

Energy and carbon conversions


ACTIONenergy
From the Carbon Trust



Heat content of fuels

The default gross calorific values given below can be used when fuel-specific values are not available from your energy supplier.

	BY WEIGHT		BY VOLUME
	kWh/tonne	litres/tonne	kWh/litre
Solid fuels			
Coal (weighted average)	7,500	-	-
Coke	8,278	-	-
Liquid fuels	kWh/tonne	litres/tonne	kWh/litre
Crude oil (weighted average)	12,694	1,192	10.6
Petroleum products (weighted average)	12,722	-	-
Ethane	14,083	2,730	5.2
Liquefied petroleum gas	13,722	1,850	7.4
Aviation turbine fuel	12,833	1,248	10.3
Motor spirit	13,083	1,359	9.6
Gas/diesel oil	12,667	1,167	10.9
Fuel oil	12,083	1,021	11.8
Lubricating oils	12,555	1,133	11.1
Orimulsion	8,250	-	-
Naphtha	13,249	-	-
Gaseous fuels	kWh/tonne	litres/tonne	kWh/m ³
Natural gas	-	-	11.0
Coke oven gas	-	-	5.0
Blast furnace gas	-	-	0.8
Landfill gas	-	-	10.7
Sewage gas	-	-	10.7
Solid renewables	kWh/tonne	litres/tonne	kWh/m ³
Domestic wood	2,778	-	-
Industrial wood	3,306	-	-
Straw	4,167	-	-
Poultry litter	2,444	-	-
General industrial waste	4,444	-	-
Hospital waste	3,889	-	-
Municipal solid waste	2,639	-	-
Refuse-derived waste	5,139	-	-
Tyres	8,889	-	-

Conversion factors for energy units

To	therms	kWh	Btu	MJ	toe	kcal
From						
therms	1	29.31	100,000	105.5	2.52×10^{-3}	25×10^3
kWh	0.03412	1	3412	3.6	85.98×10^{-6}	859.7
Btu	1×10^{-5}	0.2931×10^{-3}	1	1.055×10^{-3}	25.2×10^{-9}	0.252
MJ	9.478×10^{-3}	0.2778	947.8	1	2.388×10^{-5}	238.8
toe	396.8	11,630	39.68×10^6	41,870	1	1×10^7
kcal	4×10^{-5}	1.163×10^{-3}	3.968	4.187×10^{-3}	1×10^{-7}	1

1 hp = 746 watts toe = tonne of oil equivalent

Common prefixes

The following prefixes are used for multiples of joules, watts and watthours:

kilo (k) = 10^3 ; mega (M) = 10^6 ; giga (G) = 10^9 ; tera (T) = 10^{12} ; peta (P) = 10^{15}

Carbon emission factors

The factors given below are taken from Annex A of UKETS(01)05 (Guidelines for the measurement and reporting of emissions in the UK Emissions Trading Scheme). These figures are consistent with the National Air Emission Inventory and with the carbon factors given in the generic PP3.02 (Underlying Climate Change Agreement for the [] sector).

		CARBON EMISSION FACTORS		
Fuel		kg C/kWh	kg CO ₂ /kWh	
Grid electricity	Delivered ¹	0.117	0.43	
	Primary ²	0.0453	0.1661	
Natural gas		0.0518	0.19	
Coal		0.0817	0.3	
Coke		0.101^3	0.37^3	
Petroleum coke		0.0927	0.34	
Gas/diesel oil		0.068	0.25	
Heavy fuel oil		0.0709	0.26	
Petrol		0.0655	0.24	
LPG		0.0573^4	0.21^4	
Jet kerosene		0.0655	0.24	
Ethane		0.0545	0.2	
Naphtha		0.0709	0.26	
Refinery gas		0.0545	0.2	

1 The carbon emission factor for delivered electricity should be used when taking consumption as read from the meter.

2 The carbon emission factor for primary electricity should be used in calculations for Climate Change Agreements, where all energy use is reported in terms of primary energy.

3 Climate Change Agreement participants should use 0.117 kg C/kWh (0.43 kg CO₂/kWh) for Coke.

4 Climate Change Agreement participants should use 0.0627 kg C/kWh (0.23 kg CO₂/kWh) for LPG.

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www.actionenergy.org.uk

Action Energy is a programme run by the Carbon Trust and funded by the Department for Environment, Food and Rural Affairs, the Scottish Executive, Invest Northern Ireland and the National Assembly for Wales.

Useful websites

Action Energy

www.actionenergy.org.uk

The Carbon Trust

www.thecarbontrust.co.uk

Department for Environment, Food and Rural Affairs

For information and guidelines on environmental reporting and climate change

www.defra.gov.uk/environment/envrp/index.htm

<http://www.defra.gov.uk/environment/climatechange/index.htm>

Department of Trade and Industry

For information on energy prices, energy trends and the Digest of UK Energy Statistics

www.dti.gov.uk/energy

UK Emissions Trading Group

www.uketg.com

Scottish Energy Efficiency Office

www.energy-efficiency.org

Invest Northern Ireland

www.investni.com

Environment Agency

www.environment-agency.gov.uk

Scottish Environment Protection Agency

www.sepa.org.uk

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