

## SIMULAZIONE PVSYST

### IMPIANTO DI PRODUZIONE DA FONTE SOLARE "TERRE DEL RENO" DA INSTALLARE NEL COMUNE DI TERRE DEL RENO (FE)

00	16/07/2025	Prima emissione	DF	RM	RC
<b>REV</b>	<b>DATA</b>	<b>DESCRIZIONE</b>	<b>BY</b>	<b>CHK</b>	<b>APP</b>

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# PVsyst - Simulation report

## Grid-Connected System

Project: Terre del Reno

Variant: Sottocampo 1

Tracking system with backtracking

System power: 8819 kWp

Mirabello - Italy

**Author**

GRID SHAPE SRL (Italy)

**PVsyst V8.0.13**

VCO, Simulation date:  
23/06/25 16:51  
with V8.0.13

**Project summary****Geographical Site**

**Mirabello**  
Italy

**Situation**

Latitude 44.83 °(N)  
Longitude 11.44 °(E)  
Altitude 16 m  
Time zone UTC+1

**Project settings**

Albedo 0.20

**Weather data**

Mirabello  
PVGIS api TMY

**System summary****Grid-Connected System****Orientation #1****Tracking plane, horizontal N-S axis**

Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

**Tracking algorithm**

Astronomic calculation  
Backtracking activated

**System information****PV Array**

Nb. of modules 13888 units  
Pnom total 8819 kWp

**Tracking system with backtracking****Near Shadings**

Linear shadings : Fast (table)

**User's needs**

Unlimited load (grid)

**Inverters**

Nb. of units 25 units  
Total power 7500 kWac  
Pnom ratio 1.18

**Results summary**

Produced Energy	16527 MWh/year	Specific production	1874 kWh/kWp/year	Perf. Ratio PR	91.74 %
				Bifacial perf. ratio	86.92 %

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## General parameters

## Grid-Connected System

## Orientation #1

## Tracking plane, horizontal N-S axis

Axis azimuth	0 °
Phi min / max.	-/+ 60 °
Diffuse shading	all trackers

## Tracking algorithm

Astronomic calculation  
Backtracking activated

## Tracking system with backtracking

## Field properties

Nb. of trackers	500 units
Tracking plane, horizontal N-S axis	

## Sizes

Tracker Spacing	5.50 m
Sensitive width	2.38 m
Average GCR	43.3 %

## Backtracking limit angle

Phi limits	+/- 64.4 °
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## Backtracking parameters

Backtracking pitch	5.50 m
Backtracking width	2.38 m
Left inactive band	0.00 m
Right inactive band	0.00 m
GCR Backtracking	43.3 %
Parameters choice:	Automatic

## Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

## Horizon

Free Horizon

## Near Shadings

Linear shadings : Fast (table)

## User's needs

Unlimited load (grid)

## Bifacial system definition

## Orientation #1

## Bifacial system

Model Unlimited Trackers 2D model

## Bifacial model geometry

Tracker Spacing	5.50 m
Tracker width	2.38 m
GCR	43.3 %
Axis height above ground	3.20 m
Nb. of sheds	99 units

## Bifacial model definitions

Ground albedo	0.20
Bifaciality factor	80 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

## PV Array Characteristics

## PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS6.2-66TB635 1500V
(Custom parameters definition)	
CS6.2-66TB635_CSI_DRA_1500V_V7_40_A0.PAN	
Unit Nom. Power	635 Wp
Number of PV modules	13888 units
Nominal (STC)	8819 kWp
Modules	496 string x 28 In series

## At operating cond. (50°C)

Pmpp	8216 kWp
U mpp	1060 V
I mpp	7751 A

## Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-330KTL-H1
(Original PVsyst database)	
Unit Nom. Power	300 kWac
Number of inverters	25 units
Total power	7500 kWac
Operating voltage	550-1500 V
Max. power (=>30°C)	330 kWac
Pnom ratio (DC:AC)	1.18
Power sharing within this inverter	



**PVsyst V8.0.13**

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GRID SHAPE SRL (Italy)

**PV Array Characteristics**

**Total PV power**

Nominal (STC) 8819 kWp  
Total 13888 modules  
Module area 37514 m<sup>2</sup>

**Total inverter power**

Total power 7500 kWac  
Max. power 8250 kWac  
Number of inverters 25 units  
Pnom ratio 1.18

**Array losses**

**Array Soiling Losses**

Loss Fraction 1.0 %

**Thermal Loss factor**

Module temperature according to irradiance  
Uc (const) 29.0 W/m<sup>2</sup>K  
Uv (wind) 0.0 W/m<sup>2</sup>K/m/s

**DC wiring losses**

Global array res. 2.2 m  
Loss Fraction 1.50 % at STC

**LID - Light Induced Degradation**

Loss Fraction 1.0 %

**Module Quality Loss**

Loss Fraction -0.40 %

**Module mismatch losses**

Loss Fraction 2.00 % at MPP

**Strings Mismatch loss**

Loss Fraction 0.10 %

**IAM loss factor**

Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

**AC wiring losses**

**Inv. output line up to injection point**

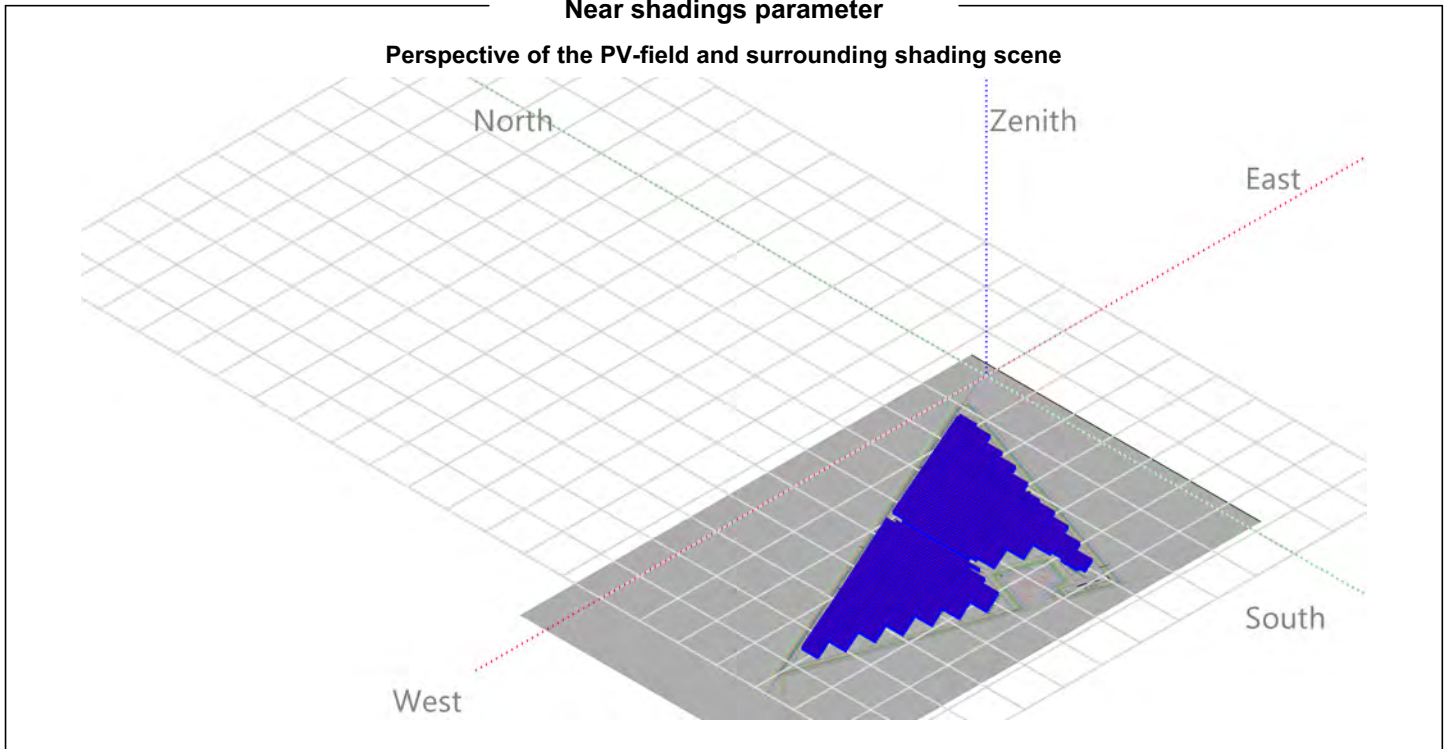
Inverter voltage 800 Vac tri  
Loss Fraction 1.50 % at STC

**Inverter: SUN2000-330KTL-H1**

Wire section (25 Inv.) Alu 25 x 3 x 300 mm<sup>2</sup>  
Average wires length 262 m

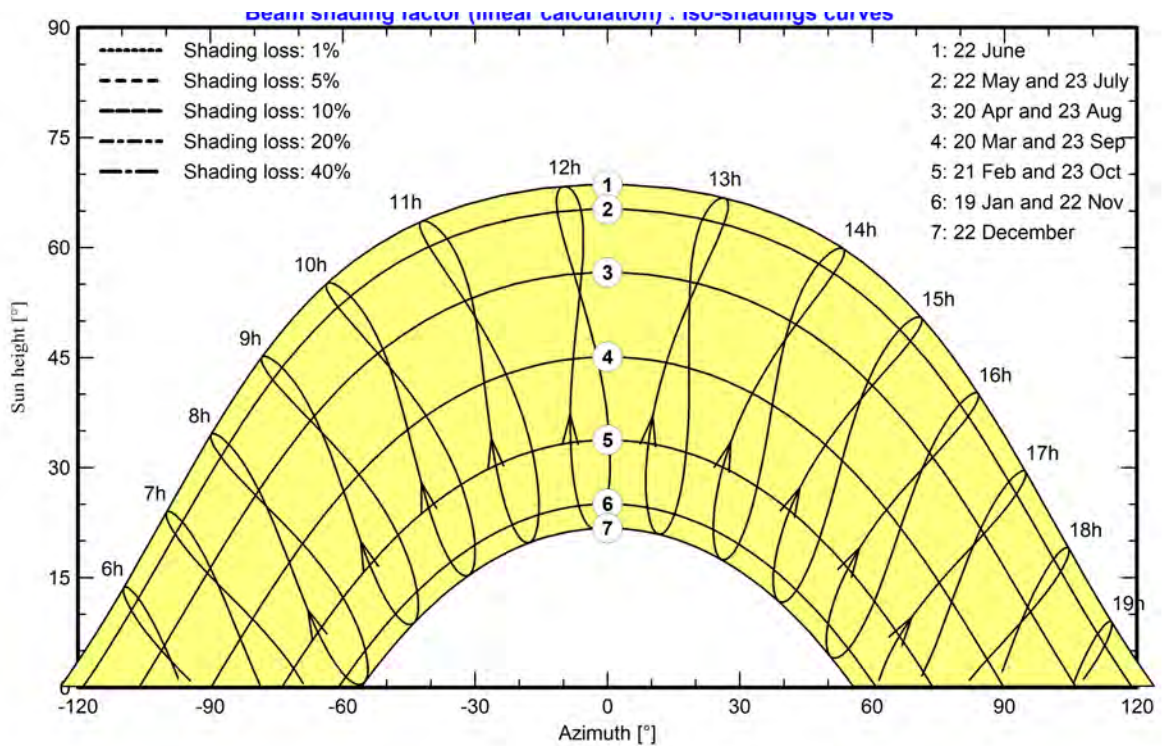


### Near shadings parameter



### Iso-shadings diagram

#### Orientation #1 -



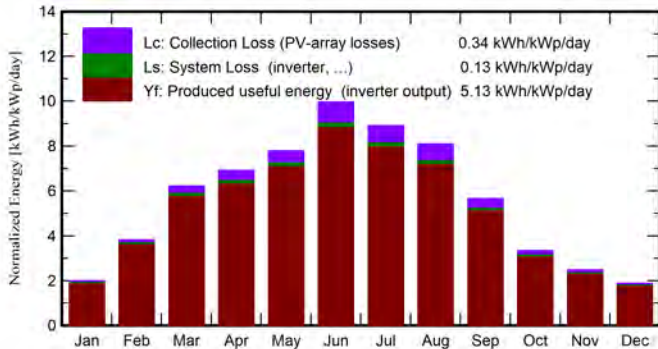


**Main results**

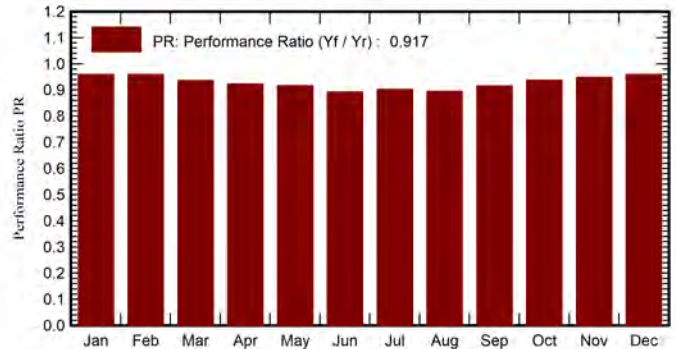
**System Production**

Produced Energy	16527 MWh/year	Specific production	1874 kWh/kWp/year
		Perf. Ratio PR	91.74 %
		Bifacial perf. ratio	86.92 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**Balances and main results**

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR	PRBifi
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	MWh	MWh	ratio	ratio
January	47.7	23.82	5.94	62.1	59.4	541	525	0.959	0.907
February	78.6	29.01	6.93	107.1	103.4	926	906	0.959	0.913
March	142.7	46.31	12.29	192.9	187.0	1628	1592	0.936	0.890
April	160.4	58.50	15.64	207.6	201.0	1729	1688	0.922	0.873
May	193.5	77.15	18.43	241.4	233.8	1999	1951	0.917	0.865
June	230.4	69.25	25.54	298.8	290.2	2407	2351	0.892	0.845
July	215.1	77.40	24.02	276.0	267.7	2246	2194	0.901	0.853
August	192.4	60.62	26.41	251.0	243.8	2027	1981	0.895	0.848
September	130.2	55.81	21.26	169.7	164.0	1401	1369	0.915	0.867
October	80.7	38.45	14.90	103.4	99.4	878	855	0.938	0.886
November	55.6	24.33	9.51	74.4	71.5	639	622	0.948	0.900
December	44.4	21.67	3.68	58.4	55.6	510	494	0.960	0.908
<b>Year</b>	<b>1571.8</b>	<b>582.33</b>	<b>15.42</b>	<b>2042.8</b>	<b>1976.8</b>	<b>16932</b>	<b>16527</b>	<b>0.917</b>	<b>0.869</b>

**Legends**

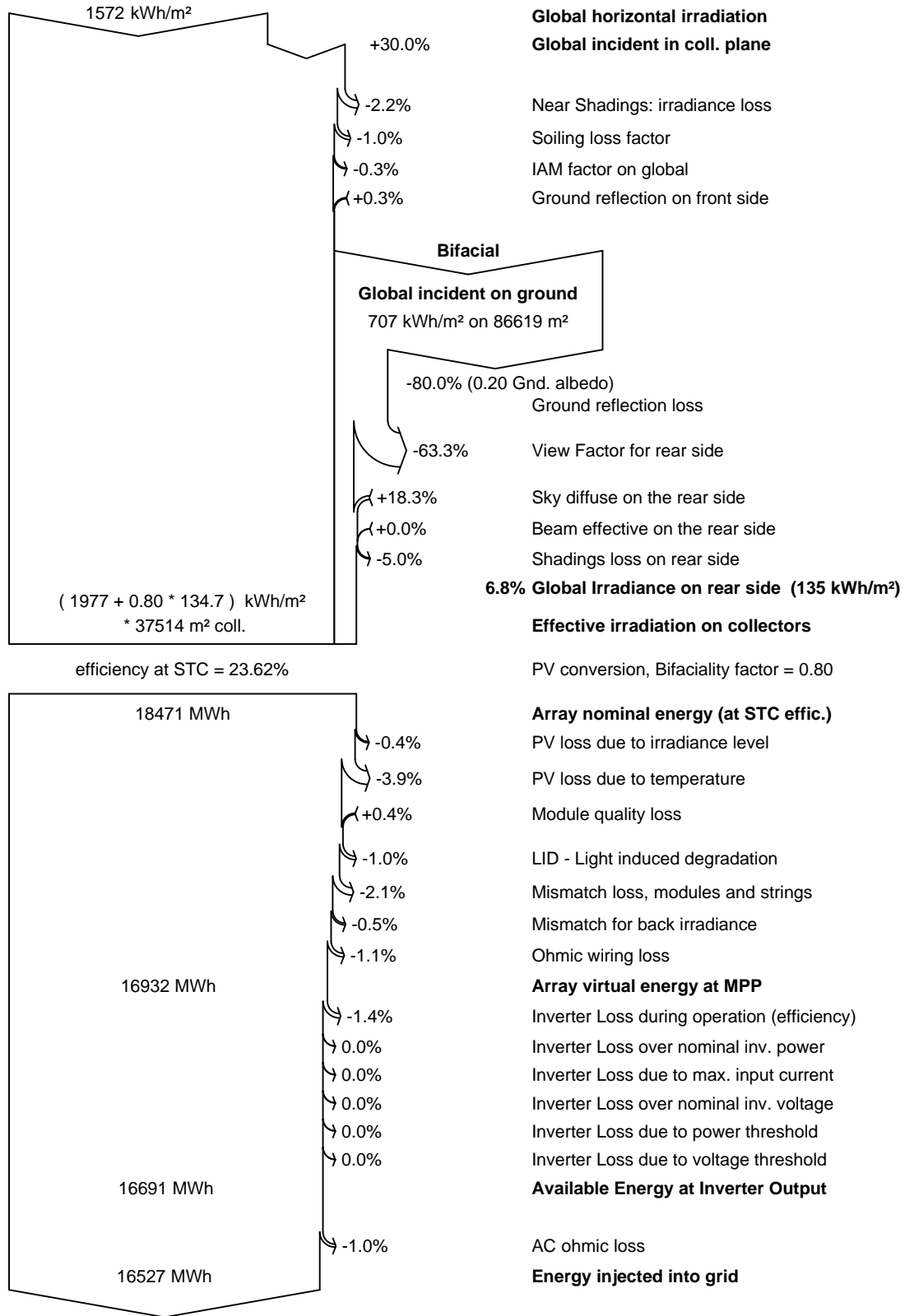
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	PRBifi	Bifacial Performance Ratio
GlobEff	Effective Global,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



PVsyst V8.0.13

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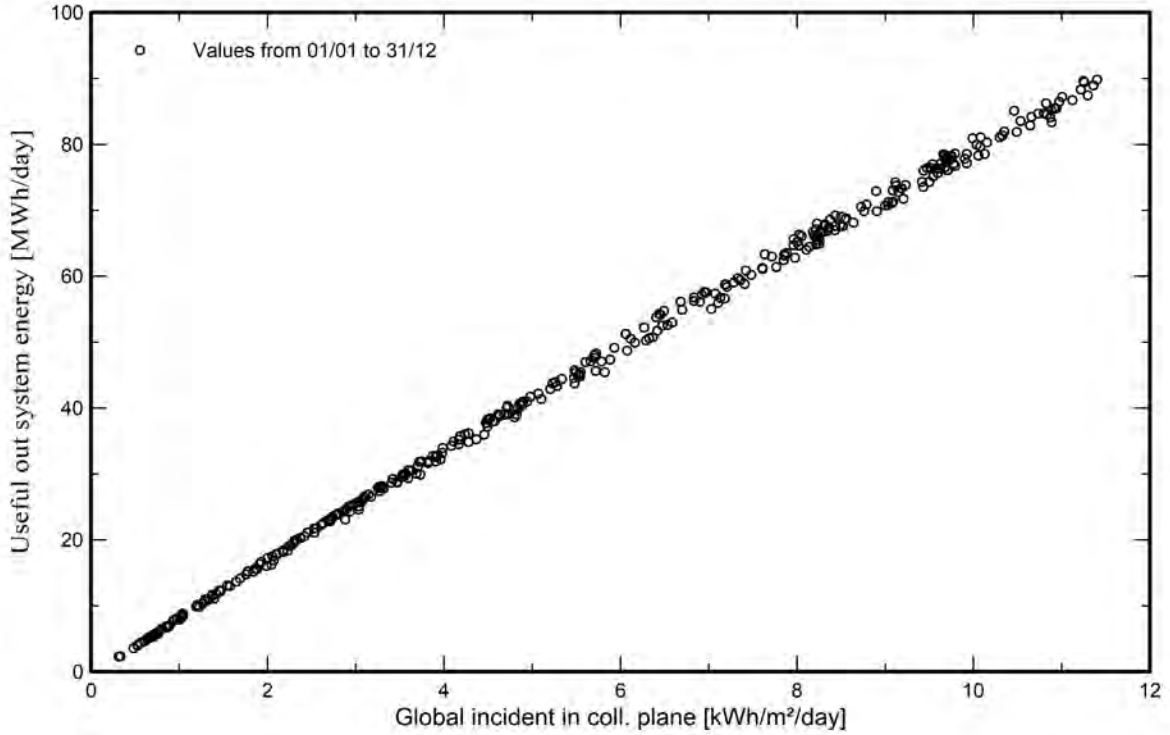
Loss diagram



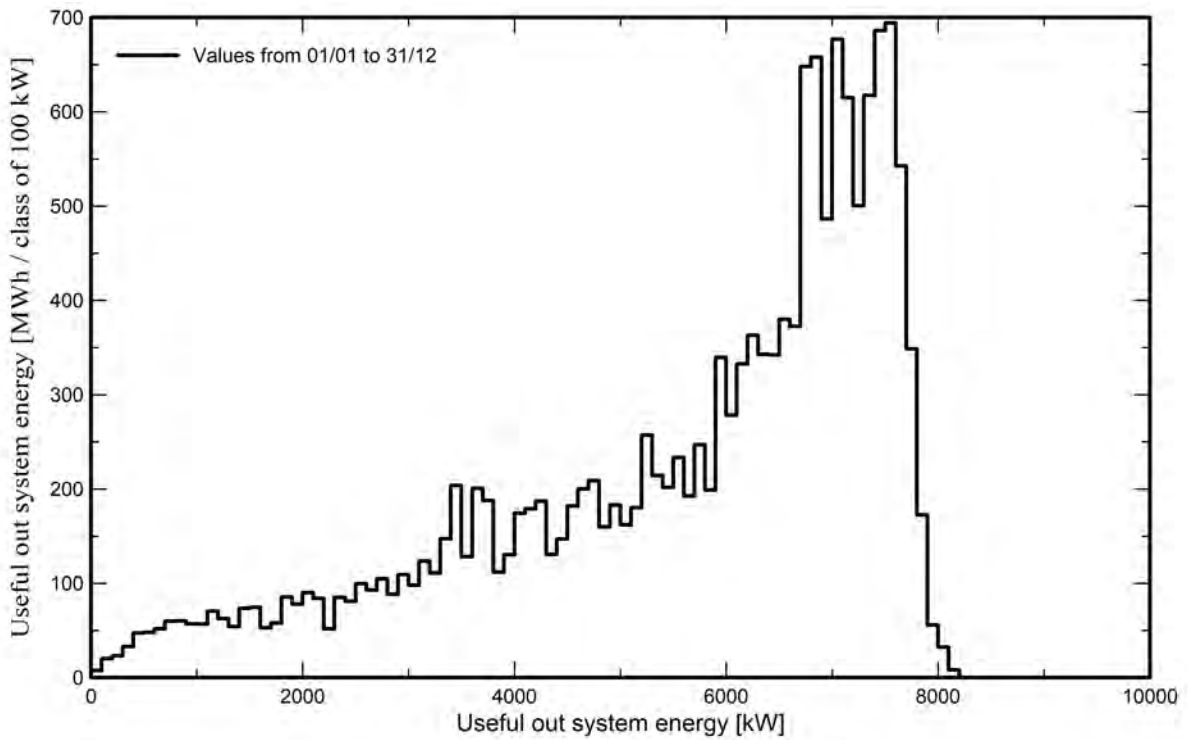


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

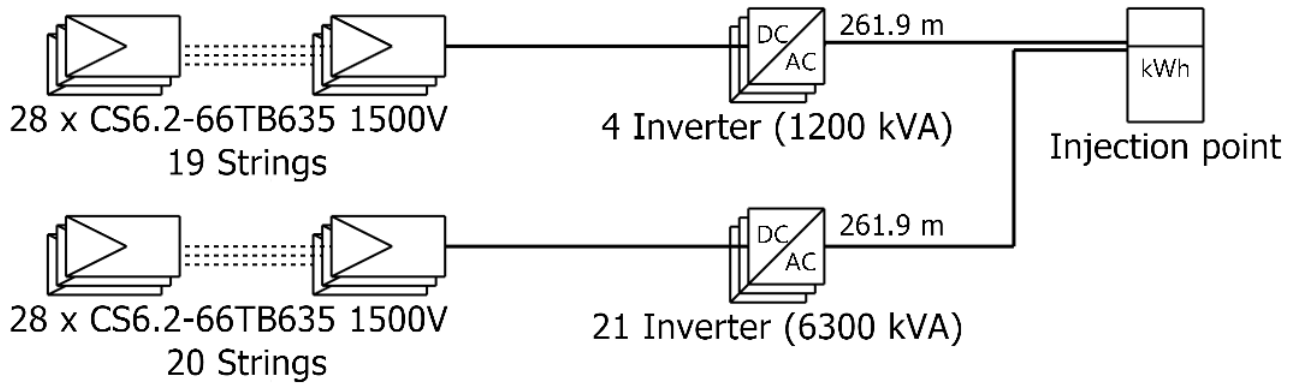




# Single-line diagram

**PVsyst V8.0.13**

VC0, Simulation date:  
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with V8.0.13



PV module	CS6.2-66TB635 1500V
Inverter	SUN2000-330KTL-H1
String	28 x CS6.2-66TB635 1500V

Terre del Reno

GRID SHAPE SRL (Italy)

VC0 : Sottocampo 1

14/07/25

# PVsyst - Simulation report

## Grid-Connected System

Project: Terre del Reno

Variant: Sottocampo 2

Tracking system with backtracking

System power: 14.28 MWp

Mirabello - Italy

**Author**

GRID SHAPE SRL (Italy)

**PVsyst V8.0.13**

VC2, Simulation date:  
23/06/25 16:55  
with V8.0.13

GRID SHAPE SRL (Italy)

**Project summary****Geographical Site**

**Mirabello**  
Italy

**Situation**

Latitude 44.83 °(N)  
Longitude 11.44 °(E)  
Altitude 16 m  
Time zone UTC+1

**Project settings**

Albedo 0.20

**Weather data**

Mirabello  
PVGIS api TMY

**System summary****Grid-Connected System****Orientation #1**

**Tracking plane, horizontal N-S axis**  
Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

**Tracking algorithm**

Astronomic calculation  
Backtracking activated

**System information****PV Array**

Nb. of modules 22484 units  
Pnom total 14.28 MWp

**Tracking system with backtracking****Near Shadings**

Linear shadings : Fast (table)

**User's needs**

Unlimited load (grid)

**Inverters**

Nb. of units 40 units  
Total power 12000 kWac  
Pnom ratio 1.19

**Results summary**

Produced Energy	26753 MWh/year	Specific production	1874 kWh/kWp/year	Perf. Ratio PR	91.73 %
				Bifacial perf. ratio	86.91 %

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## General parameters

## Grid-Connected System

## Orientation #1

## Tracking plane, horizontal N-S axis

Axis azimuth	0 °
Phi min / max.	-/+ 60 °
Diffuse shading	all trackers

## Tracking algorithm

Astronomic calculation  
Backtracking activated

## Tracking system with backtracking

## Field properties

Nb. of trackers	799 units
Tracking plane, horizontal N-S axis	

## Sizes

Tracker Spacing	5.50 m
Sensitive width	2.38 m
Average GCR	43.3 %

## Backtracking limit angle

Phi limits	+/- 64.4 °
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## Backtracking parameters

Backtracking pitch	5.50 m
Backtracking width	2.38 m
Left inactive band	0.00 m
Right inactive band	0.00 m
GCR Backtracking	43.3 %
Parameters choice:	Automatic

## Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

## Horizon

Free Horizon

## Near Shadings

Linear shadings : Fast (table)

## User's needs

Unlimited load (grid)

## Bifacial system definition

## Orientation #1

## Bifacial system

Model Unlimited Trackers 2D model

## Bifacial model geometry

Tracker Spacing	5.50 m
Tracker width	2.38 m
GCR	43.3 %
Axis height above ground	3.20 m
Nb. of sheds	156 units

## Bifacial model definitions

Ground albedo	0.20
Bifaciality factor	80 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

## PV Array Characteristics

## PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS6.2-66TB635 1500V
	(Custom parameters definition)
	CS6.2-66TB635_CSI_DRA_1500V_V7_40_A0.PAN
Unit Nom. Power	635 Wp
Number of PV modules	22484 units
Nominal (STC)	14.28 MWp
Modules	803 string x 28 In series

## At operating cond. (50°C)

Pmpp	13.30 MWp
U mpp	1060 V
I mpp	12548 A

## Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-330KTL-H1
	(Original PVsyst database)
Unit Nom. Power	300 kWac
Number of inverters	40 units
Total power	12000 kWac
Operating voltage	550-1500 V
Max. power (=>30°C)	330 kWac
Pnom ratio (DC:AC)	1.19
Power sharing within this inverter	

**PVsyst V8.0.13**

VC2, Simulation date:  
23/06/25 16:55  
with V8.0.13

GRID SHAPE SRL (Italy)

**PV Array Characteristics****Total PV power**

Nominal (STC) 14277 kWp  
Total 22484 modules  
Module area 60734 m<sup>2</sup>

**Total inverter power**

Total power 12000 kWac  
Max. power 13200 kWac  
Number of inverters 40 units  
Pnom ratio 1.19

**Array losses****Array Soiling Losses**

Loss Fraction 1.0 %

**Thermal Loss factor**

Module temperature according to irradiance  
Uc (const) 29.0 W/m<sup>2</sup>K  
Uv (wind) 0.0 W/m<sup>2</sup>K/m/s

**DC wiring losses**

Global array res. 1.4 m  
Loss Fraction 1.50 % at STC

**LID - Light Induced Degradation**

Loss Fraction 1.0 %

**Module Quality Loss**

Loss Fraction -0.40 %

**Module mismatch losses**

Loss Fraction 2.00 % at MPP

**Strings Mismatch loss**

Loss Fraction 0.10 %

**IAM loss factor**

Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

**AC wiring losses****Inv. output line up to injection point**

Inverter voltage 800 Vac tri  
Loss Fraction 1.50 % at STC

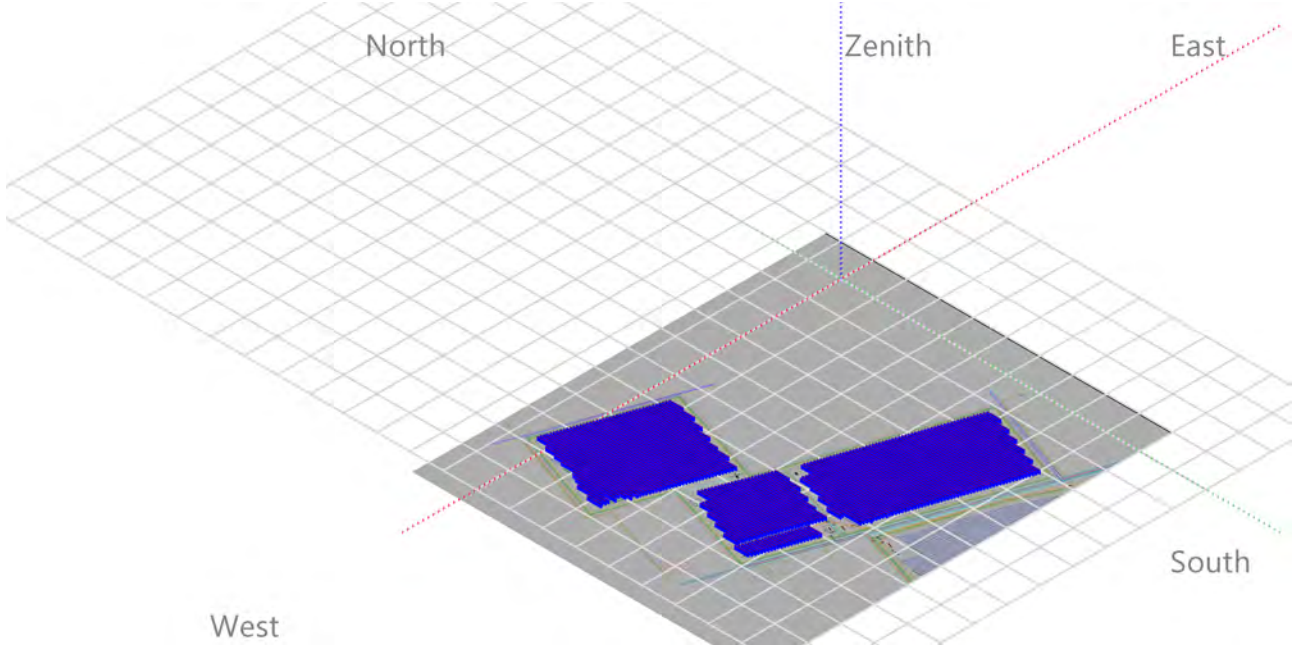
**Inverter: SUN2000-330KTL-H1**

Wire section (40 Inv.) Alu 40 x 3 x 300 mm<sup>2</sup>  
Average wires length 259 m



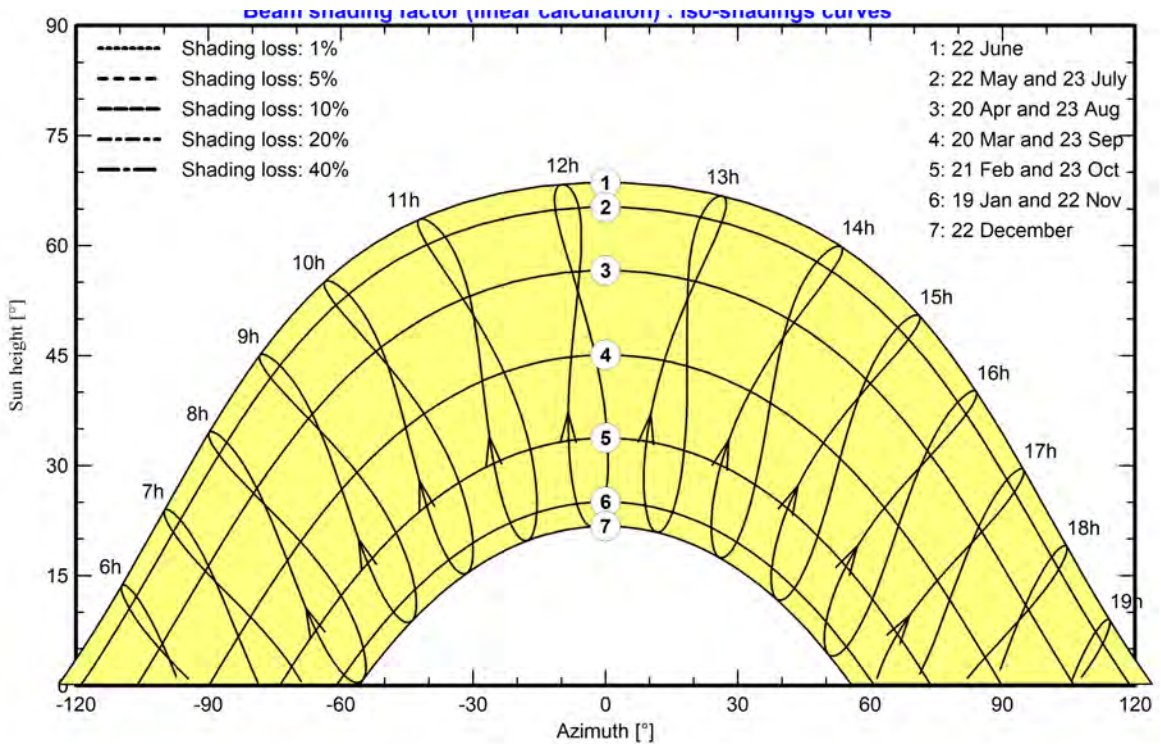
### Near shadings parameter

Perspective of the PV-field and surrounding shading scene



### Iso-shadings diagram

Orientation #1 -



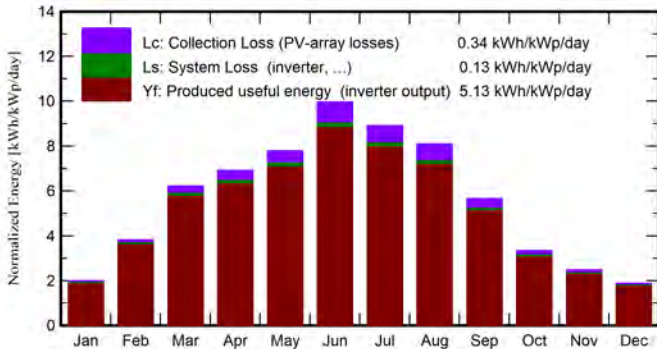


**Main results**

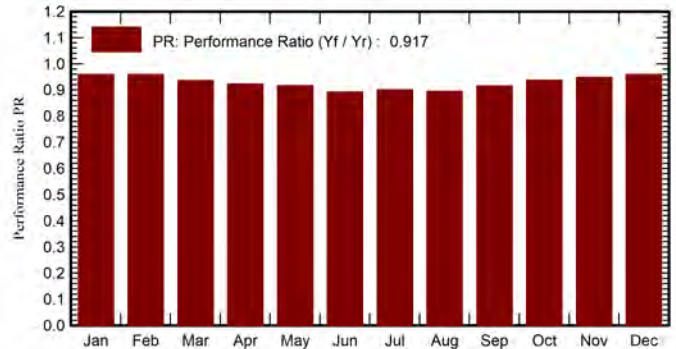
**System Production**

Produced Energy	26753 MWh/year	Specific production	1874 kWh/kWp/year
		Perf. Ratio PR	91.73 %
		Bifacial perf. ratio	86.91 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**Balances and main results**

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR	PRBifi
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	MWh	MWh	ratio	ratio
January	47.7	23.82	5.94	62.1	59.4	875	850	0.959	0.907
February	78.6	29.01	6.93	107.1	103.4	1499	1466	0.959	0.913
March	142.7	46.31	12.29	192.9	187.0	2635	2577	0.936	0.890
April	160.4	58.50	15.64	207.6	201.0	2799	2732	0.922	0.873
May	193.5	77.15	18.43	241.4	233.7	3235	3157	0.916	0.865
June	230.4	69.25	25.54	298.8	290.2	3896	3805	0.892	0.845
July	215.1	77.40	24.02	276.0	267.7	3636	3551	0.901	0.853
August	192.4	60.62	26.41	251.0	243.8	3282	3207	0.895	0.848
September	130.2	55.81	21.26	169.7	163.9	2268	2216	0.915	0.867
October	80.7	38.45	14.90	103.4	99.4	1421	1384	0.938	0.886
November	55.6	24.33	9.51	74.4	71.5	1034	1007	0.948	0.900
December	44.4	21.67	3.68	58.4	55.6	825	800	0.960	0.909
<b>Year</b>	<b>1571.8</b>	<b>582.33</b>	<b>15.42</b>	<b>2042.8</b>	<b>1976.6</b>	<b>27406</b>	<b>26753</b>	<b>0.917</b>	<b>0.869</b>

**Legends**

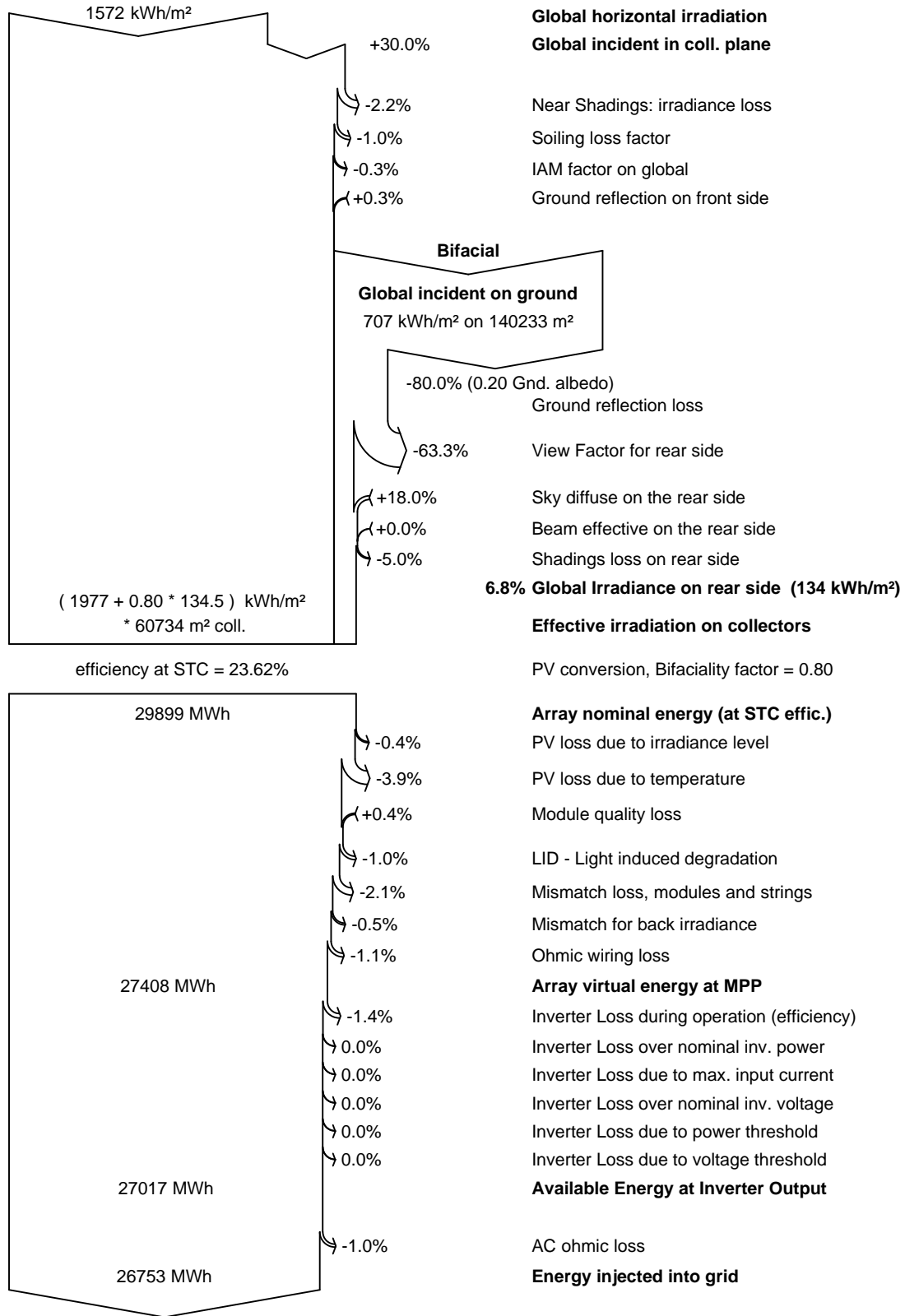
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	PRBifi	Bifacial Performance Ratio
GlobEff	Effective Global,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



PVsyst V8.0.13

VC2, Simulation date:  
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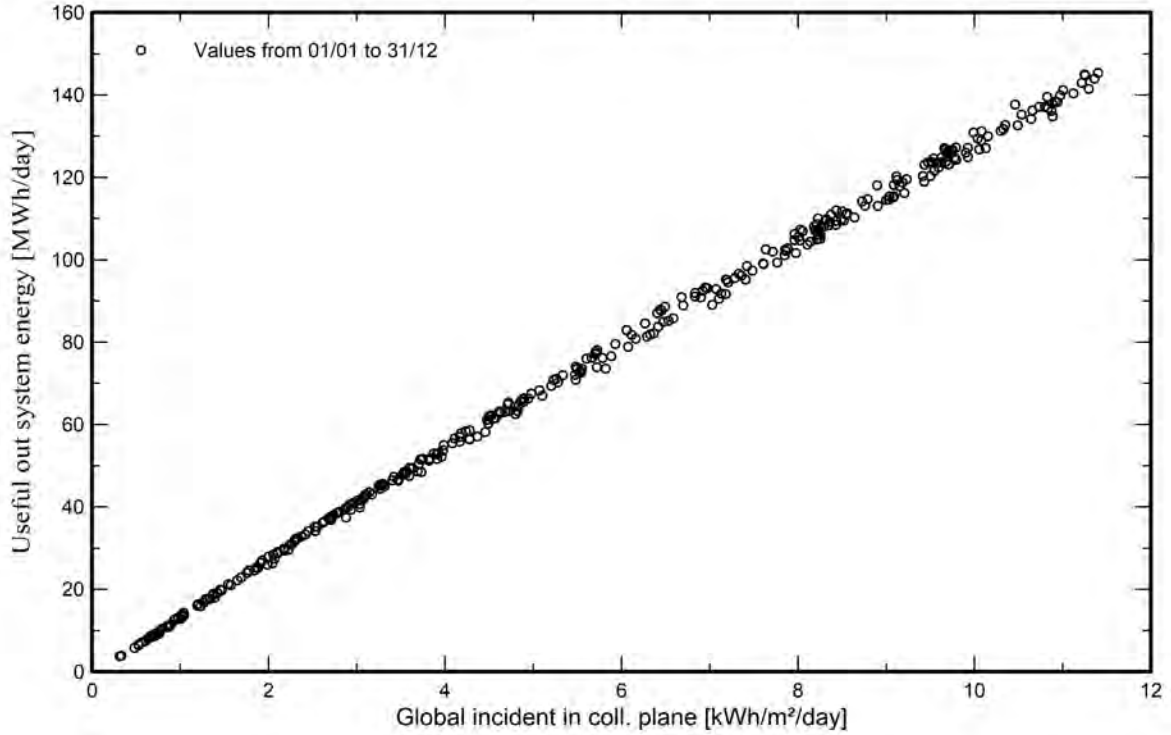
Loss diagram



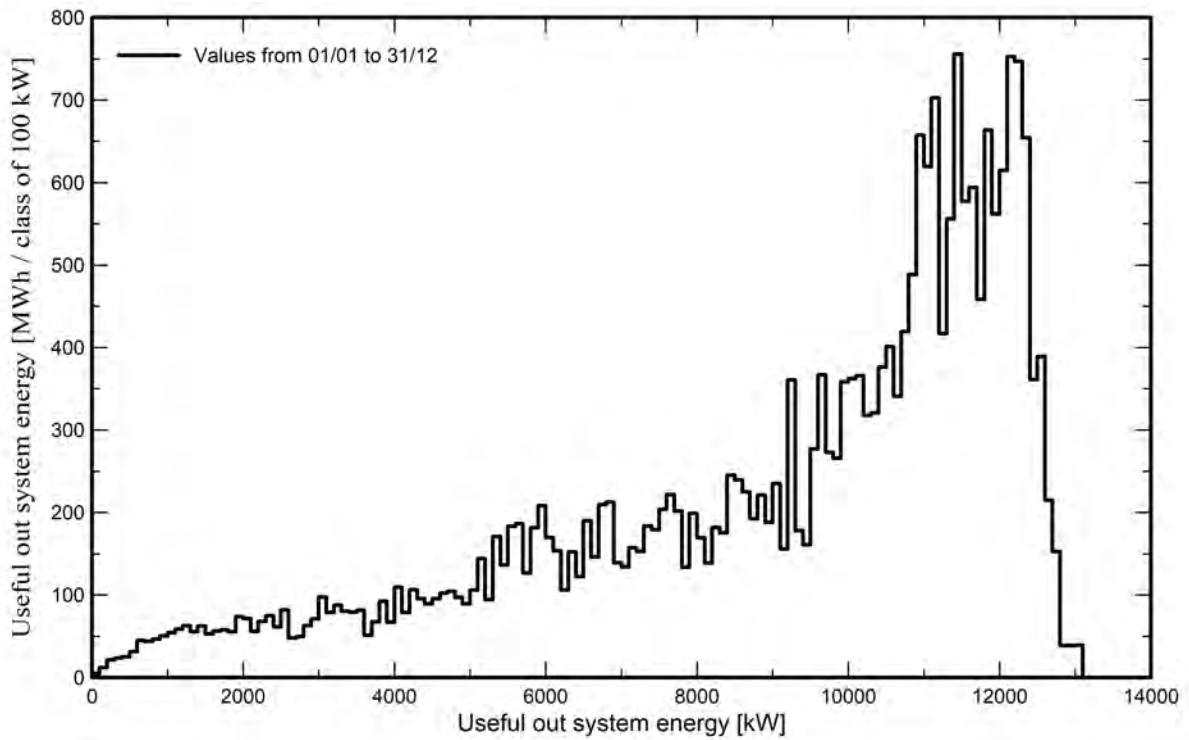


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

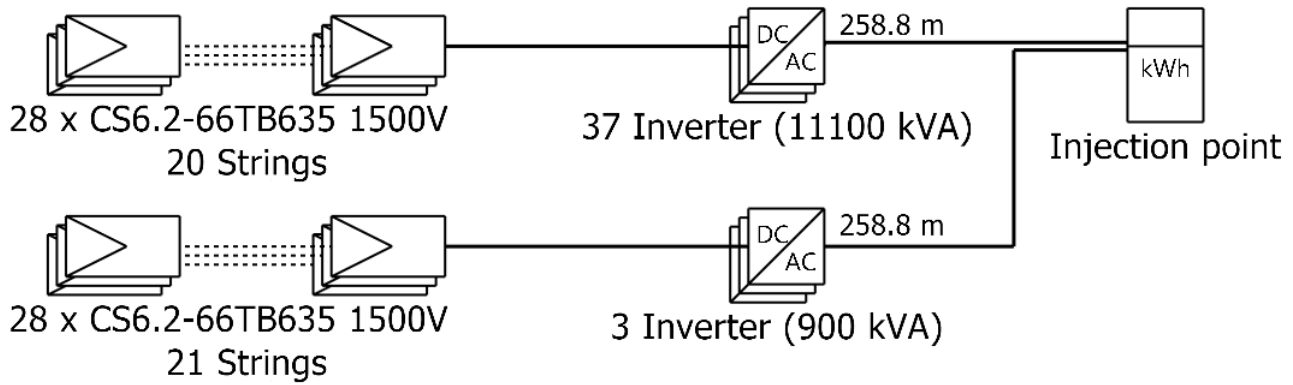




# Single-line diagram

**PVsyst V8.0.13**

VC2, Simulation date:  
23/06/25 16:55  
with V8.0.13



PV module	CS6.2-66TB635 1500V
Inverter	SUN2000-330KTL-H1
String	28 x CS6.2-66TB635 1500V

Terre del Reno

GRID SHAPE SRL (  
Italy)

VC2 : Sottocampo 2

14/07/25

# PVsyst - Simulation report

## Grid-Connected System

Project: Terre del Reno

Variant: Sottocampo 3.1 e 3.2

Tracking system with backtracking

System power: 14.17 MWp

Mirabello - Italy

**Author**

GRID SHAPE SRL (Italy)



**PVsyst V8.0.13**

VC3, Simulation date:  
 23/06/25 16:56  
 with V8.0.13

GRID SHAPE SRL (Italy)

**Project summary**

<b>Geographical Site</b>	<b>Situation</b>	<b>Project settings</b>
<b>Mirabello</b>	Latitude 44.83 °(N)	Albedo 0.20
Italy	Longitude 11.44 °(E)	
	Altitude 16 m	
	Time zone UTC+1	
<b>Weather data</b>		
Mirabello		
PVGIS api TMY		

**System summary**

<b>Grid-Connected System</b>	<b>Tracking system with backtracking</b>		<b>User's needs</b>
<b>Orientation #1</b>	<b>Near Shadings</b>		Unlimited load (grid)
<b>Tracking plane, horizontal N-S axis</b>	Linear shadings : Fast (table)		
Axis azimuth 0 °			
Phi min / max. -/+ 60 °			
Diffuse shading all trackers			
<b>Tracking algorithm</b>			
Astronomic calculation			
Backtracking activated			
<b>System information</b>			
<b>PV Array</b>	<b>Inverters</b>		
Nb. of modules 22316 units	Nb. of units 40 units		
Pnom total 14.17 MWp	Total power 12000 kWac		
	Pnom ratio 1.18		

**Results summary**

Produced Energy 26814 MWh/year	Specific production 1892 kWh/kWp/year	Perf. Ratio PR 92.63 %
		Bifacial perf. ratio 87.76 %

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**PVsyst V8.0.13**

VC3, Simulation date:  
23/06/25 16:56  
with V8.0.13

GRID SHAPE SRL (Italy)

**General parameters**

**Grid-Connected System**

**Orientation #1**

**Tracking plane, horizontal N-S axis**

Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

**Tracking algorithm**

Astronomic calculation  
Backtracking activated

**Horizon**

Free Horizon

**Bifacial system definition**

**Orientation #1**

**Bifacial system**

Model Unlimited Trackers 2D model

**Bifacial model geometry**

Tracker Spacing 5.50 m  
Tracker width 2.38 m  
GCR 43.3 %  
Axis height above ground 3.20 m  
Nb. of sheds 129 units

**Bifacial model definitions**

Ground albedo 0.20  
Bifaciality factor 80 %  
Rear shading factor 5.0 %  
Rear mismatch loss 10.0 %  
Shed transparent fraction 0.0 %

**Tracking system with backtracking**

**Field properties**

Nb. of trackers 783 units  
Tracking plane, horizontal N-S axis

**Sizes**

Tracker Spacing 5.50 m  
Sensitive width 2.38 m  
Average GCR 43.3 %

**Backtracking limit angle**

Phi limits +/- 64.4 °

**Backtracking parameters**

Backtracking pitch 5.50 m  
Backtracking width 2.38 m  
Left inactive band 0.00 m  
Right inactive band 0.00 m  
GCR Backtracking 43.3 %  
Parameters choice:Automatic

**Near Shadings**

Linear shadings : Fast (table)

**Models used**

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

**User's needs**

Unlimited load (grid)

**PV Array Characteristics**

**PV module**

Manufacturer CSI Solar Co., Ltd.  
Model CS6.2-66TB635 1500V  
(Custom parameters definition)  
CS6.2-66TB635\_CSI\_DRA\_1500V\_V7\_40\_A0.PAN  
Unit Nom. Power 635 Wp  
Number of PV modules 22316 units  
Nominal (STC) 14.17 MWp  
Modules 797 string x 28 In series

**At operating cond. (50°C)**

Pmpp 13.20 MWp  
U mpp 1060 V  
I mpp 12454 A

**Inverter**

Manufacturer Huawei Technologies  
Model SUN2000-330KTL-H1  
(Original PVsyst database)  
Unit Nom. Power 300 kWac  
Number of inverters 40 units  
Total power 12000 kWac  
Operating voltage 550-1500 V  
Max. power (=>30°C) 330 kWac  
Pnom ratio (DC:AC) 1.18  
Power sharing within this inverter



**PVsyst V8.0.13**

VC3, Simulation date:  
 23/06/25 16:56  
 with V8.0.13

**PV Array Characteristics**

<b>Total PV power</b>		<b>Total inverter power</b>	
Nominal (STC)	14171 kWp	Total power	12000 kWac
Total	22316 modules	Max. power	13200 kWac
Module area	60280 m <sup>2</sup>	Number of inverters	40 units
		Pnom ratio	1.18

**Array losses**

<b>Array Soiling Losses</b>		<b>Thermal Loss factor</b>		<b>DC wiring losses</b>				
Loss Fraction	1.0 %	Module temperature according to irradiance		Global array res.	1.4 m			
		Uc (const)	29.0 W/m <sup>2</sup> K	Loss Fraction	1.50 % at STC			
		Uv (wind)	0.0 W/m <sup>2</sup> K/m/s					
<b>LID - Light Induced Degradation</b>		<b>Module Quality Loss</b>		<b>Module mismatch losses</b>				
Loss Fraction	1.0 %	Loss Fraction	-0.40 %	Loss Fraction	2.00 % at MPP			
<b>Strings Mismatch loss</b>								
Loss Fraction	0.10 %							
<b>IAM loss factor</b>								
Incidence effect (IAM): User defined profile								
20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

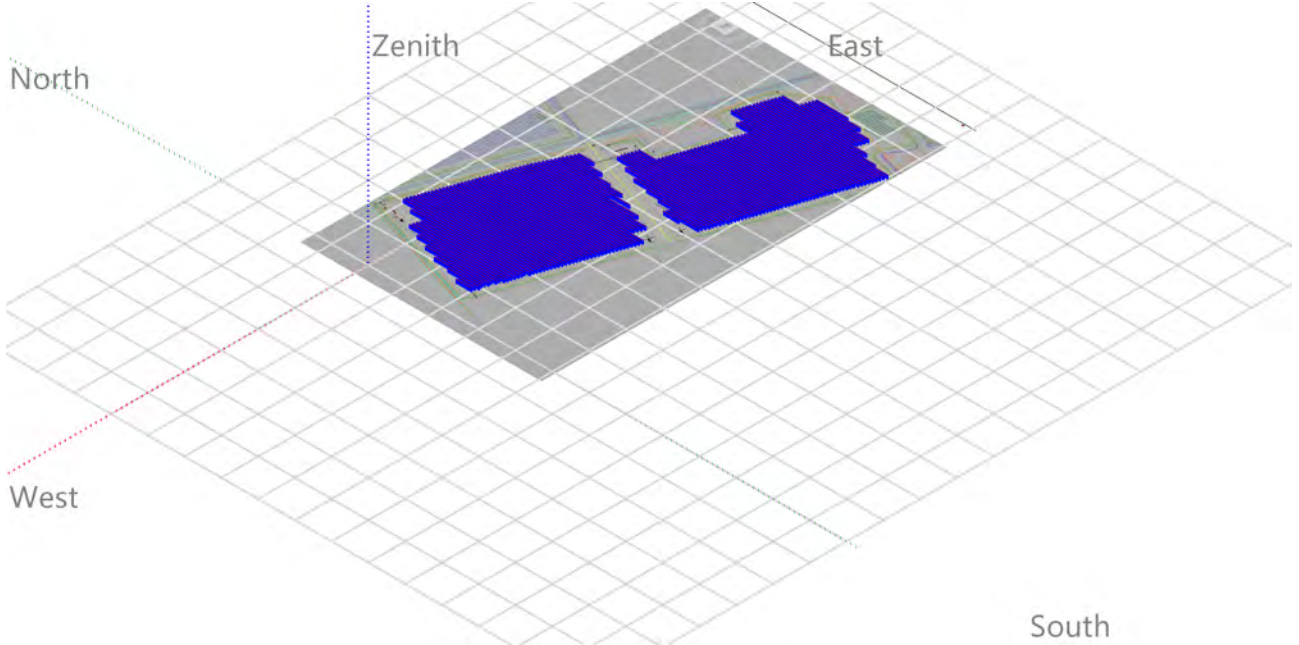


**PVsyst V8.0.13**

VC3, Simulation date:  
23/06/25 16:56  
with V8.0.13

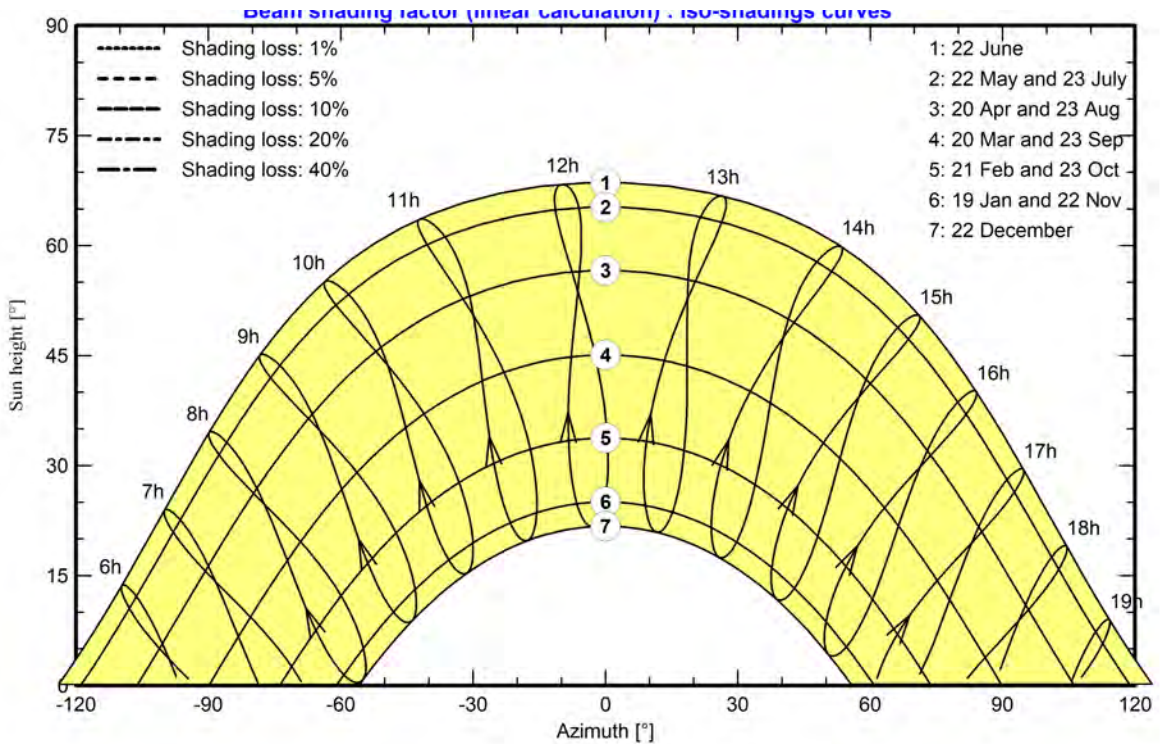
**Near shadings parameter**

**Perspective of the PV-field and surrounding shading scene**



**Iso-shadings diagram**

**Orientation #1 -**



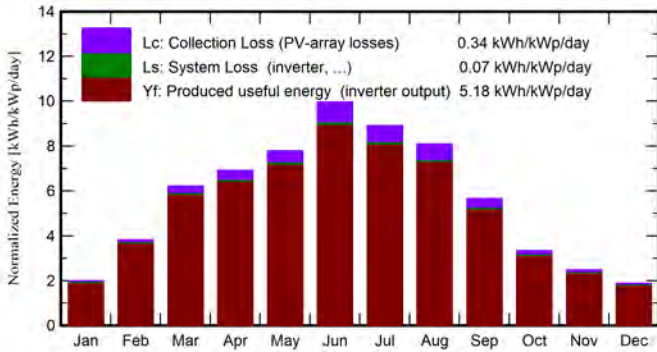


**Main results**

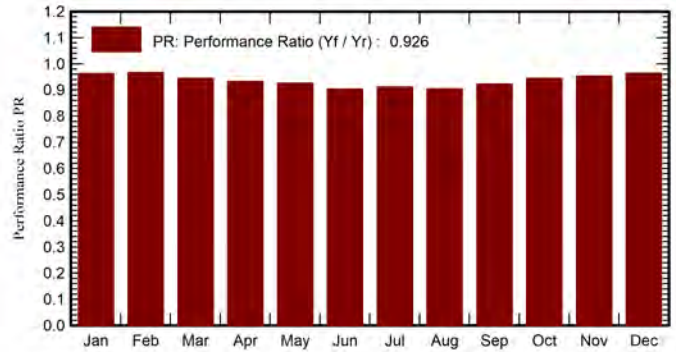
**System Production**

Produced Energy	26814 MWh/year	Specific production	1892 kWh/kWp/year
		Perf. Ratio PR	92.63 %
		Bifacial perf. ratio	87.76 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**Balances and main results**

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR	PRBifi
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	MWh	MWh	ratio	ratio
January	47.7	23.82	5.94	62.1	59.4	869	848	0.963	0.912
February	78.6	29.01	6.93	107.1	103.4	1488	1466	0.966	0.920
March	142.7	46.31	12.29	192.9	187.0	2615	2583	0.945	0.899
April	160.4	58.50	15.64	207.6	201.0	2778	2741	0.932	0.882
May	193.5	77.15	18.43	241.4	233.7	3211	3169	0.927	0.875
June	230.4	69.25	25.54	298.8	290.2	3867	3821	0.902	0.855
July	215.1	77.40	24.02	276.0	267.7	3609	3563	0.911	0.862
August	192.4	60.62	26.41	251.0	243.7	3257	3217	0.904	0.858
September	130.2	55.81	21.26	169.7	163.9	2251	2220	0.923	0.874
October	80.7	38.45	14.90	103.4	99.4	1410	1384	0.944	0.892
November	55.6	24.33	9.51	74.4	71.5	1026	1005	0.953	0.905
December	44.4	21.67	3.68	58.4	55.6	819	798	0.964	0.913
<b>Year</b>	<b>1571.8</b>	<b>582.33</b>	<b>15.42</b>	<b>2042.8</b>	<b>1976.4</b>	<b>27200</b>	<b>26814</b>	<b>0.926</b>	<b>0.878</b>

**Legends**

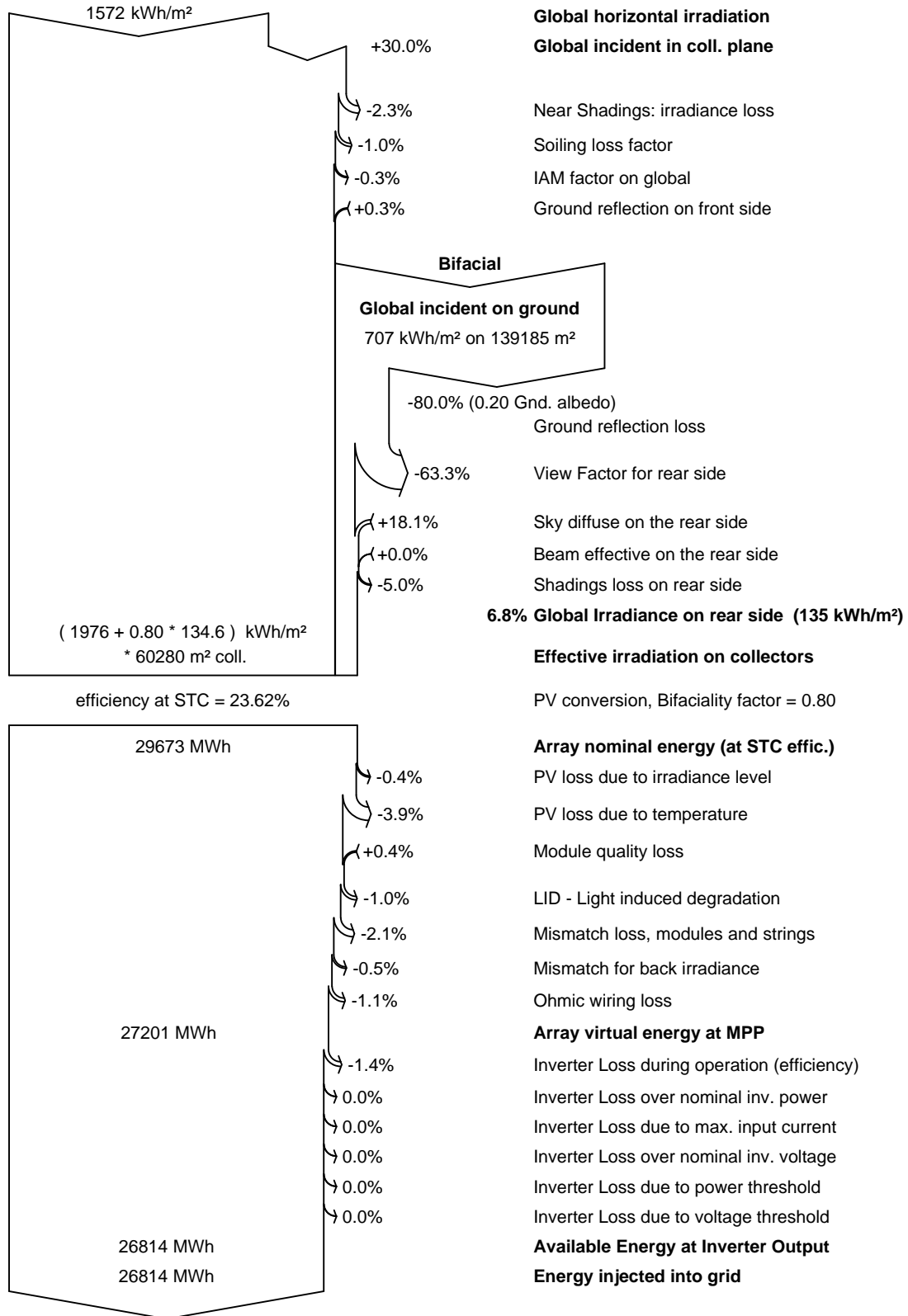
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	PRBifi	Bifacial Performance Ratio
GlobEff	Effective Global,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



**PVsyst V8.0.13**

VC3, Simulation date:  
 23/06/25 16:56  
 with V8.0.13

**Loss diagram**



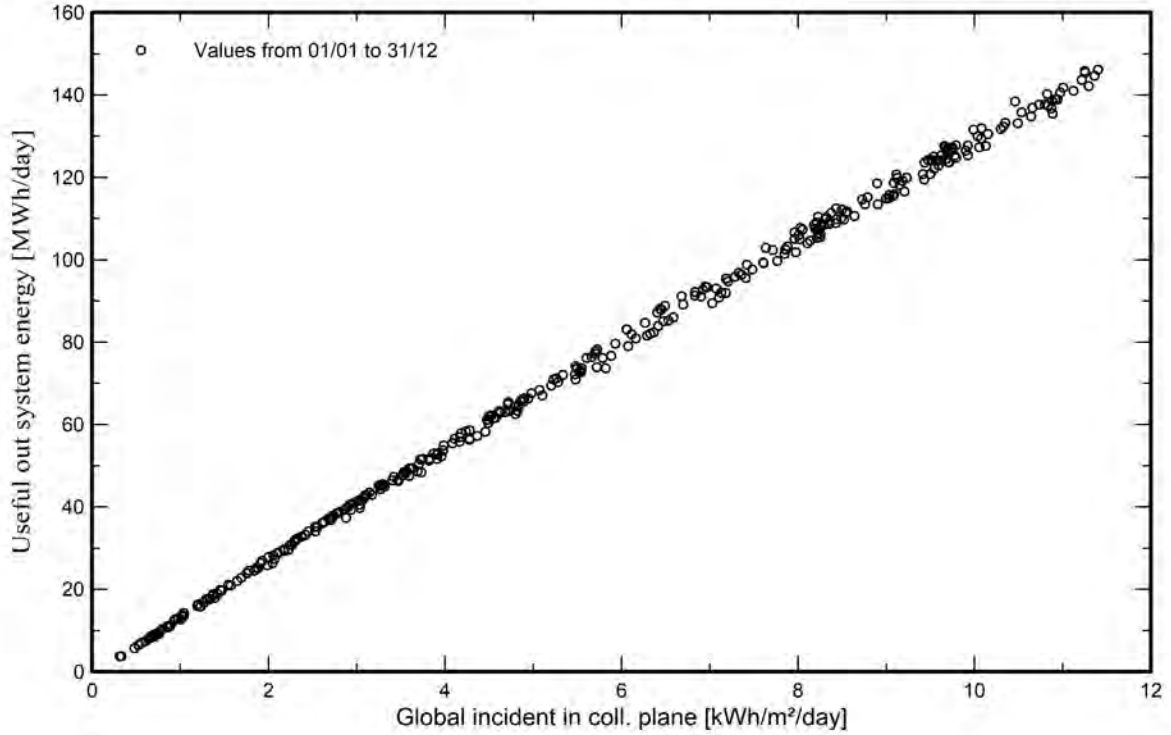


**PVsyst V8.0.13**

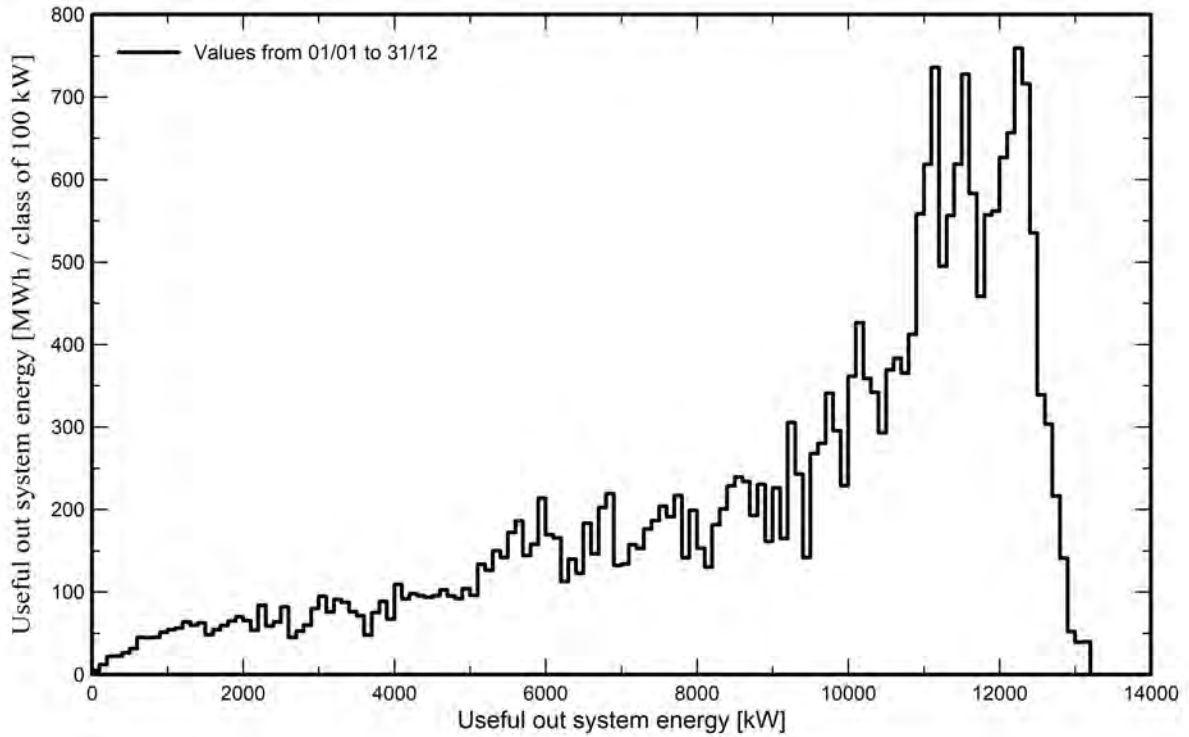
VC3, Simulation date:  
23/06/25 16:56  
with V8.0.13

**Predef. graphs**

**Daily Input/Output diagram**



**System Output Power Distribution**

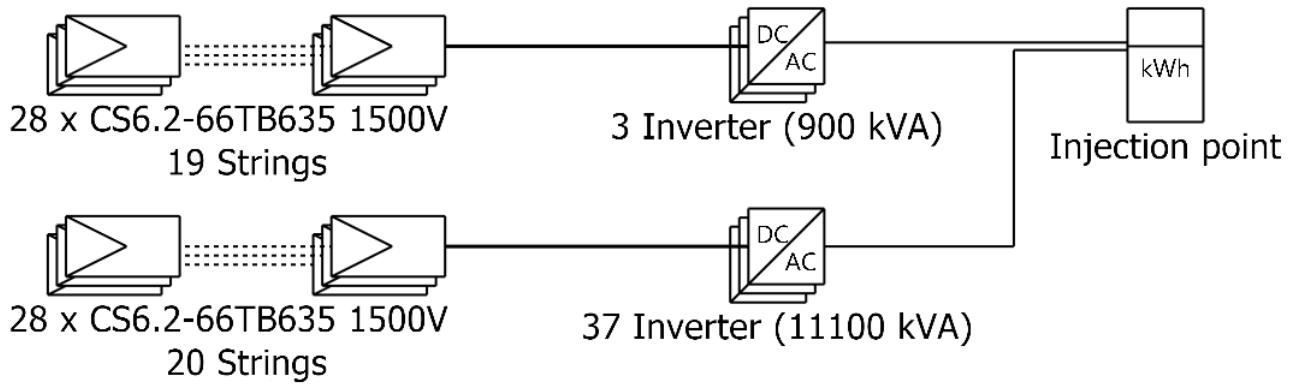




# Single-line diagram

**PVsyst V8.0.13**

VC3, Simulation date:  
23/06/25 16:56  
with V8.0.13



PV module	CS6.2-66TB635 1500V
Inverter	SUN2000-330KTL-H1
String	28 x CS6.2-66TB635 1500V

Terre del Reno

GRID SHAPE SRL (Italy)

VC3 : Sottocampo 3.1 e 3.2

14/07/25

# PVsyst - Simulation report

## Grid-Connected System

Project: Terre del Reno

Variant: Sottocampo 3.3

Tracking system with backtracking

System power: 18.86 MWp

Mirabello - Italy

**Author**

GRID SHAPE SRL (Italy)

**PVsyst V8.0.13**

VC4, Simulation date:  
23/06/25 16:57  
with V8.0.13

GRID SHAPE SRL (Italy)

**Project summary****Geographical Site**

**Mirabello**  
Italy

**Situation**

Latitude 44.83 °(N)  
Longitude 11.44 °(E)  
Altitude 16 m  
Time zone UTC+1

**Project settings**

Albedo 0.20

**Weather data**

Mirabello  
PVGIS api TMY

**System summary****Grid-Connected System****Orientation #1****Tracking plane, horizontal N-S axis**

Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

**Tracking algorithm**

Astronomic calculation  
Backtracking activated

**System information****PV Array**

Nb. of modules 29708 units  
Pnom total 18.86 MWp

**Tracking system with backtracking****Near Shadings**

Linear shadings : Fast (table)

**User's needs**

Unlimited load (grid)

**Inverters**

Nb. of units 53 units  
Total power 15900 kWac  
Pnom ratio 1.19

**Results summary**

Produced Energy	35699 MWh/year	Specific production	1892 kWh/kWp/year	Perf. Ratio PR	92.64 %
				Bifacial perf. ratio	87.77 %

**Table of contents**

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Main results	6
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## PVsyst V8.0.13

VC4, Simulation date:  
23/06/25 16:57  
with V8.0.13

GRID SHAPE SRL (Italy)

## General parameters

## Grid-Connected System

## Orientation #1

## Tracking plane, horizontal N-S axis

Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

## Tracking algorithm

Astronomic calculation  
Backtracking activated

## Horizon

Free Horizon

## Bifacial system definition

## Orientation #1

## Bifacial system

Model Unlimited Trackers 2D model

## Bifacial model geometry

Tracker Spacing 5.50 m  
Tracker width 2.38 m  
GCR 43.3 %  
Axis height above ground 3.20 m  
Nb. of sheds 156 units

## Bifacial model definitions

Ground albedo 0.20  
Bifaciality factor 80 %  
Rear shading factor 5.0 %  
Rear mismatch loss 10.0 %  
Shed transparent fraction 0.0 %

## Tracking system with backtracking

## Field properties

Nb. of trackers 1061 units  
Tracking plane, horizontal N-S axis

## Sizes

Tracker Spacing 5.50 m  
Sensitive width 2.38 m  
Average GCR 43.3 %

## Backtracking limit angle

Phi limits +/- 64.4 °

## Backtracking parameters

Backtracking pitch 5.50 m  
Backtracking width 2.38 m  
Left inactive band 0.00 m  
Right inactive band 0.00 m  
GCR Backtracking 43.3 %  
Parameters choice:Automatic

## Near Shadings

Linear shadings : Fast (table)

## Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

## User's needs

Unlimited load (grid)

## PV Array Characteristics

## PV module

Manufacturer CSI Solar Co., Ltd.  
Model CS6.2-66TB635 1500V  
(Custom parameters definition)  
CS6.2-66TB635\_CSI\_DRA\_1500V\_V7\_40\_A0.PAN  
Unit Nom. Power 635 Wp  
Number of PV modules 29708 units  
Nominal (STC) 18.86 MWp  
Modules 1061 string x 28 In series

## At operating cond. (50°C)

Pmpp 17.57 MWp  
U mpp 1060 V  
I mpp 16580 A

## Inverter

Manufacturer Huawei Technologies  
Model SUN2000-330KTL-H1  
(Original PVsyst database)  
Unit Nom. Power 300 kWac  
Number of inverters 53 units  
Total power 15900 kWac  
Operating voltage 550-1500 V  
Max. power (=>30°C) 330 kWac  
Pnom ratio (DC:AC) 1.19  
Power sharing within this inverter



**PVsyst V8.0.13**

VC4, Simulation date:  
23/06/25 16:57  
with V8.0.13

GRID SHAPE SRL (Italy)

**PV Array Characteristics**

<b>Total PV power</b>		<b>Total inverter power</b>	
Nominal (STC)	18865 kWp	Total power	15900 kWac
Total	29708 modules	Max. power	17490 kWac
Module area	80247 m <sup>2</sup>	Number of inverters	53 units
		Pnom ratio	1.19

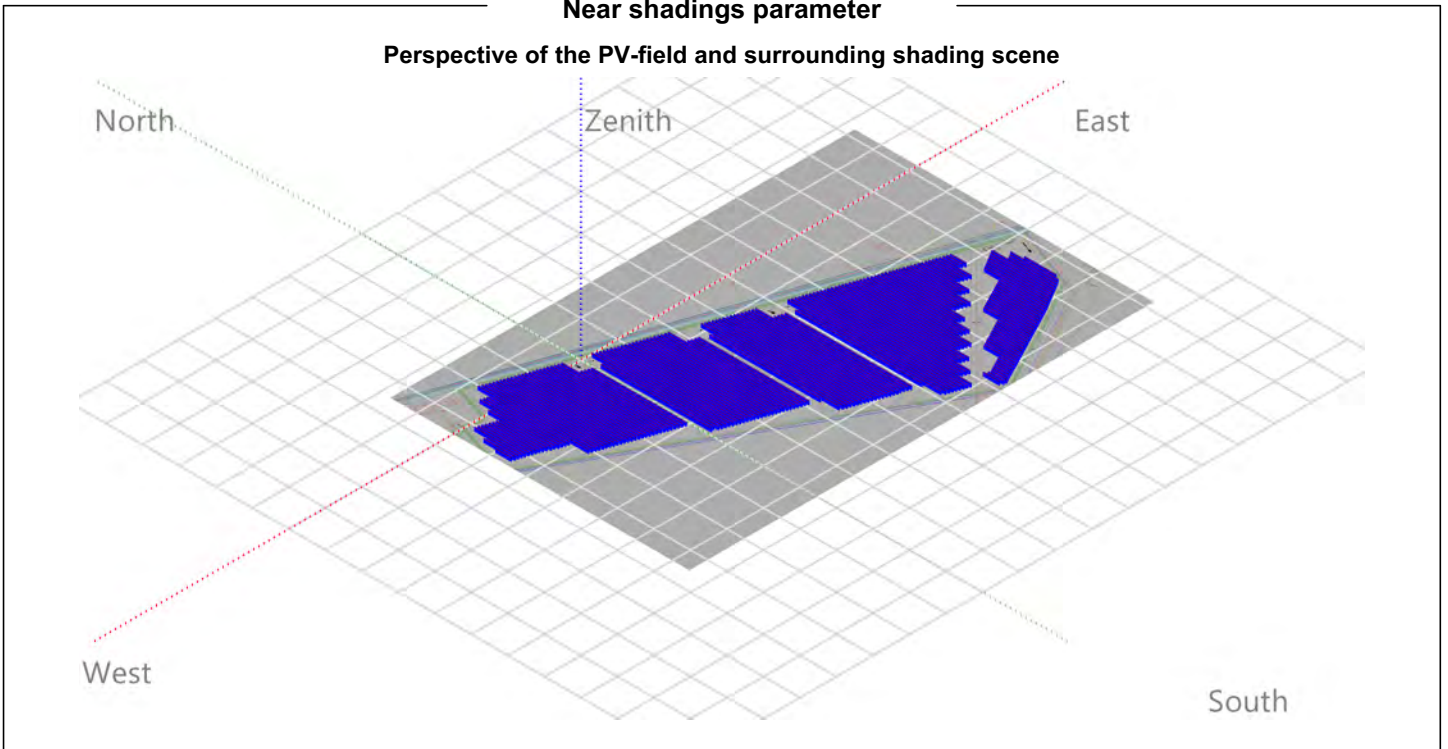
**Array losses**

<b>Array Soiling Losses</b>		<b>Thermal Loss factor</b>		<b>DC wiring losses</b>				
Loss Fraction	1.0 %	Module temperature according to irradiance		Global array res.	1.0 m			
		Uc (const)	29.0 W/m <sup>2</sup> K	Loss Fraction	1.50 % at STC			
		Uv (wind)	0.0 W/m <sup>2</sup> K/m/s					
<b>LID - Light Induced Degradation</b>		<b>Module Quality Loss</b>		<b>Module mismatch losses</b>				
Loss Fraction	1.0 %	Loss Fraction	-0.40 %	Loss Fraction	2.00 % at MPP			
<b>Strings Mismatch loss</b>								
Loss Fraction	0.10 %							
<b>IAM loss factor</b>								
Incidence effect (IAM): User defined profile								
20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000



### Near shadings parameter

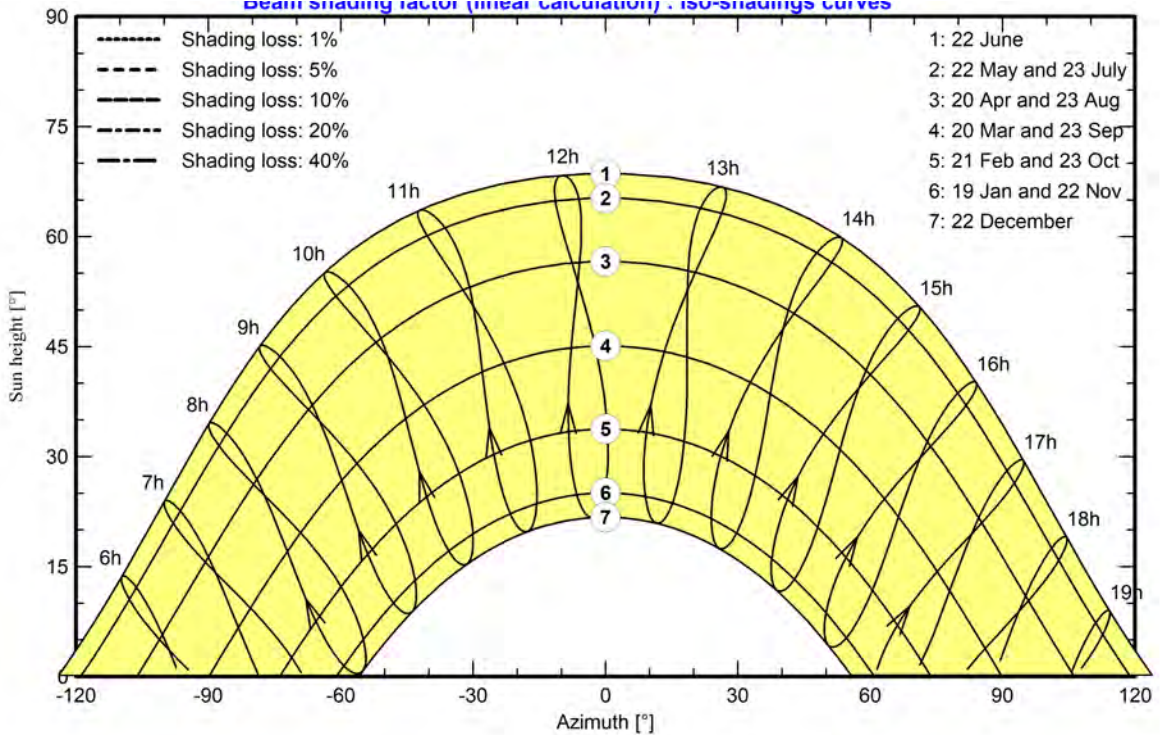
Perspective of the PV-field and surrounding shading scene



### Iso-shadings diagram

Orientation #1 -

Beam shading factor (linear calculation) - Iso-shadings curves



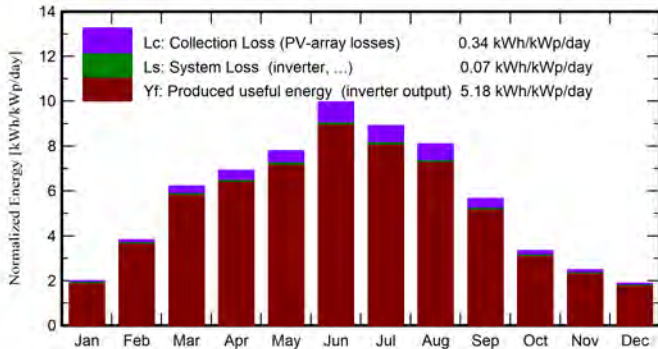


**Main results**

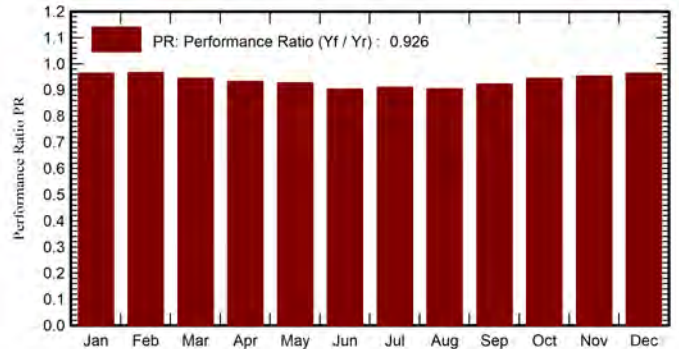
**System Production**

Produced Energy	35699 MWh/year	Specific production	1892 kWh/kWp/year
		Perf. Ratio PR	92.64 %
		Bifacial perf. ratio	87.77 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**Balances and main results**

	GlobHor kWh/m <sup>2</sup>	DiffHor kWh/m <sup>2</sup>	T_Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray MWh	E_Grid MWh	PR ratio	PRBifi ratio
January	47.7	23.82	5.94	62.1	59.4	1157	1130	0.964	0.912
February	78.6	29.01	6.93	107.1	103.4	1981	1952	0.966	0.920
March	142.7	46.31	12.29	192.9	187.0	3481	3438	0.945	0.899
April	160.4	58.50	15.64	207.6	201.0	3698	3649	0.932	0.882
May	193.5	77.15	18.43	241.4	233.7	4276	4220	0.927	0.875
June	230.4	69.25	25.54	298.8	290.2	5149	5087	0.903	0.855
July	215.1	77.40	24.02	276.0	267.7	4803	4743	0.911	0.862
August	192.4	60.62	26.41	251.0	243.8	4337	4283	0.905	0.858
September	130.2	55.81	21.26	169.7	163.9	2997	2955	0.923	0.874
October	80.7	38.45	14.90	103.4	99.4	1877	1842	0.944	0.892
November	55.6	24.33	9.51	74.4	71.5	1366	1338	0.953	0.905
December	44.4	21.67	3.68	58.4	55.6	1090	1062	0.964	0.913
<b>Year</b>	<b>1571.8</b>	<b>582.33</b>	<b>15.42</b>	<b>2042.8</b>	<b>1976.6</b>	<b>36212</b>	<b>35699</b>	<b>0.926</b>	<b>0.878</b>

**Legends**

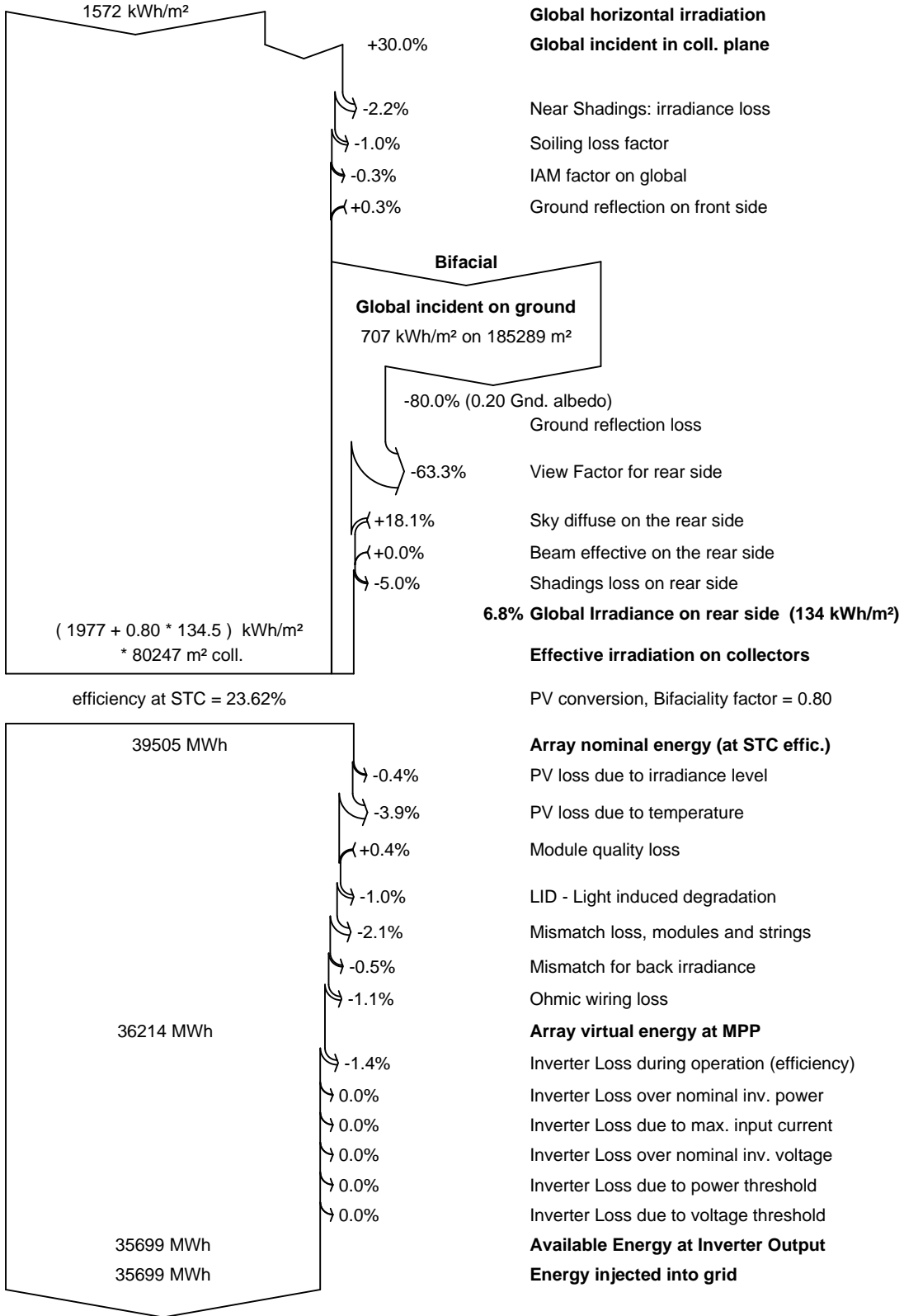
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	PRBifi	Bifacial Performance Ratio
GlobEff	Effective Global,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



PVsyst V8.0.13

VC4, Simulation date:  
23/06/25 16:57  
with V8.0.13

Loss diagram



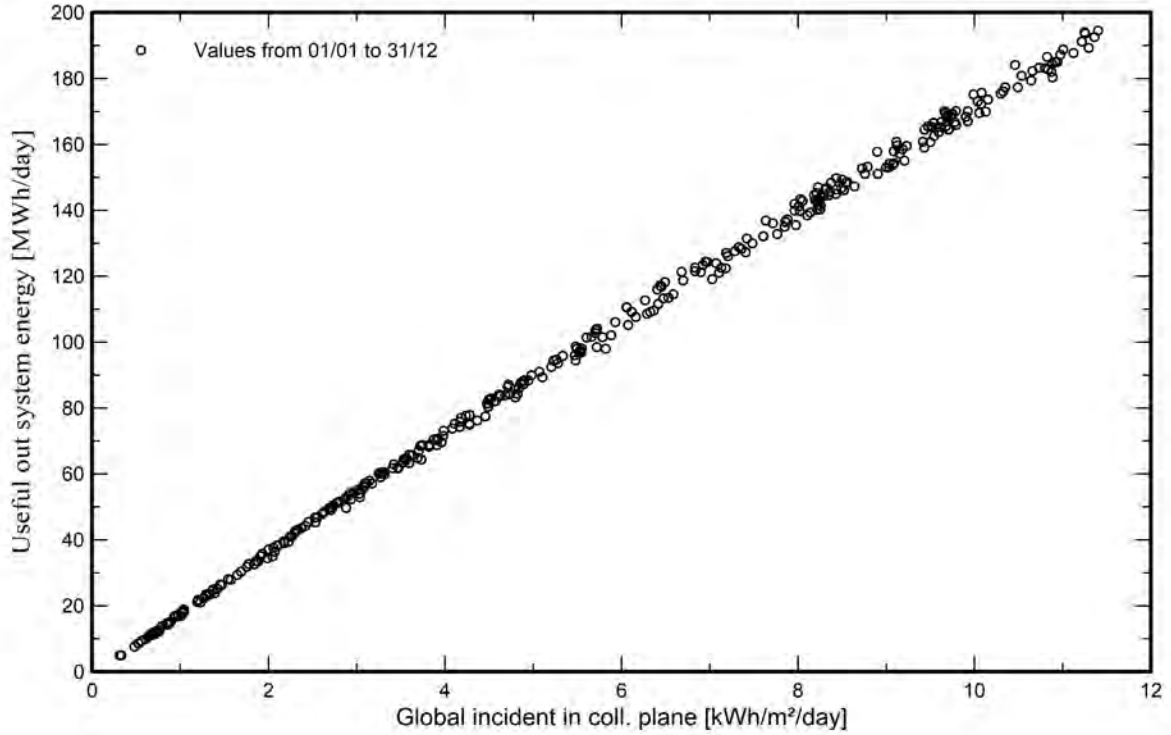


PVsyst V8.0.13

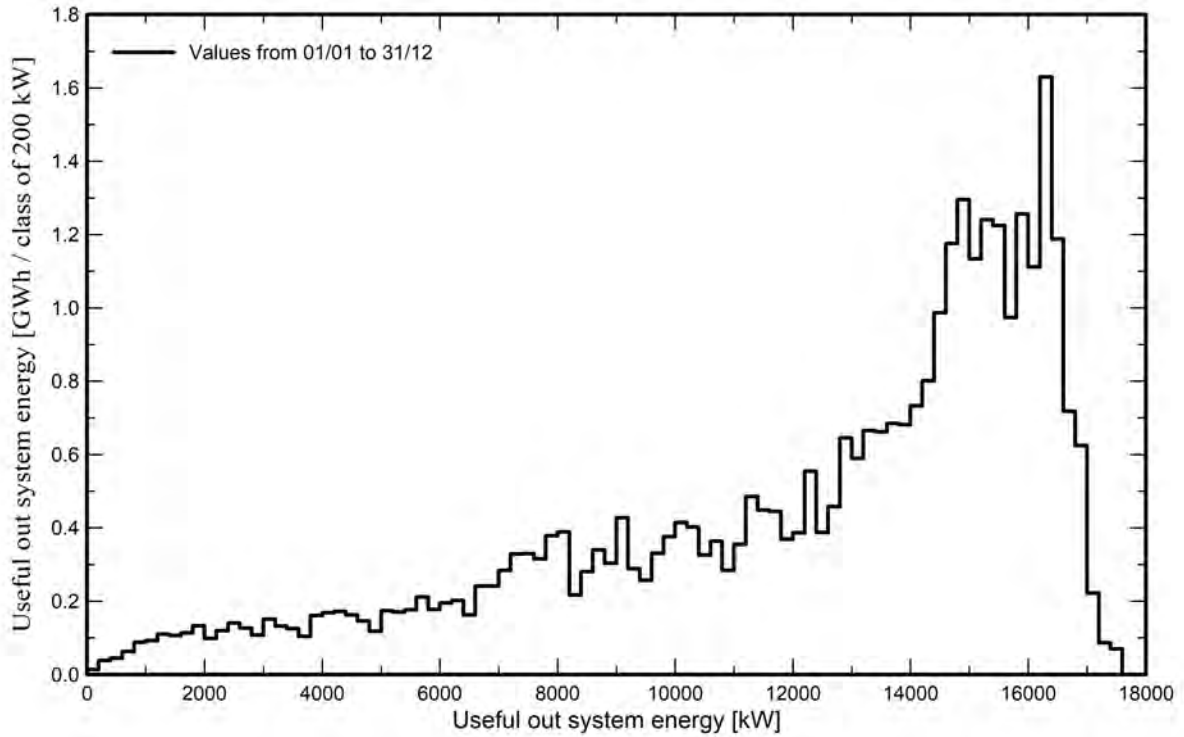
VC4, Simulation date:  
23/06/25 16:57  
with V8.0.13

Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

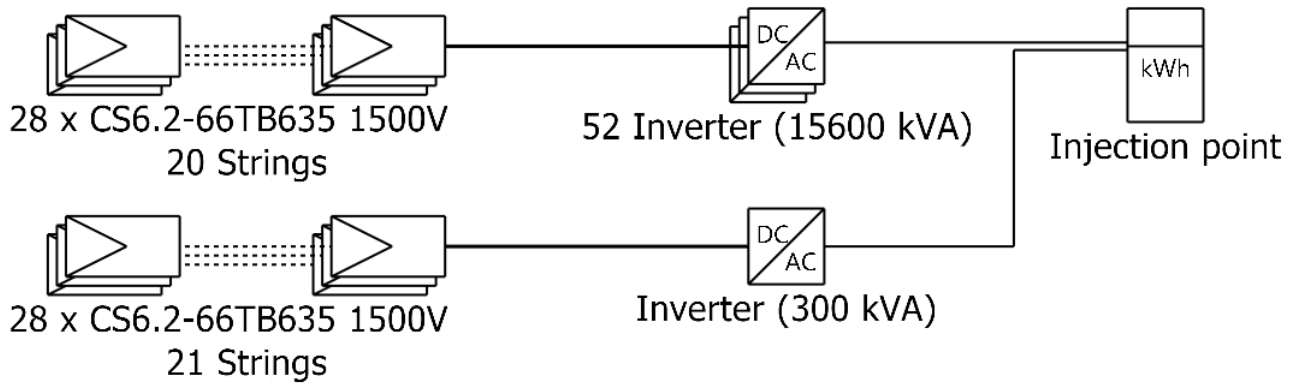




# Single-line diagram

**PVsyst V8.0.13**

VC4, Simulation date:  
23/06/25 16:57  
with V8.0.13



PV module	CS6.2-66TB635 1500V
Inverter	SUN2000-330KTL-H1
String	28 x CS6.2-66TB635 1500V

Terre del Reno

GRID SHAPE SRL (Italy)

VC4 : Sottocampo 3.3

14/07/25

# PVsyst - Simulation report

## Grid-Connected System

Project: Terre del Reno

Variant: Sottocampo 4

Tracking system with backtracking

System power: 19.65 MWp

Mirabello - Italy

**Author**

GRID SHAPE SRL (Italy)

**PVsyst V8.0.13**

VC1, Simulation date:  
23/06/25 16:53  
with V8.0.13

GRID SHAPE SRL (Italy)

**Project summary****Geographical Site**

**Mirabello**  
Italy

**Situation**

Latitude 44.83 °(N)  
Longitude 11.44 °(E)  
Altitude 16 m  
Time zone UTC+1

**Project settings**

Albedo 0.20

**Weather data**

Mirabello  
PVGIS api TMY

**System summary****Grid-Connected System****Orientation #1****Tracking plane, horizontal N-S axis**

Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

**Tracking algorithm**

Astronomic calculation  
Backtracking activated

**System information****PV Array**

Nb. of modules 30940 units  
Pnom total 19.65 MWp

**Tracking system with backtracking****Near Shadings**

Linear shadings : Fast (table)

**User's needs**

Unlimited load (grid)

**Inverters**

Nb. of units 55 units  
Total power 16500 kWac  
Pnom ratio 1.19

**Results summary**

Produced Energy	36812 MWh/year	Specific production	1874 kWh/kWp/year	Perf. Ratio PR	91.72 %
				Bifacial perf. ratio	86.90 %

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## PVsyst V8.0.13

VC1, Simulation date:  
23/06/25 16:53  
with V8.0.13

GRID SHAPE SRL (Italy)

## General parameters

## Grid-Connected System

## Orientation #1

## Tracking plane, horizontal N-S axis

Axis azimuth 0 °  
Phi min / max. +/- 60 °  
Diffuse shading all trackers

## Tracking algorithm

Astronomic calculation  
Backtracking activated

## Horizon

Free Horizon

## Bifacial system definition

## Orientation #1

## Bifacial system

Model Unlimited Trackers 2D model

## Bifacial model geometry

Tracker Spacing 5.50 m  
Tracker width 2.38 m  
GCR 43.3 %  
Axis height above ground 3.20 m  
Nb. of sheds 130 units

## Bifacial model definitions

Ground albedo 0.20  
Bifaciality factor 80 %  
Rear shading factor 5.0 %  
Rear mismatch loss 10.0 %  
Shed transparent fraction 0.0 %

## Tracking system with backtracking

## Field properties

Nb. of trackers 1105 units  
Tracking plane, horizontal N-S axis

## Sizes

Tracker Spacing 5.50 m  
Sensitive width 2.38 m  
Average GCR 43.3 %

## Backtracking limit angle

Phi limits +/- 64.4 °

## Backtracking parameters

Backtracking pitch 5.50 m  
Backtracking width 2.38 m  
Left inactive band 0.00 m  
Right inactive band 0.00 m  
GCR Backtracking 43.3 %  
Parameters choice:Automatic

## Near Shadings

Linear shadings : Fast (table)

## Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

## User's needs

Unlimited load (grid)

## PV Array Characteristics

## PV module

Manufacturer CSI Solar Co., Ltd.  
Model CS6.2-66TB635 1500V  
(Custom parameters definition)  
CS6.2-66TB635\_CSI\_DRA\_1500V\_V7\_40\_A0.PAN  
Unit Nom. Power 635 Wp  
Number of PV modules 30940 units  
Nominal (STC) 19.65 MWp  
Modules 1105 string x 28 In series

## At operating cond. (50°C)

Pmpp 18.30 MWp  
U mpp 1060 V  
I mpp 17267 A

## Inverter

Manufacturer Huawei Technologies  
Model SUN2000-330KTL-H1  
(Original PVsyst database)  
Unit Nom. Power 300 kWac  
Number of inverters 55 units  
Total power 16500 kWac  
Operating voltage 550-1500 V  
Max. power (=>30°C) 330 kWac  
Pnom ratio (DC:AC) 1.19  
Power sharing within this inverter

**PVsyst V8.0.13**

VC1, Simulation date:  
23/06/25 16:53  
with V8.0.13

**PV Array Characteristics****Total PV power**

Nominal (STC) 19647 kWp  
Total 30940 modules  
Module area 83575 m<sup>2</sup>

**Total inverter power**

Total power 16500 kWac  
Max. power 18150 kWac  
Number of inverters 55 units  
Pnom ratio 1.19

**Array losses****Array Soiling Losses**

Loss Fraction 1.0 %

**Thermal Loss factor**

Module temperature according to irradiance  
Uc (const) 29.0 W/m<sup>2</sup>K  
Uv (wind) 0.0 W/m<sup>2</sup>K/m/s

**DC wiring losses**

Global array res. 1.0 m  
Loss Fraction 1.50 % at STC

**LID - Light Induced Degradation**

Loss Fraction 1.0 %

**Module Quality Loss**

Loss Fraction -0.40 %

**Module mismatch losses**

Loss Fraction 2.00 % at MPP

**Strings Mismatch loss**

Loss Fraction 0.10 %

**IAM loss factor**

Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

**AC wiring losses****Inv. output line up to injection point**

Inverter voltage 800 Vac tri  
Loss Fraction 1.50 % at STC

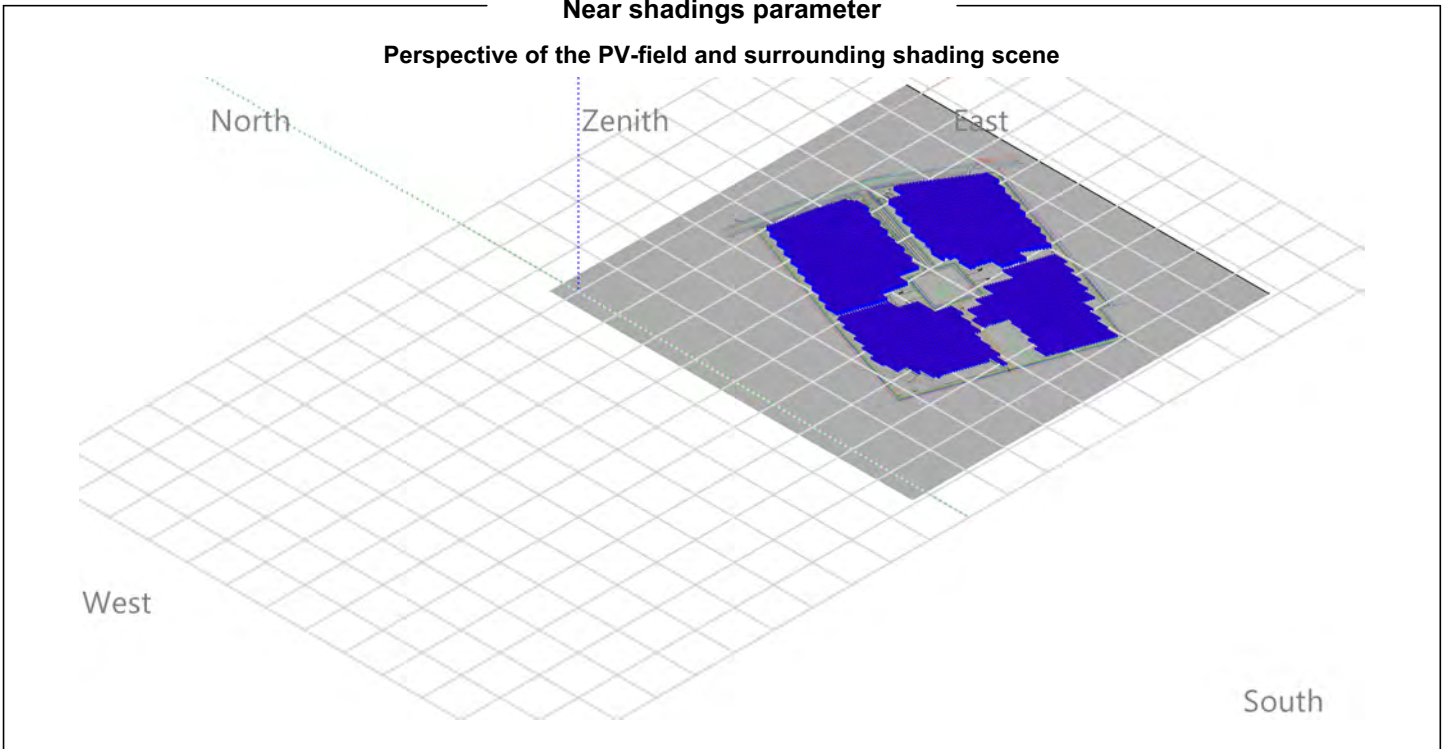
**Inverter: SUN2000-330KTL-H1**

Wire section (55 Inv.) Alu 55 x 3 x 185 mm<sup>2</sup>  
Average wires length 160 m



### Near shadings parameter

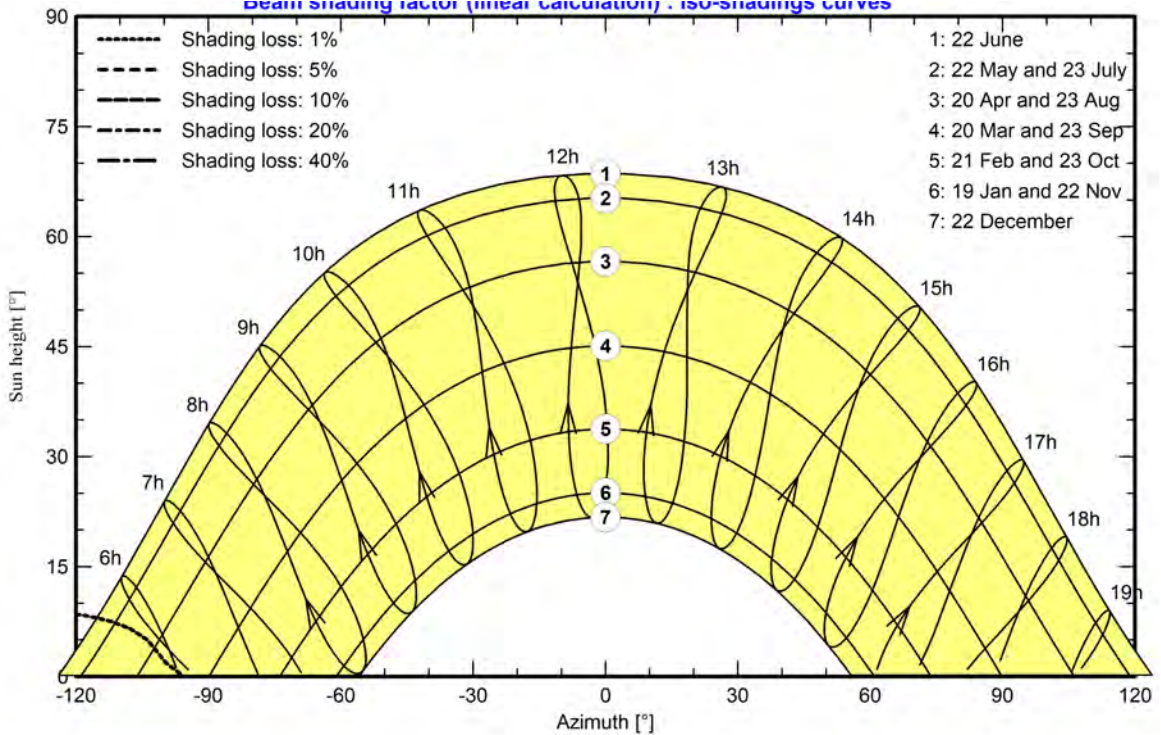
Perspective of the PV-field and surrounding shading scene



### Iso-shadings diagram

Orientation #1 -

Beam shading factor (linear calculation) - Iso-shadings curves



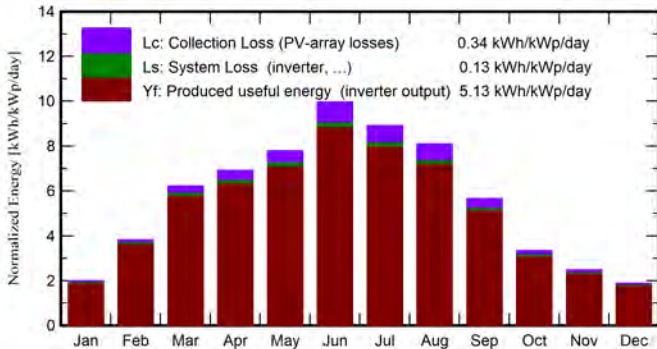


**Main results**

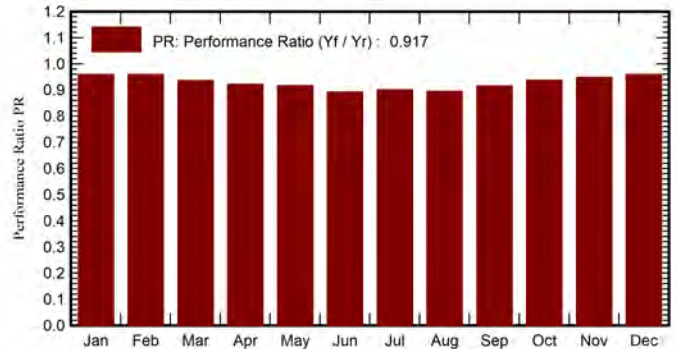
**System Production**

Produced Energy	36812 MWh/year	Specific production	1874 kWh/kWp/year
		Perf. Ratio PR	91.72 %
		Bifacial perf. ratio	86.90 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**Balances and main results**

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR	PRBifi
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	MWh	MWh	ratio	ratio
January	47.7	23.82	5.94	62.1	59.4	1205	1170	0.959	0.907
February	78.6	29.01	6.93	107.1	103.4	2063	2017	0.959	0.913
March	142.7	46.31	12.29	192.9	187.0	3626	3546	0.936	0.890
April	160.4	58.50	15.64	207.6	201.0	3851	3760	0.922	0.873
May	193.5	77.15	18.43	241.4	233.7	4451	4344	0.916	0.865
June	230.4	69.25	25.54	298.8	290.2	5361	5235	0.892	0.845
July	215.1	77.40	24.02	276.0	267.7	5003	4886	0.901	0.853
August	192.4	60.62	26.41	251.0	243.8	4516	4412	0.895	0.848
September	130.2	55.81	21.26	169.7	163.9	3121	3050	0.915	0.866
October	80.7	38.45	14.90	103.4	99.4	1955	1905	0.938	0.886
November	55.6	24.33	9.51	74.4	71.5	1423	1386	0.948	0.900
December	44.4	21.67	3.68	58.4	55.6	1135	1101	0.960	0.908
<b>Year</b>	<b>1571.8</b>	<b>582.33</b>	<b>15.42</b>	<b>2042.8</b>	<b>1976.4</b>	<b>37710</b>	<b>36812</b>	<b>0.917</b>	<b>0.869</b>

**Legends**

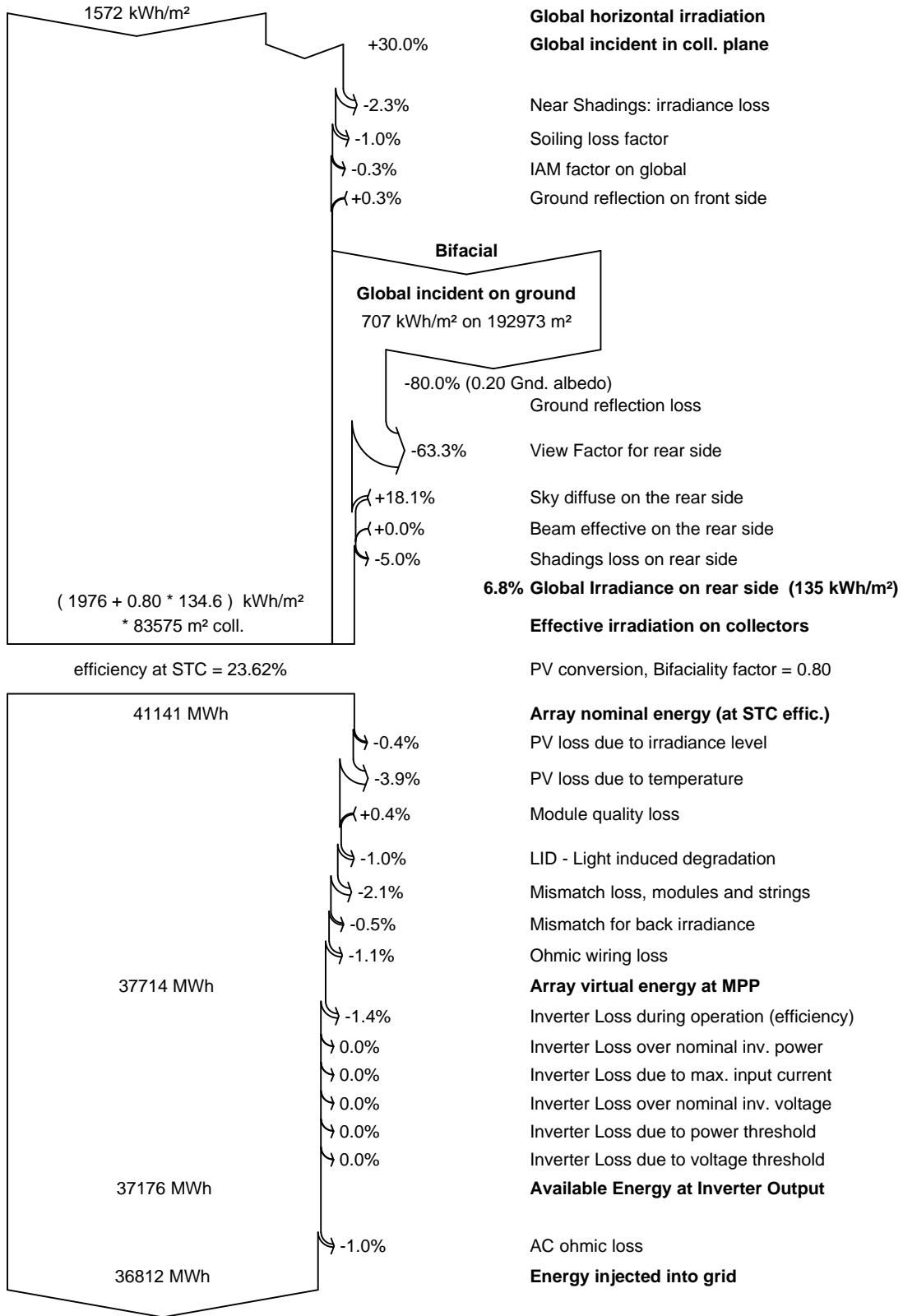
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	PRBifi	Bifacial Performance Ratio
GlobEff	Effective Global,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



PVsyst V8.0.13

VC1, Simulation date:  
23/06/25 16:53  
with V8.0.13

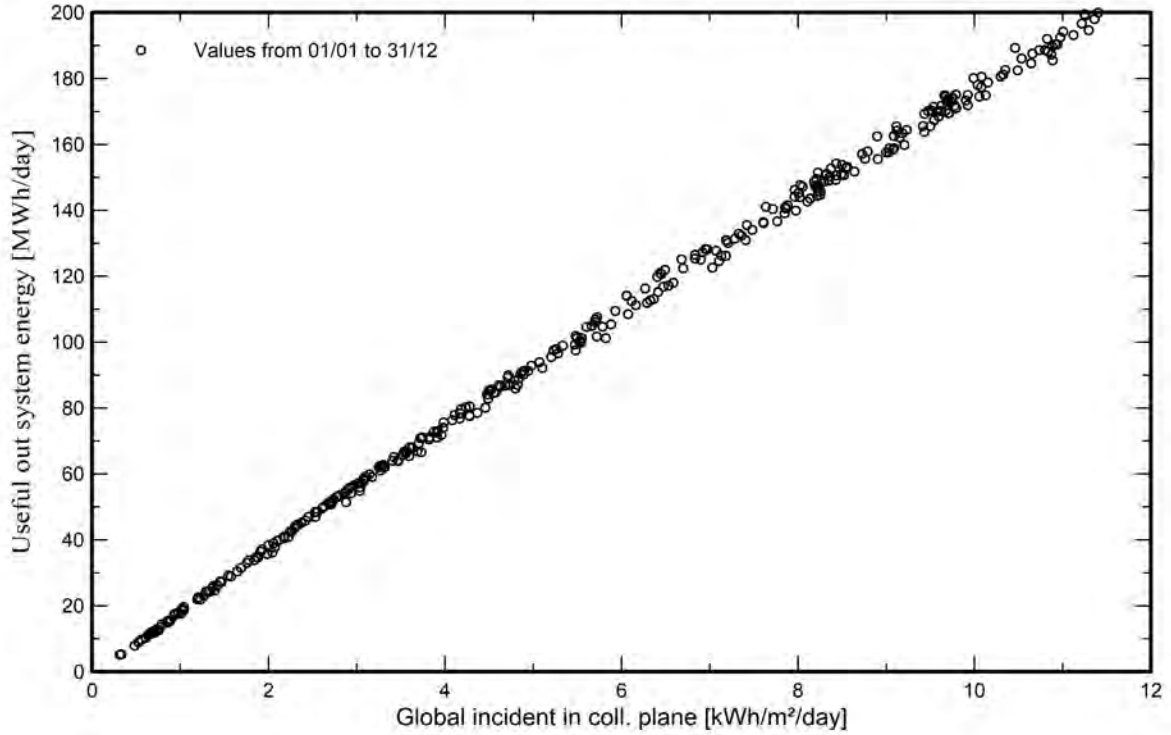
Loss diagram



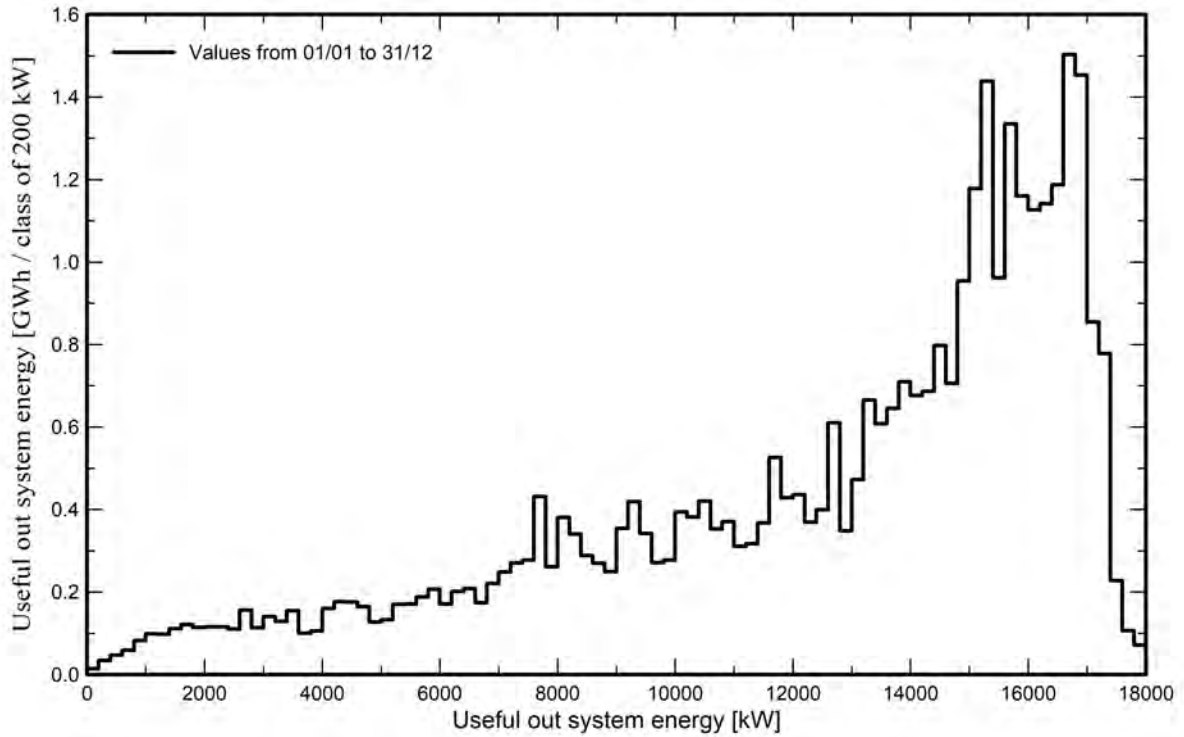


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

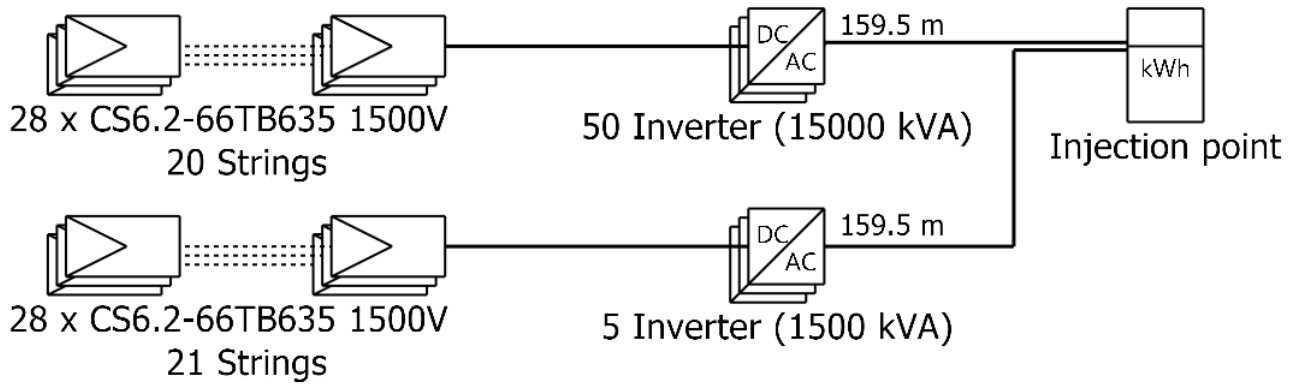




# Single-line diagram

**PVsyst V8.0.13**

VC1, Simulation date:  
23/06/25 16:53  
with V8.0.13



PV module	CS6.2-66TB635 1500V
Inverter	SUN2000-330KTL-H1
String	28 x CS6.2-66TB635 1500V

Terre del Reno

GRID SHAPE SRL (Italy)

VC1 : Sottocampo 4

14/07/25