

16. Units, Conversion Factors, and Calorific Values

Conversion factors concerning units of energy

1 kilojoule [kJ] = 1000 J
 1 megajoule [MJ] = 1000 kJ
 1 gigajoule [GJ] = 1000 MJ
 1 terajoule [TJ] = 1000 GJ
 1 petajoule [PJ] = 1000 TJ

1 kWh (kilowatt-hour) = 3.6 MJ = 860 kcal (kilogram calories)
 1 MWh (megawatt-hour) = 3.6 GJ
 1 GWh (gigawatt-hour) = 3.6 TJ
 1 TWh (terawatt-hour) = 3.6 PJ

Conversion factors concerning units of power

1 kilowatt [kW] = 1000 W
 1 megawatt [MW] = 1000 kW
 1 gigawatt [GW] = 1000 MW
 1 megajoule per second [MJ/s] = 1 MW
 1 horsepower [HP] = 632 kcal/h = 0.735 kW

Conversion factors concerning quantities of wood chips, energy, and calorific value

Cubic content/weight:

1 cubic metre of solid content of wood chips takes up approx. 2.8 cubic metres
 1 cubic metre of wood chips contains approx. 0.35 cubic metre of solid content
 1 cubic metre of wood chips weighs approx. 250 kg*
 1 tonne of wood chips fills approx. 4.0 cubic metre*
 1 tonne of wood chips contains approx. 1.4 cubic metre solid content wood*

Calorific value:

Calorific value in 1 cubic metre of wood chips = 2.6 GJ*
 Calorific value in 1 cubic metre of solid content wood chips = 7.3 GJ*
 Calorific value in 1 tonne of wood chips = 10.4 GJ*
 Calorific value in 1000 litres fuel oil = 14 cubic metre wood chips*
 Calorific value in 1000 cubic metre natural gas = 15 cubic metre wood chips*
 1 megatonne (Mt.) (1 million tonnes of oil equivalent, crude oil) = 41.868 PJ
 1 tonne of fuel oil = 42.7 GJ
 1000 litres of fuel oil = 36.0 GJ
 1 litre of fuel oil = 36.0 MJ = 10 kWh

* The calculations are based on wood chips of Norway spruce. The starting point is Norway spruce with a specific gravity (solid matter content) of 400 kg per cubic metre of solid wood and wood chips with a moisture content of approx. 40% which is equal to the moisture content in storage-dry wood chips.

“Wood for Energy Production”, second edition, is a readily understood guide to the application of wood in the Danish energy supply. The first edition was named Wood Chips for Energy Production”.

It describes the wood fuel from forest to consumer and provides a concise introduction to technological, environmental, and financial matters concerning heating systems for farms, institutions, district heating plants, and CHP plants. The individual sections deal with both conventional, well known technology, and the most recent technological advances in the field of CHP production as well.

The purpose of this publication is to reach the largest possible numbers of people, and it is so designed that the layman will find its background information of special relevance.

“Wood for Energy Production” is also available in German and Danish.