Regione Puglia

Provincia di Foggia

Comune di Foggia

Nome Progetto / Projet Name

Progetto per la realizzazione di un impianto agrivoltaico denominato "Agrosolar 3", della potenza complessiva pari a 28,439 MWp e delle relative opere connesse, nel comune di Foggia (FG).

Sviluppatore / Developer

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Titolo documento /Document title

Relazione sulla producibilità

Tavola /Pannel

Codice elaborato /Code processed

PA3_REL_FV_PRD_005

N.	DATA REVISIONE	DESCRIZIONE REVISIONE	PREPARED	CHECKED	APPROVED
00	03/2024	PROGETTO PRELIMINARE			

Specialista / Specialist

Ing. Pasquale De Bonis

Timbro e firma / Stamp and signature

Progettisti / Planner

RENEWABLE CONSULTING S.R.L.

ORDINE DEGLI INGEGNERI DELLA PROVINCIA DI FOGGIA
Ing. IUNIOR
Pasquale
DE BONIS
N° 832
Sezione: B
Settore: b) Industriale

De Bonis Pasquale
09.04.2024 17:43:36 GMT+00:00

Nome file	Dimensione cartiglio	Scala
PA3_REL_FV_PRD_005	A4	-

SOMMARIO

ALLEGATI:

- REPORT PVSYST

1. PREMESSA

Il presente documento è parte integrante del progetto definitivo redatto per la realizzazione della connessione elettrica alla rete di Terna SpA, in riferimento all'impianto di produzione di energia elettrica da fonte fotovoltaica denominato **PUGLIA AGRISOLARE 3** da realizzarsi in agro di Manfredonia (FG), caratterizzato da una potenza di 28,439 MWp.

2. CALCOLO PRODUCIBILITà IMPIANTO

La valutazione della producibilità è stata eseguita tramite simulazione software con l'inserimento dei dati geometrici ed elettrici dell'impianto, geolocalizzando il sito per i dati meteorologici annuali calcolando quindi puntualmente i diversi orientamenti ottenuti dal movimento delle strutture ad inseguimento durante la giornata.
Da tale report si evince che la producibilità attesa media annua dell'impianto è pari a **53826.45 MWh/anno** con una produzione specifica pari a **1893 kWh/kWp/a**.

Version 7.4.5

PVsyst - Simulation report

Grid-Connected System

Progetto: Agrosolar 3

Variant: Progetto definitivo

Tracking system

System power: 28.44 MWp

Masseria Barretta - Italy

Autore

ING. PASQUALE DE BONIS (Italy)

Project: AGNELLI CIANO

Variant: Progetto definitivo

ING. PASQUALE DE BONIS (Italy)

Project summary

Geographical Site
Masseria Barretta
Italy

Situation

Latitude	41.49 °N
Longitude	15.83 °E
Altitude	16 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Masseria Barretta
Meteonorm 8.1 (1986-2005), Sat=7% - Sintetico

System summary

Grid-Connected System

Tracking system

PV Field Orientation
Orientation
Tracking plane, horizontal N-S axis
Axis azimuth 0 °

Tracking algorithm
Astronomic calculation

Near Shadings
Linear shadings : Fast (table)
Diffuse shading Automatic

System information

PV Array

Nb. of modules	41216 units
Pnom total	28.44 MWp

Inverters

Nb. of units	9 units
Pnom total	27.00 MWac
Pnom ratio	1.053

User's needs
Unlimited load (grid)

Results summary

Produced Energy	53826.45 MWh/year	Specific production	1893 kWh/kWp/year	Perf. Ratio PR	87.21 %

Table of contents

General parameters

Grid-Connected System

Tracking system

PV Field Orientation

Orientation
Tracking plane, horizontal N-S axis
Axis azimuth 0 °

Tracking algorithm
Astronomic calculation

Trackers configuration
Nb. of trackers 1472 units

Sizes
Tracker Spacing 5.50 m
Collector width 1.30 m
Ground Cov. Ratio (GCR) 23.7 %
Phi min / max. -/+ 60.0 °

Shading limit angles
Phi limits for BT -/+ 76.2 °

Models used
Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon
Free Horizon

Near Shadings
Linear shadings : Fast (table)
Diffuse shading Automatic

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	Risen Solar
Model	RSM132-8-690BHDG
(Original PVsyst database)	
Unit Nom. Power	690 Wp
Number of PV modules	41216 units
Nominal (STC)	28.44 MWp
Modules	1472 string x 28 In series
At operating cond. (50°C)	
Pmpp	26.79 MWp
U mpp	1079 V
I mpp	24834 A

Inverter

Manufacturer	SMA
Model	Sunny Central 3000-EV
(Original PVsyst database)	
Unit Nom. Power	3000 kWac
Number of inverters	9 units
Total power	27000 kWac
Operating voltage	956-1425 V
Pnom ratio (DC:AC)	1.05

Total PV power

Nominal (STC)	28439 kWp
Total	41216 modules
Module area	128031 m²

Total inverter power

Total power	27000 kWac
Number of inverters	9 units
Pnom ratio	1.05

Array losses

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses
Global array res. 0.70 mΩ
Loss Fraction 1.5 % at STC

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

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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with v7.4.5

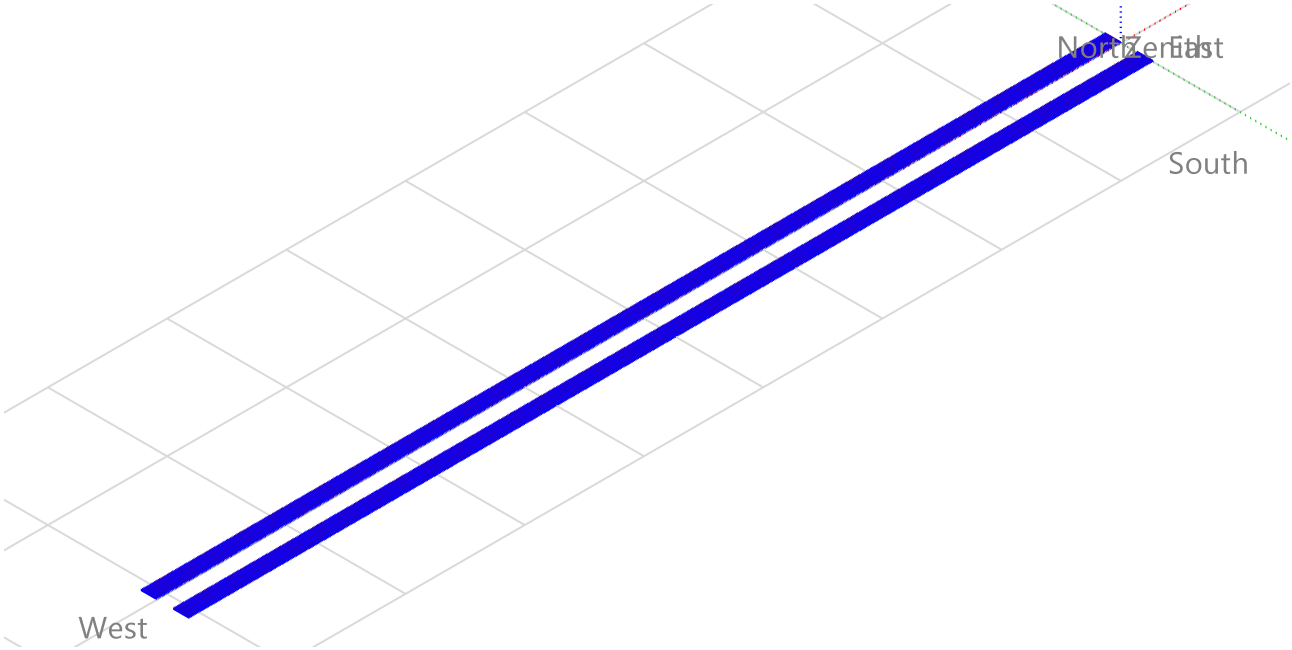
System losses

Unavailability of the system

Time fraction	2.0 %
	7.3 days,
	3 periods

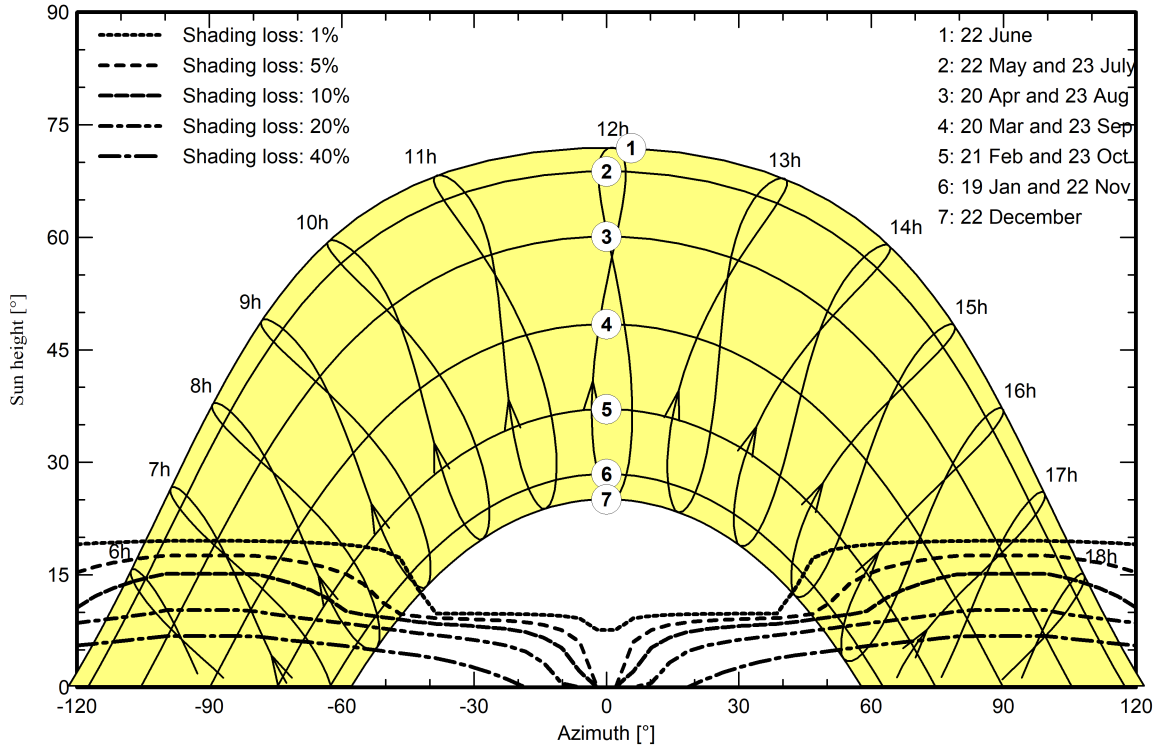
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

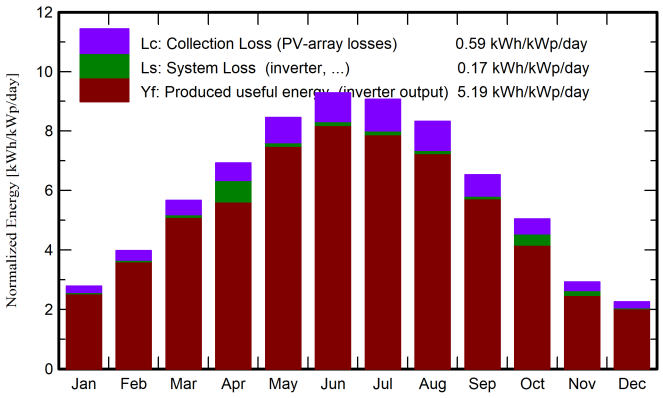


Main results

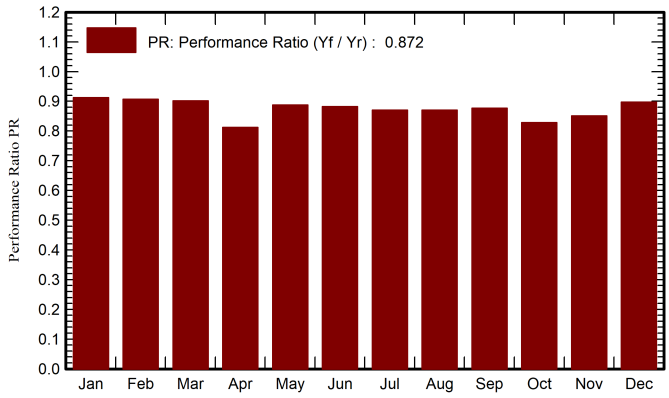
System Production

Produced Energy	53826.45 MWh/year	Specific production	1893 kWh/kWp/year
		Perf. Ratio PR	87.21 %

Normalized productions (per installed kWp)



Performance Ratio PR



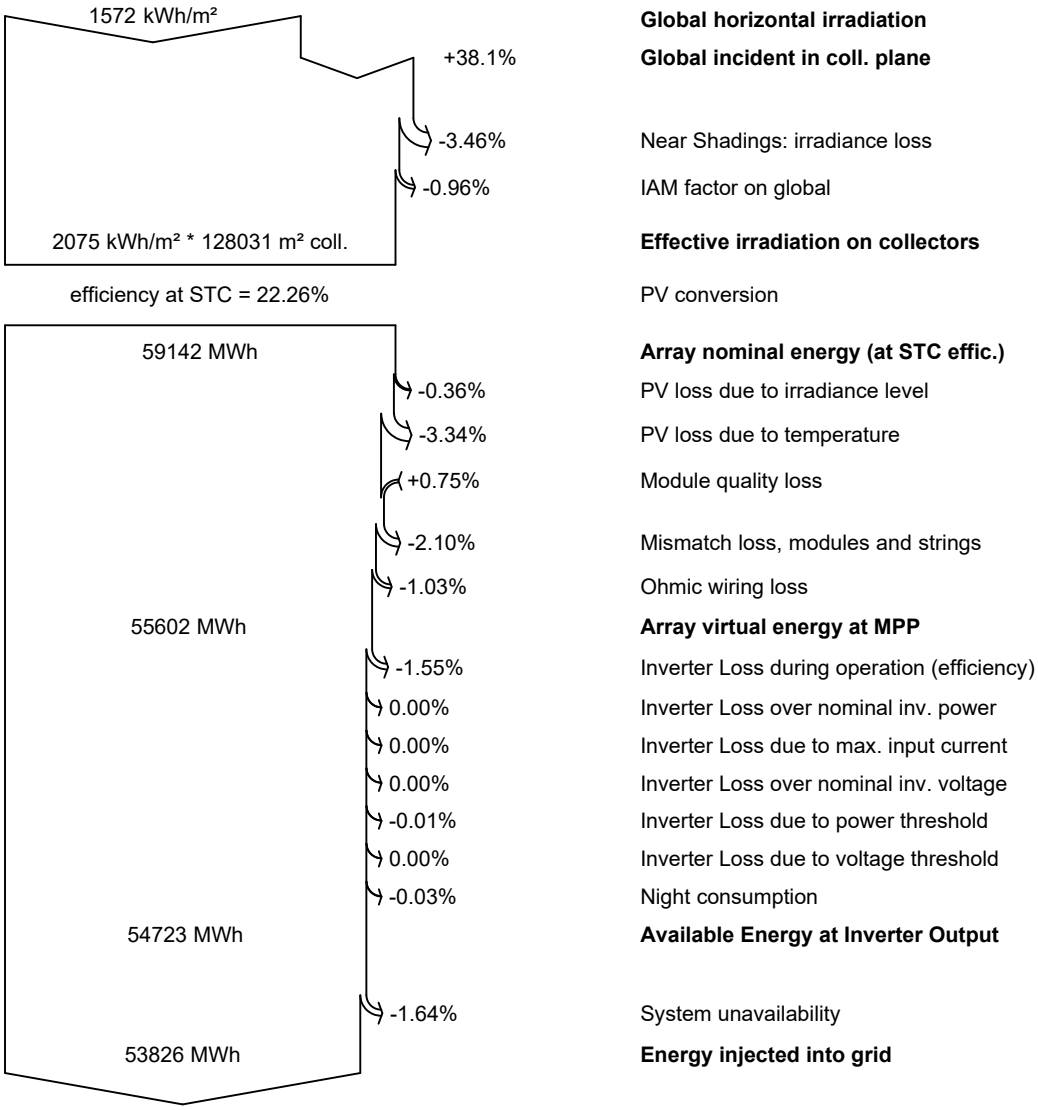
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	59.4	27.06	7.38	86.2	81.3	2273	2235	0.912
February	77.3	34.95	7.94	111.4	104.9	2920	2873	0.907
March	125.5	52.34	11.30	175.6	166.7	4577	4503	0.902
April	156.3	69.74	14.53	207.7	199.7	5419	4799	0.812
May	195.2	82.42	19.98	262.0	251.6	6716	6610	0.887
June	206.0	82.27	24.84	278.5	269.6	7101	6990	0.883
July	209.1	82.63	27.77	281.1	270.9	7064	6955	0.870
August	187.3	67.43	27.44	258.1	248.6	6489	6387	0.870
September	139.2	60.63	22.04	196.0	186.2	4964	4888	0.877
October	107.1	38.37	18.08	156.2	148.3	4008	3682	0.829
November	60.5	28.17	12.74	87.6	82.0	2256	2119	0.851
December	48.9	24.26	8.71	69.9	65.2	1816	1785	0.898
Year	1571.8	650.27	16.95	2170.2	2074.9	55602	53826	0.872

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



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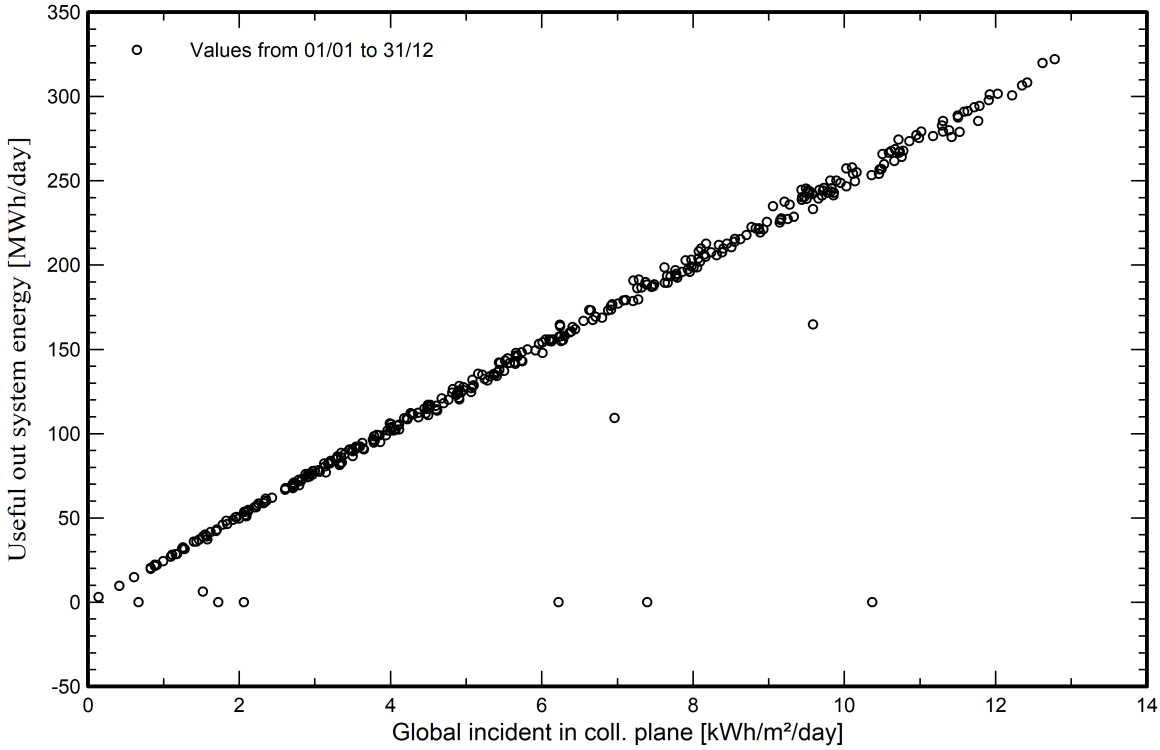
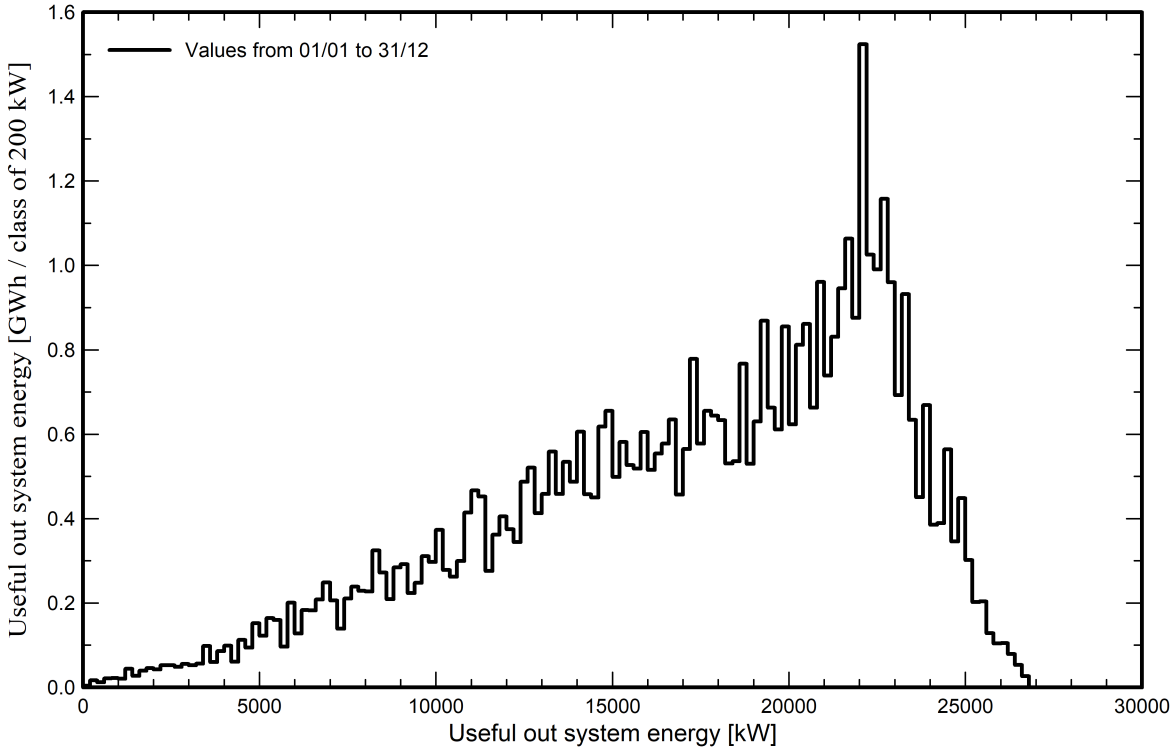
Predef. graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



Single-line diagram

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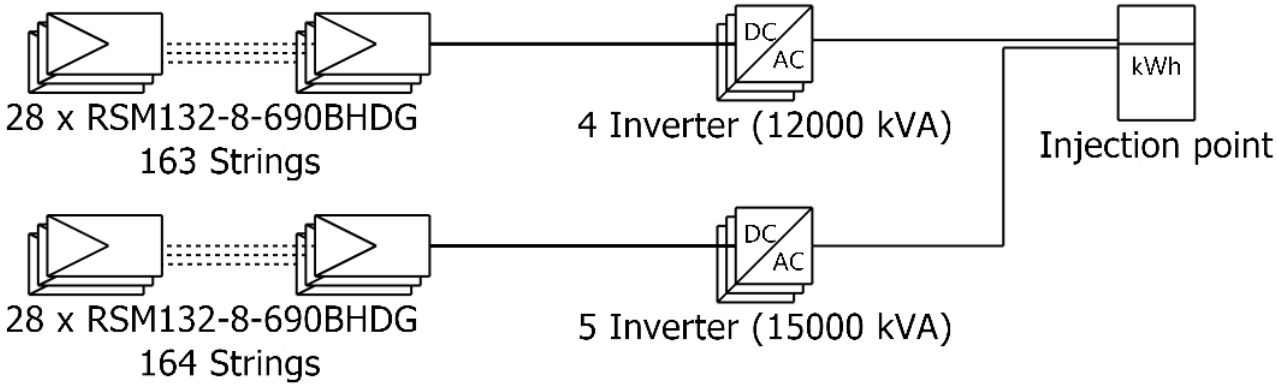

PV module	RSM132-8-690BHDG
Inverter	Sunny Central 3000-EV
String	28 x RSM132-8-690BHDG

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