Carbon Price Impact on Fuel Cost

Extra cost of a fuel from a carbon price, per GJ, per tonne of fuel and per year, from its emission factor and calorific value.

Method: Carbon cost = EF × CV × carbon price

Input parameters

Unit system: SI

Parameter	Value	Unit
Emission factor (kg CO_2/GJ; IPCC factors are per GJ of NCV)	94.600	
Calorific value (same basis as EF)	25.800	MJ/kg
Carbon price per tonne CO_2	1,500.0	
Fuel price per tonne	8,000.0	
Fuel used per year	50,000	t

Calculated results

Parameter	Value	Unit
Carbon cost per GJ	141.90	
Carbon cost per tonne of fuel	3,661.0	
Increase in fuel cost	45.763	%
Carbon cost per year	1.8305e+08	

Formula and method

$$c_{GJ} = EF \cdot p_{CO_2}, \quad c_t = c_{GJ} \cdot CV$$

Variables

EF	Emission factor (kg CO_2/GJ; IPCC factors are per GJ of NCV)	-
CV	Calorific value (same basis as EF)	J/kg
p_{CO_2}	Carbon price per tonne CO_2	-
p_f	Fuel price per tonne	-
m	Fuel used per year	kg
c_{GJ}	Carbon cost per GJ	-
c_t	Carbon cost per tonne of fuel	-
x	Increase in fuel cost	-
C_y	Carbon cost per year	-

Method and standards

Emission factor method.

Assumptions and limits

- Constant price.
- EF and CV on one basis. IPCC default factors are per GJ of net calorific value: entering a GCV with them overstates the cost per tonne by about 5 % for coal and 10 % for natural gas.

References

- Carbon cost = EF × CV × carbon price

Report details

Report reference	FCC-DH4V-G1X4 (the same inputs always give the same reference)
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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/environmental/carbon-energy/carbon-price-fuel-cost

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.