

PVsyst - Simulation report

Grid-Connected System

Project: Cordova - Lot 1-Baseline Model
Variant: Lot1-4617x650Wp=3001kWp_12xSMA150kW
Sheds, single array
System power: 3001 kWp
Cordova - United States



Author

Pieter F de Vries (Indonesia)



Project: Cordova

Variant: Lot1-4617x650Wp=3001kWp_12xSMA150kW

PVsyst V7.2.11

VCO, Simulation date:
27/05/23 14:29
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Project summary

Geographical Site Cordova United States	Situation Latitude 38.88 °N Longitude -76.00 °W Altitude 15 m Time zone UTC-5	Project settings Albedo 0.20
Meteo data Cordova Meteonorm 8.0 (1991-2005), Sat=28% - Synthetic		

System summary

Grid-Connected System Simulation for year no 10	Sheds, single array		
PV Field Orientation Fixed plane Tilt/Azimuth 30 / 0 °	Near Shadings Linear shadings	User's needs Unlimited load (grid)	
System information		Inverters	
PV Array			
Nb. of modules	4617 units	Nb. of units	16 units
Pnom total	3001 kWp	Pnom total	2400 kWac
		Pnom ratio	1.250

Results summary

Produced Energy	4103 MWh/year	Specific production	1367 kWh/kWp/year	Perf. Ratio PR	80.07 %
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General parameters

Grid-Connected System		Sheds, single array		Models used	
PV Field Orientation		Sheds configuration		Transposition Perez	
Orientation		Nb. of sheds	25 units	Diffuse	Perez, Meteonorm
Fixed plane		Single array		Circumsolar	separate
Tilt/Azimuth	30 / 0 °	Sizes			
		Sheds spacing	7.50 m		
		Collector width	3.95 m		
		Ground Cov. Ratio (GCR)	52.7 %		
		Top inactive band	0.02 m		
		Bottom inactive band	0.02 m		
		Shading limit angle			
		Limit profile angle	26.0 °		
Horizon		Near Shadings		User's needs	
Free Horizon		Linear shadings		Unlimited load (grid)	

PV Array Characteristics

PV module		Inverter	
Manufacturer	Risen Energy Co., Ltd	Manufacturer	SMA
Model	RSM132-8-650BMDG	Model	Sunny Highpower SHP150-20-PEAK3
(Custom parameters definition)		(Original PVsyst database)	
Unit Nom. Power	650 Wp	Unit Nom. Power	150 kWac
Number of PV modules	4617 units	Number of inverters	16 units
Nominal (STC)	3001 kWp	Total power	2400 kWac
Modules	171 Strings x 27 In series	Operating voltage	855-1450 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.25
Pmpp	2746 kWp	Total inverter power	
U mpp	929 V	Total power	2400 kWac
I mpp	2956 A	Number of inverters	16 units
Total PV power		Pnom ratio	1.25
Nominal (STC)	3001 kWp		
Total	4617 modules		
Module area	14342 m ²		
Cell area	13438 m ²		

Array losses

Array Soiling Losses		Thermal Loss factor		DC wiring losses	
Loss Fraction	3.0 %	Module temperature according to irradiance		Global array res.	5.2 mΩ
		Uc (const)	20.0 W/m ² K	Loss Fraction	1.5 % at STC
		Uv (wind)	0.0 W/m ² K/m/s		
LID - Light Induced Degradation		Module Quality Loss		Module mismatch losses	
Loss Fraction	1.6 %	Loss Fraction	-0.8 %	Loss Fraction	2.0 % at MPP
Strings Mismatch loss		Module average degradation			
Loss Fraction	0.1 %	Year no	10		
		Loss factor	0.4 %/year		
		Mismatch due to degradation			
		Imp RMS dispersion	0.4 %/year		
		Vmp RMS dispersion	0.4 %/year		



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Array losses

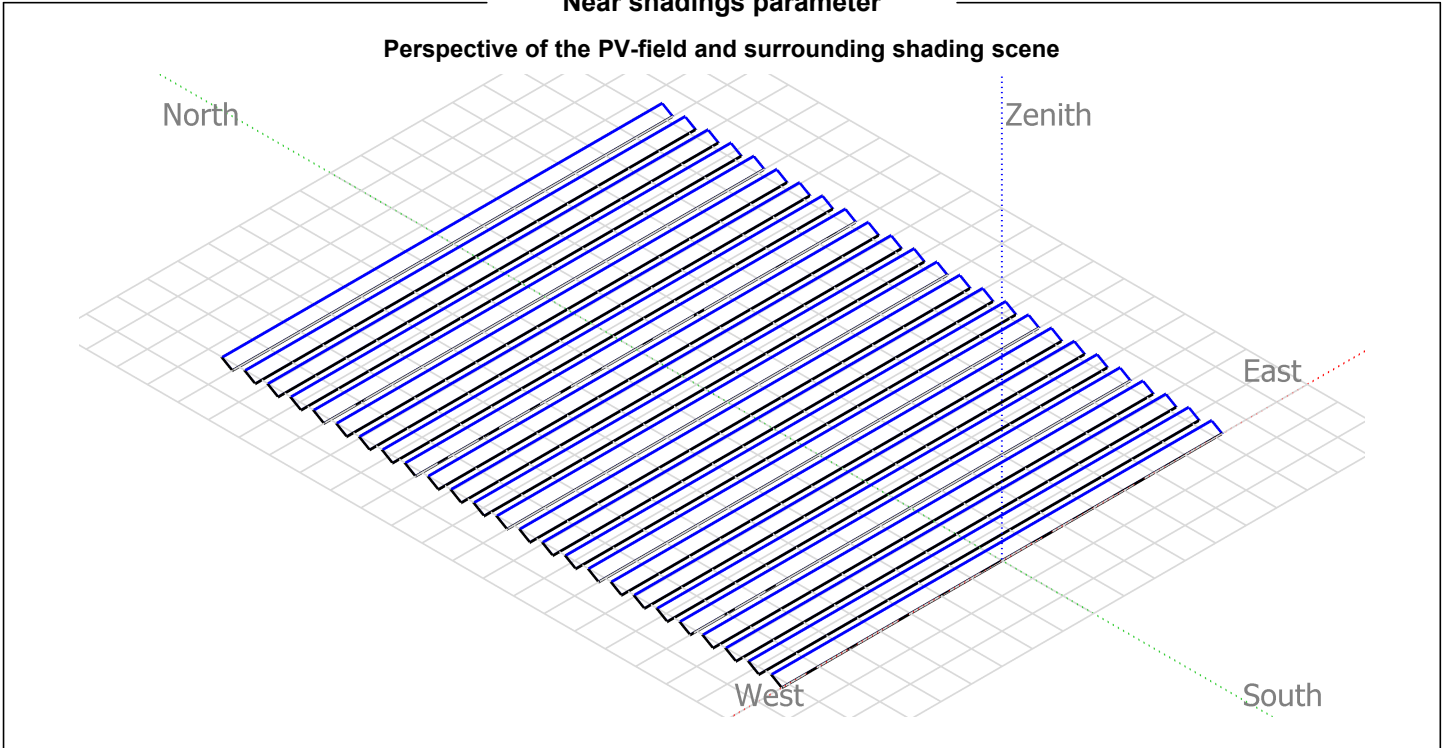
IAM loss factor

Incidence effect (IAM): User defined profile

0°	20°	40°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	0.992	0.978	0.946	0.850	0.000



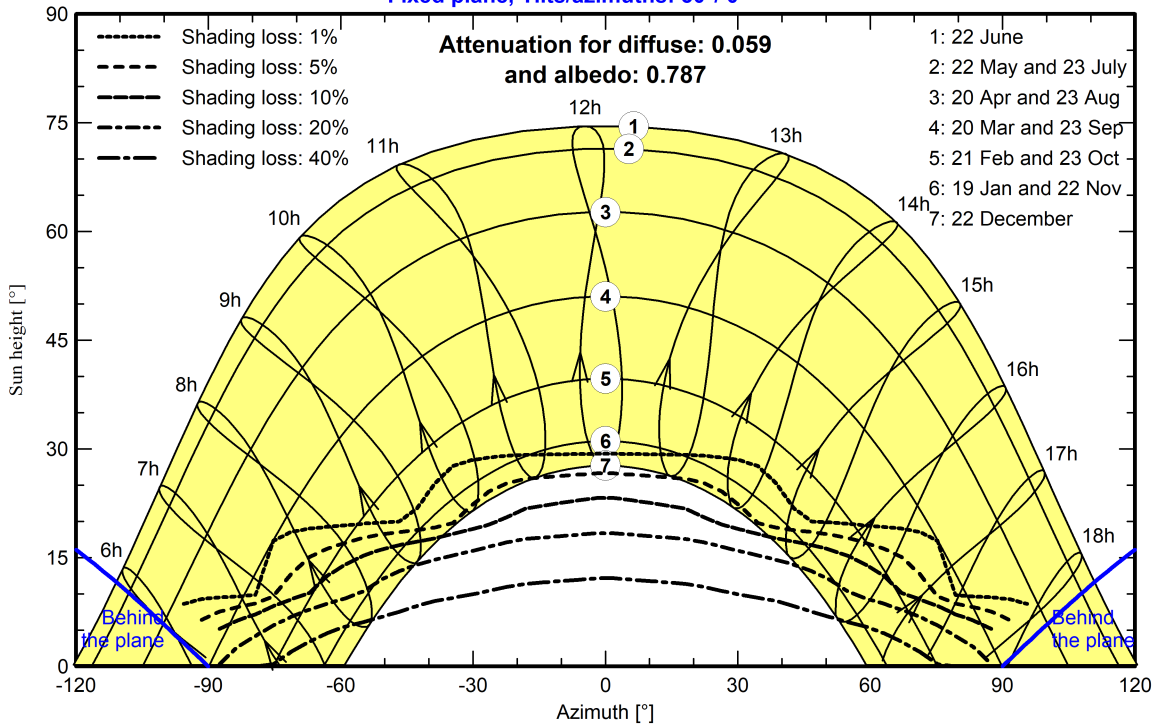
Near shadings parameter



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 30°/ 0°





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Main results

System Production

Produced Energy 4103 MWh/year

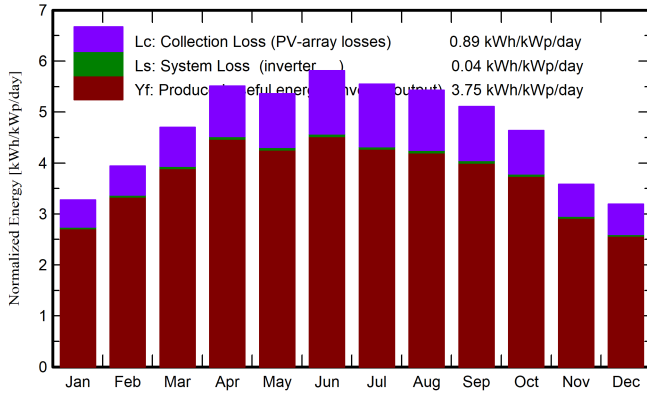
Specific production

1367 kWh/kWp/year

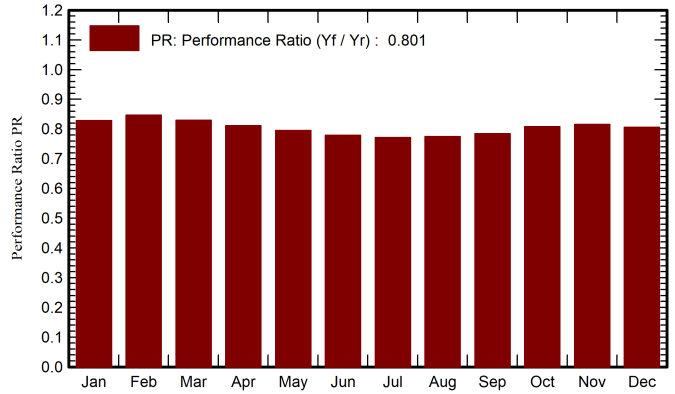
Performance Ratio PR

80.07 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

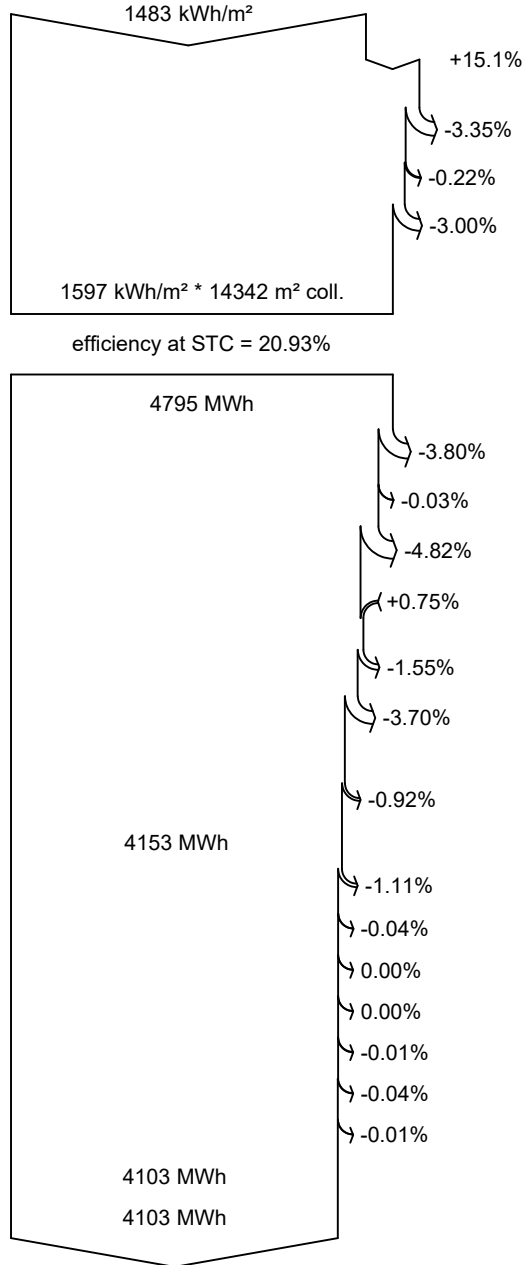
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR ratio
January	63.9	27.87	1.17	101.5	92.6	255.5	252.5	0.829
February	79.9	37.85	2.51	110.4	103.6	283.8	280.5	0.847
March	120.3	57.71	7.08	145.7	137.4	366.9	362.6	0.829
April	153.4	72.54	12.98	165.4	155.8	407.3	402.6	0.811
May	170.1	82.75	18.45	166.2	156.1	400.8	396.4	0.795
June	184.2	85.24	23.21	174.3	163.9	411.7	407.1	0.778
July	179.8	88.64	25.85	172.0	161.4	402.4	398.1	0.771
August	162.4	77.17	24.85	168.3	158.5	395.6	391.2	0.775
September	131.6	59.62	20.69	153.2	144.6	364.7	360.6	0.784
October	107.4	45.95	14.64	143.8	135.6	352.6	348.6	0.808
November	70.9	32.03	8.49	107.6	99.2	266.3	263.3	0.816
December	59.4	24.13	3.94	99.0	88.4	242.1	239.3	0.805
Year	1483.4	691.52	13.72	1707.3	1597.0	4149.6	4102.6	0.801

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



Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

IAM factor on global

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

Module Degradation Loss (for year #10)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

LID - Light induced degradation

Mismatch loss, modules and strings
(including 1.6% for degradation dispersion)

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

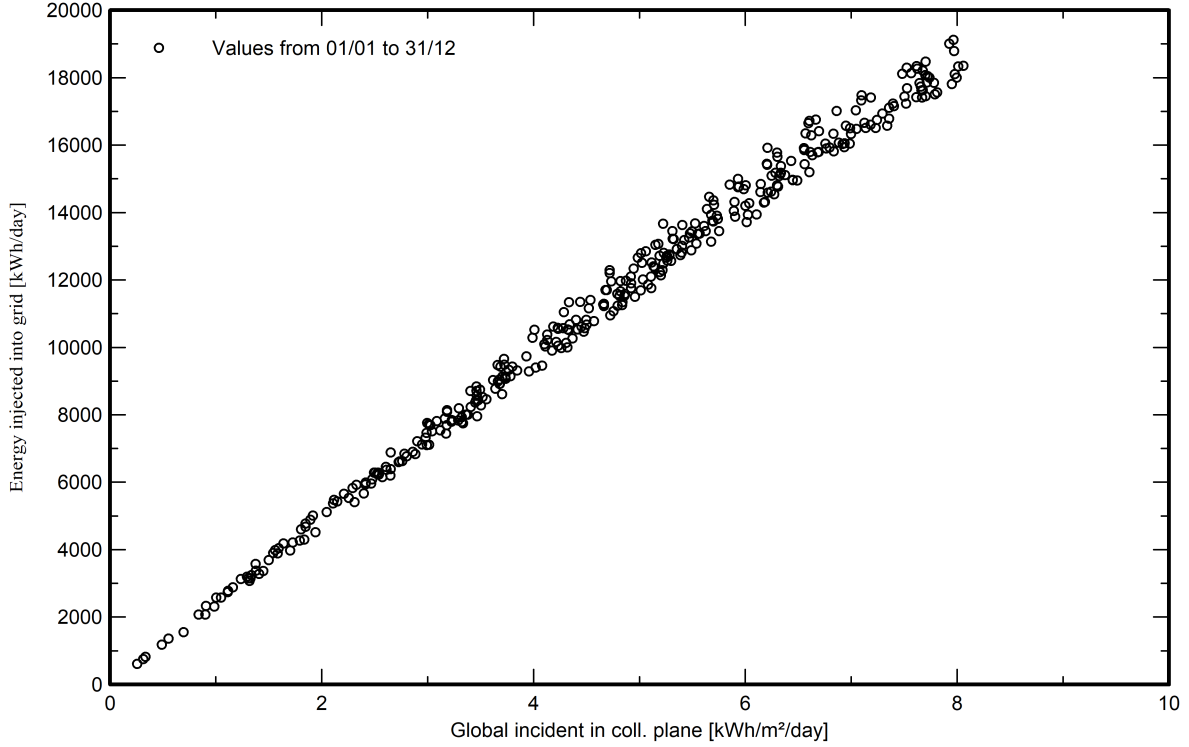
Available Energy at Inverter Output

Energy injected into grid



Special graphs

Daily Input/Output diagram



System Output Power Distribution

