Version 7.3.4

PVsyst - Simulation report

Grid-Connected System

Project: Sim00

Variant: S1

Unlimited Trackers with backtracking

System power: 57.7 kWp

NREL BEST Field - United States

Author

National renewable energy laboratory (United states)

PVsyst V7.3.4
VC0, Simulation date:
06/06/23 17:05
with v7.3.4

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Project summary

Geographical Site
NREL BEST Field
United States

Situation

Latitude	39.74 °N
Longitude	-105.17 °W
Altitude	1765 m
Time zone	UTC-7

Meteo data
DENVER/CENTENNIAL [GOLDEN - NREL]
NREL BEST Field - TMY

Monthly albedo values

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20

System summary

Grid-Connected System
Unlimited Trackers with backtracking

PV Field Orientation
Orientation
Tracking horizontal axis

Tracking algorithm
Astronomic calculation
Backtracking activated

Near Shadings
No Shadings

System information

PV Array

Nb. of modules	144 units
Pnom total	57.7 kWp

Inverters

Nb. of units	3 units
Pnom total	72.0 kWac
Pnom ratio	0.801

User's needs
Unlimited load (grid)

Results summary

Produced Energy	124986 kWh/year	Specific production	2168 kWh/kWp/year	Perf. Ratio PR	91.41 %

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General parameters

Grid-Connected System — **Unlimited Trackers with backtracking**

PV Field Orientation

Orientation
Tracking horizontal axis

Tracking algorithm
Astronomic calculation
Backtracking activated

Backtracking array

Nb. of trackers	10 units
Unlimited trackers	

Sizes

Tracker Spacing	5.70 m
Collector width	2.00 m
Ground Cov. Ratio (GCR)	35.1 %
Left inactive band	0.02 m
Right inactive band	0.02 m
Phi min / max.	-/+ 60.0 °

Backtracking strategy

Phi limits for BT	-/+ 68.9 °
Backtracking pitch	5.70 m
Backtracking width	2.00 m

Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	with diffuse

Horizon
Free Horizon

Near Shadings
No Shadings

User's needs
Unlimited load (grid)

Bifacial system
Model 2D Calculation
unlimited trackers

Bifacial model geometry

Tracker Spacing	5.70 m
Tracker width	2.04 m
GCR	35.8 %
Axis height above ground	1.50 m

Bifacial model definitions

Ground albedo	0.30
Bifaciality factor	87 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

PV Array Characteristics

PV module

Manufacturer	Sunpreme
Model	Bifi 400 Wp 150 cells Bifacial
(Custom parameters definition)	
Unit Nom. Power	400.4 Wp
Number of PV modules	144 units
Nominal (STC)	57.7 kWp
Modules	9 Strings x 16 In series

At operating cond. (50°C)

Pmpp	54.3 kWp
U mpp	703 V
I mpp	77 A

Inverter

Manufacturer	Fronius USA
Model	Symo Advanced 24.0-3 480
(Original PVsyst database)	
Unit Nom. Power	24.0 kWac
Number of inverters	3 * MPPT 0.57 3 units
Total power	72.0 kWac
Operating voltage	200-800 V
Pnom ratio (DC:AC)	0.80

Total PV power

Nominal (STC)	58 kWp
Total	144 modules
Module area	294 m²
Cell area	246 m²

Total inverter power

Total power	72 kWac
Number of inverters	3 units
Pnom ratio	0.80

Array losses

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 20.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses
Global array res. 149 mΩ
Loss Fraction 1.5 % at STC

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 1.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

IAM loss factor
Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000

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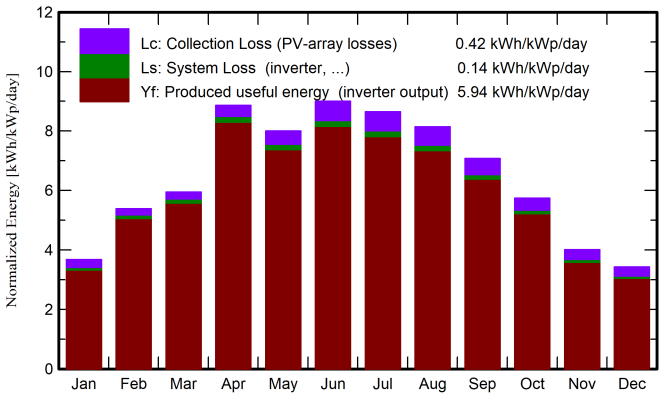
Main results

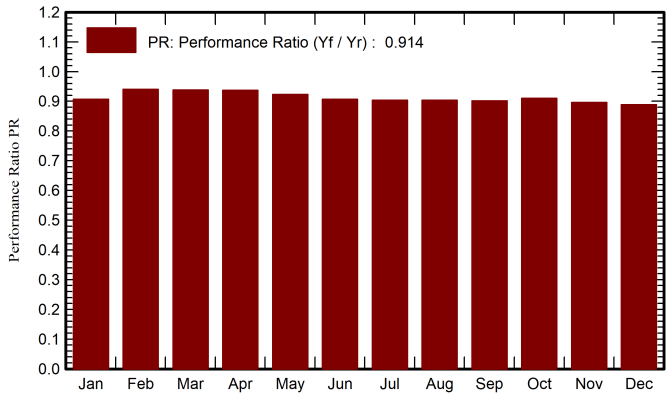
System Production

Produced Energy	124986 kWh/year	Specific production	2168 kWh/kWp/year
		Perf. Ratio PR	91.41 %

Normalized productions (per installed kWp)



Performance Ratio PR



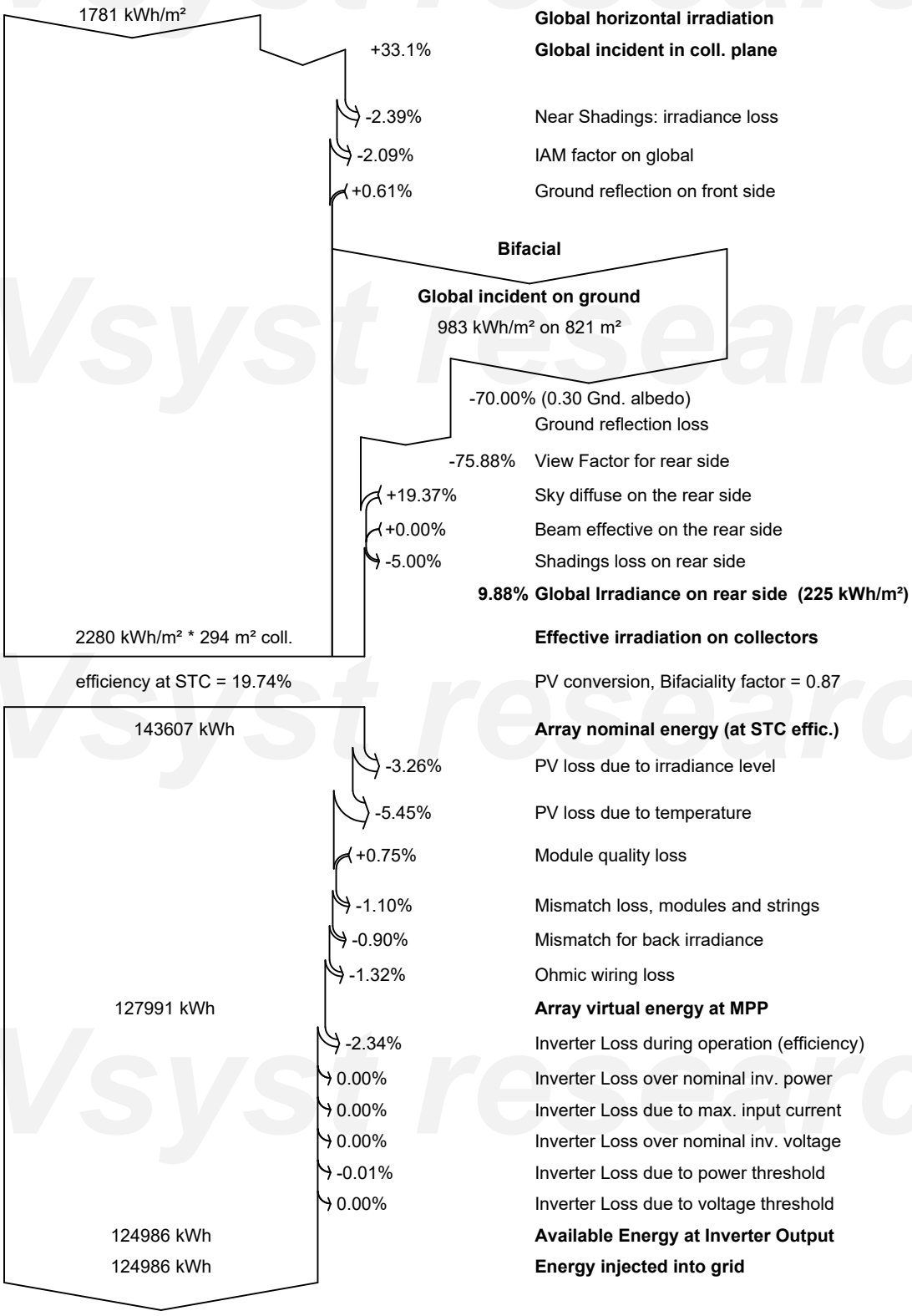
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_Grid kWh	PR ratio
January	81.2	28.03	1.69	114.1	107.4	6110	5963	0.906
February	108.6	32.46	-0.42	150.8	144.2	8360	8173	0.940
March	142.7	55.33	5.08	184.5	176.9	10218	9983	0.938
April	197.1	56.45	9.87	266.0	257.8	14702	14372	0.937
May	195.2	72.55	13.83	248.0	239.3	13516	13197	0.923
June	209.8	67.86	21.86	270.1	261.3	14467	14122	0.907
July	211.3	68.73	24.14	268.3	259.7	14322	13977	0.903
August	194.5	68.72	23.50	252.3	243.5	13462	13140	0.903
September	155.8	43.00	20.31	212.4	205.3	11313	11047	0.902
October	126.1	30.14	12.96	178.0	171.3	9562	9342	0.910
November	84.5	25.42	9.39	120.4	114.1	6371	6219	0.896
December	74.1	23.40	5.14	106.4	99.5	5588	5451	0.889
Year	1781.0	572.09	12.35	2371.4	2280.3	127991	124986	0.914

Legends

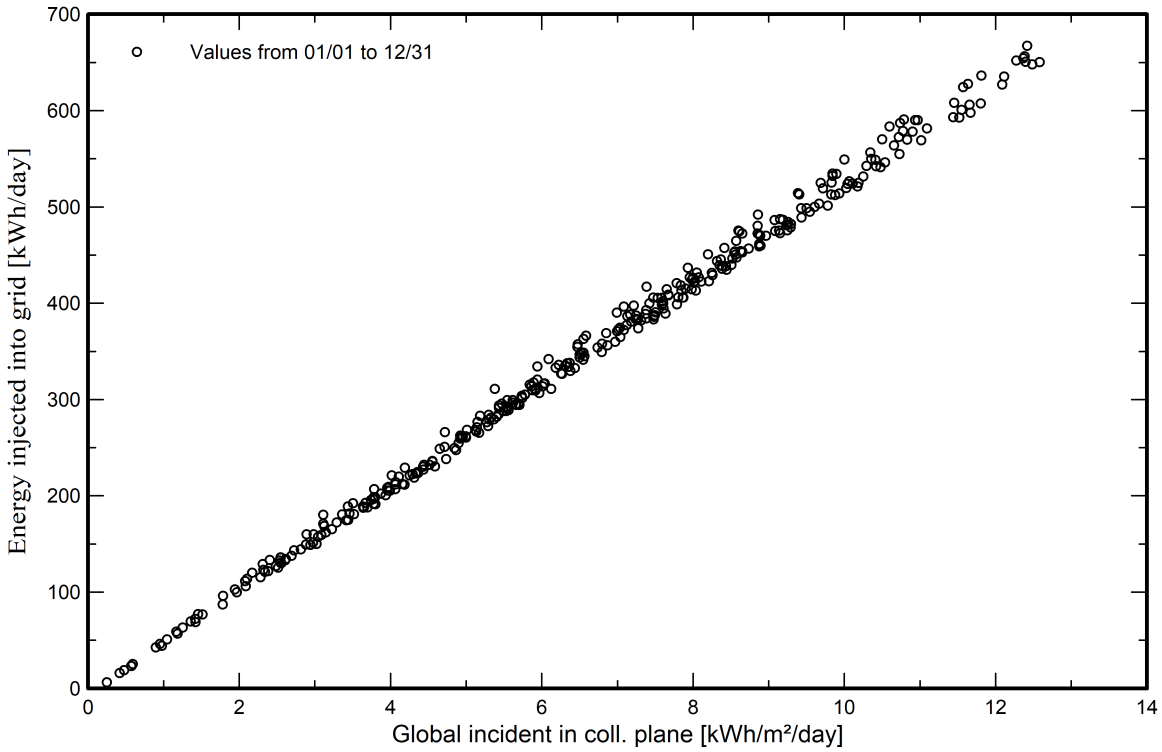
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

Loss diagram



Predef. graphs

Daily Input/Output diagram



System Output Power Distribution