Heat Rate Converter (kJ/kWh, kcal/kWh, Btu/kWh, Efficiency)

Convert a power plant or engine heat rate between kJ/kWh, kcal/kWh and Btu/kWh, and to the thermal efficiency it represents.

Method: Unit definitions per NIST SP 811 and the SI Brochure (exact where defined)

Input parameters

Unit system: SI

Parameter	Value	Unit
Heat rate (choose its unit)	10,551	kJ/kWh

Calculated results

Parameter	Value	Unit
Heat rate in kJ/kWh	10,551	kJ/kWh
Heat rate in kcal/kWh	2,520.0	kcal/kWh
Heat rate in Btu/kWh	10,000	Btu/kWh
Thermal efficiency 1/HR	34.121	%

Notes for this case

• Heat rate is the fuel heat put in per unit of electricity out, so it is the reciprocal of efficiency: 3600 kJ/kWh is 100 %. 860 kcal/kWh and 3412 Btu/kWh are the same 100 %. Say whether the heat rate is on the gross (HHV) or net (LHV) heating value and whether it is gross or net of auxiliary power: the four combinations differ by several per cent.

Formula and method

$$\eta = \frac{1}{HR} = \frac{3600\ \text{kJ/kWh}}{HR} = \frac{860\ \text{kcal/kWh}}{HR} = \frac{3412\ \text{Btu/kWh}}{HR}$$

Variables

HR	Heat rate (choose its unit)	J/J
η	Thermal efficiency 1/HR	-

Method and standards

Heat rate units.

Assumptions and limits

- Heat rate and efficiency on the same heating-value basis.

References

Unit definitions per NIST SP 811 and the SI Brochure (exact where defined)

Report details

Report reference	FCC-C692-HNAD (the same inputs always give the same reference)
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Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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/general/unit-conversions/heat-rate-unit-converter

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.