ENERGY STATISTICS OF OECD COUNTRIES

DOCUMENTATION FOR BEYOND 2020 FILES

INTERNATIONAL ENERGY AGENCY

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1. CHANGES FROM LAST EDITION

Geographical coverage

As Estonia became an IEA member in May 2014, it is now included within the regional aggregate IEA, starting in 1990.

Coal classification

In previous editions, **sub-bituminous coal** was exceptionally included under **hard coal** for 12 countries. In order to maximise the consistency of this definition and to harmonize terminology with other energy-focused organisations, the decision has been made to exclude any sub-bituminous coal exceptions from the hard coal definition. This therefore means that **brown coal** now comprises lignite and sub-bituminous coal and **hard coal** comprises anthracite, coking coal and other bituminous coal for *all* countries. As a result, revisions in time series may appear for Australia, Belgium, Chile, Finland, France, Iceland, Japan, Korea, Mexico, New Zealand, Portugal and the United States.

Primary coal data prior to 1978 are only classified as hard coal or brown coal. Unless specified, no attempt has been made to estimate and relocate possible sub-bituminous components in this data, if any exist. So for the same group of countries listed above, hard coal data prior to 1978 may include some sub-bituminous coal.

In addition, following international recommendations on energy statistics, oil shale is now presented separately from lignite, and not included any longer under the coal category.

Products

Old longname	New longname	Shortname	Old shortname (if changed)
BKB/peat briquettes (kt)	BKB (kt)	BKB	
Other recovered gases (TJ-gross)	Other recovered gases (TJ-gross)	OGASES	OXYSTGS
	Peat products (kt)	PEATPROD	
Memo: oil shale (kt)	Oil shale and oil sands (kt)	OILSHALE	
Primary solid biofuels (TJ-net)	Primary solid biofuels (TJ-net)	PRIMSBIO	SBIOMASS
Biogases (TJ-net)	Biogases (TJ-net)	BIOGASES	GBIOMASS
Motor gasoline (kt)	Motor gasoline excl. bio (kt)	NONBIOGASO	MOTORGAS
Gas/diesel oil (kt)	Gas/diesel oil excl. bio (kt)	NONBIODIES	GASDIES
Non-specified oil products	Other oil products	ONONSPEC	ONONSPEC

Supply estimates for oil products

In this edition, to provide more accurate information on the most recent year estimates (2013), data for the flow of "transfers" for oil products have been included as a complement to the supply flows.

Flows

Old longname	New longname	Shortname	Old short-name (if changed)
BKB plants	BKB/peat briquette plants	TBKB	
BKB plants	BKB/peat briquette plants	EBKB	
Memo: Feedstock use in petro-chemical industry	Memo: Non-energy use chemical/petrochemical	NECHEM	

Calorific values

Within the database for calorific values, the flow NAVERAGE for the various coal products, peat and oil shale, previously marked as not applicable, is now used to represent the weighted calorific value of the supply for a given product.

2. DATABASE STRUCTURE

The database *Energy Statistics of OECD countries* includes annual data for:

- countries: 34 countries and 5 regional aggregates (see section 5: *Geographical coverage*);
- years: 1960-2013, unless otherwise specified. Data for 2013 are limited to supply.

The database includes the following two files:

OECDBES.IVT	**Energy statistics**
	Energy statistics in matrix form (68 products; 88 flows) (various natural units, depending on the product);
	Electricity and heat output by type of producer (12 flows) (GWh; TJ).
REDCONV.IVT	**Conversion factors of OECD countries:**
	net calorific values by flow (14 flows) for 15 coal, peat, oil shale products (toe/t; kJ/kg);
	average net calorific values for 23 oil products and 4 biofuel products (toe/t; kJ/kg);
	volume to mass ratio for 22 oil products and 3 biofuel products (barrels/tonne).

3. FLOW DEFINITIONS

Supply		
Flow	**Short name**	**Definition**
Production	INDPROD	Refers to the quantities of fuels extracted or produced, calculated after any operation for removal of inert matter or impurities (e.g. sulphur from natural gas). For "other hydrocarbons" (shown with crude oil), production should include synthetic crude oil (including mineral oil extracted from bituminous minerals such as oil shale and tar sands, etc.). Production of secondary oil products represents the gross refinery output. Secondary coal products (including coal gases) represent the output from coke ovens, gas works, blast furnaces and other transformation processes.
From other sources – coal	OSCOAL	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. For example, under primary coal: recovered slurries, middlings, recuperated coal dust and other low-grade coal products that cannot be classified according to type of coal from which they are obtained; under gas works gas: natural gas, refinery gas, and LPG, that are treated or mixed in gas works (i.e. gas works gas produced from sources other than coal).
From other sources - natural gas	OSNATGAS	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.
From other sources - oil products	OSOIL	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. For example, under additives: benzol, alcohol and methanol produced from natural gas; under refinery feedstocks: backflows from the petrochemical industry used as refinery feedstocks; under "other hydrocarbons" (included with crude oil): liquids obtained from coal liquefaction and GTL plants.
From other sources - renewables	OSRENEW	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.

Supply		
Flow	**Short name**	**Definition**
From other sources - non-specified	OSNONSPEC	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. This flow is used if the source is not known.
Imports	IMPORTS	Comprises amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place. *For coal*: Imports comprise the amount of fuels obtained from other countries, whether or not there is an economic or customs union between the relevant countries. Coal in transit should not be included. *For oil and natural gas:* Quantities of crude oil and oil products imported under processing agreements (i.e. refining on account) are included. Quantities of oil in transit are excluded. Crude oil, NGL and natural gas are reported as coming from the country of origin; refinery feedstocks and oil products are reported as coming from the country of last consignment. *For electricity*: Amounts are considered as imported when they have crossed the national territorial boundaries of the country. If electricity is "wheeled" or transited through a country, the amount is shown as both an import and an export.
Exports	EXPORTS	Comprises amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place. *For coal*: Exports comprise the amount of fuels supplied to other countries, whether or not there is an economic or customs union between the relevant countries. Coal in transit should not be included. *For oil and natural gas:* Quantities of crude oil and oil products exported under processing agreements (i.e. refining on account) are included. Re-exports of oil imported for processing within bonded areas are shown as an export of product from the processing country to the final destination. *For electricity*: Amounts are considered as exported when they have crossed the national territorial boundaries of the country. If electricity is "wheeled" or transited through a country, the amount is shown as both an import and an export.
International marine bunkers	MARBUNK	Covers those quantities delivered to ships of all flags that are engaged in international navigation. The international navigation may take place at sea, on inland lakes and waterways, and in coastal waters. Consumption by ships engaged in domestic navigation is excluded. The domestic/international split is determined on the basis of port of departure and port of arrival, and not by the flag or nationality of the ship. Consumption by fishing vessels and by military forces is also excluded. See definitions of *transport*, *fishing*, and *non-specified (other)*.

Supply		
Flow	**Short name**	**Definition**
International aviation bunkers	AVBUNK	Includes deliveries of aviation fuels to aircraft for international aviation. 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. For many countries this incorrectly excludes fuel used by domestically owned carriers for their international departures.
Stock changes	STOCKCHA	Reflects the difference between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers, energy transformation industries and large consumers. Oil and gas stock changes in pipelines are not taken into account. With the exception of large users mentioned above, changes in final users' stocks are not taken into account. A stock build is shown as a negative number, and a stock draw as a positive number.
Domestic supply	DOMSUP	Defined as *production + from other sources + imports - exports - international marine bunkers - international aviation bunkers ± stock changes*. Note, exports, bunkers and stock changes incorporate the algebraic sign directly in the number.
Transfers	TRANSFER	Comprises *interproduct transfers*, *products transferred* and *recycled products*. *Interproduct transfers* results from reclassification of products either because their specification has changed or because they are blended into another product, e.g. kerosene may be reclassified as gasoil after blending with the latter in order to meet its winter diesel specification. The net balance of *interproduct transfers* is zero. *Products transferred* is intended for oil products imported for further processing in refineries. For example, fuel oil imported for upgrading in a refinery is transferred to the feedstocks category. *Recycled products* are finished products which pass a second time through the marketing network, **after** having been once delivered to final consumers (e.g. used lubricants which are reprocessed).
Statistical differences	STATDIFF	Defined as deliveries to *final consumption* + use for *transformation processes* + consumption by *energy industry own use + losses - domestic supply - transfers*. Statistical differences arise because the data for the individual components of supply are often derived from different data sources by the national administration. Furthermore, the inclusion of changes in some large consumers' stocks in the supply part of the balance introduces distortions which also contribute to the statistical differences.

Transformation processes		
Flow	**Short name**	**Definition**
Transformation processes	TOTTRANF	Transformation processes comprise the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke, crude oil to oil products, and fuel oil to electricity).
Main activity producer electricity plants	MAINELEC	Refers to plants which are designed to produce electricity only. If one or more units of the plant is a CHP unit (and the inputs and outputs can not be distinguished on a unit basis) then the whole plant is designated as a CHP plant. Main activity producers generate electricity for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.
Autoproducer electricity plants	AUTOELEC	Refers to plants which are designed to produce electricity only. If one or more units of the plant is a CHP unit (and the inputs and outputs can not be distinguished on a unit basis) then the whole plant is designated as a CHP plant. Autoproducer undertakings generate electricity wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned.
Main activity producer CHP plants	MAINCHP	Refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations). If possible, fuel inputs and electricity/heat outputs are on a unit basis rather than on a plant basis. However, if data are not available on a unit basis, the convention for defining a CHP plant noted above should be adopted. Main activity producers generate electricity and/or heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.
Autoproducer CHP plants	AUTOCHP	Refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations). If possible, fuel inputs and electricity/heat outputs are on a unit basis rather than on a plant basis. However, if data are not available on a unit basis, the convention for defining a CHP plant noted above should be adopted. Note that for autoproducer CHP plants, all fuel inputs to electricity production are taken into account, while only the part of fuel inputs to heat sold is shown. Fuel inputs for the production of heat consumed within the autoproducer's establishment are not included here but are included with figures for the final consumption of fuels in the appropriate consuming sector. Autoproducer undertakings generate electricity and/or heat, wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned.

Transformation processes		
Flow	**Short name**	**Definition**
Main activity producer heat plants	MAINHEAT	Refers to plants (including heat pumps and electric boilers) designed to produce heat only and who sell heat to a third party (e.g. residential, commercial or industrial consumers) under the provisions of a contract. Main activity producers generate heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.
Autoproducer heat plants	AUTOHEAT	Refers to plants (including heat pumps and electric boilers) designed to produce heat only and who sell heat to a third party (e.g. residential, commercial or industrial consumers) under the provisions of a contract. Autoproducer undertakings generate heat, wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned.
Heat pumps	THEAT	Includes heat produced by heat pumps in transformation. Heat pumps that are operated within the residential sector where the heat is not sold are not considered a transformation process and are not included here – the electricity consumption would appear as residential use.
Electric boilers	TBOILER	Includes electric boilers used to produce heat.
Chemical heat for electricity production	TELE	Includes heat from chemical processes that is used to generate electricity.
Blast furnaces	TBLASTFUR	Includes the production of recovered gases (e.g. blast furnace gas and oxygen steel furnace gas). The production of pig-iron from iron ore in blast furnaces uses fuels for supporting the blast furnace charge and providing heat and carbon for the reduction of the iron ore. Accounting for the calorific content of the fuels entering the process is a complex matter as transformation (into blast furnace gas) and consumption (heat of combustion) occur simultaneously. Some carbon is also retained in the pig-iron; almost all of this reappears later in the oxygen steel furnace gas (or converter gas) when the pig-iron is converted to steel. In the 1992/1993 annual questionnaires, Member Countries were asked for the first time to report in *transformation processes* the quantities of all fuels (e.g. pulverised coal injection [PCI] coal, coke oven coke, natural gas and oil) entering blast furnaces and the quantity of blast furnace gas and oxygen steel furnace gas produced. The Secretariat then needed to split these inputs into the transformation and consumption components. The transformation component is shown in the row *blast furnaces* in the column appropriate for the fuel, and the consumption component is shown in the row *iron and steel*, in the column appropriate for the fuel. The Secretariat decided to assume a transformation efficiency such that the carbon input into the blast furnaces should equal the carbon output. This is roughly equivalent to assuming an energy transformation efficiency of 40%.
Gas works	TGASWKS	Includes the manufacture of town gas.
Coke ovens	TCOKEOVS	Includes the manufacture of coke and coke oven gas.
Patent fuel plants	TPATFUEL	Includes the manufacture of patent fuels.

Transformation processes		
Flow	**Short name**	**Definition**
BKB/peat briquette plants	TBKB	Includes the manufacture of BKB and peat briquettes.
Oil refineries	TREFINER	Includes the manufacture of finished oil products.
Petrochemical plants	TPETCHEM	Covers backflows returned from the petrochemical industry. Note that backflows from oil products that are used for non-energy purposes (i.e. white spirit and lubricants) are not included here, but in non-energy use.
Coal liquefaction plants	TCOALLIQ	Includes coal, oil and tar sands used to produce synthetic oil.
Gas-to-liquids (GTL) plants	TGTL	Includes natural gas used as feedstock for the conversion to liquids, e.g. the quantities of fuel entering the methanol production process for transformation into methanol.
For blended natural gas	TBLENDGAS	Includes other gases that are blended with natural gas.
Charcoal production plants	TCHARCOAL	Includes the transformation of solid biofuels into charcoal.
Non-specified (transformation)	TNONSPEC	Includes other non-specified transformation.

Energy industry own use and Losses		
Flow	**Short name**	**Definition**
Energy industry own use	TOTENGY	Energy industry own use covers the amount of fuels used by the energy producing industries (e.g. for heating, lighting and operation of all equipment used in the extraction process, for traction and for distribution).It includes energy consumed by energy industries for heating, pumping, traction and lighting purposes [ISIC Rev. 4 Divisions 05, 06, 19 and 35, Group 091 and Classes 0892 and 0721].
Coal mines	EMINES	Represents the energy which is used directly within the coal industry for hard coal and lignite mining. It excludes coal burned in pithead power stations (included under electricity plants in transformation processes) and free allocations to miners and their families (considered as part of household consumption and therefore included under residential).
Oil and gas extraction	EOILGASEX	Represents the energy which is used for oil and gas extraction. Flared gas is not included.
Blast furnaces	EBLASTFUR	Represents the energy which is used in blast furnaces.
Gas works	EGASWKS	Represents the energy which is used in gas works.
Gasification plants for biogases	EBIOGAS	Represents own consumption of biogas necessary to support temperatures needed for anaerobic fermentation.
Coke ovens	ECOKEOVS	Represents the energy used in coke ovens.
Patent fuel plants	EPATFUEL	Represents the energy used in patent fuel plants.
BKB/peat briquette plants	EBKB	Represents the energy used in BKB and peat briquette plants.
Oil refineries	EREFINER	Represents the energy used in oil refineries.
Coal liquefaction plants	ECOALLIQ	Represents the energy used in coal liquefaction plants.
Liquefaction (LNG) / regasification plants	ELNG	Represents the energy used in LNG and regasification plants.
Gas-to-liquids (GTL) plants	EGTL	Represents the energy used in gas-to-liquids plants.
Own use in electricity, CHP and heat plants	EPOWERPLT	Represents the energy used in electricity, CHP and heat plants.
Pumped storage plants	EPUMPST	Represents electricity consumed in hydro-electric plants for pumped storage.
Nuclear industry	ENUC	Represents the energy used in the nuclear industry.
Charcoal production plants	ECHARCOAL	Represents the energy used in charcoal production plants.
Non-specified (energy)	ENONSPEC	Represents use in non-specified energy industries.
Losses	DISTLOSS	Losses in energy distribution, transmission and transport.

Final consumption		
Flow	**Short name**	**Definition**
Final consumption	FINCONS	Equal to the sum of the consumption in the end-use sectors. Energy used for transformation processes and for own use of the energy producing industries is excluded. Final consumption reflects for the most part deliveries to consumers (see note on *stock changes*). Backflows from the petrochemical industry are not included in final consumption (see *from other sources* under supply and *petrochemical plants* in transformation processes). *Starting with the 2009 edition, international aviation bunkers is no longer included in final consumption at the country level.*
Industry	TOTIND	Industry consumption is specified by sub-sector as listed below: (Note - energy used for transport by industry is not included here but is reported under transport.)
Iron and steel	IRONSTL	[ISIC Rev. 4 Group 241 and Class 2431]
Chemical and petrochemical	CHEMICAL	[ISIC Rev. 4 Divisions 20 and 21] Excluding petrochemical feedstocks.
Non-ferrous metals	NONFERR	[ISIC Rev. 4 Group 242 and Class 2432] Basic industries.
Non-metallic minerals	NONMET	[ISIC Rev. 4 Division 23] Such as glass, ceramic, cement, etc.
Transport equipment	TRANSEQ	[ISIC Rev. 4 Divisions 29 and 30]
Machinery	MACHINE	[ISIC Rev. 4 Divisions 25 to 28] Fabricated metal products, machinery and equipment other than transport equipment.
Mining and quarrying	MINING	[ISIC Rev. 4 Divisions 07 and 08 and Group 099] Mining (excluding fuels) and quarrying.
Food and tobacco	FOODPRO	[ISIC Rev. 4 Divisions 10 to 12]
Paper, pulp and print	PAPERPRO	[ISIC Rev. 4 Divisions 17 and 18]
Wood and wood products	WOODPRO	[ISIC Rev. 4 Division 16] Wood and wood products other than pulp and paper.
Construction	CONSTRUC	[ISIC Rev. 4 Division 41 to 43]
Textile and leather	TEXTILES	[ISIC Rev. 4 Divisions 13 to 15]
Non-specified (industry)	INONSPEC	[ISIC Rev. 4 Divisions 22, 31 and 32] Any manufacturing industry not included above. Note: Most countries have difficulties supplying an industrial breakdown for all fuels. In these cases, the *non-specified (industry)* row has been used. Regional aggregates of industrial consumption should therefore be used with caution.

Final consumption		
Flow	**Short name**	**Definition**
Transport	TOTTRANS	Consumption in transport covers all transport activity (in mobile engines) regardless of the economic sector to which it is contributing [ISIC Rev. 4 Divisions 49 to 51], and is specified as follows:
Domestic aviation	DOMESAIR	Includes deliveries of aviation fuels to aircraft for domestic aviation - commercial, private, agricultural, etc. It includes use for purposes other than flying, e.g. bench testing of engines, but not airline use of fuel for road transport. The domestic/ international split should be determined on the basis of departure and landing locations and not by the nationality of the airline. Note that this may include journeys of considerable length between two airports in a country (e.g. San Francisco to Honolulu). For many countries this incorrectly includes fuel used by domestically owned carriers for outbound international traffic;
Road	ROAD	Includes fuels used in road vehicles as well as agricultural and industrial highway use. Excludes military consumption as well as motor gasoline used in stationary engines and diesel oil for use in tractors that are not for highway use;
Rail	RAIL	Includes quantities used in rail traffic, including industrial railways;
Pipeline transport	PIPELINE	Includes energy used in the support and operation of pipelines transporting gases, liquids, slurries and other commodities, including the energy used for pump stations and maintenance of the pipeline. Energy for the pipeline distribution of natural gas or coal gases, hot water or steam (ISIC Rev. 4 Division 35) from the distributor to final users is excluded and should be reported in *energy industry own use*, while the energy used for the final distribution of water (ISIC Rev. 4 Division 36) to household, industrial, commercial and other users should be included in *commercial/public services*. Losses occurring during the transport between distributor and final users should be reported as *losses*;
Domestic navigation	DOMESNAV	Includes fuels delivered to vessels of all flags not engaged in international navigation (see *international marine bunkers*). The domestic/international split should be determined on the basis of port of departure and port of arrival and not by the flag or nationality of the ship. Note that this may include journeys of considerable length between two ports in a country (e.g. San Francisco to Honolulu). Fuel used for ocean, coastal and inland fishing and military consumption are excluded;
Non-specified (transport)	TRNONSPE	Includes all transport not elsewhere specified. Note: *International marine bunkers* and *international aviation bunkers* are shown in *Supply* and are not included in transport as part of final consumption.

Final consumption		
Flow	**Short name**	**Definition**
Other	TOTOTHER	Includes residential, commercial/public services, agriculture/ forestry, fishing and non-specified (other).
Residential	RESIDENT	Includes consumption by households, excluding fuels used for transport. Includes households with employed persons [ISIC Rev. 4 Divisions 97 and 98] which is a small part of total residential consumption.
Commercial and public services	COMMPUB	[ISIC Rev. 4 Divisions 33, 36-39, 45-47, 52, 53, 55-56, 58-66, 68-75, 77-82, 84 (excluding Class 8422), 85-88, 90-96 and 99]
Agriculture/forestry	AGRICULT	Includes deliveries to users classified as agriculture, hunting and forestry by the ISIC, and therefore includes energy consumed by such users whether for traction (excluding agricultural highway use), power or heating (agricultural and domestic) [ISIC Rev. 4 Divisions 01 and 02].
Fishing	FISHING	Includes fuels used for inland, coastal and deep-sea fishing. Fishing covers fuels delivered to ships of all flags that have refuelled in the country (including international fishing) as well as energy used in the fishing industry [ISIC Rev. 4 Division 03]. *Prior to 2007 edition, fishing was included with agriculture/forestry and this may continue to be the case for some countries.*
Non-specified (other)	ONONSPEC	Includes all fuel use not elsewhere specified as well as consumption in the above-designated categories for which separate figures have not been provided. Military fuel use for all mobile and stationary consumption is included here (e.g. ships, aircraft, road and energy used in living quarters) regardless of whether the fuel delivered is for the military of that country or for the military of another country.
Non-energy use	NONENUSE	Non-energy use covers those fuels that are used as raw materials in the different sectors and are not consumed as a fuel or transformed into another fuel. Non-energy use is shown separately in final consumption under the heading non-energy use. Note that for biomass commodities, only the amounts specifically used for energy purposes (a small part of the total) are included in the energy statistics. Therefore, the non-energy use of biomass is not taken into consideration and the quantities are null by definition.
Non-energy use industry/transformation/energy	NEINTREN	Non-energy in industry, transformation processes and energy industry own use.
Memo: Non-energy use chemical/petrochemical	*NECHEM*	The petrochemical industry includes cracking and reforming processes for the purpose of producing ethylene, propylene, butylene, synthesis gas, aromatics, butadene and other hydrocarbon-based raw materials in processes such as steam cracking, aromatics plants and steam reforming [part of ISIC Rev. 4 Group 201]. *Note: this flow was called "of which petrochemical feedstocks" in previous editions.*
Non-energy use in transport	NETRANS	Non-energy use in transport.

Final consumption		
Flow	**Short name**	**Definition**
Non-energy use in other	NEOTHER	Non-energy use in other sectors such as residential, commercial/public services, agriculture/forestry and fishing.

Electricity output (GWh)		
Flow	**Short name**	**Definition**
Electricity output (GWh)	ELOUTPUT	Shows the total number of GWh generated by power plants separated into electricity plants and CHP plants. Electricity production for hydro pumped storage is also given separately for main activity producers and autoproducers.
Electricity output (GWh)-main activity producer electricity plants	ELMAINE	
Electricity output (GWh)-autoproducer electricity plants	ELAUTOE	
Electricity output (GWh)-main activity producer CHP plants	ELMAINC	
Electricity output (GWh)-autoproducer CHP plants	ELAUTOC	
Main activity producers - pumped hydro production (GWh)	MHYDPUMP	
Autoproducer - pumped hydro production (GWh)	AHYDPUMP	

Heat output (TJ)		
Flow	**Short name**	**Definition**
Heat output (TJ)	HEATOUT	Shows the total number of TJ generated by power plants separated into CHP plants and heat plants.
Heat output (TJ)-main activity producer CHP plants	HEMAINC	
Heat output (TJ)-autoproducer CHP plants	HEAUTOC	
Heat output (TJ)-main activity producer heat plants	HEMAINH	
Heat output (TJ)-autoproducer heat plants	HEAUTOH	

Conversion factors Expressed in **tonne of oil equivalent/tonne and** in **kilojoules/kilogramme; volume to mass** in **barrels/tonne**		
Flow	**Short name**	**Definition**
Average net calorific value	NAVERAGE	Represents the average gross energy content minus the latent heat of vaporisation of 1 unit of mass.
NCV of production	NINDPROD	
NCV of imports	NIMPORTS	
NCV of exports	NEXPORTS	
NCV of coke ovens	NCOKEOVS	
NCV of blast furnaces	NBLAST	
NCV in main activity producer electricity plants	NMAIN	
NCV in autoproducer electricity plants	NAUTOELEC	
NCV in main activity CHP plants	NMAINCHP	
NCV in autoproducer CHP plants	NAUTOCHP	
NCV in main activity heat plants	NMAINHEAT	
NCV in autoproducer heat plants	NAUTOHEAT	
NCV in industry	NIND	
NCV for other uses	NOTHER	
Volume to mass ratio	BBLTONRATIO	This ratio (barrels/tonne) is the inverse of density.

4. PRODUCT DEFINITIONS

Coal With the exception of the coal gases, the fuels in this section are expressed in thousand tonnes. The coal gases are expressed in terajoules on a **gross calorific value basis**.		
Product	**Short name**	**Definition**
Hard coal (if no detail)	HARDCOAL	This item is only used if the detailed breakdown is not available. It includes anthracite, coking coal and other bituminous coal.
Brown coal (if no detail)	BROWN	This item is only used if the detailed breakdown is not available. It includes lignite and sub-bituminous coal.
Anthracite	ANTCOAL	Anthracite is a high rank coal used for industrial and residential applications. It has generally less than 10% volatile matter and a high carbon content (about 90% fixed carbon). Its gross calorific value is equal to or greater than 24 000 kJ/kg on an ash-free but moist basis.
Coking coal	COKCOAL	Coking coal refers to bituminous coal with a quality that allows the production of a coke suitable to support a blast furnace charge. Its gross calorific value is equal to or greater than 24 000 kJ/kg on an ash-free but moist basis.
Other bituminous coal	BITCOAL	Other bituminous coal is used mainly for steam raising and space heating purposes and includes all bituminous coal that is not included under coking coal nor anthracite. It is characterized by higher volatile matter than anthracite (more than 10%) and lower carbon content (less than 90% fixed carbon). Its gross calorific value is equal to or greater than 24 000 kJ/kg on an ash-free but moist basis.
Sub-bituminous coal	SUBCOAL	Non-agglomerating coal with a gross calorific value between 20 000 kJ/kg and 24 000 kJ/kg containing more than 31% volatile matter on a dry mineral matter free basis.
Lignite	LIGNITE	Lignite is a non-agglomerating coal with a gross calorific value of less than 20 000 kJ/kg and greater than 31% volatile matter on a dry mineral matter free basis. *Note: starting with the 2014 edition, oil shale is presented separately and not included with lignite any longer.*

Coal With the exception of the coal gases, the fuels in this section are expressed in thousand tonnes. The coal gases are expressed in terajoules on a **gross calorific value basis**.		
Product	**Short name**	**Definition**
Patent fuel	PATFUEL	Patent fuel is a composition fuel manufactured from hard coal fines with the addition of a binding agent. The amount of patent fuel produced may, therefore, be slightly higher than the actual amount of coal consumed in the transformation process. Consumption of patent fuels during the patent fuel manufacturing process is included under *other energy industry own use*.
Coke oven coke	OVENCOKE	Coke oven coke is the solid product obtained from the carbonisation of coal, principally coking coal, at high temperature. It is low in moisture content and volatile matter. Coke oven coke is used mainly in the iron and steel industry, acting as energy source and chemical agent. Also included are semi-coke (a solid product obtained from the carbonisation of coal at a low temperature), lignite coke (a semi-coke made from lignite), coke breeze and foundry coke. The heading *other energy industry own use* includes the consumption at the coking plants themselves. Consumption in the *iron and steel industry* does not include coke converted into blast furnace gas. To obtain the total consumption of coke oven coke in the iron and steel industry, the quantities converted into blast furnace gas have to be added (these are included in *blast furnaces*).
Gas coke	GASCOKE	Gas coke is a by-product of hard coal used for the production of town gas in gas works. Gas coke is used for heating purposes. *Other energy industry own use* includes the consumption of gas coke at gas works.
Coal tar	COALTAR	Coal tar is a result of the destructive distillation of bituminous coal or of the low-temperature carbonisation of brown coal. Coal tar from bituminous coal is the liquid by-product of the distillation of coal to make coke in the coke oven process. Coal tar can be further distilled into different organic products (e.g. benzene, toluene, naphthalene), which normally would be reported as a feedstock to the petrochemical industry.
BKB	BKB	Brown coal briquettes are composition fuels manufactured from lignite, produced by briquetting under high pressure with or without the addition of a binding agent.
Gas works gas	GASWKSGS	Gas works gas covers all types of gas produced in public utility or private plants, whose main purpose is the manufacture, transport and distribution of gas. It includes gas produced by carbonisation (including gas produced by coke ovens and transferred to gas works), by total gasification (with or without enrichment with oil products) and by reforming and simple mixing of gases and/or air.
Coke oven gas	COKEOVGS	Coke oven gas is obtained as a by-product of the manufacture of coke oven coke for the production of iron and steel.

Coal

With the exception of the coal gases, the fuels in this section are expressed in thousand tonnes. The coal gases are expressed in terajoules on a **gross calorific value basis**.

Product	Short name	Definition
Blast furnace gas	BLFURGS	Blast furnace gas is produced during the combustion of coke in blast furnaces in the iron and steel industry. It is recovered and used as a fuel, partly within the plant and partly in other steel industry processes or in power stations equipped to burn it.
Other recovered gases	OGASES	By-product of the production of steel in an oxygen furnace, recovered on leaving the furnace. The gases are also known as converter gas, LD gas or BOS gas. The quantity of recuperated fuel should be reported on a gross calorific value basis. Also covers non-specified manufactured gases not mentioned above, such as combustible gases of solid carbonaceous origin recovered from manufacturing and chemical processes not elsewhere defined.

Peat and peat products

The fuels in this section are expressed in thousand tonnes.

Product	Short name	Definition
Peat	PEAT	Peat is a combustible soft, porous or compressed, fossil sedimentary deposit of plant origin with high water content (up to 90% in the raw state), easily cut, of light to dark brown colour. Peat used for non-energy purposes is not included here. Milled peat is included here.
Peat products	PEATPROD	Products such as peat briquettes derived directly or indirectly from sod peat and milled peat.

Oil shale

The fuels in this section are expressed in thousand tonnes.

Product	Short name	Definition
Oil shale and oil sands	OILSHALE	Oil shale and oil sands are sedimentary rock which contains organic matter in the form of kerogen. Kerogen is a waxy hydrocarbon-rich material regarded as a precursor of petroleum. Oil shale may be burned directly or processed by heating to extract shale oil. Oil shale and tar sands used as inputs for other transformation processes are also included here (this includes the portion consumed in the transformation process). Shale oil and other products derived from liquefaction are included in *from other sources* under crude oil (*other hydrocarbons*).

Natural gas Natural gas is expressed in terajoules on a **gross calorific value** basis.		
Product	**Short name**	**Definition**
Natural gas	NATGAS	Natural gas comprises gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both "non-associated" gas originating from fields producing only hydrocarbons in gaseous form, and "associated" gas produced in association with crude oil as well as methane recovered from coal mines (colliery gas) or from coal seams (coal seam gas). Production represents dry marketable production within national boundaries, including offshore production and is measured after purification and extraction of NGL and sulphur. It includes gas consumed by gas processing plants and gas transported by pipeline. Quantities of gas that are re-injected, vented or flared are excluded.

Crude, NGL, refinery feedstocks The fuels in this section are expressed in thousand tonnes.		
Product	**Short name**	**Definition**
Crude/NGL/feedstocks (if no detail)	CRNGFEED	This item is only used if the detailed breakdown is not available. It includes crude oil, natural gas liquids, refinery feedstocks, additives/blending components and other hydrocarbons.
Crude oil	CRUDEOIL	Crude oil is a mineral oil of natural origin consisting of a mixture of hydrocarbons and associated impurities, such as sulphur. It exists in the liquid phase under normal surface temperatures and pressure and its physical characteristics (density, viscosity, etc.) are highly variable. It includes field or lease condensates (separator liquids) which are recovered from associated and non-associated gas where it is commingled with the commercial crude oil stream.
Natural gas liquids	NGL	NGL are the liquid or liquefied hydrocarbons recovered from natural gas in separation facilities or gas processing plants. Natural gas liquids include ethane, propane, butane (normal and iso-), (iso) pentane and pentanes plus (sometimes referred to as natural gasoline or plant condensate).
Refinery feedstocks	REFFEEDS	A refinery feedstock is a processed oil destined for further processing (e.g. straight run fuel oil or vacuum gas oil) other than blending in the refining industry. With further processing, it will be transformed into one or more components and/or finished products. This definition also covers returns from the petrochemical industry to the refining industry (e.g. pyrolysis gasoline, C4 fractions, gasoil and fuel oil fractions).
Additives/blending components	ADDITIVE	Additives are non-hydrocarbon compounds added to or blended with a product to modify its properties, for example, to improve its combustion characteristics. Alcohols and ethers (MTBE, methyl tertiary-butyl ether) and chemical alloys such as tetraethyl lead are included here. The biofuel fractions of biogasoline, biodiesel and ethanol are not included here, but under liquid biofuels. This differs from the presentation of additives in the *Oil Information* publication.
Other hydrocarbons	NONCRUDE	This category includes synthetic crude oil from tar sands, shale oil, etc., liquids from coal liquefaction, output of liquids from natural gas conversion into gasoline, hydrogen and emulsified oils (e,g, Orimulsion).

Oil products

The fuels in this section are expressed in thousand tonnes.

Oil products are any oil-based products which can be obtained by distillation and are normally used outside the refining industry. The exceptions to this are those finished products which are classified as refinery feedstocks.

Production of oil products shows gross refinery output for each product.

Refinery fuel (row *oil refineries*, under *energy industry own use*) represents consumption of oil products, both intermediate and finished, within refineries, e.g. for heating, lighting, traction, etc.

Product	Short name	Definition
Refinery gas	REFINGAS	Refinery gas includes a mixture of non-condensed 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.. It also includes gases which are returned from the petrochemical industry. Refinery gas production refers to gross production. Own consumption is shown separately under *oil refineries* in *energy industry own use*.
Ethane	ETHANE	Ethane is a naturally gaseous straight-chain hydrocarbon (C_2H_6) which is extracted from natural gas and refinery gas streams.
Liquefied petroleum gases (LPG)	LPG	Liquefied petroleum gases are light paraffinic hydrocarbons derived from refinery processes, crude oil stabilisation plants and natural gas processing plants. They consist mainly of propane (C_3H_8) and butane (C_4H_{10}) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene. LPG are normally liquefied under pressure for transportation and storage.
Motor gasoline excl. biofuels	NONBIOGASO	Motor gasoline is light hydrocarbon oil for use in internal combustion engines such as motor vehicles, excluding aircraft. Motor gasoline is distilled between 35^{o}C and 215^{o}C and is used as a fuel for land based spark ignition engines. Motor gasoline may include additives, oxygenates and octane enhancers, including lead compounds such as TEL (tetraethyl lead) and TML (tetramethyl lead). Motor gasoline excluding biofuels does not include the liquid biofuel or ethanol blended with gasoline - see liquid biofuels.
Aviation gasoline	AVGAS	Aviation gasoline is motor spirit prepared especially for aviation piston engines, with an octane number suited to the engine, a freezing point of -60^{o}C, and a distillation range usually within the limits of 30^{o}C and 180^{o}C.
Gasoline type jet fuel	JETGAS	Gasoline type jet fuel includes all light hydrocarbon oils for use in aviation turbine power units, distilling between 100^{o}C and 250^{o}C. This fuel is obtained by blending kerosene and gasoline or naphthas in such a way that the aromatic content does not exceed 25% in volume, and the vapour pressure is between 13.7 kPa and 20.6 kPa. Additives can be included to improve fuel stability and combustibility.

Oil products

The fuels in this section are expressed in thousand tonnes.

Oil products are any oil-based products which can be obtained by distillation and are normally used outside the refining industry. The exceptions to this are those finished products which are classified as refinery feedstocks.

Production of oil products shows gross refinery output for each product.

Refinery fuel (row *oil refineries*, under *energy industry own use*) represents consumption of oil products, both intermediate and finished, within refineries, e.g. for heating, lighting, traction, etc.

Product	Short name	Definition
Kerosene type jet fuel excluding biofuels	NONBIOJETK	Kerosene type jet fuel is a medium distillate used for aviation turbine power units. It has the same distillation characteristics and flash point as kerosene (between 150°C and 300°C but not generally above 250°C). In addition, it has particular specifications (such as freezing point) which are established by the International Air Transport Association (IATA). It includes kerosene blending components. Kerosene type jet fuel excluding bio does not include the liquid biofuels blended with jet kerosene.
Other kerosene	OTHKERO	Kerosene (other than kerosene used for aircraft transport which is included with aviation fuels) comprises refined petroleum distillate intermediate in volatility between gasoline and gas/diesel oil. It is a medium oil distilling between 150°C and 300°C.
Gas/diesel oil excluding biofuels	NONBIODIES	Gas/diesel oil includes heavy gas oils. Gas oils are obtained from the lowest fraction from atmospheric distillation of crude oil, while heavy gas oils are obtained by vacuum redistillation of the residual from atmospheric distillation. Gas/diesel oil distils between 180°C and 380°C. Several grades are available depending on uses: diesel oil for diesel compression ignition (cars, trucks, marine, etc.), light heating oil for industrial and commercial uses, and other gas oil including heavy gas oils which distil between 380°C and 540°C and which are used as petrochemical feedstocks. Gas/diesel oil excluding biofuels does not include the liquid biofuels blended with gas/diesel oil – see liquid biofuels.
Fuel oil	RESFUEL	Fuel oil defines oils that make up the distillation residue. It comprises all residual fuel oils, including those obtained by blending. Its kinematic viscosity is above 10 cSt at 80°C. The flash point is always above 50°C and the density is always higher than 0.90 kg/l.
Naphtha	NAPHTHA	Naphtha is a feedstock destined either for the petrochemical industry (e.g. ethylene manufacture or aromatics production) or for gasoline production by reforming or isomerisation within the refinery. Naphtha comprises material that distils between 30°C and 210°C. Naphtha imported for blending is shown as an import of naphtha, and then shown in the transfers row as a negative entry for naphtha and a positive entry for the corresponding finished product (e.g. gasoline).

Oil products

The fuels in this section are expressed in thousand tonnes.

Oil products are any oil-based products which can be obtained by distillation and are normally used outside the refining industry. The exceptions to this are those finished products which are classified as refinery feedstocks.

Production of oil products shows gross refinery output for each product.

Refinery fuel (row *oil refineries*, under *energy industry own use*) represents consumption of oil products, both intermediate and finished, within refineries, e.g. for heating, lighting, traction, etc.

Product	Short name	Definition
White spirit & SBP	WHITESP	White spirit and SBP are refined distillate intermediates with a distillation in the naphtha/kerosene range. White Spirit has a flash point above 30°C and a distillation range of 135°C to 200°C. Industrial Spirit (SBP) comprises light oils distilling between 30°C and 200°C, with a temperature difference between 5% volume and 90% volume distillation points, including losses, of not more than 60°C. In other words, SBP is a light oil of narrower cut than motor spirit. There are seven or eight grades of industrial spirit, depending on the position of the cut in the distillation range defined above.
Lubricants	LUBRIC	Lubricants are hydrocarbons produced from distillate or residue; they are mainly used to reduce friction between bearing surfaces. This category includes all finished grades of lubricating oil, from spindle oil to cylinder oil, and those used in greases, including motor oils and all grades of lubricating oil base stocks.
Bitumen	BITUMEN	Bitumen is a solid, semi-solid or viscous hydrocarbon with a colloidal structure that is brown to black in colour. It is obtained by vacuum distillation of oil residues from atmospheric distillation of crude oil. Bitumen is often referred to as asphalt and is primarily used for surfacing of roads and for roofing material. This category includes fluidised and cut back bitumen.
Paraffin waxes	PARWAX	Paraffin waxes are saturated aliphatic hydrocarbons. These waxes are residues extracted when dewaxing lubricant oils, and they have a crystalline structure which is more or less fine according to the grade. Their main characteristics are that they are colourless, odourless and translucent, with a melting point above 45°C.
Petroleum coke	PETCOKE	Petroleum coke is defined as a black solid by-product, obtained mainly by cracking and carbonising of petroleum derived feedstocks, vacuum bottoms, tar and pitches in processes such as delayed coking or fluid coking. It consists mainly of carbon (90 to 95%) and has a low ash content. It is used as a feedstock in coke ovens for the steel industry, for heating purposes, for electrode manufacture and for production of chemicals. The two most important qualities are "green coke" and "calcinated coke". This category also includes "catalyst coke" deposited on the catalyst during refining processes: this coke is not recoverable and is usually burned as refinery fuel.

Oil products

The fuels in this section are expressed in thousand tonnes.

Oil products are any oil-based products which can be obtained by distillation and are normally used outside the refining industry. The exceptions to this are those finished products which are classified as refinery feedstocks.

Production of oil products shows gross refinery output for each product.

Refinery fuel (row *oil refineries*, under *energy industry own use*) represents consumption of oil products, both intermediate and finished, within refineries, e.g. for heating, lighting, traction, etc.

Product	Short name	Definition
Other oil products	ONONSPEC	Other oil products not classified above (e.g. tar, sulphur and grease) are included here. This category also includes aromatics (e.g. BTX or benzene, toluene and xylene) and olefins (e.g. propylene) produced within refineries.

Biofuels and Waste

The fuels in this section are expressed in terajoules on a **net calorific value** basis, with the exception of liquid biofuels and charcoal, which are in thousand tonnes.

Product	Short name	Definition
Industrial waste	INDWASTE	Industrial waste of non-renewable origin consists of solid and liquid products (e.g. tyres) combusted directly, usually in specialised plants, to produce heat and/or power. Renewable industrial waste is not included here, but with solid biofuels, biogas or liquid biofuels.
Municipal waste (renewable)	MUNWASTER	Municipal waste consists of products that are combusted directly to produce heat and/or power and comprises wastes produced by households, industry, hospitals and the tertiary sector that are collected by local authorities for incineration at specific installations. Municipal waste is split into renewable and non-renewable.
Municipal waste (non-renewable)	MUNWASTEN	Municipal waste consists of products that are combusted directly to produce heat and/or power and comprises wastes produced by households, industry, hospitals and the tertiary sector that are collected by local authorities for incineration at specific installations. Municipal waste is split into renewable and non-renewable.
Primary solid biofuels	PRIMSBIO	Primary solid biofuels are defined as any plant matter used directly as fuel or converted into other forms before combustion. This covers a multitude of woody materials generated by industrial process or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, sulphite lyes also known as black liquor, animal materials/wastes and other solid biofuels).
Biogases	BIOGASES	Biogases are gases arising from the anaerobic fermentation of biomass and the gasification of solid biomass (including biomass in wastes). The biogases from anaerobic fermentation are composed principally of methane and carbon dioxide and comprise landfill gas, sewage sludge gas and other biogases from anaerobic fermentation. Biogases can also be produced from thermal processes (by gasification or pyrolysis) of biomass and are mixtures containing hydrogen and carbon monoxide (usually known as syngas) along with other components. These gases may be further processed to modify their composition and can be further processed to produce substitute natural gas. Biogases are used mainly as a fuel but can be used as a chemical feedstock.
Biogasoline	BIOGASOL	Biogasoline includes bioethanol (ethanol produced from biomass and/or the biodegradable fraction of waste), biomethanol (methanol produced from biomass and/or the biodegradable fraction of waste), bioETBE (ethyl-tertio-butyl-ether produced on the basis of bioethanol; the percentage by volume of bioETBE that is calculated as biofuel is 37%) and bioMTBE (methyl-tertio-butyl-ether produced on the basis of biomethanol: the percentage by volume of bioMTBE that is calculated as biofuel is 22%). Biogasoline includes the amounts that are blended into the gasoline - it does not include the total volume of gasoline into which the biogasoline is blended.

Biofuels and Waste

The fuels in this section are expressed in terajoules on a **net calorific value** basis, with the exception of liquid biofuels and charcoal, which are in thousand tonnes.

Product	Short name	Definition
Biodiesels	BIODIESEL	Biodiesels includes biodiesel (a methyl-ester produced from vegetable or animal oil, of diesel quality), biodimethylether (dimethylether produced from biomass), Fischer Tropsh (Fischer Tropsh produced from biomass), cold pressed bio-oil (oil produced from oil seed through mechanical processing only) and all other liquid biofuels which are added to, blended with or used straight as transport diesel or in electricity and heat generation. Biodiesels includes the amounts that are blended into the diesel - it does not include the total volume of diesel into which the biodiesel is blended.
Other liquid biofuels	OBIOLIQ	Other liquid biofuels includes liquid biofuels, used directly as fuel, not reported in either biogasoline or biodiesels.
Non-specified primary biofuels/waste	RENEWNS	This item is used when the detailed breakdown for primary combustible renewables and wastes is not available.
Charcoal	CHARCOAL	It covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.

Electricity and Heat

Electricity is expressed in gigawatt hours and heat is expressed in terajoules.
Direct use of geothermal and solar thermal is in terajoules on a **net calorific value** basis.

Product	Short name	Definition
Elec/heat output from non-specified manufactured gases	MANGAS	This item is only used if the detailed breakdown is not available. It includes coke oven gas, blast furnace gas and oxygen steel furnace gas. Gas works gas is not included here.
Heat output from non-specified combustible fuels	HEATNS	This item is only used if the detailed breakdown is not available.
Nuclear	NUCLEAR	Energy released by nuclear fission or nuclear fusion.
Hydro	HYDRO	Hydro energy represents the potential and kinetic energy of water converted into electricity in hydroelectric plants.
Geothermal	GEOTHERM	Geothermal energy is the energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It is exploited at suitable sites: • for electricity generation using dry stream or high enthalpy brine after flashing • directly as heat for district heating, agriculture, etc.
Solar photovoltaics	SOLARPV	Electricity from photovoltaic cells.
Solar thermal	SOLARTH	Solar energy is the solar radiation exploited for hot water production and electricity generation, by: • flat plate collectors, mainly of the thermosyphon type, for domestic hot water or for the seasonal heating of swimming pools • solar thermal-electric plants Passive solar energy for the direct heating, cooling and lighting of dwellings or other buildings is not included.
Tide, wave and ocean	TIDE	Tide, wave and ocean represents the mechanical energy derived from tidal movement, wave motion or ocean current and exploited for electricity generation.
Wind	WIND	Wind energy represents the kinetic energy of wind exploited for electricity generation in wind turbines.
Heat pumps	HEATPUMP	Heat pumps should include the inputs and outputs to heat pumps corresponding to the amount of heat that is sold to third parties.
Electric boilers	BOILER	Electric boilers should include the inputs and outputs to electric boilers corresponding to the amount of heat that is sold to third parties.
Heat from chemical sources	CHEMHEAT	Heat from chemical sources corresponds to heat originating from processes without input energy, such as a chemical reaction (e.g. the treatment of zinc oxide ore with hydrochloric acid). Note that waste heat originating from energy driven processes is not considered as a primary energy source and is included with the heat produced from the corresponding fuel.

Electricity and Heat Electricity is expressed in gigawatt hours and heat is expressed in terajoules. Direct use of geothermal and solar thermal is in terajoules on a **net calorific value** basis.		
Product	**Short name**	**Definition**
Other sources	OTHER	Other sources includes production not included elsewhere such as fuel cells.
Electricity	ELECTR	Gross electricity production is measured at the terminals of all alternator sets in a station; it therefore includes the energy taken by station auxiliaries and losses in transformers that are considered integral parts of the station. The difference between gross and net production is generally estimated as 7% for conventional thermal stations, 1% for hydro stations, and 6% for nuclear, geothermal and solar stations. Production in hydro stations includes production from pumped storage plants.
Heat	HEAT	Heat production includes all heat produced by main activity producer CHP and heat plants, as well as heat sold by autoproducer CHP and heat plants to third parties. Fuels used to produce quantities of heat for sale are included in transformation processes under the rows *CHP plants* and *Heat plants*. The use of fuels for heat which is not sold is included under the sectors in which the fuel use occurs.

5. GEOGRAPHICAL COVERAGE

Countries and regions

This document is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Country/Region	Short name	Definition
Australia	AUSTRALI	Excludes the overseas territories.
Austria	AUSTRIA	
Belgium	BELGIUM	
Canada	CANADA	
Chile	CHILE	Data start in 1971.
Czech Republic	CZECH	Data start in 1971.
Denmark	DENMARK	Excludes Greenland and the Danish Faroes, except prior to 1990, where data on oil for Greenland were included with the Danish statistics. The Administration is planning to revise the series back to 1974 to exclude these amounts.
Estonia	ESTONIA	Data start in 1990. Prior to that, they are included within Former Soviet Union in the publication *Energy Statistics of Non-OECD countries*. *Note: Estonia joined the IEA in May 2014.*
Finland	FINLAND	
France	FRANCE	Includes Monaco, and excludes the following overseas departments and territories: Guadeloupe, Guyana, Martinique, New Caledonia, French Polynesia, Reunion, and St.-Pierre and Miquelon.
Germany	GERMANY	Includes the new federal states of Germany from 1970 onwards.
Greece	GREECE	
Hungary	HUNGARY	Data start in 1965.
Iceland	ICELAND	
Ireland	IRELAND	

Countries and regions

This document is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Country/Region	Short name	Definition
Israel	ISRAEL	The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law. Data start in 1971.
Italy	ITALY	Includes San Marino and the Vatican.
Japan	JAPAN	Includes Okinawa.
Korea	KOREA	Data start in 1971.
Luxembourg	LUXEMBOU	
Mexico	MEXICO	Data start in 1971.
Netherlands	NETHLAND	Excludes Suriname and the Netherlands Antilles.
New Zealand	NZ	
Norway	NORWAY	
Poland	POLAND	
Portugal	PORTUGAL	Includes the Azores and Madeira.
Slovak Republic	SLOVAKIA	Data start in 1971.
Slovenia	SLOVENIA	Data start in 1990. Priori to that, they are included within Former Yugoslavia in the publication *Energy Statistics of non-OECD countries*.
Spain	SPAIN	Includes the Canary Islands.
Sweden	SWEDEN	
Switzerland	SWITLAND	Includes Liechtenstein for the oil data. Data for other fuels do not include Liechtenstein.
Turkey	TURKEY	
United Kingdom	UK	Shipments of coal and oil to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of coal and oil to these islands are, therefore, included as part of UK supply. Exports of natural gas to the Isle of Man are included with the exports to Ireland.
United States	USA	Includes the 50 states and the District of Columbia. Oil statistics as well as coal trade statistics also include Puerto Rico, Guam, the U.S. Virgin Islands, American Samoa, Johnston Atoll, Midway Islands, Wake Island and the Northern Mariana Islands.

OECD Total	OECDTOT	Includes Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel[1], Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Estonia and Slovenia are included starting in 1990. Prior to 1990, data for Estonia are included in Former Soviet Union and data for Slovenia in Former Yugoslavia in the publication *Energy Statistics of Non-OECD Countries*.
OECD Americas	OECDAM	Includes Canada, Chile, Mexico and the United States.
OECD Asia Oceania	OECDAO	Includes Australia, Israel[1], Japan, Korea and New Zealand.
OECD Europe	OECDEUR	Includes Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom. Estonia and Slovenia are included starting in 1990. Prior to 1990, data for Estonia are included in Former Soviet Union and data for Slovenia in Former Yugoslavia in the publication *Energy Statistics of Non-OECD Countries*.
IEA	IEATOT	Includes Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Estonia is included starting in 1990. Prior to 1990, data for Estonia are included in Former Soviet Union in the publication *Energy Statistics of Non-OECD Countries*.

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

6. COUNTRY NOTES

General notes

The notes given below refer to data for the years 1960 to 2012 and cover the summary tables at the back of the book, as well as the information on CD-ROM and the on-line data service. In general, more detailed notes are available for data starting in 1990.

Prior to 1974, most fuel inputs and electricity and heat outputs for autoproducers are included in main activity producers. The figures for the quantities of fuels used for the generation of electricity and heat and the corresponding outputs in CHP and heat plants should be used with caution. Despite estimates introduced by the Secretariat, inputs and outputs are not always consistent. Please refer to notes below under *Electricity and Heat*.

Data for anthracite, coking coal, other bituminous coal, sub-bituminous coal and lignite are available separately from 1978. Prior to 1978, only data for hard coal and brown coal (lignite/sub-bituminous coal) are available.

In 1996, the IEA Secretariat extensively revised data on coal and coke use in blast furnaces, and in the iron and steel industry (for those countries with blast furnaces), based on data provided to the OECD Steel Committee and other sources. The quantities of fuels transformed into blast furnace gas have been estimated by the IEA Secretariat based on its blast furnace model.

Moreover, in 1996 and 1997, the IEA Secretariat extensively revised data on biofuels and waste (*i.e.* solid biofuels, biogases, liquid biofuels, industrial waste and municipal waste) based on data from Eurostat (for the EU-15 Member countries) and on other national sources for other OECD Member countries. As consumption data for biofuels and waste from Eurostat are generally available from 1989, there may be breaks in series between 1988 and 1989 for some EU Member countries. Generally data on biofuels and waste are reported in non-specified prior to 1989 for EU Member countries.

Australia

In the 2013 edition, data for Australia were revised back to 2003 due to the adoption of the National Greenhouse and Energy Reporting (NGER) as the main energy consumption data source for the Australian Energy Statistics. As a result, there are breaks in the time series for many data between 2002 and 2003. The revisions have also introduced some methodological problems. The national statistics appear to have problems identifying inputs and outputs to certain transformation processes such as gas works plants, electricity plants and CHP plants. Energy industry own use and inputs to the transformation processes are sometimes not reported separately in the correct categories. More detail is given in the notes below.

All data refer to the fiscal year (*e.g.* July 2012 to June 2013 for 2013). For the 2002 data, the Australian Administration started to use a new survey methodology which caused shifts in the structure of industry consumption. The Australian Administration is planning to revise the historical series.

Coal: Hard coal data prior to 1978 may include sub-bituminous coal. Data on blast furnace gas for electricity production by autoproducers begins in 1986. Consumption in wood and wood products is included in paper, pulp and print from 2001 onwards. The drop in BKB production in 2004 was due to a fire in the main production plant. Only anthracite for export is reported separately; the remainder that is consumed domestically is included with other bituminous coal.

Reclassification of some coal types in 2013 were calculated on an energy basis and resulted in a net increase of quantities of primary coal from 2003 to 2011. Export trade in coke oven coke since 2004 exists, but data are unavailable for reasons of confidentiality. Coal tar data for 2011 include tars from other fuel sources and also some manufactured coal products. Natural gas consumed to fuel the distribution of natural gas in natural gas networks is reported as transformation for gas works gas production. Coke oven gas reported as energy industry own-use in electricity or CHP plants is used for generation purposes, while natural gas used for own-use plant support is reported in the transformation sector. In the 2013 edition, production data for all manufactured gases were revised downwards as part of the new national methodology, leading to significant statistical differences.

Oil: Changes in methodologies resulted in breaks in series in 2012, and, for certain products/flows in 2011. Historical revisions are pending. Large refinery losses in 2012 are due to data issues that are being addressed by the national administration. Negative refinery losses in time series are caused by differences in treatment of transfers between refineries. Imports of fuel oil have been estimated by the Australian Administration. Prior to 1992, part of the NGL production is included in crude oil. The drop in the production of crude oil in 1999 is due to a gas explosion at the Longford plant. There is a break in the series for crude oil and NGL between 2001 and 2002.

Natural Gas: For 2012, a new methodology was used to report production, now including previously not captured flows, and consumption for energy use in liquefaction plants. This caused a reduction of statistical differences as well as breaks in series. Revisions to previous years are pending. Prior to 1986, natural gas inputs to blast furnaces were included in the iron and steel sector. Prior to 1991, natural gas data include ethane. Data for 1999 and 2000 are estimated by the Australian Administration. Between 2001 and 2002 there are breaks in series for consumption data due to an industry structural shift and changes in methodology. Natural gas consumed to fuel the distribution of natural gas in natural gas networks is reported as transformation for gas works gas production.

Biofuels and Waste: For biofuels and waste, a different industry consumption breakdown is available from 1996 and leads to breaks in series. Biogas production at sewage treatment works is unavailable.

Electricity and Heat: Inputs and outputs from autoproducer CHP plants are not available prior to 1986. The production of electricity from wind is available from 1994. Electricity production from solar PV starts in 1992 and from solar thermal in 2003. Prior to 1995, electricity production from biogases is included in natural gas. Heat data are not available from 1992 onwards. In 2002, the Australian Administration started to use a new survey methodology and reclassified the types of plants between main activity producers and autoproducers.

Prior to 2006, electricity consumption in mining and quarrying includes consumption in liquefaction/ regasification plants. From 1990 to 2008, electricity consumption in wood and wood products is included together with paper, pulp and printing.

Austria

Historical revisions by the Austrian Administration have resulted in some breaks in series between 1989 and 1990.

Coal: Other bituminous coal includes hard coal briquettes. "Trockenkohle" is included with BKB because of its high calorific value. Since 1996, gas works gas is reported with natural gas because it is distributed in the same network. The amount of gas works gas is negligible and it is mostly consumed by households. The last lignite mine closed in the second quarter of 2004 and lignite use for power generation ceased in 2006. LD gas, which should normally be reported as other recovered gases, is reported with blast furnace gas.

Oil: Prior to 1990, a portion of naphtha is included with other oil products.

Natural Gas: Export amounts are calculated by the national administration by subtracting stock changes and domestic consumption from import figures. The break in the time series for autoproducer electricity and CHP plants between 1995 and 1996 is due to the availability of more detailed data from 1996 onwards. Differences due to measurement are included with losses prior to 2000. There are inconsistencies in the time series for commercial/public services as this subsector is computed by the Austrian Administration as a residual.

Biofuels and Waste: Data for 1986 to 1989 for solid biofuels, industrial waste, biogases and liquid biofuels are IEA Secretariat estimates based on information

published by OSTAT in *Energieversongung Österreichs Endgültige Energiebilanz*. Due to a change in the survey methodology, the heat produced in small plants (capacity inferior to 1 MW) is not reported starting in 2002. Prior to 2002, data for biogases only include plants of 1 MW or larger. A large autoproducer electricity plant was reclassified as an autoproducer CHP plant and therefore creates a break in series for municipal waste in 2011.

Electricity and Heat: Heat from chemical processes used for electricity production is available from 2004. Electricity plants data may include some CHP plants operating in electricity only mode. Inputs of other oil products to autoproducer CHP plants were reclassified as refinery gas and natural gas in 2009. Revisions to the historical time series are planned by the Austrian Administration.

From 1990 to 2009, small amounts of electricity used in heat pumps have been included in the residential sector. Electricity consumption in oil refineries includes consumption in gas works plants prior to 1991. Also prior to 1991, electricity consumption in the iron and steel industry includes consumption in coke ovens and blast furnaces. Consumption in commercial/ public services includes electricity used in the field of electricity supply, district heating and water supply prior to 1990. Starting in 1990, consumption of electricity in the field of electricity supply, district heating and water supply are included in *other energy industry own use*.

Belgium

Coal: Hard coal data prior to 1978 may include sub-bituminous coal. Sub-bituminous coal data reported in *from other sources* refer to coal recuperated from coal dumps. Production of other bituminous coal ceased on 31 August 1992. The use of coke oven gas in chemical and petrochemical activities ceased in 1996. The decrease of bituminous coal and coke oven coke in the iron and steel industry in 2002 is due to the closure of several plants. Supply-side data are obtained through surveying questionnaires in lieu of customs data.

Oil: The decrease of fuel oil in industry consumption since 1993 is due to the introduction of an excise tax as well as increased use of natural gas. In 2002, patent fuel plants used fuel oil to increase the calorific value of patent fuel. Historical revisions of naphtha backflows are pending. In the 2014 edition, some amounts of additives have been reclassified as motor gasoline for the most recent years.

Natural Gas: As of 2000, natural gas has started to replace blast furnace gas in the iron and steel industry. The large decrease in non-specified industry in 2003 is due to improvements in data collection. New legislation for data collection has led to breaks in series for industry and energy industry own use between 2004 and 2005, and between 2007 and 2008. Starting in 2009, gas trade in Belgium includes imported LNG which is regasified and subsequently exported to other countries. Trade data for 2012, energy sector own use and final consumption data for 2011 and 2012 have been estimated by the IEA Secretariat.

Biofuels and Waste: In 2003, combustion of municipal waste for electricity and heat generation purposes increased significantly. However, because a large portion of the heat produced is not used (sold), plant efficiencies dropped significantly between 2002 and 2003. Data for biodiesels are available starting in 2007. Data for biogasoline are available starting in 2008. A new series for industrial waste used in the chemical sector for one region were reported in 2011, causing a break series. New data on consumption cause breaks in series for primary solid biofuels between 2011 and 2012.

Electricity and Heat: For 1998 and 1999, electricity production at CHP plants with annual heat output below 0.5 TJ is reported with electricity only plants. In 2000, most autoproducer electricity plants using combustible fuels were reclassified as autoproducer CHP plants; the heat production from these plants was used for internal industrial processes and not sold to third parties until 2005. Heat from chemical processes used for electricity production is available from 2005. Heat production from chemical sources has been estimated in 2012 by the IEA secretariat. In the 2014 edition, the refinery gas main activity CHP plants have been reclassified as autoproducer CHP plants for data from 2010 to 2012. In 2012, the electricity production from wind autoproducer electricity plants was 213 MWh, which appears as rounded to 0 GWh in this publication.

For 2012, oil refineries electricity consumption has been estimated by the IEA Secretariat based on refinery activity data. Part of the estimated amount has been removed from consumption in the chemical and petrochemical sector. Electricity consumption in the mining and quarrying sector has been estimated by the IEA secretariat for 2012. Breaks in series exist between 1991 and 1992 for heat consumption in

chemical and non-specified industry. Breaks in series may exist between 2007 and 2008 due to revisions of NACE classifications. There is no heat consumption starting in 2007 in the iron and steel industry because the installation concerned became an autoproducer in July 2006 and the heat is no longer sold.

Canada

Revisions received by the Canadian Administration and incorporated into the 2002 edition have resulted in breaks in series between 1989 and 1990. For the 2014 edition of this publication, the Canadian Administration revised time series for the period 2005-2011 to include more complete survey results.

Coal: Due to a Canadian confidentiality law, it is not possible for the Canadian Administration to submit disaggregated series for all of the coal types. Between 2002 and 2006, the IEA Secretariat has estimated some of the missing series. The data for 2007 onwards are given directly as reported, however data may be present in non-representative products, and additionally these ad hoc reclassification methodologies contribute significantly to larger than normal statistical differences across products. In the 2014 edition, some revisions to the 2004 to 2006 data were received in addition to some time series and products for 2007 to 2011. The Canadian Administration is planning to further refine its reporting.

Oil: From 1988 onwards, data for several industrial sub-sectors are no longer available. Transfers include purchases of feedstock and other additives from non-reporting companies. The reporting of LPG supply data changed starting in 1989. Production data, as well as products transferred, will therefore show changes in series between 1988 and 1989. Prior to 1990, LPG includes ethane and condensates (pentanes plus). Ethane is mainly used as a petrochemical feedstock. Prior to 1990, hydrogen used for the upgrading of synthetic crude oil production was included in natural gas supply; from 1990, a different methodology was adopted by the Canadian Administration and these amounts are now shown in *other hydrocarbons* (part of crude oil). Canada imported orimulsion from Venezuela from 1994 to 2000. Due to confidentiality reasons, biodiesel data for 2012 were partially estimated by the IEA secretariat. Time series for *other oil products* may fluctuate as they have been computed as residuals.

Natural Gas: Gas production data includes colliery gas, as well as associated gas produced in Alberta. Gas-to-liquids (transformation) represents quantities of natural gas consumed in the production of synthetic crude oil. *Non-specified transformation* represents quantities of natural gas used for the upgrading of refined oil products. The 2012 increased consumption in non-metallic mineral is due to switching from coal to natural gas in cement manufacturing. Prior to 1978, consumption in the non-specified category of the industry sector includes gas used as fuel in oil refineries. Data on natural gas consumption in the chemical industry is not available before 1976; in 1976 and 1977, the figure includes only natural gas used as a feedstock (excluding use as energy). Prior to 1978, agriculture is included in industry, and no detailed industry sub-sector data are available. Prior to 1990, data for consumption of natural gas for construction is not available. Starting in 1992, consumption of natural gas in main activity producer CHP plants includes use in three new facilities in the province of Ontario. In 2000, the increase in main activity producer electricity data is due to new generation plants in Alberta and Ontario, while the increase in autoproducer electricity is due to the addition of independent power production. For the 2014 edition, revisions back to 2005 were submitted by the national administration, creating a break in series between 2004 and 2005. Further revisions are pending.

Biofuels and Waste: The IEA Secretariat has estimated the data for industrial waste from 1990 to 2007, biogasoline (ethanol) from 1998 to 2004, municipal waste from 1990 to 2004, and landfill gas from 1997 to 2006 based on information supplied by Natural Resources Canada. The IEA Secretariat estimated landfill gas production and consumption for 2007 from information supplied by Environment Canada, Waste Management. Heat generation and input data are estimated by the Canadian Administration. For confidentiality reasons, production of biodiesel for 2012 was estimated by the IEA secretariat using the 2011 figure.

Electricity and Heat: Heat production includes heat produced by nuclear power stations for distribution to other consumers up to 1997. The breakdown of electricity and heat generation between natural gas and oil products in main activity producer CHP plants has been estimated by the Canadian Administration starting in 1990. This may cause breaks in the time series between 1989 and 1990. Starting in 2009, a new source has been used for electricity production from solar, wind, and tide. This new source covers production from solar and wind only from plants with

capacity higher than 500 kW. For the 2014 edition, the Canadian Administration has started revising heat production and demand accordingly to a new methodology. Since the revisions will be finalised for the next edition, some breaks or inconsistencies could appear.

Starting from 2012, heat consumption in the chemical and petrochemical sector became confidential and is included under the not elsewhere specified industry sector. Electricity transmission and distribution losses could include statistical difference for some years.

Chile

Data are available starting in 1971.

From 1990, consumption in paper and pulp includes forestry and consumption in agriculture is included in non-specified industry. In general, a new methodology has been applied for data since 1990, leading to other breaks in series between 1989 and 1990.

Coal: Other bituminous coal includes sub-bituminous coal. Hard coal data prior to 1978 may include sub-bituminous coal.

Oil: There are breaks in series between 2008 and 2009 due to a change in methodology by the Chilean Administration.

Natural Gas: For 2009 and 2010, inputs of natural gas to autoproducer CHP plants were estimated by the national administration. For other years, these inputs are included in autoproducer electricity. Data reported in *from other sources - oil* represent LPG injected into the natural gas distribution network. These data are available from 2009. Natural gas used for oil and gas extraction is included in gas consumption for energy use in refineries.

Biofuels and Waste: Production of landfill gas ceased in 2001 as landfill sites stopped producing adequate gas to continue collection. Charcoal production and consumption have been estimated by the IEA Secretariat. Industrial waste data for 2011 have been estimated by the IEA Secretariat. Solar thermal heat production for 2012 was estimated by the Chilean Administration. A new survey on primary solid biofuels causes breaks in production and input to autoproducer CHP between 2011 and 2012.

Electricity and Heat: The split of electricity generation by main activity and autoproducer by fuel was estimated by the Chilean Administration for the period 1990 to 2003. Electricity production from *other sources* is from a conveyor belt transporting crushed rock from a high altitude to a lower altitude in a mine, as well as waste heat. Production of chemical heat used for electricity generation started in 2013.

Czech Republic

Data are available starting in 1971.

Coal: In the 2014 edition, residential consumption for the period 1990 through 2011 was revised for other bituminous coal, lignite, coke oven coke and BKB, as more accurate consumption data became available. This resulted in large statistical differences. For all other flows, final consumption data were submitted by the Czech Administration starting with 1996 data. Due to economic restructuring in consumption in the late 1990s (big state enterprises subdividing and/or privatising and the utilisation of new technologies by businesses), there may be breaks in time series in these sectors. Data for 1990 to 1995 were estimated based on the Czech publication *Energy Economy Year Book*. In 1995, town gas production (included in gas works gas) ceased. Revisions by the Czech Administration have resulted in some breaks in series between 2001 and 2002. Production *from other sources* of other bituminous coal is from coal slurries. Sub-bituminous coal is included in other bituminous coal.

Oil: Data prior to 1994 are estimated by the IEA Secretariat. The Czech Administration submitted an Oil Questionnaire to the IEA for the first time with 1994 data. Breaks in series between 1998 and 1999 for the final consumption of gas/diesel oil are due to a new data management system implemented by the Czech Administration.

Natural Gas: Data from 1993 onwards have been officially submitted by the Czech Statistical Office. The breaks in series between 1993 and 1994 are due to a change in the energy balance methodology between former Czechoslovakia and the Czech Republic. Prior to 1994, data in transport are for former Czechoslovakia. Natural gas inputs into gas works ceased in 1996. From 2008, hydrogen production is reported in petrochemical feedstocks as non-energy use.

Biofuels and Waste: Data for solid biofuels are not available prior to 1990. The restructuring of the Czech electricity market leads to breaks in the time series in all sectors between 1998 and 1999. Data for liquid biofuels are available starting in 1992 and for municipal waste starting in 1999. New survey systems cause

breaks in final consumption in 1999 and in 2002. Breaks in both supply and consumption of biofuels and waste occur again in 2003. Hospital waste previously reported as municipal waste is reported under industrial waste since 2008. Due to a reclassification of plant types, there is a break in series in 2011 for municipal waste used for electricity and heat generation.

Electricity and Heat: Electricity statistics from 1971 to 1989 have been estimated by the IEA Secretariat except for final consumption and trade which were submitted by the Czech Administration. Data on heat production, and the corresponding fuel inputs, have been estimated from 1980 to 1989 based on consumption in residential and commercial/public services. Prior to that, inputs are included in industry. Data from 1990 onwards have been officially submitted by the Czech Administration. This may lead to breaks in series between 1989 and 1990. Prior to 1990, electricity production in main activity producer CHP and autoproducer CHP plants is included in main activity producer electricity plants. Heat production prior to 1990 excludes heat sold by industry. In addition, heat production prior to 1990 is reported under main activity heat plants because the breakdown by producer and plant type is not available before then. The amount of heat reported under *other sources* is waste heat from the glass industry. In 1999 and 2000, various big enterprises have been divided, sold and merged. This causes breaks in the time series of all types of plants. The new reporting methodology used by the Czech Administration for biofuels and wastes causes some breaks in time series between 2002 and 2003. In 2012, a main activity producer electricity plant using solid biofuels started to produce also heat and was reclassified as main activity CHP plant.

From 2000 onwards, the consumption of electricity in the *non-specified transport* sector includes trams and other transport activities within companies properties. Prior to 2000, the split of road transport and non-specified transport is not available.

Denmark

In the 2004 edition, major revisions were made by the Danish Administration for the 1990 to 2001 data, which may cause breaks in time series between 1989 and 1990.

Coal: Declines in stocks on hand of thermal coal stem from extensive deployment of renewable generation technologies and policy to further reduce Denmark's utilisation of coal-fired power and implement co-firing with renewable fuels as a part of their *Energy Strategy 2050*.

Oil: Consumption data are based on a detailed survey sent to companies in Denmark every other year. For non-survey years, the consumption figures are estimated by the Danish Energy Agency. As of 1987, separate data for paraffin waxes are no longer available. Information on waste oil recycling and final consumption begins in 1989 and is reported in *other oil products*. Prior to 1990, Greenland and the Danish Faroes are included in the oil data. Also prior to 1990, gas/diesel oil consumption and fuel oil consumption for fishing are included in domestic navigation. Due to better survey methods, inputs to electricity and heat generation have been reclassified, causing a break in series between 1993 and 1994. Industry detail for 1994 and 1995 is based on a new survey. Between 1995 and 2004, other hydrocarbon imports and inputs to main activity producer CHP plants represent orimulsion. The oil inputs used in industrial sub-sectors for producing surplus heat, which is delivered to district heating networks, are allocated to these industrial sub-sectors.

Biofuels and Waste: Fish oil used in main activity producer heat plants is included with solid biofuels. The number of heating companies burning wood chips that are equipped with boilers with flue-gas condensation is increasing. This implies a very high efficiency of heat plants. For 2012, biogasoline is included under biodiesels, for confidentiality reasons. In the 2014 edition, time series for liquid biofuels main activity heat plants became available. Although they refer to biodiesels and biogasoline, they are reported under other liquid biofuels for confidentiality reasons.

Electricity and Heat: In the 2014 edition, total heat production has been revised back to 1994, due to the availability of new data for heat production from liquid biofuels. Heat produced for sale by heat pumps starts in 1994. Prior to 1994 the electricity and heat production are estimated based on fuel inputs. The amount of heat reported under *other sources* is heat recovered from industrial processes and sold for district heating. For 2012, autoproducer heat plants for natural gas and biogases show efficiencies larger than 100%, on a net calorific value basis, due to the use of a condensing boiler that recovers the latent heat of vaporisation.

Electricity consumption in *other energy industry own use* includes consumption in district heating plants and use for the distribution of electricity. From 1984 onwards, small amounts of heat have been imported from Germany. For 2012, the breakdown of heat consumption for industry, the energy sector, agriculture and forestry is estimated by the Danish Administration.

Estonia

Data for Estonia are available starting in 1990. Prior to that, they are included in Former Soviet Union in *Energy Statistics of Non-OECD Countries*.

Coal: In the 2013 edition, data for oil shale production for the period 1991 to 1997 were revised to match Estonian GHG National Inventory values. Consumption data remained unchanged. Fuels reported as coke oven coke (semi-coke) and gas works gas are by-products of oil shale liquefaction.

Oil: For the years 1990 to 2007, oil data are based on direct communication with Statistics Estonia and UNECE. Breaks in time series occur for 2012 for trade figures, now including re-exports, and for international bunkers.

Natural Gas: In 2009, Estonia's main producer of fertilisers ceased activity, resulting in a sharp decrease in the non-energy use of natural gas. The plant re-opened in 2012.

Biofuels and Waste: Data for biogases include landfill gas starting in 2005.

Electricity and Heat: From 1990 to 1999, some of the electricity and heat production are reported under *other oil products* while the inputs are reported under the individual fuels. Revisions to classify the electricity and heat production by oil product are pending. Inputs of fuel oil and gas works gas to transformation processes include shale oil.

Finland

A new survey system and a reclassification of the data lead to breaks in the time series between 1999 and 2000 for most products and sectors. The new survey system is more detailed and has better product coverage, especially in electricity, CHP and heat production, as well as in industry.

Coal: Hard coal data prior to 1978 may include sub-bituminous coal. The first coking plant started operation in 1987, hence imports of coking coal and production of coke oven coke and coke oven gas started in that year. Coal tars used for non-energy purposes are not reported in production or consumption. The increase of other bituminous coal inputs into main activity producer electricity plants from 1993 to 1994 was due to coal replacing imported electricity and hydro power. Production of gas works gas ceased in April 1994. Prior to 2008, peat products are included with peat.

Oil: In 1995, there is a break in series for oil products trade due to the aligning of the National Board of Customs trade data collection system with the European Union's Intrastat system. Due to a new calculation model, there is a break in fuel oil *other* consumption between 1998 and 1999. Prior to 2002, petroleum coke used as refinery fuel was included with refinery gas.

Natural Gas: Prior to 1989, natural gas consumption in residential and agriculture/forestry has been estimated by the Finnish Administration. Due to a new system of data collection, the breakdown between residential and commercial/public services is available since 1995. Consumption in *other transformation* is mainly natural gas used for cracking and hydration in oil refineries.

Biofuels and Waste: Data for biogases and industrial waste are available from 1996. Prior to 2004, industrial waste also included other energy forms such as hydrogen, heat from chemical processes, natural gas and blast furnace gas.

Electricity and Heat: Electricity production in Finland is affected by the connection to the Nord Pool. In period of high waterfalls, importing electricity from other Nordic countries is more economic than producing it. This can cause breaks in the time series. Electricity and heat production from biogases are available from 1996. Heat output from autoproducer CHP plants is available starting in 1996 and from autoproducer heat plants starting in 2000. Heat from chemical processes and associated electricity generation are available from 2004. The increasing heat production from heat pumps in 2007 and 2008 is from the new Katri Vala heating and cooling plant. *Other sources* includes hydrogen and purchased steam.

Consumption of electricity in *non-specified transport* corresponds to use for urban transport systems. Con-

sumption of heat in residential includes consumption in agriculture/forestry and commercial/public services.

France

Coal: Hard coal data prior to 1978 may include sub-bituminous coal. For 1989 to 1998, the IEA Secretariat has estimated industry consumption based on *Consommations d'Energie dans l'Industrie*, SESSI. Other manufactured gases (oxygen steel furnace gas) are included in blast furnace gas. The distinction between coke oven gas consumption, and consumption of other gases produced in the iron and steel sector is ill defined, resulting in jumps in time series and unusual efficiencies.

Oil: Additives and oxygenates data are available from 1991. From 1998, imported oil products needing further refinery processing are no longer reported as refinery feedstock imports but as oil product imports and products transferred. The consumption of kerosene type jet fuel includes military use as of 1998. From 1999, due to a reallocation of some products, part of the amounts previously reported in *other oil products* is now reported in fuel oil. Since 2001, transfers of various oil products are reported with fuel oil in some years. Breaks in the time series in 2001 for LPG consumption are due to improved data collection. Ethylene produced in Lacq is not included in NGL from 2002 onwards. In the 2013 edition, the French Administration has revised the data for international marine bunkers and domestic navigation back to 1995 inclusive following improved access to consumption data. At the same time, military consumption of jet kerosene was reported separately from domestic aviation in *other non-specified* since military data are no longer confidential.

Natural Gas: From 1990 to 1998, the statistical difference includes gas consumption that is not broken down by sector. From 1999 onwards, a new methodology was used for preparing the natural gas balances which leads to breaks in series between 1999 and 2000. Gas for pipelines is included in losses. Up until 2007, some statistical differences reported by the French utilities were included in distribution losses. As of 2008, these amounts are included under statistical differences. There is a break in series in the industry sub-sectors between 2005 and 2006. Improvements in data collection lead to some breaks in series between 2008 and 2009. For 2000, the split between consumption in the commercial and public services and residential sectors is estimated.

Biofuels and Waste: Plants using municipal waste were reclassified as autoproducer CHP plants from 1995, which leads to a break in series. Some solid biofuels autoproducer plants were reclassified as main activity plants in 2011. The breakdown of the final energy consumption of biogases was estimated by the French Administration from 1970 to 2003.

Breaks in series in 2012 for electricity and CHP plants using municipal waste and solid biofuels are caused by reclassifications, as described in the Electricity and Heat note.

Electricity and Heat: Electricity production from wind is available from 1993. From 1995, due to a change in the economic activity classification, data have been reported in other non-specified. A new method of survey and a reclassification between main activity producer electricity plants and autoproducer electricity plants may cause breaks in the series for other bituminous coal between 1998 and 1999. From 2000 to 2008, there are further classification problems for inputs and outputs of electricity and heat from oil products. The French Administration is working to reconcile their data collection methods for the inputs and the outputs for electricity generation. Data for heat produced from fossil fuels in heat only plants are available starting from 2012. The amount of heat not sold in autoproducer plants is included in total heat production up to 2010. The French Administration is planning to revise the autoproducers heat time series for the next edition of this publication. Starting from 2011, all photovoltaic plants with capacity above 100kWp are considered as main activity producers, while all plants with capacity below that value are considered autoproducers. This methodological changes result in breaks in time series. A revision of time series is pending. Electricity production from *other sources* is available starting in 2012, representing production of electricity from purchased steam. The input is shown under non-specified transformation. In 2012, several plants have been reclassified from electricity only to CHP plants. This causes breaks in the time series. In 2005, autoproducer CHP efficiencies for other biogases drop due to the opening of a larger, less efficient plant.

For the 2014 edition of this publication, the French Administration revised electricity consumption data in the agriculture sector back to 2004, resulting in breaks in time series. Consumption of electricity for oil and gas extraction includes that used in oil refineries from 1988 to 2000. Other non-specified consumption in-

cludes exports to Monaco prior to 1992. Data on heat distribution losses are available only starting from 2012. Prior to that, they were included in final consumption.

Prior to 2012 data, all the geothermal heat consumption was reported as direct use. For 2012 data, some quantities are reported as output of heat plants, resulting in breaks in series for production, transformation and consumption. Time series revisions are pending.

Germany

German data include the new federal states of Germany from 1970 onwards.

The German Administration has changed the methodology for reporting heat. Between 2003 and 2006, autoproducer heat output was provided, but no inputs. Starting in 2007, more information is available on main activity heat plants and additional inputs started to be reported for this category. This causes breaks in series between 2006 and 2007.

Coal: In the 2014 edition, significant revisions were submitted for all primary coal types, derived products and manufactured gases for the period 2003 to 2011 as previous estimations were updated with more accurate information. Revisions primarily affected consumption, including industry and other sectors; but also supply, statistical differences and weighted calorific values. Due to earlier reclassification of several sectors by the German Administration, breaks in series may occur between 1990 and 1992; this particularly affects BKB, lignite and coke oven coke. BKB inputs to gas works plants stopped in 1997. Breaks in series may occur between 1998 and 2005 for coke oven gas and blast furnace gas. Up to 2002, other bituminous coal includes anthracite. Consumption of non-renewable municipal waste and other solid biofuels as a reductant occurs in German blast furnaces, but is not currently quantified. Likewise, coal tar is a by-product of coke ovens, but not currently reported.

Oil: Beginning in 1994, final consumption by individual sector has been improved due to new survey methods instituted by the Mineröl wirtschaftsverband. In 1995, a break in gas/diesel oil consumption occurs as a result of an alignment with the Classification of the Economic Activities in the European Community (NACE). From 2000, part of the product *Andere Rückstände* (other residues) is included with fuel oil instead of *other oil products*. Breaks in series in consumption data between 2002 and 2003 are due to structural changes in energy statistics following the newly introduced Energy Statistics Act.

Natural Gas: Before 1970, there is no detailed breakdown available for the industry sector with the exception of iron and steel and chemical industries. Prior to 1995, inputs of natural gas for main activity producer heat are included with main activity producer CHP. Also prior to 1995, final consumption data are based on *Arbeitsgemeinschaft Energiebilanzen*. From 1995 onwards, the industry sub-sector breakdown is based on the new 1995 NACE classification. This leads to a number of breaks in series between 1994 and 1995. In 2003, there is a break in series for electricity and CHP plants (both autoproducers and main activity producers). From 2003 onwards, own use of gas in coke ovens was negligible. There is no official data for construction from 2004 onwards. There is a break in series between 2009 and 2010 due to a new, more comprehensive legal framework that resulted in methodological changes for production and new calorific values for natural gas. From 2007 onwards, all heat production in autoproducers is considered as non-sold (i.e. for self-use); inputs for this heat production are therefore no longer reported in the transformation sector. Moreover, information on district heating has become available. This causes breaks in series between 2006 and 2007. Consumption in agriculture and *other non-specified*, which was previously estimated, is no longer shown starting in 2010 and losses have been included in statistical differences. In the 2013 edition, revisions back to 2003 caused breaks in series between 2002 and 2003 for all sectors.

Biofuels and Waste: A new survey for renewables causes breaks in the time series between 1998 and 1999. The German Administration submitted an incomplete annual questionnaire on renewables and waste for the years 2001 and 2002. As a consequence, the IEA Secretariat estimated the missing data based on statistics published by the Federal Environment Ministry and data submitted in the Electricity and Heat Questionnaire. Where estimation was impossible due to lack of information, the data from the previous year were used. A new reporting system leads to break in series between 2002 and 2003. The German Administration is undertaking the reconciliation of historical data. There is a large drop in the series reported for industrial waste between 2004 and 2005 because new information redistributed amounts previously reported as industrial waste into municipal waste, solid biofuels and biogases. Total final consumption of biofuels and waste by sector became available in

2007. Prior to 2008, data for municipal solid waste and industrial waste data were collected together and the split between the two types of waste had been estimated. Starting in 2008, municipal solid waste and industrial waste data were collected separately. This leads to breaks in the time series between 2007 and 2008. Data on biogasoline and biodiesels are available starting in 2004. In the 2013 edition, numerous changes to methodology and classifications have caused many breaks in series between 2010 and 2011.

Electricity and Heat: In the 2014 edition, the German Administration performed some major revisions back to 2003. This can lead to breaks in the time series between 2002 and 2003. Data should be used with caution since numerous breaks in series occur from 1998 onwards. In some instances, electricity generation from nuclear, hydro, solar and wind in autoproducer electricity plants is confidential or not available and therefore is included in main activity producer electricity plants. For 2002 and 2003, the German Administration did not submit the breakdown of electricity and heat production from combustible fuels. The data were estimated as follows: renewables and waste were taken from the Renewables and Waste Questionnaire and the other combustible fuels were estimated pro rata based on 2001 estimates. Electricity production in electricity plants includes production from CHP plants prior to 2003. Due to the implementation of the Energy Statistics Act, collection concerning heat produced in heat plants and district heating plants became more efficient and more complete. This leads to breaks in series between 2002 and 2003 and between 2003 and 2004. Prior to 1993, all heat production from BKB/peat briquettes is included in main activity producer CHP plants. Detailed data by fuel are not available for total heat production. The non-allocated part is reported as heat production from non-specified combustible fuels. Electricity production from *other sources* is available starting in 2009. This refers to the production of electricity from turbines which are located at pressure drops in fluid transport and from purchased waste heat. Due to a reclassification of wind energy and solar photovoltaic in the official legal data of the German Federal Statistical Office since 2011, the production is now only reported under main activity producer plants.

The German Federal Statistics Office reclassified some industrial branches which may cause a break in series in industry sub-sectors between 1994 and 1995. Revisions from the German Administration to the electricity consumption data may cause breaks in the time series between 1999 and 2000.

For the 2014 edition, data on geothermal production and direct consumption were revised by the German Administration and are only available starting in 2003.

Greece

Oil: Data on feedstocks for cracking in refineries are available from 1986. Crude oil production stopped on 30 November 1998 and started again in December 1999. Data for 2012 present certain breaks in series due to the introduction of a new reporting system.

Natural Gas: Natural gas produced in Greece has a higher than average gross calorific value due to a high content of C_2/C_4 hydrocarbons. In 1997, a new pipeline between Russia and Greece became operational. In 1998, consumption in residential is included with commercial/public services. Production of natural gas stopped on 30 November 1998 and started again in December 1999. A new methodology for measuring gas consumed by the non-ferrous metals sub-sector has been applied on data for 2011 onwards.

Biofuels and Waste: Solid biofuel consumption in commercial/public services is included in residential. Data for biogases are available from 1990 and data for industrial waste from 1992. New information on solid biofuels is available from 1996 and leads to breaks between 1995 and 1996. Inputs of solid biofuels to charcoal production are estimated for 2007 to 2010 by the IEA Secretariat assuming an efficiency of 40%.

Electricity and Heat: Data on biofuels and waste are available from 1992. Production and consumption of distributed heat (heat sold) that is produced from lignite is available from 1997. The use of landfill gas to produce electricity started in 2011.

A break in series exists between 1991 and 1992 for electricity consumption in transport.

Direct use of geothermal heat in residential is available starting in 2004.

Hungary

Data are available starting in 1965.

Coal: From 1992, the production of sub-bituminous coal has been included with lignite due to the low quality of the coal. For 1990 to 1999, the use of this domestic coal in main activity producer electricity and

CHP plants has also been reclassified to lignite. Autoproducer heat and power plants using coke oven gas and blast furnace gas were reclassified in 1998 as main activity power plants.

Oil: The Hungarian Administration submitted questionnaires to the IEA Secretariat for the first time with 1993 data. Prior to 1993, white spirit is included in motor gasoline. Data for additives and aviation gasoline are available starting from 1998.

Natural Gas: Due to a new methodology, some breaks in series exist between 1996 and 1997. From 1997, two autoproducer heat plants have been reclassified to main activity producer heat plants. Prior to 2004, iron and steel consumption includes transformation of natural gas in blast furnaces.

Biofuels and Waste: Data for biogases are available from 2000.

Electricity and Heat: Electricity and heat production from solid biofuels in autoproducer CHP plants is available from 1995. Geothermal heat production from main activity producer heat plants is also available from 1995. The Hungarian Administration reclassified some of their plants between 1996 and 2000, which may lead to breaks in the time series. Prior to 2000, electricity output from sub-bituminous coal is included with lignite.

Direct use of geothermal heat is available from 1990. Direct use of solar thermal heat is available from 2001.

Iceland

Coal: Hard coal data prior to 1978 may include sub-bituminous coal. Final consumption increased in 2000 as a new iron and steel plant came on-line.

Oil: Oil supply and consumption data for 2008 and 2009 are estimated by the IEA Secretariat. The large decrease in total final consumption of oil products in 2012 is due to the closure of the plant that was previously using petroleum coke for non-energy purposes.

Biofuels and Waste: The use of municipal waste to produce heat is available from 1993 and stops in 2010.

Electricity and Heat: Electricity production from geothermal sources in main activity producer CHP plants is available from 1992. Heat production from municipal waste is available from 1993 and stops in 2010. In 1998, 60 MW of generating capacity was installed in the geothermal CHP plant at Nesjavellir. Since the plant was inoperable for four months, production of geothermal heat decreased compared to 1997. The extra electricity capacity caused electricity production from geothermal to almost double over the same period. In 2002, the increase of heat produced by geothermal was due to the installation of a third unit at the Nesjavellir CHP power plant. The increase in hydro and geothermal electricity production from 2007 is due to the expansion of the aluminium industry.

Energy industry own use of electricity refers mainly to the use of electricity by the geothermal industry to pump geothermal water from underground sources. The consumption of electricity reported in *other non-specified* corresponds to a NATO base at Keflavik airport which closed in 2005. The increase of electricity consumption in construction from 2004 to 2007 is due to the drilling of tunnels for the Kárahnjúkar power plant. Electricity consumption in non-specified transport includes consumption for ferries and cruise lines. In the 2014 edition, geothermal consumption across sectors was revised for the period 2007-2012. The industrial consumption is still reported under non-specified industry, as, starting in 2007, the Icelandic Administration decided not to estimate the allocation amongst the sub-sectors of industry as they had done previously. Prior to 2008, all heat for space heating was reported in residential. From 2008, a portion is estimated to be consumed in commercial and public services.

Ireland

Coal: The production of gas works gas ceased in 1987 due to fuel switching to natural gas. Other bituminous coal inputs to main activity producer electricity plants increased from 1986 due to three new generating units at Moneypoint coming on-line. A reclassification causes a break in the series for peat consumption in the energy industry own use in BKB/peat product plants from 1989 to 1990. Due to confidentiality reasons, inputs of anthracite, other bituminous coal and peat briquettes for patent fuel transformation are reported with residential consumption. Prior to 1990, possible imports of BKB, if present, are included with imports of peat products, as is the case for consumption. Imports of BKB since 1990 are not reported at all. Rainfall in 2012 led to the lowest peat harvest since IEA records began in 1960, requiring large stock

drawdown and increased use of biomass for electricity generation.

Oil: Consumption in commercial/public services includes quantities used by state-owned agricultural companies. Consumption data collected for 1993 are based on a detailed survey. Data for historical years back to 1990 were revised by the national administration based on the results of this survey. Owing to these revisions, breaks in series exist between 1989 and 1990 in the detailed consumption data for LPG, kerosene, gas/diesel oil and fuel oil. There is a break in series between 2006 and 2007 for white spirit, lubricants and bitumen and between 2008 and 2009 for gas/diesel oil and petroleum coke due to a new methodology being applied to sectoral demand by Sustainable Energy Ireland (SEI). For confidentiality reasons, inputs of petroleum coke into patent fuel transformation are reported with residential consumption.

Natural Gas: Detailed consumption figures for the use of natural gas in industry and other sectors are not available prior to 1986. The large increase in imports since 1996 is due to the depletion of the Kinsale gas field and the availability of a new pipeline system to the United Kingdom. The decrease in natural gas consumption in the iron and steel industry from 2001 onwards is due to the shutdown of Ireland's main steel plant. Feedstock use in the petrochemical industry stopped in 2003, due to the shutdown of a fertiliser plant. The increased consumption in food, beverages and tobacco from 2004 is due to a change of methodology. From 2006 onwards a different methodology for allocating unsold steam from autoproducer CHP is used. Data are not comparable with previous series. The increased consumption in machinery in 2007 is a result of changes in industry sub-sector structure and fuel usage. In 2011, the large increase in non-ferrous metals consumption is due to a fuel switch to natural gas. Data on natural gas consumption in oil refineries started in 2010. For the 2014 edition the data was revised to align with Ireland's national energy balance.

Biofuels and Waste: Direct use of geothermal heat and solar thermal heat is available from 1989 and 1990, respectively. Data for solid biofuels and biogases are available from 1990. Data for municipal waste are available from 2009. Prior to 2011, production and trade of biogasoline and biodiesels cannot be distinguished due to confidentiality issues. For 2012, the renewable fraction of tyre-derived fuel used by a cement plant was reported by the Administration under renewable municipal waste; the non-renewable fraction is reported under industrial waste.

Electricity and Heat: Electricity production from wind begins in 1992.

In 2012 a new main activity electricity plant burning municipal waste (the Meath plant) started operation.

The decrease of electricity consumption in the iron and steel industry from 2001 onwards is due to the fact that the main steel plant in Ireland ceased production. In accordance with ISIC definitions, electricity used for urban transport has been included in non-specified transport. The increase in 2004 is due to the new light rail transit system in Dublin.

Direct use of solar thermal heat is available from 1990.

Israel

Data are available starting in 1971.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD and/or the IEA is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Oil: From 2007 to 2009, oil data are estimated by the IEA Secretariat based on information from the Ministry of National Infrastructures. From 2010 onwards, white spirit is included in other products. Supply and consumption of kerosene type jet fuel for 2011 and 2012 have been estimated by the IEA Secretariat.

Natural Gas: Imports of natural gas began in 2008. All data for natural gas in 2012, except input to electricity production, were estimated by the IEA Secretariat.

Biofuels and Waste: Input to transformation for municipal waste for 2008, for biogases and primary solid biofuels for 2012 was estimated by the IEA Secretariat. The corresponding production was recalculated by the IEA for the years 2009-2012. Imports and consumption of charcoal were estimated for 2012 based on figures for 2011.

Electricity and Heat: Electricity production from wind begins in 2001. For 2009, solar photovoltaic electricity

generation is estimated. Electricity own use, as well as transmission and distribution losses are estimated by the IEA Secretariat from 2010.

Italy

A change in methodology leads to breaks in series for industry and transformation between 2003 and 2004.

Coal: From 1986 onwards, figures from lignite are given using the same methodology as in the *Bilancio Energetico Nazionale*. In 1991, all industrial activities were reclassified on the basis of ISTAT/NACE 91. This has implied some transfers of activities which may result in some anomalies between 1991 and earlier years. Due to a change in the survey system, breaks in series may occur between 1997 and 1998 for final consumption. Prior to 2009, sub-bituminous coal used in main activity electricity plants was included with other bituminous coal. The apparent jump in production of coke oven gas in 2012 was the consequence of improvements in scope of reporting. As such, coke oven gas data in prior years should be viewed as under-representing production and consumption, so coke oven efficiencies will likewise appear lower than actual.

Oil: Inputs to electricity and heat generation have been estimated by the IEA Secretariat for the years 1984 to 1997 based on submissions of the Electricity and Heat Questionnaire. All other data for the years 1992 to 1997 and the detailed consumption breakdown for other years have been estimated by the IEA Secretariat based on *Bilancio Energetico Nazionale.* Due to new surveys, breaks appear in the consumption series between 1998 and 1999. For gas/diesel oil, non-specified use is included in commercial/public services. A new survey to determine the split between international marine bunkers and domestic navigation caused a break in series for fuel oil in 1996 and for gas/diesel in 1999. From 2009 onwards, transfers of lubricants could not be disaggregated from refinery output data.Increased production of non-specified oil products from 2004 onwards is due to methodological changes.

Natural Gas: The production of gas works gas from natural gas ceased in 1996. Prior to 2008, inputs of natural gas for useful heat production in industry are reported in final consumption. Except for liquefaction plants, data in energy industry own use are estimated and include statistical differences and *other non-specified* consumption.

Biofuels and Waste: Data for biofuels and waste were reclassified in 2008, which results in several breaks in the time series for transformation. Data collection for wood and other solid biofuels consumption by sector was improved in 2008. In 2010, the methodology for calculating charcoal production changed, creating a break in series. The methodology of data collection for the geothermal sector changed in 2010, causing a break in time series between 2009 and 2010. Biogasoline includes bio-ETBE.

Electricity and Heat: Prior to 2004, electricity production from orimulsion is confidential and is included with fuel oil. From 2000 onwards, the Italian Administration defines electricity and heat production from autoproducers as generation from producers that consume more than 70% of their own electricity production. However, for the 2000 to 2002 period, all electricity production from autoproducers is reported with main activity producers. With the introduction of a new survey in 2008, amounts of naphtha and other kerosene that were previously included in *other oil products* have been reported separately in autoproducer CHP plants. The production of electricity reported in the category *other fuel sources* refers to electricity produced from turbines which are located at pressure drops in fluid transport. Heat production is reported starting in 2004 and includes self-generation in industry. The methodology of data collection for photovoltaic electricity production changed in 2009 and the distinction between main activity and autoproducer plants could not be determined, causing a break in the time series.

Other energy industry own use includes electricity consumption for blast furnaces. From 2000 it also includes consumption for the distribution of gas and prior to 1989 consumption for uranium extraction. The breakdown of heat consumption by sector is estimated by the Italian Administration. Revisions of the heat final consumption by the Italian Administration could lead to breaks between 2010 and 2011.

Japan

Between 2004 and 2007, the IEA received a series of revisions from the Japanese Administration. The first set of revisions received in 2004 increased the 1990 supply by 5% for coal, 2% for natural gas and 0.7%

for oil compared to the previous data. This led to an increase of 2.5% in 1990 CO_2 emissions calculated using the Reference Approach while the Sectoral Approach remained fairly constant. For the 2006 edition, the IEA received revisions to the coal and oil data which had a significant impact on both the energy data and the CO_2 emissions. The most significant revisions occurred for coke oven coke, naphtha, blast furnace gas and petroleum coke. These revisions affected consumption rather than supply in the years concerned. As a result, the Sectoral Approach CO_2 emissions increased for all the years, however at different rates. For example, the Sectoral Approach CO_2 emissions for 1990 were 4.6% higher than those calculated for the 2005 edition while the 2003 emissions were 1.1% higher than those of the previous edition. Due to the impact these successive revisions have had on the final energy balance as well as on CO_2 emissions, the IEA was in close contact with the Japanese Administration to better understand the reasons behind these changes. These changes were mainly due to the Government of Japan's efforts to improve the input-output balances in the production of oil products and coal products in response to inquiries from the UNFCCC Secretariat. To cope with this issue, the Japanese Administration established a working group in March 2004. The working group completed its work in April 2006. Many of its conclusions were incorporated in the 2006 edition but some further revisions to the time series (especially in industry and *other*) were submitted for the 2007 edition.

Starting in 1990, data are reported on a fiscal year basis (*e.g.* April 2012 to March 2013 for 2012).

Consumption data for commercial/public services may include consumption in small and medium-size industries. The Japanese Administration expects that this shortcoming be corrected in the near future.

Coal: Other bituminous coal includes sub-bituminous coal. Hard coal data prior to 1978 may include sub-bituminous coal. In the 2014 edition, further supply-side revisions to data from 1990 through 2011 were received, primarily to imports of other bituminous coal, in order to reconcile differences between submissions to the IEA and UNFCCC.

The inputs of coke oven coke to blast furnaces as well as the final consumption of coke oven coke in the iron and steel industry have been estimated by the IEA Secretariat starting in 1990. From 1998, inputs of coke oven gas, blast furnace gas and other recovered gases into autoproducer electricity plants include the amount used to produce electricity with TRT technology (Top pressure Recovery Turbines) which was previously included in industry. Inputs of manufactured gases to main activity electricity and heat plants are calculated based on outputs and using efficiencies of main activity producers from other fuels. For autoproducers, the specific inputs are known, however the specific electricity production by each gas is estimated based on a pro-rata of the total electricity generation from all gas types. Statistical differences in hard coal include stock changes since 2001. Large positive differences for several years since 2004 are partly due to stock build by final consumers. The net calorific values for coal and coal products have been recalculated by the IEA Secretariat based upon gross values submitted by Japan. Coal injected in blast furnaces (PCI) is classified as coking coal in order to be consistent with Japanese trade statistics.

Oil: Orimulsion was imported for electricity generation between 1991 and 2006.

Natural Gas: From 2000 onwards, most of the gas works gas production and consumption has been included with natural gas.

Biofuels and Waste: Inputs of solid biofuels to charcoal production are estimated by the IEA Secretariat assuming an efficiency of 40%. Stock changes in industrial waste represent stocked tires on the consumer side reserved for energy production.

Electricity and Heat: Data for the entire time series refer to fiscal year. Electricity and heat produced in CHP plants are not included in the CHP data series, but instead are reported as separate electricity or heat components. Data on heat produced for sale by autoproducer heat plants are not available. Heat production from geothermal and solar thermal sources in Japan is not reported by the Japanese Administration. Production of electricity from wind began in 1993. Production of electricity from solar photovoltaic and wind in autoproducer plants is understated as it covers only plants with capacity higher than 1 000 kW. The IEA Secretariat estimated the photovoltaic (PV) electricity generation from autoproducers starting in 1992 based on an average capacity factor of 12% and capacity data for autoproducers. Autoproducer PV capacity is derived from data from the Japanese Administration as well as the IEA Photovoltaic Power Systems Programme (IEA-PVPS) report, "Trends in Photovoltaic Applications" published in 2013. The capacity factor was based on the report "National survey report of PV Power Applications in Japan", published by IEA-PVPS. The corresponding

electricity consumption has been included with *other non-specified* consumption. Prior to 1998, the electricity produced using TRT technology (Top pressure Recovery Turbines) was included with electricity generated from solid biofuels. Starting in 1998, it is included with electricity generated from coal gases. Due to the events related to the March 2011 tsunami, the Japanese authorities decided to scale back the level of their nuclear program.

The electricity consumption in the *non specified (industry)* sector is estimated by the Japanese Administration as residual item to include the non assigned industry consumption. For this reason, the trend in this category could behave erratically. Electricity consumption in urban transport systems is included with rail.

Korea

Data are available starting in 1971. Data for 2002 onwards have been reported on a different basis, causing breaks in series between 2001 and 2002, especially for inputs and outputs to electricity generation and consumption in the iron and steel industry. The Korean Administration is planning to revise the historical series as time and resources permit.

Coal: Hard coal data prior to 1978 may include subbituminous coal. Data for coal and coal products from 1971 to 2001 are based on information provided by the Korean Administration, as well as information from the *Yearbook of Energy Statistics 2002*, the *Yearbook of Coal Statistics 2001* (both from the Ministry of Commerce, Industry and Energy), and *Statistics of Electric Power in Korea 2001* (from the Korea Electric Power Corporation). During this period, import data by coal type were estimated by the IEA Secretariat, based on statistics of the exporting countries. Consumption of imported coke oven coke starting in 2002 is reported under non-specified industry. Consumption of manufactured gases in the iron and steel industry starting in 2002 includes the consumption in blast furnaces, oxygen steel furnaces and other iron and steel processing plants. Blast furnace gas used for energy purposes in blast furnaces prior to 2007 are reported in the iron and steel industry. Coal tar production prior to 2007 is not available at this time. Complementary statistical differences for manufactured gases in 2012 are partly the result of classification issues. The national administration is working to improve reporting of coal-derived gases production and consumption.

Oil: Inputs of fuel oil to autoproducer electricity and autoproducer CHP are included with final consumption.

Natural Gas: The breakdown of final consumption has been estimated by the IEA Secretariat for the years 1987 to 1991, and the residential sector for 1992. Prior to 2007, consumption of natural gas in machinery was included with transport equipment. There are breaks in series in industry sub-sectors in 2008 due to a new classification. Energy industry own use in liquefaction plants includes losses and measuring errors.

Biofuels and Waste: In 2007, some main activity heat plants and autoproducers in the commercial/public services sector were reclassified as main activity CHP plants, which causes a break in the time series between 2006 and 2007 for biogases. Inputs to *autoproducer* heat plants have been estimated by the IEA Secretariat because of efficiency issues for municipal waste prior to 2011 and in 2012 and for biogas in 2008, 2011 and 2012. New plants have been included in the Korean survey creating breaks in series in 2011.

Electricity and Heat: Electricity statistics from 1971 to 1993 have been estimated by the IEA Secretariat based on the Korean National Statistics. Data from 1994 have been submitted by the Korean Administration. This leads to breaks in series between 1993 and 1994. Before 1994, electricity production from main activity producer CHP plants is included with main activity producer electricity only plants. Heat data are available starting in 1993. For 1993 to 1999, the breakdown of heat output by type of fuel has been estimated by the IEA Secretariat. In 2000, the Korean Administration started to report heat statistics for some heat plants which were not reported before. Electricity and heat production by autoproducers using natural gas and liquid fuels are available from 2000. Electricity production using heat from chemical processes in copper and zinc plants is available from 2005. The corresponding heat inputs are estimated. Heat from chemical processes that is sold is available from 2008. Electricity generation reported under *other sources* is from fuel cells. Prior to 2009, autoproducer heat production includes amounts of unsold heat.

Prior to 2007, production and consumption of electricity and heat in oil refineries and LNG liquefaction/regasification plants are included in industry. Prior to 2008, sales of electricity by Korea's

main electricity distributor, KEPCO, to the non-ferrous metals sector are included in iron and steel consumption. Data for electricity consumption in the transport equipment sector are included in machinery from 1994 to 1999. Heat consumption by subsector was reclassified in 2010 due to new information available on heat sales from autoproducers to end-users by sector.

Direct use of geothermal heat is available from 2002. Geothermal direct use is overstated as it refers to heat production by geothermal heat pumps, which include inputs of electricity and/or gas in the transformation process.

Luxembourg

Natural Gas: Prior to 2000, residential consumption includes consumption in commercial/public services and agriculture/forestry. The large increase of gas consumption in transformation from 2002 onwards is due to a new 350-MW combined cycle power plant. From 2000, consumption in the non-ferrous metals sub-sector is included in iron and steel for reasons of confidentiality. Data for 2012 residential and commercial sectors may be subject to further change in the next edition. In 2011, the only main activity natural gas electricity plant met the requirements to be reclassified as a CHP plant.

Biofuels and Waste: Data on solid biofuels are available from 1992. In the 2013 edition, the Luxembourg Administration revised the time series for solid biofuels to include wood pellets. The blending of biogases with natural gas started in 2011.

Electricity and Heat: Most of the hydro production shown for Luxembourg is from the Vianden pumped storage plant and is exported directly to Germany. Electricity from natural gas for autoproducer CHP plants are available starting in 1995 and for main activity CHP plants starting in 1996. The iron and steel industry stopped production of electricity at the end of 1997. Electricity production from biogases is available from 1999. Data for solar thermal are available starting in 2001 and for solar PV starting in 2003. The increase in electricity production in 2002 is due to a new natural gas combined cycle power plant. Heat production from biogases is available from 2010.

The breakdown of electricity consumption in industry is not available from 1990 to 1999. Starting in 2005, data for electricity transmission and distribution losses were obtained from the network operator. Prior to 2005, they were estimated by the national administration. In the 2014 edition, the classification of power plants by type and the production and consumption data for both electricity and heat have been revised back to 2000 by the Luxembourgian Administration. This could lead to breaks in time series. The only main activity electricity plant consuming natural gas has been reclassified as main activity CHP plant starting from 2012.

Mexico

Data are available starting in 1971 and are partly estimated based on the publication *Balance Nacional - Energía*. The Mexican Administration submitted data directly by questionnaire for the first time with 1992 data. As a result, some breaks in series may occur between 1991 and 1992.

Coal: Hard coal data prior to 1978 may include sub-bituminous coal. The time series for blast furnace gas and inputs of coke oven coke to blast furnaces start in 1991. Production and some consumption of coke oven gas are estimated by the IEA Secretariat for 1990 to 2011 with agreement from the Mexican Administration. Other bituminous coal is either reported as coking coal or sub-bituminous coal, depending upon usage.

Oil: Prior to 1987, the split of LPG consumption between residential and commercial/public services has been estimated by the IEA Secretariat. Consumption of lubricants, bitumen and paraffin waxes are available from 1990 and petroleum coke from 1993. Because of a change in the processing of the data, breaks in series occur between 1998 and 1999. Certain breaks between 2010 and 2011 data are due to changes in methodology. Historical revisions are pending. For 2012, refinery fuel is accounted differently. Historical revisions are pending.

Natural Gas: Natural gas reported in the IEA publications may be different from what is reported in the Mexican energy publications, as IEA includes only dry gas and excludes natural gas liquids. Losses and pipeline transport have been included in oil and gas extraction. Beginning with 1993, data have been submitted by the "Secretaria de Energia".

Biofuels and Waste: Data on biogases are available from 1997. Data for solid biofuels used in autoproducer electricity plants from 1991 to 2005 have been

estimated by the Mexican Administration. For wind energy, the utilization rate might appear high in 2012, the reason being that the capacity reported was the official capacity, while some wind turbines were on test phase and already injecting electricity to the grid.

Electricity and Heat: Electricity production from wind and solar photovoltaic is available from 1990. Electricity production from solid biofuels and biogases are available respectively from 1991 and 1997. New autoproducer electricity plants fuelled with coke oven gases were put on-line in 1999.

Some electricity consumption in energy industry own use is included in the industry sub-sector where it was generated (*e.g.* the chemical industry, as well as in non-specified industry).

Direct use of solar thermal heat is available from 1990.

Netherlands

In the national statistical system of the Netherlands, use of fuel in manufacturing industries for CHP production is considered to be consumption in transformation. However, in IEA statistics, this own use for heat production (autoproduced heat) is reported under the relevant industry sub-sector, based on estimates provided by the Central Bureau of Statistics.

Coal: International trade into and through the hub ports of Amsterdam and Rotterdam is complicated by the capacity to purchase coal directly at these points. The majority of coal traded is purely in transit, where the Netherlands is neither the country of origin or destination and this data has been removed where possible. Prior to 2011, stock changes for primary coal types were estimated by the Dutch Administration based on trade and consumption data.

Oil: Refinery gas includes chemical gas and is included in chemical industry consumption. Motor gasoline includes other light oils until 2007. Some breaks in series occur in 2007 when the Dutch Administration has started to report the petrochemical industry according to IEA methodology. From 2007, naphtha includes aromatics, naphtha and other light oils.

Natural Gas: Consumption in commercial/public services includes *other non-specified* consumption starting in 1988. In 2008, a new autoproducer CHP plant came on-stream, accounting for the large consumption increases in that year. In 2009, the increase in main activity electricity is due to the opening of a new plant in the second half of 2008.

Biofuels and Waste: In 2006, for municipal waste some plants changed ownership and were reclassified from electricity only to CHP plants as they started heat projects. Starting in 2010, production and trade of pure biogasoline are confidential; net imports are estimated based on consumption.

Electricity and Heat: Electricity from other sources represents generation from expansion gases and chemical waste gases (the latter up to 2007). Heat in non-specified transformation represents waste heat bought from other industries that was generated from combustible fuels. The corresponding electricity output is included with that of natural gas. Electricity production from solar photovoltaic is available from 1992. The decrease of electricity produced from nuclear in 1997 is due to the closure for five months of one nuclear power plant. Heat produced from biofuels and waste is available from 1990. A new main activity producer CHP plant fuelled by refinery gas started up in 1999 and there was a fuel reclassification in 2000. Autoproducers heat plants using refinery gases are included with autoproducers CHP plants because data are considered confidential. A new reporting methodology causes some breaks between 2004 and 2005. Prior to 1990, all electricity and heat produced from coal is included in CHP plants. For natural gas, all electricity production prior to 1998 and all heat production prior to 1995 is included in CHP plants. For biofuels and waste, all electricity and heat produced prior to 1995 is included in CHP plants. All municipal solid waste autoproducer electricity and heat only plants have been reclassified by Statistics Netherlands as autoproducers CHP for 2012, causing breaks in the time series.

Commercial/public services electricity consumption includes small users. Increasing electricity consumption in agriculture/forestry is due to expansion of greenhouse farming. The large increase in electricity trade in 1999 is due to the liberalisation of the Dutch electricity market. A new reporting methodology starting in 2005 causes breaks in the heat consumption series. The absence of heat consumption in the mining and quarrying subsector starting in 2012 is due to the reclassification of a company done by Statistics Neth-

erlands. The company has merged with a main activity electricity producer.

Direct use of geothermal heat in agriculture/forestry starting in 2008 is due to a new project extracting deep geothermal heat.

New Zealand

Where data refer to the fiscal year, April 1993 to March 1994 is shown as 1993.

Coal: In the 2014 edition, the definition of hard coal was aligned with the International Recommendations for Energy Statistics definition. Prior to this, hard coal for New Zealand from 1960 to 1977 had contained sub-bituminous coal. The portion of sub-bituminous coal production and residential consumption has been estimated by the IEA Secretariat for this period and moved to brown coal. Peat, although produced in New Zealand, is not used as a fuel. It is used for agricultural purposes only. In final consumption, some industry data are reported in non-specified industry for confidentiality reasons. Breaks in time series between 2008 and 2009 are due to changes in data collector and improvements in reporting scope. Prior to 2009, mining and quarrying is included in agriculture. Prior to 2010, construction is included with commercial/public services. Sub-bituminous coal inputs into coke ovens refers to coal that is merged with iron sands and limestone to form the inputs for the multi-hearth-furnaces, kilns and melters that produce direct reduced iron (Glenbrook Steel Site), with off-gases and supplemental and natural gas driving CHP plants. This method, while not the typical iron and steel process, produces similar by-products. The sub-bituminous coal inputs are reported under coke oven coke transformation and the resulting off-gases are reported as production of coke oven gas and blast furnace gas. Blast furnace gas production and distribution losses prior to 1998 are IEA Secretariat estimates. Portions of this gas will have been used for energy purposes in the multi-hearth furnaces or elsewhere in the plant. Some transformation efficiencies will appear higher than normal due to non-reporting of certain inputs, including some confidential data.

Oil: For reasons of confidentiality, beginning in 1994, the New Zealand Administration no longer reports data on the production of methanol. Liquefaction of other hydrocarbons shown as crude oil represents synthetic gasoline production from natural gas. In February 1997, production of synthetic gasoline ceased. Light fuel oil is included in fuel oil until 1997. As of 1998, light fuel oil is included in gas/diesel oil. Between 2009 and 2010, the Administration changed its reporting methodology for the demand of gas/diesel oil in commercial/public services.

Natural Gas: Losses are included in statistical differences for the years 1977-1979 and 1986-1989. Detailed consumption breakdown for industry is only available as of 1990. Prior to 2003, gas consumed in industry includes some gas for energy industry own-use. In February 1997, production of synthetic gasoline from natural gas ceased. In 1998, two new autoproducer CHP plants came on-stream, accounting for the very large consumption increases in that year. Gas inputs to autoproducer CHP plants can vary considerably, to compensate for variations in production from hydro plants due to weather. A steep decline in consumption in chemical industry in 2005 was caused by closure of the Motunui methanol production plant. The Motunui plant was then reopened in late 2008 resulting in an increase in consumption in the chemical industry in 2009.

Biofuels and Waste: Data prior to 1993 are for the fiscal year.

Electricity and Heat: The classifications used by the Administration of New Zealand were changed in 1991. Prior to 1994, data refer to fiscal year. From 1994, data refer to calendar year. Electricity production by autoproducers for geothermal is available from 1990. The New Zealand Administration has updated efficiencies for electricity production from geothermal heat from 10% to 15% from 1990 onwards; this causes a break in the time series between 1989 and 1990. Heat from chemical processes used for electricity production is available from 1990 and corresponds to acid plants in the fertiliser industry where sulphur is the main input. Heat outputs from main activity and autoproducer CHP plants are not available.

Electricity consumption in paper, pulp and printing is included in wood and wood products prior to 1990.

Direct use of geothermal heat is available from 1990 and direct use of solar thermal heat from 2002.

Norway

Coal: Other bituminous coal includes lignite. The decrease of bituminous coal production in 2005 is due to a fire in one of the coal mines; this entailed a break in the production for a large part of the year.

Oil: The IEA Secretariat calculates the net calorific value for Norwegian crude oil based on the oil pro–duct outputs of the oil refineries. Since 1986, imports of refinery feedstocks are reported under the relevant oil product imports. Due to revisions from the Norwegian Administration, there are breaks in series in 1990, 1993 and 2003. Ethane is included with LPG prior to 1990. Prior to 2002, part of LPG exports was reported as NGL exports. Gas/diesel oil used in fishing is included in agriculture/forestry prior to 2000. Consumption of petroleum coke in industry has been reclassified from 2005. The national administration is working to improve the reporting of oil products and to reduce statistical differences.

Natural Gas: For Norway, supply of natural gas is the residual of two very large and opposite terms, production and exports. As a result, large statistical differences in some years may lead to discrepancies in the growth rates of supply and demand of natural gas. For the 2014 edition, data on stock changes were reported back to 2008, causing a break in series between 2007 and 2008.The large increase in the oil and gas extraction in 1992 results from the start up of new fields. Before 2000, in energy industry own use, the oil and gas extraction data included data normally included under total final consumption. Consumption for pipeline transport is included in oil and gas extraction. From 2002 onwards, domestic navigation is included under non-specified transport. The steep increase in non-specified transport in 2007 is due to the wider usage of gas-powered sea vessels. Starting in 2007, gas inputs to electricity and CHP plants are included in autoproducers electricity for reasons of confidentiality.

Biofuels and Waste: Data for industrial waste and biogases are available from 1991. Distribution losses for biogases are included in commercial/public services prior to 2003. Liquid biofuels imports are available starting in 2006. Prior to 2007, equal shares of renewable and non-renewable municipal waste were estimated because the actual split was not known.

Electricity and Heat: Heat production from heat pumps and electric boilers (including the electricity used for this production) is available from 1989. No data on electricity production from solar energy are submitted separately to the IEA by the Norwegian Administration. Electricity production from wind is available from 1992. Heat production from biogases is available from 1995. Breaks in series between 1996 and 1997 are due to a reclassification of main activity producers and of autoproducers. The electricity generated from *other sources* represents electricity from waste heat. Heat produced by autoproducer heat plants from chemical processes and from *other sources* and used for electricity production has been estimated by the IEA Secretariat for the period 1990 to 2006. Starting in 2007, data for natural gas electricity and CHP plants are aggregated in autoproducers electricity plants for reasons of confidentiality.

Consumption of electricity for pipeline transport is included in oil and gas extraction. The breakdown of heat consumption by industry sub-sector was expanded in 1992, reclassified in 1994 and collected by a new reporting system in 1997.

Poland

Coal: Prior to 2010, own use in coal mines included worker's take home allowance, which should be included in residential. Other recovered gases reported as output of blast furnaces includes off-gases from zinc and copper smelting, ceramics kilns and steel production.

Oil: From 1997, a hydrocracking complex produces hydrogen from natural gas. These amounts are reported in *from other sources* of inputs of origin other than crude oil or NGL (included with crude oil in the publication). Petroleum coke data are available from 2003 onwards.

Natural Gas: Natural gas reported in associated production contains some heavier hydrocarbons. This results in a high gross calorific value for this flow. The inputs of natural gas in transformation have been inferred by the Polish Administration and for some years may be out of line with historical data. *Non-specified transformation* represents natural gas used for hydrogen manufacture in catalytic reforming processes. Distribution losses may include some statistical differences. Non-specified energy industries own use includes gas used for heating and pumping operations in the distribution network.

Biofuels and Waste: Data for industrial waste include gaseous industrial waste. Data for biogases refer only to the gas from fermentation of biomass. Due to data availability, there is a large increase in solid biofuels between 1992 and 1993 for residential, commercial/public services and agriculture/forestry. Before 2000, industrial wastes were used interchangeably with light fuel oil in some plants, which might result in breaks in the time series. Data on liquid biofuels are available

starting in 2003. In 2008, a new questionnaire was administered which increased the coverage of renewable and waste data. In 2008, a reclassification of autoproducer CHP plants to main activity CHP plants caused a break in series for industrial waste.

Electricity and Heat: Heat production from autoproducer CHP plants includes the unsold heat for own use between 1988 and 1995. In order to alleviate this, the Polish Administration adopted new methods to estimate the production of heat sold in autoproducer heat plants (1993) and in autoproducer CHP plants (1995). This causes breaks between 1992 and 1993, and between 1994 and 1995 for heat production and fuel inputs in these plants and for heat consumption in industry sub-sectors. Modifications to the methodology used to estimate heat recovered from industrial processes causes breaks in the heat balance between 2010 and 2011. Heat supply and consumption can include autoproducers unsold heat. Revisions will be available in future publications. In 2008, a number of CHP plants were reclassified from autoproducer to main activity producer due to an industry reorganisation. Heat production from heat pumps is available from 2009.

Heat consumption in energy industry own use includes process heat not sold before 1995.

Direct use of geothermal heat is available from 2000 and direct use of solar thermal heat in commercial/public services from 2002 and in residential from 2009.

Portugal

Coal: Between 1997 and 2001 gas works gas was gradually replaced by natural gas in the commercial/public service and residential sectors. The production of pig iron ceased in the first quarter of 2001, leading to decreases in supply and consumption of coking coal, coke oven coke, coke oven gas and blast furnace gas in 2001.Hard coal data prior to 1978 may include sub-bituminous coal.

Oil: Consumption of gas/diesel oil in industry and commercial/public services represents diesel use in mobile fleets.

Natural Gas: Portugal started to import natural gas in February 1997. The decrease in natural gas used for gas works in 2001 is due to the closing of the Lisbon gas works plant in May 2001.

Biofuels and Waste: Data are available from 1994 for biogases, from 1999 for municipal waste and from 2003 for industrial waste. Data for solid biofuels were revised by the National Administration from 1990 to 2001, which may result in breaks in series between 1989 and 1990. Data on solid biofuels were further revised based on a new survey on industry, resulting in breaks in sub-sectoral consumption for 2012.

Electricity and Heat: To conform to IEA methodology, heat produced from biofuels and waste (mainly black liquor) and from coal gases in autoproducer CHP plants is not accounted for since it is not sold, while the electricity produced in these plants is included. New plants fuelled by solid biofuels and by municipal waste started in 1999. In 2007, some power plants that were previously reported as main activity CHP have been reclassified as autoproducer CHP. The power station that burns industrial waste started to work as a CHP plant in 2007, whereas previously it was only producing electricity.

Direct use of solar thermal heat is available from 1989 and direct use of geothermal heat from 1994.

Slovak Republic

Data are available starting in 1971. There are some breaks in series between 1992 and 1993. A new survey system in 2001 leads to major breaks in series for most products.

Coal: Commercial/public services also includes statistical differences for other bituminous coal, lignite, patent fuel and coke oven coke from 1980 onwards and BKB from 1989 onwards.

Oil: Kerosene type jet fuel includes small amounts of other kerosene from 2001 onwards. International aviation bunkers data include small quantities of kerosene type jet fuel used for domestic aviation. For gas/diesel oil, road data include rail use. Energy use of white spirit is not available. Between 2008 and 2009, one of the companies changed its status from autoproducer CHP plant to main activity producer CHP plant, resulting in a decrease in fuel oil consumption for autoproducer CHP.

Natural Gas: The break in series for oil and gas extraction in 2001 is due to application of the IEA's definition starting in that year. Consumption in *other transformation* is mainly natural gas used for production of hydrogen and in hydrocracking for gasoline.

From 2009, data for losses are no longer available. There are inconsistencies in the time series for commercial/public services as this sub-sector is computed as a residual.

Biofuels and Waste: Prior to 2001, the data reported as industrial waste include biogases and municipal waste.

Electricity and Heat: Electricity and heat production from combustible fuels from 1990 to 2000 have been estimated based on the data on fuel used for electricity and heat plants reported in the annual fuel questionnaires. Data for solar photovoltaic are available from 2010.

The low electricity consumption in oil refineries in 2003 and 2004 is due to a change in ownership and work carried out on a refinery.

Direct use of geothermal heat is available from 2001 and direct use of solar thermal heat from 2005.

Slovenia

Data for Slovenia are available starting in 1990. Prior to that, they are included in *Energy Statistics of Non-OECD Countries* in Former Yugoslavia. A new energy data collection system was implemented in January 2001, causing some breaks in time series between 1999 and 2000.

Natural Gas: There are inconsistencies in the time series for commercial/public services as this sub-sector is computed by the Slovenian Administration as a residual. For 2011, the decrease in consumption of natural gas in the chemical sector came as a result of minimal use of gas for production of methanol.

Biofuels and Waste: Breaks in total final consumption for industrial waste are a result of a sectoral reclassification. In the 2014 edition, the Slovenian Administration revised the total final consumption for solid biofuels based on the results of a household survey carried out in 2011.

Electricity and Heat: Direct use of solar thermal and geothermal heat is available from 2009.

Surveys for data on heat consumption are available from 2003 onwards for the residential, industry and energy sectors. Prior to 2003 the data have been estimated by the Slovenian Administration.

Spain

Coal: Lignite mining was halted indefinitely in 2008. Data associated with the coke oven coke transformation process are under review by Spain and revised data are pending.

Oil: A change in the reporting system in mid-1996 has resulted in some breaks in series.

Natural Gas: Prior to 1982, natural gas consumption in textiles and leather, transportation equipment and machinery has been included in non-specified industry. The increase of natural gas used as feedstock starting in 1988 reflects a substitution of naphtha for the production of fertilisers. Since 1990, the decrease of natural gas inputs into gas works gas production is due to the substitution of natural gas by manufactured gas. There is a break in series between 1993 and 1994 in autoproducer CHP consumption, since a new survey revealed a larger number of CHP autoproducers that had previously been included in industry consumption. The large increase in main activity producer electricity consumption in 1997 is due to two main activity producer electricity plants running on natural gas. From 2001 onwards, the final consumption breakdown is estimated by the national administration. The consumption data for 2006 onwards have been estimated on a different basis, thus causing breaks in the energy industry own use and in final consumption.

Biofuels and Waste: A new reporting system leads to breaks in final consumption sectors between 1999 and 2000 and again between 2005 and 2006. In 2000 and 2006, many plants were reclassified from main activity producer to autoproducer or vice versa. Prior to 2006, inputs of biogases used to generate process heat were erroneously included as inputs to transformation when they should have been reported in the appropriate industry in final consumption. The National Energy Commission reclassified plants that consume biogases, leading to breaks in series between 2007 and 2008.

Electricity and Heat: The large increase in electricity output from main activity producer electricity plants fuelled by natural gas in 1997 is due to the opening of a new plant. For 2004 and 2005, electricity production from gas/diesel oil is included with fuel oil. Electricity from solar thermal plants is available from 2007. A reclassification of plants from main activity to autoproducer in 2008 has led to breaks in electricity production between 2008 and 2009. Residential rooftop solar photovoltaic electricity production data are

included in main activity electricity plants according to the Spanish Administration classification.

Transmission and distribution losses are estimated by the Spanish Administration. Starting in 2006, a new method was used to estimate the losses from final consumption data resulting in a break in time series between 2005 and 2006. For 2012, the electricity consumption data are estimated by the Spanish Administration. Revisions are pending.

Direct use of geothermal heat is available from 1990. Direct use of solar thermal heat is available from 1994.

Sweden

Coal: Other bituminous coal production is coal recovered during the quarrying of clay. Autoproducer inputs to waste heat production that is sold are reported in the respective final consumption sectors and not in transformation. Some mixture of LNG with air to form a lower calorie product is reported as gas works gas production replacing traditional gas works gas manufacture.

Oil: Beginning in 1995, Sweden has changed its standard classification of industry sub-sectors. Data are available from 2000 for additives and ethane, and from 2003 for refinery gas. From 2011, the country's gas works plants stopped using naphtha.

Natural Gas: Prior to 1993, road transport is included in commercial/public services. Total final consumption and its breakdown in 2008 have been estimated by the IEA Secretariat based on other Statistics Sweden publications. The natural gas inputs to gas works has been estimated by the IEA Secretariat for 2005 to 2012.

Biofuels and Waste: Data for biogases begin in 1992. Consumption data by sector for biogases are available from 2011. Heat production from solid biofuels in autoproducer CHP includes waste heat and chemical heat. From 1990 to 2006, municipal waste was reported as 60% non-renewable and 40% renewable. In 2007, reanalysis of the waste revealed the content was 40% non-renewable and 60% renewable. This results in breaks in the time series between 2006 and 2007 for both renewable and non-renewable municipal waste.

For 2012, small quantities of bio-methanol used to produce electricity are included in other liquid biofuels, under production, as well as input and output of autoproducer CHP.

Electricity and Heat: In Sweden, heat produced in heat pumps is sold to third parties (as district heat) and is therefore included in transformation. Inputs to heat pumps include heat recovered from industry and from ambient sources (including sewage and seawater). Ambient heat is shown as the indigenous production of heat. The electricity used to drive heat pumps is considered to be transformed and appears as output in transformation rather than as electricity used in energy industry own use. Fuel inputs to the heat that is recovered by the heat pump are reported in the appropriate industry sub-sector (*i.e.* chemical and paper, pulp and printing). Prior to 1992, electricity production from biogases is included with solid biofuels. Information on heat for sale produced in heat pumps and electric boilers is available starting in 1992. Heat produced for sale by autoproducer CHP plants is reported starting in 1992. Heat production from liquid fuels in main activity producer CHP plants includes heat recovered from flue-gas condensing for 1997 and 1998.

Industry consumption of the heat produced by heat pumps has been estimated by the IEA Secretariat based on fuel inputs submitted by the Swedish Administration (2/3 in paper, pulp and printing and 1/3 in chemical). Consumption of electricity for distribution of district heat is included with *other energy industry own use*.

Switzerland

From 1999, data on consumption result from a new survey and are not comparable with data of previous years.

Coal: From 1985, industrial consumption of gas works gas is reported in non-specified industry to prevent the disclosure of commercially confidential data. Allocation of consumption data between certain coal types is estimated by the Swiss Administration, as are the net calorific values for these coals.

Oil: As of 1993, the Swiss Administration has reported figures for naphtha that are net of quantities used for blending into motor gasoline. For 1994, 1995, 1997, 1999, 2001 and 2002 this reporting has led to negative production numbers for naphtha. For these years, the IEA Secretariat has moved the data into transfers and reduced the production of motor gasoline by corresponding amounts. Petroleum coke production started in 2004 due to the installation of a

cracking unit in a refinery. The statistical differences for gas/diesel oil are partly due to changes in consumer stocks.

Natural Gas: The breaks in series in 2007 and 2008 for CHP plants are due to the closing of a plant in 2007 and the opening of another plant in 2008.

Biofuels and Waste: The autoproducer heat plant that produced heat for sale using municipal waste was closed in 2006. Landfill waste is no longer being used for heat production as of 2011. The Swiss Administration revised the time series for municipal waste from 1999, leading to a break in the time series in 1999.Consumption data for biogases in the transport sector are available from 1996.

Electricity and Heat: Heat production includes heat produced by nuclear power stations and distributed to other consumers. Solar electricity production by autoproducers is available from 1990. In 2012, the municipal waste autoproducer plant previously reported as electricity plant met the CHP requirements and was reclassified as such.

Electricity consumption in the transport equipment industry is included with machinery.

Direct use of geothermal heat and solar thermal heat is available from 1990. Geothermal direct use is overstated as it refers to heat production by geothermal heat pumps, which include inputs from electricity and/or gas in the transformation process.

Turkey

Coal: Production of gas works gas declined in 1989 due to plant closures; the last plant closed in 1994. Use of gas coke and gas works gas ceased in 1994. Due to government regulations in industry and residential, in particular, there has been a shift from the use of domestically produced coal to imported coal and natural gas. Privatisation of state owned coke ovens in recent years results in incomplete information on coke oven gas distribution. Data from 2008 are provided from the results of an improved questionnaire. Significant changes occur in consumption patterns within the iron and steel industry, coal mining as well as across industry, residential and commercial/public services for other bituminous coal. Some coal used in cement kilns is reported under construction instead of non-metallic minerals.

Oil: Breaks in series of consumption for LPG, motor gasoline and gas/diesel oil between 2010 and 2011 are due to improved survey methods. Petroleum coke data are reported starting from 2012. Prior to 2012, consumption of other oil products in the chemical sector was included under non-specified industry.

Natural Gas: Data for commercial/public services were included in residential prior to 2000. The decrease in natural gas consumption in petrochemical feedstocks between 1999 and 2001 is related to the fertiliser industry. Classification improvements resulted in a break in series for non-energy use in the chemical industry in 2006. Storage capacity has been reviewed which resulted in a break in series for stock change in 2008. As of 2009, consumption data are collected by Turkey's Energy Market Regulatory Authority. This leads to breaks in series across all sectors. Non-specified industry includes natural gas distributed by OIZ (Organised Industrial Zones).

Biofuels and Waste: The Turkish Administration only intermittently surveys renewables and waste used for power and heat. Due to this fact, some breaks may appear in the biofuels and waste series.

Electricity and Heat: Electricity production from wind is available starting in 1998. In the 2006 edition, the Turkish Statistical Office started providing electricity and heat output on the basis of a new survey that revised time series back to 2000. This causes breaks in the time series between 1999 and 2000. Not all of the input series have been revised. Data for blast furnace gas for electricity and heat generation are available from 1995.

Consumption in the machinery sector includes transport equipment. Prior to 1998, consumption in the wood and wood products includes that of the paper, pulp and printing industry.

In 2009, a reclassification of solar thermal direct use created a break in series.

United Kingdom

Coal: Consumption shown for the commercial/public services includes consumption of some of *other non-specified*. Prior to 1994, the consumption of substitute natural gas is included with natural gas while its production is included with gas works gas. Oxygen steel

furnace gas is reported with blast furnace gas rather than as other recovered gases.

Oil: Prior to 1995, the product breakdown for transfers is estimated by the UK Administration. Beginning with 1995, the UK Administration revised their product breakdown for transfers and petrochemical reporting methodology. Breaks in series for LPG occur between 2000 and 2001 due to a re-allocation of data. Fuel oil inputs to heat production are available starting in 2000. Beginning with 2009, the UK Administration revised their product consumption data based on a new reporting methodology. Imports of motor gasoline were revised back to 2005 inclusive, following the Administration's improved access to customs trade data. Breaks occur in international marine bunkers and domestic navigation time series in 2008, when a different methodology is used for the fuel split. Deliveries to international marine bunkers may be underestimated for previous years.

Natural Gas: From 1992 onwards, losses include metering differences and losses due to pipeline leakage. Before 2008, consumption of natural gas in the commercial sector is included in *other non-specified* while public services consumption is shown separately. Natural gas consumption includes substitute natural gas made at gas works and piped into the natural gas distribution system. Data in non-specified industry refer to sales by independent gas suppliers unallocated by category. Natural gas amounts consumed by the mining and quarrying and the wood and wood products sectors are included under non-specified industry. The natural gas used to form synthetic coke oven gas is reported under non-specified transformation. Non-specified energy sector includes gas used for heating and pumping operations in the distribution network.

Biofuels and Waste: Final consumption of industrial waste in commercial/public services includes hospital waste, which should be shown under municipal waste. Prior to 2001, some of the industrial waste was reported with *other oil products*.

Electricity and Heat: The reorganisation and subsequent privatisation of the electricity supply industry in 1990 has resulted in some breaks in series. Inputs and output from natural gas for main activity producer electricity production are included in autoproducer electricity for 1990 (for reasons of confidentiality). For the United Kingdom, it is necessary to combine figures for main activity producers and autoproducers in order to prevent the disclosure of information relating to less than three electricity generating companies, since this information is considered confidential. For this reason, data for main activity producer CHP plants have been included with autoproducer CHP plants from 1988. Prior to 1988, electricity output from CHP plants was included with autoproducer electricity plants. Prior to 2003, all outputs of electricity and heat from oil products are reported in the *other oil products* category. From 2007 onwards, outputs of electricity from petroleum coke are included in fuel oil. In 1996, the break in electricity production from nuclear is due to a reclassification of plants from autoproducer to main activity producer plants. Electricity production from solar PV is available from 1999. The launch of a feed-in-tariff scheme in April 2010 resulted in a rapid increase of capacity and corresponding electricity production growth from solar PV in the following years.

Electricity consumption in coal mines includes consumption in patent fuel plants. Consumption in gas works includes electricity use in the transmission/ distribution of public supply gas. Consumption in the non-metallic mineral products sector includes mining and quarrying. Starting in 1990, small amounts of electricity used in heat pumps have been included in residential. Data for electricity consumption in the transport sector were classified by sub-sector only starting from 2004, resulting in a break in time series between 2003 and 2004. Prior to 2004, non-specified transport includes consumption for traction by urban rails and road vehicles, and consumption for non-traction by railways and bus stations and airports. From 2004 onwards, non-specified transport includes consumption by road vehicles only. Prior to 2004, electricity consumption in rail refers to industrial rail only and from 2004 onwards it includes both industrial and urban rail.

United States

For the 2014 edition of this publication, end-use energy consumption data for the United States present a break in series with historical data due to a change in methodology. The break in series occurs between 2011 and 2012 for oil; and between 2001 and 2002 for electricity and natural gas. The new methodology is based on the last historical year of the most recent Annual Energy Outlook (AEO) publication. Changes occur primarily in reported end-use energy consump-

tion in the industrial sector and its subsectors, including the non-manufacturing industries of mining, construction and agriculture. Historical revisions are pending.

Due to problems in reporting, there are numerous breaks in series for the US data, particularly in 1992, 1999, 2001 and 2002. Care should be taken when evaluating consumption by sector since inputs of fuel to autoproducers are included in final consumption for some years. No data are available for most energy products in the construction and mining and quarrying industries.

Coal: Hard coal data prior to 1978 may include subbituminous coal. In 2002, the United States reported "synfuel" production as patent fuel for the first time. Prior to 2002, the consumption of this fuel was reported with other bituminous coal. Production ceased in 2007 for economic reasons. Since the Energy Information Administration (EIA) and the US Department of Commerce do not collect separate data on patent fuel exports by country, total exports of patent fuel are included in the exports of other bituminous coal. Coal tar as a by-product of coke ovens is not currently reported.

Oil: International marine bunkers of fuel oil show a large increase in 1990 due to a change in the data collection and reporting methodology of the US Administration. From 1992 onwards, the individual components of NGL and LPG have been converted using their respective gravities rather than an average gravity, resulting in a break in series. In 1993, the US Administration made several adjustments to its collection system for oil statistics in order to accommodate the revisions to the Clean Air Act of 1990. As a result, data for oxygenates (*i.e.* fuel ethanol, MTBE, etc.) were collected in 1993 and reported in the additives category, or in the case of ethanol, in biogasoline. Beginning in 1994, motor gasoline consumption in commercial/public services is based on a new model from the US Department of Transportation. High statistical differences for crude oil represent "unaccounted for crude oil", the difference between the supply and disposition of crude oil. From 1995 onwards, LPG inputs to gas works are included in industry. As a result of a new Manufacturing Energy Consumption Survey (MECS), there are breaks in series between 1999 and 2000 for industry, and again between 2000 and 2001 as the MECS percentages were revised due to revisions in CHP electricity. There were significant revisions to fuel oil and unfinished oils for 2001 data. Primarily, the changes are a result of importers misclassifying unfinished oils as fuel oil. From 2002 onwards, the IEA Secretariat has estimated the amounts of refinery gas used for autoproducer electricity production. Refinery gas data present a break in 2012 due to the use of a different value for density. Historical revisions are pending.

Natural Gas: The amounts of gas works gas that are blended with natural gas have been estimated from 1990 to 2002 on the basis of the output efficiency of the process. Data for natural gas consumption by autoproducer CHP plants are available from 1989, and by autoproducer electricity and main activity producer CHP plants from 1991. Prior to these years, this consumption is included with industry and commerce/public services. Breaks in the transformation sub-sectors between 1999 and 2000 are due to a new data reporting method. Other energy sector own use represents gas consumed for the production of ethanol. Data on consumption in the road sector were collected for the first time in 1991 and are not available for previous years. A detailed breakdown of industry consumption is not available prior to 1995 (chemical consumption between 1990 and 1994 is estimated by the US Administration). From 1995 to 2001, this breakdown is estimated by the US Administration, using the Manufacturing Energy Consumption Survey (MECS) which is conducted every four years. Consumption in fisheries is included under non-specified industry; consumption in agriculture and forestry is included under non-specified industry up to 2001.

Biofuels and Waste: The EIA collects generation and consumption data from all plants 1 MW or more in capacity. For the year 2012, the data for biogasoline and biodiesel trade and stock change were not available; the indigenous production figure was estimated by the IEA Secretariat based on the amount of blended biofuels reported in the oil questionnaire. The final energy consumption of other liquid biofuels in 2012 was estimated based on 2011 figures.

Electricity and Heat: There are breaks in series concerning the total production of electricity and heat in the United States. Comprehensive data on electricity and heat production and consumption in main activity producer electricity, CHP and heat plants and autoproducer electricity and CHP plants are not available for all years. The selling of main activity producer plants to autoproducers may cause breaks in the series between 1998 and 2000. For the United States, prior to 2000, autoproducers include small and independent power producers, which under IEA definitions are considered main activity producers. In the 2003 edition, the US Administration changed what it was

reporting under autoproducers. This reclassification causes more breaks between 1999 and 2000. For the 2009 edition, the US Administration changed their methodology for calculating heat production in CHP plants, and revised data back to 2006. This leads to breaks in series between 2005 and 2006. Electricity generation reported under *other sources* is from purchased steam. From 2007, industrial waste includes recovered heat from industrial processes. Starting in 2002, autoproducer electricity output for oil includes generation from refinery gases with a low average calorific value. Prior to 2002, this output was not accounted for. Accurate accounting of coke oven gas and refinery gas inputs is not always possible, which can lead to efficiencies over 100% in main activity producer CHP plants. The low efficiencies in 2011 and 2012 for other bituminous coal autoproducer electricity plants are due to the fact that one unit, the *Albany Brewery Power Plant* only produces unsold heat. Prior to 2008, heat produced by heat pumps was incorrectly reported as geothermal use in residential and commercial/public services.

Data for electricity absorbed by pumping and electricity production from pumped storage plants became available starting in 1987. For the first time in 2012 the US Administration provided detailed data for the electricity consumption in the different sectors and subsectors. This could lead to breaks between 2011 and 2012. The consumption of heat sold in industry is available from 1991 and in energy industry own use from 1992. Prior to 1991, total consumption of heat sold referred to consumption in commercial/public services. No data are available for heat sold that is consumed in residential and agriculture/forestry. Since 1995, heat consumption data are no longer collected and have been estimated by the US Administration, resulting in breaks in the time series between 1994 and 1995.

Direct use of solar thermal heat in residential is available from 1999. Prior to 1999, solar thermal electricity production includes generation from natural gas because some natural gas units are attached to solar thermal plants and their production could not be separated. The IEA Secretariat estimated US photovoltaic (PV) electricity generation from autoproducers starting in 1999 by multiplying the dispersed and distributed PV capacity estimated by the US Administration by an average capacity factor of 12%. The capacity factor was based on a report published in 2007 by the IEA Photovoltaic Power Systems Programme, *Cost and Performance Trends in Grid-Connected Photovoltaic Systems and Case Studies*. The corresponding consumption of electricity has been included under *other non-specified*.

7. UNITS AND CONVERSIONS

General conversion factors for energy

To:	TJ	Gcal	Mtoe	MBtu	GWh
From:	multiply by:				
terajoule (TJ)	1	238.8	2.388×10^{-5}	947.8	0.2778
gigacalorie (Gcal)	4.1868×10^{-3}	1	10^{-7}	3.968	1.163×10^{-3}
million tonne of oil equivalent (Mtoe)	4.1868×10^{4}	10^{7}	1	3.968×10^{7}	11630
million British thermal unit (MBtu)	1.0551×10^{-3}	0.252	2.52×10^{-8}	1	2.931×10^{-4}
gigawatt hour (GWh)	3.6	860	8.6×10^{-5}	3412	1

Conversion factors for mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	0.001	9.84×10^{-4}	1.102×10^{-3}	2.2046
tonne (t)	1000	1	0.984	1.1023	2204.6
long ton (lt)	1016	1.016	1	1.120	2240.0
Short ton (st)	907.2	0.9072	0.893	1	2000.0
pound (lb)	0.454	4.54×10^{-4}	4.46×10^{-4}	5.0×10^{-4}	1

Conversion factors for volume

To:	gal U.S.	gal U.K.	bbl	ft^3	l	m^3
From:	multiply by:					
U.S. gallon (gal)	1	0.8327	0.02381	0.1337	3.785	0.0038
U.K. gallon (gal)	1.201	1	0.02859	0.1605	4.546	0.0045
Barrel (bbl)	42.0	34.97	1	5.615	159.0	0.159
Cubic foot (ft^3)	7.48	6.229	0.1781	1	28.3	0.0283
Litre (l)	0.2642	0.220	0.0063	0.0353	1	0.001
Cubic metre (m^3)	264.2	220.0	6.289	35.3147	1000.0	1

Decimal prefixes

10^{1}	deca (da)	10^{-1}	deci (d)
10^{2}	hecto (h)	10^{-2}	centi (c)
10^{3}	kilo (k)	10^{-3}	milli (m)
10^{6}	mega (M)	10^{-6}	micro (μ)
10^{9}	giga (G)	10^{-9}	nano (n)
10^{12}	tera (T)	10^{-12}	pico (p)
10^{15}	peta (P)	10^{-15}	femto (f)
10^{18}	exa (E)	10^{-18}	atto (a)

8. ABBREVIATIONS

Btu:	British thermal unit
GWh:	gigawatt hour
kcal:	kilocalorie
kg:	kilogramme
kJ:	kilojoule
kt:	kilotonne
Mt:	million tonnes
m^3:	cubic metre
t:	metric ton = tonne = 1000 kg
TJ:	terajoule
toe:	tonne of oil equivalent = 10^7 kcal
CHP:	combined heat and power
GCV:	gross calorific value
HHV:	higher heating value = GCV
LHV:	lower heating value = NCV
NCV:	net calorific value
PPP:	purchasing power parity
IEA:	International Energy Agency
IPCC:	Intergovernmental Panel on Climate Change
ISIC:	International Standard Industrial Classification
OECD:	Organisation for Economic Co-Operation and Development
OLADE:	Organización Latinoamericana de Energía
UN:	United Nations
UNIPEDE:	International Union of Producers and Distributors of Electrical Energy
c	confidential
e	estimated
..	not available
-	nil
x	not applicable