PVsyst - Simulation report

Grid-Connected System

Project: Organize yanı New Project

Variant: New simulation variant

Sheds system

System power: 240 kWp

Büyüktüysüz - Turkey

Author

PVsyst V8.0.0
VC0, Simulation date:
19/04/25 04:58
with V8.0.0

Project summary

Geographical Site
Büyüktüysüz
Turkey

Situation

Latitude	36.99 °N
Longitude	36.11 °E
Altitude	74 m
Time zone	UTC+3

Project settings
Albedo 0.20

Weather data
Büyüktüysüz
Meteonorm 8.2 (2006-2013), Sat=100% - Synthetic

System summary

Grid-Connected System

Sheds system

Orientation #1
Fixed plane
Tilt/Azimuth 24 / 0 °

Near Shadings
According to strings : Fast (table)
Electrical effect 100 %

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	437 units
Pnom total	240 kWp

Inverters

Nb. of units	2 units
Pnom total	200 kWac
Pnom ratio	1.202

Results summary

Produced Energy	365020 kWh/year	Specific production	1519 kWh/kWp/year	Perf. Ratio PR	78.85 %

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General parameters

Grid-Connected System

Sheds system

Orientation #1

Fixed plane
Tilt/Azimuth 24 / 0 °

Sheds configuration
The widths of the trackers are not identical. As a result, some mutual shadings may be present.
Nb. of sheds 437 units
Identical arrays

Shading limit angle
Limit profile angle 15.5 °

Sizes

Sheds spacing	2.70 m
Collector width	1.11 m
Average GCR	41.2 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height 16.1 °

Near Shadings

According to strings : Fast (table)
Electrical effect 100 %

User's needs

Unlimited load (grid)

PV Array Characteristics

Array #1 - PV Array

PV module

Manufacturer	Generic
Model	JAM72-S30-550-MR
(Original PVsyst database)	
Unit Nom. Power	550 Wp
Number of PV modules	221 units
Nominal (STC)	122 kWp
Modules	17 string x 13 In series
At operating cond. (50°C)	
Pmpp	112 kWp
U mpp	494 V
I mpp	226 A

Inverter

Manufacturer	Generic
Model	Sirio K100
(Original PVsyst database)	
Unit Nom. Power	100 kWac
Number of inverters	1 unit
Total power	100 kWac
Operating voltage	330-700 V
Pnom ratio (DC:AC)	1.22

Array #2 - Sub-array #2

PV module

Manufacturer	Generic
Model	TSM-DE19-550Wp Vertex
(Original PVsyst database)	
Unit Nom. Power	550 Wp
Number of PV modules	216 units
Nominal (STC)	119 kWp
Modules	12 string x 18 In series
At operating cond. (50°C)	
Pmpp	109 kWp
U mpp	515 V
I mpp	211 A

Inverter

Manufacturer	Generic
Model	Sirio K100
(Original PVsyst database)	
Unit Nom. Power	100 kWac
Number of inverters	1 unit
Total power	100 kWac
Operating voltage	330-700 V
Pnom ratio (DC:AC)	1.19

Total PV power

Nominal (STC)	240 kWp
Total	437 modules
Module area	1135 m²

Total inverter power

Total power	200 kWac
Number of inverters	2 units
Pnom ratio	1.20

Array losses

Thermal Loss factor

Module temperature according to irradiance

Uc (const)	20.0 W/m²K
Uv (wind)	0.0 W/m²K/m/s

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.2 %

Module Quality Loss

Array #1 - PV Array

Loss Fraction -0.8 %

Array #2 - Sub-array #2

Loss Fraction -0.3 %

IAM loss factor - Array #1

Incidence effect (IAM): User defined profile

0°	30°	50°	65°	70°	75°	80°	85°	90°
1.000	1.000	0.999	0.953	0.910	0.853	0.725	0.448	0.000

IAM loss factor - Array #2

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	0.963	0.892	0.814	0.679	0.438	0.000

DC wiring losses

Global wiring resistance 10 mΩ
Loss Fraction 1.5 % at STC

Array #1 - PV Array

Global array res. 36 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sub-array #2

Global array res. 40 mΩ
Loss Fraction 1.5 % at STC

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Horizon definition

Horizon line at Büyüktüysüz

Average Height	16.1 °	Albedo Factor	0.25
Diffuse Factor	0.89	Albedo Fraction	100 %

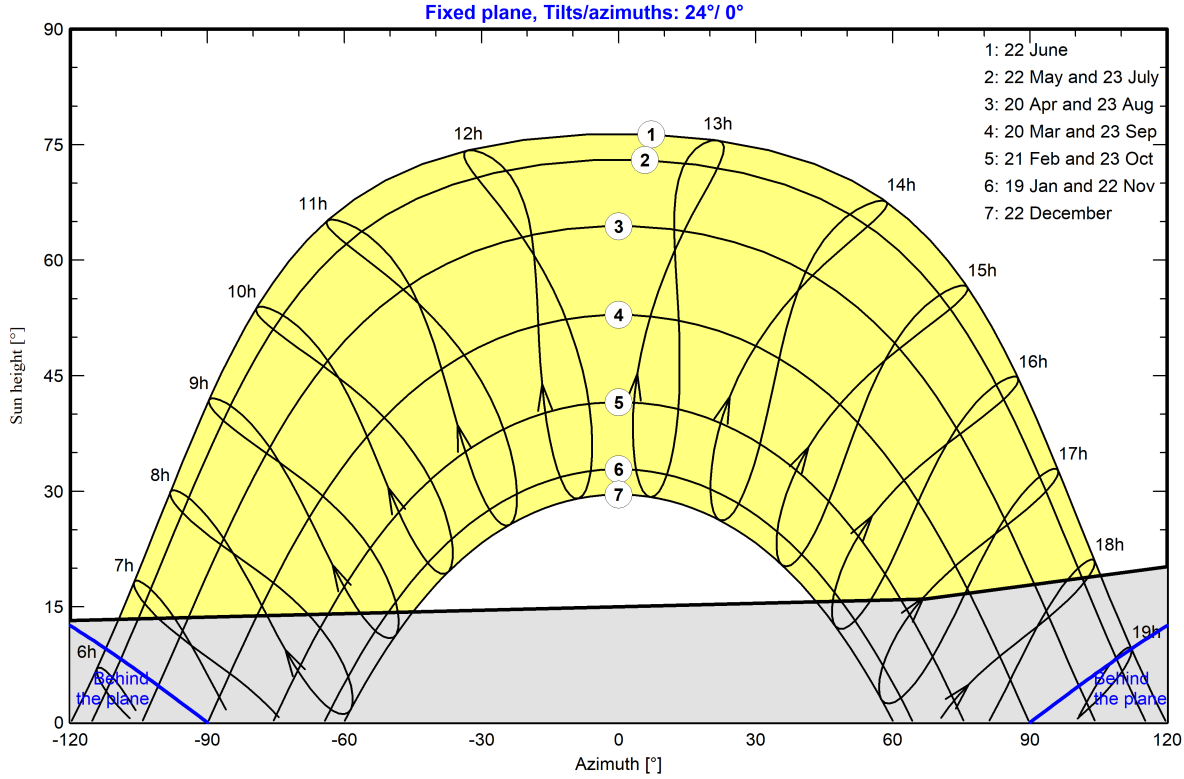
Horizon profile

Azimuth [°]	-168	-147	67	130
Height [°]	41.0	12.8	16.0	21.0

Sun Paths (Height / Azimuth diagram)

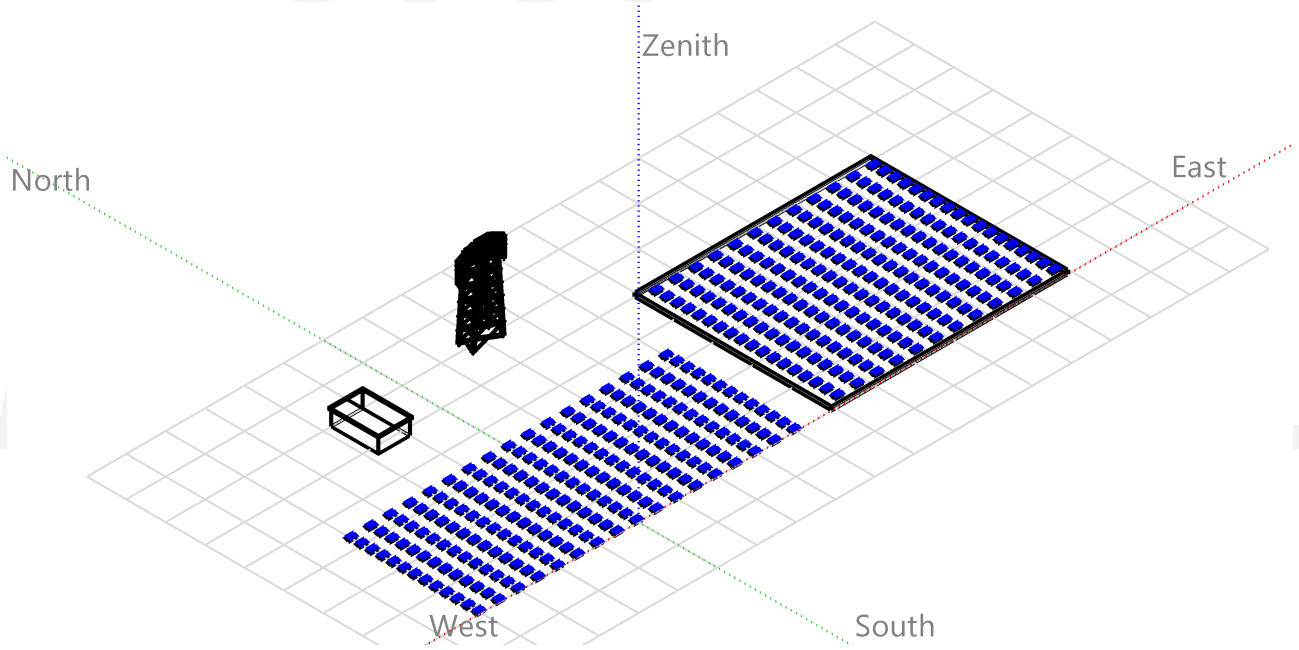
Orientation #1

Fixed plane, Tilts/azimuths: 24°/ 0°



Near shadings parameter

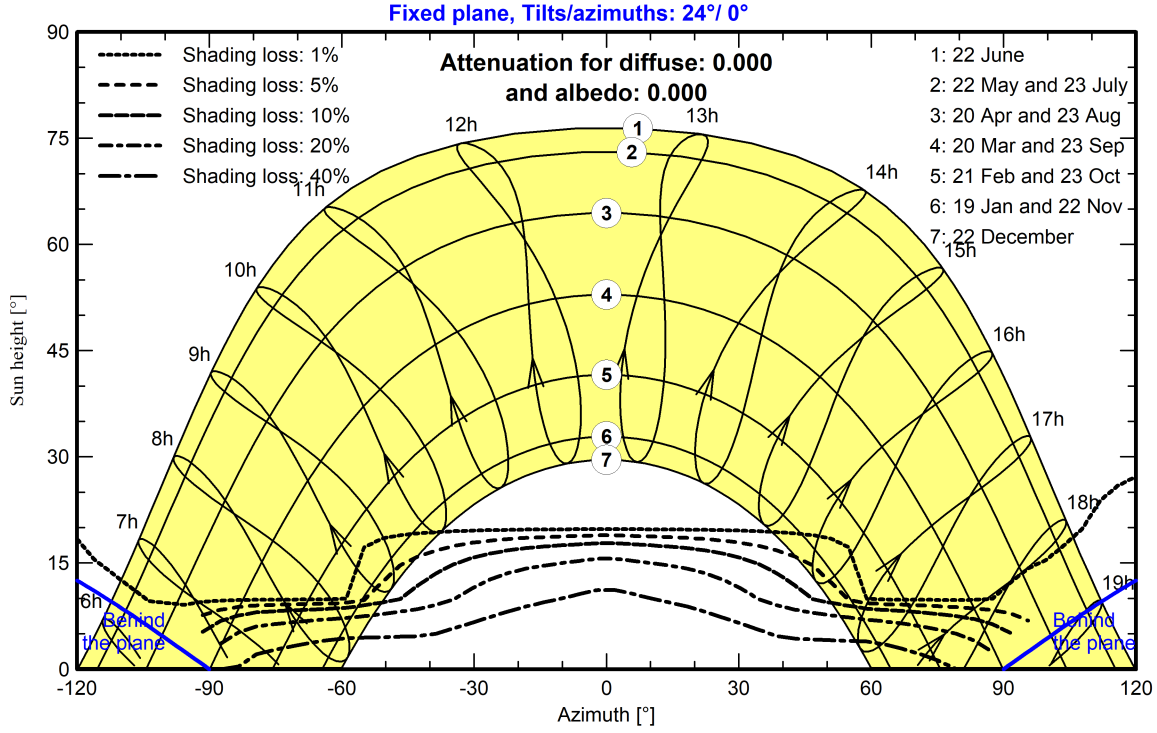
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 24°/ 0°



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Main results

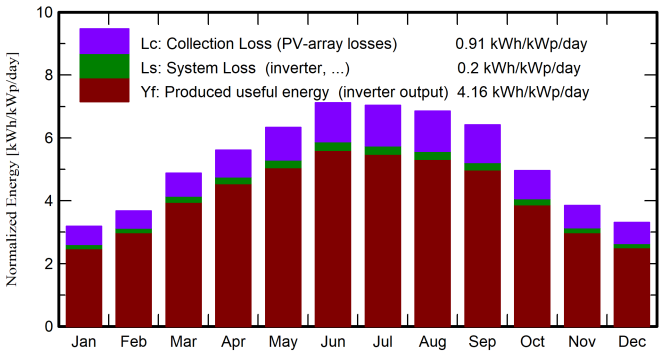
System Production

Produced Energy	365020 kWh/year	Specific production	1519 kWh/kWp/year
		Perf. Ratio PR	78.85 %

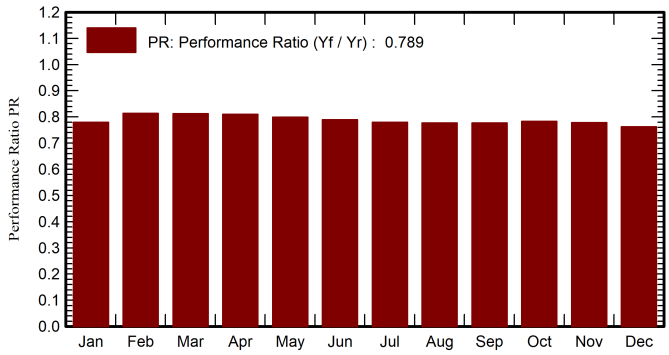
Economic evaluation

Investment		Yearly cost		LCOE	
Global	7,406,100.00 TRY	Annuities	0.00 TRY/yr	Energy cost	1.16 TRY/kWh
Specific	30.8 TRY/Wp	Run. costs	425,000.00 TRY/yr		
		Payback period	Unprofitable		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh	E_Grid kWh	PR ratio
January	69.2	34.09	9.56	98.9	85.8	19485	18537	0.780
February	81.0	44.05	11.33	102.8	93.8	21119	20124	0.814
March	129.3	58.15	14.76	151.3	141.1	30978	29536	0.812
April	157.6	78.87	17.92	168.3	157.7	34373	32794	0.811
May	197.0	85.20	22.40	196.4	185.3	39527	37727	0.799
June	220.8	78.29	26.12	213.4	202.7	42411	40471	0.789
July	222.3	77.75	29.24	218.2	207.4	42847	40884	0.780
August	202.3	70.18	29.88	212.4	201.9	41559	39663	0.777
September	165.7	52.02	26.54	192.5	181.0	37663	35950	0.777
October	120.3	47.19	22.41	153.8	142.4	30341	28946	0.783
November	81.3	33.95	16.26	115.6	103.0	22682	21623	0.778
December	67.6	31.16	11.31	102.5	87.3	19702	18765	0.762
Year	1714.4	690.89	19.86	1926.0	1789.4	382687	365020	0.789

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		

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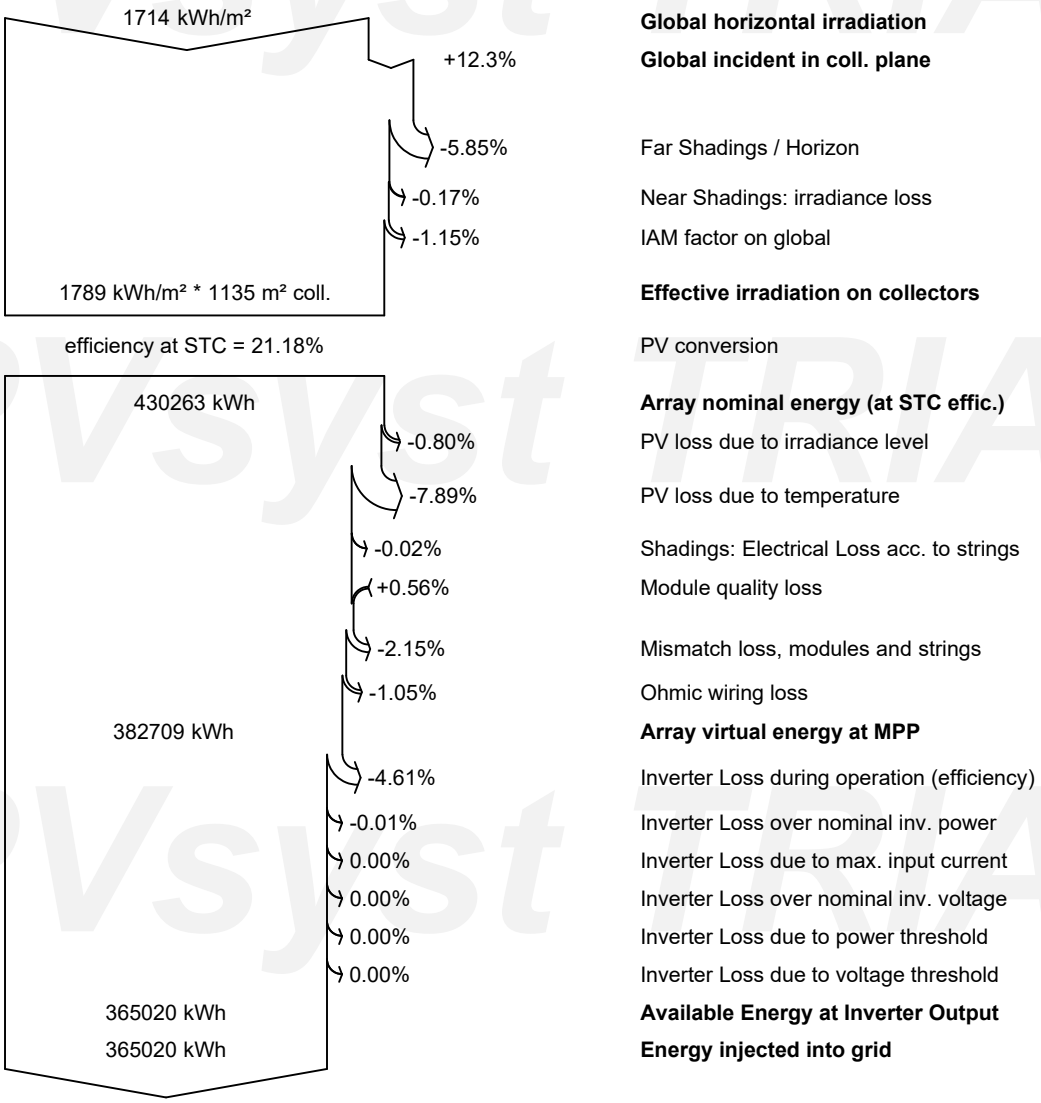
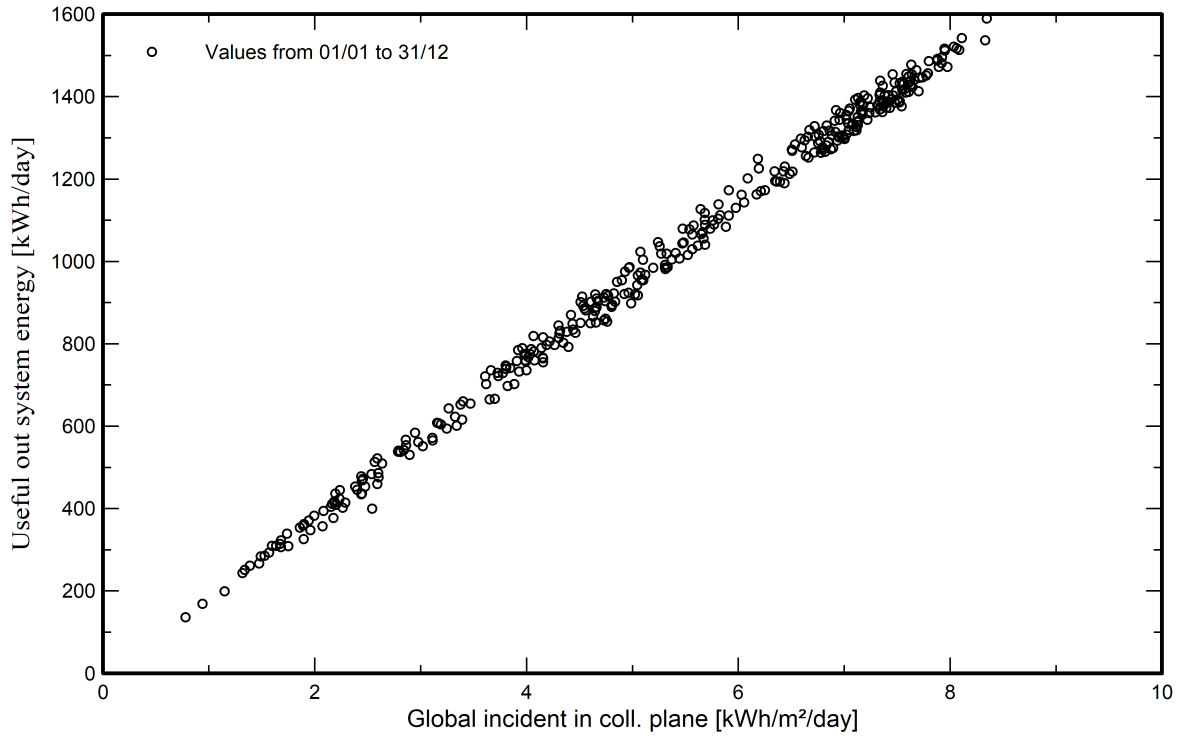
Loss diagram

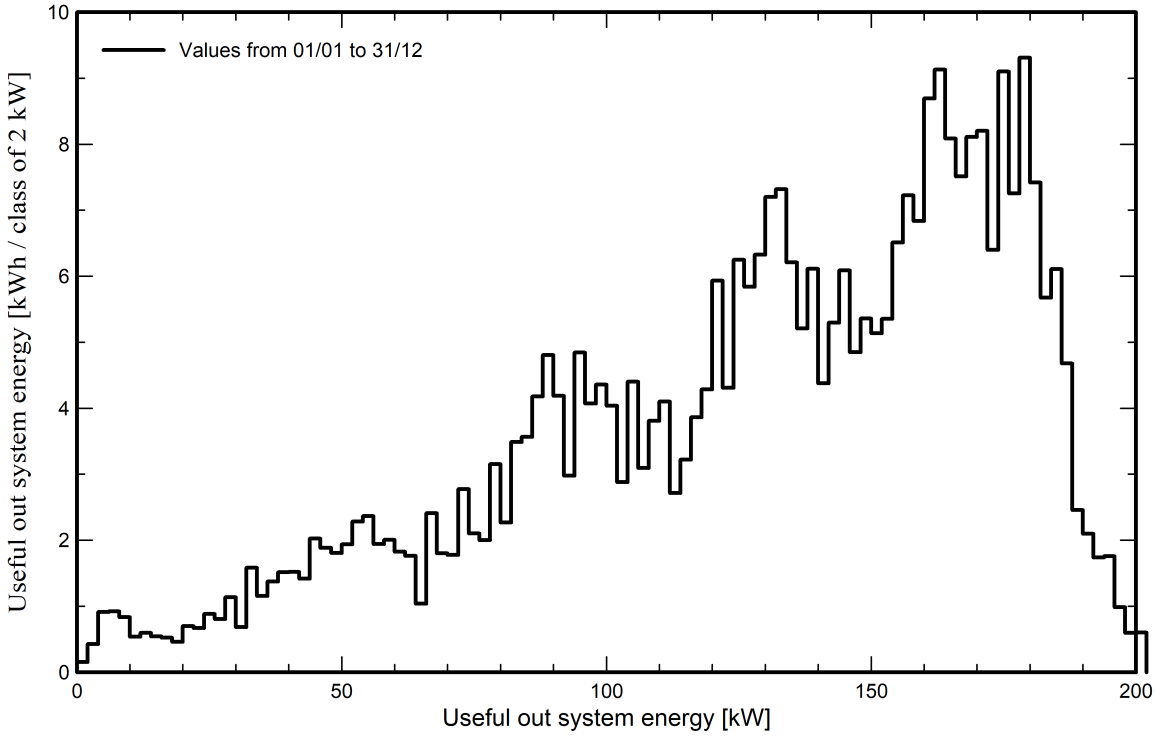


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



Single-line diagram

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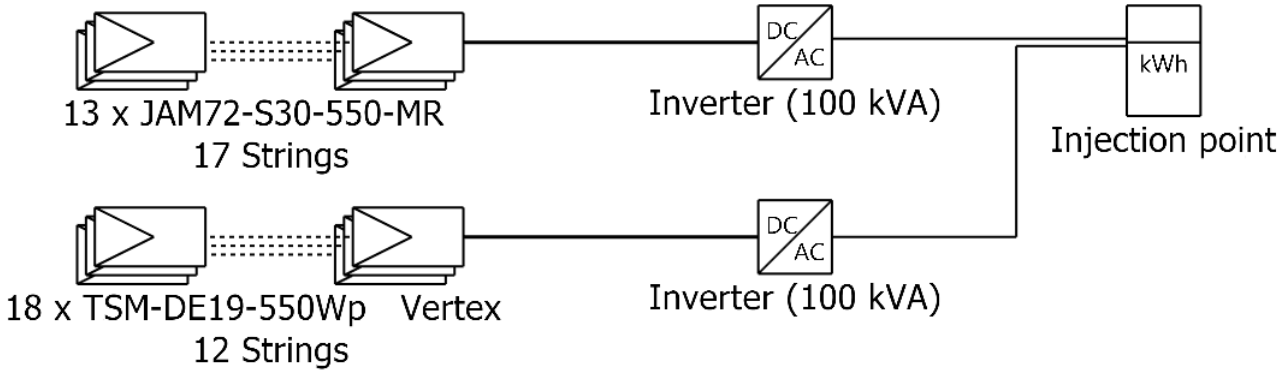

PV module 1	JAM72-S30-550-MR
PV module 2	TSM-DE19-550Wp Vertex
Inverter	Sirio K100
String 1	13 x JAM72-S30-550-MR
String 2	18 x TSM-DE19-550Wp Vertex

	Organize yanı New Project	
	VC0 : New simulation variant	19/04/25

Cost of the system

Installation costs

Item	Quantity units	Cost TRY	Total TRY
PV modules			
JAM72-S30-550-MR	221	4,000.00	884,000.00
TSM-DE19-550Wp Vertex	216	4,300.00	928,800.00
Supports for modules	437	400.00	174,800.00
Inverters			
Sirio K100	2	145,000.00	290,000.00
Other components			
Wiring	1	500,000.00	500,000.00
Combiner box	1	50,000.00	50,000.00
Monitoring system, display screen	1	400,000.00	400,000.00
Measurement system, pyranometer	1	100,000.00	100,000.00
Surge arrester	1	400,000.00	400,000.00
Studies and analysis			
Engineering	1	100,000.00	100,000.00
Permitting and other admin. Fees	1	50,000.00	50,000.00
Environmental studies	1	50,000.00	50,000.00
Economic analysis	1	50,000.00	50,000.00
Installation			
Global installation cost per module	437	500.00	218,500.00
Global installation cost per inverter	2	10,000.00	20,000.00
Transport	1	200,000.00	200,000.00
Settings	1	100,000.00	100,000.00
Grid connection	1	300,000.00	300,000.00
Insurance			
Building insurance	1	40,000.00	40,000.00
Transport insurance	1	50,000.00	50,000.00
Liability insurance	1	50,000.00	50,000.00
Delay in start-up insurance	1	50,000.00	50,000.00
Land costs			
Land purchase	1	2,000,000.00	2,000,000.00
Land preparation	1	400,000.00	400,000.00
		Total	7,406,100.00
		Depreciable asset	2,277,600.00

Operating costs

Item	Total TRY/year
Maintenance	
Salaries	200,000.00
Repairs	100,000.00
Cleaning	50,000.00
Security fund	150,000.00
Subsidies	-75,000.00
Total (OPEX)	425,000.00

Cost of the system

System summary		
Total installation cost	7,406,100.00	TRY
Operating costs	425,000.00	TRY/year
Produced Energy	365	MWh/year
Cost of produced energy (LCOE)	1.1643	TRY/kWh

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CO_2 Emission Balance

Total: 4219.7 tCO_2

Generated emissions

Total: 426.55 tCO_2

Source: Detailed calculation from table below

Replaced Emissions

Total: 5354.8 tCO_2

System production: 365.02 MWh/yr

Grid Lifecycle Emissions: 489 gCO_2/kWh

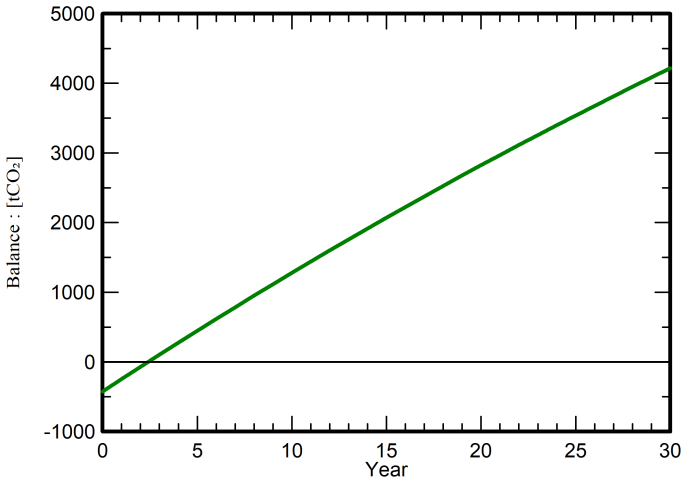
Source: IEA List

Country: Turkey

Lifetime: 30 years

Annual degradation: 1.0 %

Saved CO_2 Emission vs. Time



System Lifecycle Emissions Details

Item	LCE	Quantity	Subtotal
			[$kgCO_2$]
Modules	1713 kgCO2/kWp	240 kWp	411652
Supports	3.26 kgCO2/kg	4370 kg	14253
Inverters	323 kgCO2/units	2.00 units	646