



MINISTERO
TRANSIZIONE ECOLOGICA



REGIONE PUGLIA



PROVINCIA DI FOGGIA



COMUNE DI TROIA

NOME PROGETTO:

Costruzione ed esercizio di un impianto agrovoltaiico avente potenza in immissione pari a 32,813 MW, con relativo collegamento alla rete elettrica, sito nel Comune di Troia (FG) - Impianto "FESTA".

ID. PROGETTO DEL MITE:

PROCEDURA:

Valutazione di impatto ambientale ai sensi dell'art. 23 c. 1 del D.Lgs. 152/2006 e Autorizzazione Unica ex art. 12 D.Lgs. 387/2003.

PROPONENTE:



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VTY95R4_37_PD

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Iscrizione all'Albo n° A 2508
alla Sezione degli Ingegneri (Sez. A)

- Settore civile e ambientale
- Settore industriale
- Settore dell'informazione



TITOLO ELABORATO:

Analisi della risorsa solare e stima di produzione energia

SCALA:

-



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N. REV.	DATA	REVISIONE	ELABORATO	VERIFICATO	VALIDATO
0	Ott-2022	Emissione	Ing. Baldaconi	Ing. Bolignano	Ing. Giretti
1	-	-			
2	-	-			
3	-	-			

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PVsyst - Simulation report

Grid-Connected System

Project: Festa PV

Variant: New simulation variant

Ground system (tables) on a hill

System power: 34.57 MWp

Troia - Italy



Project: Festa PV

Variant: New simulation variant

PVsyst V7.2.19

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11/10/22 15:41
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ARATO SRL (Italy)

Project summary

Geographical Site	Situation	Project settings
Troia	Latitude 41.40 °N	Albedo 0.20
Italy	Longitude 15.31 °E	
	Altitude 250 m	
	Time zone UTC+1	
Meteo data		
Troia		
PVGIS api TMY		

System summary

Grid-Connected System	Ground system (tables) on a hill		
Simulation for year no 1			
PV Field Orientation	Near Shadings	User's needs	
Fixed plane	Linear shadings	Unlimited load (grid)	
Tilt/Azimuth 30 / -1 °			
System information			
PV Array		Inverters	
Nb. of modules 51604 units		Nb. of units 20 units	
Pnom total 34.57 MWp		Pnom total 32.81 MWac	
		Pnom ratio 1.054	

Results summary

Produced Energy 51.86 GWh/year	Specific production 1500 kWh/kWp/year	Perf. Ratio PR 83.72 %
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ARATO SRL (Italy)

General parameters

Grid-Connected System		Ground system (tables) on a hill			
PV Field Orientation		Sheds configuration		Models used	
Orientation		Nb. of sheds	2052 units	Transposition	Perez
Fixed plane		Identical arrays		Diffuse	Imported
Tilt/Azimuth	30 / -1 °	Sizes		Circumsolar	separate
		Sheds spacing	6.27 m		
		Collector width	2.63 m		
		Ground Cov. Ratio (GCR)	41.9 %		
		Shading limit angle			
		Limit profile angle	18.2 °		
Horizon		Near Shadings		User's needs	
Average Height	1.6 °	Linear shadings		Unlimited load (grid)	

PV Array Characteristics

PV module		Inverter	
Manufacturer	Trina Solar	Manufacturer	Santerno
Model	TSM-DE2	Model	Sunway TG 1800 1500V TE - 600
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	670 Wp	Unit Nom. Power	1662 kWac
Number of PV modules	8036 units	Number of inverters	3 units
Nominal (STC)	5384 kWp	Total power	4986 kWac
Array #1 - Campo #1			
Number of PV modules	2716 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	1820 kWp	Total power	1662 kWac
Modules	97 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1661 kWp	Pnom ratio (DC:AC)	1.09
U mpp	970 V		
I mpp	1713 A		
Array #2 - Campo #2			
Number of PV modules	2716 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	1820 kWp	Total power	1662 kWac
Modules	97 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1661 kWp	Pnom ratio (DC:AC)	1.09
U mpp	970 V		
I mpp	1713 A		
Array #12 - Campo #12			
Number of PV modules	2604 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	1745 kWp	Total power	1662 kWac
Modules	93 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1592 kWp	Pnom ratio (DC:AC)	1.05
U mpp	970 V		
I mpp	1642 A		



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PV Array Characteristics

PV module		Inverter	
Manufacturer	Trina Solar	Manufacturer	Santerno
Model	TSM-DE2	Model	Sunway TG 900 1500V TE - 600 (956kW)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	670 Wp	Unit Nom. Power	956 kWac
Number of PV modules	7980 units	Number of inverters	5 units
Nominal (STC)	5347 kWp	Total power	4780 kWac
Array #3 - Campo #3			
Number of PV modules	1652 units	Number of inverters	1 unit
Nominal (STC)	1107 kWp	Total power	956 kWac
Modules	59 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1010 kWp	Max. power (=>25°C)	957 kWac
U mpp	970 V	Pnom ratio (DC:AC)	1.16
I mpp	1042 A		
Array #8 - Campo #8			
Number of PV modules	1624 units	Number of inverters	1 unit
Nominal (STC)	1088 kWp	Total power	956 kWac
Modules	58 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	993 kWp	Max. power (=>25°C)	957 kWac
U mpp	970 V	Pnom ratio (DC:AC)	1.14
I mpp	1024 A		
Array #9 - Campo #9			
Number of PV modules	1624 units	Number of inverters	1 unit
Nominal (STC)	1088 kWp	Total power	956 kWac
Modules	58 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	993 kWp	Max. power (=>25°C)	957 kWac
U mpp	970 V	Pnom ratio (DC:AC)	1.14
I mpp	1024 A		
Array #11 - Campo #11			
Number of PV modules	1624 units	Number of inverters	1 unit
Nominal (STC)	1088 kWp	Total power	956 kWac
Modules	58 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	993 kWp	Max. power (=>25°C)	957 kWac
U mpp	970 V	Pnom ratio (DC:AC)	1.14
I mpp	1024 A		
Array #19 - Campo #19			
Number of PV modules	1456 units	Number of inverters	1 unit
Nominal (STC)	976 kWp	Total power	956 kWac
Modules	52 Strings x 28 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	890 kWp	Max. power (=>25°C)	957 kWac
U mpp	970 V	Pnom ratio (DC:AC)	1.02
I mpp	918 A		



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PV Array Characteristics

Array #4 - Campo #4

PV module

Manufacturer Trina Solar
Model TSM-DE2

(Custom parameters definition)

Unit Nom. Power 670 Wp
Number of PV modules 2072 units
Nominal (STC) 1388 kWp
Modules 74 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1267 kWp
U mpp 970 V
I mpp 1307 A

Inverter

Manufacturer Santerno
Model Sunway TG 1800 1500V TE - 600 (1350kW)

(Custom parameters definition)

Unit Nom. Power 1350 kWac
Number of inverters 2 * MPPT 50% 1 unit
Total power 1350 kWac
Operating voltage 860-1200 V
Max. power (=>25°C) 1871 kWac
Pnom ratio (DC:AC) 1.03

Array #5 - Campo #5

PV module

Manufacturer Trina Solar
Model TSM-DE2

(Custom parameters definition)

Unit Nom. Power 670 Wp
Number of PV modules 1316 units
Nominal (STC) 882 kWp
Modules 47 Strings x 28 In series

At operating cond. (50°C)

Pmpp 805 kWp
U mpp 970 V
I mpp 830 A

Inverter

Manufacturer Santerno
Model SUNWAY TG 900 1500V TE - 600

(Custom parameters definition)

Unit Nom. Power 831 kWac
Number of inverters 1 unit
Total power 831 kWac
Operating voltage 860-1200 V
Max. power (=>25°C) 936 kWac
Pnom ratio (DC:AC) 1.06

PV module

Manufacturer Trina Solar
Model TSM-DE2

(Custom parameters definition)

Unit Nom. Power 670 Wp
Number of PV modules 20944 units
Nominal (STC) 14.03 MWp

Inverter

Manufacturer Santerno
Model Sunway TG 1800 1500V TE - 690

(Custom parameters definition)

Unit Nom. Power 1912 kWac
Number of inverters 7 units
Total power 13384 kWac

Array #6 - Campo #6

Number of PV modules 2856 units
Nominal (STC) 1914 kWp
Modules 102 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1747 kWp
U mpp 970 V
I mpp 1801 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.00

Array #13 - Campo #13

Number of PV modules 3080 units
Nominal (STC) 2064 kWp
Modules 110 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1884 kWp
U mpp 970 V
I mpp 1942 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.08



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PV Array Characteristics

Array #14 - Campo #14

Number of PV modules 3080 units
Nominal (STC) 2064 kWp
Modules 110 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1884 kWp
U mpp 970 V
I mpp 1942 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.08

Array #15 - Campo #15

Number of PV modules 3080 units
Nominal (STC) 2064 kWp
Modules 110 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1884 kWp
U mpp 970 V
I mpp 1942 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.08

Array #16 - Campo #16

Number of PV modules 2856 units
Nominal (STC) 1914 kWp
Modules 102 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1747 kWp
U mpp 970 V
I mpp 1801 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.00

Array #18 - Campo #18

Number of PV modules 2968 units
Nominal (STC) 1989 kWp
Modules 106 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1815 kWp
U mpp 970 V
I mpp 1872 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.04

Array #20 - Campo #20

Number of PV modules 3024 units
Nominal (STC) 2026 kWp
Modules 108 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1849 kWp
U mpp 970 V
I mpp 1907 A

Number of inverters 2 * MPPT 50% 1 unit
Total power 1912 kWac

Operating voltage 690-1200 V
Max. power (=>25°C) 2151 kWac
Pnom ratio (DC:AC) 1.06

PV module

Manufacturer Trina Solar
Model TSM-DE2
(Custom parameters definition)

Unit Nom. Power 670 Wp
Number of PV modules 11256 units
Nominal (STC) 7542 kWp

Inverter

Manufacturer Santerno
Model SUNWAY STATION TG1800&900-1500V-TE 600 (2494kW)
(Custom parameters definition)

Unit Nom. Power 2494 kWac
Number of inverters 3 units
Total power 7482 kWac



PV Array Characteristics

Array #7 - Campo #7			
Number of PV modules	3724 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	2495 kWp	Total power	2494 kWac
Modules	133 Strings x 28 In series		
At operating cond. (50°C)			
Pmpp	2277 kWp	Operating voltage	860-1200 V
U mpp	970 V	Max. power (=>25°C)	2494 kWac
I mpp	2348 A	Pnom ratio (DC:AC)	1.00
Array #10 - Campo #10			
Number of PV modules	3808 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	2551 kWp	Total power	2494 kWac
Modules	136 Strings x 28 In series		
At operating cond. (50°C)			
Pmpp	2329 kWp	Operating voltage	860-1200 V
U mpp	970 V	Max. power (=>25°C)	2494 kWac
I mpp	2401 A	Pnom ratio (DC:AC)	1.02
Array #17 - Campo #17			
Number of PV modules	3724 units	Number of inverters	2 * MPPT 50% 1 unit
Nominal (STC)	2495 kWp	Total power	2494 kWac
Modules	133 Strings x 28 In series		
At operating cond. (50°C)			
Pmpp	2277 kWp	Operating voltage	860-1200 V
U mpp	970 V	Max. power (=>25°C)	2494 kWac
I mpp	2348 A	Pnom ratio (DC:AC)	1.00
Total PV power		Total inverter power	
Nominal (STC)	34575 kWp	Total power	32813 kWac
Total	51604 modules	Number of inverters	20 units
Module area	160300 m ²	Pnom ratio	1.05

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)	29.0 W/m ² K	Loss Fraction	0.1 % at STC			
		Uv (wind)	0.0 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): 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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ARATO SRL (Italy)

DC wiring losses

Global wiring resistance	0.49 mΩ		
Loss Fraction	1.5 % at STC		
Array #1 - Campo #1			
Global array res.	9.3 mΩ	Array #2 - Campo #2	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #3 - Campo #3			
Global array res.	15 mΩ	Array #4 - Campo #4	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #5 - Campo #5			
Global array res.	19 mΩ	Array #6 - Campo #6	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #7 - Campo #7			
Global array res.	6.8 mΩ	Array #8 - Campo #8	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #9 - Campo #9			
Global array res.	16 mΩ	Array #10 - Campo #10	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #11 - Campo #11			
Global array res.	16 mΩ	Array #12 - Campo #12	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #13 - Campo #13			
Global array res.	8.2 mΩ	Array #14 - Campo #14	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #15 - Campo #15			
Global array res.	8.2 mΩ	Array #16 - Campo #16	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #17 - Campo #17			
Global array res.	6.8 mΩ	Array #18 - Campo #18	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction
Array #19 - Campo #19			
Global array res.	17 mΩ	Array #20 - Campo #20	Global array res.
Loss Fraction	1.5 % at STC		Loss Fraction

System losses

Auxiliaries loss	
constant (fans)	32.7 kW
0.0 kW from Power thresh.	

AC wiring losses

Inv. output line up to MV transfo	
Inverter voltage	600 Vac tri
Loss Fraction	1.00 % at STC
Inverters: Sunway TG 1800 1500V TE - 600, Sunway TG 900 1500V TE - 600 (956kW), Sunway TG 1800 1500V TE - 600 (1350kW), SUNWAY TG 900	
Wire section (20 Inv.)	Copper 20 x 3 x 10000 mm ²
Average wires length	1363 m
MV line up to Injection	
MV Voltage	20 kV
Wires	Copper 3 x 1000 mm ²
Length	629 m
Loss Fraction	0.10 % at STC



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ARATO SRL (Italy)

AC losses in transformers

MV transfo

Grid voltage 20 kV

Operating losses at STC

Nominal power at STC 34053 kVA

Iron loss (24/24 Connexion) 33.71 kW

Loss Fraction 0.10 % at STC

Coils equivalent resistance 3 x 0.11 mΩ

Loss Fraction 1.00 % at STC



Horizon definition

Horizon from PVGIS website API, Lat=41°23'54', Long=15°18'48', Alt=250m

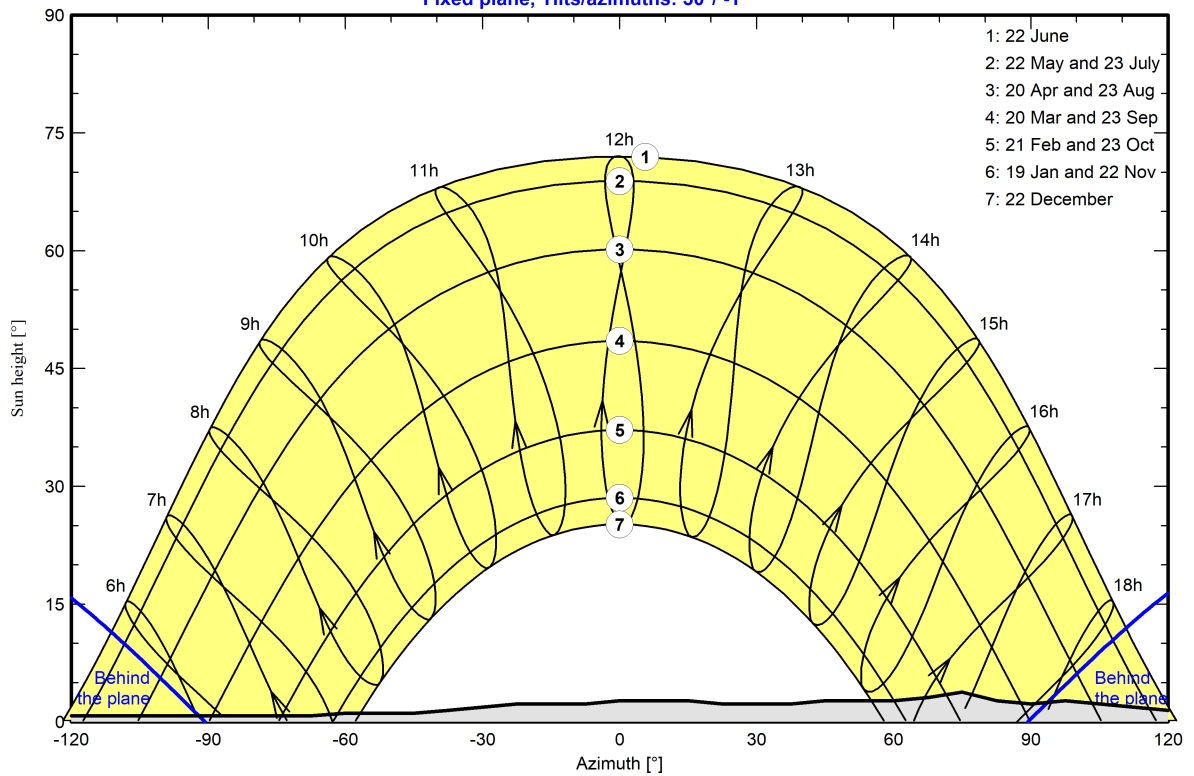
Average Height	1.6 °	Albedo Factor	0.89
Diffuse Factor	0.98	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-150	-143	-68	-60	-45	-38	-30
Height [°]	1.1	0.8	0.4	0.4	0.8	0.8	1.1	1.1	1.5	1.9
Azimuth [°]	-23	-8	0	15	23	38	45	60	68	75
Height [°]	2.3	2.3	2.7	2.7	2.3	2.3	2.7	2.7	3.1	3.8
Azimuth [°]	83	90	98	105	113	120	165	173	180	
Height [°]	2.7	2.3	2.7	2.3	1.9	1.5	1.5	1.1	1.1	

Sun Paths (Height / Azimuth diagram)

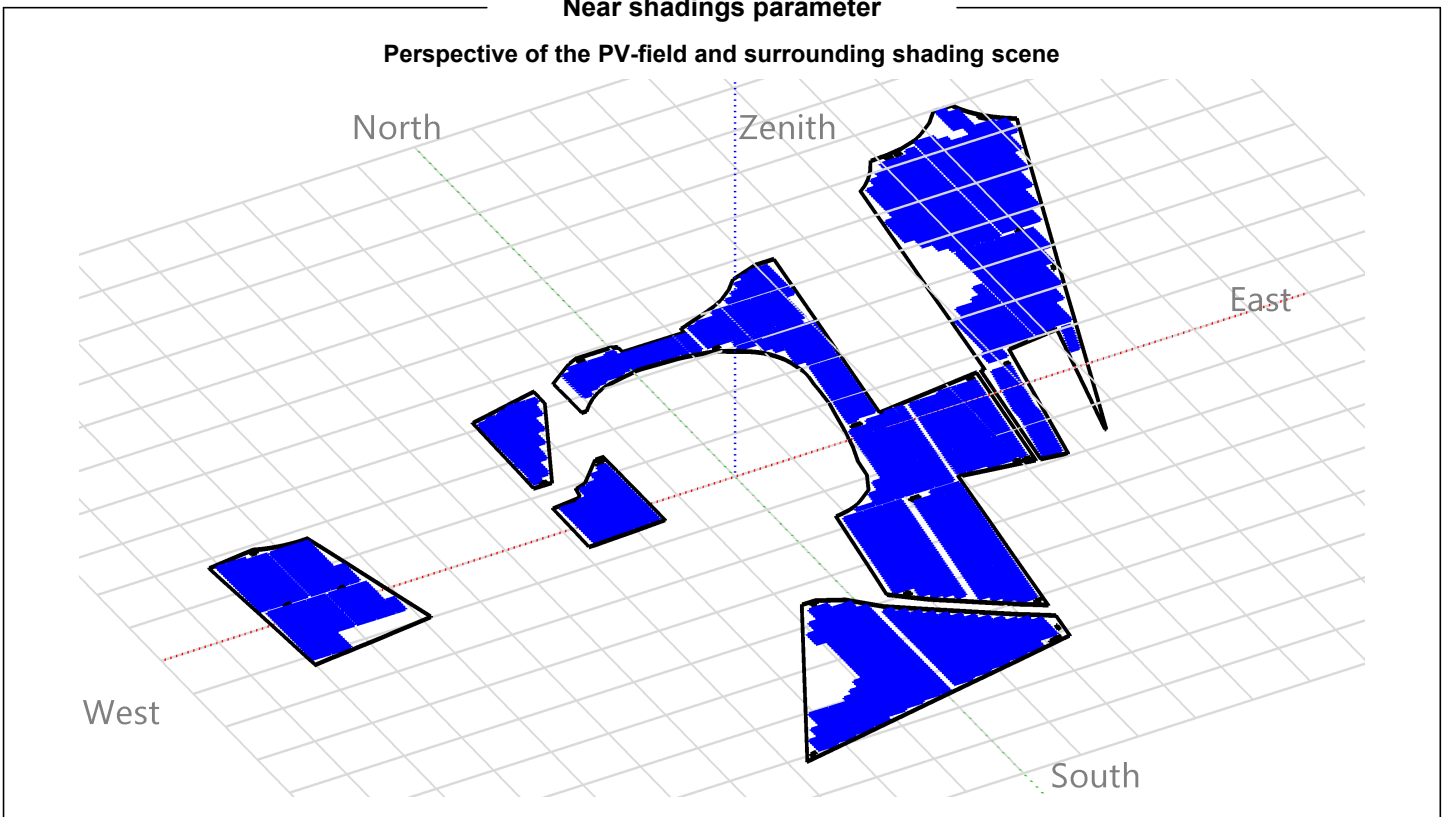
Fixed plane, Tilts/azimuths: 30°/ -1°





Near shadings parameter

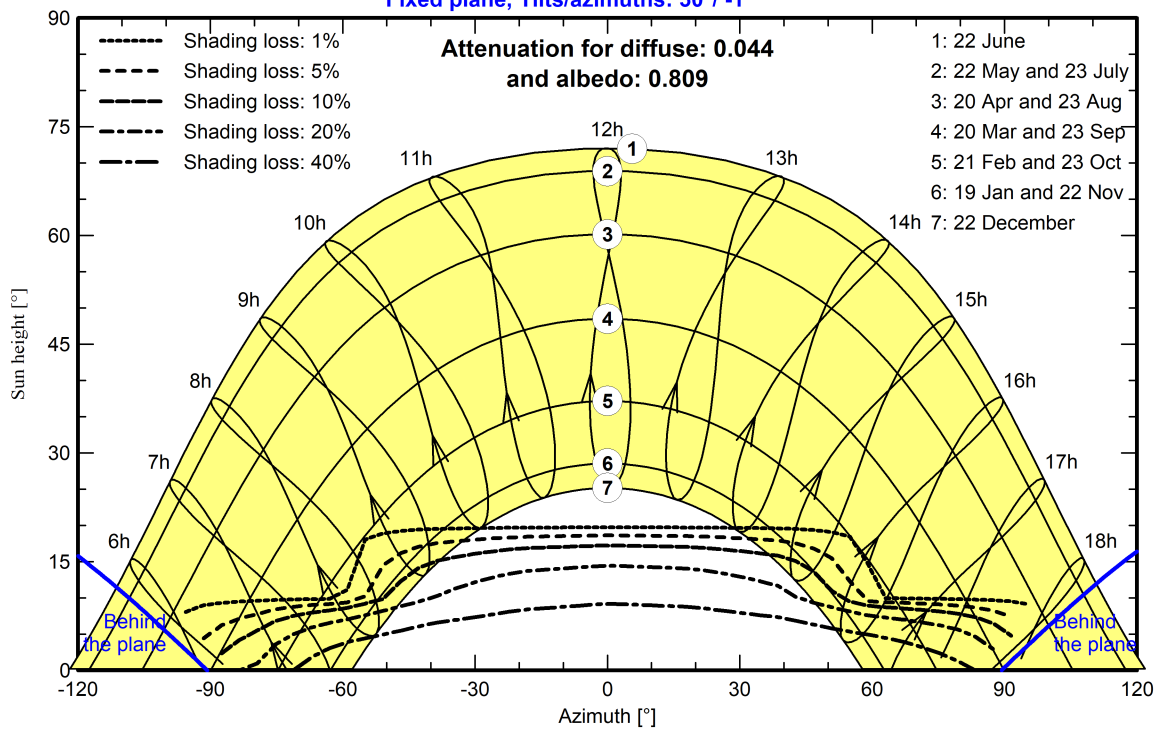
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 30°/ -1°



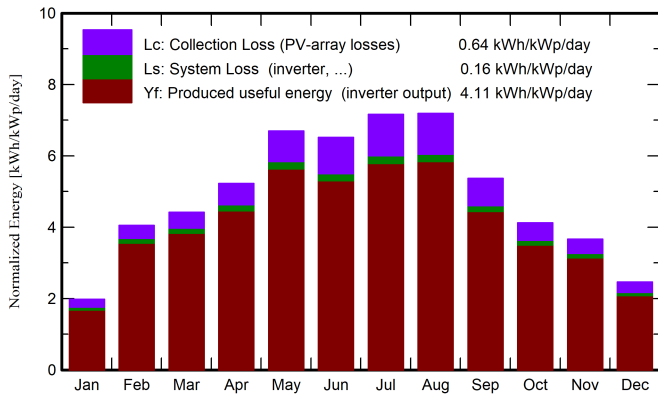


Main results

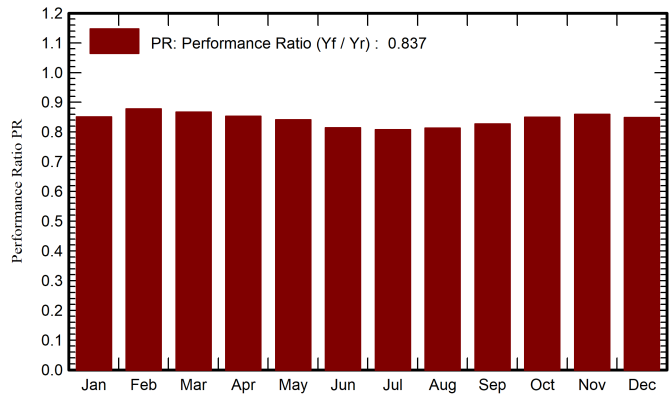
System Production

Produced Energy 51.86 GWh/year Specific production 1500 kWh/kWp/year
Performance Ratio PR 83.72 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

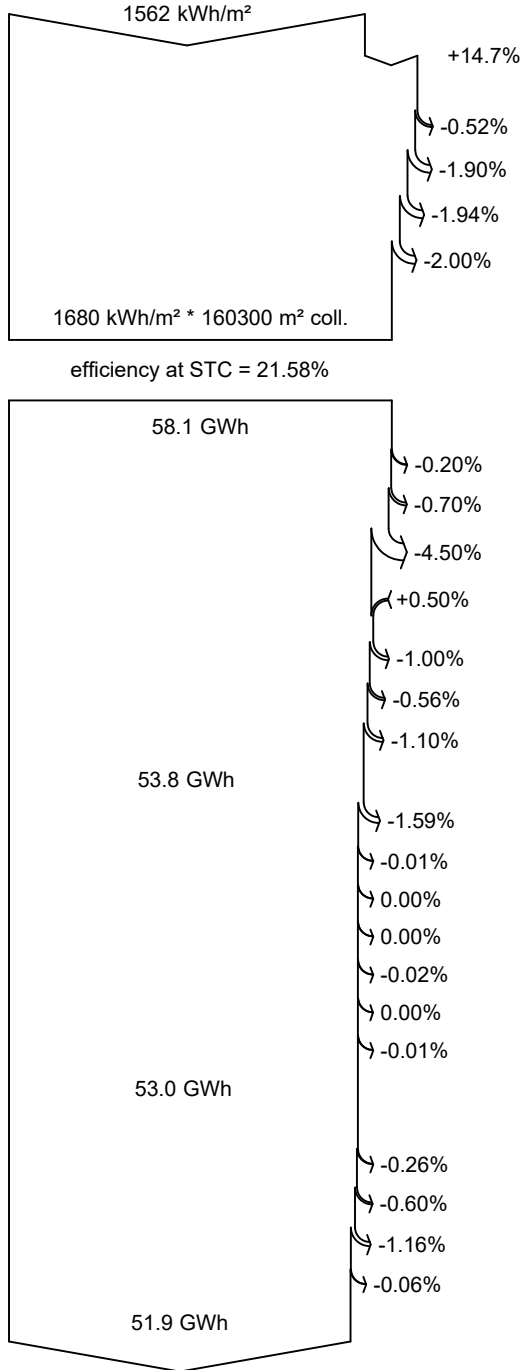
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray GWh	E_Grid GWh	PR ratio
January	41.4	26.01	8.09	61.3	55.9	1.891	1.803	0.851
February	79.3	35.17	7.19	113.3	106.8	3.572	3.440	0.878
March	111.4	51.49	9.28	136.9	128.5	4.262	4.107	0.868
April	143.1	68.46	13.50	156.9	147.2	4.804	4.630	0.854
May	206.0	70.22	16.78	207.7	195.5	6.263	6.039	0.841
June	203.5	75.11	23.32	195.5	183.1	5.709	5.505	0.814
July	224.9	65.81	26.15	222.0	208.9	6.433	6.203	0.808
August	207.0	62.37	25.40	222.8	210.3	6.485	6.262	0.813
September	135.4	53.99	21.58	161.2	151.9	4.782	4.611	0.827
October	95.6	42.20	15.34	127.8	120.4	3.900	3.758	0.850
November	68.1	29.49	12.39	109.8	102.3	3.389	3.266	0.860
December	45.9	23.91	8.47	76.2	69.4	2.336	2.236	0.848
Year	1561.6	604.20	15.67	1791.5	1680.1	53.827	51.858	0.837

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



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

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

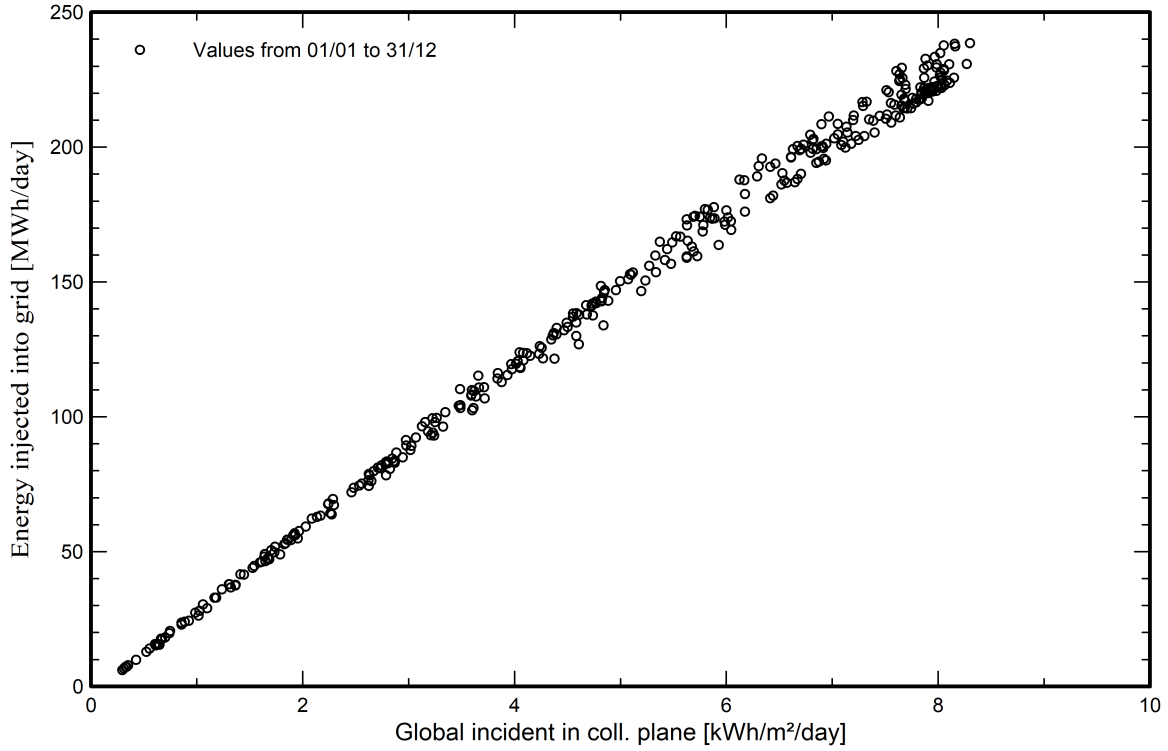
MV line ohmic loss

Energy injected into grid

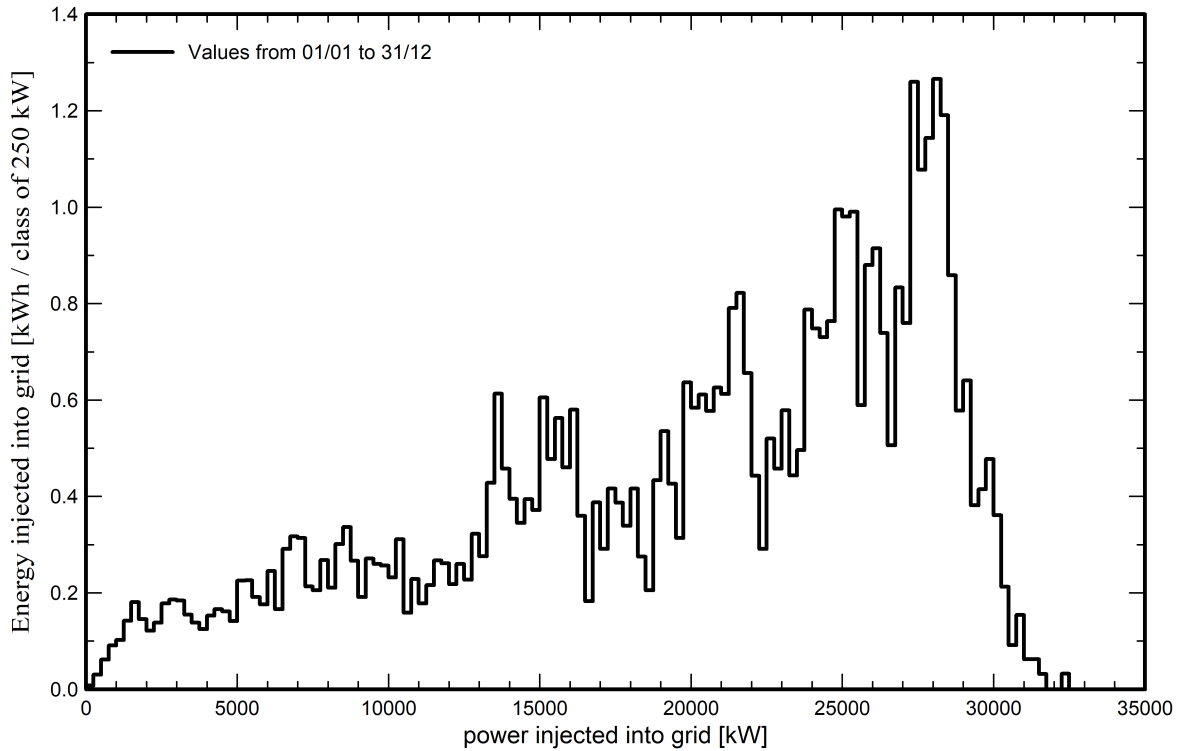


Special graphs

Daily Input/Output diagram



System Output Power Distribution





PVsyst V7.2.19

VCO, Simulation date:
11/10/22 15:41
with v7.2.19

ARATO SRL (Italy)

Aging Tool

Aging Parameters

Time span of simulation 30 years

Module average degradation

Loss factor 0.4 %/year

Mismatch due to degradation

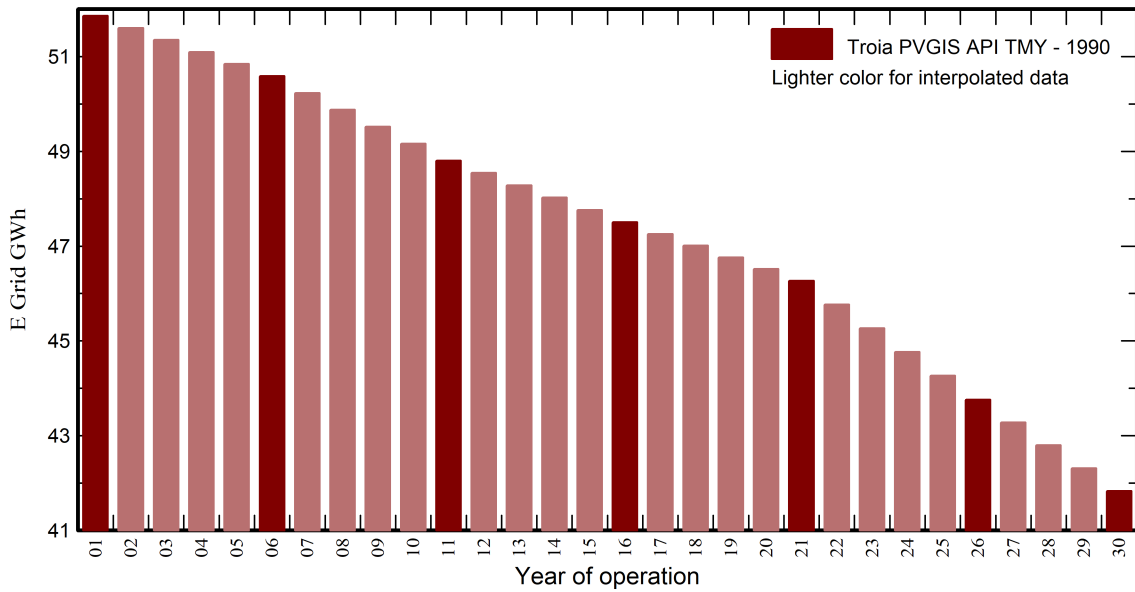
Imp RMS dispersion 0.4 %/year
Vmp RMS dispersion 0.4 %/year

Meteo used in the simulation

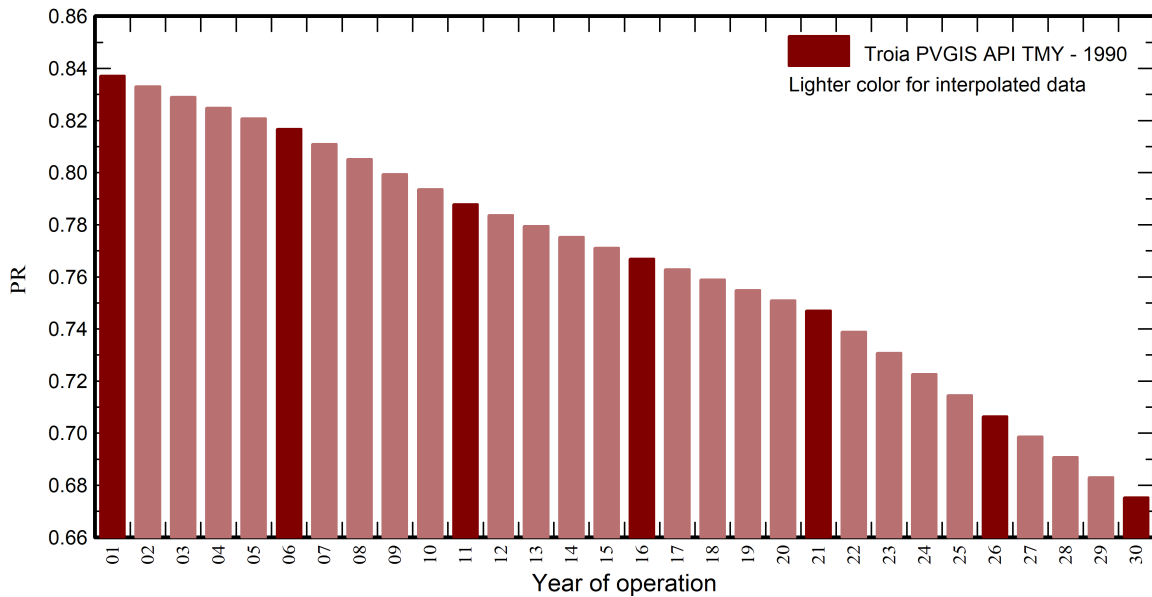
#1 Troia PVGIS API TMY

Years 1990 (reference year)
Years simulated 1,6,11,16,21,26,30

Energy injected into grid



Performance Ratio





PVsyst V7.2.19

VCO, Simulation date:
11/10/22 15:41
with v7.2.19

ARATO SRL (Italy)

Aging Tool

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Meteo used in the simulation

#1 Troia PVGIS API TMY

Years 1990 (reference year)

Years simulated 1,6,11,16,21,26,30

Troia PVGIS API TMY

Year	E Grid GWh	PR	PR loss %
1	51.86	0.837	0%
2	51.60	0.833	-0.5%
3	51.35	0.829	-1%
4	51.10	0.825	-1.5%
5	50.84	0.821	-2%
6	50.59	0.817	-2.4%
7	50.23	0.811	-3.1%
8	49.87	0.805	-3.8%
9	49.52	0.799	-4.5%
10	49.16	0.794	-5.2%
11	48.80	0.788	-5.9%
12	48.54	0.784	-6.4%
13	48.28	0.78	-6.9%
14	48.02	0.775	-7.4%
15	47.76	0.771	-7.9%
16	47.50	0.767	-8.4%
17	47.26	0.763	-8.9%
18	47.01	0.759	-9.3%
19	46.76	0.755	-9.8%
20	46.52	0.751	-10.3%
21	46.27	0.747	-10.8%
22	45.77	0.739	-11.7%
23	45.27	0.731	-12.7%
24	44.76	0.723	-13.7%
25	44.26	0.715	-14.6%
26	43.76	0.706	-15.6%
27	43.28	0.699	-16.5%
28	42.79	0.691	-17.5%
29	42.31	0.683	-18.4%
30	41.83	0.675	-19.3%



Predef. graphs

Normalized Production and Loss Factors

