

Energy Unit Conversions and Energy Content of Common Fuels

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Some basic energy unit conversions

1 Btu (British thermal unit) = 0.252 kcal = 0.000293 kWh = 1,055 Joules

1kcal (kilocalorie) = 3.97 Btu = 0.0012 kWh = 4,188 Joules

1 kWh (kilowatt-hour) = 3,413 Btu = 860 kcal = 3,600,000 Joules

1 barrel of oil (42 US gallons) = 5,600,000 Btu = 1,410,000 kcal = 1,640 kWh = 5.9×10^9 Joules

Energy content of some common fuels

Fuel	Density (lb/ft ³)	Energy per Unit Mass (BTU/lb)	Energy per Unit Volume (BTU/ft ³)
Gasoline	45.9	19,100	876,000
No. 2 Diesel Fuel	52.4	19,000	995,000
Kerosene	51.3	19,100	970,000
Jet Fuel	48.6	18,700	910,000
Ethanol	49.1	11,600	570,000
Methanol	49.7	8,700	432,000
Methane (gas) ^{a*}	8.5	21,500	183,000
Methane (liquid) ^{b*}	26.5	21,500	570,000
Propane ^c	36.2	20,000	724,000
Butane ^c	35.2	19,700	695,000
Hydrogen (gas) ^a	1.1	52,000	56,000
Hydrogen (liquid) ^b	4.4	52,000	229,000

a. gas at 27° C and 3000 psig

b. liquid at cryogenic temperatures and one atmosphere

c. liquid at 27° C

* note that natural gas, both gaseous and liquefied, is primarily made up of methane

source: McAuliffe, Charles A. *Hydrogen and Energy*. Gulf Publishing Company, Houston, 1980