PV System Size for an Annual Electricity Consumption

PV capacity, number of modules and roof area to supply a share of a building's annual electricity from the site's specific yield and the module rating and size.

Method: Annual energy balance for PV sizing

Input parameters

Unit system: SI

Parameter	Value	Unit
Annual electricity consumption	12,000	kWh
Share of consumption to cover	100.00	%
Specific yield (kWh per kWp per year)	1,450.0	
Module rating	0.43000	kW
Module area	1.9500	m²
Roof area factor (gaps, access; 1.1–1.3)	1.2000	

Calculated results

Parameter	Value	Unit
PV capacity needed	8.2759	kW
Modules	20.000	
Installed with whole modules	8.6000	kW
Roof area needed	46.800	m²
Annual PV generation	12.470	MWh

Notes for this case

• kWp = f·E/Y; specific yield already includes system losses (use a value for the site, tilt and orientation). Covering the annual total does not mean covering every hour: most of the PV output is exported in summer and imported back in winter without storage.

Formula and method

$$P_{PV} = \frac{fE}{Y}, \quad n = \left\lceil \frac{P_{PV}}{P_m} \right\rceil, \quad A = nA_m k_A$$

Variables

E	Annual electricity consumption	J
f	Share of consumption to cover	-
Y	Specific yield (kWh per kWp per year)	-
P_m	Module rating	W
A_m	Module area	m²
k_A	Roof area factor (gaps, access; 1.1–1.3)	-
P_{PV}	PV capacity needed	W
n	Modules	-
P	Installed with whole modules	W
A	Roof area needed	m²
E_{PV}	Annual PV generation	J

Method and standards

PV sizing by annual energy.

Assumptions and limits

- Annual energy balance only.

References

Annual energy balance for PV sizing

Report details

Report reference	FCC-MZY7-E5MT (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

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/pv-size-for-annual-consumption

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.