

# PVsyst - Simulation report

## Grid-Connected System

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Project: Sim00

Variant: BIFACIAL\_Row2

Unlimited Trackers with backtracking

System power: 51.9 kWp

NREL BEST Field - United States

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## PVsyst V7.3.4

VC1, Simulation date:  
06/16/23 09:19  
with v7.3.4

National renewable energy laboratory (United states)

## 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

51.9 kWp

## Inverters

Nb. of units

3 units

Pnom total

72.0 kWac

Pnom ratio

0.720

## User's needs

Unlimited load (grid)

## Results summary

Produced Energy 105082 kWh/year Specific production 2026 kWh/kWp/year Perf. Ratio PR 85.75 %

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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. -/+ 50.0 °

## 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 0.20

Bifaciality factor 69 %

Rear shading factor 5.0 %

Rear mismatch loss 10.0 %

Shed transparent fraction 0.0 %

## PV Array Characteristics

## PV module

Manufacturer Prism Solar Technologies

Model Prism Bi72-457BSTC

(Custom parameters definition)

Unit Nom. Power 360.2 Wp

Number of PV modules 144 units

Nominal (STC) 51.9 kWp

Modules 9 Strings x 16 In series

## At operating cond. (50°C)

Pmpp 46.8 kWp

U mpp 559 V

I mpp 84 A

## Total PV power

Nominal (STC) 52 kWp

Total 144 modules

Module area 285 m<sup>2</sup>Cell area 246 m<sup>2</sup>

## 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) 0.72

## Total inverter power

Total power 72 kWac

Number of inverters 3 units

Pnom ratio 0.72



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## 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. 112 mΩ  
Loss Fraction 1.5 % at STC

## LID - Light Induced Degradation

Loss Fraction 1.5 %

## Module Quality Loss

Loss Fraction -0.8 %

## Module mismatch losses

Loss Fraction 2.0 % at MPP

## Strings Mismatch loss

Loss Fraction 0.2 %

## 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

105082 kWh/year

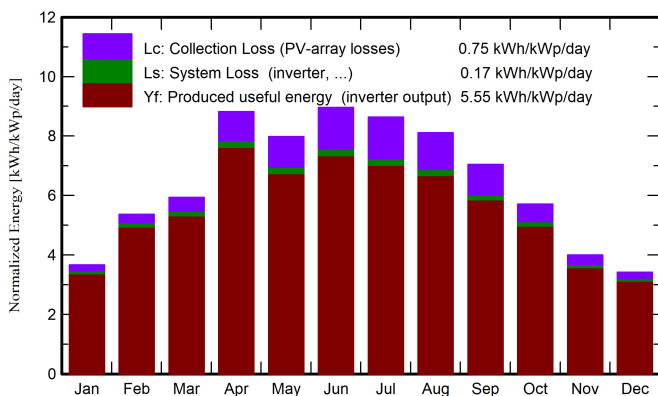
Specific production

2026 kWh/kWp/year

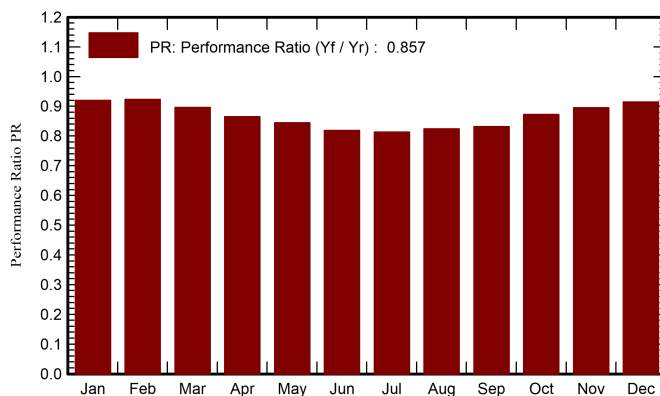
Perf. Ratio PR

85.75 %

Normalized productions (per installed kWp)



Performance Ratio PR



## Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	kWh	kWh	ratio
January	81.2	28.03	1.69	113.6	107.0	5593	5426	0.920
February	108.6	32.46	-0.42	150.1	143.5	7396	7191	0.923
March	142.7	55.33	5.08	184.2	176.5	8814	8556	0.896
April	197.1	56.45	9.87	264.6	256.4	12230	11875	0.865
May	195.2	72.55	13.83	247.6	238.7	11188	10845	0.845
June	209.8	67.86	21.86	269.0	260.2	11794	11428	0.819
July	211.3	68.72	24.14	267.7	259.0	11656	11292	0.813
August	194.5	68.72	23.50	251.5	242.6	11090	10746	0.824
September	155.8	43.00	20.31	211.5	204.4	9412	9125	0.832
October	126.1	30.14	12.96	177.1	170.4	8255	8010	0.872
November	84.5	25.42	9.39	119.9	113.5	5741	5567	0.895
December	74.1	23.40	5.14	105.9	99.1	5180	5022	0.914
Year	1781.0	572.09	12.35	2362.6	2271.2	108350	105082	0.857

## 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

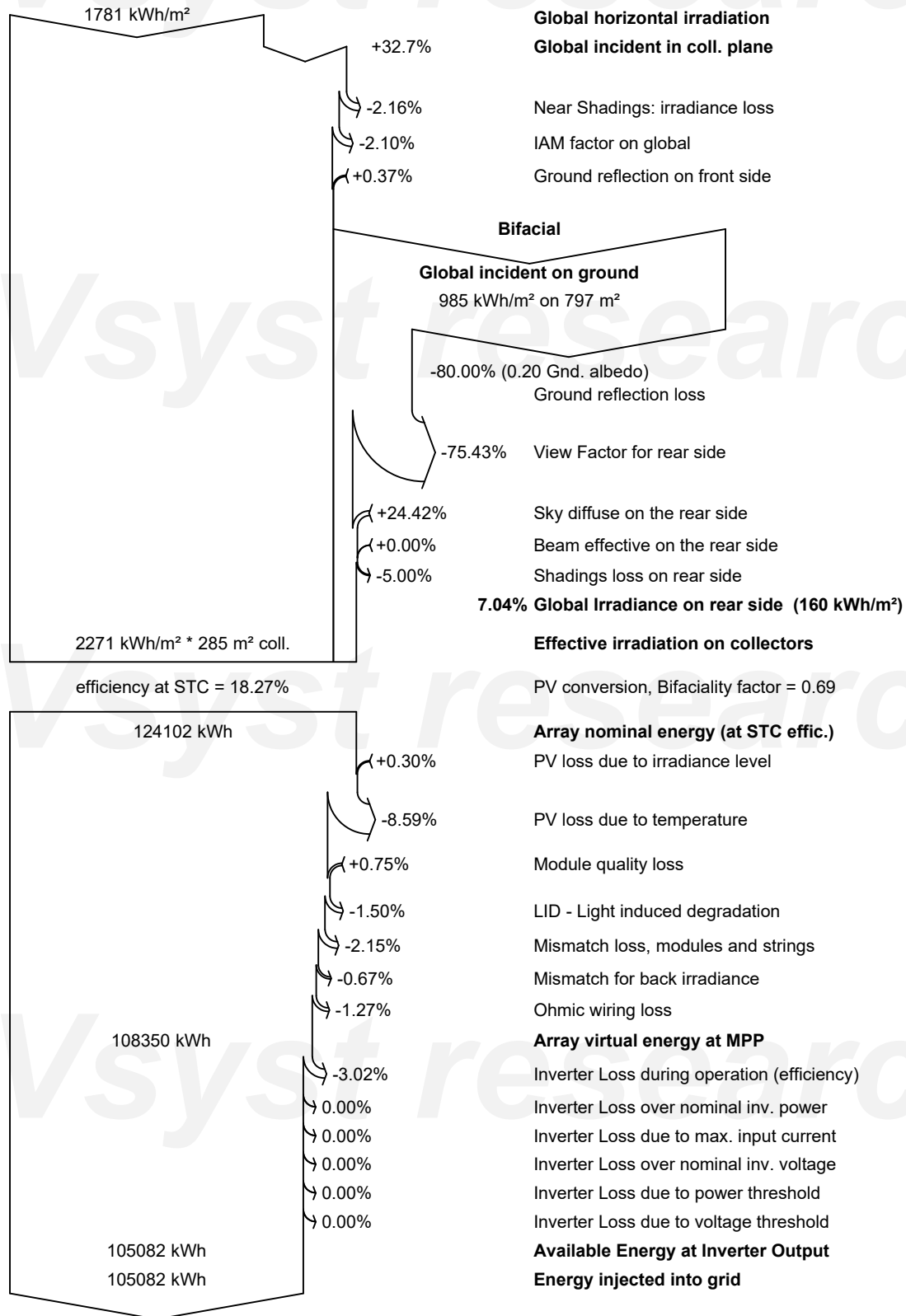


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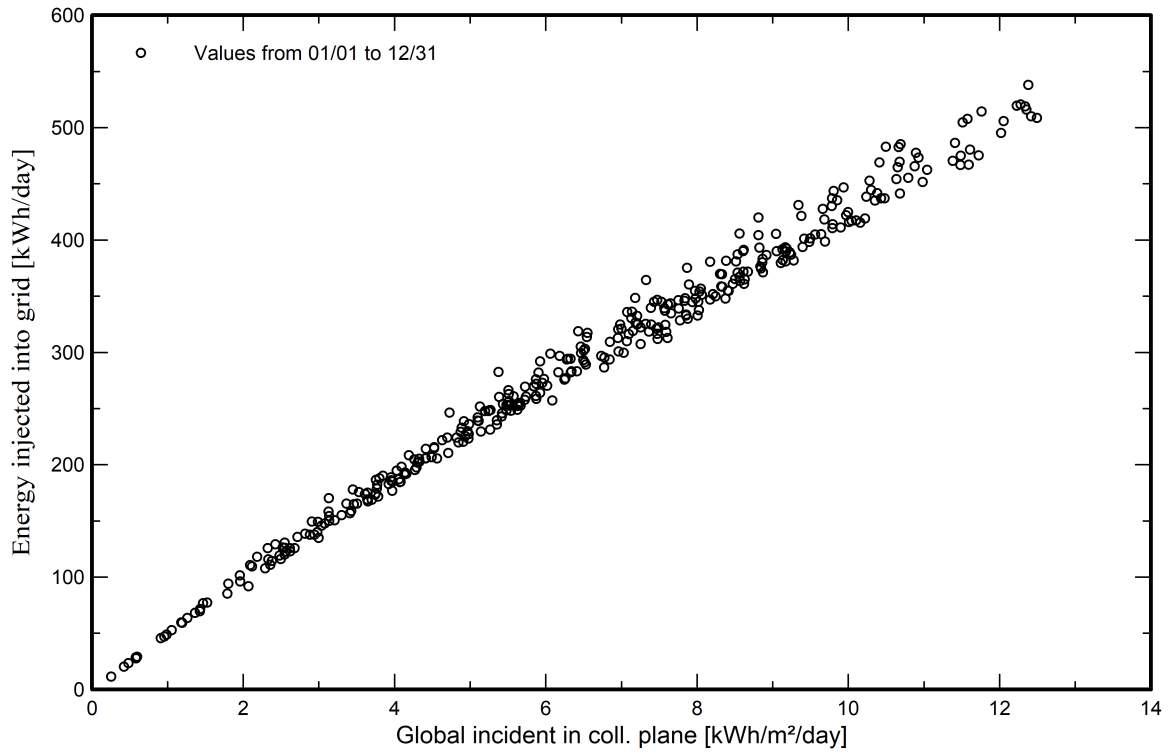
## Loss diagram





### Predef. graphs

#### Daily Input/Output diagram



#### System Output Power Distribution

