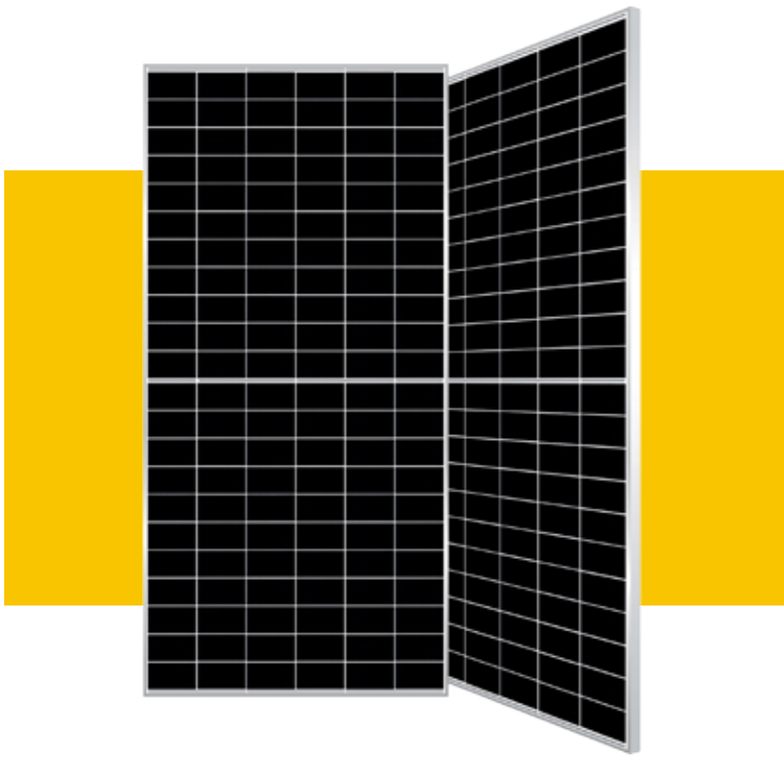
München Energieprodukte
MAXIMALENERGIE

MSMDxxxG12-HJT132DS

680-700w

132-cell Bifacial HJT Half Cell Solar Module



Product Advantages

HJT
Heterojunction Technology

G12
210mm Cell

22.53%
Module efficiency

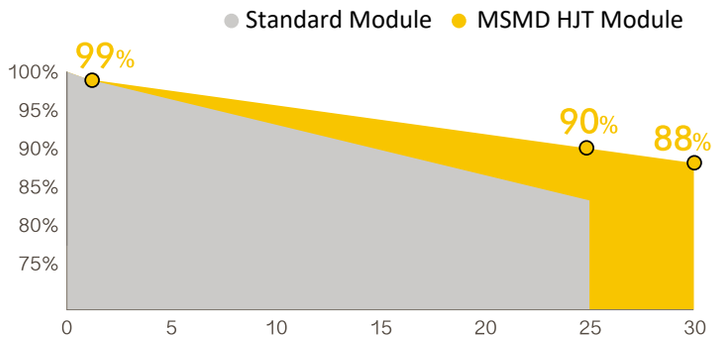
700W
Highest power output

SMBB
SMBB Half-Cut Cell Technology

Up to 85% Bifaciality

Lower BoS Cost Ensure A Better LCOE, Shorter Payback Time

Performance Warranty



-1.00%
First year power degradation

-0.375%
Annual degradation

15 Years
Materials and workmanship warranty

30 Years
Linear power warranty

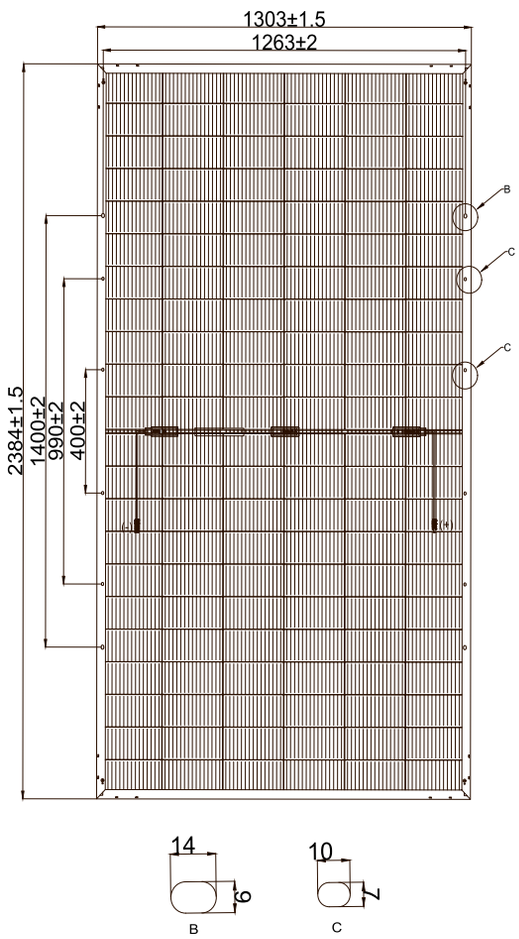
Product Certification

info@muenchen-energieprodukte.de

MSMDxxxG12-HJT132DS

Engineering Drawings

Unit: mm



Electrical Characteristics (STC*)

MSMDxxxG12-HJT132DS		680	685	690	695	700
Maximum Power	(Pmax)	680W	685W	690W	695W	700W
Module Efficiency	(%)	21.89%	22.05%	22.21%	22.37%	22.53%
Optimum Operating Voltage	(Vmp)	41.49V	41.65V	41.80V	41.95V	42.10V
Optimum Operating Current	(Imp)	16.39A	16.45A	16.51A	16.57A	16.63A
Open Circuit Voltage	(Voc)	49.50V	49.66V	49.82V	49.98V	50.13V
Short Circuit Current	(Isc)	17.19A	17.25A	17.31A	17.37A	17.43A
Operating Module Temperature		-40 to +85℃				
Maximum System Voltage		DC1500V (IEC)				
Maximum Series Fuse		30A				
Power Tolerance		0~+5W				
Bifaciality		80%±5%				

*STC: Irradiance 1000 W/m², cell temperature 25℃, AM=1.5. Tolerance of Pmax is within +/- 3%.

BSTC**

Maximum Power	(Pmax)	750W	756W	761W	767W	772W
Optimum Operating Voltage	(Vmp)	41.49V	41.65V	41.80V	41.95V	42.10V
Optimum Operating Current	(Imp)	18.08A	18.16A	18.21A	18.29A	18.34A
Open Circuit Voltage	(Voc)	49.50V	49.66V	49.82V	49.98V	50.13V
Short Circuit Current	(Isc)	18.96A	19.04A	19.09A	19.17A	19.22A

**BSTC: Front side irradiation 1000W/m², back side reflection irradiation 135W/m², AM=1.5, ambient temperature 25℃.

Mechanical Characteristics

Cell Type	HJT Mono 210×105mm
Cell Connection	132 (66×2)
Module Dimension	2384×1303×35 mm
Weight	38.7 kg
Junction Box	IP67 / IP68
Output Cable	4mm², 1400mm in length, length can be customized / UV Resistant
Connectors Type	MC4 Compatible
Frame	Anodised Aluminum Alloy
Encapsulant	POE
Front Load	5400 Pa
Rear Load	2400 Pa
Glass Thickness	(F) 2.0mm Anti-reflective surface Solar glass | (B) 2.0mm Solar glass

Temperature Characteristics

Nominal Operating Cell Temp. (NOCT)	44℃±2℃
Temperature Coefficiency of Pmax	-0.26%/℃
Temperature Coefficiency of Voc	-0.24%/℃
Temperature Coefficiency of Isc	0.04%/℃

Safety & Warranty

Safety Class	Class II
Product Warranty	15 yrs Workmanship
Performance Warranty	30 yrs Linear Warranty*

* 1st year 99%, after 2nd year 0.375% annual degradation to year 30.

Shipping Configurations

		HC
Container Length		40'
Pallets Per Container		17
Modules Per Pallet	(pcs)	31
Modules Per Container	(pcs)	527

info@muenchen-energieprodukte.de

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

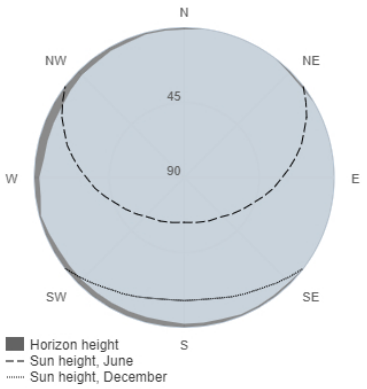
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

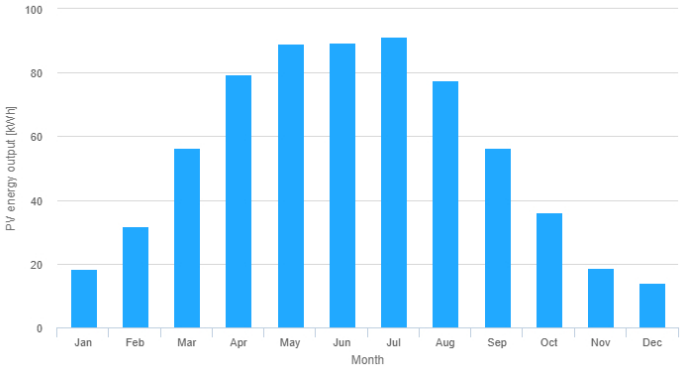
Simulation outputs

Slope angle:	5 °
Azimuth angle:	0 °
Yearly PV energy production:	658.26 kWh
Yearly in-plane irradiation:	1225.5 kWh/m²
Year-to-year variability:	19.44 kWh
Changes in output due to:	
Angle of incidence:	-3.91 %
Spectral effects:	1.55 %
Temperature and low irradiance:	-8.56 %
Total loss:	-23.27 %

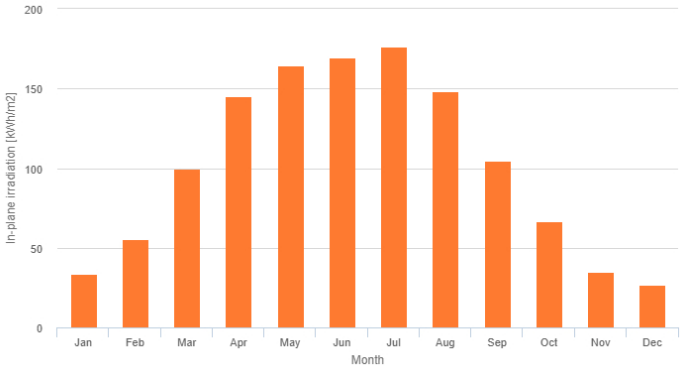
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	18.5	33.7	2.6
February	31.7	55.2	3.5
March	56.3	99.6	4.9
April	79.4	145.0	8.8
May	89.0	164.6	9.1
June	89.4	169.6	6.3
July	91.4	176.3	6.2
August	77.5	148.5	4.9
September	56.3	104.9	5.2
October	36.1	66.4	4.8
November	18.8	35.1	2.3
December	13.9	26.6	1.3

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

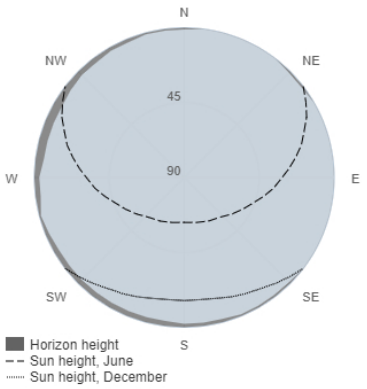
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

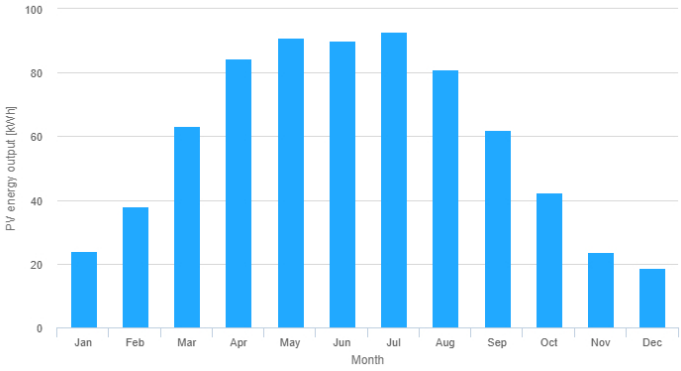
Simulation outputs

Slope angle:	15 °
Azimuth angle:	0 °
Yearly PV energy production:	711.4 kWh
Yearly in-plane irradiation:	1315.93 kWh/m²
Year-to-year variability:	23.18 kWh
Changes in output due to:	
Angle of incidence:	-3.36 %
Spectral effects:	1.62 %
Temperature and low irradiance:	-8.55 %
Total loss:	-22.77 %

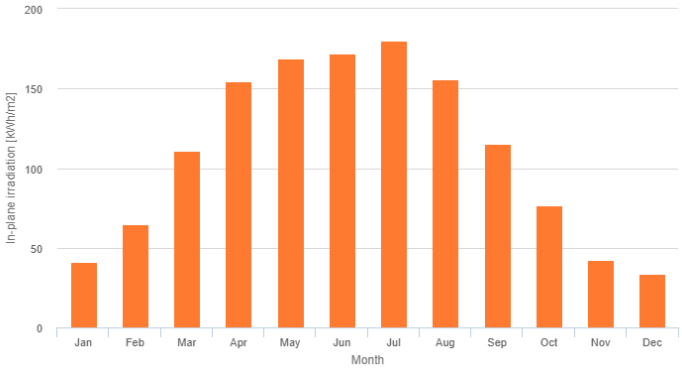
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	23.9	41.3	3.9
February	38.1	64.8	4.8
March	63.1	111.1	6.0
April	84.4	154.6	9.9
May	91.0	169.0	9.5
June	90.1	171.7	6.4
July	92.8	179.9	6.4
August	81.2	155.8	5.3
September	62.0	115.2	6.0
October	42.3	76.5	6.2
November	23.8	42.5	3.4
December	18.8	33.4	2.2

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

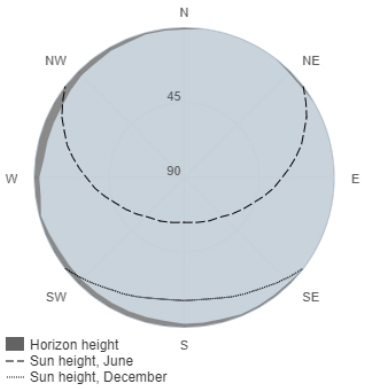
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

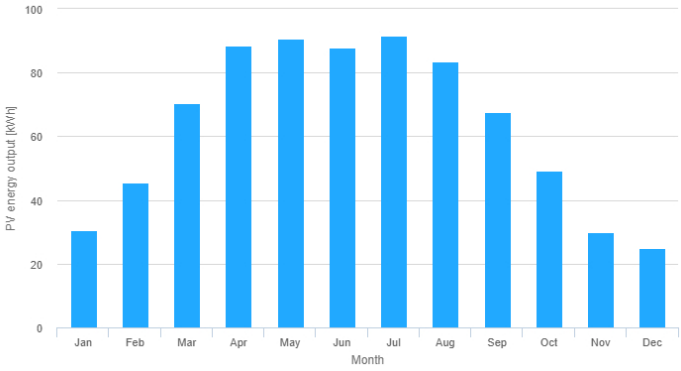
Simulation outputs

Slope angle:	30 °
Azimuth angle:	0 °
Yearly PV energy production:	759.86 kWh
Yearly in-plane irradiation:	1398.21 kWh/m²
Year-to-year variability:	27.45 kWh
Changes in output due to:	
Angle of incidence:	-2.87 %
Spectral effects:	1.7 %
Temperature and low irradiance:	-8.61 %
Total loss:	-22.36 %

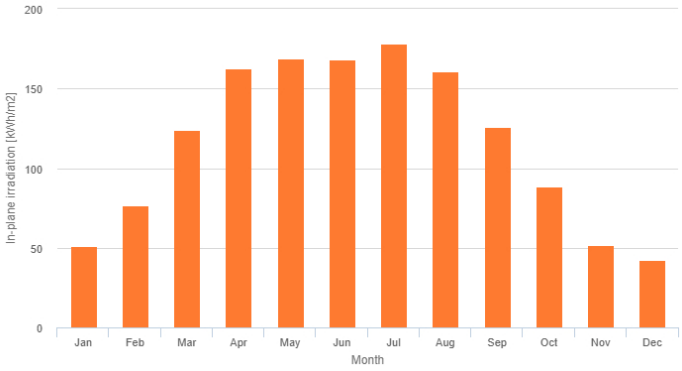
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	30.5	51.1	5.5
February	45.5	76.6	6.6
March	70.3	123.7	7.4
April	88.4	162.7	10.9
May	90.7	169.0	9.7
June	87.9	168.1	6.2
July	91.5	178.1	6.4
August	83.3	160.7	5.6
September	67.5	125.8	6.9
October	49.3	88.5	7.9
November	29.9	51.8	4.8
December	24.8	42.3	3.4

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Joint Research Centre

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

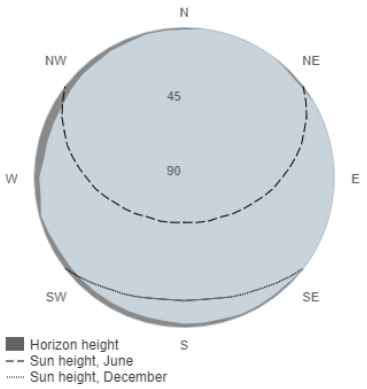
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

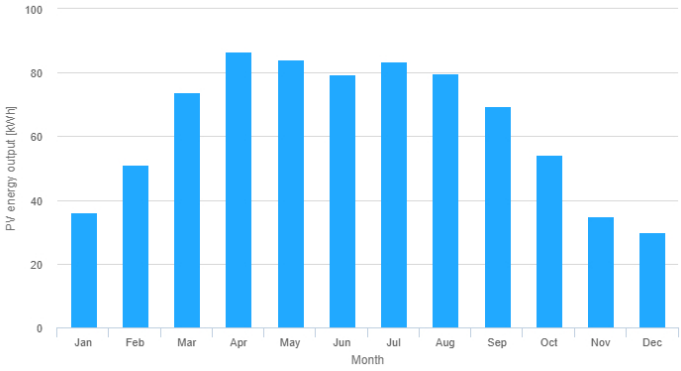
Simulation outputs

Slope angle:	50 °
Azimuth angle:	0 °
Yearly PV energy production:	763.16 kWh
Yearly in-plane irradiation:	1399.48 kWh/m²
Year-to-year variability:	30.37 kWh
Changes in output due to:	
Angle of incidence:	-2.77 %
Spectral effects:	1.79 %
Temperature and low irradiance:	-8.47 %
Total loss:	-22.1 %

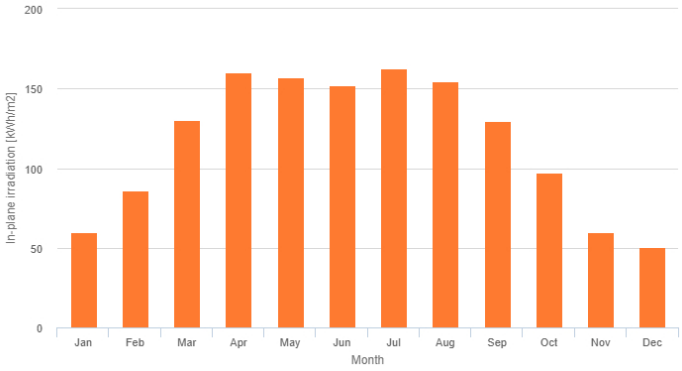
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	36.1	59.8	6.9
February	51.2	85.9	8.1
March	74.0	130.3	8.4
April	86.7	160.2	11.1
May	84.0	157.0	9.1
June	79.3	152.2	5.6
July	83.5	162.8	5.9
August	79.9	154.4	5.6
September	69.3	129.5	7.4
October	54.2	97.1	9.3
November	34.9	59.9	6.1
December	30.0	50.4	4.6

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

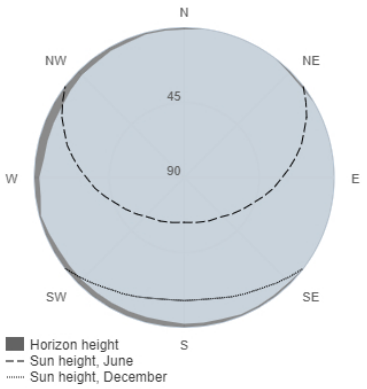
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

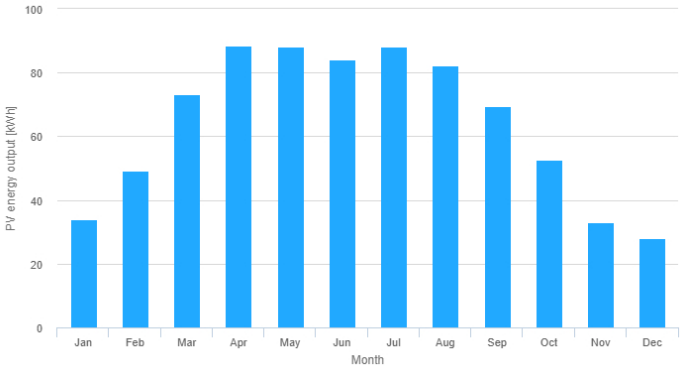
Simulation outputs

Slope angle:	41 (opt) °
Azimuth angle:	0 °
Yearly PV energy production:	770.73 kWh
Yearly in-plane irradiation:	1415.34 kWh/m²
Year-to-year variability:	29.45 kWh
Changes in output due to:	
Angle of incidence:	-2.75 %
Spectral effects:	1.75 %
Temperature and low irradiance:	-8.58 %
Total loss:	-22.21 %

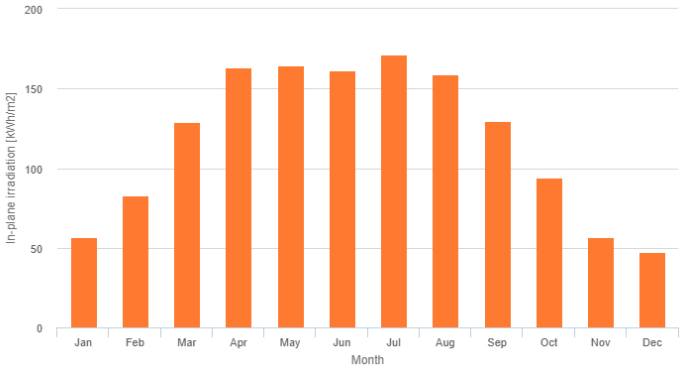
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	34.0	56.5	6.3
February	49.3	82.7	7.5
March	73.2	128.8	8.1
April	88.5	163.3	11.2
May	88.0	164.3	9.5
June	84.2	161.2	6.0
July	88.1	171.6	6.2
August	82.4	159.1	5.7
September	69.3	129.3	7.3
October	52.6	94.3	8.8
November	33.1	57.0	5.6
December	28.1	47.3	4.1

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

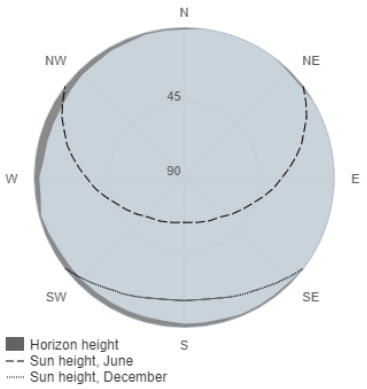
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

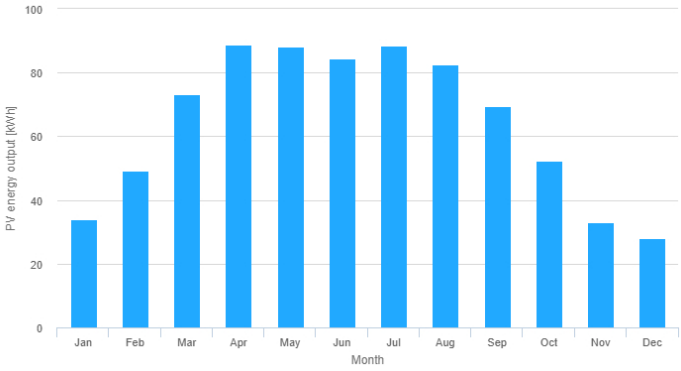
Simulation outputs

Slope angle:	41 (opt) °
Azimuth angle:	-5 (opt) °
Yearly PV energy production:	771.51 kWh
Yearly in-plane irradiation:	1416.4 kWh/m²
Year-to-year variability:	29.42 kWh
Changes in output due to:	
Angle of incidence:	-2.74 %
Spectral effects:	1.75 %
Temperature and low irradiance:	-8.57 %
Total loss:	-22.19 %

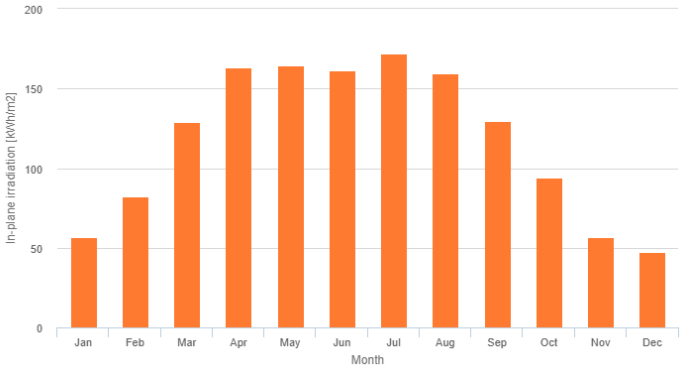
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	34.0	56.4	6.3
February	49.2	82.5	7.5
March	73.1	128.7	8.0
April	88.7	163.5	11.1
May	88.3	164.7	9.6
June	84.4	161.5	6.0
July	88.4	172.1	6.2
August	82.7	159.7	5.7
September	69.4	129.4	7.3
October	52.4	93.9	8.8
November	33.0	56.7	5.6
December	28.1	47.3	4.1

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

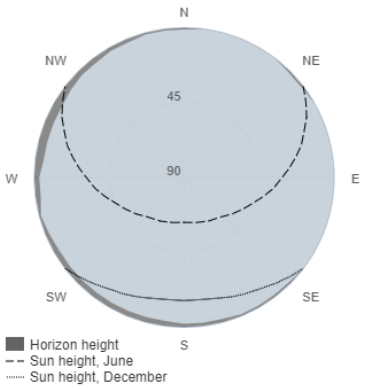
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

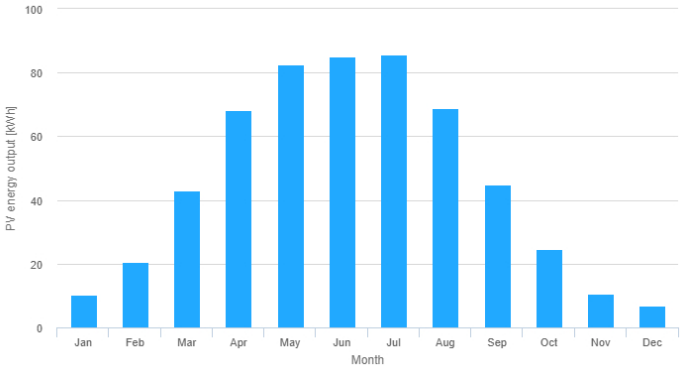
Simulation outputs

Slope angle:	10 °
Azimuth angle:	-179 °
Yearly PV energy production:	550.86 kWh
Yearly in-plane irradiation:	1045.98 kWh/m²
Year-to-year variability:	12.95 kWh
Changes in output due to:	
Angle of incidence:	-5.32 %
Spectral effects:	1.42 %
Temperature and low irradiance:	-8.9 %
Total loss:	-24.76 %

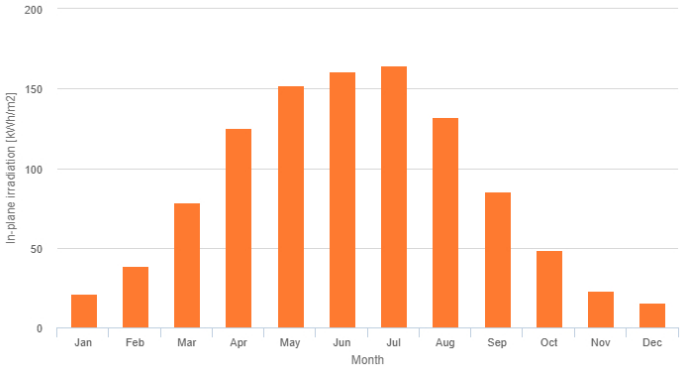
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	10.1	21.4	1.0
February	20.4	38.9	1.5
March	43.1	78.8	2.8
April	68.1	125.0	6.6
May	82.4	152.0	8.0
June	85.1	160.6	6.0
July	85.7	164.4	5.6
August	68.7	131.8	4.0
September	44.9	85.4	3.5
October	24.8	48.8	2.2
November	10.7	22.9	0.6
December	6.9	15.8	0.8

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

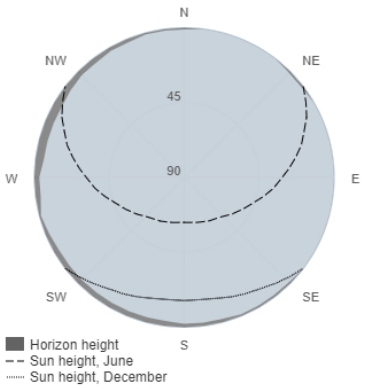
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

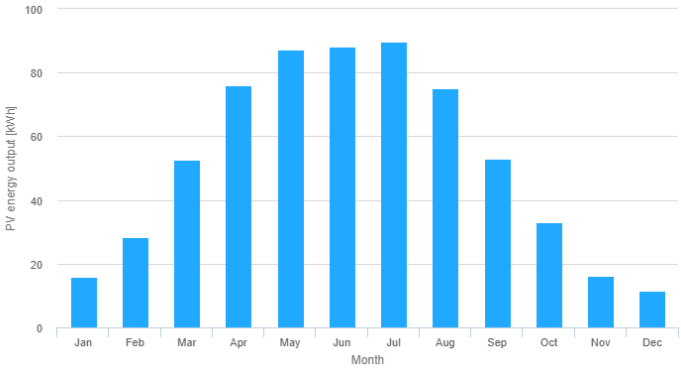
Simulation outputs

Slope angle:	2 °
Azimuth angle:	80 °
Yearly PV energy production:	626.76 kWh
Yearly in-plane irradiation:	1172.62 kWh/m²
Year-to-year variability:	17.47 kWh
Changes in output due to:	
Angle of incidence:	-4.28 %
Spectral effects:	1.52 %
Temperature and low irradiance:	-8.62 %
Total loss:	-23.64 %

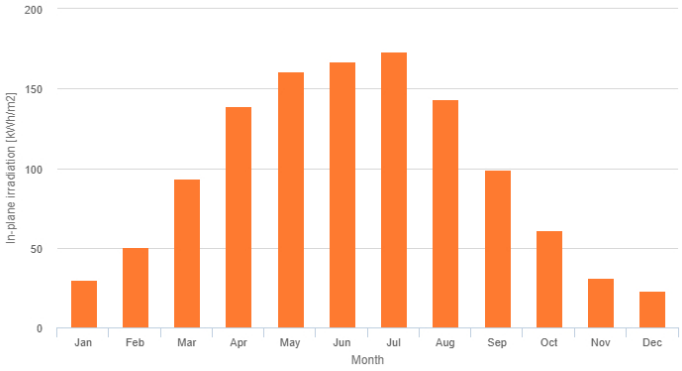
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	15.8	29.9	2.1
February	28.4	50.3	2.8
March	52.6	93.5	4.3
April	76.1	139.1	8.3
May	87.1	161.0	8.8
June	88.3	167.2	6.2
July	89.9	173.0	6.0
August	75.0	143.5	4.6
September	53.0	99.1	4.7
October	32.9	61.3	4.0
November	16.3	31.4	1.7
December	11.6	23.2	1.0

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

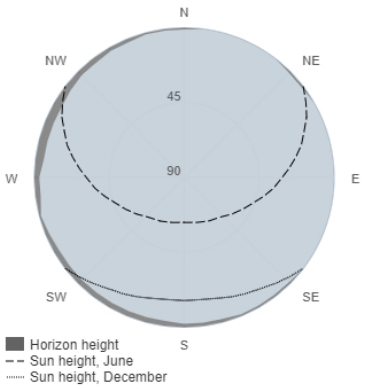
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

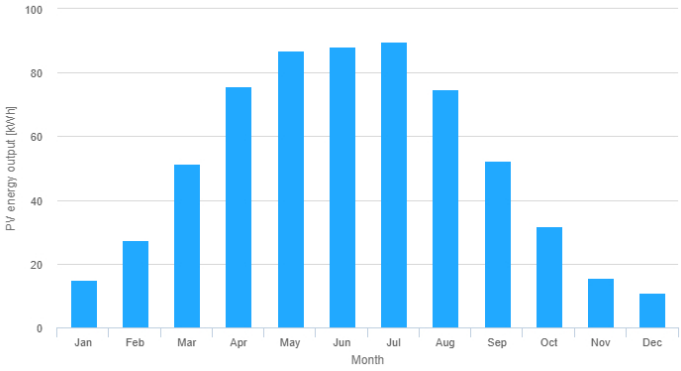
Simulation outputs

Slope angle:	2 °
Azimuth angle:	-120 °
Yearly PV energy production:	619.59 kWh
Yearly in-plane irradiation:	1160.73 kWh/m²
Year-to-year variability:	16.92 kWh
Changes in output due to:	
Angle of incidence:	-4.4 %
Spectral effects:	1.5 %
Temperature and low irradiance:	-8.62 %
Total loss:	-23.74 %

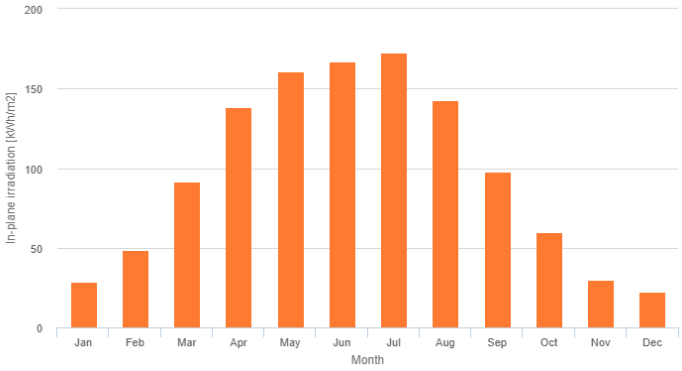
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	15.0	28.7	1.9
February	27.4	48.9	2.6
March	51.5	91.8	4.1
April	75.6	138.0	8.0
May	87.1	160.7	8.8
June	88.3	167.2	6.2
July	89.8	172.8	6.0
August	74.7	142.9	4.6
September	52.2	97.7	4.5
October	31.7	59.5	3.8
November	15.4	30.2	1.6
December	10.9	22.3	0.9

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/11/27

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

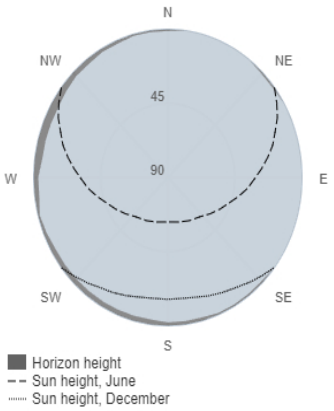
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

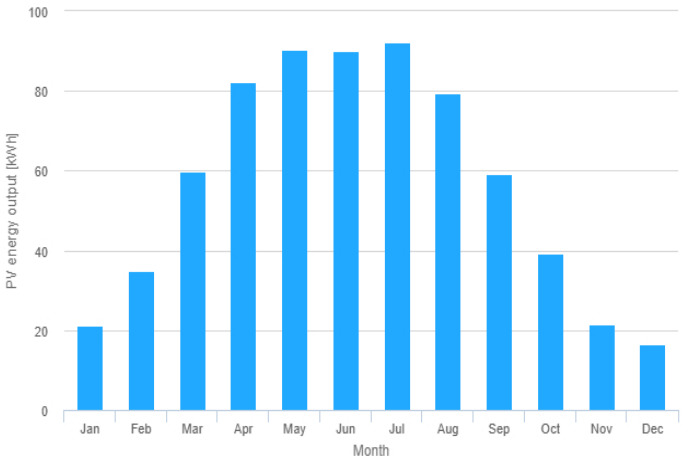
Simulation outputs

Slope angle:	10 °
Azimuth angle:	0 °
Yearly PV energy production:	686.89 kWh
Yearly in-plane irradiation:	1274.01 kWh/m²
Year-to-year variability:	21.40 kWh
Changes in output due to:	
Angle of incidence:	-3.6 %
Spectral effects:	1.59 %
Temperature and low irradiance:	-8.54 %
Total loss:	-22.98 %

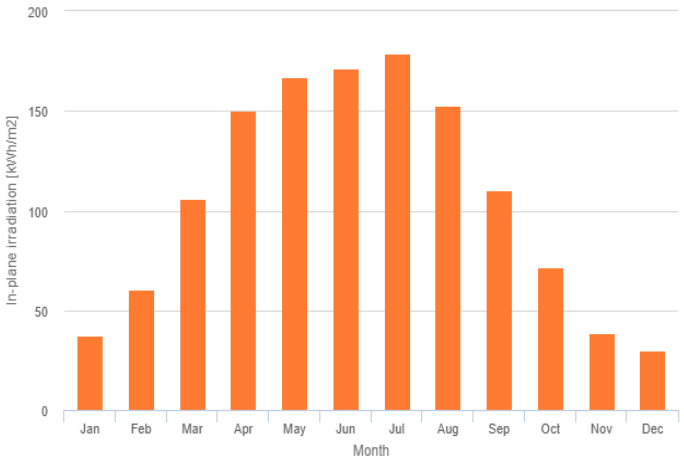
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	21.3	37.6	3.3
February	35.0	60.2	4.2
March	59.9	105.7	5.5
April	82.1	150.2	9.4
May	90.2	167.3	9.3
June	90.0	171.0	6.4
July	92.3	178.6	6.3
August	79.5	152.6	5.1
September	59.3	110.3	5.6
October	39.3	71.7	5.5
November	21.4	38.9	2.9
December	16.4	30.1	1.8

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/12/05

Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

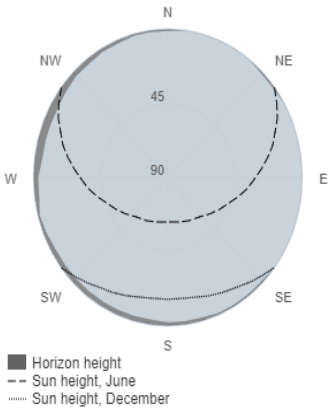
Provided inputs:

Latitude/Longitude:	50.103,14.388
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline silicon
PV installed:	0.7 kWp
System loss:	14 %

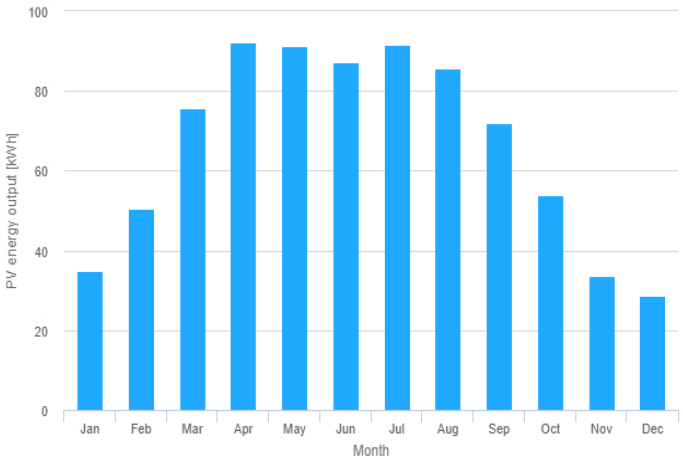
Simulation outputs

Slope angle:	41 (opt) °
Azimuth angle:	-5 (opt) °
Yearly PV energy production:	797.36 kWh
Yearly in-plane irradiation:	1416.33 kWh/m²
Year-to-year variability:	30.99 kWh
Changes in output due to:	
Angle of incidence:	-2.73 %
Spectral effects:	1.74 %
Temperature and low irradiance:	-5.5 %
Total loss:	-19.57 %

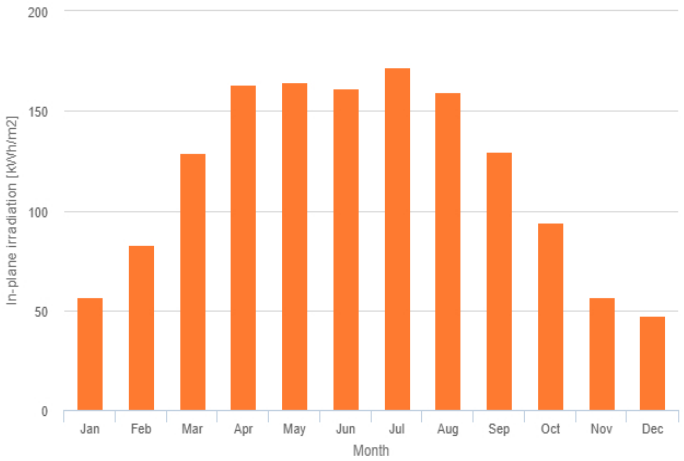
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	34.7	56.4	6.6
February	50.6	82.6	7.8
March	75.6	128.8	8.6
April	92.1	163.5	11.9
May	91.4	164.6	10.2
June	87.3	161.4	6.3
July	91.5	172.0	6.6
August	85.8	159.6	6.1
September	71.9	129.4	7.7
October	54.0	94.0	9.2
November	33.7	56.8	5.8
December	28.7	47.3	4.3

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Report generated on 2023/12/05