Regione
Emilia Romagna

Provincia
Parma

Comune
Soragna

PARCO AGRIVOLTAICO E RELATIVE OPERE DI CONNESSIONE DI POTENZA 9.051 MW - COMUNE DI SORAGNA (PR)

Società proponente:

TRIUM POWER SRL

P.IVA: 02187200387
PEC: cert@pec.triumpower.it

Scala

na

Formato

A4

Titolo elaborato:

Report di producibilità

PROGETTISTI INCARICATI

Ing. Giuseppe Romani

CODICE ELABORATO

LIVELLO PROG.	COD. RINTR.	N. EL	REV.
R	471382153	01	00

Rev.	Data	Descrizione	Redige	Verifica	Approva
00	12/25	Prima emissione	R.S.	G.C.	G.R.
01					
02					
03					
04					
05					
06					

GESTORE RETE ELETTRICA

e-distribuzione

1 Dati Generali di progetto

Ubicazione

Regione	Emilia Romagna
Provincia	Parma
Comune	Soragna
Riferimenti catastali	Fg. 46 part. 7 (parz.) - 8 (parz.) - 16 - 29
Superficie totale di impianto	12,5 ha

Società proponente

Ragione sociale	TRIUM POWER S.r.l.
P.iva e c.f.	02187200387
Indirizzo sede legale	Vicolo chiuso del Teatro 2/a - 44121 Ferrara (FE) -
PEC	cert@pec.triumpower.it

Grandezze principali di impianto

Potenza DC – Lotto 1	4.515 kW
Potenza AC di connessione – Lotto 1	4.000 kW (Potenza nominale)
Potenza DC – Lotto 2	4.536 kW
Potenza AC di connessione – Lotto 2	4.000 kW (Potenza nominale)

Componenti principali di impianto

Cabina di consegna	n. 1 dimensioni DG2093 ed. 1, dettagli costruttivi DG2061 ed. 9
Cabina utente - Lotto 1	n. 1 cabina box P67
Cabina utente - Lotto 2	n. 1 cabina box P67
Cabina di trasformazione – Lotto 1	n.2 skid in resina da 2.000 kVA
Cabina di trasformazione – Lotto 2	n.2 skid in resina da 2.000 kVA
Inverter di stringa – Lotto 1	n.14 inverter da 330 kWac
Inverter di stringa – Lotto 2	n.14 inverter da 330 kWac
Moduli – Lotto 1	n.6.020 moduli 750 Wp
Moduli – Lotto 2	n.6.048 moduli 750 Wp
Tracker	Mono-assiali 1P con azimut 0°

Opere di connessione alla rete

Tensione di connessione	15 kV – Media tensione
Gestore di rete	E-Distribuzione Spa
Cod. pratica	471382153
POD	IT001E125204201 - IT001E125204198

PVsyst - Simulation report

Grid-Connected System

Project: Soragna

Variant: Agrivoltaico
Tracking system with backtracking
System power: 9051 kWp
Toccalmatto - Italia

Author

PVsyst V7.2.8
VC0, Simulation date:
11/12/25 19:36
with v7.2.8

Project summary

Geographical Site
Toccalmatto
Italia

Situation
Latitude	44.89 °N
Longitude	10.11 °E
Altitude	56 m
Time zone	UTC+1

Project settings
Albedo	0.20

Meteo data
Toccalmatto
Meteonorm 8.0 (1991-2014), Sat=56% - Sintetico

System summary

Grid-Connected System   **Tracking system with backtracking**

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

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array
Nb. of modules	12572 units
Pnom total	9051 kWp

Inverters
Nb. of units	28 units
Pnom total	8400 kWac
Grid power limit	8000 kWac
Grid lim. Pnom ratio	1.131

Results summary

Produced Energy	13919 MWh/year	Specific production	1538 kWh/kWp/year	Perf. Ratio PR	91.32 %

Table of contents

PVsyst V7.2.8
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11/12/25 19:36
with v7.2.8

General parameters

Grid-Connected System

Tracking system with backtracking

PV Field Orientation

Orientation		Backtracking strategy		Models used	
Tracking plane, horizontal N-S axis		Nb. of trackers	481 units	Transposition	Perez
Axis azimuth	0 °	**Sizes**		Diffuse	Perez, Meteonorm
		Tracker Spacing	6.00 m	Circumsolar	separate
		Collector width	2.38 m		
		Ground Cov. Ratio (GCR)	39.7 %		
		Phi min / max.	-/+ 60.0 °		
		Backtracking limit angle			
		Phi limits	+/- 66.4 °		

Horizon	Near Shadings	User's needs
Free Horizon	Linear shadings	Unlimited load (grid)

Bifacial system

Model	2D Calculation		
	unlimited trackers		

Bifacial model geometry		Bifacial model definitions	
Tracker Spacing	6.00 m	Ground albedo	0.20
Tracker width	2.38 m	Bifaciality factor	80 %
GCR	39.7 %	Rear shading factor	5.0 %
Axis height above ground	3.13 m	Rear mismatch loss	10.0 %
		Shed transparent fraction	0.0 %

Grid power limitation

Active Power	8000 kWac
Pnom ratio	1.131

PV Array Characteristics

PV module

Manufacturer	Trina Solar
Model	TSM-720NEG21C.20
(Custom parameters definition)	
Unit Nom. Power	720 Wp
Number of PV modules	12572 units
Nominal (STC)	9052 kWp
Modules	449 Strings x 28 In series

At operating cond. (50°C)

Pmpp	8410 kWp
U mpp	1060 V
I mpp	7932 A

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-330KTL-H1-Preliminary V0.1
(Custom parameters definition)	
Unit Nom. Power	300 kWac
Number of inverters	28 units
Total power	8400 kWac
Operating voltage	500-1500 V
Max. power (=>30°C)	330 kWac
Pnom ratio (DC:AC)	1.08

Total PV power

Nominal (STC)	9052 kWp
Total	12572 modules
Module area	39053 m²

Total inverter power

Total power	8400 kWac
Nb. of inverters	28 units
Pnom ratio	1.08

Project: Soragna

Variant: Agrivoltaico

Array losses

Array Soiling Losses		**Thermal Loss factor**		**DC wiring losses**	
Loss Fraction	1.0 %	Module temperature according to irradiance		Global array res.	1.7 mΩ
		Uc (const)	29.0 W/m²K	Loss Fraction	1.2 % at STC
		Uv (wind)	0.0 W/m²K/m/s		

LID - Light Induced Degradation		**Module Quality Loss**		**Module mismatch losses**	
Loss Fraction	2.0 %	Loss Fraction	-0.3 %	Loss Fraction	2.0 % at MPP

Strings Mismatch loss

Loss Fraction   0.1 %

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.999	0.994	0.969	0.928	0.829	0.588	0.000

System losses

Auxiliaries loss

Proportionnal to Power   5.0 W/kW

0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage	800 Vac tri
Loss Fraction	1.11 % at STC

Inverter: SUN2000-330KTL-H1-Preliminary V0.1

Wire section (28 Inv.)	Alu 28 x 3 x 240 mm²
Average wires length	170 m

MV line up to Injection

MV Voltage	15 kV
Average each inverter	
Wires	Alu 3 x 95 mm²
Length	400 m
Loss Fraction	0.13 % at STC

AC losses in transformers

MV transfo

Grid voltage	15 kV

Operating losses at STC

Nominal power at STC	8894 kVA
Iron loss (24/24 Connexion)	2.22 kW/Inv.
Loss Fraction	0.10 % at STC
Coils equivalent resistance	3 x 2.88 mΩ/inv.
Loss Fraction	1.00 % at STC

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Near shadings parameter
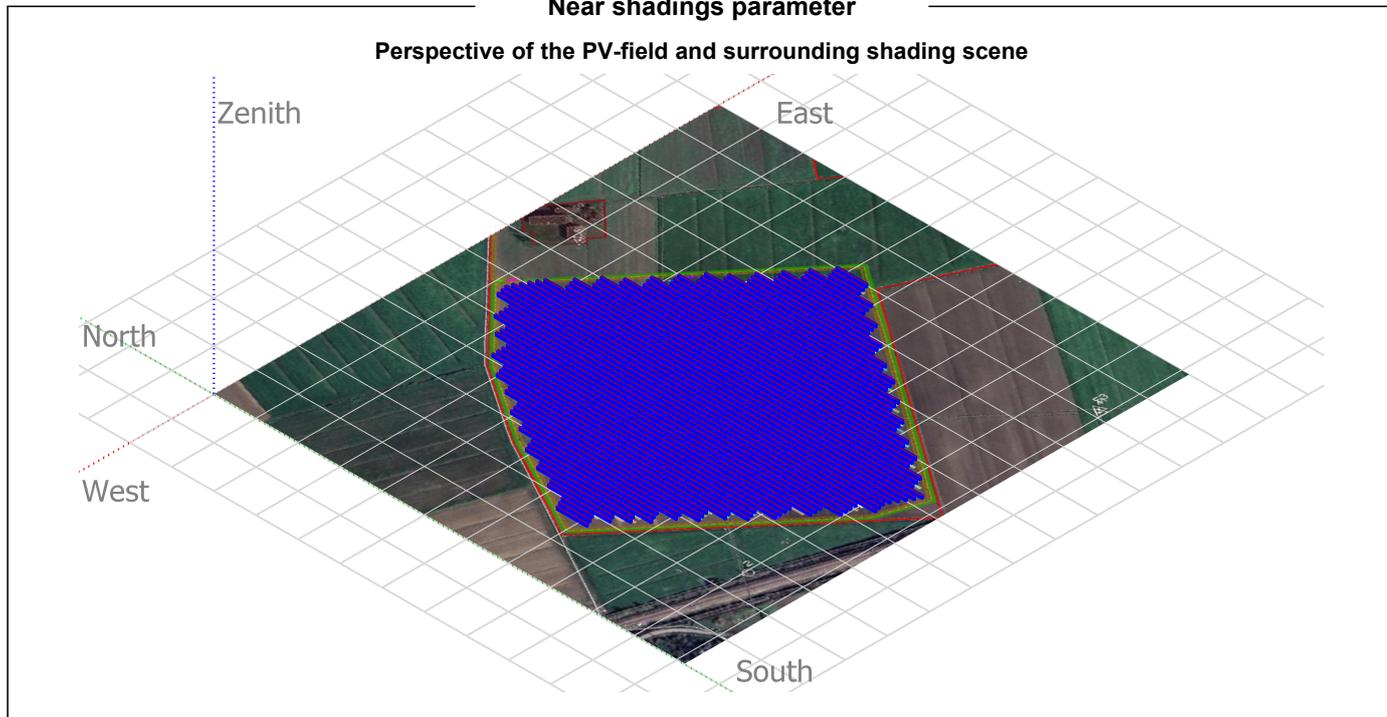
Perspective of the PV-field and surrounding shading scene

Iso-shadings diagram

Soragna - Legal Time

Attenuation for diffuse: 0.000
and albedo: 0.000

Shading loss legend	
--------	Shading loss: 1%
- - - -	Shading loss: 5%
———	Shading loss: 10%
—·—·—	Shading loss: 20%
—··—··—	Shading loss: 40%

1: 22 June
2: 22 May and 23 July
3: 20 Apr and 23 Aug
4: 20 Mar and 23 Sep
5: 21 Feb and 23 Oct
6: 19 Jan and 22 Nov
7: 22 December

Project: Soragna

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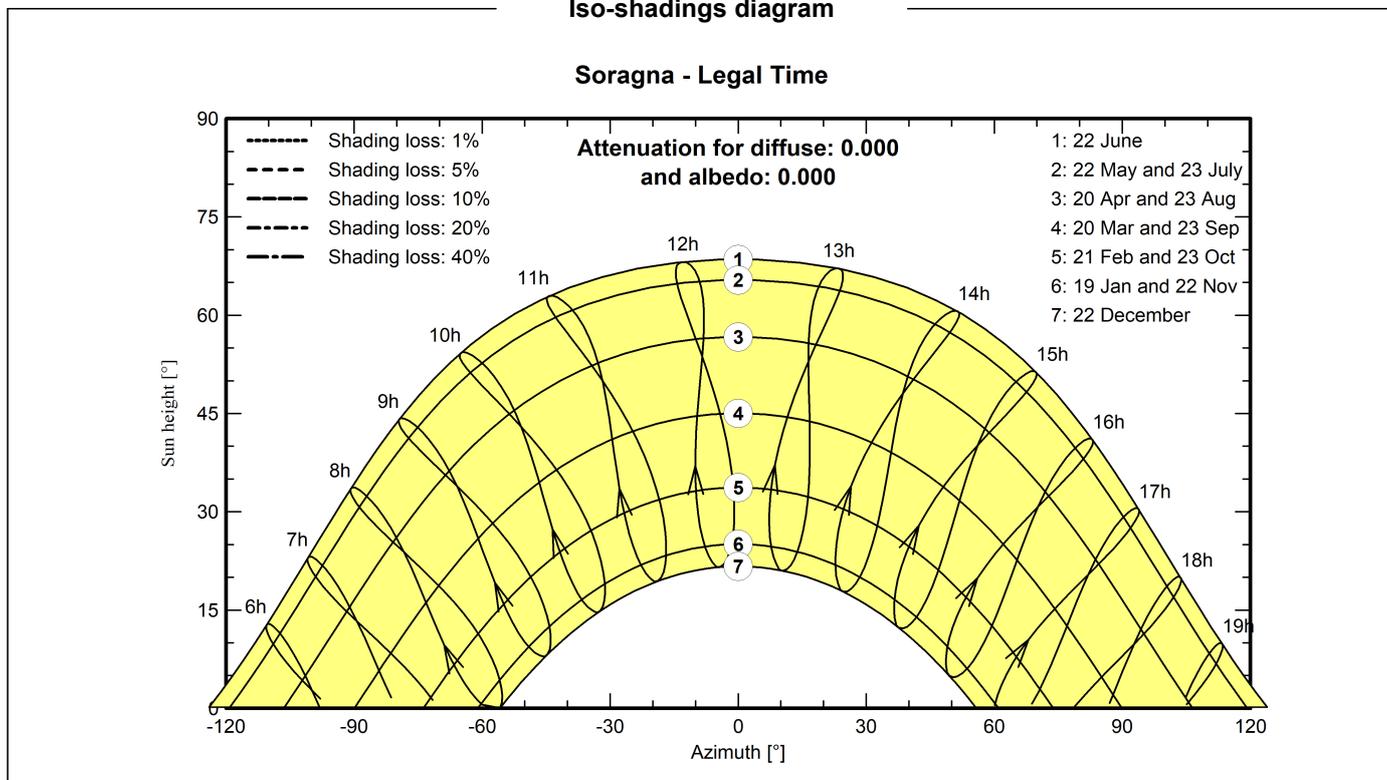
Main results

System Production

Produced Energy	13919 MWh/year	Specific production	1538 kWh/kWp/year
		Performance Ratio PR	91.32 %

Normalized productions (per installed kWp)

Lc: Collection Loss (PV-array losses)   0.24 kWh/kWp/day
Ls: System Loss (inverter, ...)   0.16 kWh/kWp/day
Yf: Produced useful energy (inverter output) 4.21 kWh/kWp/day

Performance Ratio PR

PR: Performance Ratio (Yf / Yr) : 0.913
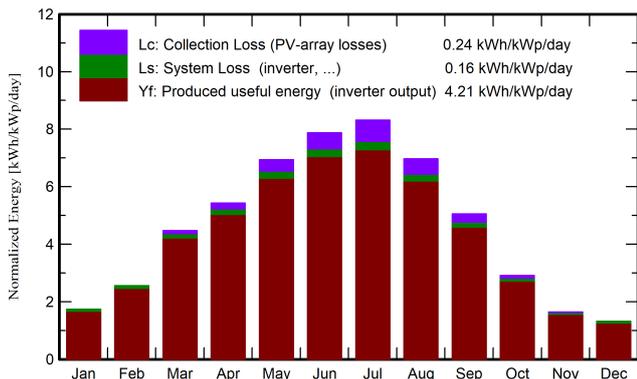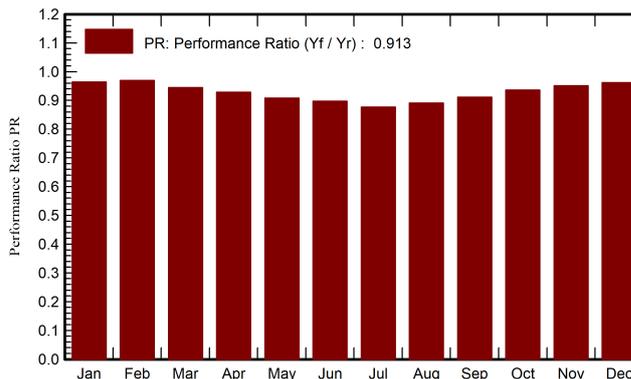
Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	MWh	MWh	ratio
January	40.3	18.48	2.89	53.7	51.5	488	469	0.964
February	57.5	36.20	4.77	71.3	68.2	649	626	0.970
March	108.5	56.02	9.75	138.8	133.8	1229	1187	0.945
April	131.2	71.37	13.89	163.0	157.2	1422	1371	0.929
May	170.9	85.00	19.04	215.2	208.2	1837	1769	0.908
June	187.6	93.90	23.67	236.1	228.5	1991	1917	0.897
July	197.1	74.14	26.00	257.7	250.2	2128	2045	0.877
August	167.6	75.46	25.44	216.1	209.4	1809	1742	0.890
September	118.0	55.85	20.01	151.5	146.4	1297	1250	0.911
October	72.6	43.57	14.73	90.2	86.5	793	765	0.936
November	40.1	26.53	8.66	49.3	47.0	442	425	0.952
December	32.9	20.90	3.82	40.8	38.7	371	355	0.961
Year	1324.4	657.41	14.44	1683.8	1625.6	14455	13919	0.913

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		

Project: Soragna

Variant: Agrivoltaico

Loss diagram

1324 kWh/m²	**Global horizontal irradiation**
+27.1%	**Global incident in coll. plane**
-2.43%	Near Shadings: irradiance loss
-0.46%	IAM factor on global
-1.00%	Soiling loss factor
+0.42%	Ground reflection on front side

Bifacial

Global incident on ground
666 kWh/m² on 98288 m²

-80.00% (0.20 Gnd. albedo)	Ground reflection loss
-66.79%	View Factor for rear side
+25.71%	Sky diffuse on the rear side
+0.00%	Beam effective on the rear side
-5.00%	Shadings loss on rear side

8.18% Global Irradiance on rear side (133 kWh/m²)

1626 kWh/m² * 39053 m² coll. **Effective irradiation on collectors**

efficiency at STC = 23.21%   PV conversion, Bifaciality factor = 0.80

15698 MWh	**Array nominal energy (at STC effic.)**
+0.23%	PV loss due to irradiance level
-3.03%	PV loss due to temperature
+0.30%	Module quality loss
-2.00%	LID - Light induced degradation
-2.10%	Mismatch loss, modules and strings
-0.77%	Mismatch for back irradiance
-0.78%	Ohmic wiring loss
14456 MWh	**Array virtual energy at MPP**
-1.42%	Inverter Loss during operation (efficiency)
0.00%	Inverter Loss over nominal inv. power
0.00%	Inverter Loss due to max. input current
0.00%	Inverter Loss over nominal inv. voltage
0.00%	Inverter Loss due to power threshold
0.00%	Inverter Loss due to voltage threshold
0.00%	Night consumption
14250 MWh	**Available Energy at Inverter Output**
-0.50%	Auxiliaries (fans, other)
-0.63%	AC ohmic loss
-1.13%	Medium voltage transfo loss
-0.08%	MV line ohmic loss
13919 MWh	**Energy injected into grid**

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Special graphs

Diagramma giornaliero entrata/uscita

Values from 01/01 to 31/12

Y-axis: Energy injected into grid [kWh/day]
X-axis: Global incident in coll. plane [kWh/m²/day]
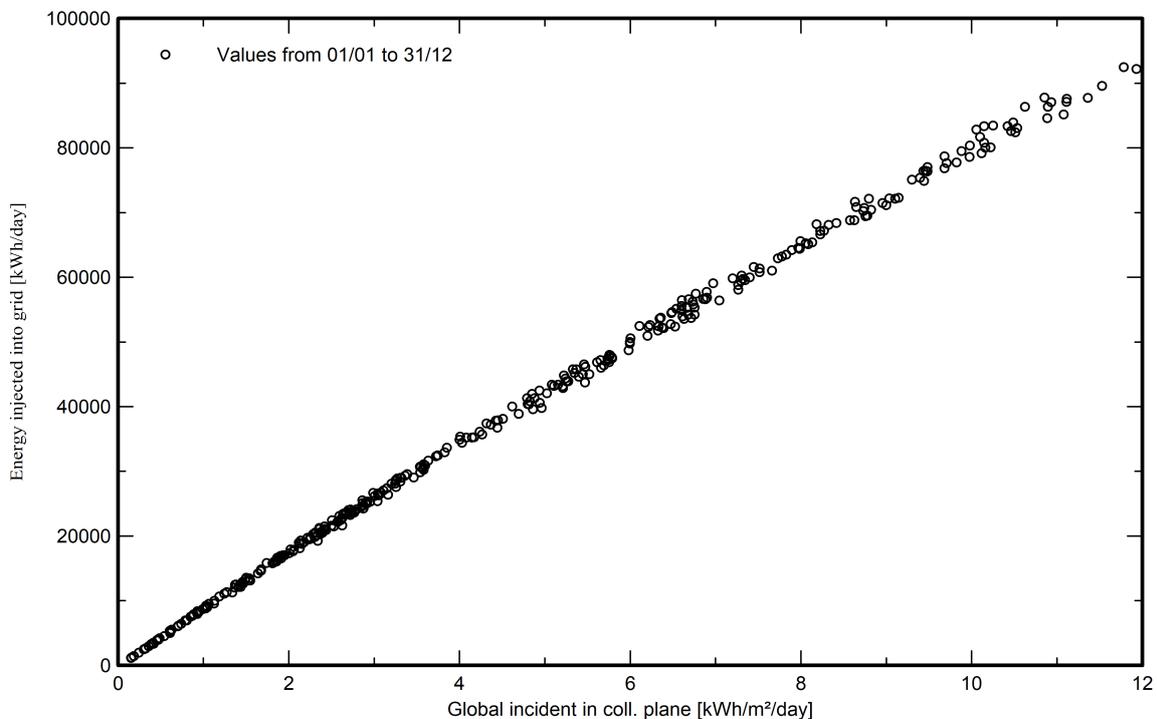
Distribuzione potenza in uscita sistema

Values from 01/01 to 31/12

Y-axis: Energy injected into grid [kWh / Bin]
X-axis: Power injected into grid [kW]