Heating or Cooling Energy from Degree-Days

Seasonal heating or cooling energy of a building from its heat loss coefficient (UA) and degree-days, with the fuel or electricity needed.

Method: Degree-day method Q = UA × DD × 24 h (CIBSE TM41; ASHRAE Handbook—Fundamentals ch. 19)

Input parameters

Unit system: SI

Parameter	Value	Unit
Heat loss coefficient (fabric and ventilation)	2.5000	kW/K
Degree-days (K·day) For your site and base temperature, from weather data.	2,200.0	
System efficiency (heating, NCV basis) or COP (cooling)	0.85000	
Fuel net calorific value (0 for electricity)	42.000	MJ/kg
Price per kg of fuel or per kWh	75.000	

Calculated results

Parameter	Value	Unit
Heat or cooling delivered	132,000	kWh
Energy input	155,294	kWh
Fuel (if NCV given)	13,311	kg
Cost	998,319	

Notes for this case

- Degree-days must use a base temperature that suits the building's balance point.

Formula and method

$$Q = UA \cdot DD \cdot 86\,400, \quad E = \frac{Q}{\eta}, \quad m_f = \frac{E}{NCV}, \quad C = m_f c \ \text{(fuel)} \ \text{or} \ C = \frac{E}{3.6 \times 10^6} c \ \text{(electricity, per kWh)}$$

Variables

UA	Heat loss coefficient (fabric and ventilation)	W/K
DD	Degree-days (K·day)	-
η	System efficiency (heating, NCV basis) or COP (cooling)	-
NCV	Fuel net calorific value (0 for electricity)	J/kg
c	Price per kg of fuel or per kWh	-
Q	Heat or cooling delivered	J
E	Energy input	J
m_f	Fuel (if NCV given)	kg
C	Cost	-

Method and standards

Degree-day method.

Assumptions and limits

- Steady UA.
- The fuel quantity uses the net calorific value, so the heating efficiency must be on the NCV basis too; a GCV-based efficiency mis-states the fuel by the GCV/NCV ratio (about 5–11 %).

References

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Report details

Report reference	FCC-KGR8-RT6E (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Heating or Cooling Energy from Degree-Days
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/hvac/loads/degree-day-energy

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.