



REGIONE PUGLIA COMUNE DI BRINDISI (BR)



Proponente:



VRE .2

VRE.2 SRL

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Procedura:

Valutazione di impatto ambientale (art. 23, D.Lgs. 156/06)

Oggetto:

Costruzione ed esercizio di un impianto agrovoltaiico, costituito da lotto Brindisi A della potenza in immissione pari a 5,486 MW e lotto Brindisi B della potenza in immissione pari a 5,486 MW, con relativo collegamento alla rete elettrica.
Comune di Brindisi (BR)

IMPIANTO DI PRODUZIONE: "VRE.2"



ID Progetto del MiTE:

Identificatore:

27_PD_R

Scala:

-

Elaborato redatto da:

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Iscrizione all'Albo n° A 2508
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- Settore civile e ambientale
- Settore industriale
- Settore dell'informazione



ORDINE DEGLI INGEGNERI
DELLA PROVINCIA DI REGGIO CALABRIA

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Titolo elaborato:

Analisi della risorsa solare e stima di produzione energia

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Rev.	Data	Descrizione revisione:	Redatto:	Controllato:	Approvato:
0	07/2022	Prima emissione	Ing. Baldacconi	Ing. Bolignano	Ing. Bolignano
1					
2					
3					

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PVsyst - Simulation report

Grid-Connected System

Project: Brindisi-A PV

Variant: New simulation variant

Tracking system with backtracking

System power: 6324 kWp

Tuturano - Italy



Project: Brindisi-A PV

Variant: New simulation variant

PVsyst V7.2.16

VCO, Simulation date:
15/07/22 16:16
with v7.2.16

ARATO SRL (Italy)

Project summary

Geographical Site	Situation	Project settings
Tuturano	Latitude 40.52 °N	Albedo 0.20
Italy	Longitude 17.90 °E	
	Altitude 62 m	
	Time zone UTC+1	
Meteo data		
Tuturano		
PVGIS api TMY		

System summary

Grid-Connected System	Tracking system with backtracking		
Simulation for year no 1			
PV Field Orientation	Tracking algorithm	Near Shadings	
Orientation	Irradiance optimization	Linear shadings	
Tracking plane, horizontal N-S axis	Backtracking activated		
Avg axis azim. -4.7 °			
System information			
PV Array	Inverters		
Nb. of modules 10368 units	Nb. of units 3 units		
Pnom total 6324 kWp	Pnom total 5486 kWac		
	Pnom ratio 1.153		
User's needs			
Unlimited load (grid)			

Results summary

Produced Energy	12 GWh/year	Specific production	1825 kWh/kWp/year	Perf. Ratio PR	85.04 %
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Project: Brindisi-A PV

Variant: New simulation variant

ARATO SRL (Italy)

PVsyst V7.2.16

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General parameters

Grid-Connected System		Tracking system with backtracking	
PV Field Orientation		Tracking algorithm	Backtracking array
Orientation		Irradiance optimization	Nb. of trackers 460 units
Tracking plane, horizontal N-S axis		Backtracking activated	Sizes
Avg axis azim. -4.7 °			Tracker Spacing 5.50 m
			Collector width 2.46 m
			Ground Cov. Ratio (GCR) 44.8 %
			Phi min / max. +/- 55.0 °
			Backtracking strategy
			Phi limits +/- 79.9 °
			Backtracking pitch 5.50 m
			Backtracking width 2.47 m
Models used		Near Shadings	User's needs
Transposition Perez		Linear shadings	Unlimited load (grid)
Diffuse Imported			
Circumsolar separate			
Horizon			
Free Horizon			

PV Array Characteristics

PV module		Inverter	
Manufacturer	JA Solar	Manufacturer	Santerno
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 690
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1912 kWac
Number of PV modules	7248 units	Number of inverters	2 units
Nominal (STC)	4421 kWp	Total power	3824 kWac
Array #1 - BRINDISI A - Campo 1a		Array #2 - BRINDISI A - Campo 2	
Number of PV modules	3888 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	2372 kWp	Total power	1912 kWac
Modules	162 Strings x 24 In series	Operating voltage	690-1200 V
At operating cond. (50°C)		Max. power (=>25°C)	2151 kWac
Pmpp	2148 kWp	Pnom ratio (DC:AC)	1.24
U mpp	982 V		
I mpp	2186 A		
Array #3 - BRINDISI A - Campo 2		Array #4 - BRINDISI A - Campo 2	
Number of PV modules	3360 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	2050 kWp	Total power	1912 kWac
Modules	140 Strings x 24 In series	Operating voltage	690-1200 V
At operating cond. (50°C)		Max. power (=>25°C)	2151 kWac
Pmpp	1856 kWp	Pnom ratio (DC:AC)	1.07
U mpp	982 V		
I mpp	1889 A		



PV Array Characteristics

Array #2 - BRINDISI A - Campo 1b		Inverter	
PV module		Manufacturer	Santerno
Manufacturer	JA Solar	Manufacturer	
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 600 (1662W)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1662 kWac
Number of PV modules	3120 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	1903 kWp	Total power	1662 kWac
Modules	130 Strings x 24 In series	Operating voltage	860-1200 V
At operating cond. (50°C)		Max. power (=>25°C)	1662 kWac
Pmpp	1723 kWp	Pnom ratio (DC:AC)	1.15
U mpp	982 V		
I mpp	1754 A		
Total PV power		Total inverter power	
Nominal (STC)	6324 kWp	Total power	5486 kWac
Total	10368 modules	Number of inverters	3 units
Module area	28982 m ²	Pnom ratio	1.15
Cell area	26720 m ²		

Array losses

Array Soiling Losses		Thermal Loss factor		Serie Diode Loss				
Loss Fraction	2.0 %	Module temperature according to irradiance		Voltage drop	0.7 V			
		Uc (const)	25.0 W/m ² K	Loss Fraction	0.1 % at STC			
		Uv (wind)	1.2 W/m ² K/m/s					
LID - Light Induced Degradation		Module Quality Loss		Module mismatch losses				
Loss Fraction	1.0 %	Loss Fraction	-0.5 %	Loss Fraction	0.5 % at MPP			
Strings Mismatch loss		Module average degradation						
Loss Fraction	0.1 %	Year no	1					
		Loss factor	0.4 %/year					
		Mismatch due to degradation						
		Imp RMS dispersion	0.4 %/year					
		Vmp RMS dispersion	0.4 %/year					
IAM loss factor								
Incidence effect (IAM): User defined profile								
0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	1.000	0.985	0.943	0.840	0.000

DC wiring losses

Global wiring resistance	2.8 mΩ		
Loss Fraction	1.5 % at STC		
Array #1 - BRINDISI A - Campo 1a		Array #2 - BRINDISI A - Campo 1b	
Global array res.	7.5 mΩ	Global array res.	9.3 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #3 - BRINDISI A - Campo 2			
Global array res.	8.6 mΩ		
Loss Fraction	1.5 % at STC		



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System losses

Auxiliaries loss

constant (fans) 10.80 kW
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 690 Vac tri
Loss Fraction 1.00 % at STC

Inverters: Sunway TG 1800 1500V TE - 690, Sunway TG 1800 1500V TE - 600 (1662W)

Wire section (3 Inv.) Copper 3 x 3 x 10000 mm²
Average wires length 1121 m

MV line up to Injection

MV Voltage 20 kV
Wires Copper 3 x 185 mm²
Length 334 m
Loss Fraction 0.05 % at STC

AC losses in transformers

MV transfo

Grid voltage 20 kV

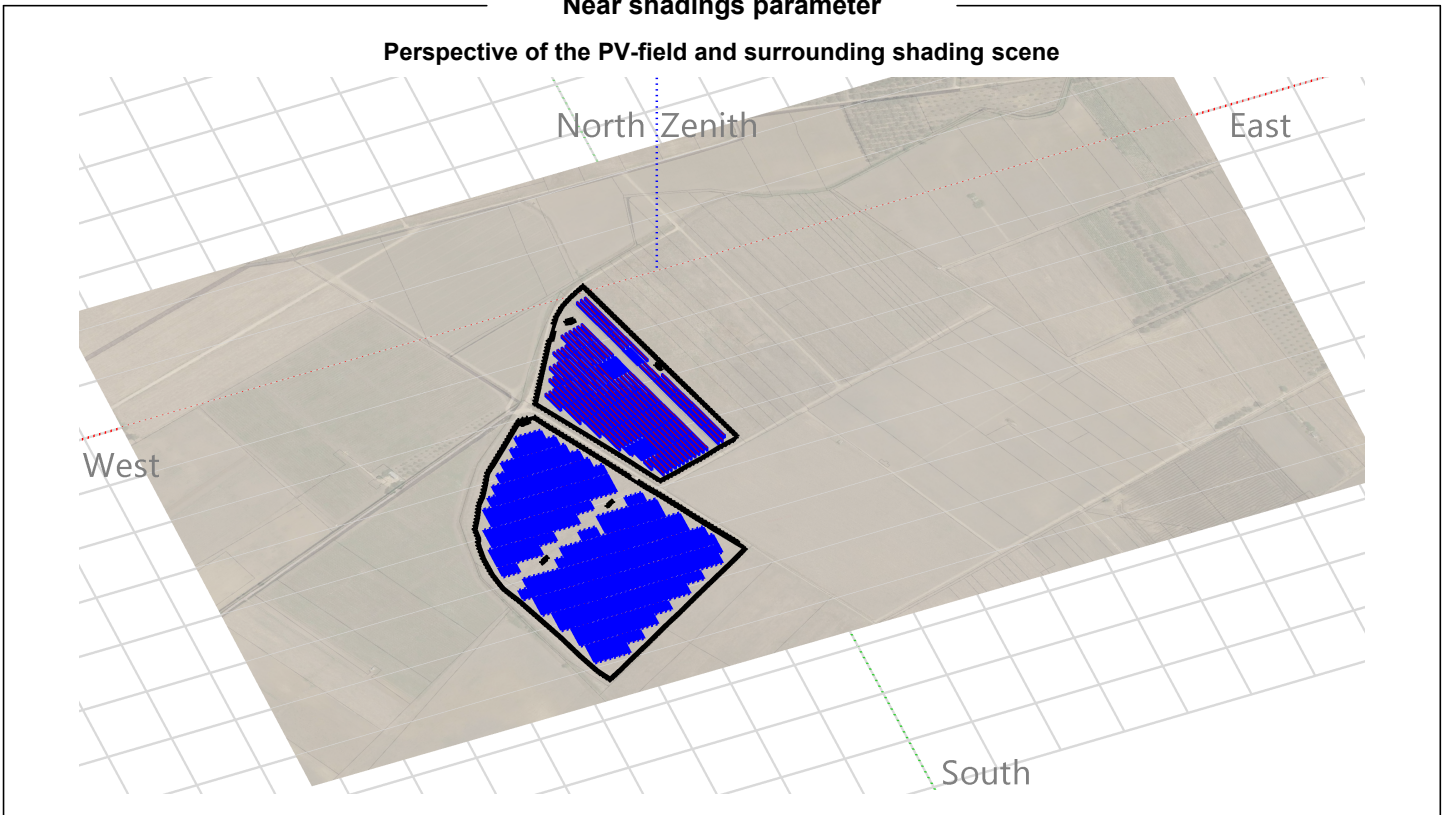
Operating losses at STC

Nominal power at STC 6227 kVA
Iron loss (night disconnect) 6.23 kW
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 0.76 mΩ
Loss Fraction 1.00 % at STC



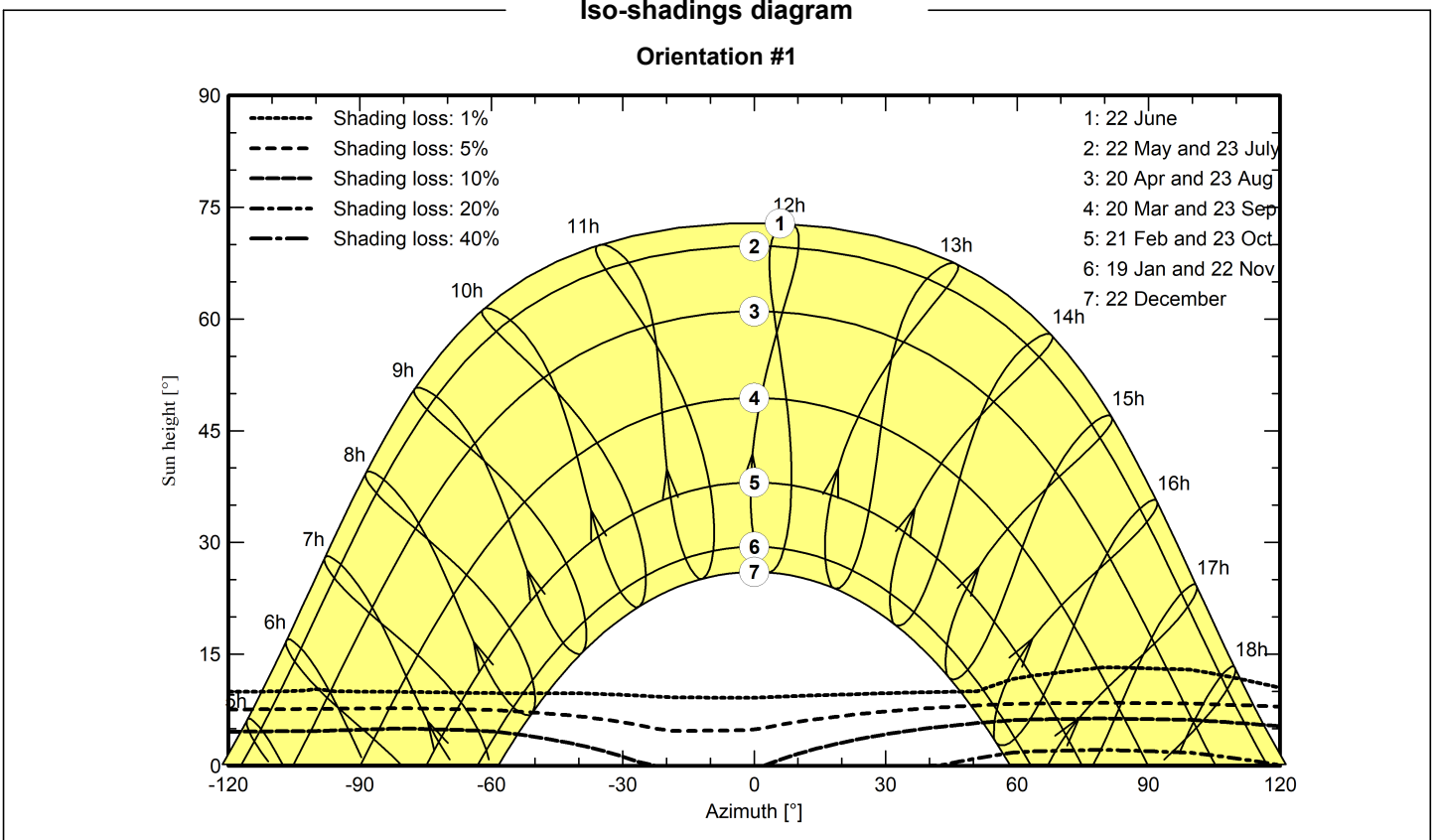
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1





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Main results

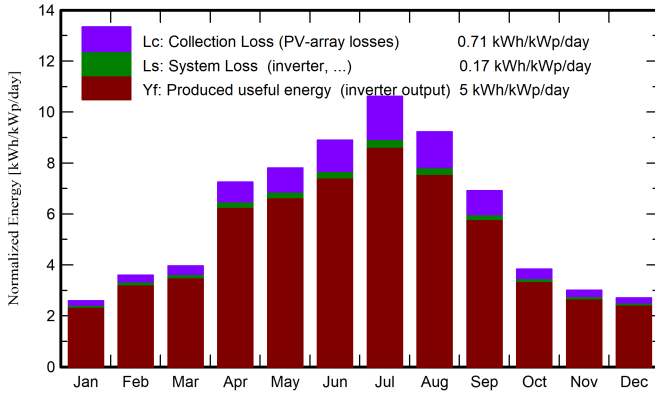
System Production

Produced Energy 12 GWh/year

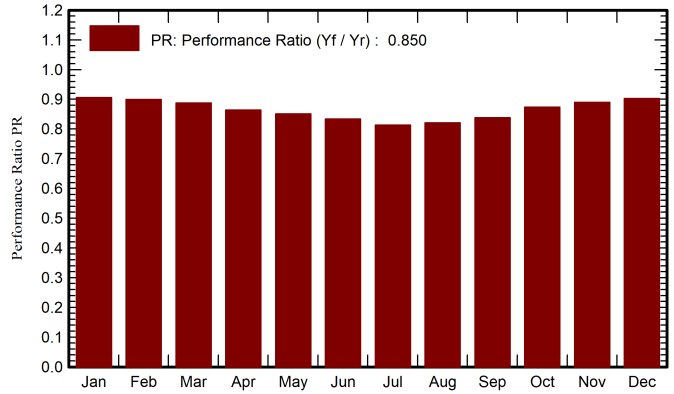
Specific production
Performance Ratio PR

1825 kWh/kWp/year
85.04 %

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 GWh	E_Grid GWh	PR ratio
January	62.5	30.63	7.42	80.5	77.1	0.477	0.461	0.905
February	78.7	37.62	9.70	100.7	96.6	0.592	0.573	0.899
March	100.4	52.49	11.17	122.7	117.9	0.713	0.689	0.888
April	170.3	63.27	14.44	217.6	209.4	1.231	1.190	0.864
May	189.9	69.64	17.83	242.0	232.8	1.349	1.303	0.851
June	211.1	70.12	23.27	267.1	257.3	1.457	1.408	0.834
July	251.9	59.64	27.12	329.3	317.3	1.753	1.693	0.813
August	216.4	59.52	25.72	286.1	275.4	1.536	1.484	0.820
September	157.0	52.93	23.45	207.5	199.4	1.136	1.099	0.838
October	92.8	44.73	15.75	119.1	114.3	0.681	0.658	0.874
November	69.3	29.48	13.08	90.2	86.4	0.525	0.508	0.890
December	62.4	26.76	9.18	83.8	80.2	0.494	0.479	0.903
Year	1662.7	596.82	16.54	2146.5	2064.2	11.944	11.545	0.850

Legends

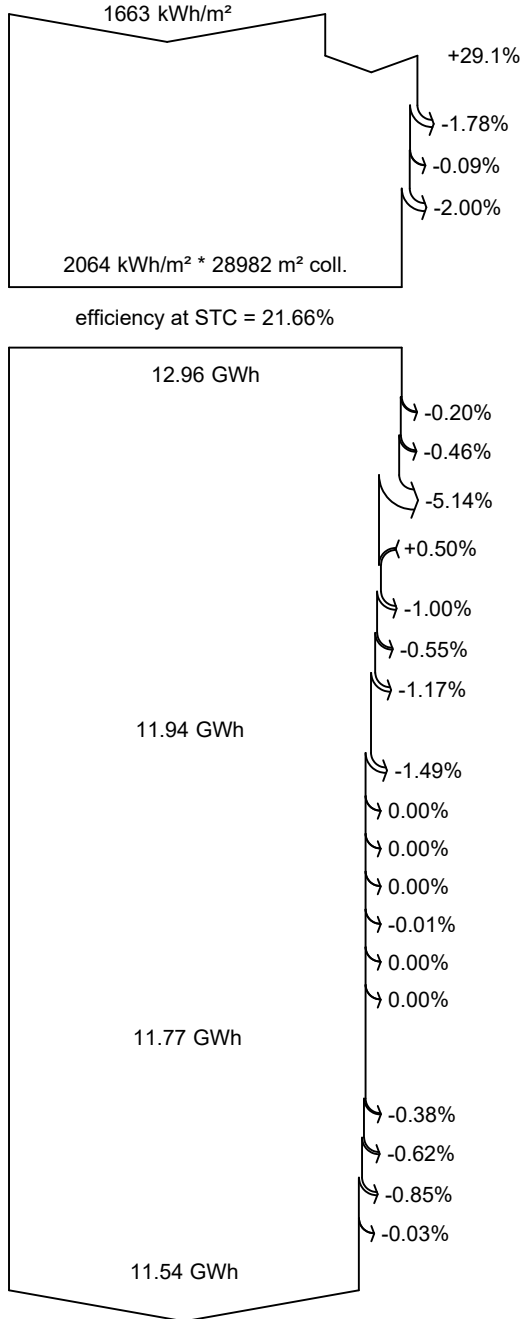
- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse irradiation
- T_Amb Ambient Temperature
- GlobInc Global incident in coll. plane
- GlobEff Effective Global, corr. for IAM and shadings
- EArray Effective energy at the output of the array
- E_Grid Energy injected into grid
- PR Performance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



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Loss diagram



- 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 #1)
- PV loss due to irradiance level
- PV loss due to temperature
- Module quality loss
- LID - Light induced degradation
- Mismatch loss, modules and strings
- 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**
- Auxiliaries (fans, other)
- AC ohmic loss
- Medium voltage transfo loss
- MV line ohmic loss
- Energy injected into grid**



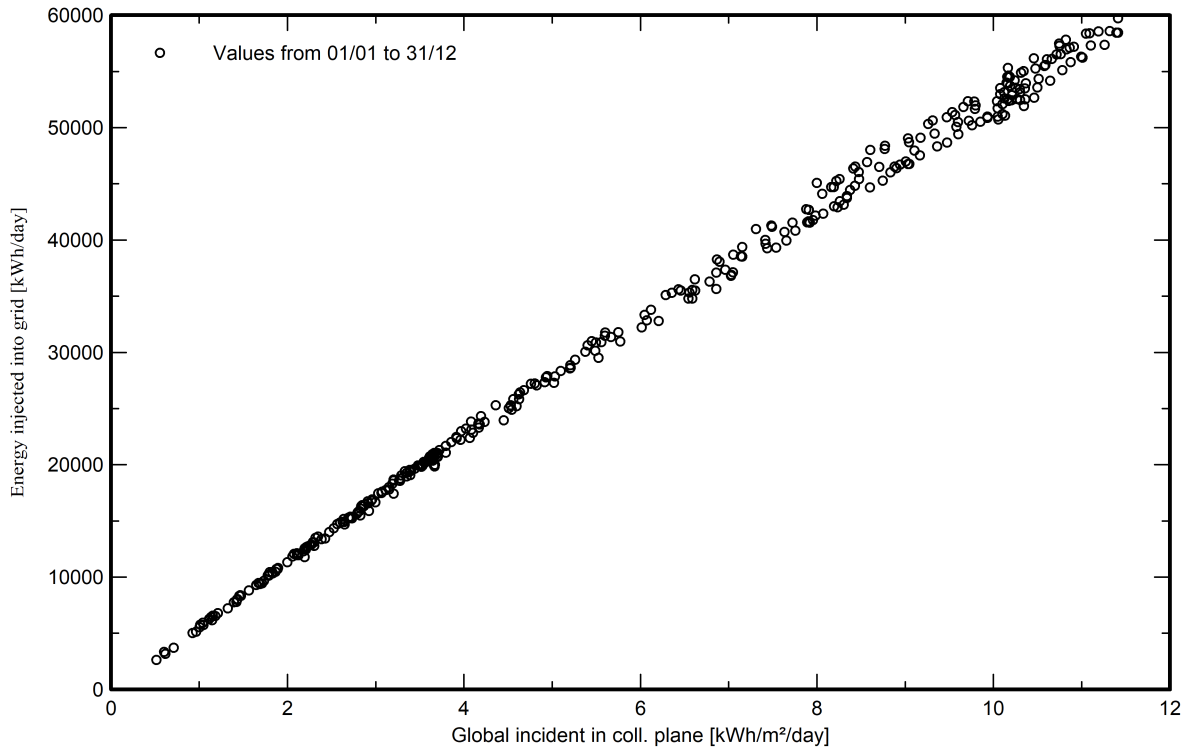
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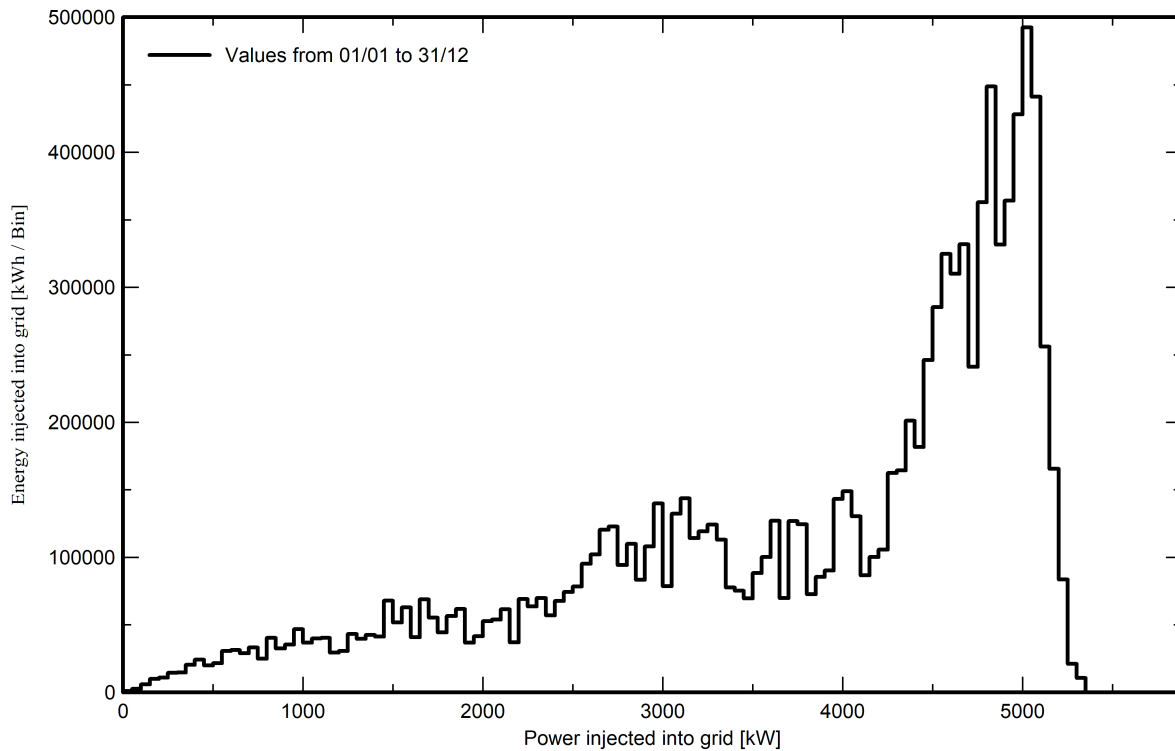
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Special graphs

Daily Input/Output diagram



System Output Power Distribution





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Aging Tool

Aging Parameters

Time span of simulation 20 years

Module average degradation

Loss factor 0.4 %/year

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year

Vmp RMS dispersion 0.4 %/year

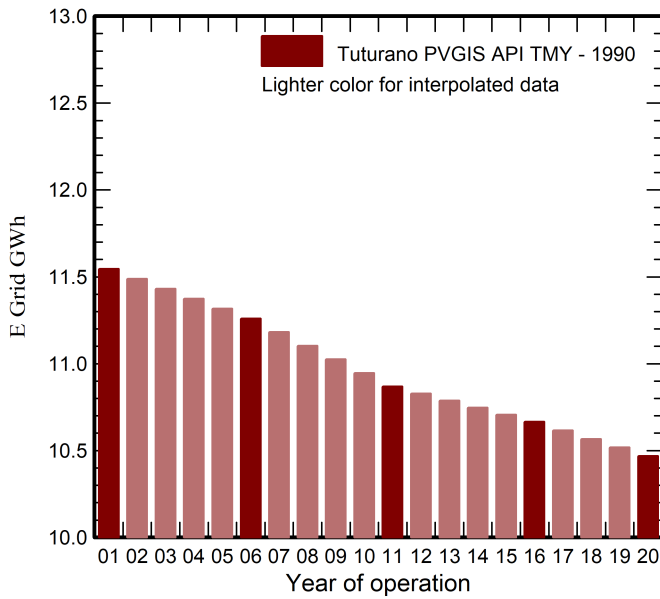
Meteo used in the simulation

#1 Tutturano PVGIS API TMY

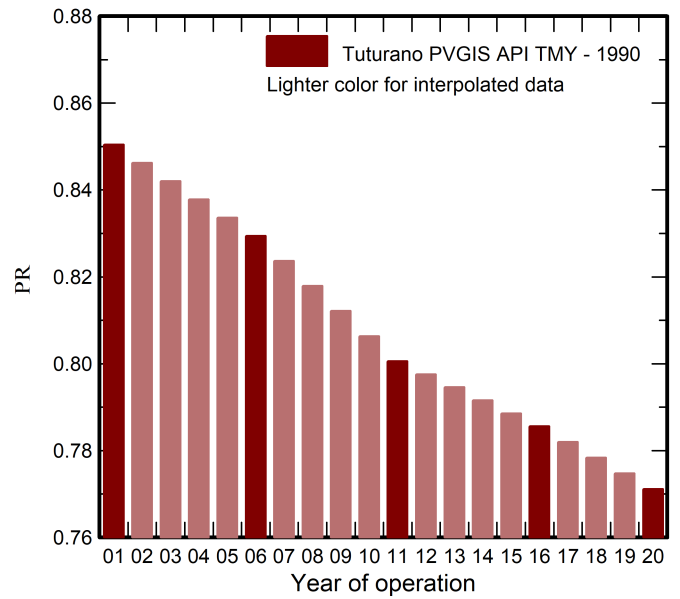
Years 1990 (reference year)

Years simulated 1,6,11,16,20

Energy injected into grid



Performance Ratio





Aging Tool

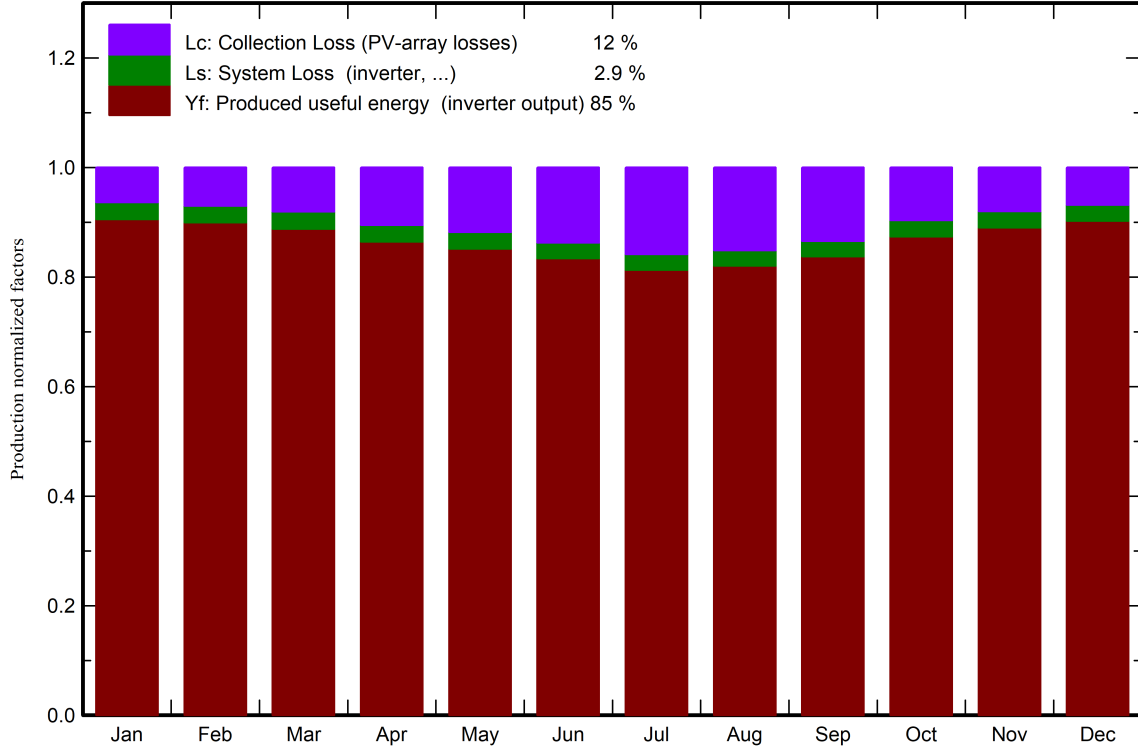
Tuturano PVGIS API TMY

Year	E Grid GWh	PR	PR loss %
1	11.54	0.85	0%
2	11.49	0.846	-0.5%
3	11.43	0.842	-1%
4	11.37	0.838	-1.5%
5	11.32	0.834	-2%
6	11.26	0.829	-2.5%
7	11.18	0.824	-3.1%
8	11.10	0.818	-3.8%
9	11.02	0.812	-4.5%
10	10.95	0.806	-5.2%
11	10.87	0.801	-5.9%
12	10.83	0.798	-6.2%
13	10.79	0.795	-6.6%
14	10.75	0.792	-6.9%
15	10.71	0.789	-7.3%
16	10.66	0.786	-7.6%
17	10.62	0.782	-8%
18	10.57	0.778	-8.5%
19	10.52	0.775	-8.9%
20	10.47	0.771	-9.3%



Predef. graphs

Normalized Production and Loss Factors



PVsyst - Simulation report

Grid-Connected System

Project: Brindisi-B PV

Variant: New simulation variant

Tracking system with backtracking

System power: 5636 kWp

Tuturano - Italy



Project: Brindisi-B PV

Variant: New simulation variant

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ARATO SRL (Italy)

Project summary

Geographical Site	Situation	Project settings
Tuturano	Latitude 40.52 °N	Albedo 0.20
Italy	Longitude 17.90 °E	
	Altitude 62 m	
	Time zone UTC+1	
Meteo data		
Tuturano		
PVGIS api TMY		

System summary

Grid-Connected System	Tracking system with backtracking		
Simulation for year no 1			
PV Field Orientation	Tracking algorithm	Near Shadings	
Orientation	Irradiance optimization	Linear shadings	
Tracking plane, horizontal N-S axis	Backtracking activated		
Avg axis azim. -15.5 °			
System information			
PV Array	Inverters		
Nb. of modules 9240 units	Nb. of units 3 units		
Pnom total 5636 kWp	Pnom total 5486 kWac		
	Pnom ratio 1.027		
User's needs			
Unlimited load (grid)			

Results summary

Produced Energy	10 GWh/year	Specific production	1811 kWh/kWp/year	Perf. Ratio PR	84.83 %
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Project: Brindisi-B PV

Variant: New simulation variant

ARATO SRL (Italy)

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General parameters

Grid-Connected System		Tracking system with backtracking	
PV Field Orientation		Tracking algorithm	Backtracking array
Orientation		Irradiance optimization	Nb. of trackers 398 units
Tracking plane, horizontal N-S axis		Backtracking activated	Sizes
Avg axis azim. -15.5 °			Tracker Spacing 5.37 m
			Collector width 2.46 m
			Ground Cov. Ratio (GCR) 45.9 %
			Phi min / max. +/- 55.0 °
			Backtracking strategy
			Phi limits +/- 79.9 °
			Backtracking pitch 5.36 m
			Backtracking width 2.47 m
Models used		Near Shadings	User's needs
Transposition Perez		Linear shadings	Unlimited load (grid)
Diffuse Imported			
Circumsolar separate			
Horizon			
Free Horizon			

PV Array Characteristics

PV module		Inverter	
Manufacturer	JA Solar	Manufacturer	Santerno
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 690
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1912 kWac
Number of PV modules	6480 units	Number of inverters	2 units
Nominal (STC)	3953 kWp	Total power	3824 kWac
Array #1 - BRINDISI B - Campo 3		Array #1 - BRINDISI B - Campo 3	
Number of PV modules	3336 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	2035 kWp	Total power	1912 kWac
Modules	139 Strings x 24 In series	Operating voltage	690-1200 V
At operating cond. (50°C)		Max. power (=>25°C)	2151 kWac
Pmpp	1843 kWp	Pnom ratio (DC:AC)	1.06
U mpp	982 V		
I mpp	1876 A		
Array #2 - BRINDISI B - Campo 4a		Array #2 - BRINDISI B - Campo 4a	
Number of PV modules	3144 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	1918 kWp	Total power	1912 kWac
Modules	131 Strings x 24 In series	Operating voltage	690-1200 V
At operating cond. (50°C)		Max. power (=>25°C)	2151 kWac
Pmpp	1737 kWp	Pnom ratio (DC:AC)	1.00
U mpp	982 V		
I mpp	1768 A		



Project: Brindisi-B PV

Variant: New simulation variant

ARATO SRL (Italy)

PVsyst V7.2.16

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PV Array Characteristics

Array #3 - BRINDISI B - Campo 4b		Inverter	
PV module		Inverter	
Manufacturer	JA Solar	Manufacturer	Santerno
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 600 (1662W)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1662 kWac
Number of PV modules	2760 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	1684 kWp	Total power	1662 kWac
Modules	115 Strings x 24 In series	Operating voltage	860-1200 V
At operating cond. (50°C)		Max. power (=>25°C)	1662 kWac
Pmpp	1525 kWp	Pnom ratio (DC:AC)	1.01
U mpp	982 V		
I mpp	1552 A		
Total PV power		Total inverter power	
Nominal (STC)	5636 kWp	Total power	5486 kWac
Total	9240 modules	Number of inverters	3 units
Module area	25829 m ²	Pnom ratio	1.03
Cell area	23813 m ²		

Array losses

Array Soiling Losses		Thermal Loss factor		Serie Diode Loss				
Loss Fraction	2.0 %	Module temperature according to irradiance		Voltage drop	0.7 V			
		Uc (const)	25.0 W/m ² K	Loss Fraction	0.1 % at STC			
		Uv (wind)	1.2 W/m ² K/m/s					
LID - Light Induced Degradation		Module Quality Loss		Module mismatch losses				
Loss Fraction	1.0 %	Loss Fraction	-0.5 %	Loss Fraction	0.5 % at MPP			
Strings Mismatch loss		Module average degradation						
Loss Fraction	0.1 %	Year no	1					
		Loss factor	0.4 %/year					
		Mismatch due to degradation						
		Imp RMS dispersion	0.4 %/year					
		Vmp RMS dispersion	0.4 %/year					
IAM loss factor								
Incidence effect (IAM): User defined profile								
0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	1.000	0.985	0.943	0.840	0.000

DC wiring losses

Global wiring resistance	3.1 mΩ		
Loss Fraction	1.5 % at STC		
Array #1 - BRINDISI B - Campo 3		Array #2 - BRINDISI B - Campo 4a	
Global array res.	8.7 mΩ	Global array res.	9.2 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #3 - BRINDISI B - Campo 4b			
Global array res.	10 mΩ		
Loss Fraction	1.5 % at STC		



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System losses

Auxiliaries loss

constant (fans) 10.80 kW
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 690 Vac tri
Loss Fraction 1.00 % at STC

Inverters: Sunway TG 1800 1500V TE - 690, Sunway TG 1800 1500V TE - 600 (1662W)

Wire section (3 Inv.) Copper 3 x 3 x 10000 mm²
Average wires length 1254 m

MV line up to Injection

MV Voltage 20 kV
Wires Copper 3 x 185 mm²
Length 334 m
Loss Fraction 0.05 % at STC

AC losses in transformers

MV transfo

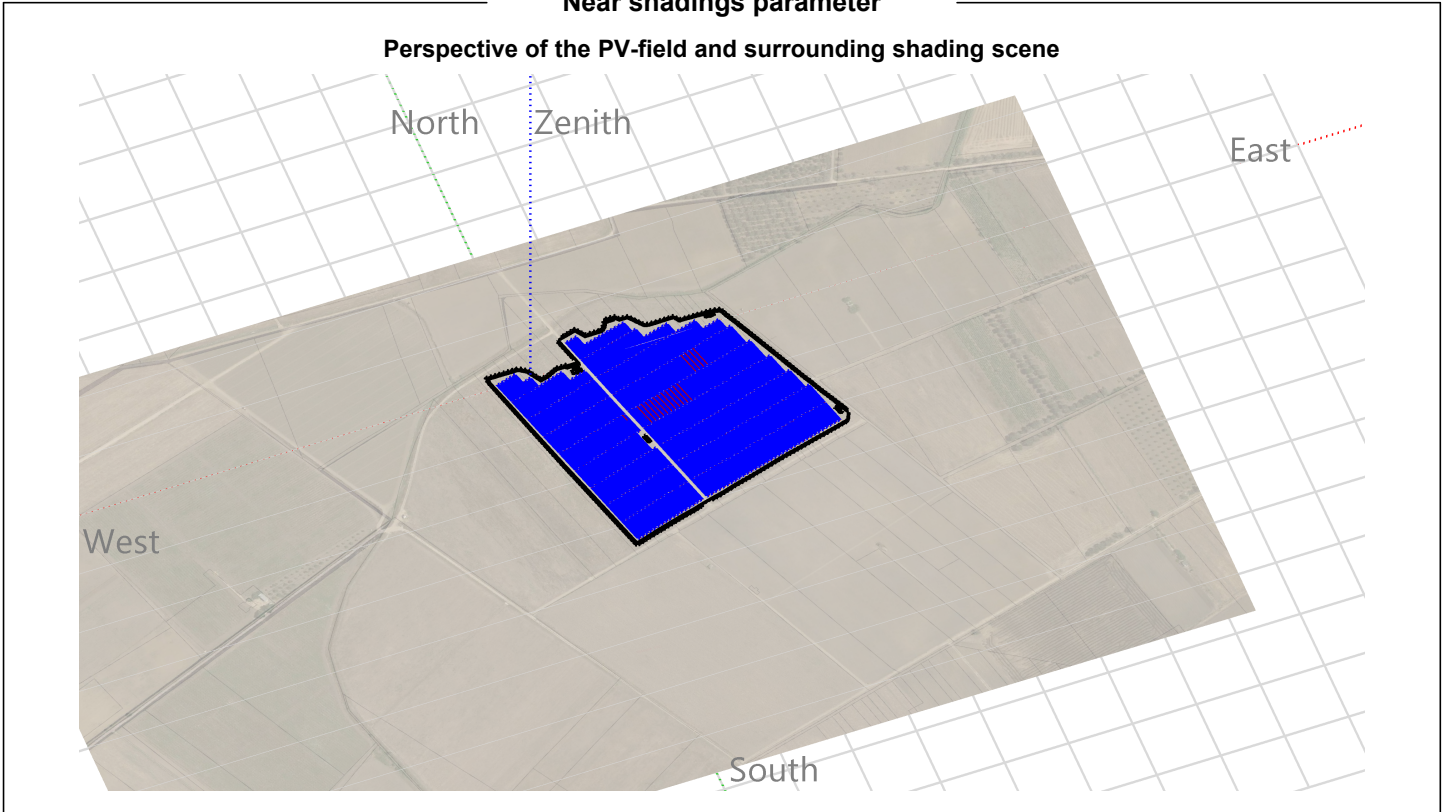
Grid voltage 20 kV

Operating losses at STC

Nominal power at STC 5551 kVA
Iron loss (night disconnect) 5.55 kW
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 0.86 mΩ
Loss Fraction 1.00 % at STC

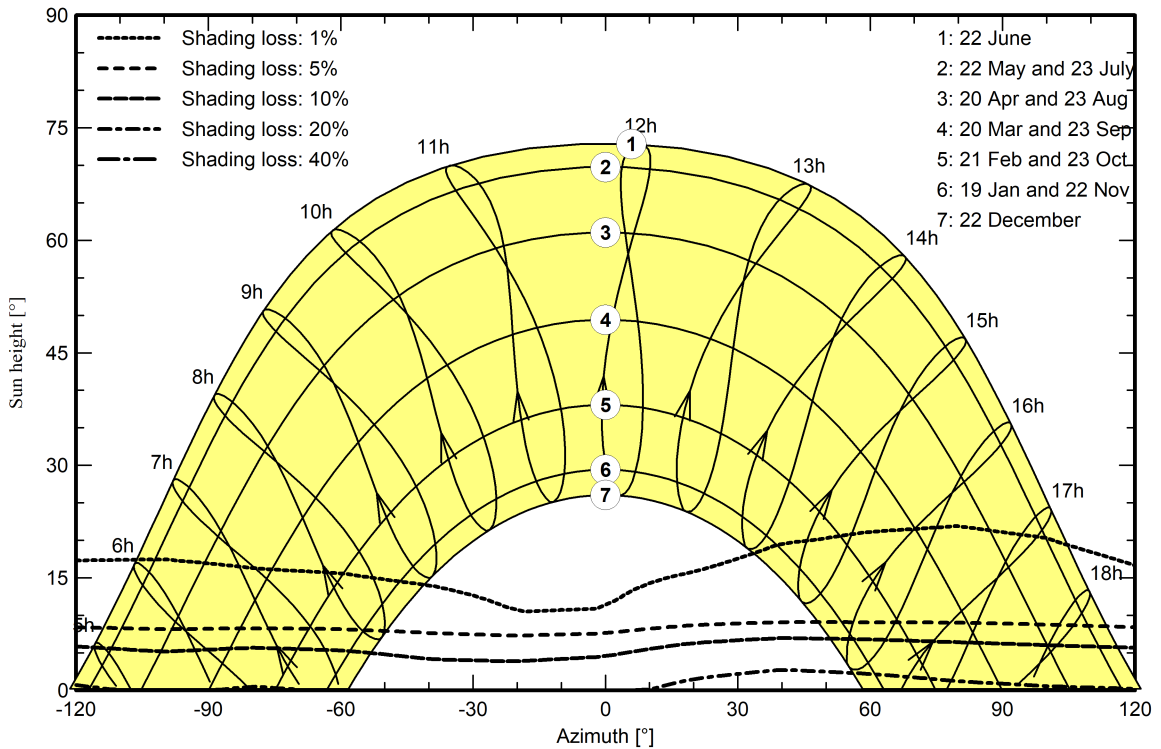


Near shadings parameter



Iso-shadings diagram

Orientation #1





Main results

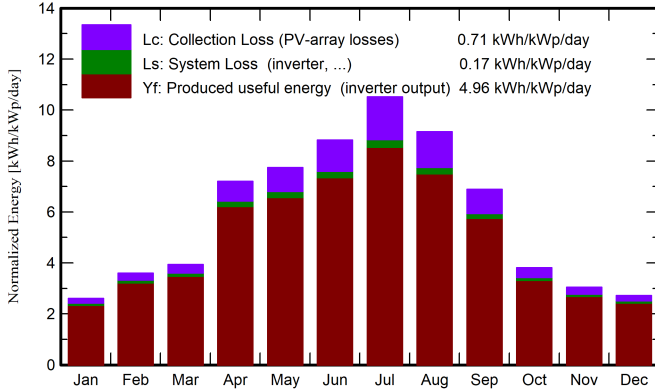
System Production

Produced Energy 10 GWh/year

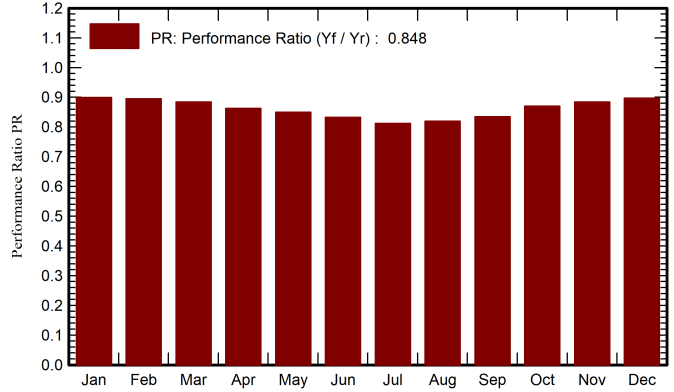
Specific production
 Performance Ratio PR

1811 kWh/kWp/year
 84.83 %

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 GWh	E_Grid GWh	PR ratio
January	62.5	30.63	7.42	80.8	77.0	0.424	0.409	0.900
February	78.7	37.62	9.70	100.8	96.5	0.527	0.509	0.895
March	100.4	52.49	11.17	121.9	116.9	0.630	0.608	0.885
April	170.3	63.27	14.44	216.2	207.7	1.088	1.051	0.863
May	189.9	69.64	17.83	240.0	230.6	1.191	1.150	0.850
June	211.1	70.12	23.27	264.7	254.6	1.286	1.243	0.833
July	251.9	59.64	27.12	326.2	313.8	1.545	1.493	0.812
August	216.4	59.52	25.72	283.8	272.7	1.356	1.311	0.819
September	157.0	52.93	23.45	206.6	198.2	1.006	0.973	0.835
October	92.8	44.73	15.75	118.3	113.2	0.601	0.580	0.870
November	69.3	29.48	13.08	91.3	87.1	0.471	0.455	0.884
December	62.4	26.76	9.18	84.1	80.2	0.439	0.425	0.897
Year	1662.7	596.82	16.54	2134.7	2048.4	10.565	10.207	0.848

Legends

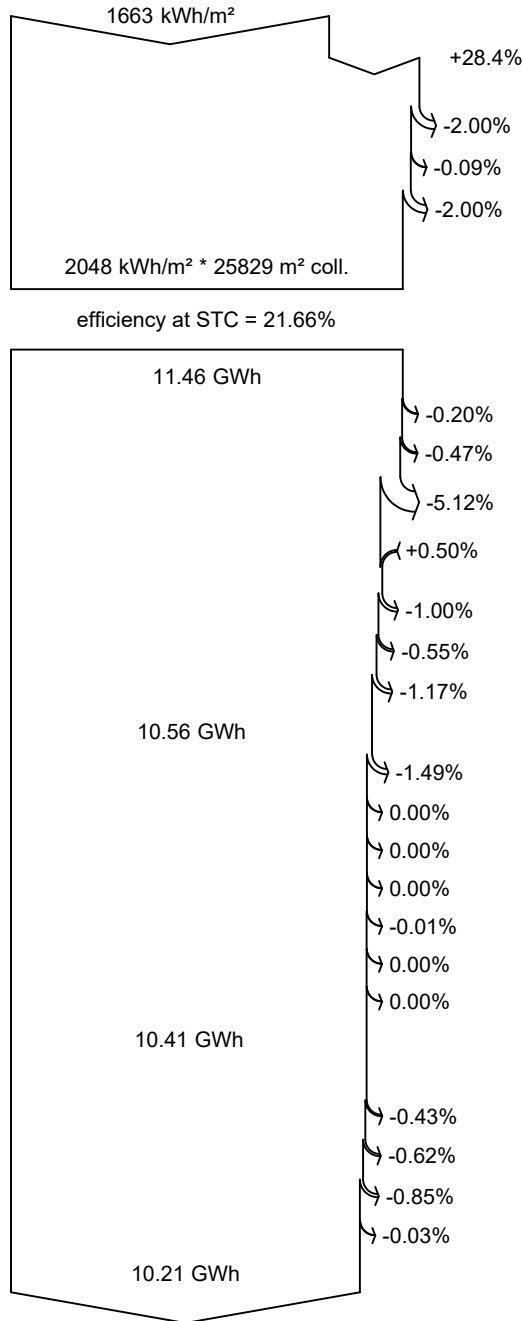
- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse irradiation
- T_Amb Ambient Temperature
- GlobInc Global incident in coll. plane
- GlobEff Effective Global, corr. for IAM and shadings
- EArray Effective energy at the output of the array
- E_Grid Energy injected into grid
- PR Performance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



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Loss diagram

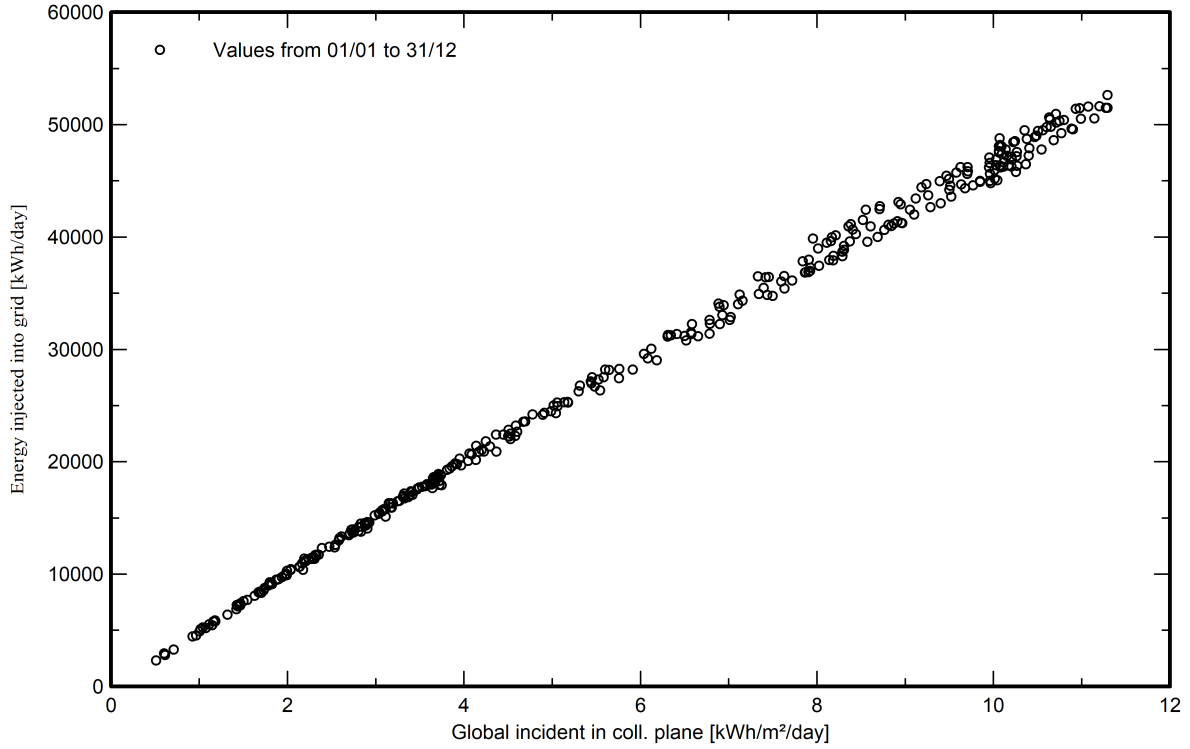


- Global horizontal irradiation**
- Global incident in coll. plane**
- Near Shadings: irradiance loss
- IAM factor on global
- Soiling loss factor
- Effective irradiation on collectors**
- PV conversion
- Array nominal energy (at STC effic.)**
- Module Degradation Loss (for year #1)
- PV loss due to irradiance level
- PV loss due to temperature
- Module quality loss
- LID - Light induced degradation
- Mismatch loss, modules and strings
- 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**
- Auxiliaries (fans, other)
- AC ohmic loss
- Medium voltage transfo loss
- MV line ohmic loss
- Energy injected into grid**

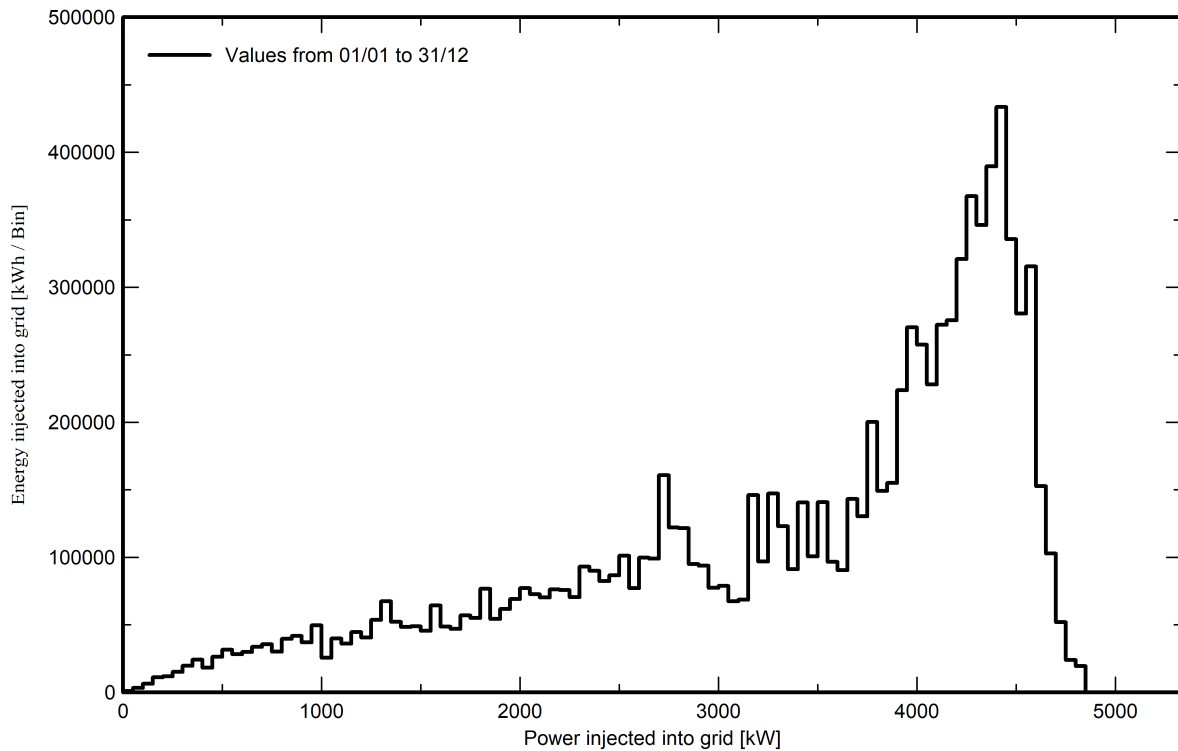


Special graphs

Daily Input/Output diagram



System Output Power Distribution





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Aging Tool

Aging Parameters

Time span of simulation 20 years

Module average degradation

Loss factor 0.4 %/year

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year

Vmp RMS dispersion 0.4 %/year

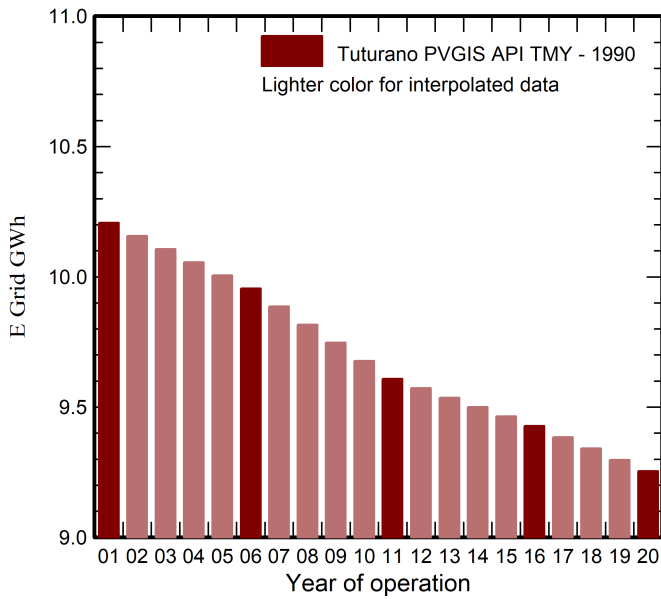
Meteo used in the simulation

#1 Tutturano PVGIS API TMY

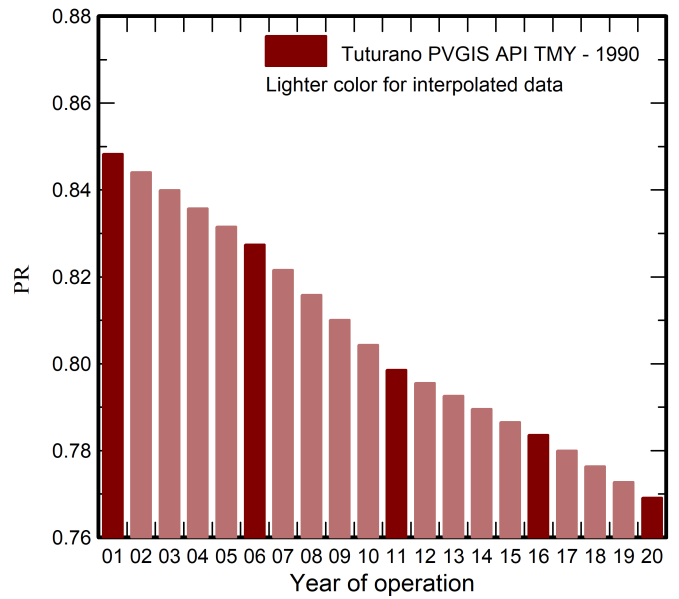
Years 1990 (reference year)

Years simulated 1,6,11,16,20

Energy injected into grid



Performance Ratio





Aging Tool

Tuturano PVGIS API TMY

Year	E Grid GWh	PR	PR loss %
1	10.21	0.848	0%
2	10.16	0.844	-0.5%
3	10.11	0.84	-1%
4	10.06	0.836	-1.5%
5	10.01	0.832	-2%
6	9.955	0.827	-2.5%
7	9.886	0.822	-3.1%
8	9.817	0.816	-3.8%
9	9.747	0.81	-4.5%
10	9.678	0.804	-5.2%
11	9.608	0.799	-5.9%
12	9.572	0.796	-6.2%
13	9.536	0.793	-6.6%
14	9.500	0.79	-6.9%
15	9.464	0.787	-7.3%
16	9.428	0.784	-7.6%
17	9.385	0.78	-8.1%
18	9.341	0.776	-8.5%
19	9.298	0.773	-8.9%
20	9.254	0.769	-9.3%



Predef. graphs

Normalized Production and Loss Factors

