Fuel Cost per GJ of Useful Heat (Compare Two Fuels)

Compares two fuels by cost per GJ of fuel and per GJ of useful heat, from price per tonne, calorific value and the boiler efficiency on each fuel.

Method: Definitions of energy cost

Input parameters

Unit system: SI

Parameter	Value	Unit
Price per tonne (your currency)	4,500.0	
Gross calorific value	15,500	kJ/kg
Boiler efficiency on this fuel (GCV)	74.000	%
Price per tonne (your currency)	9,000.0	
Gross calorific value	24,000	kJ/kg
Boiler efficiency on this fuel (GCV)	82.000	%

Calculated results

Parameter	Value	Unit
Fuel 1: cost per GJ of useful heat	392.33	
Fuel 2: cost per GJ of useful heat	457.32	
Fuel 2 compared with fuel 1 (+ = dearer)	16.565	%
Fuel 1: cost per GJ of fuel	290.32	
Fuel 2: cost per GJ of fuel	375.00	

Notes for this case

- Add handling, ash disposal and maintenance differences for a full comparison.

Formula and method

$$c_{GJ} = \frac{c}{GCV} \qquad C = \frac{c_{GJ}}{\eta} \qquad \Delta = \frac{C_2}{C_1} - 1$$

Variables

c_1	price of fuel 1 per tonne	–
GCV_1	GCV of fuel 1	J/kg
η_1	efficiency on fuel 1	–
c_2	price of fuel 2 per tonne	–
GCV_2	GCV of fuel 2	J/kg
η_2	efficiency on fuel 2	–
C_1	fuel 1 cost per useful GJ	–
C_2	fuel 2 cost per useful GJ	–
Δ	fuel 2 against fuel 1	–
$c_{GJ,1}$	fuel 1 cost per GJ of fuel	–
$c_{GJ,2}$	fuel 2 cost per GJ of fuel	–
c, GCV, c_{GJ}, C, η	price, calorific value, costs and efficiency in general	–

Method and standards

Cost per GJ from price per tonne and GCV; useful heat divides by boiler efficiency on that fuel.

Assumptions and limits

- Prices delivered to the boiler, per metric tonne in every unit system, for the fuel as received; the GCV must be on the same as-received moisture basis.
- Efficiency on GCV; there is no NCV option. The outputs are in currency per GJ whatever the display units of the GCV.
- When fuel 1 is free, the percentage comparison is not shown.

References

- Definitions of energy cost

Report details

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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/boilers-power-plant/combustion/fuel-cost-per-gj

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.