

RENEWABLES ENERGY AND FUELS

Definition: Fuels and energy obtained directly or indirectly from the recent effects of sunlight, and from geothermal heat and gravitational forces.

Explanation: These are sources of energy which are naturally replenished as they are used. Their indirect use is through the exploitation of wind, tides, hydro and biomass.

Remark: The term 'recent' excludes fossil fuels which were formed from biomass in prehistoric times.

Consultant's comments

This is a purely physical definition which limits itself to defining renewable fuels and energy in terms of their origins. No attempt has been made to introduce the issues related to sustainability of renewables (mainly for biofuels) into it. Indeed, as the notions of renewable and sustainable are becoming intertwined it would be better to avoid the term renewable in order to avoid the value judgement which now comes with it.

SOLAR ENERGY

Definition: Energy captured from sunlight using collectors which carry away the heat or electricity for use.

Remark: The definition is framed to cover active solar energy only. Two types of active energy collection and conversion are defined, electricity using photovoltaic cells, and heat, using thermal collectors.

Electricity - Photovoltaic cells (solar cells)

Definition: Electricity produced by the conversion of sunlight through photoelectronic processes in the cells.

Heat - Thermal collectors

Definition: Heat taken from a fluid which is circulated through a collector heated by sunlight.

WIND ENERGY

Definition: Electricity produced from devices driven by wind.

Consultant's comments

For the purposes of energy statistics wind energy is the energy obtained from devices driven by the wind. In the large majority of cases this is electricity.

WAVE ENERGY

Definition: Electricity produced from devices driven by the motion of waves.

HYDRO ENERGY

Definition: Electricity produced from devices driven by flowing water.

GEOHERMAL ENERGY

Definition: Heat extracted from the earth.

Explanation: The sources of the heat are radioactive decay in the crust and mantle and heat from the core of the earth.

Heat from shallow geothermal sources will include heat gained by the earth from direct sunlight and rain.

Remark: The heat is usually extracted from the earth in the form of heated water or steam.

BIOMASS

Definition: Material obtained from living or recently living organisms. It excludes fossilised or partly fossilised material.

Remark: The material may be in the solid, liquid or gaseous state. It includes animal by-products and residues but excludes peat.

Consultant's comments

Biomass is not a term used within energy statistics as a recognised fuel but, because the definition for biofuels uses the term biomass and biomass contains biofuels, a separate definition for biomass is required.

The structure of the classification for biomass is a proposal for consideration by InterEnerStat as is the example provided by the Swedish commentator.

The particular biofuels included within a classification will reflect those chosen for international energy statistics. National classifications would coexist with it and be mapped to it for international reporting and discussions.

BIOENERGY

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Consultant's comments

The term bioenergy is replaced by biofuels as the former is broader than it needs to be to consistent with its definition.

FUELWOOD, WOOD RESIDUES AND BY-PRODUCTS

Definition: Fuelwood or firewood (in log, brushwood, pellet or chip form) obtained from natural or managed forests or isolated trees. Also included are wood residues used as fuel and in which the original composition of wood is retained.

AGROFUELS

Definition: Biofuels obtained from crops, and crop and agricultural residues.

Remark: Residues from agricultural production include animal solid excreta, meat and fish residues. Agrofuel is sub divided into Bagasse, Animal Wastes, and Other vegetal material and residues.

BAGASSE

Definition: The fuel obtained from the fibre which remains after juice extraction in sugar cane processing.

ANIMAL WASTES

Definition: Excreta of animals which, when dry, are used directly as a fuel.

Remark: This excludes wastes used in anaerobic fermentation plants. Fuel gases from these plants are included under biogases.

OTHER VEGETAL MATERIAL AND RESIDUES

Definition: Biofuels obtained from straw, vegetable husks, ground nut shells, pruning brushwood, olive pomace and other wastes arising from the maintenance, cropping and processing of plants other than sugar cane.

CHARCOAL

Definition: The solid residue from the carbonisation of wood or other vegetal matter through slow pyrolysis.

BLACK LIQUOR

Definition: The alkaline-spent liquor obtained from the digesters during the production of sulphate or soda pulp required for paper manufacture.

Explanation: The lignin contained in the liquor burns to release heat when the concentrated liquor is sprayed into a recovery furnace and heated with hot gases at 900°C.

Remark: Black liquor is used as a fuel in the pulping process.

LIQUID BIOFUELS

Definition: Liquids derived from biomass and used as fuels.

Remark: Liquid biofuels comprise Biogasoline, Biodiesel and Other liquid biofuels. They are used for transport, electricity generation and stationary engines.

BIOGASOLINE

Definition: Liquid fuels derived from biomass and used in spark-ignition internal combustion engines.

Remark: Common examples are:

- bioethanol
- biomethanol
- bio ETBE (ethyl-tertio-butyl-ether)
- bio MTBE (methyl-tertio-butyl-ether)

Biogasoline may be blended with petroleum gasoline or used directly in engines. The blending may take place in refineries or at or near the point of sale.

BIODIESEL

Definition: Liquid biofuels which are usually modified chemically so that they can be used as fuel in diesel engines either directly or after blending with petroleum diesel.

Explanation: Biodiesels obtained by chemical modification are a linear alkyl ester made by transesterification of vegetable oils or animal fats with methanol. The transesterification distinguishes biodiesel from straight vegetable and waste oils. Biodiesel has a flash point of around 150°C and a density of about 0.88 kg/litre. Biological sources of biodiesel include, but are not limited to, vegetable oils made from canola (rapeseed), soybeans, corn, oil palm, peanut, or sunflower. Some liquid biofuels (straight vegetable oils) may be used without chemical modification their use usually requires modification of the engine.

OTHER LIQUID BIOFUELS

Definition: Liquid biofuels not elsewhere specified.

BIOGASES

Definition: Gases arising from the anaerobic fermentation of biomass.

Remark: These gases are composed principally of methane and carbon dioxide and comprise Landfill gas, Sewage sludge gas and other biogases. They are used mainly as a fuel.

Consultant's comments

There is some use of biogas (mostly in pilot plants) as a feedstock for chemicals manufacture including syngas. It is likely that the practice will increase in the future.

This may be ignored if the practice does not lead to chemicals for which there is significant use as a fuel, or to intermediate chemicals for which the downstream use does not give rise to by-products which are used as a fuel.

LANDFILL GAS

Definition: Biogas from the anaerobic fermentation of organic matter in landfills.

SEWAGE SLUDGE GAS

Definition: Biogas from the anaerobic fermentation of waste matter in sewage plants.

OTHER BIOGASES

Definition: Biogases used as a fuel and not elsewhere specified.

WASTES

Definition: For the purposes of energy statistics, wastes are materials no longer required by their holders and which are used as fuels. They are incinerated with heat recovery at installations designed for mixed wastes or co-fired with other fuels.\

Remark: The heat may be used for heating or electricity generation. Certain wastes are mixtures of materials of fossil and biomass origin.

Consultant's comments

The definitions below seek to define the subsets of all waste which lead to heat used for productive purposes. The definition is drafted to make clear that only those wastes which lead to productive heat are included.

INDUSTRIAL WASTES

Definition: Non-renewable waste which is combusted with heat recovery in plants other than those used for the incineration of municipal waste. The renewable portions of industrial waste combusted with heat recovery are classified according to the biofuels which best describe them.

Remark: Examples are, used tyres, specific residues from the chemical industry and hazardous wastes from health care. Combustion includes co-firing with other fuels.

Consultant's comments

The name 'Industrial Waste' is unsatisfactory as it effectively covers all non-municipal, non-renewable waste which is combusted with heat recovery. As the examples show this is not uniquely waste from industry.

MUNICIPAL WASTE

Definition: Household waste and waste from companies and public services that resembles household waste and which is collected and destroyed at installations specifically designed for the incineration of mixed wastes with heat recovery.

Remark: Municipal wastes can be divided into renewable and non-renewable fractions.