Small Hydro Power and Annual Energy

Electrical output of a small hydro plant from flow, net head and overall efficiency, with annual energy at a plant load factor.

Method: P = ρ g Q H η

Input parameters

Unit system: SI

Parameter	Value	Unit
Flow through the turbine	9,000.0	m³/h
Net head	30.000	m
Overall efficiency (turbine, generator, transformer)	82.000	%
Plant load factor	45.000	%

Calculated results

Parameter	Value	Unit
Electrical output	603.11	kW
Annual energy	2,377.5	MWh

Notes for this case

- Net head is gross head less penstock and intake losses.

Formula and method

$$P = \rho g Q H \eta, \quad E = P \cdot PLF \cdot 8760\ \text{h}$$

Variables

Q	Flow through the turbine	m³/s
H	Net head	m
η	Overall efficiency (turbine, generator, transformer)	-
PLF	Plant load factor	-
P	Electrical output	W
E	Annual energy	J
ρ	Water density, taken as 1 000	kg/m³
g	Standard gravity, 9.806 65	m/s²

Method and standards

Hydraulic power.

Assumptions and limits

- Steady flow; water density fixed at 1 000 kg/m³.
- Any size: the page notes when the output exceeds 25 MW, the upper limit of small hydro in India (classes differ by country).

References

- P = ρ g Q H η

Report details

Report reference	FCC-XFDR-A7P4 (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Small Hydro Power and Annual Energy
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/environmental/carbon-energy/small-hydro-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.