Solar PV Energy Generation (kWh per Year)

Daily and annual energy from a solar PV plant from its kWp rating, the plane-of-array irradiation (peak sun hours) and the performance ratio, with CUF and specific yield.

Method: IEC 61724-1 (performance ratio definition)

Input parameters

Unit system: SI

Parameter	Value	Unit
Plant rating (DC, at STC)	1,000.0	kW
Irradiation on the modules (kWh/m² per day = peak sun hours) Yearly mean daily irradiation on the tilted plane, from a solar resource database for the site.	5.2000	
Performance ratio Covers temperature, soiling, mismatch, cable, inverter and transformer losses; typically 0.75–0.82 for a well-run plant.	78.000	%
Days in the period	365.00	

Calculated results

Parameter	Value	Unit
Energy per day	4,056.0	kWh
Energy in the period	1,480.4	MWh
Specific yield (kWh per kWp)	1,480.4	
Capacity utilisation factor (on DC kWp)	16.900	%

Notes for this case

- The energy is AC at the meter only if the performance ratio includes inverter and transformer losses; module degradation (about 0.5 % a year) is not included.

Formula and method

$$E_d = P_{pk}\, H\, PR \qquad E = E_d\, d \qquad Y_f = H\, PR\, d \qquad CUF = \frac{H\, PR}{24}$$

Variables

P_{pk}	DC rating at STC	W
H	daily irradiation on the modules (peak sun hours)	kWh/m² per day
PR	performance ratio	–
d	days	–
E_d	energy per day	J
E	energy in the period	J
Y_f	specific yield	kWh/kWp
CUF	capacity utilisation factor, on the DC kWp rating	–

Method and standards

Reference yield (irradiation over 1 kW/m²) times performance ratio, as defined in IEC 61724-1.

Assumptions and limits

- Yearly mean conditions; degradation and curtailment not included.
- CUF is on the DC (kWp) rating; Indian plant reports often quote it on the AC (inverter) capacity, which is higher by the DC/AC ratio.

References

- IEC 61724-1 (performance ratio definition)

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/solar-pv/solar-pv-energy-yield

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.