Performance of grid-connected PV

PVGIS-5 estimates of solar electricity generation:

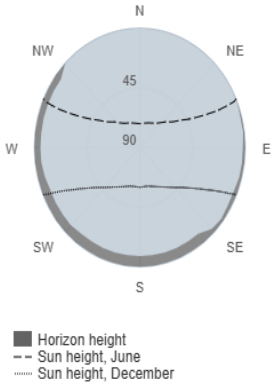
Provided inputs:

Latitude/Longitude:	5.628,-77.405
Horizon:	Calculated
Database used:	PVGIS-ERA5
PV technology:	Crystalline Silicon (original)
PV installed:	113.6 kWp
System loss:	14 %

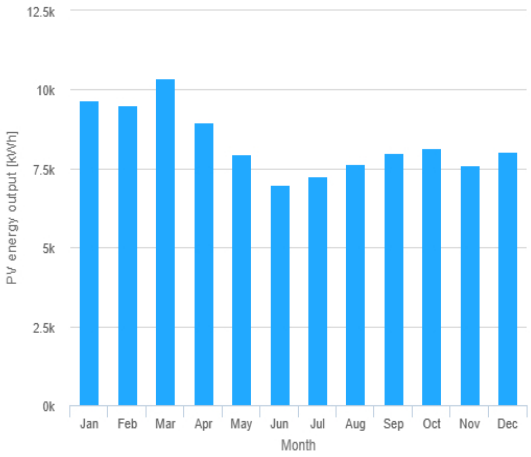
Simulation outputs

Slope angle:	15 °
Azimuth angle:	0 °
Yearly PV energy production:	100159.13 kWh
Yearly in-plane irradiation:	1180.33 kWh/m²
Year-to-year variability:	6797.15 kWh
Changes in output due to:	
Angle of incidence:	-3.23 %
Spectral effects:	NaN %
Temperature and low irradiance:	-10.24 %
Total loss:	-25.3 %

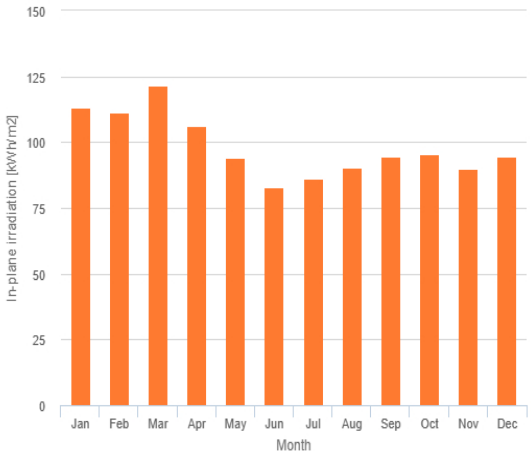
Outline of horizon at chosen location:



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	9664.8	113.1	1189.5
February	9500.8	111.2	1197.3
March	10364.7	121.7	1261.0
April	8981.9	106.0	898.5
May	7943.1	94.3	681.9
June	6984.9	83.1	598.2
July	7258.0	86.1	655.6
August	7635.8	90.3	987.0
September	8015.4	94.4	647.5
October	8133.0	95.7	778.1
November	7628.0	89.7	974.5
December	8048.6	94.7	1193.1

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].

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Performance of grid-connected PV

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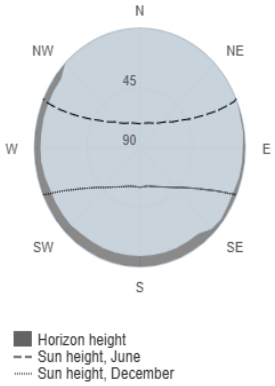
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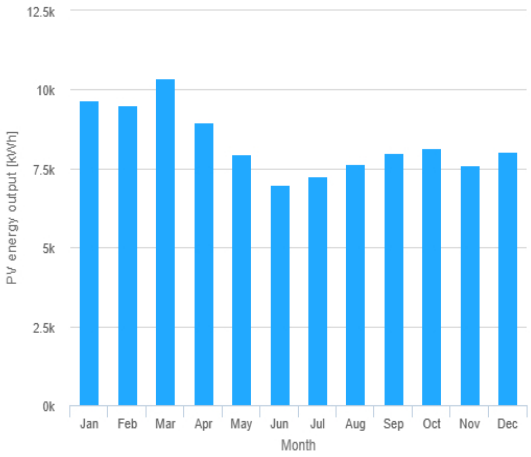
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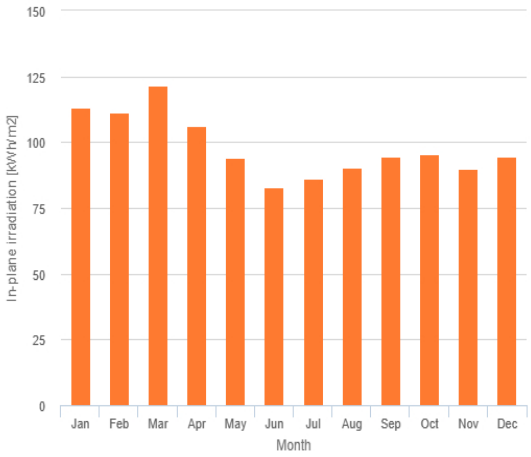
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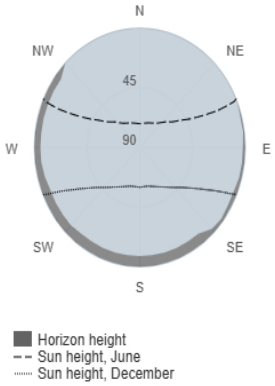
Performance of off-grid PV system

PVGIS-5 estimates of solar electricity generation

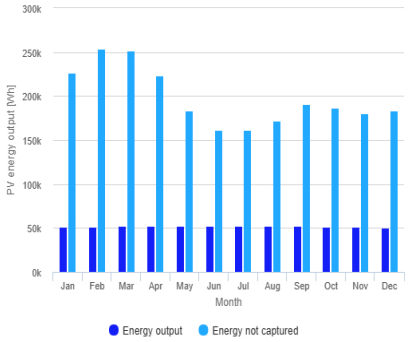
Provided inputs

Latitude/Longitude:	5.628,-77.405	Slope angle:	15 °
Horizon:	Calculated	Azimuth angle	0 °
Database used:	PVGIS-ERA5	**Simulation outputs**	
PV installed:	113600 Wp	Percentage days with full battery:	99.18 %
Battery capacity:	28672 Wh	Percentage days with empty battery:	100 %
Cutoff limit:	20 %	Average energy not captured:	199316.1 Wh
Consumption per day:	83448 Wh	Average energy missing:	31468.12 Wh

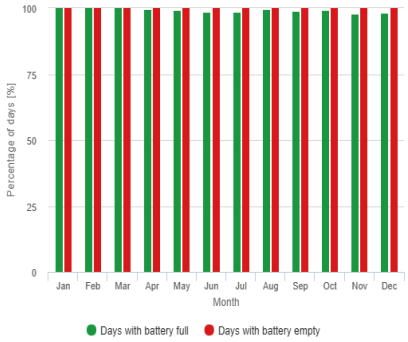
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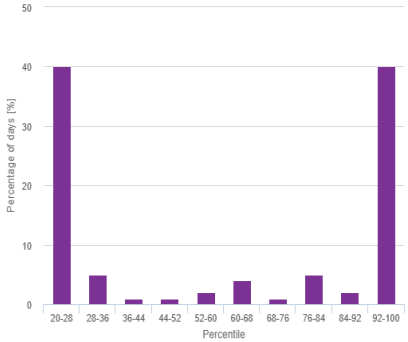
Power production estimate for off-grid PV:



Battery performance for off-grid PV system:



Probability of battery charge state at the end of the day:



Monthly average performance

Month	E_d	E_l	f_f	f_e
January	51702.4	226606.8	100.0	100.0
February	51709.1	253819.5	100.0	100.0
March	52318.1	252060.7	99.8	100.0
April	52839.7	223523.3	99.7	100.0
May	52705.8	183911.5	99.3	100.0
June	52340.0	161996.0	98.8	100.0
July	52035.3	161928.0	98.6	100.0
August	52101.6	171606.0	99.5	100.0
September	52479.5	190508.1	99.1	100.0
October	51898.5	186544.7	99.2	100.0
November	50892.5	180529.1	97.9	100.0
December	50728.6	183246.7	98.3	100.0

E_d: Average energy production per day [Wh/day].
E_l: Average energy not captured per day [Wh/day].
f_f: Percentage of days when battery became full [%].
f_e: Percentage of days when battery became empty [%].

Cs	Cb
20-28	40.0
28-36	5.0
36-44	1.0
44-52	1.0
52-60	2.0
60-68	4.0
68-76	1.0
76-84	5.0
84-92	2.0
92-100	40.0

Cs: Charge state at the end of each day [%].
Cb: Percentage of days with this charge state [%].

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