Biogas Energy and Power from Volume and Methane Content

Energy and electrical output from a daily biogas volume, its methane content and the methane heating value, with an engine or boiler efficiency.

Method: Energy = V × x_CH₄ × LHV_CH₄

Input parameters

Unit system: SI

Parameter	Value	Unit
Biogas per day (normal)	2,000.0	Nm³/d
Methane volume fraction	60.000	%
Methane lower heating value About 35.8 MJ/Nm³ at 0 °C, 1 atm; your reference.	35.800	MJ/Nm³
Engine electrical efficiency	38.000	%
Recoverable heat efficiency	40.000	%

Calculated results

Parameter	Value	Unit
Fuel energy per day	42.960	GJ
Average electrical output	188.94	kW
Average recoverable heat	198.89	kW

Formula and method

$$\dot{E} = \dot{V} x_{CH_4} LHV, \quad P_e = \eta_e \dot{E}$$

Variables

V	Biogas per day (normal)	Nm³/s
x_{CH_4}	Methane volume fraction	-
LHV	Methane lower heating value	J/m³
η_e	Engine electrical efficiency	-
η_h	Recoverable heat efficiency	-
E	Fuel energy per day	J
P_e	Average electrical output	W
P_h	Average recoverable heat	W

Method and standards

Energy balance.

Assumptions and limits

- Steady gas production.
- Electrical plus recoverable heat efficiency may not exceed 100 %.

References

- Energy = V × x_CH₄ × LHV_CH₄

Report details

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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/biogas-energy

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.