Definitions

Definitions

A. Definition of products

Coal

This section includes coal, i.e. solid fossil fuel consisting of carbonised vegetal matter, and coal products derived directly or indirectly from the various classes of coal by carbonisation or pyrolysis processes, by the aggregation of finely divided coal or by chemical reactions with oxidising agents, including water.

1. Anthracite

A high-rank, hard coal with a gross calorific value (moist, ash- free basis) greater than or equal to 24 MJ/kg and a Vitrinite mean Random Reflectance greater than or equal to 2.0 per cent.

2. Coking coal

A bituminous coal that can be used in the production of a coke capable of supporting a blast furnace charge.

3. Bituminous coal

A medium-rank hard coal with either a gross calorific value (moist, ash-free basis) not less than 24 MJ/kg and with a Vitrinite mean Random Reflectance less than 2.0 per cent, or a gross calorific value (moist, ash-free basis) less than 24 MJ/kg provided that the Vitrinite mean random reflectance is equal to or greater than 0.6 per cent.

4. Sub-bituminous coal

A brown coal with a gross calorific value (moist, ash-free basis) equal to or greater than 20 MJ/kg but less than 24 MJ/kg.

5. Lignite

A brown coal with a gross calorific value (moist, ash-free basis) less than 20 MJ/kg.

6. Peat

A solid formed from the partial decomposition of dead vegetation under conditions of high humidity and limited air access (initial stage of coalification). It is available in two forms for use as a fuel, sod peat and milled peat.

7. Patent fuel

A composition fuel made by moulding hard coal fines into briquette shapes with the addition of a binding agent.

8. Coke oven coke

Coke comprises Coke Oven Coke and Gas Coke.

- **Coke oven coke:** the solid product obtained from carbonisation of coking coal at high temperature. Coke oven coke is low in moisture, and volatile matter and has the mechanical strength to support a blast furnace charge. It is used mainly in the iron and steel industry acting as heat source and chemical agent.
- **Gas coke:** a by-product from the carbonisation of bituminous coal for the manufacture of "gas works gas". Gas coke is used mainly for heating purposes.

9. Coal tar

The liquid by-product of the carbonisation of coal in coke ovens.

10. BKB/PB (Braunkohlenbriketts/Peat briquettes)

BKB is a composition fuel made of brown coal

produced by briquetting under high pressure with or without the addition of a binding agent.

Peat briquette is a fuel comprising of small blocks of dried, highly compressed peat made without a binding agent.

11. Gas works gas

This group includes gases obtained from the carbonisation or gasification of carbonaceous material of fossil or biomass origins in Gas Works. The gases comprise: (a) gases obtained from carbonisation or gasification of coals, cokes, biomass or waste; and (b) substitute natural gas (a methane-rich gas) made from synthesis gas.

12. Coke oven gas

A gas produced from coke ovens during the manufacture of coke oven coke.

13. Blast furnace gas

The by-product gas of blast furnace operation consisting mainly of nitrogen, carbon dioxide and carbon monoxide. The gas is recovered as it leaves the furnace. Its calorific value arises mainly from the carbon monoxide produced by the partial combustion of coke and other carbon bearing products in the blast furnace. It is used to heat blast air and as a fuel in the iron and steel industry. It may also be used by other nearby industrial plants. Note that where carbonised biomass (e.g, charcoal or animal meal) is used in blast furnaces, part of the carbon supply may be considered renewable.

14. Oxygen steel furnace gas

The by-product gas of the production of steel in a basic oxygen furnace. The gas is recovered as it leaves the furnace.

Oil

1. Crude oil

A mineral oil of fossil origin extracted by conventional means from underground reservoirs, and comprises liquid or near-liquid hydrocarbons and associated impurities such as sulphur and metals.

It exists in the liquid phase under normal surface temperature and pressure, and usually flows to the surface under the pressure of the reservoir. This is termed "conventional" extraction. Crude oil includes condensate from condensate fields, and "field" or "lease" condensate extracted with the crude oil.

2. Natural gas liquids (NGL)

Mixture of ethane, propane, butane (normal and iso), (iso) pentane and a few higher alkanes collectively referred to as pentanes plus.

NGL are produced in association with oil or natural gas. They are removed in field facilities or gas separation plants before sale of the gas. All of the components of NGL except ethane are either liquid at the surface or are liquefied for disposal.

3. Refinery feedstocks

Oils or gases from crude oil refining or the processing of hydrocarbons in the petrochemical industry which are destined for further processing in the refinery excluding blending. Typical feedstocks include naphthas, middle distillates, pyrolysis gasoline and heavy oils from vacuum distillation and petrochemical plants.

4. Additives/Oxygenates

Compounds added to or blended with oil products

to modify their properties (octane, cetane, cold properties, etc). Examples of these products are: (a) oxygenates such as alcohols (methanol, ethanol) and ethers such as methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME); (b) esters such as (e.g., rapeseed or dimethylester, etc); and (c) chemical compounds such as tetramethyllead (TML), tetraethyllead (TEL) and detergents. Some additives and oxygenates may be derived from biomass while others may be of hydrocarbon origin.

5. Biofuels

Fuels derived directly or indirectly from biomass.

- **Biogasoline:** liquid fuels derived from biomass and used in spark-ignition internal combustion engines.
- **Biodiesel:** liquid biofuels derived from biomass and used in diesel engines.
- **Bio-jet kerosene:** liquid biofuels derived from biomass and blended with or replacing jet kerosene.
- **Bioethanol:** ethanol produced from biomass and/or biodegradable fraction of waste;
- **Biomethanol:** methanol produced from biomass and/or the biodegradable fraction of waste;
- **Biodimethylether:** a diesel quality fuel produced from biomass and/or the biodegradable fraction of waste;
- **Bio-oil:** a pyrolysis oil fuel produced from biomass

6. Other hydrocarbons

These are non-conventional oil and hydrogen. Non-conventional oils refer to oils obtained by non-conventional production techniques, that is oils which are extracted from reservoirs containing extra heavy oils or oil sands which need heating or treatment (e.g., emulsification) in situ before they can be brought to the surface for refining/processing. They also include oils extracted from oil sands, extra heavy oils, coal and oil shale which are at, or can be brought to the surface without treatment and require processing after mining (ex situ processing). Non-conventional oils may also be produced from natural gas. Hydrogen, although not a hydrocarbon, is included unless it is a component of another gas.

7. Refinery gas (not liquefied)

A mixture of non-condensable gases mainly consisting of hydrogen, methane, ethane and olefins obtained during distillation of crude oil or treatment of oil products (e.g., cracking) in refineries or from nearby petrochemical plants. It is used mainly as a fuel within the refinery.

8. Ethane

A naturally gaseous straight-chain hydrocarbon (C_2H_6). Ethane is obtained at gas separation plants or from the refining of crude oil. It is a valuable feedstock for petrochemical manufacture.

9. Liquefied petroleum gases (LPG)

Refers to liquefied propane (C_3H_8) and butane (C_4H_{l0}) or mixtures of both. Commercial grades are usually mixtures of the gases with small amounts of propylene, butylene, isobutene and isobutylene stored under pressure in containers.

10. Naphtha

Refers to light or medium oils distilling between 30ºC and 210ºC which do not meet the specification for motor gasoline. The main uses for naphthas are as feedstock for high octane gasolines and the manufacture of olefins in the petrochemical industry.

11. Gasolines

Complex mixtures of volatile hydrocarbons distilling

between approximately 25°C and 220°C and consisting of compounds in the C_4 to C_{12} range.

- **Motor gasoline:** motor gasoline is a mixture of some aromatics (for example, benzene and toluene) and aliphatic hydrocarbons in the C_5 to C_{12} range. The distillations range is 25°C to 220°C. Motor gasoline may also contain biogasoline products.
- **Aviation gasoline:** aviation gasoline is gasoline prepared especially for aviation piston engines with additives which assure performance under flight conditions. Aviation gasolines are predominantly alkylates (obtained by combining C_4 and C_5 isoparaffins with C_3, C_4 and C_5 olefins) with the possible addition of more aromatic components including toluene. The distillation range is 25°C to 170°C.
- **Gasoline-type jet fuel:** this includes all light hydrocarbon oils for use in aviation turbine power units, distilling between 100°C and 250°C. They are obtained by blending kerosene and gasoline or naphtha in such a way that the aromatic content does not exceed 25% in volume and the vapor pressure is between 13.7 kilopascal (kPa) and 20.6 kPa.

12. Kerosenes

Comprise kerosene-type jet fuel and other kerosene. This is a mixture of hydrocarbons in the range C_9 to C_{16} distilling over the temperature interval 145°C to 300°C, but not usually above 250°C, and with a flash point above 38°C.

- **Kerosene type jet fuel:** this is a blend of kerosene suited to flight conditions with particular specifications, such as freezing point. The specifications are set down by a small number of national standards committees, most notably, ASTM (US), MOD (UK), GOST (Russia).
- **Other kerosene: k**erosene used for heating, cooking, lighting, solvents and internal combustion engines. Other names of this product are burning oil, vaporising oil, power kerosene and illuminating oil.

13. Gas/Diesel oil (Distillate fuel oil)

Middle distillates, predominantly of carbon number range C_{11} to C_{25} and with a distillation range of 160°C to 420°C. This product comprises road diesel and heating or other gas oil.

14. Fuel oil

This comprises residual fuel oil and heavy fuel oil which is usually a blended product based on the residues from various refinery, distillation and cracking processes. Residual fuel oils A-5 have a distillation range of 350°C to 650°C and a kinematic viscosity in the range 6 to 55 centistokes (cSt) at 100°C. Their flash point is always above 60°C and their specific gravity is above 0.95.

15. White spirit and SBP

White spirit and special boiling point industrial spirits (SBP) are refined distillate intermediates with a distillation in the naphtha/kerosene range. They are mainly used for non-fuel purposes and sub-divided as: (a) white spirit - an industrial spirit with a flash point above 30°C and a distillation range of 135°C to 200°C; and (b) industrial spirit (SBP) – light oils distilling between 30°C and 200°C.

16. Lubricants

Oils, produced from crude oil, for which the principal use is to reduce friction between sliding surfaces and during metal cutting operations.

17. Bitumen

A solid, semi-solid or viscous hydrocarbon with a colloidal structure, being brown to black in color. It is

obtained as a residue in the distillation of crude oil and by vacuum distillation of oil residues from atmospheric distillation. It should not be confused with the nonconventional primary extra heavy oils which may also be referred to as bitumen.

18. Paraffin waxes

Residues extracted when dewaxing lubricant oils. The waxes have a crystalline structure which varies in fineness according to the grade, and are colourless, odourless and translucent, with a melting point above 45ºC.

19. Petroleum coke

A black solid obtained mainly by cracking and carbonising heavy hydrocarbon oils, tars and pitches. It consists mainly of carbon (90 to 95 per cent) and has a low ash content. The two most important categories are "green coke" and "calcined coke". Green coke (raw coke) is the primary solid carbonisation product from high boiling hydrocarbon fractions obtained at temperatures below 630ºC. It contains 4-15 per cent by weight of matter that can be released as volatiles during subsequent heat treatment at temperatures up to approximately 1330ºC. Calcined coke is a petroleum coke or coal-derived pitch coke obtained by heat treatment of green coke to about 1330ºC. It will normally have a hydrogen content of less than 0.1 per cent by weight.

20. Other products

Other products include products (including partly refined products) from the refining of crude oil and feedstocks which are not specified above.

Gas

1. Natural gas

A mixture of gaseous hydrocarbons, primarily methane, but generally also including ethane, propane and higher hydrocarbons in much smaller amounts and some noncombustible gases such as nitrogen and carbon dioxide.

- **Associated gas:** gas produced in association with crude oil.
- **Non-associated gas:** gas originating from fields producing hydrocarbons only in gaseous form.
- **Colliery gas:** gas recovered from coal mines.
- **Shale gas:** natural gas produced from hydrocarbon rich shale formation. Shale gas is typically a dry gas primarily composed of methane (90% or more methane), but some formations do produce wet gas.
- **Coal seam gas:** Coal seam gas (also known as coal bed methane) is a form of natural gas extracted from coal seams.

2. LNG

Liquid Natural Gas is produced by liquefaction of natural gas, liquefied by reducing its temperature in order to simplify storage and transportation when production sites are remote from centres of consumption and pipeline transportation is not economically practicable.

1. Fuelwood

Fuelwood (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. Charcoal and black liquor are excluded.

2. Woodwaste

Yard trash and types of waste typically generated by sawmills, plywood mills, and woodyards associated with the lumber and paper industry, such as wood residue, cutoffs, wood chips, sawdust, wood shavings, bark, wood refuse, wood-fired boiler ash, and plywood or other bonded materials that contain only phenolic-based glues or other glues that are approved specifically by the administrative authority.

3. Bagasse

Fuel obtained from the fibre which remains after juice extraction in sugar cane processing.

4. Charcoal

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

5. Other biomass

All other solid biomass products not specifically mentioned above. This includes agricultural wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs, palm oil bunches, etc. The quantity of fuel used should be reported on a net calorific value basis.

6. Biogas

Gases arising from the anaerobic fermentation of biomass and the gasification of solid biomass (including biomass in wastes).

- **Landfill gas:** biogas from the anaerobic fermentation of organic matter in landfills.
- **Sewage sludge gas:** biogas from the anaerobic fermentation of waste matter in sewage plants.
- **Other biogas:** other biogases from anaerobic fermentation not elsewhere specified.

7. Industrial waste

Non-renewable waste which is combusted with heat recovery in plants other than those used for the incineration of municipal waste.

8. Municipal solid waste (renewables)

Household waste and waste from companies and public services that resembles household waste and which is collected at installations specifically designed for the disposal of mixed wastes with recovery of combustible liquids, gases or heat.

9. Liquid Biofuels

Liquids derived from biomass and used as fuels.

- **Biogasoline** refers to liquid fuels derived from biomass and used in spark- ignition internal combustion engines. 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.
- **Bioethanol** refers to ethanol produced from biomass.
- **Biodiesel** refers to liquid biofuels derived from biomass and used in diesel engines. Biodiesels may be blended with petroleum diesel or used directly in diesel engines.
- **Bio-jet kerosene** refers to liquid biofuels derived from biomass and blended with or replacing jet kerosene.

10. Hydro

Electricity produced from devices driven by fresh,

flowing or falling water.

11. Geothermal

- Electricity and heat generation produced from geothermal plants.

12. Solar

- **Electricity from solar photovoltaics** refers to electricity produced by the direct conversion of solar radiation through photovoltaic processes in semiconductor devices (solar cells), including concentrating photovoltaic systems.
- **Heat from concentrating solar thermal** refers to high temperature heat produced from solar radiation captured by concentrating solar thermal systems. The high temperature heat can be transformed to generate electricity, drive chemical reactions, or be used directly in industrial processes.
- **Heat from non-concentrating solar thermal** refers to Low temperature heat produced from solar radiation captured by non-concentrating solar thermal systems.

13. Tide/wave/ocean

Electricity generation produced from tide / wave / ocean.

14. Wind energy

Electricity produced from devices driven by wind.

Electricity and heat

1. Thermal

Electricity and heat generation from combustible fuels such as coal, oil and gas.

2. Hydro

Power generation from hydro plants, including pumped up (pumped storage) plants.

3. Nuclear

Electricity and heat generation from nuclear plants.

4. Geothermal

Electricity and heat generation from geothermal plants.

5. Renewable energy

Electricity and heat generation from solar, biomass, and waste and Electricity generation from tide, wave, ocean and wind.

- **Solar**
  - **Electricity:** quantity of electricity generated by solar photovoltaic and from solar thermal systems.
  - **Heat:** solar energy exploited for hot water production by: Flat plate collectors, mainly of the thermosyphon type, for domestic hot water or for the seasonal heating of swimming pools.

    Note: Passive solar energy for the direct heating, cooling and lighting dwellings or other buildings is not included.
- **Tide, Wave, Ocean:** electricity generation produced from tide / wave / ocean.
- **Wind:** electricity produced from devices driven by wind.
- **Biomass:** electricity and heat produced by fuelwood, woodwaste, bagasse, other biomass, biogas and liquid biofuels.

- **Waste:** electricity and heat produced by industrial waste and municipal solid waste.

6. Others

Electricity and heat generation from other fuel sources such as fuel cells, etc.

B. Definition of flows

Supply sector

Domestic supply is defined as *indigenous production + from other sources + imports - exports - international marine bunkers - international aviation bunkers ± stock changes*.

1. Production

Production is defined as the capture, extraction or manufacture of fuels or energy in forms which are ready for general use. In energy statistics, two types of production are distinguished, primary and secondary. *Primary production* is the capture or extraction of fuels or energy from natural energy flows, the biosphere and natural reserves of fossil fuels within the national territory in a form suitable for use. Inert matter removed from the extracted fuels and quantities reinjected, flared or vented are not included. The resulting products are referred to as "primary" products. *Secondary production* is the manufacture of energy products through the process of transformation of primary fuels or energy. The quantities of secondary fuels reported as production include quantities lost through venting and flaring during and after production. In this manner, the mass, energy and carbon within the primary source(s) from which the fuels are manufactured may be balanced against the secondary fuels produced. Fuels, electricity and heat produced are usually sold but may be partly or entirely consumed by the producer.

There are a few specificities according to the fuels:

- **Oil:** production includes only marketable production, and excludes volumes returned to formation. Such production should include all crude oil, NGL, condensates and oil from shale and tar sand, etc. It should also include the receipts of additives/ oxygentates by refineries and blending plants from outside the refinery sector.
- **Natural gas:** all dry marketable production is measured after purification and extraction of NGLs and sulphur. Quantities reinjected, vented or flared, are not included. Production includes quantities used within the natural gas industry; in gas extraction, pipeline systems and processing plants.

Calculation of production of hydro, geothermal, solar, wind, etc and nuclear follows some conventions used by selected international organisations.

As regards the production of secondary energy in the basic energy statistics, production of secondary oil products represents the gross refinery output. Secondary coal products and gases represent the output from coke ovens, gas works, blast furnaces and other transformation processes. In the energy balances production of secondary products is zero and the gross refinery output is included in the transformation sector.

Production from other sources: Production from other sources refers to both primary energy that has not been accounted for under production and secondary energy that has been accounted for in the production of another fuel. There are a few examples:

- additives and other hydrocarbons produced from coal, gas or renewables;
- oil and coal used in natural gas blending plants to adjust calorific value;
- recovered slurries, middling and other low

grade coal products which cannot be classified according to the main categories of coal.

2. Imports and exports

Imports of energy products comprise all fuel and other energy products entering the national territory. Goods simply being transported through a country (goods in transit) and goods temporarily admitted are excluded but re-imports, which are domestic goods exported but subsequently readmitted, are included. The bunkering of fuel outside the reference territory by national merchant ships and civil aircraft engaged in international travel is excluded from imports. Fuels delivered to national merchant ships and civil aircraft which are outside of the national territory and are engaged in international travel should be classified as "International Marine" or "Aviation Bunkers", respectively, in the country where such bunkering is carried out. Note that the "country of origin" of energy products should be recorded as a country from which goods were imported.

Exports of energy products comprise all fuel and other energy products leaving the national territory with the exception that exports exclude quantities of fuels delivered for use by merchant (including passenger) ships and civil aircraft, of all nationalities, during international transport of goods and passengers. Goods simply being transported through a country (goods in transit) and goods temporarily withdrawn are excluded but re-exports, foreign goods exported in the same state as previously imported, are included. Fuels delivered to foreign merchant ships and civil aircraft engaged in international travel are classified as "International Marine" or "Aviation Bunkers", respectively. Note that "country of destination" of energy products (that is country of the last known destination as it is known at the time of exportation) should be recorded as a country to which these products are exported to.

Quantities of crude oil and products imported or exported under processing agreements (i.e. refining on account) should be included. Crude oil and NGLs should be reported as coming from the economy of ultimate origin; refinery feedstocks and finished products should be reported as coming from the economy of last consignment. Any gas liquids (e.g. LPG) extracted during the regasification of imported liquefied natural gas should be included as imports. Petroleum products imported or exported directly by the petrochemical industry should be included.

Note: Imports or exports of ethanol (reported in the Additives/Oxygenate column) should relate to the quantities destined for fuel use.

- Re-exports of oil imported for processing within bonded areas should be included as an export of product from the processing economy to the final destination.

3. International marine bunkers

International Marine Bunkers are quantities of fuels delivered to merchant (including passenger) ships, of any nationality, for consumption during international voyages transporting goods or passengers. International voyages take place when the ports of departure and arrival are in different national territories. Fuels delivered for consumption by ships during domestic transportation, fishing or military uses are not included here. For the purposes of energy statistics International Marine Bunkers are not included in exports. Consumption of warships should be included in Final Consumption under Other Sector, Not Elsewhere Specified. Consumption by ships engaged in fishing and in transport in inland and coastal waters is not included.

4. International aviation bunkers

International aviation bunkers are quantities of fuels

delivered to civil aircraft, of any nationality, for consumption during international flights transporting goods or passengers. International flights take place when the ports of departure and arrival are in different national territories. Fuels delivered for consumption by aircraft undertaking domestic or military flights are not included here. Fuels used by airlines for their road vehicles are excluded. The domestic/international split should be determined on the basis of departure and landing locations and not by the nationality of the airline.

5. Stock changes

Stocks are quantities of energy products that can be held and used to: (a) maintain service under conditions where supply and demand are variable in their timing or amount due to normal market fluctuations, or (b) supplement supply in the case of a supply disruption. Stocks used to manage a supply disruption may be called "strategic" or "emergency" stocks and are often held separately from stocks designed to meet normal market fluctuations. Stock changes are defined as the increase (stock build) or decrease (stock draw) in the quantity of stock over the reporting period. They are calculated as a difference between the opening and closing stocks.

6. Transfers

This refers to products transferred and inter-product transfers. *Product transferred* refers to the reclassification (renaming) of products which is necessary when finished oil products are used as feedstock in refineries. *Interproduct transfers* refer to the movements of fuels between product categories because of reclassification of a product which no longer meets its original specification. The transferred product is often blended with its host. For example, quantities of kerosene may be reclassified as gas oil after blending with the latter in order to meet its winter diesel specification.

7. Statistical difference

This is the difference between calculated and observed gross inland deliveries. National Administrations sometimes obtain the data components of domestic availability from a variety of sources. Owing to differences in concepts, coverage, timing and definitions, observed and calculated gross inland deliveries are often not identical.

Transformation sector

Transformation is the process where the movement of part or all of the energy content of a product entering a process to one or more different products leaving the process (e.g. coking coal to coke, crude oil to petroleum products, and heavy fuel oil to electricity). The transformation can take place in various plants including: electricity plants, combined heat and power plants, heat plants, blast furnace/gas works, coke/patent fuel/BKB plants, petroleum refineries, petrochemical industry, liquefaction plants, and other plants.

1. Electricity plants

Electricity plants refer to plants producing only electricity. The electricity may be obtained directly from natural sources such as hydro, geothermal, wind, tidal, marine, solar energy or from fuel cells or from the heat obtained from the combustion of fuels or nuclear reactions.

2. Combined heat and power plants (CHP)

Combined heat and power plants refer to plants which produce both heat and electricity from at least one generating unit in the plant. They are sometimes

referred to as " co-generation" plants. Both main activity producer (formerly known as public) and autoproducer plants are included here.

3. Heat plants

Heat plants refer to plants (including heat pumps and electric boilers) designed to produce heat only for deliveries to third party. Both main activity producer (formerly known as public) and autoproducer plants are included here. Deliveries of fuels for heat generated by an establishment for its own use are classified within the part of final consumption where they are consumed.

4. Blast furnaces

Blast furnaces are furnaces which produce blast furnace gas as a by-product when making pig iron from iron ore. During the process, carbon, mainly in the form of coke, is added to the blast furnace to support and reduce the iron oxide charge and provide heat. Blast furnace gas comprises carbon monoxide and other gases formed during the heating and reduction process.

5. Gas works

Gas works plants are for the production of town gas/gas work gas by carbonisation (including gas produced by coke ovens and transferred to gas works gas), by total gasification with or without enrichment with oil products (LPG, residual fuel oil, etc), and by reforming and simple mixing of gases and/or air.

6. Coke ovens

Coke Ovens are facilities for the carbonisation of coal, principally coking coal, at high temperature. The transformation process provide for the production of coke and by-products such as coke oven gas and coal tar.

7. Patent fuel plants

Patent Fuel Plants are for the manufacturing of a composition fuel made of hard coal fines and addition of a binding agent.

8. BKB plants

BKB (Brown Coal Briquettes) plants are for the manufacturing of a composition fuel made of lignite/brown coal (including dried lignite fines and dust) produced by briquetting under high pressure without the addition of a binding agent. This includes Peat Briquettes Plants which produce a similar composition fuel using peat.

9. Petroleum refineries

Petroleum refineries are industrial plants which transform crude oil and other hydrocarbons into finished oil products. Typical finished products are liquefied petroleum gases, naphtha, motor gasoline, gas oils, aviation fuels and other kerosene, and fuel oils.

10. Petrochemical industry

Petrochemical industries are industrial plants which convert hydrocarbon feedstock into organic chemicals, intermediate compounds and finished products such as plastics, fibres, solvents and surfactants. Feedstock used by the plant is usually obtained from the refinery and includes naphtha, ethane, propane and middle distillate oils (for example, gas oil). Quantities of backflows or petroleum products returned from the petrochemical sector, whether returned to refineries for further processing/blending or used directly. Note: energy use in the petrochemical sector is reported in the Energy Sector, non-energy use is shown in the chemical/petrochemical industrial sector as non-energy.

11. Liquefaction plants

Liquefaction plants include diverse liquefaction

processes, such as coal liquefaction plants and gas-to-liquid plants. Coal Liquefaction plants are facilities where coal is used to produce liquid fuels suitable for transportation applications by the removal of carbon or addition of hydrogen, either directly or indirectly.

12. Natural gas blending plants

These are plants, separate from gas works, in which substitute natural gas, petroleum gases or biogases are mixed with natural gas for distribution in the gas mains. Where blending of substitute natural gas with natural gas takes place within gas works the blending is considered part of the gas works process.

13. Charcoal production plants

Charcoal plants are facilities in which wood or other vegetal matter is carbonised through slow pyrolysis to produce charcoal.

14. Other transformation plants

Other transformation plants represent other energy transformation processes not already covered by the list of definition.

Energy sector

The energy sector covers ISIC Divisions 05, 06, 19 and 35. The energy sector includes the manufacture of chemical materials for atomic fission and fusion and the products of these processes. Fuels used in the manufacture of fuel briquettes and packaged fuel from coal or lignite and consumption in coke ovens and other transformation industries should also be reported here.

The energy sector is divided into the following sub-sectors: Coal Mines, Patent Fuel Plants, Coke Ovens, Gas Work Plants, Natural Gas Blending Plants, Blast Furnaces, BKB/PB Plants, Petroleum Refineries, Electricity, CHP and Heat Plants, Liquefaction Plants, Not elsewhere Specified and Distribution Losses.

Fuels used by the energy industry to support the extraction (mining, oil and gas production) or transformation activity are reported in this category. For example: fuel used for heating, lighting, or operating pumps/compressors, or used as inputs fuel into furnaces or ovens. Note that quantities of fuels transformed into another energy form should be reported under the transformation sector. Consumption used in support of the operation of pipelines (oil, gas and coal slurry) should be reported in the transport sector.

Final energy consumption sector

The term final consumption (equal to the sum of the consumption in the end-use sectors: industry, transport, residential, commercial/public services, agriculture/ forestry, fishing and non-specified) implies that energy used for transformation and for own use of the energy producing industries is excluded. Final consumption reflects for the most part deliveries to consumers. It includes consumption for both energy and non-energy purposes.

1. Industry sector

Industry sector covers all industrial undertakings as enumerated below. Sectors included are iron and steel; chemical including petrochemical; non-ferrous metals; non-metallic mineral products; transport equipment; machinery; mining (excluding energy producing industries) and quarrying; food

processing, beverages and tobacco; pulp, paper and printing; wood and wood products (other than pulp and paper); construction; textile and leather; not elsewhere specified.

1.1 Iron and steel

Covers ISIC Group 241 and Class 2431. The consumption in coke ovens and blast furnaces are defined as part of Transformation Processes and Energy Industry Own Use.

1.2 Chemical including petrochemical

Refers to ISIC Division 20 and 21, excluding ISIC 2011. The consumption by plants manufacturing charcoal or enrichment/production of nuclear fuels is excluded, as these plants are considered part of the energy industries.

- Includes manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms (ISIC 201)
- Other chemical products (ISIC 202), Man-made fibers (ISIC 203)

1.3 Non-ferrous metals

Refers to ISIC Group 242 and Class 2432.

- Manufacture of precious and non-ferrous metals (ISIC 242)
- Casting of non-ferrous metals (ISIC Class 2432)

1.4 Non-metallic minerals products

Covers ISIC Division 23, i.e.: Glass, ceramic, cement and other building materials industries.

- Manufacture of glass and glass products (ISIC 231)
- Non-metallic mineral products (ISIC 239) such as ceramics, tiles, baked clay products and cement

1.5 Transport equipment

Covers ISIC Division 29 and 30, i.e.:

- Manufacture of motor vehicles (ISIC 291) bodies for motor vehicles and semi-trailers (ISIC 292)
- Manufacture of parts and accessories for motor vehicles (ISIC 293)
- Building of ships and boats (ISIC 301)
- Manufacture of railway locomotives and rolling stock (ISIC 302)
- Manufacture of air and spacecraft and related machinery (ISIC 303)
- Manufacture of transport equipment not elsewhere classified (ISIC 309)

1.6 Machinery

Refers to Fabrication of metal products, machinery and equipment other than transport equipment. ISIC Division 25, 26, 27 and 28.

Includes manufacture of:

- Structural metal products, tanks, reservoirs and steam generators (ISIC 251)
- Weapons and ammunition (ISIC 252)
- Other fabricated metal products; metalworking service activities (ISIC 259)
- Electronic components and boards (ISIC 261)
- Computers and peripheral equipment (ISIC 262)
- Communication equipment (ISIC 263)
- Consumer electronics (ISIC 264)
- Measuring, testing, navigating and control equipment; watches and clocks (ISIC 265)
- Irradiation, electromedical and electrotherapeutic equipment (ISIC 266)
- Optical instruments and photographic equipment (ISIC 267)
- Magnetic and optical media (ISIC 268)
- Electric motors, generators and transformers and electricity distribution and control apparatus (ISIC 271)
- Batteries and accumulators (ISIC 272)
- Wiring and wiring devices (ISIC 273)
- Electric lighting equipment (ISIC 274)

- Domestic appliances (ISIC 275)
- Other electrical equipment (ISIC 279)
- General purpose machinery (ISIC 281)
- Special purpose machinery (ISIC 282)

1.7 Mining (excluding energy producing industries) and quarrying

Refers to ISIC Divisions 13 and 14, i.e.:

- Mining of iron ores (ISIC 131)
- Mining of non- ferrous metal ores (ISIC 132)
- Quarrying of stone, sand and clay (ISIC 141)
- Mining and quarrying not elsewhere classified (ISIC 142)

1.8 Food, beverages and tobacco

Refers to ISIC Division 10, 11 and 12, i.e.:

- Processing and preserving of meat, fish, crustaceans and molluscs, fruit and vegetables (ISIC 101, 102, 103)
- Manufacture of vegetable and animal oils fats, dairy products (ISIC 104, 105)
- Manufacture of grain mill products, starches and starch products (ISIC 106)
- Manufacture of other food products (ISIC 107)
- Manufacture of prepared animal feeds (ISIC 108)
- Manufacture of beverages (ISIC 110)
- Manufacture of tobacco products (ISIC 120)

1.9 Pulp, paper and printing

Refers to ISIC Division 17 and 18. Includes production of recorded media.

- Manufacture of paper and paper products (ISIC 170)
- Printing and service activities related to printing (ISIC 181)
- Reproduction of recorded media (ISIC 182)

1.10 Wood and wood products (other than pulp and paper)

Refers to ISIC Division 16, i.e.:

- Sawmill and planing of wood (ISIC 161)
- Manufacture of products of wood, cork, straw and plaiting materials (ISIC 162)

1.11 Construction

Refers to ISIC Division 41, 42 and 43, i.e.:

- Construction of buildings (ISIC 410)
- Construction of roads and railways (ISIC 421)
- Construction of utility projects (ISIC 422)
- Construction of other civil engineering projects (ISIC 429)
- Demolition and site preparation (ISIC 431)
- Electrical, plumbing and other construction installation activities (ISIC 432)
- Building completion and finishing (ISIC 433)
- Other specialised construction activities (ISIC 439)

1.12 Textile and leather

Refers to ISIC Divisions 13, 14 and 15, i.e.:

- Spinning, weaving and finishing of textiles (ISIC 131)
- Manufacture of other textiles (ISIC 139)
- Manufacture of wearing apparel except fur apparel (ISIC 141)
- Manufacture of articles of fur (ISIC 142)
- Manufacture of knitted and crocheted fabrics and apparel (ISIC 143)
- Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur (ISIC 151)
- Manufacture of footwear (ISIC 152)

1.13 Not elsewhere specified

If your economy's industrial classification does not correspond to the above ISIC, please estimate the breakdown by industry and include in "Not elsewhere specified" only consumption in sectors which is not covered above. This covers ISIC Division 22, 31 and 32, i.e.: Manufacture of

- Rubber products (ISIC 221)
- Plastic products (ISIC 222)

- Furniture (ISIC 310)
- Jewellery, bijouterie and related articles (ISIC 321)
- Musical instruments (ISIC 322)
- Sports goods (ISIC 323)
- Games and toys (ISIC 324)
- Medical and dental instruments and supplies (ISIC 325)
- Others manufacturing not elsewhere classified (ISIC 329)

2. Transport sector

All transport activities irrespective of the economic sector in which the activity occurs. Refers to ISIC Divisions 49, 50 and 51.

2.1 Domestic air transport

Refers to domestic aircraft - commercial, private, agricultural, etc; include oil used for purposes other than flying, e.g. bench-testing of engines. Military use of aviation fuels also should be excluded here.

2.2 Road

Transport by road vehicles. It includes agricultural highway use, but excludes motor gasoline used in stationary engines (included in the Other sector) and diesel oil for non-highway use in tractors (included in Agriculture). Lubricants for use in road vehicles should be included here. Bitumen for use in road surfacing and gas oil used in engines at construction sites should not be included here but should be included in the Industry subsector "Construction" below.

2.3 Rail

Refers to rail traffic, including industrial railways.

2.4 Inland waterways

Refers to water vessels navigating in inland waterways and coastal shipping. For example: small craft, barges, and those coastal ships which do not travel for international transportation.

2.5 Pipeline transport

Refers to transport of goods through pipelines.

2.6 Not elsewhere specified

Transport activities not included elsewhere.

3. Other sector

Other sector covers commercial and public services, residential, agriculture, fishing and other final consumption not elsewhere classified.

3.1 Commercial and public services

These refer to business and offices in the public and private sectors. ISIC Divisions 01, 02, 03, 33, 36-39, 45-99, ISIC Class 8422.

3.2 Residential

Refers to all households including "households with employed persons." ISIC Division 97 and 98.

3.3 Agriculture

Refers to agriculture, hunting and forestry by ISIC as follows: ISIC Divisions 01 and 02.

3.4 Fishing

Refers to aquaculture and fisheries, covering the use of fishery resources from marine, brackish or freshwater environments, with the goal of capturing or gathering fish, crustaceans, molluscs and other marine organisms and products (e.g. aquatic plants, pearls, sponges, etc). Also included are activities that are normally integrated in the process of production for own account (e.g. seeding oysters for pearl production). ISIC Division 03.

3.5 Not elsewhere specified

Report activities not included elsewhere, please specify. This category includes military use.

3.6 Non-energy use

Refers to use of energy products as raw materials in the different sectors; that is, not consumed as a fuel

or transformed into another fuel. Example: in industry, coal used to make methanol or ammonia.

This is further classified into:

- **Chemical (incl. the petrochemical sector):** Non-energy use of coal includes uses as feedstocks to produce fertiliser and as feedstocks for other petrochemical products.
- **Transport sector:** Non-energy use in all Transport sub sectors.
- **Other Sector:** Non-energy use in Commercial and Public Services, Residential, Agriculture and Not elsewhere specified.

C. Energy prices

Energy prices

Energy prices are in either local currency units or in US dollars.

Table 1. Import prices

These are import prices based on CIF. These prices are obtained by dividing the value by the volume in foreign trade. Value and volume are recorded by customs administrations for each tariff position. Values recorded at the import stage include cost, insurance and freight (CIF) but exclude import duties.

These are import prices of coal and coal products; crude oil, NGL and petroleum products; electricity and other products including biofuels and other renewable energy products.

The average local currency exchange rate to the US dollar and local currency unit are also required in this table.

Table 2. Wholesale prices

Table 2 contains wholesale prices. These are the prices that a buyer pays for large volume purchases whether for own consumption of retail. Examples are prices paid by electricity distribution companies to electricity generators or suppliers.

Prices are either in local currency units or in US dollars.

Table 3. Consumer prices

These are the prices paid by end-use consumers such as motorists buying fuel in filling stations, household electricity bills, coal briquette prices in supermarkets, etc. The prices may also be in local currency units or in US dollars.

Electricity prices are prices charged to the industrial, commercial, residential rates and rates to other consumers. Commercial sector include the government services and streetlights. Others include agriculture and other sectors not included in industrial, commercial and residential.

D. Definition of columns and rows of the Energy Balance Table

Definition of columns and rows of the Energy Balance Table

1. Unit

For the purpose of presenting its energy balances APEC has adopted kcal and Joules. 10^7 kcal (41.868 gigajoules) is equivalent to one ton of oil equivalent (toe). This quantity of energy is, within a few percent, equal to the net heat content of one ton of crude oil.

2. Conversion (from original to TOE)

The Coordinating Agency has adopted specific factors supplied by the member economies for each flow or use. The balances are expressed in term of "net" heat value. The difference between the "net" and "gross" heat value for each fuel is the latent heat in condensation of the water vapor produced during combustion of the fuel. For coal and oil, net heat value is 5 percent less than gross, for most forms of natural and manufactured gas the difference is 9-10 percent, while for electricity there is no difference. The use of net heat value is consistent with the practice of the Statistical Offices of the European Communities and the United Nations.

3. Layout

The energy balances are presented in tabular format: columns for the various sources of energy and rows for the different origins and uses.

Columns

Across the top of the table from left to right, there are thirteen columns with the following headings:

Column 1: Coal includes all primary coal, such as anthracite, coking coal, other bituminous coal, sub-bituminous coal, lignite and peat.

Column 2: Coal Products includes all fuels derived from coal including patent fuel, coke oven coke, gas coke, briquettes, coal tar, coke oven gas, blast furnace gas and oxygen steel furnace gas.

Column 3: Crude Oil comprises crude oil, refinery feedstocks and natural gas liquids. Natural LPG is included in LPG.

Columns 4 and 4.1 to 4.10: Petroleum products (Column 4) comprises motor gasoline, naphtha, jet fuel, kerosene, gas/diesel oil, residual fuel oil, LPG, refinery gas, ethane and other petroleum products such as: aviation gasoline, white spirit, lubricants, bitumen, paraffin waxes and petroleum coke (Columns 4.1 to 4.10). The definitions of these products are in Appendix A.

Column 5: Gas includes natural gas and LNG (excluding natural gas liquids).

Column 6: Hydro shows the energy content of the electricity produced in hydro power plants. Hydro output includes output from pumped storage plants.

Column 7: Nuclear shows the primary heat equivalent of the electricity produced by a nuclear power plant with an average thermal efficiency of 33 percent.

Column 8: Geothermal, solar, etc shows the primary heat equivalent of the electricity produced in geothermal plants with an average thermal efficiency of 10 percent, and the energy content of electricity produced in non-thermal power plants such as

photovoltaic, wind, tide wave etc.

Column 9: Others includes wood, wood waste, black liquor, industrial and municipal waste and biomass (power generation from other fuel sources such as defined in "Others" is included here).

Column 10: Electricity shows final consumption and trade in electricity (which is accounted at the same heat value as electricity in final consumption; i.e. 1 GWh = 0.000086 Mtoe).

Column 11: Heat includes heat production from public Combined Heat and Power plants (CHP), from autoproducer's heat that is sold to a third party (e.g. to a network).

Column 12: Total = the total of columns (1) to (11).

Rows

The categories on the left hand side of the table have the following functions.

Row 1: Indigenous production shows only production of primary energy, i.e. hard coal, lignite, crude oil, NGL, natural gas, hydro and nuclear, geothermal, etc, electricity and others.

Row 2/3: Imports and exports comprise amounts having crossed the boundaries of the economy whether or not customs clearance has taken place.

Row 4/5: International marine and aviation bunkers cover those quantities delivered to sea-going ships and international flights of all flags. Consumption by ships and planes engaged in transport in inland and coastal waters is not included.

Row 6: Stock changes are treated as follows: a decrease in stocks, shown in the table as a positive number, is added to supply and an increase in stocks, shown as a negative number, is deducted from supply. Producers', importers', energy transformation industries' and large users' stocks are included.

Row 7: Total primary energy supply (TPES) are made up of *indigenous production (Row 1) + imports (Row 2) – exports (Row 3) – international marine and aviation bunkers (Row 4/5) and ± stock changes (Row 6)*.

Row 8: Transfers refer to interproduct transfers, product transferred, liquid products from gas separation and recycled products as defined in Appendix B.

Row 9: Total transformation sector is made up of *Main activity producer (Row10) + Autoproducers (Row11) + Gas processing (Row12) + Petroleum refineries (Row13) + Coal transformation (Row14) + Other transformation (Row15)*.

Row 10: Main activity producer, column 1 to 9 show primary and secondary fuel input to public utilities' plants as negative entries. Gross electricity produced (including power stations' own consumption) appears as a positive quantity in column 11, "Electricity". Transformation losses appear in the "Total", column 12, as a negative number.

Row 11: Autoproducers, columns 1 to 9 show primary and secondary fuel input to electricity generation of autoproducers as negative entries. An autoproducer is an establishment which, in addition to its main activities, generates electricity wholly or partially for its own use, such as industries, railways, refineries etc. Total gross electricity produced appears as a positive quantity in column 10, "Electricity". Transformation losses appear in the "Total", column 12 as a negative number.

Row 12: Where there is a production of gas at Gas-to-Liquid Facilities, the treatment is similar to that for electricity generation, with the quantity produced

appearing as a positive figure in column 5 "Gas", input as negative entries in column 1 (coal), 2 (coal products), 4 (petroleum products) and 5 (natural gas input) and conversion losses appearing in the "Total" column.

Row 13: The row petroleum refineries shows the transformation of crude oil, NGL and condensate to petroleum products.

Row 14: Coal transformation shows the transformation of coal from primary to secondary fuels and from secondary to tertiary fuels (hard coal to coke, coke to blast furnace gas, brown coal to BKB, etc).

Row 15: Other transformation: contains the energy feedstocks and outputs of petrochemical industry, biofuel processing, charcoal processing and other transformation processes that are not classified elsewhere.

Row 16: Loss & own use: Own use contains the primary and secondary energy consumed by transformation industries for heating, traction and lighting purposes. These are shown as negative figures. Included here are, for example, the coal mines' own use of energy, energy use in refineries, electricity plants' own consumption (which includes gross electricity consumed for pumped storage), and energy used for oil and gas extraction (which also includes consumption for the pipeline system). Loss include losses in gas distribution, electricity transmission, and coal transport.

Row 17: Discrepancy is a category which includes the sum of the unexplained statistical differences for individual fuels.

Row 18: Total final energy consumption (TFEC) is the sum of consumption by the different end-use sectors. In final consumption, petrochemical feedstocks as well as natural gas for producing fertiliser are shown under industry sector.

Row 19: Consumption of the industry sector (energy used for transport by industry is not included here but reported under transport).

Row 20: Iron and steel covers ISIC Group 241 and Class 2431. Report pulverised coal injection (PCI) into blast furnaces under blast furnaces, Transformation sector. To avoid double counting, fuels used in blast furnaces should be reported in the transformation sector.

Row 21: Chemical & petrochemical refers to ISIC Division 20 and 21.

Includes manufacture of basic chemicals (ISIC 201)

Other chemical products (ISIC 202), Man-made fibers (ISIC 203)

Row 22: Non-metallic minerals covers ISIC Division 23, i.e.: Glass, ceramic, cement and other building materials industries.

Manufacture of glass and glass products (ISIC 231)

Non-metallic mineral products (ISIC 239) such as ceramics, tiles, baked clay products and cement

Row 23: Other industries cover consumption of all other manufacturing industries, mining, quarrying and constructions.

Row 24: The transport sector includes all fuels for transport, except international marine bunkers. It includes transport in the industry sector and covers road, railway, domestic air transport, inland waterways (including small craft, fishing vessels and coastal shipping not included under marine bunkers) and non-specified transport.

Row 25: Domestic air transport refers to domestic aircraft - commercial, private, agricultural, etc; include oil used for purposes other than flying, e.g. bench-testing of engines. Military use of aviation fuels also should be excluded here.

Row 26: Road covers transport by road vehicles. It

includes agricultural highway use, but excludes motor gasoline used in stationary engines (included in the other sector) and diesel oil for non-highway use in tractors (included in agriculture). Lubricants for use in road vehicles should be included here. Bitumen for use in road surfacing and gas oil used in engines at construction sites should not be included here but should be included in the industry subsector "Construction".

Row 27: Rail refers to rail traffic, including industrial railways.

Row 28: Inland waterways refers to water vessels navigating in inland waterways and coastal shipping. For example: small craft, barges, and those coastal ships which do not travel for international transportation.

Row 29: Pipeline transport refers to transport of goods through pipelines.

Row 30: Non-specified industry covers transport activities not included elsewhere.

Row 31: Other sectors cover agriculture, residential, commercial and public services and non-specified consumption.

Row 32: Refers to all households including "households with employed persons." ISIC Division 97 and 98.

Row 33: These refer to business and offices in the public and private sectors.

Row 34: Consumption of the agriculture sector.

Row 35: Other shows non-specified use which may include military use.

Row 36: Non-energy use covers use of coal, gas and petroleum products such as white spirit, paraffin waxes, lubricants, bitumen and other products. Petroleum coke is shown as non-energy use only when there is evidence of such use; otherwise it is shown under energy use in industry or other sectors. Feedstocks for the petrochemical industry are accounted for in industry (row 21). This covers all oil including naphtha, except the other petroleum products listed above, and gas used as petrochemical feedstock. Gas used as raw material for chemical products such as methanol and ammonia/urea is also included.

E. Conversion factors

1. Coal

Coal has separate factors for production, imports, exports, inputs to power plants, coal used in coke ovens, and coal used in industry. Each economy's individual conversion factors are applied.

2. Crude oil

The conversion factors of each economy are applied as shown in the table of conversion factors.

3. Petroleum products

The conversion factors of each economy are applied.

4. Gas

To convert the gross heat content of a gas to its net heat content, the following multiplying factors were used:

Natural gas	0.9
Gas works gas	0.9
Coke oven gas	0.9
Blast furnace gas	1.0

5. Electricity

Figures for electricity production, trade, and final consumption are calculated using the energy content of the electricity, i.e. at a rate of 1 TWh = 0.086 Mtoe. Hydro-electricity production (excluding pumped storage) and electricity produced by other non-thermal means (wind, tide, photovoltaic etc) are accounted for similarly using 1 TWh = 0.086 Mtoe. However, the primary energy value ascribed to nuclear power plants is calculated from the gross generation by assuming that only 33% of the primary energy content appears as electricity, i.e. 1 TWh = (0.086/0.33) Mtoe. In the case of electricity produced from geothermal heat the primary value is calculated using 1 TWh = (0.086/0.1) Mtoe.

6. Heat

Information on heat is supplied in net kilocalories. 10^{10} kilocalories = 1 Mtoe

7. Others

The conversion factors used for other energy, such as wood, wood waste, black liquor, etc are those that are provided by each economy. In cases where the member economies cannot provide a conversion factor, the CA used the following net calorific values:

Fuel wood and wood waste	3 702 kcal/kg
Bagasse	1 959 kcal/kg
Charcoal	6 898 kcal/kg
Industrial waste	3 344 kcal/kg
Municipal solid waste	3 344 kcal/kg
Other biomass	2 986 kcal/kg

Average Net Calorific Values of Energy Products in 2014

	Australia	Brunei	Canada	Chile	China	Hong Kong, China	Indonesia	Japan	Korea
Coal									
Coking Coal	6 925		5 919		6 121			6 534	
Anthracite	6 377				6 488	6 998		6 311	4 450
Other Bituminous Coal	6 139		6 490	5 255	4 653	6 298	5 880	5 892	
Sub-bituminous Coal	4 413		4 275					5 735	
Lignite	2 341		3 348		3 005				
Peat					6 121			6 534	
Coal Products									
Patent Fuels								5 344	4 450
Coke Oven Coke	6 449		6 558	6 829	6 800			6 623	6 900
Coal Tar	8 530			9 688	8 000				8 837
Coal Briquettes	5 008				4 250		4 740		
Crude Oil and NGL									
Crude Oil	10 338	10 748	10 220	10 306	10 000		10 920	10 161	10 199
Natural Gas Liquids	10 846	10 900	10 801	11 487			11 934	11 088	
Refinery Feedstocks	10 338		10 151	10 700				10 257	10 700
Additives/Oxygenates	7 190	9 597	6 000	5 410	10 233		9 690		10 000
Other Hydrocarbons	10 000	11 023			10 000		8 880		
Petroleum Products									
Refinery Gas	11 488	11 369	11 488	11 488	11 000			10 515	11 488
Ethane	11 799		11 799						
LPG	11 393	11 023	11 297	11 297	12 000	10 999	11 934	11 360	11 393
Naptha	10 318		10 748	10 748	9 176	10 540	11 064	10 257	10 318
Motor Gasoline	10 560	10 688	10 501	10 700	10 300	10 217	11 064	10 276	10 653
Bio-ethanol	6 401		6 401		10 300				
Aviation Gasoline	10 653		10 700	10 700			9 801		10 653
Gasoline Type Jet Fuel			10 700		10 300				
Kerosene Type Jet Fuel	10 629	10 648	10 653	10 653	10 300	10 262	10 398	10 527	10 629
Other Kerosene	10 246	10 648	10 461	10 461	10 300	10 522	10 212	10 174	10 246
Gas/Diesel Oil	10 161	10 361	10 163	10 342	10 200	10 150	9 166	10 357	10 174
Bio-diesel	8 790		8 790		10 200	9 028	9 690		10 125
Fuel Oil	10 175	9 716	9 602	9 602	10 000	9 912	10 319	10 535	10 175
White Spirit SBP	10 270		10 270		9 176				10 270
Lubricants	10 246	9 984	10 032		9 176		9 996	10 238	10 246
Bitumen	9 267	9 554	9 554		9 176				9 267
Paraffin Wax					9 176		9 996		9 554
Petroleum Coke	8 073		7 643	7 643	7 350			7 553	8 073
Other Products	9 554	11 023	9 554	9 554	9 310		9 996	9 500	9 554
Natural Gas									
Natural Gas	8 462	9 253	8 351	8 430	9 310	9 309	8 885	8 453	8 974
New and Renewables									
Fuel wood and Wood waste	3 701		3 701	3 701				3 702	3 701
Bagasse	1 958		1 958	1 958					1 958
Charcoal	7 357			7 357		6 998		6 898	
Other Biomass	3 701		3 701	3 701	7 000		3 702		3 701
Biogas									
Industrial Waste	3 343		3 343	3 343	7 000			3 344	3 343
Municipal Solid Waste	3 343		3 343	3 343	7 000		3 702	3 344	3 343
Liquid Biofuels	7 190		6 799	6 401	10 233	9 028	9 690		10 125

Note: The Net Calorific Values are used to convert the unit of each product to tons of oil equivalent (toe). 1 toe = 10^7 kcal

Average Net Calorific Values of Energy Products in 2014 (continued)

kcal/kg (kcal/m^3 for Natural Gas)

Malaysia	Mexico	New Zealand	Papua New Guinea	Peru	The Philippines	Russia	Singapore	Chinese Taipei	Thailand	United States	Viet Nam
	6 827	7 187				6 807		6 660		6 736	
	6 241					6 927		6 745	7 431	6 863	5 600
6 300	6 180	6 778		6 500		5 517	6 162	5 671	6 242	6 186	
	4 866	4 899			5 278			4 677		4 516	
	2 665	3 471				3 563		3 957	2 622	3 303	
						6 807		6 660			
								3 610			
	6 805	7 046		6 735		6 930	6 735	6 650	6 539	6 894	
	9 069										
	4 299					4 200			6 242		
10 219	10 714	10 279	10 120	10 271	9 905	10 050	10 200	10 442	10 089	10 320	10 200
11 790	9 802	10 936	10 120	10 604		10 010			11 757	11 134	10 000
	10 115	10 482		10 402			10 230			9 776	
8 789	8 498			10 534	7 773			10 442	10 334	6 000	
10 150	10 000								11 778	12 182	
11 000	11 488	11 488	10 515	14 992		11 823	11 488	14 996		11 488	
	11 799									11 799	
10 880	11 297	11 393	11 393	11 080	10 760	10 987	11 297	11 893	11 778	11 297	10 900
	10 748		10 500		11 031	10 509	10 748	10 924		10 748	
10 500	10 700	10 644	10 654	10 402	10 570	10 509	10 700	10 494	10 450	10 368	10 500
		6 894		6 351	7 083				10 450	7 650	
	10 700	10 653			10 894	10 509	10 700	10 669		10 700	
								10 485			
10 320	10 653	10 629	10 632	10 231	9 957	10 270	10 653	10 038	11 675	10 653	10 300
10 320	10 461	10 246	10 233	10 231	9 855		10 461	10 600	10 310	10 461	10 300
10 150	10 175	10 175	10 284	9 847	10 049	10 175	10 342	10 066	10 236	10 184	10 200
8 789		9 520		11 157	9 416			10 116	10 236	10 750	
11 530	9 602	10 175	10 520	10 381	9 819	9 554	9 602	10 027	10 105	9 602	9 900
		10 270				10 414	10 270	11 538		10 270	
	10 032	10 246	10 240			10 032	10 032	9 600		10 032	
	9 554	9 267			9 248	9 315	9 315	10 000		9 554	
	9 554					9 554	9 554	10 664		9 554	
	7 643	8 073	8 078			7 643	7 643	8 200		7 643	
10 150	9 554	9 554	9 602	10 402	9 864		9 554	12 496	10 000	9 554	9 900
8 388	8 139	8 398	9 163	8 691	8 292	8 218	8 385	9 000	8 634	8 221	9 000
	3 701	3 701		3 598	3 455	3 701	3 344	3 039	3 820	3 701	2 388
	1 958	1 958		1 499	2 166	1 958			1 800	1 958	
	7 357			6 558	6 313	7 357			6 900		
3 218	3 701	3 701		3 596	3 163	3 701	3 344		3 029	3 701	
								3 690			
	3 343	3 343				3 343				3 343	
	3 343	3 343			3 344	3 343	3 344	2 092	1 160	3 343	
8 789	6 401	7 332		10 537	7 772			10 094	10 334	8 000	