Coal and Biomass Fuel Blending Calculator

Calorific value, ash, sulphur, moisture and price of a blend of two fuels (for example Indian and imported coal, or coal and biomass) by mass share.

Method: Mass-weighted mixing of as-fired properties

Input parameters

Unit system: SI

Parameter	Value	Unit
Share of fuel 1 in the blend, by mass	70.000	%
Gross calorific value	15,500	kJ/kg
Ash	38.000	%
Sulphur	0.50000	%
Moisture	10.000	%
Price per metric tonne (your currency)	4,500.0	
Gross calorific value	24,000	kJ/kg
Ash	12.000	%
Sulphur	0.80000	%
Moisture	15.000	%
Price per metric tonne (your currency)	9,000.0	

Calculated results

Parameter	Value	Unit
Blend gross calorific value	18,050	kJ/kg
Blend ash	30.200	%
Blend sulphur	0.59000	%
Blend moisture	11.500	%
Blend price per tonne	5,850.0	
Blend cost per GJ	324.10	

Notes for this case

- Ash fusion and slagging behaviour of a blend do not mix linearly; test the blend's ash before firing it.

Formula and method

$$GCV_b = s_1 GCV_1 + s_2 GCV_2 \quad (s_2 = 1 - s_1) \qquad A_b, S_b, M_b, c_b \text{ likewise} \qquad c_{GJ} = \frac{c_b}{GCV_b \times 1000 \text{ kg/t} / 10^9 \text{ J/GJ}}$$

Variables

s_1	share of fuel 1	–
GCV_1	GCV of fuel 1	J/kg
A_1	ash of fuel 1	–
S_1	sulphur of fuel 1	–
M_1	moisture of fuel 1	–
c_1	price of fuel 1 per metric tonne	currency/t
GCV_2	GCV of fuel 2	J/kg
A_2	ash of fuel 2	–
S_2	sulphur of fuel 2	–

M_2	moisture of fuel 2	–
c_2	price of fuel 2 per metric tonne	currency/t
GCV_b	blend GCV	J/kg
A_b	blend ash	–
S_b	blend sulphur	–
M_b	blend moisture	–
c_b	blend price per metric tonne	currency/t
c_{GJ}	blend cost per GJ of fuel GCV	currency/GJ
s_2	share of fuel 2	–

Method and standards

Mass-weighted averages of as-fired properties; cost per GJ from price per tonne and GCV.

Assumptions and limits

- Both fuels on the same (as-fired) basis; mixing air-dried and as-received analyses cannot be detected.
- Prices are per metric tonne (1000 kg) in every unit system.
- The cost per GJ is per GJ of fuel heat (GCV) fired; it does not include the different boiler efficiency the two fuels may give.

References

- Mass-weighted mixing of as-fired properties

Report details

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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-blending

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Reopens the calculator with the inputs of this report.