Version 7.3.4

PVsyst - Simulation report

Grid-Connected System

Project: Test Bifi Sheds

Variant: FT30 Az90 Alb060 (bifi)

Sheds, single array

System power: 2558 kWp

Sacramento/McClellan Park - United States

Author
DNV (USA)

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Project summary

Geographical Site
Sacramento/McClellan Park
United States

Situation

Latitude	38.67 °N
Longitude	-121.40 °W
Altitude	18 m
Time zone	UTC-8

Project settings
Albedo 0.20

Meteo data
Sacramento/McClellan Park
MeteoNorm 8.1 station - Synthetic

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 30 / 90 °

Near Shadings
According to strings
Electrical effect 70 %

User's needs
Unlimited load (grid)

System information

PV Array		Inverters	
Nb. of modules	4410 units	Nb. of units	1 unit
Pnom total	2558 kWp	Pnom total	2200 kWac
		Pnom ratio	1.163

Results summary

Produced Energy	4199527 kWh/year	Specific production	1642 kWh/kWp/year	Perf. Ratio PR	96.88 %

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General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	30 / 90 °

Sheds configuration		
Nb. of sheds	49	units
Single array		
Sizes		
Sheds spacing	5.00	m
Collector width	2.47	m
Ground Cov. Ratio (GCR)	49.3	%
Top inactive band	0.02	m
Bottom inactive band	0.02	m
Shading limit angle		
Limit profile angle	23.6	°

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
According to strings
Electrical effect 70 %

User's needs
Unlimited load (grid)

Bifacial system
Model 2D Calculation
unlimited sheds

Bifacial model geometry		
Sheds spacing	5.00	m
Sheds width	2.51	m
Limit profile angle	23.6	°
GCR	50.1	%
Height above ground	1.50	m

Bifacial model definitions	
Ground albedo	0.60
Bifaciality factor	70 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

PV Array Characteristics

PV module

Manufacturer	HT-SAAE
Model	HT78-18X-580 Bifacial
(Original PVsyst database)	
Unit Nom. Power	580 Wp
Number of PV modules	4410 units
Nominal (STC)	2558 kWp
Modules	245 Strings x 18 In series
At operating cond. (50°C)	
Pmpp	2351 kWp
U mpp	731 V
I mpp	3219 A

Inverter

Manufacturer	SMA
Model	Sunny Central 2200
(Original PVsyst database)	
Unit Nom. Power	2200 kWac
Number of inverters	1 unit
Total power	2200 kWac
Operating voltage	570-950 V
Pnom ratio (DC:AC)	1.16

Total PV power

Nominal (STC)	2558 kWp
Total	4410 modules
Module area	12327 m²
Cell area	11351 m²

Total inverter power

Total power	2200 kWac
Number of inverters	1 unit
Pnom ratio	1.16

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Array losses

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 25.0 W/m²K
Uv (wind) 1.2 W/m²K/m/s

DC wiring losses
Global array res. 3.7 mΩ
Loss Fraction 1.5 % at STC

LID - Light Induced Degradation
Loss Fraction 1.0 %

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 1.0 % at MPP

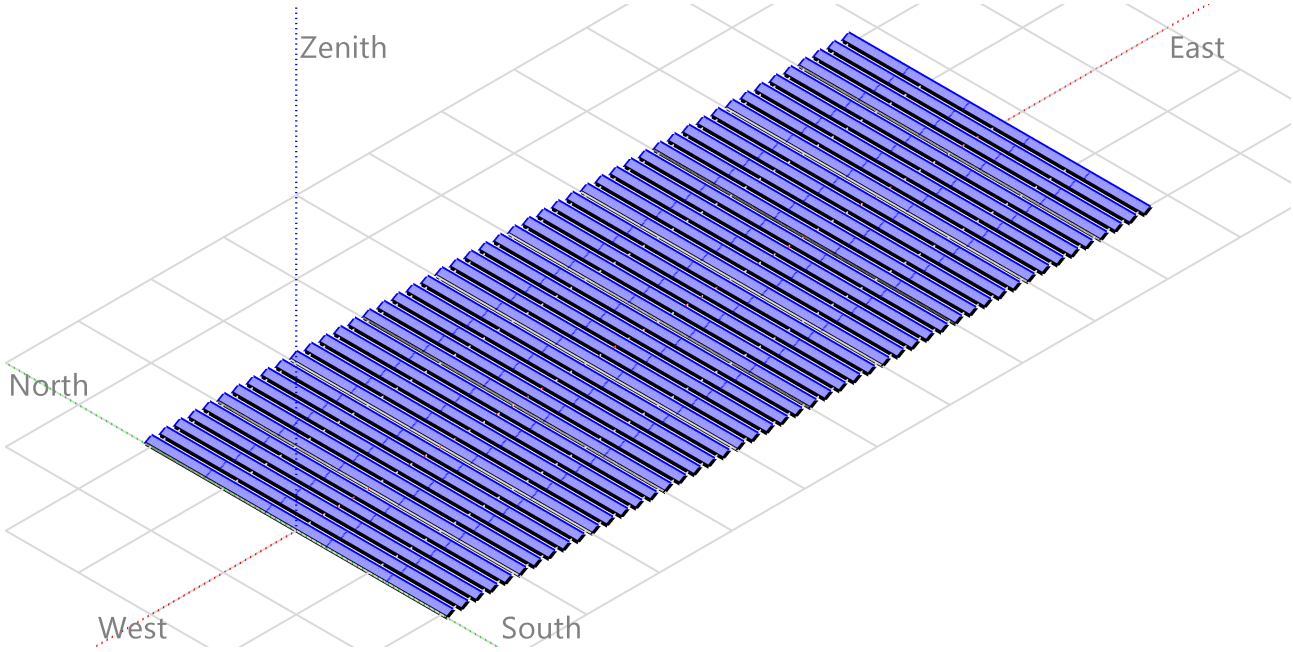
Strings Mismatch loss
Loss Fraction 0.2 %

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

Near shadings parameter

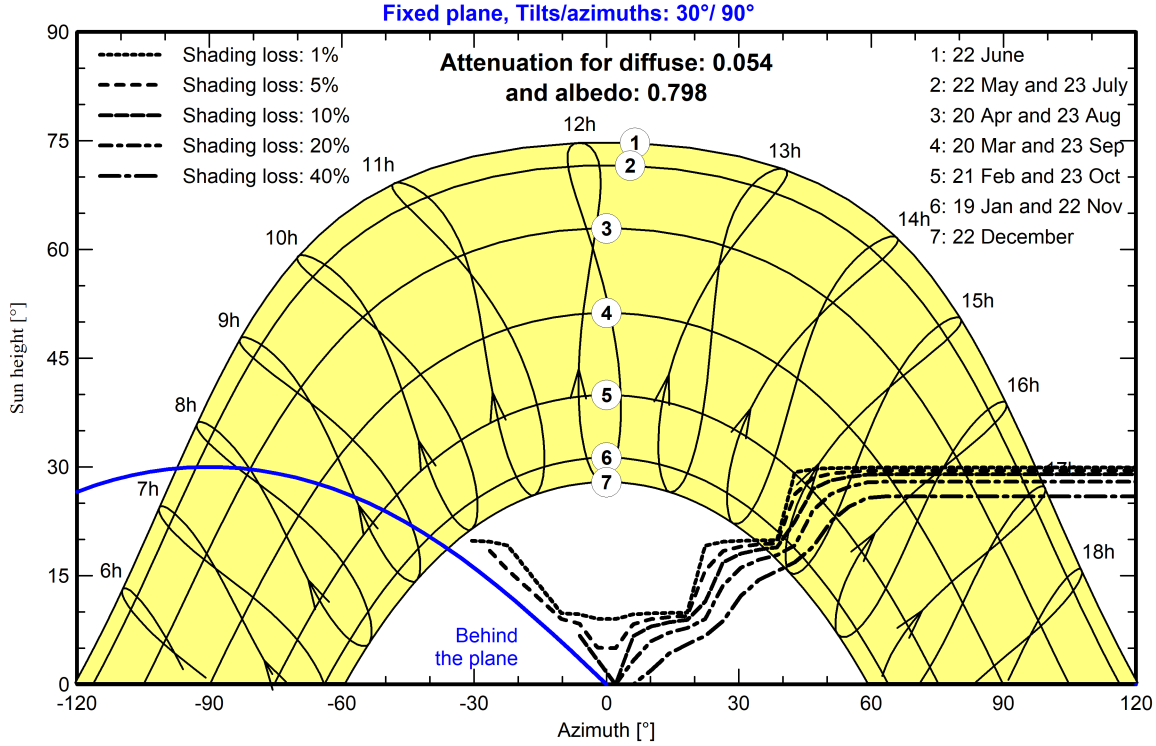
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 30°/ 90°



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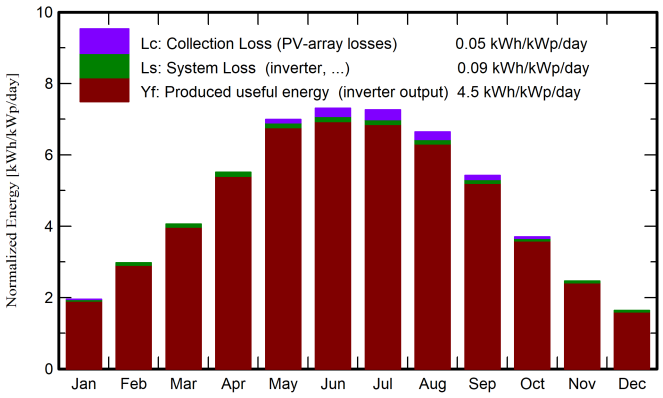
Main results

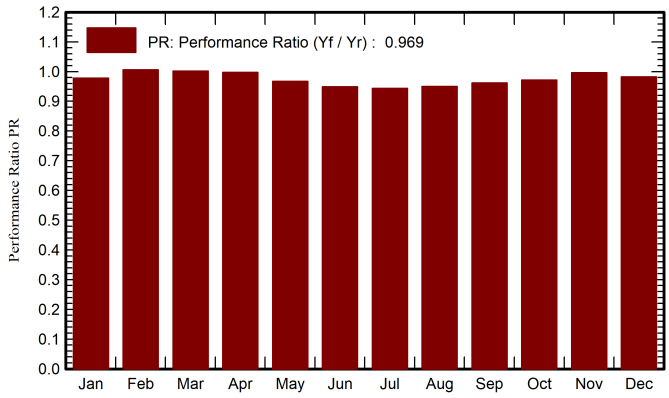
System Production

Produced Energy	4199527 kWh/year	Specific production	1642 kWh/kWp/year
		Perf. Ratio PR	96.88 %

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	61.4	32.80	7.00	60.5	53.5	154608	151304	0.978
February	83.2	36.20	9.10	81.0	73.8	212822	208520	1.006
March	133.6	60.00	12.60	123.1	113.7	321754	315348	1.002
April	176.1	61.40	15.30	162.5	152.4	422857	414476	0.997
May	231.1	61.70	19.70	216.9	205.2	547407	536433	0.967
June	234.9	64.30	23.20	219.3	208.2	543167	532410	0.949
July	241.8	61.00	24.80	225.2	213.5	554769	543830	0.944
August	217.5	51.60	23.70	206.0	194.2	510533	500539	0.950
September	172.8	39.60	20.90	162.6	151.6	407756	399856	0.961
October	119.1	40.70	16.40	114.6	105.1	290456	284850	0.972
November	76.5	30.60	10.40	72.6	65.4	189024	185181	0.997
December	51.3	27.00	6.70	50.5	44.8	129663	126780	0.982
Year	1799.3	566.90	15.85	1694.8	1581.3	4284815	4199527	0.969

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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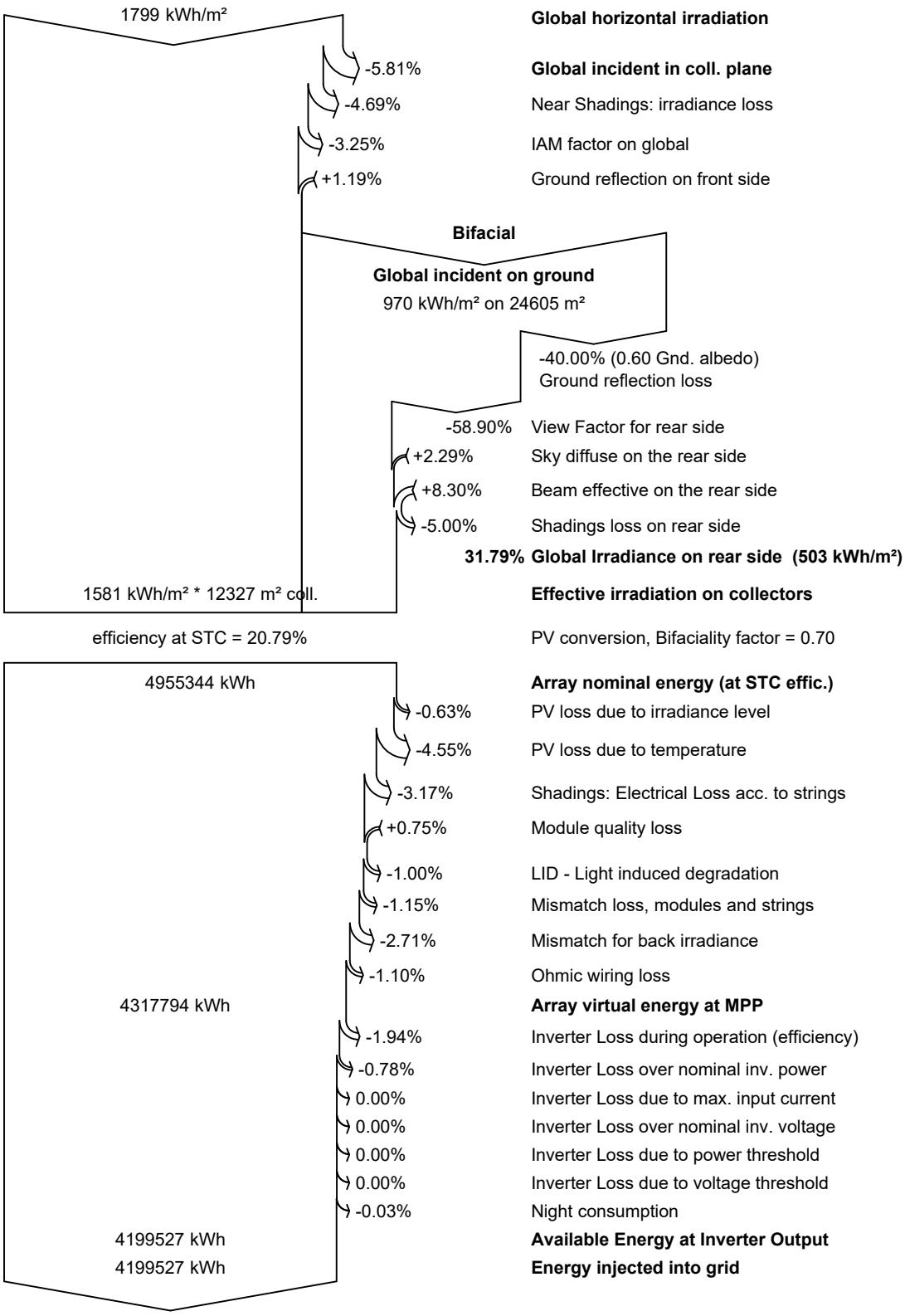
Loss diagram



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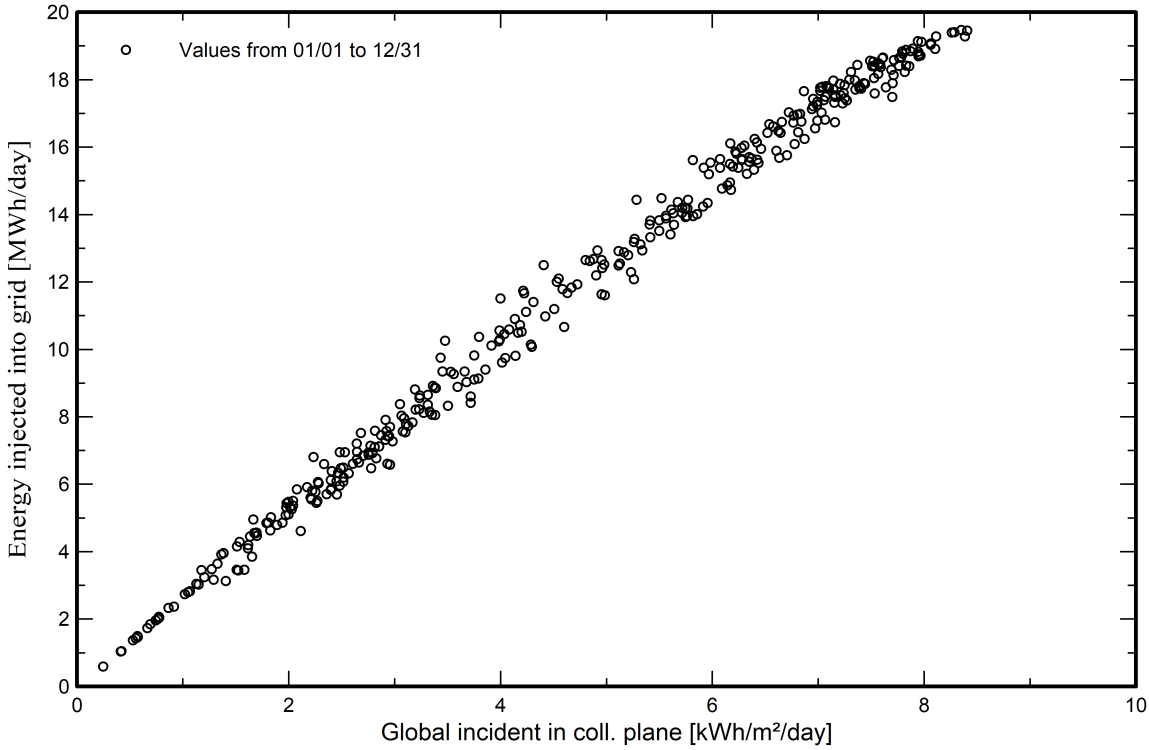
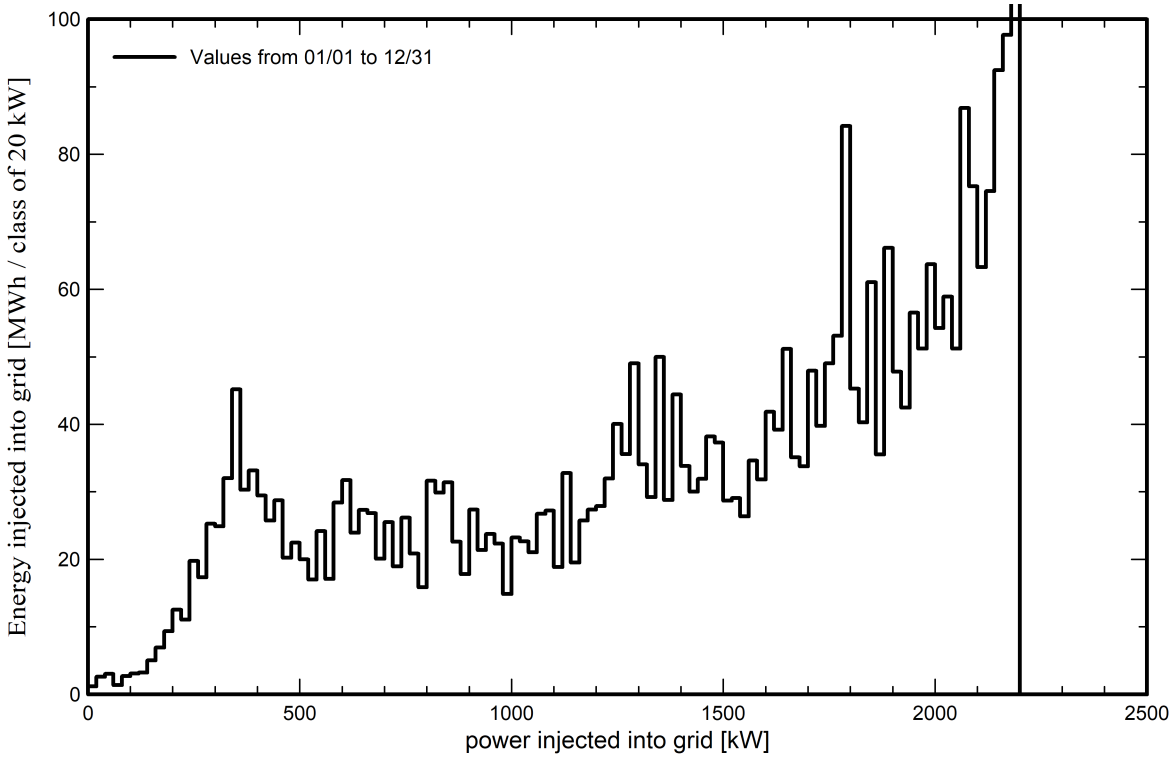
Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



Single-line diagram

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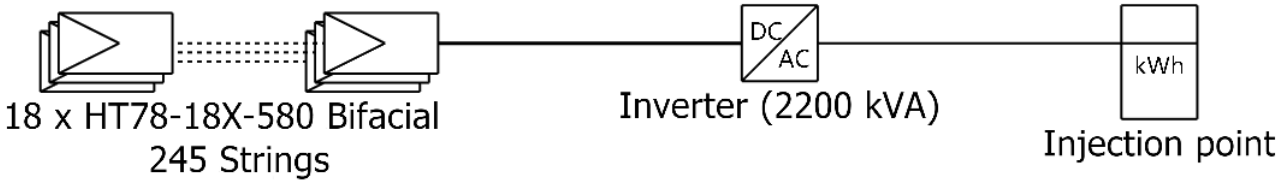

PV module	HT78-18X-580 Bifacial
Inverter	Sunny Central 2200
String	18 x HT78-18X-580 Bifacial

	Test Bifi Sheds	DNV (USA)
	VC4 : FT30 Az90 Alb060 (bifi)	12/28/23