Co-Firing: Heat Share and Blended Fuel Cost

Heat input from each of two fuels fired together, their shares of heat, and the blended fuel cost per GJ, from rates, calorific values and prices.

Method: Energy balance on gross calorific values

Input parameters

Unit system: SI

Parameter	Value	Unit
Fuel 1 rate (e.g. bagasse)	30.000	t/h
Fuel 1 GCV, as fired	9,600.0	kJ/kg
Fuel 1 price per tonne	1,800.0	
Fuel 2 rate (e.g. coal)	4.0000	t/h
Fuel 2 GCV, as fired	23,000	kJ/kg
Fuel 2 price per tonne	9,000.0	

Calculated results

Parameter	Value	Unit
Total heat input	105.56	MW
Fuel 1 share of heat	75.789	%
Fuel 2 share of heat	24.211	%
Blended cost per GJ	236.84	

Formula and method

$$\dot{Q} = \dot{m}_1 GCV_1 + \dot{m}_2 GCV_2, \quad s_1 = \frac{\dot{m}_1 GCV_1}{\dot{Q}}, \quad s_2 = \frac{\dot{m}_2 GCV_2}{\dot{Q}}$$

$$c_{GJ} = \frac{(\dot{m}_1 c_1 + \dot{m}_2 c_2)/1000\ \text{kg/t}}{\dot{Q}} \times 10^9\ \text{J/GJ}$$

Variables

$\dot{m}_1$	Fuel 1 rate (e.g. bagasse)	kg/s
GCV_1	Fuel 1 GCV	J/kg
c_1	Fuel 1 price per tonne	-
$\dot{m}_2$	Fuel 2 rate (e.g. coal)	kg/s
GCV_2	Fuel 2 GCV	J/kg
c_2	Fuel 2 price per tonne	-
$\dot{Q}$	Total heat input	W
s_1	Fuel 1 share of heat	-
s_2	Fuel 2 share of heat	-
c_{GJ}	Blended cost per GJ	-

Method and standards

Energy balance.

Assumptions and limits

- Steady firing.
- Each GCV must be on the as-fired basis of its own fuel rate; mixing an as-fired value with a dry one distorts the heat shares.

References

- Energy balance on gross calorific values

Report details

Report reference	FCC-3XS5-HDN0 (the same inputs always give the same reference)
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Calculator	Co-Firing: Heat Share and Blended Fuel Cost
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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/boilers-power-plant/boilers/co-firing-heat-share

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.