.678
Oct. 21	194.0	60.62	13.74	248.3	242.1	485.7	412.1	0.726	0.693
Nov. 21	164.9	65.05	17.08	204.9	199.2	393.8	275.2	0.588	0.563
Dec. 21	243.8	65.31	21.50	317.7	310.3	592.6	467.4	0.644	0.614
Year	1628.0	546.05	13.43	2098.1	2034.1	4090.9	3108.7	0.648	0.620

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
PRBifi Bifacial Performance Ratio

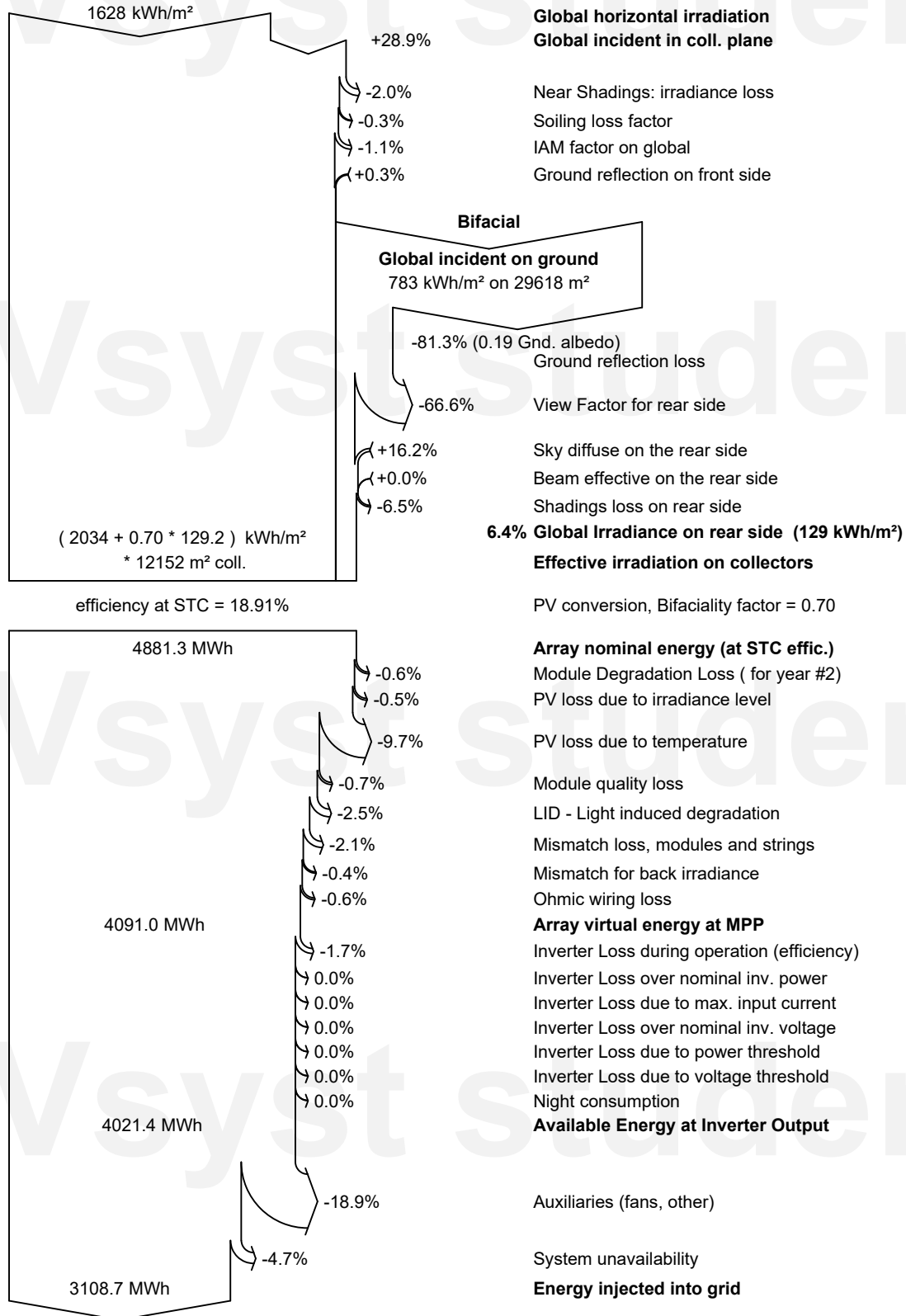


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Loss diagram





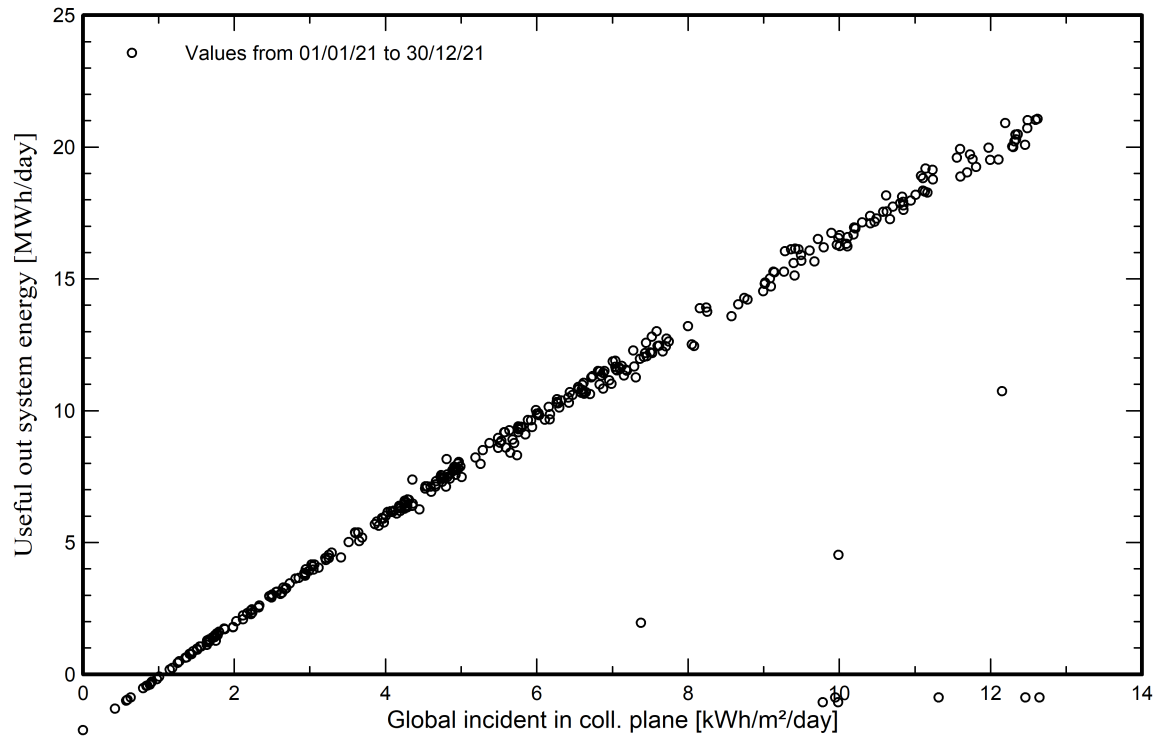
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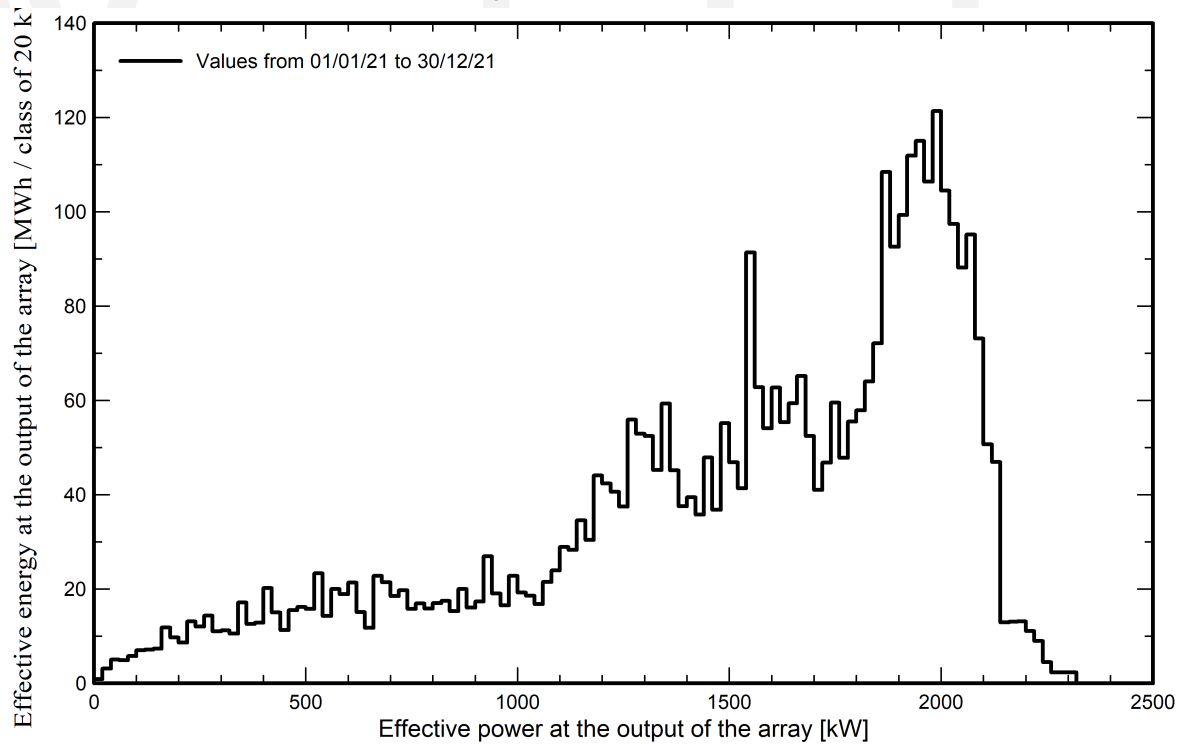
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Predef. graphs

Daily Input/Output diagram



Array Power Distribution





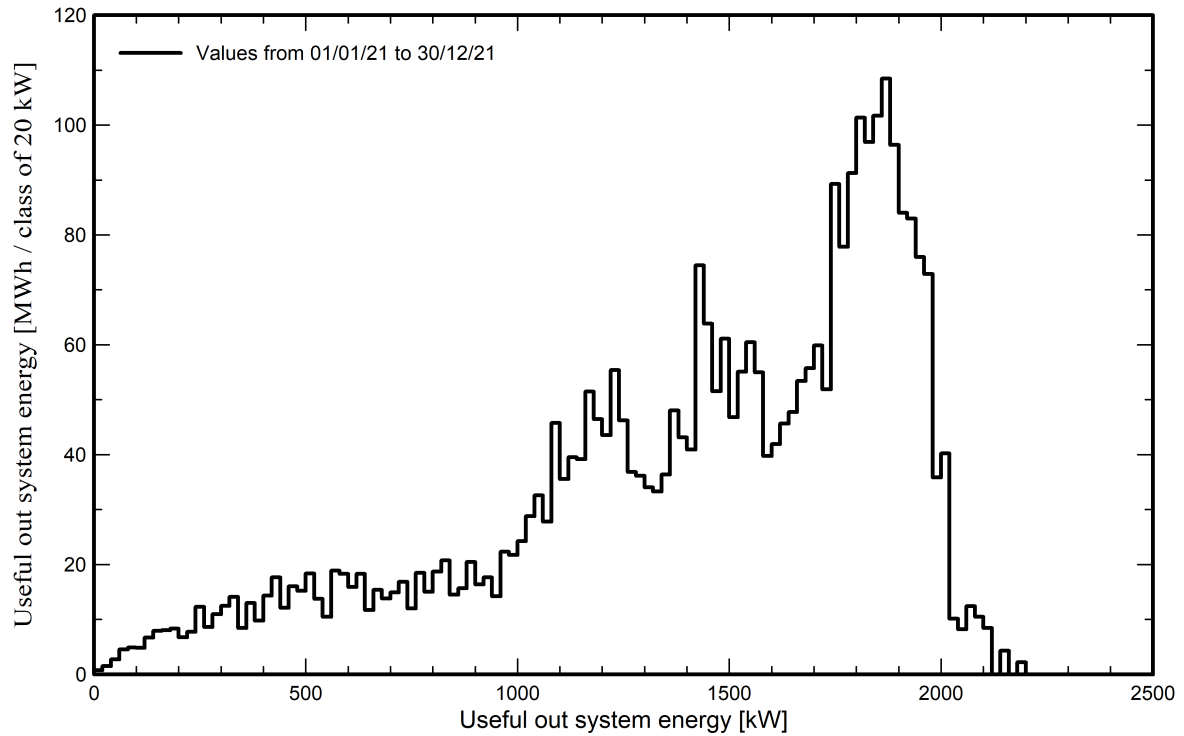
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Predef. graphs

System Output Power Distribution

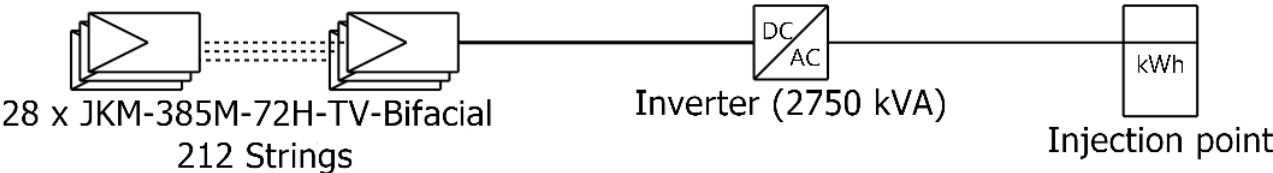




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Single-line diagram



PV module	JKM-385M-72H-TV-Bifacial	
Inverter	Sunny Central 2750-EV	
String	28 x JKM-385M-72H-TV-Bifacial	
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CO₂ Emission BalanceTotal: -219999.2 tCO₂

Generated emissions

Total: 288725.12 tCO₂

Source: Detailed calculation from table below

Replaced Emissions

Total: 79207.8 tCO₂

System production: 3117.19 MWh/yr

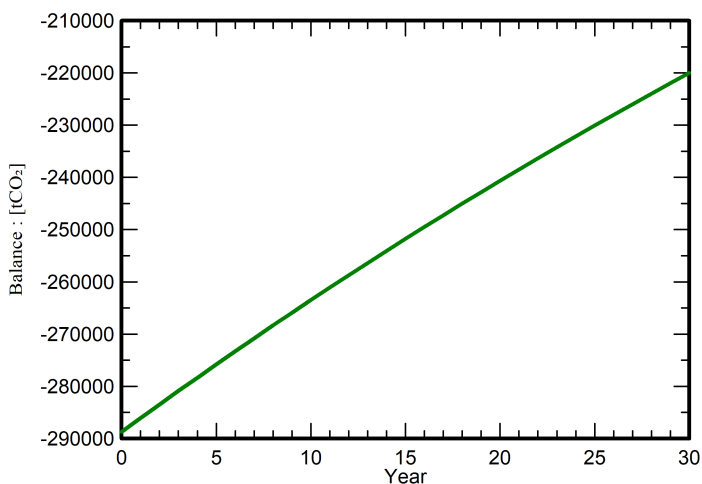
Grid Lifecycle Emissions: 847 gCO₂/kWh

Source: IEA List

Country: Australia

Lifetime: 30 years

Annual degradation: 1.0 %

Saved CO₂ Emission vs. Time

System Lifecycle Emissions Details

Item	LCE	Quantity	Subtotal
			[kgCO ₂]
Modules	1713 kgCO ₂ /kWp	118019 kWp	202134255
Supports	5.65 kgCO ₂ /kg	15327200 kg	86590863