PVsyst - Simulation report

Grid-Connected System

Project: Melbourne_10MW

Variant: Mahya Shahshahani_810199598

Sheds on ground

System power: 9999 kWp

Docklands - Australia

Author

PVsyst V7.4.8
VC1, Simulation date:
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Project summary

Geographical Site
Docklands
Australia

Situation
Latitude	-37.82 °S
Longitude	144.95 °E
Altitude	23 m
Time zone	UTC+10

Project settings
Albedo	0.25

Weather data
Docklands
Meteonorm 8.1 (1999-2013) - Synthetic

System summary

Grid-Connected System
Sheds on ground

PV Field Orientation
Fixed plane	
Tilt/Azimuth	33.9 / 0 °

Near Shadings
Linear shadings : Fast (table)

User's needs
Unlimited load (grid)

System information

PV Array		Inverters	
Nb. of modules	16665 units	Nb. of units	4 units
Pnom total	9999 kWp	Pnom total	8800 kWac
		Pnom ratio	1.136

Results summary

Produced Energy	15185444 kWh/year	Specific production	1519 kWh/kWp/year	Perf. Ratio PR	86.51 %

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General parameters

Grid-Connected System

Sheds on ground

PV Field Orientation

Orientation		**Sheds configuration**		**Models used**	
Fixed plane		Nb. of sheds	1111 units	Transposition	Perez
Tilt/Azimuth	33.9 / 0 °	**Sizes**		Diffuse	Perez, Meteonorm
		Sheds spacing	5.00 m	Circumsolar	separate
		Collector width	1.13 m		
		Ground Cov. Ratio (GCR)	22.7 %		
		Top inactive band	0.02 m		
		Bottom inactive band	0.02 m		
		Shading limit angle			
		Limit profile angle	9.0 °		

Horizon	**Near Shadings**	**User's needs**
Free Horizon	Linear shadings : Fast (table)	Unlimited load (grid)

PV Array Characteristics

PV module		**Inverter**	
Manufacturer	Jinkosolar	Manufacturer	SMA
Model	JKM-600N-78HL4-BDV	Model	Sunny Central 2200
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	600 Wp	Unit Nom. Power	2200 kWac
Number of PV modules	16665 units	Number of inverters	4 units
Nominal (STC)	9999 kWp	Total power	8800 kWac
Modules	1111 string x 15 In series	Operating voltage	570-950 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.14
Pmpp	9256 kWp		
U mpp	631 V		
I mpp	14676 A		

Total PV power		**Total inverter power**	
Nominal (STC)	9999 kWp	Total power	8800 kWac
Total	16665 modules	Number of inverters	4 units
Module area	46584 m²	Pnom ratio	1.14

Array losses

Thermal Loss factor		**DC wiring losses**		**Module Quality Loss**	
Module temperature according to irradiance		Global array res.	0.70 mΩ	Loss Fraction	-0.8 %
Uc (const)	20.0 W/m²K	Loss Fraction	1.5 % at STC		
Uv (wind)	0.0 W/m²K/m/s				

Module mismatch losses		**Strings Mismatch loss**	
Loss Fraction	2.0 % at MPP	Loss Fraction	0.2 %

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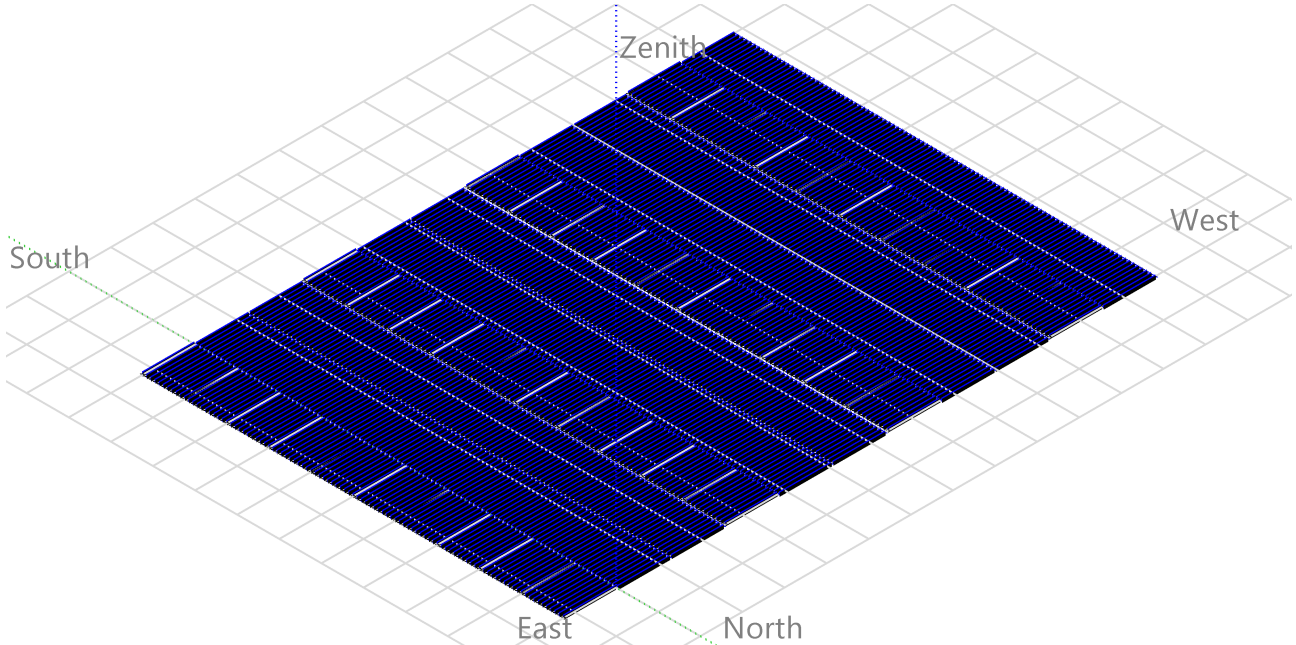Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000

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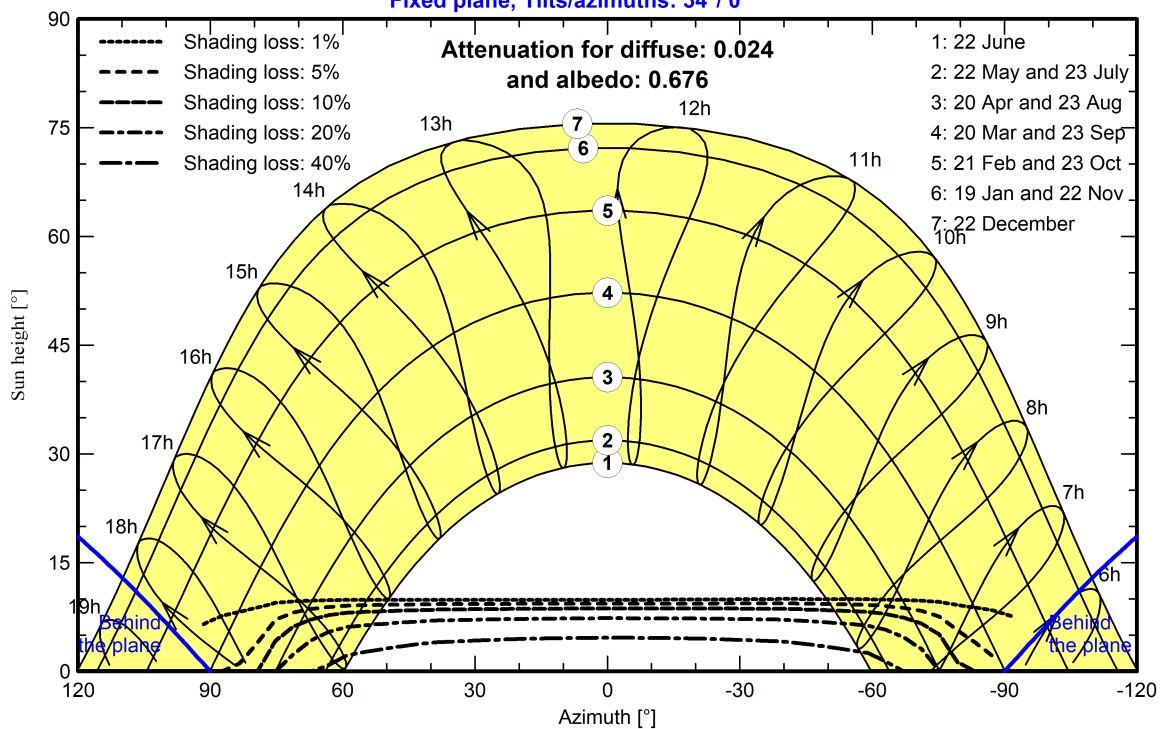Variant: Mahya Shahshahani_810199598

Near shadings parameter

Perspective of the PV-field and surrounding shading scene

Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 34°/ 0°

**Attenuation for diffuse: 0.024
and albedo: 0.676**

Shading loss: 1%	
Shading loss: 5%	
Shading loss: 10%	
Shading loss: 20%	
Shading loss: 40%	

1: 22 June
2: 22 May and 23 July
3: 20 Apr and 23 Aug
4: 20 Mar and 23 Sep
5: 21 Feb and 23 Oct
6: 19 Jan and 22 Nov
7: 22 December

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Main results

System Production

Produced Energy	15185444 kWh/year	Specific production	1519 kWh/kWp/year
		Perf. Ratio PR	86.51 %

Normalized productions (per installed kWp)

Lc: Collection Loss (PV-array losses)   0.57 kWh/kWp/day
Ls: System Loss (inverter, ...)   0.08 kWh/kWp/day
Yf: Produced useful energy (inverter output)   4.16 kWh/kWp/day

Performance Ratio PR

PR: Performance Ratio (Yf / Yr) : 0.865
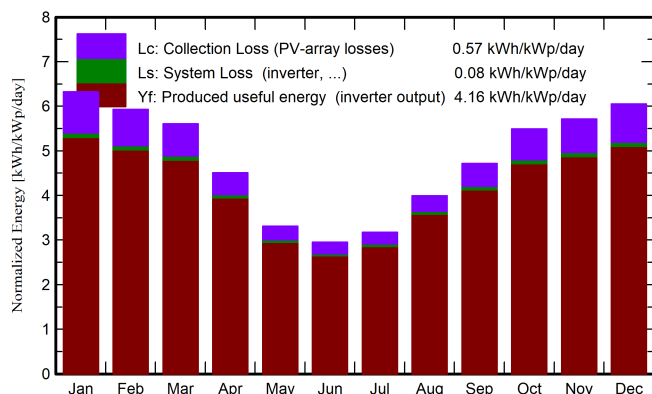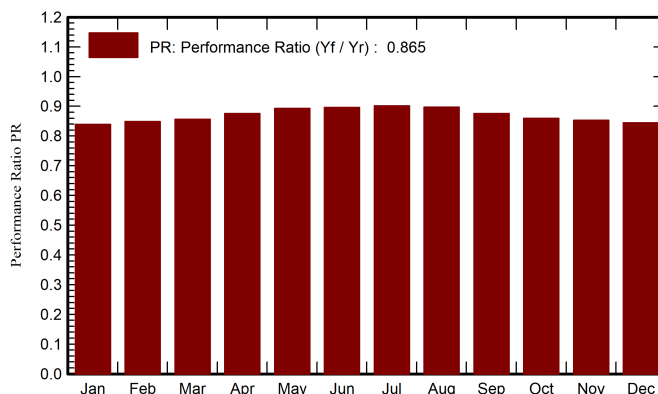
Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	kWh	kWh	ratio
January	208.8	81.50	20.55	196.1	187.2	1675709	1645893	0.839
February	162.1	78.89	20.23	166.0	158.9	1433326	1408211	0.848
March	146.4	60.42	18.58	173.8	167.4	1515055	1488242	0.856
April	99.9	45.66	15.02	135.3	130.7	1206849	1185376	0.876
May	67.1	31.77	12.39	102.6	99.2	932513	915550	0.893
June	53.5	26.42	9.89	88.6	85.0	809388	794591	0.897
July	61.4	29.52	9.74	98.5	94.9	903732	887439	0.901
August	85.6	34.88	10.37	123.8	120.1	1130933	1110482	0.897
September	115.7	46.33	12.17	141.6	136.5	1262768	1239669	0.876
October	156.5	63.57	14.48	170.2	163.2	1490284	1463218	0.860
November	178.4	73.82	16.60	171.5	163.5	1490430	1463478	0.854
December	205.0	83.99	18.72	187.6	178.7	1612145	1583295	0.844
Year	1540.6	656.75	14.87	1755.6	1685.2	15463133	15185444	0.865

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		

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Loss diagram
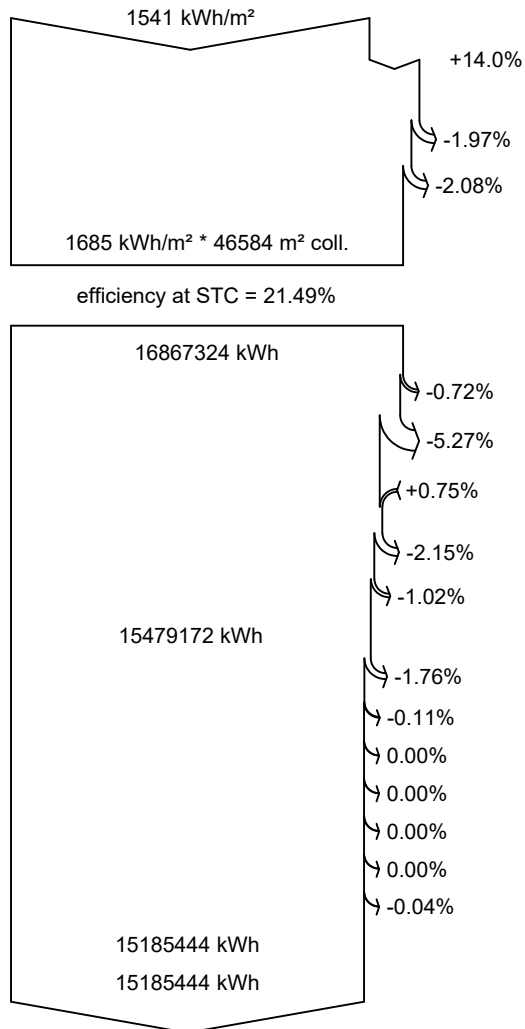
Value	Loss	Description
1541 kWh/m²		**Global horizontal irradiation**
	+14.0%	**Global incident in coll. plane**
	-1.97%	Near Shadings: irradiance loss
	-2.08%	IAM factor on global
1685 kWh/m² * 46584 m² coll.		**Effective irradiation on collectors**
efficiency at STC = 21.49%		PV conversion
16867324 kWh		**Array nominal energy (at STC effic.)**
	-0.72%	PV loss due to irradiance level
	-5.27%	PV loss due to temperature
	+0.75%	Module quality loss
	-2.15%	Mismatch loss, modules and strings
	-1.02%	Ohmic wiring loss
15479172 kWh		**Array virtual energy at MPP**
	-1.76%	Inverter Loss during operation (efficiency)
	-0.11%	Inverter Loss over nominal inv. power
	0.00%	Inverter Loss due to max. input current
	0.00%	Inverter Loss over nominal inv. voltage
	0.00%	Inverter Loss due to power threshold
	0.00%	Inverter Loss due to voltage threshold
	-0.04%	Night consumption
15185444 kWh		**Available Energy at Inverter Output**
15185444 kWh		**Energy injected into grid**

Predef. graphs

Daily Input/Output diagram
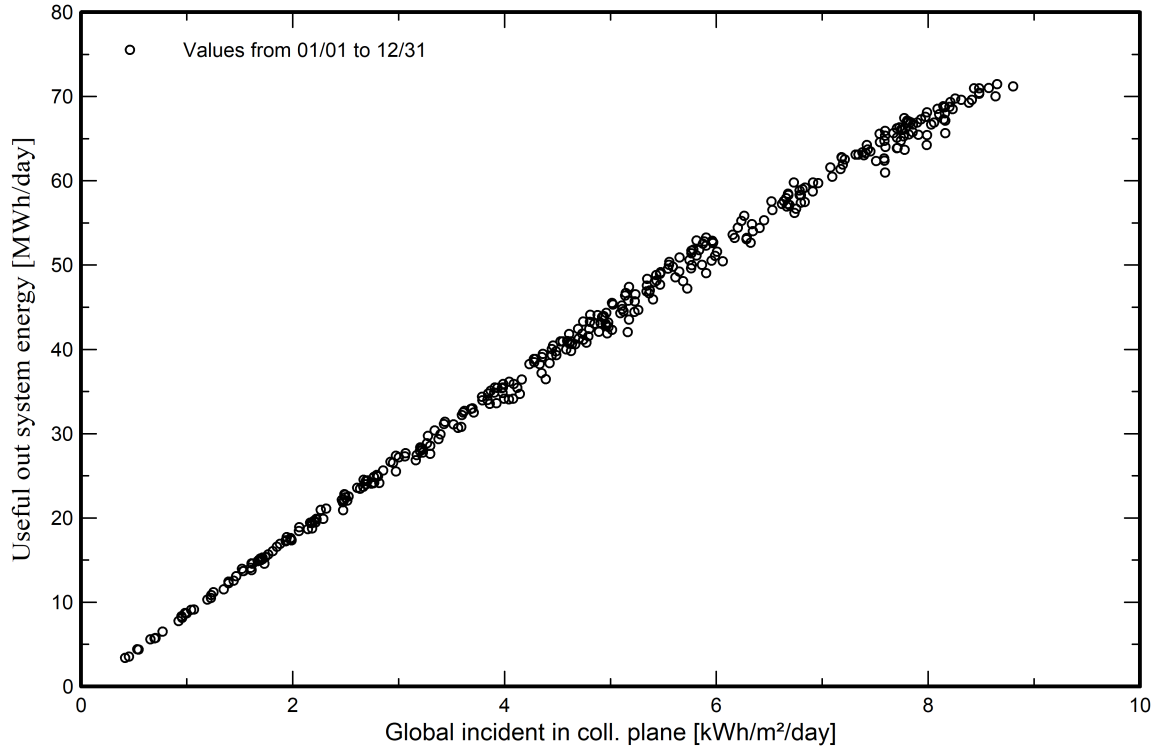
System Output Power Distribution
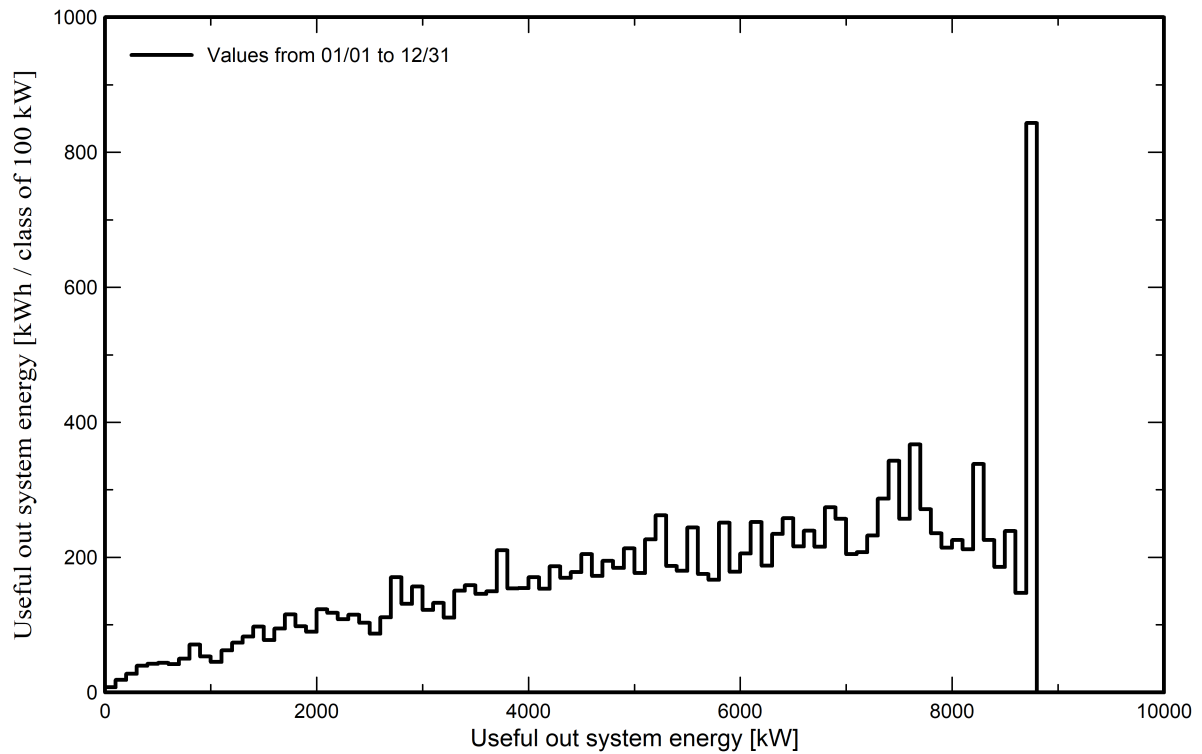
Single-line diagram

15 x JKM-600N-78HL4-BDV
277 Strings

Inverter (2200 kVA)

Injection point

kWh

15 x JKM-600N-78HL4-BDV
278 Strings

3 Inverter (6600 kVA)
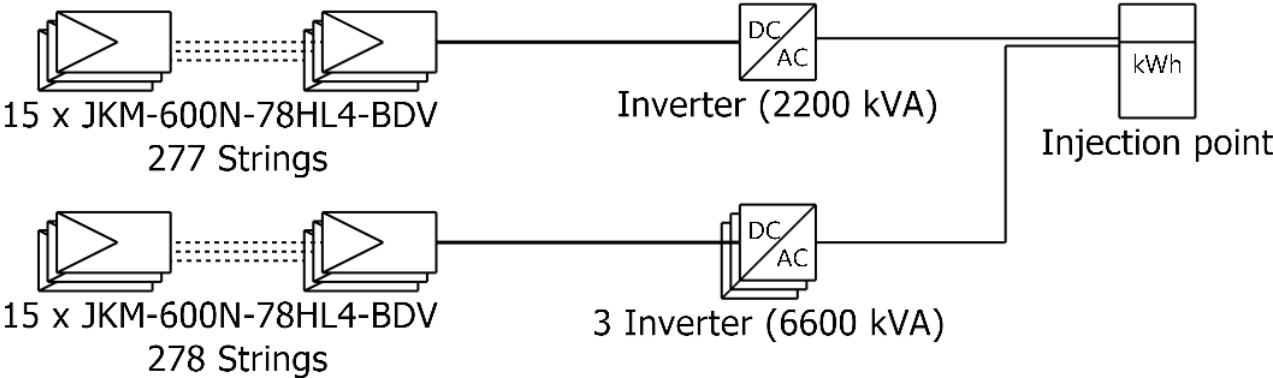
PV module	JKM-600N-78HL4-BDV
Inverter	Sunny Central 2200
String	15 x JKM-600N-78HL4-BDV

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