

## Fuel classification 2016

### Definitions for classification of fuels and energy sources 2016

#### Petroleum products

##### 111 Petroleum gases

###### **1111 Refinery gas**

Refinery gas is gas recovered from the oil refining process used as an energy source. The category also includes fuel gases from the petrochemical industry.

###### **1112 LPG (Liquefied petroleum gas)**

LPG is a mixture of propane and butane or propane. The default value used for density is 520 kg/m<sup>3</sup> at a temperature of 15°C. The uncertainty of density is assumed to be ±2 per cent.

###### **1119 Other gas**

Other gas includes fossil by-product gases generated in raw material use of oil or natural gas that are used as an energy source, excluding gases reported under refinery gas (1111). As an example, so-called PSA gas generated at refineries and gases generated from heavy fuel oil in the chemical industry.

##### 112 Light distillates

###### **1121 Naphtha**

Naphtha is a light distillate that is not much used as an energy source. It is mostly used as a solvent or feed stock in the petrochemical industry.

###### **1122 Motor gasoline**

Motor gasoline is assumed to contain **6.6%** biofuel share of the volume, on average, in 2016. This is taken into account in the default caloric value and carbon dioxide coefficient. The default value used for density is 750 kg/m<sup>3</sup> at a temperature of 15°C. The uncertainty of density is assumed to be ±2 per cent.

###### **1123 Aviation gasoline**

Aviation gasoline is a special product for small airplanes.

##### 113 Medium distillates

###### **1131 Kerosene (Jet fuel)**

Kerosene is used as a fuel for jet turbines.

###### **1132 Other kerosenes**

Other kerosenes include such as motor kerosene, paraffin and paraffin oil.

###### **1133 Diesel oil**

Diesel oil is a fuel for diesel motors, which is most commonly used in lorries, buses and coaches and vans and in part of passenger cars. Diesel oil is assumed to contain **17%** biofuel share of the volume, on average, in 2016. This is taken into account in the default caloric value and carbon dioxide coefficient. The default value used for density is 830 kg/m<sup>3</sup> at a temperature of 15°C. The uncertainty of density is assumed to be ±2 per cent.

###### **1134 Gasoil, low sulphur (heating fuel oil)**

Gasoil, heating fuel oil, whose sulphur content is at most 0.1 weight percentage, is a medium distillate that can be used for oil heating of detached houses and other small houses, as a fuel for industrial drying, melting and combustion furnaces and as a fuel for various heating and drying apparatuses, and as ship fuel. Several types of heating fuel oil (light fuel oil) are sold under different product names.

The bio oil share has not been taken into account in the default caloric values and coefficients of 2016. The default value used for density is 840 kg/m<sup>3</sup> at a temperature of 15°C. The uncertainty of density is assumed to be ±2 per cent.

#### **1135 Gasoil, sulphur-free (for non-road use and heating)**

Sulphur-free gasoil is a fuel applicable for use in diesel motors of moving off-road machinery. It can be utilised for all uses of gasoil (light fuel oil).

The bio oil share has not been taken into account in the default caloric values and coefficients of 2016. The default value used for density is 840 kg/m<sup>3</sup> at a temperature of 15°C. The uncertainty of density is assumed to be ±2 per cent.

#### **1139 Other medium distillates**

Other medium distillates include special products corresponding to light fuel oil.

### **114 Heavy distillates**

Heavy distillates are produced from an undistilled cut of crude oil, which is used as a fuel for large oil heating plants and stations, industrial melting and combustion furnaces, and ships and diesel plants. Below are the default densities of the most important heavy fuel oils at a temperature of 15°C. Temperature-adjusted density can be calculated using the calculation instructions published by oil companies (e.g. Neste: User guide for heavy fuel oil, Section 1.4.6.1). The uncertainty of density is assumed to be ±2 per cent.

#### **1141 Heavy fuel oil, sulphur content < 1%**

Heavy fuel oil with a sulphur content of more than 0.5 per cent but less than 1 per cent. The default value used for density is 990 kg/m<sup>3</sup>.

#### **1142 Heavy fuel oil, sulphur content ≥ 1%**

The default value used for density is 1000 kg/m<sup>3</sup>.

#### **1143 Other heavy distillates**

Other heavy distillates include special products such as extra heavy bottom oil and other bottom oils.

#### **1144 Heavy fuel oil, sulphur content ≤ 0.1%**

Low-sulphur fuel belonging to heavy fuel oils. A fuel mainly for ship use but other use is also possible. The default value used for density is 890 kg/m<sup>3</sup>.

#### **1145 Heavy fuel oil, sulphur content ≤ 0.5%**

Heavy fuel oil with a sulphur content of more than 0.1 per cent but less than or equal to 0.5 per cent. The default value used for density is 910 kg/m<sup>3</sup>.

#### **1148 Asphaltene**

A fuel containing heavy residual fractions separated from base oil in a solvent extraction process in oil processing. It is in solid form at normal ambient conditions. It can be utilised as gasification feedstock or in energy production, e.g. pelleted or mixed in heavy fuel oil.

### **115 Petroleum coke**

Includes coke produced from oil by distillation and catalytic FCC and TCC coke by cracking.

### **116 Recycled and waste oils**

The oils that are recovered from use after possible refining and are utilised as energy sources.

### **119 Other petroleum products**

This category includes oil products not belonging to other categories. Please specify which oil products are reported in this group.

## **Coal**

### **121 Hard coal and anthracite**

Hard coal refers to a solid organic fossil fuel whose calorific value in an ash-free substance is over 24 MJ/kg. Types of hard coal are mainly classified by the amount of volatile matter and calorific value.

**1211 Anthracite**

Measured by geological age, anthracite is the oldest and most advanced type of hard coal with a low content of volatile matter. The net calorific value of anthracite is highest, about 33 MJ/kg.

**1212 Hard coal**

Bituminous coal, so called steam coal. Includes types of coal whose calorific value is at least 24 MJ/kg, excluding anthracite.

**122 Other coal****1221 Semi-bituminous coal, brown coal, lignite**

Brown coal is the youngest coal by geological age. It is less carbonised than hard coal but it contains more volatile components such as hydrogen and oxygen. The calorific value of brown coal is under 24 MJ/kg.

**1222 Coal briquettes**

Pieces of certain size produced from hard coal by adding binding agents.

**1228 Coal tar**

Tar formed of hard coal in connection with the production of coke.

**1229 Other non-specified coal**

Coal other than belonging to the categories above. Please specify which coal product has been used as a fuel.

**123 Coke**

Coke is a fuel produced from hard coal by pyrolysis. The category also includes semi-coke.

**124 Coke oven gas**

Gas obtained as a by-product from the production of coke, containing hydrogen and light hydrocarbon gases. Gas is used as an energy source at coking plants and elsewhere in the iron and steel industry.

**125 Blast furnace gas**

Blast furnace gas produced in a blast furnace, which is used after refining as a fuel for heating and energy production.

**126 CO-gas**

Coal gas (CO-gas) generated mainly from coke in connection with metal processing. Prior to 2015 it has been reported in the blast furnace gas category (125) or in category 499. CO-gas can include small amounts of other compounds.

**Natural gas****131 Natural gas**

Natural gas contains primarily methane and some other light hydrocarbons. Natural gas is used as an energy source in the manufacturing industry and energy production. Natural gas can also be used as a transport fuel and as a feed stock in the production of hydrogen.

**1311 Natural gas**

Natural gas in gaseous form distributed for use through the pipe network.  
Liquefied natural gas distributed for use through the natural gas network is also reported in this category.

**1312 Liquefied natural gas (LNG)**

Natural gas distributed in liquefied form for use outside the pipe network.

**Peat**

Peat is an organic type of soil generated as a result of slow decay of marsh plants, decomposed incompletely and stored in the habitat under extremely wet conditions. Peat is used as a fuel

after drying. Snag trees among peat are considered as part of peat. If wood or other fuel has been added to peat, each fuel is reported separately.

## **211 Milled peat**

Milled peat is a fine powder milled from the peatland surface.

Typical properties as fired: moisture content 40–50%, net calorific value 9–11 GJ/t.

## **212 Sod peat**

Sod peat is peat compressed into pieces and separated from the peatland surface.

Typical properties as fired: moisture content 35–40%, net calorific value 11–13 GJ/t.

## **213 Peat pellets and briquettes**

Peat pellets and briquettes are a fuel produced from dried powdered peat by compression.

Typical properties as fired: moisture content 5–10%, net calorific value 17–21 GJ/t.

## **Biomass**

### **311 Forest fuelwood**

Includes wood harvested for energy use collected from forests and wooded areas.

#### ***3111 Firewood (stems and split firewood)***

The raw material of chopped firewood is firewood (usually 1 m in length) or culled diameter stem. Chopped firewood is chopped and cut furnace-ready firewood used in households' wood-heated equipment, such as stoves, fireplaces and central heating systems.

Typical properties as fired: moisture content 20–25%, net calorific value 13–15 GJ/t.

#### ***3112 Chips from roundwood***

Chips made from culled stem wood or from the entire superterranean biomass of the tree (stem wood, branches, needles).

Typical properties as fired: moisture content 40–55%, net calorific value 7–11 GJ/t.

**As preliminary information: The sub-classification applied to limiting the subsidy for wood chips in the electricity production subsidy system of the Energy Authority starting from 2019.** Based on the amendment of 20 March 2015 to the Act on production subsidy for electricity produced from renewable energy sources (1396/2010), by which the production subsidy for electricity produced with wood chips is limited to 60 per cent in case the chips originate from sawtimber and pulpwood suitable for processing in logging sites of large-sized timber.

#### ***3112a Chips from roundwood, small-sized trees***

Chips made from culled stem wood of small diameter or not suitable for processing or from the entire superterranean biomass of the tree of small diameter (stem wood, branches, needles).

#### ***3112b Chips from roundwood, large-sized timber***

Chips made from culled stem wood suitable for processing in logging sites of large-sized timber. Birch, pine or fir tree fulfilling the size and quality requirements of pulpwood or sawtimber.

#### ***3113 Forest residue chips***

After harvesting of commercial timber, chips or chippings made from branches and tree tops. Also includes chips or chippings produced from twig logs.

Typical properties as fired: moisture content 30–50%, net calorific value 8–13 GJ/t.

#### ***3114 Hog fuel from stumps (previously stump wood chips)***

Hog fuel and chippings produced from tree stumps and roots.

Typical properties as fired: moisture content 30–40%, net calorific value 11–13 GJ/t.

#### ***3115 Energy willow (and other short rotation coppice)***

Short rotation coppice willow is grown for energy use and is chipped prior to use. This category also includes also other short rotation forestry wood species that are grown for energy use.

## **312 Industrial wood residue**

Wood residue or by-product produced in the wood processing or other industry used as an energy source.

### **3121 Bark**

Bark residue derived from commercial timber by different debarking techniques.  
Typical properties as fired: moisture content 45–65%, net calorific value 5–11 GJ/t.

### **3122 Saw dust**

Residue from sawing of timber.  
Typical properties as fired: moisture content 45–60%, calorific value 6–10 GJ/t.

### **3123 Wood residue chips**

Chips or chippings from industrial wood residue (wood strips, offcuts, veneers in the board industry, plywood edges, etc.) and unbarked or barked chips or chippings produced as by-products by the wood industry, which do not contain halogenated organic compounds, heavy metals or plastics.

Typical properties as fired:

- Wood residue chippings: moisture content 10–60%, net calorific value 6–17 GJ/t
- Plywood residue: moisture content 5–15%, net calorific value 10–19 GJ/t

### **3124 Cutter shavings, grinding powder, etc.**

Residue from grinding or planing of timber. Also includes dry sawdust and wood dust.  
Typical properties as fired: moisture content 5–15%, calorific value 16–18 GJ/t.

### **3128 Unspecified industrial wood residue**

In this category, reported is industrial wood residue acquired as a ready mix, which is composed of at least two of the above categories (e.g. bark and sawdust) that cannot be separated even by an approximate estimate. If the mixing ratio of the wood fuel mix is known, the percentage shares of different wood fuels as energy must be defined before mixing and the amounts corresponding to their shares should be reported in the fuel categories in question.

### **3129 Other industrial wood residue**

Includes other wood residue classified as biofuels (e.g. from the construction material industry), which do not contain halogenated organic compounds, heavy metals and other such impurities.

## **313 Black liquor and other concentrated liquors**

Includes black liquor and sulphite-based chemical liquor.

## **314 By-products from wood processing industry**

### **3141 Pine oil and pitch**

Soft soap, pine oil, pine oil pitch and the like, excluding methanol and turpentine produced in pulp mill processes.

Typical properties as fired:

- pine oil: net calorific value 30–40 GJ/t

### **3142 Methanol and turpentine**

Methanol produced in pulp mill processes. Also includes turpentine.

Typical properties as fired:

- methanol: net calorific value 19.5 GJ/t
- turpentine: net calorific value 40 GJ/t

### **3149 Other by-products and waste products from wood processing industry**

Wood-based by-products and waste products from the wood processing industry belonging to other than the above-mentioned categories, such as fibrous sludges (0 fibre), weak and strong odour gases and refuse paper not fit for material recycling produced in paper production, or other paper, cardboard, paperboard and viscose waste to be burned.

### **315 Recovered wood**

Clean wood residue classified as a biofuel or disposed wood or wood product, which does not contain coatings or halogenated organic compounds and heavy metals. For example, wood residue, wood or loading pallets.

### **316 Wood pellets and briquettes**

Compressed wood made by compression from sawdust, shavings and grinding dust. Also includes pellets and briquettes made from logging waste chippings.

### **317 Vegetable-based fuels**

Vegetable-based fuels include field biomass and residues, and waste from other than arboreal plants, as well as vegetable-based by-products from the food industry. These are cereal, reed canary grass, straw, reed grass, turnip rape and linen.

#### **3171 Reed canary grass**

Reed canary grass is an energy plant used as fuel. It is usually burned as mixed fuel together with peat and wood. The components of the mixture are reported separately in their own respective fuel categories.

#### **3172 Cereal crops and straw parts**

Cereals or parts of cereal crops such as straw used as a fuel.

#### **3174 Vegetable oils and fats**

Vegetable oils and fats used as fuels, including roasting fats, etc. removed from use. NB! Transport and heating fuels produced industrially for distribution from vegetable oils and fats belong to categories 3221–3229.

#### **3179 Other vegetable-based fuels**

This category includes others than the above-mentioned vegetable-based by-products, etc. from food production or the food industry. Please specify which products that have been used as a fuel.

### **318 Animal-based fuels**

Animal-based fuels include such as meat and bone flour and animal fats. The category also includes dung and litter.

#### **3181 Animal fats**

Animal-based fats and oils used as a fuel. NB! Transport and heating fuels produced from animal fats for industrial distribution belong to categories 3221–3229.

#### **3189 Other animal-based fuels**

Other animal-based products used as a fuel, such as meat and bone flour. The category also includes dung and litter. Please specify which products that have been used as a fuel.

## **Other biofuels and mixed fuels**

### **321 Biogas**

Biogas is the result of a microbiological process, where organic matter is decomposed due to bacterial activity in an anaerobic state. Biogas and digested biomass are produced from the raw material as a result of the decomposition. This main category also includes organic gases produced in other ways, e.g. by means of a thermal process.

#### **3211 Landfill gas**

Biogas recovered from landfills. Methane content around 35–60%.

#### **3212 Biogas from wastewater treatment plants**

Biogas produced in wastewater treatment plants. Methane content around 60–70%.

#### **3213 Industrial biogas**

Biogas produced in industrial wastewater treatment plants, and from industrial biodegradable waste and by-products (e.g. in the food and forest industries). Methane content around 65–80%.

**3214 Biomethane**

Purified biogas whose methane content is over 95%.

**3215 Synthetic biogas**

A so-called synthetic (thermal) biogas produced from organic matters by gasification.

**3219 Other biogases**

Other biogases include biogas produced on farms and in co-digestion plants. Co-digestion plants differ from other plants in that they use diversified raw materials, such as waste sludges, and municipal and industrial wastes or by-products. Methane content around 55–65%.

**322 Bioliquids**

Liquid fuels produced from biomass or vegetable oil used as such (not mixed into fossil fuels). This does not include biofuel shares mixed into traffic fuels and fuel oils.

The category also includes bio-based propane, which is produced as a by-product of oil refining. Pine oil, pine oil pitch, methanol and the like derived from the wood processing industry and processing of pine oil belong to categories 3141–3149.

**3221 Biofuel oil**

Fuel oil industrially produced from biomass or vegetable oil used as such for heating or as a fuel for off-road machinery (not mixed with fossil fuels).

**3222 Biopyrolysis oil**

Fuel oil produced from wood or other biomass by the pyrolysis method.

**3223 Bio-LPG /Biopropane**

Such as biopropane generated in connection with oil refining.

**3229 Other liquid biofuels**

Other liquid fuels made from organic matters not belonging to the above-mentioned categories.

**323 Mixed fuels (fossil and non-fossil)**

Mixed fuels refer to fuels containing both fossil and renewable (biodegradable) coal.

**3231 Recovered fuels**

Fuel produced from sorted municipal solid, enterprise or industrial waste, such as SRF, REF, RDF or PDF. Pellets produced from waste go under 3235.

**3232 Demolition wood**

Wood waste from the demolition of buildings and structures containing coatings or other impurities, and does not thus belong to category 315 *Recovered wood*.

**3233 Impregnated wood (chemically treated)**

Impregnated wood products, e.g. railway sleepers.

**3234 Deinking sludge**

Fibrous sludge from the deinking process of recycled paper, which is used after desiccation as a fuel in energy production. Contains carbonates and is therefore classified as a mixed fuel.

**3235 Waste pellets**

Pellets produced from waste.

**3236 Rubber waste**

Includes various rubber waste, such as car tyres and other waste rubber.

**3238 Municipal waste /mixed waste**

Source separated municipal waste (energy waste or dry waste) used as a fuel for energy production at waste incineration plants. This category also includes the fuel section remaining from the separation of other fractions at waste treatment and separation plants. It includes also unsorted municipal waste.

**3239 Other mixed fuels**

Other mixed fuels and gases not belonging to the categories above, such as unspecified industrial waste and deinking waste. If the fossil part of these fuels is not specified separately, they are counted as totally fossil in the emissions trading system.

**324 Gasified waste (Product gas)**

Fuel gas produced from solid raw materials in a thermal gasification process. Generally the energy of product gas is to be reported as the energy content of its raw materials, including conversion losses from the gasification process.

**325 Biosludge**

Includes sludge from municipal waste water treatment, which is used as a fuel after desiccation. Fibrous sludges from the wood processing industry are reported in category *3149 Other by-products from wood processing industry*.

**326 Biocoal**

Fuel produced from wood or other biomass by heating. Includes wood coal produced by torrefication. Typical properties as fired:  
 - torrefied wood: net caloric value 18–22 GJ/t  
 - wood coal: net caloric value 28–33 GJ/t

**Nuclear energy****411 Nuclear energy****Other energy sources****491 Other by-products and wastes used as fuel**

Solid and liquid waste and by-products not belonging to other categories used as an energy source.

**4911 Plastics waste**

Includes various plastics waste, e.g. mobile phone covers.

**4913 Hazardous waste****4919 Other waste**

Waste not belonging to any of the above categories.

**492 Exothermic heat from industry**

Industrial reaction heat refers to heat generated as a by-product of an exothermic heat-transferring chemical reaction in an industrial process (such as calcination, catalytic process). The energy content of the formed heat has not previously been included in the usage figures of any other energy sources. Reaction heat is utilised in electricity and/or heat generation and it replaces other primary energy. This category also includes heat recovered from combustion gases not included in the net calorific value of fuels, which lowers the need for other primary energy.

**493 Secondary heat from industry**

Secondary heat/energy recovered from industry, which is used for production of electricity and/or heat (such as heat recovered from a ground wood or refining plant). Secondary heat utilised in industry has to be included as a 'fuel' of electricity and heat production so that the efficiency would not rise above 100 per cent at the plant level.

**494 Electricity**

Electricity used in heat pumps and electric boilers.

**495 Steam**

Steam acquired from outside for energy production.



**497 Sulphur**

Sulphur generated in industrial processes and used as a fuel in energy production.

**498 Hydrogen****499 Other non-specified energy sources**

Fuels or energy sources not belonging to the categories above. Please specify which products have been used as an energy source.