International Energy Agency

Secure • Sustainable • Together

WORLD ENERGY STATISTICS 2016 EDITION

DATABASE DOCUMENTATION

This documentation provides support information for the IEA *World Energy Statistics* database. This document can be found online at: http://www.iea.org/statistics/topics/energybalances/.

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1. CHANGES FROM LAST EDITION

Geographical coverage

The IEA continues to try to expand the coverage of our statistics reports and encourage more countries to collaborate on data exchange. This year data have become available for Suriname from 2000 to 2014, therefore Suriname has been removed from the region Other Non-OECD Americas for those years.

Old longname	New longname	Shortname	Old shortname (if changed)
	Suriname	SURINAME	

2. DATABASE STRUCTURE

The database *World Energy Statistics* includes annual data for:

- countries: 170 countries and regional aggregates (see section *Geographical coverage*);
- years: 1960-2014 (OECD countries and regions);
  1971-2014 (non-OECD countries and regions; world);
  2015 (provisional energy supply data).

The database includes the following four files:

WBES.IVT	**Energy statistics**
	Energy statistics in matrix form (68 products; 90 flows) (various natural units, depending on the product);
	Electricity and heat output by type of producer (12 flows) (GWh; TJ).
WCONV.IVT	**World conversion factors:**
	net calorific values by flow 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).
WORLD_BBL.IVT	**Oil demand by product**
	Oil consumption (4 flows for 9 oil product categories) (kbbl/d).

Detailed definitions of each flow and product are presented in sections *Flow definitions* and *Product definitions*.

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)*. *International marine bunkers* are excluded from the *supply* at the country and regional level, but not for world, where they are included in *transport* under *World marine bunkers*.

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. *International aviation bunkers* are excluded from the *supply* at the country and regional level, but not for world, where they are included in *transport* under *World aviation bunkers*.
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 and demand 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.
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.

Transformation processes		
Flow	**Short name**	**Definition**
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. Note that the sale need not take place through the public grid.
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 IEA 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 IEA 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 quantities of fuels used for the production of town gas.
Coke ovens	TCOKEOVS	Includes the use of fuels for the manufacture of coke and coke oven gas.
Patent fuel plants	TPATFUEL	Includes the use of fuels for the manufacture of patent fuels.
BKB/peat briquette plants	TBKB	Includes the use of fuels for the manufacture of BKB and peat briquettes.
Oil refineries	TREFINER	Includes the use of hydrocarbons for the manufacture of finished oil

Transformation processes		
Flow	**Short name**	**Definition**
		products.
Petrochemical plants	TPETCHEM	Includes 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 primary 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). Note that *international aviation bunkers* and *international marine bunkers* are not included in final consumption except for the world total, where they are reported as *World aviation bunkers* and *World marine bunkers* in *transport*.
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 in the following categories.:
World aviation bunkers	WORLDAV	Covers fuels delivered to aircraft of all countries that are engaged in international aviation (*International aviation bunkers*) for the world total. *World aviation bunkers* is not applicable for individual countries and regions and is included in transport for the world total. Note that for World, *total primary energy supply* includes *international aviation bunkers*.
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*;

Final consumption		
Flow	**Short name**	**Definition**
World marine bunkers	WORLDMAR	Covers fuels delivered to ships of all flags that are engaged in international navigation (*International marine bunkers*) for the world total. *World marine bunkers* is not applicable for individual countries and regions and is included in *transport* for the world total. Note that for World, *total primary energy supply* includes *international marine bunkers*.
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, except for the world total (see note on Supply). More-over, information about military consumption is not available for most non-OECD countries.
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*.

Final consumption		
Flow	**Short name**	**Definition**
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	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 biofuels, 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.
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

Calorific values, expressed in **tonne of oil equivalent / tonne** and **kilojoules / kilogramme** represent the average gross energy content minus the latent heat of vaporisation of 1 unit of mass**;**
volume to mass for oil products is expressed in **barrels / tonne.**

Flow	Short name	Definition
Average net calorific value	NAVERAGE	Available for primary and secondary oil products, liquid biofuels and charcoal. For OECD countries only, it is also available for coal products, peat and oil shale to represent the weighted average calorific value of the supply.
NCV of production	NINDPROD	Available for coal products, peat, oil shale, and primary oil products.
NCV of other sources	NOSOURCES	Available for coal products, peat, oil shale, and primary oil products.
NCV of imports	NIMPORTS	Available for coal products, peat, oil shale, and primary oil products.
NCV of exports	NEXPORTS	Available for coal products, peat, oil shale, and primary oil products.
NCV of coke ovens	NCOKEOVS	Only available for coal products, peat, oil shale.
NCV of blast furnaces	NBLAST	Only available for coal products, peat, oil shale.
NCV in main activity producer electricity plants	NMAIN	Only available for coal products, peat, oil shale.
NCV in autoproducer electricity plants	NAUTOELEC	Only available for coal products, peat, oil shale.
NCV in main activity CHP plants	NMAINCHP	Only available for coal products, peat, oil shale.
NCV in autoproducer CHP plants	NAUTOCHP	Only available for coal products, peat, oil shale.
NCV in main activity heat plants	NMAINHEAT	Only available for coal products, peat, oil shale.
NCV in autoproducer heat plants	NAUTOHEAT	Only available for coal products, peat, oil shale.
NCV in industry	NIND	Only available for coal products, peat, oil shale.
NCV for other uses	NOTHER	Only available for coal products, peat, oil shale.
Volume to mass ratio	BBLTONRATIO	This ratio (barrels/tonne), inverse of density, is used to calculate the oil demand by product (in barrels).

Oil demand Expressed in **thousand barrels/day** (converted from kt using volume to mass ratios in barrels/tonne)		
Flow	**Short name**	**Definition**
Net inland consumption	NETDELIC	Obtained from above flows, as: DOMSUP+TRANSFER+STATDIFF-TPETCHEM-TREFINER-TCOALLIQ-TGTL-EREFINER. Note that only in this table net inland consumption includes international aviation bunkers for all countries.
Refinery fuel	REFFUEL	Equal to EREFINER. It shows oil refineries' own use of oil products for operation of equipment, heating and lighting. It mainly includes refinery gas, gas/diesel oil and fuel oil.
International marine bunkers	MARBUNK	Equal to MARBUNK. It shows international marine bunkers consumption of liquid fuels, mainly gas/ diesel oil and fuel oil.
Demand	DEMAND	Sum of the previous three flows. Note that only in this table demand includes international marine and aviation bunkers for all countries.

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, other bituminous coal and (depending on the country) also may include sub-bituminous coal.
Brown coal (if no detail)	BROWN	This item is only used if the detailed breakdown is not available. It includes lignite and (depending on the country) also may include sub-bituminous coal.
Anthracite	ANTCOAL	Anthracite is a high rank coal used for industrial and residential applications. It is generally less than 10% volatile matter and a high carbon content (about 90% fixed carbon). Its gross calorific value is 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 coals 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 *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 *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. *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. Coal tar 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. Note: starting with the 2011 edition, gas works gas is included with coal. In previous years, gas works gas was included with natural gas.

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 consisting of a mixture of hydrocarbons of natural origin 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 substances 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 is defined as non-condensable gas obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. It consists mainly of hydrogen, methane, ethane and olefins. 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). It is a colourless paraffinic gas which is extracted from natural gas and refinery gas streams.
Liquefied petroleum gases (LPG)	LPG	Liquefied petroleum gases are the light hydrocarbon fraction of the paraffin series, derived from refinery processes, crude oil stabilisation plants and natural gas processing plants, comprising 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°C and 215°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°C, and a distillation range usually within the limits of 30°C and 180°C.
Gasoline type jet fuel	JETGAS	Gasoline type jet fuel includes all light hydrocarbon oils for use in aviation turbine power units, which distil between 100°C and 250°C. This fuel is obtained by blending kerosenes 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 excl. 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 excl. 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 residue, 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 "calcined 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.
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). Note that for biofuels, only the amounts of biomass 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.
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.

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
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 47%) and bioMTBE (methyl-tertio-butyl-ether produced on the basis of biomethanol: the percentage by volume of bioMTBE that is calculated as biofuel is 36%). 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.
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. 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 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 other recovered gases. 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.

Products for oil demand Expressed in **thousand barrels/day** (converted from kt using volume to mass ratios in barrels/tonne)		
Flow	**Short name**	**Definition**
NGL/LPG	NGL/LPG	NGL+LPG+ETHANE
Naphtha	NAPHTHA	NAPHTHA
Motor gasoline	MOTORGAS	MOTORGAS+ADDITIVE+BIOGASOL+OBIOLIQ
Aviation fuels	JETKERO	JETKERO+AVGAS+JETGAS
Other kerosene	OTHKERO	OTHKERO
Gas/diesel oil	GASDIES	GASDIES+BIODIESEL
Fuel oil	RESFUEL	RESFUEL
Other products	OPRODS	WHITESP+LUBRIC+BITUMEN+PARWAX+ PETCOKE+ONONSPEC+CRUDEOIL+NONCRUDE +REFINGAS
Total products	TOTPRODS	Sum of all products.

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. In this publication, 'country' refers to country or territory, as case may be. Data start in 1960 for OECD countries and regions, and in 1971 for non-OECD countries and regions, unless otherwise specified.

Country/Region	Short name	Definition
World	WORLD	Includes OECD Total; Africa; Asia (excluding China); China (P.R. of China and Hong Kong, China); Non-OECD Americas; Middle East; Non-OECD Europe and Eurasia; World aviation bunkers and World marine bunkers.
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.[2] 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.
Africa	AFRICA	Includes Algeria; Angola; Benin; Botswana (from 1981); Cameroon; Republic of Congo (Congo); Côte d'Ivoire; Democratic Republic of Congo; Egypt; Eritrea; Ethiopia; Gabon; Ghana; Kenya; Libya; Mauritius; Morocco; Mozambique; Namibia (from 1991); Nigeria; Senegal; South Africa; South Sudan[3]; Sudan; United Republic of Tanzania (Tanzania); Togo; Tunisia; Zambia; Zimbabwe and **Other Africa**.

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.
2. Latvia was not an OECD Member at the time of the preparation of this publication. Accordingly, Latvia does not appear in the list of OECD Members and is not included in the zone aggregates.
3. South Sudan became an independent country on 9 July 2011. Data for South Sudan are available from 2012. Prior to 2012, they are included in Sudan.

Countries and regions

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Country/Region	Short name	Definition
Non-OECD Americas	LATAMER	Includes Argentina; Plurinational State of Bolivia (Bolivia); Brazil; Colombia; Costa Rica; Cuba; Curacao[4]; Dominican Republic; Ecuador; El Salvador; Guatemala; Haiti; Honduras; Jamaica; Nicaragua; Panama; Paraguay; Peru; Suriname (from 2000); Trinidad and Tobago; Uruguay; Bolivarian Republic of Venezuela (Venezuela) and **Other Non-OECD Americas**.
Middle East	MIDEAST	Includes Bahrain; Islamic Republic of Iran; Iraq; Jordan; Kuwait; Lebanon; Oman; Qatar; Saudi Arabia; Syrian Arab Republic; United Arab Emirates and Yemen.
Non-OECD Europe and Eurasia	EURASIA	Includes Albania; Armenia; Azerbaijan; Belarus; Bosnia and Herzegovina; Bulgaria; Croatia; Cyprus[5]; Former Yugoslav Republic of Macedonia; Georgia; Gibraltar; Kazakhstan; Kosovo; Kyrgyzstan; Latvia[6]; Lithuania; Malta; Republic of Moldova (Moldova); Montenegro; Romania; Russian Federation; Serbia[7]; Tajikistan; Turkmenistan; Ukraine; Uzbekistan; Former Soviet Union (prior to 1990) and Former Yugoslavia (prior to 1990). Prior to 1990, data for Estonia are included in Former Soviet Union and data for Slovenia in Former Yugoslavia.
Asia (excluding China)	ASIA	Includes Bangladesh; Brunei Darussalam; Cambodia (from 1995); Democratic People's Republic of Korea; India; Indonesia; Malaysia; Mongolia (from 1985); Myanmar; Nepal; Pakistan; Philippines; Singapore; Sri Lanka; Chinese Taipei; Thailand; Viet Nam and **Other Asia**.
China (including Hong Kong, China)	CHINAREG	Includes the People's Republic of China and Hong Kong, China.

4. Netherlands Antilles was dissolved on 10 October 2010, resulting in two new constituent countries, Curaçao and Sint Maarten, with the remaining islands joining the Netherlands as special municipalities. From 2012 onwards, data now account for the energy statistics of Curaçao Island only. Prior to 2012, data remain unchanged and still cover the entire territory of the former Netherlands Antilles.

5. **Note by Turkey:**

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

6. Latvia was not an OECD Member at the time of the preparation of this publication. Accordingly, Latvia does not appear in the list of OECD Members and is still included in the non-OECD aggregates.

7. Serbia includes Montenegro until 2004 and Kosovo until 1999.

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. In this publication, 'country' refers to country or territory, as case may be. Data start in 1960 for OECD countries and regions, and in 1971 for non-OECD countries and regions, unless otherwise specified.

Country/Region	Short name	Definition
World marine bunkers	WORLDMAR	Due to the structure of the database, World marine bunkers are reported both as a flow and as an entity similar to a country or a region. World marine bunkers represents the sum of International marine bunkers from all countries. Therefore, World marine bunkers is not applicable for individual countries and regions, and it is included in transport for the world total.
World aviation bunkers	WORLDAV	Due to the structure of the database, World aviation bunkers is reported both as a flow and as an entity similar to a country or a region. World aviation bunkers represents the sum of International aviation bunkers from all countries. Therefore, World aviation bunkers is not applicable for individual countries and regions, and it is included in transport for the world total.
Albania	ALBANIA	
Algeria	ALGERIA	
Angola	ANGOLA	
Argentina	ARGENTINA	
Armenia	ARMENIA	Data for Armenia are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Australia	AUSTRALI	Excludes the overseas territories.
Austria	AUSTRIA	
Azerbaijan	AZERBAIJAN	Data for Azerbaijan are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Bahrain	BAHRAIN	
Bangladesh	BANGLADESH	Data for Bangladesh are reported on a fiscal year basis. Data for 2014 are for 1 July 2014-30 June 2015.
Belarus	BELARUS	Data for Belarus are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Belgium	BELGIUM	
Benin	BENIN	
Bolivia	BOLIVIA	
Bosnia and Herzegovina	BOSNIAHERZ	Data for Bosnia and Herzegovina are available starting in 1990. Prior to that, they are included in Former Yugoslavia.
Botswana	BOTSWANA	Data for Botswana are available from 1981. Prior to that, they are included in Other Africa.
Brazil	BRAZIL	

Countries and regions

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Country/Region	Short name	Definition
Brunei Darussalam	BRUNEI	
Bulgaria	BULGARIA	
Cambodia	CAMBODIA	Data for Cambodia are available starting in 1995. Prior to that, they are included in Other Asia.
Cameroon	CAMEROON	
Canada	CANADA	
Chile	CHILE	Data start in 1971.
People's Republic of China	CHINA	In early 2016, the National Bureau of Statistics (NBS) of the People's Republic of China (China) supplied the IEA with detailed energy balances for 2000 to 2010 and the IEA revised its data accordingly. In September 2015, the NBS published China's energy statistics for 2013, as well as revised statistics for the years 2011 and 2012. These have already been taken into account by the IEA in the "Special data release with revisions for the People's Republic of China" in November 2015.
Colombia	COLOMBIA	
Congo	CONGO	
Costa Rica	COSTARICA	
Côte d'Ivoire	COTEIVOIRE	
Croatia	CROATIA	Data for Croatia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.
Cuba	CUBA	
Curaçao	CURACAO	The Netherlands Antilles was dissolved on 10 October 2010, resulting in two new constituent countries, Curaçao and Sint Maarten, with the remaining islands joining the Netherlands as special municipalities. From 2012 onwards, data now account for the energy statistics of Curaçao Island only. Prior to 2012, data remain unchanged and still cover the entire territory of the former Netherlands Antilles.

Countries and regions

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Country/Region	Short name	Definition
Cyprus	CYPRUS	**Note by Turkey:** The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus" issue. **Note by all the European Union Member States of the OECD and the European Union:** The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this report relates to the area under the effective control of the Government of the Republic of Cyprus.
Czech Republic	CZECH	Data start in 1971.
Democratic People's Republic of Korea	KOREADPR	
Democratic Republic of Congo	CONGOREP	
Denmark	DENMARK	Excludes Greenland and the Faroe Islands, 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.
Dominican Republic	DOMINICANR	
Ecuador	ECUADOR	
Egypt	EGYPT	Data for Egypt are reported on a fiscal year basis. Data for 2014 are for 1 July 2014-30 June 2015.
El Salvador	ELSALVADOR	
Eritrea	ERITREA	Data for Eritrea are available from 1992. Prior to that, they are included in Ethiopia.
Estonia	ESTONIA	Data start in 1990. Prior to that, they are included within Former Soviet Union. *Note: Estonia joined the IEA in May 2014.*
Ethiopia	ETHIOPIA	Ethiopia includes Eritrea prior to 1992.
Finland	FINLAND	

Countries and regions

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Country/Region	Short name	Definition
France	FRANCE	Includes Monaco and excludes the following overseas departments: Guadeloupe; French Guiana; Martinique; Mayotte; and Réunion; and collectivities: New Caledonia; French Polynesia; Saint Barthélemy; Saint Martin; Saint Pierre and Miquelon; and Wallis and Futuna.
Former Yugoslav Rep. of Macedonia	FYROM	Data former Yugoslav Rep. of Macedonia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.
Gabon	GABON	
Georgia	GEORGIA	Data for Georgia are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Germany	GERMANY	Includes the new federal states of Germany from 1970 onwards.
Ghana	GHANA	
Gibraltar	GIBRALTAR	
Greece	GREECE	
Guatemala	GUATEMALA	
Haiti	HAITI	
Honduras	HONDURAS	
Hong Kong, China	HONGKONG	
Hungary	HUNGARY	Data start in 1965.
Iceland	ICELAND	
India	INDIA	Data are reported on a fiscal year basis. Data for 2014 are for April 1 2014-March 31 2015.
Indonesia	INDONESIA	
Islamic Republic of Iran	IRAN	Data are reported according to the Iranian calendar year. Data for 2014 correspond to 20 March 2014 – 19 March 2015.
Iraq	IRAQ	
Ireland	IRELAND	
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.

Countries and regions

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Country/Region	Short name	Definition
Italy	ITALY	Includes San Marino and the Holy See.
Jamaica	JAMAICA	
Japan	JAPAN	Includes Okinawa.
Jordan	JORDAN	
Kazakhstan	KAZAKHSTAN	Data for Kazakhstan are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Kenya	KENYA	
Korea	KOREA	Data start in 1971.
Kosovo	KOSOVO	Data for Kosovo are available starting in 2000. Between 1990 and 1999, data for Kosovo are included in Serbia. Prior to 1990, they are included in Former Yugoslavia.
Kuwait	KUWAIT	
Kyrgyzstan	KYRGYZSTAN	Data for Kyrgyzstan are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Latvia	LATVIA	Data for Latvia are available starting in 1990. Prior to that, they are included in Former Soviet Union. Latvia was not an OECD Member at the time of the preparation of this publication. Accordingly, Latvia does not appear in the list of OECD Members and is still included in the non-OECD aggregates.
Lebanon	LEBANON	
Libya	LIBYA	
Lithuania	LITHUANIA	Data for Lithuania are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Luxembourg	LUXEMBOU	
Malaysia	MALAYSIA	
Malta	MALTA	
Mauritius	MAURITIUS	
Mexico	MEXICO	Data start in 1971.
Moldova	MOLDOVA	Data for Moldova are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Mongolia	MONGOLIA	Data for Mongolia are available starting in 1985. Prior to that, they are included in Other Asia.

Countries and regions

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Country/Region	Short name	Definition
Montenegro	MONTENEGRO	Data for Montenegro are available starting in 2005. Between 1990 and 2004, data for Montenegro are included in Serbia. Prior to 1990, they are included in Former Yugoslavia.
Morocco	MOROCCO	
Mozambique	MOZAMBIQUE	
Myanmar	MYANMAR	
Namibia	NAMIBIA	Data for Namibia are available starting in 1991. Prior to that, data are included in Other Africa.
Nepal	NEPAL	Data for Nepal are reported on a fiscal year basis.
Netherlands	NETHLAND	Excludes Suriname and the Netherlands Antilles.
New Zealand	NZ	
Nicaragua	NICARAGUA	
Niger	NIGER	Prior to 2000, data for Niger are presented in Other Africa.
Nigeria	NIGERIA	
Norway	NORWAY	
Oman	OMAN	
Pakistan	PAKISTAN	
Panama	PANAMA	
Paraguay	PARAGUAY	
Peru	PERU	
Philippines	PHILIPPINE	
Poland	POLAND	
Portugal	PORTUGAL	Includes the Azores and Madeira.
Qatar	QATAR	
Romania	ROMANIA	
Russian Federation	RUSSIA	Data for Russia are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Saudi Arabia	SAUDIARABI	
Senegal	SENEGAL	

Countries and regions

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Country/Region	Short name	Definition
Serbia	SERBIA	Data for Serbia are available starting in 1990. Prior to that, they are included in Former Yugoslavia. Serbia includes Montenegro until 2004 and Kosovo until 1999.
Singapore	SINGAPORE	
Slovak Republic	SLOVAKIA	Data start in 1971.
Slovenia	SLOVENIA	Data start in 1990. Prior to that, they are included within Former Yugoslavia.
South Africa	SOUTHAFRIC	
South Sudan	SSUDAN	Data for South Sudan are available from 2012. Prior to 2012, they are included in Sudan.
Spain	SPAIN	Includes the Canary Islands.
Sri Lanka	SRILANKA	
Sudan	SUDAN	South Sudan became an independent country on 9 July 2011. From 2012, data for South Sudan are reported separately.
Suriname	SURINAME	Data for Suriname are available starting in 2000. Prior to that, they are included in Other Non-OECD Americas.
Sweden	SWEDEN	
Switzerland	SWITLAND	Includes Liechtenstein for the oil data. Data for other fuels do not include Liechtenstein.
Syrian Arab Republic	SYRIA	
Chinese Taipei	TAIPEI	
Tajikistan	TAJIKISTAN	Data for Tajikistan are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Tanzania	TANZANIA	
Thailand	THAILAND	
Togo	TOGO	
Trinidad and Tobago	TRINIDAD	
Tunisia	TUNISIA	
Turkey	TURKEY	
Turkmenistan	TURKMENIST	Data for Turkmenistan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Countries and regions

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Country/Region	Short name	Definition
Ukraine	UKRAINE	Data for Ukraine are available starting in 1990. Prior to that, they are included in Former Soviet Union.
United Arab Emirates	UAE	
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 but generally excludes all territories, and all trade between the U.S. and its territories. Oil statistics include Guam, Puerto Rico[8] and the United States Virgin Islands; trade statistics for coal include international trade to and from Puerto Rico and the United States Virgin Islands.
Uruguay	URUGUAY	
Uzbekistan	UZBEKISTAN	Data for Uzbekistan are available starting in 1990. Prior to that, they are included in Former Soviet Union.
Venezuela	VENEZUELA	
Viet Nam	VIETNAM	
Yemen	YEMEN	
Zambia	ZAMBIA	
Zimbabwe	ZIMBABWE	
Former Soviet Union (if no detail)	FSUND	Before 1990, includes Armenia; Azerbaijan; Belarus; Estonia; Georgia; Kazakhstan; Kyrgyzstan; Latvia; Lithuania; Republic of Moldova; Russian Federation; Tajikistan; Turkmenistan; Ukraine and Uzbekistan.
Former Yugoslavia (if no detail)	YUGOND	Before 1990, includes Bosnia and Herzegovina; Croatia; Former Yugoslav Republic of Macedonia; Kosovo; Montenegro; Slovenia and Serbia.

8. Natural gas and electricity data for Puerto Rico are included under Other Non-OECD Americas.

Countries and regions

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Country/Region	Short name	Definition
Other Africa	OTHERAFRIC	Includes Botswana (until 1980); Burkina Faso; Burundi; Cape Verde; Central African Republic; Chad; Comoros; Djibouti; Equatorial Guinea; Gambia; Guinea; Guinea-Bissau; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Namibia (until 1990); Niger (until 1999) Réunion; Rwanda; Sao Tome and Principe; Seychelles; Sierra Leone; Somalia; Swaziland; and Uganda.
Other Non-OECD Americas	OTHERLATIN	Includes Antigua and Barbuda; Aruba; Bahamas; Barbados; Belize; Bermuda; British Virgin Islands; Cayman Islands; Dominica; Falkland Islands (Malvinas); French Guiana; Grenada; Guadeloupe; Guyana; Martinique; Montserrat; Puerto Rico[9] (for natural gas and electricity); Saba (from 2012); Saint Eustatius (from 2012); Saint Kitts and Nevis; Saint Lucia; Saint Pierre and Miquelon; Saint Vincent and the Grenadines; Sint Maarten (from 2012); Suriname (until 1999); and the Turks and Caicos Islands.
Other Asia	OTHERASIA	Includes Afghanistan; Bhutan; Cambodia (until 1994); Cook Islands; East Timor; Fiji; French Polynesia; Kiribati; Lao People's Democratic Republic; Macau, China; Maldives; Mongolia (until 1984); New Caledonia; Palau (from 1994); Papua New Guinea; Samoa; Solomon Islands; Tonga and Vanuatu.
Memo: 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. Latvia was not an OECD Member at the time of the preparation of this publication. Accordingly, Latvia does not appear in the list of OECD Members and is not included in the zone aggregates. 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.
Memo: Non-OECD Total	NOECDTOT	Includes Africa; Asia (excluding China); China (P.R. of China and Hong Kong, China); Non-OECD Americas; Middle East and Non-OECD Europe and Eurasia.

9. Oil statistics as well as coal trade statistics for Puerto Rico are included under the United States.

Countries and regions

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Country/Region	Short name	Definition
Memo: IEA Total	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.
Memo: European Union - 28	EU28	Includes Austria; Belgium; Bulgaria; Croatia; Cyprus[4]; the Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; the Netherlands; Poland; Portugal; Romania; the Slovak Republic; Slovenia; Spain; Sweden and the United Kingdom. Please note that in the interest of having comparable data, all these countries are included since 1990 despite different entry dates into the European Union.
Memo: FSU 15	MFSU15	Includes the Former Soviet Union with all 15 countries for all years
Memo: Former Yugoslavia	MYUGO	Includes Former Yugoslavia (if no detail); Bosnia and Herzegovina; Croatia; Former Yugoslav Republic of Macedonia; Kosovo; Montenegro; Slovenia and Serbia.
Memo: OPEC	OPEC12	Includes Algeria; Angola; Ecuador; Islamic Republic of Iran; Iraq; Kuwait; Libya; Nigeria; Qatar; Saudi Arabia; the United Arab Emirates and Bolivarian Republic of Venezuela (Venezuela).[10]
Memo: G7	MG7	Includes Canada, France, Germany, Italy, Japan, United Kingdom and United States.
Memo: G8	MG8	Includes Canada, France, Germany, Italy, Japan, Russian Federation, United Kingdom and United States.
Memo: G20	MG20	Includes Argentina, Australia, Brazil, Canada, China (P.R. of China and Hong Kong, China), India, Indonesia, Japan, Korea, Mexico, Russian Federation, Saudi Arabia, South Africa, Turkey, United States and European Union - 28.

10. Data for Indonesia and Gabon, that re-joined OPEC in January and July 2016, respectively, are not included in the OPEC aggregate in the current edition.

Countries and regions

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Country/Region	Short name	Definition

Please note that the following countries have not been considered due to lack of data:

- Non-OECD Europe and Eurasia: Andorra and Liechtenstein[11] (except for oil data);
- Africa: Mayotte; Saint Helena; Western Sahara;
- Non-OECD Americas: Anguilla;
- Asia: Christmas Island, Nauru, Niue and Tuvalu.

11. Oil data for Liechtenstein are included under Switzerland.

6. COUNTRY NOTES AND SOURCES

OECD COUNTRIES

General notes

The notes given in this document refer to data for the years 1960 to 2014 published in the book, as well as on CD-ROM and in the on-line data service. In general, more detailed notes are available for data starting in 1990.

Data are obtained through annual submission of five fuel questionnaires from National Administrations, as indicated for each country in the section on sources.

In some instances it has been necessary for the IEA Secretariat to estimate some data; explanations of the estimates are provided in the country notes. For more information on fuel-specific methodologies, please refer to the various IEA information books. Energy data reported for 2015 (shown as 2015p) in the final release are provisional supply data based on submissions received in early 2016 and on monthly submissions to the IEA from member countries.

Revisions on 2014 data may occur for certain countries between this preliminary release and the final release which will be published in August this year.

This section lists a few specific notes that apply to all countries, and it is followed by a series of comprehensive country-specific notes by fuel and flow.

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 IEA 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

Source

Department of Industry, Innovation and Science, Canberra.

General note

All data refer to the fiscal year (e.g. July 2013 to June 2014 for 2014).

Starting with the 2013 edition and following, 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 issues. The national statistics appear to have issues 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.

Coal

- **Hard coal** data prior to 1978 may include **sub-bituminous coal**.
- In the 2016 edition, extensive revisions were received to 2010 to 2013 data for many primary and manufactured products causing breaks in production, trade and consumption between 2009 and 2010. Series which begin in 2010 may be reported in other flows until 2009. 2014 data were reported on the same basis as 2010 to 2013.
- In the 2015 edition, increases of production and consumption of **other bituminous coal** for 2013 are due to both new mine capacity and improved classification data. In the 2016 edition, these revisions were extended back to 2010. Apparent switching between **sub-bituminous coal** and **other bituminous coal** between 2009 and 2010 suggests that some **other bituminous coal** was reported as **sub-bituminous coal** prior to this, across several flows.
- Data on **blast furnace gas** for electricity production by autoproducers begins in 1986.
- Reclassification of some **coal** types in the 2013 edition were calculated on an energy basis and resulted in a net increase of quantities of primary coal from 2003 to 2011.
- Breaks in the time series for **gas works gas** between 2008 and 2009 are due to a change of survey, while reduced production and consumption between 2006 and 2008 are due to the removal of some **natural gas** inputs.
- 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.

Supply

- Only **anthracite** for export is reported separately; the remainder that is consumed domestically is included with **other bituminous coal**.
- Export trade in **coke oven coke** between 2005 and 2011 exists, but data are unavailable for reasons of confidentiality.

Transformation

- For 2003 to 2012, **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.
- **Natural gas** consumed to fuel the distribution of **natural gas** in natural gas networks is reported as transformation for **gas works gas** production until 2005.
- The drop in **BKB** production in 2004 was due to a fire in the main production plant.

Consumption

- Consumption in wood and wood products is included in paper, pulp and print from 2001 onwards.
- In the 2016 edition, revisions for 2010 onwards have increased the quantities of **sub-bituminous coal** and decreased the quantities of **other bituminous coal** being used in the non-metallic minerals industry as more accurate information has become available.

Oil

- In the 2016 edition, the Australian Administration revised oil supply/demand data from 2010, resulting in breaks in time series between 2009 and 2010. In particular, crude oil production for selected companies, previously estimated, was replaced by actual data. Transport consumption data (gas/diesel, motor gasoline, LPG) were revised to better align with data from the Australian Petroleum Statistics and the Bureau of Infrastructure, Transport and Regional Economics. A new method was adopted to split gas/diesel inputs between main-activity and autoproducer plants. Finally, *receipts from other sources (natural gas)* of **other hydrocarbons** corresponding to hydrogen used in refineries are now reported. They are also represented as the output of non-specified transformation processes in the balances format

- An in-depth review of Australian oil statistics, in particular investigation of amounts currently reported under recycled products as well as statistical differences for motor gasoline and bitumen, is on-going and may result in further improvements in the next editions.

Supply

- Imports of fuel oil have been estimated by the Australian administration.
- There is a break in the series for crude oil and NGL between 2001 and 2002.
- The drop in the production of crude oil in 1999 is due to a gas explosion at the Longford plant.
- Prior to 1992, part of the NGL production is included in crude oil.

Natural gas

- In the 2016 edition, the Australian Administration revised natural gas demand data for some flows back to 2010, resulting in breaks in time series between 2009 and 2010.
- In 2015, the Australian Administration revised production and certain consumption data back to 2006. The production figures now include previously uncaptured flows.
- Prior to 1991 natural gas data include ethane.

Transformation

Until 2005, natural gas consumed to fuel the distribution of natural gas in natural gas networks was reported as transformation for gas works gas production.

Consumption

- Between 2009 and 2010 some breaks in series may occur due to changes in methodologies and to improved data sources. Revisions to the consumption data include changes to energy use in liquefaction plants, and a shift of gas works gas (transformation) to *non-specified energy* from 2006 onwards. Revisions to previous years are pending.
- Between 2001 and 2002 there are breaks in series for consumption data due to an industry structural shift and changes in methodology.
- Data for 1999 and 2000 end-use consumption are estimated by the Australian administration.

Biofuels and waste

- In the 2016 edition of this publication, the Australian administration revised data on **primary solid biofuels** back to 2010. This impacts mostly final consumption in the food and tobacco sectors and may create breaks in time series.
- The Australian administration revised the reporting methodology for **biodiesels** starting in 2015 which create break in series between 2014 and 2015p data.
- The data for **biogasoline** and **biodiesel** are not available before 2003 and 2004 respectively.
- From 1996, a different industry consumption breakdown for biofuels and waste is available and leads to breaks in series.

Supply

Biogas production at sewage treatment works is not available.

Electricity and heat

- In the 2016 edition, several **combustible fuel** electricity production series as well as some electricity consumption series were revised by the Australian administration back to 2010 in order to limit the use of estimated data and are causing some breaks.
- From 1992 onwards, **heat** data are not available.

Supply

- The production of electricity from **wind** is available from 1994.
- Electricity production from **solar photovoltaic** starts in 1992 and from **solar thermal** in 2003.

Transformation

- Fuels used for generation by autoproducers represent single fuel-fired units only. The use of fuel in multi-fired units operated by autoproducers is included in industry consumption.
- 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 1986, inputs and outputs from autoproducer CHP plants are not available.
- Prior to 1995, electricity production from **biogases** is included in natural gas.

Consumption

- 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.
- The direct use of **solar heat** (mostly domestic solar panels) is available from 1974.
- **Electricity** consumption in coke ovens has been estimated by the Australian administration from 1974 to 1999.
- Prior to 1974, the breakdown of **electricity** consumption in industry and energy sub-sectors is not available and energy industry consumption is included in industry.
- Prior to 1971 **electricity** consumption in the commercial and public services sector is included in industry.

Austria

Source

Bundesanstalt Statistik Österreich, Vienna.

General note

In the 2016 edition, widespread data revisions were received due to enhanced reporting for 2005 onwards as a consequence of the Austrian Energy Efficiency Act (Bundes-Energieeffizienzgesetz). For some time series, these revisions were extrapolated back to 1990. As a consequence, there may be breaks between 2004 and 2005, and 1989 and 1990.

Coal

- "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**.
- In the 2016 edition, revisions concerning the iron and steel industry were received for data since 1990. The following flows were impacted by these revisions: inputs to blast furnaces, the breakdown between transformation and own-use energy support, and calorific values.

Oil

In 2016, gasoline type jet fuel was reclassified as aviation gasoline, as a result of an internal review of the refinery internal reporting systems.

Supply

- Exports of **naphtha** are no longer reported from 2014, past values may refer to exports of petrochemical raw material.
- Deliveries of **gas/diesel** to international marine bunkers were revised back to 1990 after implementation of a new study results.
- Prior to 1990, a portion of **naphtha** is included with **other oil products**.

Natural gas

Supply

Export amounts are calculated by the national administration by subtracting stock changes and domestic consumption from import figures.

Transformation

Between 1995 and 1996 there is a break in series for autoproducer electricity and CHP plants due to the availability of more detailed data.

Consumption

- There are inconsistencies in the time series for commercial/public services as this sub-sector is computed as a residual.
- The increase in pipeline transport consumption for 2013 is due to a new methodology of data collection. Historical revisions are pending. Prior to 2000, differences due to measurement are included with distribution losses.

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*.

Consumption

- In the 2016 edition, improvement in the iron and steel industry data have allowed more precision in

the consumption, among other for **industrial wastes** in blast furnaces.

- In the 2016 edition, the consumption of **solid biofuel** in the residential sector was revised down from 2005 data.

Electricity and heat

Transformation

- Electricity plants data may include some CHP plants operating in **electricity** only mode.
- A large autoproducer electricity plant was reclassified as an autoproducer CHP plant and therefore creates a break in series for **municipal waste** in 2011.
- In 2009, inputs of **other oil products** to autoproducer CHP plants were reclassified as **refinery gas** and **natural gas**.
- 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.
- **Heat from chemical processes** used for **electricity** production is available from 2004.
- Prior to 1981, inputs to main activity producer electricity plants include inputs to CHP plants. All electricity production by CHP plants is included in electricity plants, and only production from combustible fuel sources is taken into account. Autoproducer CHP heat production is included in main activity producer CHP plants. For heat, own use is included in distribution losses.

Consumption

- **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.
- From 1990 to 2009, small amounts of **electricity** used in heat pumps have been included in the residential sector.
- 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*, prior to that it was included in commercial/public services.

Belgium

Source

Observatoire de l'Energie, Brussels.

Coal

- In the 2016 edition, improved data collection has led to some breaks in time series. These revisions include **hard coal** classifications, products and processes in integrated iron and steel manufacture and may be extended further back in future editions.
- **Hard coal** data prior to 1978 may include **sub-bituminous coal**.
- **Other bituminous coal** and **sub-bituminous coal** data reported in *from other sources* refer to coal recuperated from coal dumps.

Supply

- Supply-side data are obtained through surveying questionnaires in lieu of customs data.
- Conventional production of **other bituminous coal** ceased on 31 August 1992.

Consumption

- The decrease of **other bituminous coal** and **coke oven coke** in the iron and steel industry in 2002 is due to the closure of several plants.
- The use of **coke oven gas** in chemical and petrochemical activities ceased in 1996.

Oil

In the 2016 edition, the Belgian administration reviewed and improved the methodology for reporting petrochemical consumption. Energy use of naphtha and LPG in the petrochemical sector, corresponding to recovered gases from the petrochemical process used for heating the installations, is now reported. Previously these amounts were allocated by default to non-energy use. Quantities reported under transformation in petrochemical plants have also been increased as it appeared that the petrochemical sector was returning more oil products to the market either for domestic consumption or exports. Revisions were applied back to 2009.

Supply

- The drop in international marine bunker consumption in 2014 can be at least partly explained by the

bankruptcy of one of the major players in the bunkering market in the last quarter of 2014.

- Starting from 2013, a new data source was introduced for petroleum coke trade.

Transformation

In 2002, patent fuel plants used fuel oil to increase the calorific value of patent fuel.

Consumption

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.

Natural gas

Supply

- Since 2009 gas trade in Belgium includes imported LNG which is regasified and subsequently exported to other countries.
- Between 2005 and 2006 there is a break in stocks levels due to new method of data collection.

Transformation

Between 2008 and 2009, there is a break in efficiency of **natural gas** autoproducer CHP plants due to a change in methodology regarding the reporting of unsold heat.

Consumption

- Between 2010 and 2011, there is a break in time series for the Manufacture of coke and refined petroleum products as well as Mining and quarrying due to revisions on 2011 data. Revisions on 2010 data are expected in the next publication.
- Between 2004 and 2005 and between 2007 and 2008 there are breaks in series for the industry and energy sectors due to a new legislation for data collection.
- In 2003, the large decrease in non-specified industry consumption is due to improvements in data collection.
- Since 2000, natural gas began to replace blast furnace gas in the iron and steel industry.

Biofuels and waste

- Renewable municipal wastes include a share of renewable industrial wastes.
- Data for biodiesels are available starting in 2007 and for biogasoline in 2008.

Supply

Data on pure **biogasoline** and **biodiesels** trade are not available for 2009 and 2010.

Consumption

- **Other liquid biofuels** consumed in power plants reported before 2011 can include **biodiesel**.
- In 2013, a new series for **industrial waste** used in the chemical sector for one region was reported, causing a break series.
- New data on consumption cause breaks in series for **primary solid biofuels** between 2011 and 2012.

Electricity and heat

Supply

- The electricity production under **other sources** represents mainly production at a gas expansion station with heat recovery and at a hydraulic turbine in a waste water treatment plant.
- In 2014, reported **heat** distribution losses decreased due to a more precise estimation method.
- The production of electricity from **wind** is available from 1987.

Transformation

- In 2012, heat production from chemical sources has been estimated by the IEA Secretariat.
- Prior to 2009 some unsold heat was reported in natural gas autoproducer CHP plants, together with the associated natural gas input. This causes the drop in efficiency in 2009.
- In 2007 data, no information was available on heat production in main activity CHP plants for **industrial waste**.
- Heat from chemical processes used for electricity production is available from 2005.
- 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.
- 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.
- For 1998 and 1999, **electricity** production at main activity producer CHP plants with annual heat

output below 0.5 TJ is reported with main activity producer electricity only plants.

- Prior to 1982, **electricity** production in main activity producer CHP plants is included in production from electricity plants. Also, inputs of fuels for electricity generation in main activity producer electricity plants include inputs for heat production in CHP plants.

Consumption

- For 2012, **electricity** consumption in the mining and quarrying sector has been estimated by the IEA Secretariat.
- 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.
- 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.
- Breaks in series exist between 1991 and 1992 for **heat** consumption in chemical and non-specified industry.

Canada

Source

Natural Resources Canada, Ottawa.

General note

From the 2014 edition of this publication, the Canadian administration revised time series back to 2005, using additional data from the Annual Industrial Consumption of Energy, the Annual Survey of Secondary Distributors, the Report on Energy Supply and Demand and the Natural Resources Canada Office of Energy Efficiency. Breaks in time series also between appear 1989 and 1990, due to changes in methodology, incorporated in 2002.

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 2016 edition, extensive revisions for the period 2005 to 2014 were received as more data became available due to improvements in data collection.
- In the 2014 and 2015 editions, 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.
- At this point in time, **oil shale and oil sands** data are not submitted, and this energy source is deemed to enter the supply stream as shale oil (**other hydrocarbons**).
- Due to confidentiality constraints, breakdown of **coal** by type has been estimated by Natural Resources Canada for 2015p.

Transformation

- Injection of pulvervised coal into blast furnaces (**PCI**) occurs, but is not available for confidentiality reasons. Coals consumed in this manner are reported in the iron and steel industry along with other consumption.
- Before 1978, **lignite** inputs to main activity producer heat plants are included in final consumption. Starting in 1979, these inputs are included in main activity producer electricity plants.

Consumption

Due to the unavailability of data, non-energy use of **coke oven coke** and **hard coal** is included with final consumption sectors prior to 1978 and 1980, respectively.

Oil

- In this edition, the Canadian Administration was able to reconcile some historical inconsistencies by reporting inputs and outputs to upgraders. In the supply side, these quantities are reported under Other Hydrocarbons. In the demand side, they are reported under the respective output products (Refinery Gas, Road Diesel, and Petroleum Coke).

- The Canadian Administration is currently unable to provide a figure for the domestic production of additives, but is working on solutions which will make this possible. Meanwhile, significant statistical differences can be observed for several secondary oil products.

Supply

- In this edition, the Canadian Administration started using customs based trade data to report crude oil imports. Crude oil imports data were revised following this methodology back to 2008.
- In the 2015 edition, the Canadian administration revised the allocation of primary oil products back to 2005. Condensates and pentanes plus are included in crude oil from 2005, in NGL 1990 to 2004 and in LPG prior to 1990. Historical revisions are pending.
- In the 2015 edition, primary oil products imports have been revised back to 2011 to include direct imports of condensates by crude oil producers.
- Production of other hydrocarbons represents synthetic crude oil produced from tar sands.
- From 2005, other hydrocarbons from other sources natural gas corresponds to natural gas used for the upgrading of synthetic crude oil (reported under GTL transformation in the natural gas consumption data) and natural gas used to upgrade petroleum products (reported under non-specified transformation in the natural gas consumption data). From 1990 to 2005, these quantities are reported in indigenous production of other hydrocarbons. Prior to 1990, they are included in the natural gas supply.
- Imports of other hydrocarbons from 1994 to 2000 correspond to Orimulsion imports from Venezuela.
- Refinery output from gas/diesel oil and petroleum coke includes output from oil sands and upgraders.
- Time series for other non-specified oil products may fluctuate as they have been computed as residuals.
- International marine bunkers are included with inland waterways prior to 1978.

Consumption:

Due to confidentiality issues, consumption data for selected products and flows, such as fuel oil and gas/diesel consumption in iron and steel from 2009, are not available. For the same reason, selected products may include estimates provided by the Canadian Administration, such as Fuel Oil and Bitumen data for 2014.

Natural gas

For the 2015 edition, revisions back to 2005 were submitted by the Canadian administration, creating a break in series between 2004 and 2005. Amounts reported as transport equipment; machinery; food, beverages and tobacco; wood and wood products; textiles and leather were reported as *non-specified industry* prior to 2005. Further historical revisions are pending.

Transformation

- In 2000, the increase in main activity producer electricity data is due to new generation plants in Alberta and Ontario.
- 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.

Consumption

- For 2012, the increase consumption by non-metallic mineral production is due to switching from coal to natural gas in cement manufacturing.
- Prior to 1990 data for consumption of natural gas for construction are not available.
- Prior to 1978, consumption in the non-specified category of the industry sector includes gas used as fuel in oil refineries.
- Prior to 1978, agriculture is included in industry, and no detailed industry sub-sector data are available.

Biofuels and waste

- The split of **municipal waste** reported assumes 65% renewable and 35% non-renewable.
- The IEA Secretariat has estimated the data for **biogases, industrial and municipal waste** from 1990 to 2004, **biogasoline (ethanol)** from 1998 to 2004 based on information supplied by Natural Resources Canada.

Supply

There were no exports of **biogasoline** since 2013.

Electricity and heat

The breakdown of electricity and heat generation from combustible fuel for 2015p was estimated by the IEA Secretariat.

Supply

- 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.
- **Heat** production includes **heat** produced by **nuclear** power stations for distribution to other consumers up to 1997.

Transformation

- In the 2016 edition of this publication, there was a reclassification from autoproducer to main activity producer for plants fueled by biogases and municipal waste.
- For autoproducers generating electricity with process steam produced from biofuels and waste, the energy required to produce the initial steam is not taken into account by the Canadian Administration and as a result the efficiencies are overstated.
- Secretariat estimates have been made for certain inputs to CHP production based on output. However, incompatibility of data for inputs to and output from thermal production of autoproducers may result in variable efficiency rates.
- 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.
- Net electricity production by autoproducers prior to 1990 includes production from combustible fuel sources only.
- Inputs of fuels to heat plants are not available for 1979 to 1987.

Consumption

- *Total final consumption* of **solar thermal** energy for 2015p was estimated by the IEA Secretariat based on 2014 data.
- **Electricity** transmission and distribution losses could include statistical difference for certain years.
- Starting from 2012, **heat** consumption in the chemical and petrochemical sector became confidential and is included under the "not elsewhere specified industry" sector.
- The Canadian Administration revised the **electricity** consumption for the commercial and public services sector from 2012 according to a new methodology. This causes a break in the time series between 2011 and 2012.
- Consumption of **electricity** in coal mines is not available between 1982 and 1986.
- Consumption of **electricity** in oil and gas extraction is not available prior to 1987.
- Breaks in the series occur between 1973 and 1974 in agriculture, and between 1987 and 1988 in the industry sector.

Chile

Source

Energía Abierta, Comisión Nacional de Energía, Ministerio de Energía, Santiago.

General notes

- Data are available starting in 1971.
- Data for Chile for 2015p have been estimated by the IEA Secretariat.
- 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 for all years, if present.
- Data for Chile for 2014 and for 2015p have been estimated by the IEA Secretariat.

Oil

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

Natural gas

Supply

Since 2009 data representing LPG injected into the natural gas distribution network are available. They are reported in *from other sources - oil*.

Transformation

- For 2009 and 2010, inputs of natural gas to autoproducer CHP plants were estimated by the Chilean administration. For other years, these inputs are included in autoproducer electricity.
- Natural gas used for oil and gas extraction is included in gas consumption for energy use in refineries.

Biofuels and waste

Supply

Production of **landfill gas** ceased in 2001 as landfill sites stopped producing adequate gas to continue collection.

Transformation

A new survey on primary **solid biofuels** causes breaks in production and input to autoproducer CHP between 2011 and 2012.

Consumption

- **Charcoal** production and consumption have been estimated by the IEA Secretariat until 2013. From 2014 data, only the inputs of solid biofuels to charcoal production plants are estimated.
- The Chilean authority applied a new revised methodology for *final consumption* of **primary solid biofuels**. This may lead to data breaks in time series.

Electricity and heat

Supply

The majority of electricity generation *from other sources* is from a conveyor belt transporting crushed rock from high altitude to lower altitude in a mine. A small amount from waste heat is also included.

Transformation

- In 2014 data, input to transformation was taken from the published energy balance, and the output was estimated based on the efficiency reported in previous years.
- Electricity production from **other bituminous coal** includes sub-bituminous coal.
- Production of **chemical heat** used for electricity generation started in 2013. Besides chemical heat data for heat production in CHP and heat plants are not available.
- Increases in electricity from **natural gas** in 2010 are due to the openings of new LNG terminals.
- The split of **electricity** generation by main activity and autoproducer by fuel was estimated by the Chilean Administration for the period 1990 to 2003.

Consumption

- **Solar thermal heat** production for 2012 was estimated by the Chilean administration.
- Prior to 2009, statistical differences are included in distribution losses.

Czech Republic

Source

Czech Statistical Office, Prague.

General notes

- Data are available starting in 1971.
- Due to ongoing review of energy data for 2010-2014, revisions are expected in the 2017 edition.

Coal

- 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.
- Coal which had been previously classified as **sub-bituminous coal** until the 2008 edition is now reported under **lignite** for all years.
- Sub-bituminous coal is included in other bituminous coal.
- Increased production and consumption of other recovered gases in 2014 is due to improved tracking of by-products from various transformation processes. Tail gases from the production of carbon black from coal tar are reported here, as are off gases from the manufacture and cleaning of syngas from lignite for an IGCC plant. Historical revisions are expected in future publications.

Supply

Production *from other sources* of **other bituminous coal** is from coal slurries, and this data is not available for 2015p.

Consumption

- In the 2015 edition, improved reporting enabled revisions to be adopted for certain primary **coal** consumption flows between 2010 and 2012.
- 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.
- 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.

Oil

Data prior to 1994 are estimated by the IEA Secretariat.

Transformation

From 2002 data onwards, some amounts of **fuel oil** have been reclassified under **other products**. This change mainly affects the transformation sector.

Consumption

Between 1998 and 1999, breaks in **gas/diesel** final consumption time series are due to a new data management system implemented by the Czech administration.

Natural gas

Between 1993 and 1994 there are some breaks in series due to a change in the energy balance methodology between former Czechoslovakia and the Czech Republic. Since 1993 data have been officially submitted by the Czech Statistical Office.

Supply

Starting with 2008 data, hydrogen production is reported in petrochemical feedstocks as non-energy use.

Transformation

In 1996 natural gas inputs into gas works ended.

Consumption

Prior to 1994 data in transport are for former Czechoslovakia.

Biofuels and waste

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

Consumption

- Hospital waste previously reported as municipal waste is reported under industrial waste since 2008.
- 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.

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 from 1990 onwards have been officially submitted by the Czech administration. This may lead to breaks in series between 1989 and 1990.

Supply

- The amount of heat reported under **other sources** is waste heat from the glass industry.
- From 1999 onwards, small amounts of **heat** have been exported to Slovak Republic.

Transformation

- Electricity generated from **waste heat** in CHP plants is included with the total production from **combustible fuels**.
- In the 2016 edition, a revision of the methodology for reporting the production of autoproducer plant running on **combustible fuels** causes multiple breaks in series between 2013 and 2014 for CHP and electricity only plant.
- From 2014, some autoproducer **heat** plants production figures became too small to appear in data collected.
- From 2012 data, new autoproducer **heat** plants were added to the data collection, causing a break in series.
- In 2012, a main activity producer electricity plant using **solid biofuels** started to produce also heat and was reclassified as main activity CHP plant.

- Due to a reclassification of plant types, there is a break in series in 2011 for **municipal waste** used for electricity and heat generation.
- A different reporting methodology used by the Czech Administration for **biofuels and wastes** causes some breaks in time series between 2002 and 2003.
- 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.
- **Industrial waste** use in main activity producer electricity plants is included with **solid biofuels** from 1996.
- Data on **biogases** and waste used in main activity producer CHP and autoproducer heat plants start in 1993.
- Prior to 1990, **electricity** production in main activity producer CHP and autoproducer CHP plants is included in main activity producer electricity plants.
- Prior to 1990, **heat** production 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 breakdown of net **electricity** production by source is not available prior to 1990.
- 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.

Consumption

- The direct use of **solar energy** is available from 2003.
- Prior to 2000, the split of *rail transport* and *non-specified transport* is not available.

Denmark

Source

Danish Energy Agency, Copenhagen.

General note

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

Supply

- A large increase of **steam coal** imports in 2003 was related to a drought in Scandinavia. Thermal power plants were operated more intensively to replace hydro-generated electricity that was consumed in the country. Additionally, more coal-generated electricity was exported to other countries in the region. Significant fluctuations in demand are also evident for other years for similar reasons, including 2006 and 2013, but exist to a lesser extent.
- Declines in stocks on hand of **steam 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

- From 1990 onwards, Greenland and the Danish Faroes are not included in the oil data.
- From 2012, due to confidentiality issues, all liquid biofuels are reported under **biodiesel**
- Between 1995 and 2004, **other hydrocarbon** imports and inputs to main activity producer CHP plants represent orimulsion.
- Information on waste oil recycling and final consumption begins in 1989 and is reported in other oil products.
- In 1988, consumption of **gasoline type jet fuel** ceased.
- As of 1987, separate data for **paraffin waxes** are no longer available.
- Prior to 1975, **refinery gas** is reported net of consumption in refineries.

Transformation

- Due to improved survey methods, inputs to electricity and heat generation have been reclassified, causing a break in series between 1993 and 1994. 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.
- In 1994, the marked increase in inputs to CHP production is due to increased electricity exports to Norway.
- From 1974 to 1979, consumption of fuel oil for the CHP production by autoproducers has been estimated.

Consumption

- 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
- **White spirit** and **lubricants** deliveries are estimated by Denmark.
- For 1994 and 1995, industry detail is based on a new survey.
- Prior to 1990, **gas/diesel oil** and **fuel oil** consumption for fishing are included in domestic navigation

Natural gas

Consumption

In the 2016 edition, the Danish administration has revised **natural gas** consumption in the industry sector from 1990.

Biofuels and waste

Transformation

- From 2012, **biogasoline** trade designated to be blended with motor gasoline is included under **biodiesels**, for confidentiality reasons.
- From 2012, **biodiesel** production was confidential and gathered with imports.

Consumption

In the 2016 edition, the Danish statistics have revised energy consumption in industry sectors causing some breaks in **solid biofuels** consumption between 2010 and 2011.

Electricity and heat

Heat data are not available prior to 1976.

Supply

- The amount of **heat** reported under *other sources* is heat recovered from industrial processes and sold for district heating.
- **Heat** produced for sale by heat pumps starts in 1994.
- **Geothermal** and **solar heat** production for sale is available from 1989.
- From 1984 onwards, small amounts of **heat** have been imported from Germany.
- The production of electricity from **wind** is available from 1978.

Transformation

- Fish oil used in main activity producer heat plants is included with **solid biofuels**.
- Due to the high number of heating companies burning wood chips that are equipped with boilers with flue-gas condensation, the **solid biofuels** heat plants show a high efficiency.
- For some years heat plants for **natural gas** and **biogases** show efficiencies larger than 100%, on a net calorific value basis, due to the use of condensing boilers that recover the latent heat of vaporisation.
- **Biodiesels** and **biogasoline** consumption for electricity and heat production are reported under **other liquid biofuels**, for confidentiality reasons.
- Data for **other liquid biofuels** main activity heat plants are available back to 1994.

Consumption

- In the 2016 edition, the Danish administration has revised **electricity** and **heat** consumption in the industry sector from 1990.
- **Electricity** consumption in *non-specified industry* includes consumption in district heating plants and for the distribution of electricity.
- From 2012, the breakdown of **heat** consumption for industry, the energy sector, agriculture and forestry is estimated by the Danish administration.
- The direct use of **solar thermal** energy is available from 1978.

Estonia

Source

Statistics Estonia, Tallinn.

General note

Data for Estonia are available starting in 1990. Prior to that, they are included in Former Soviet Union in *World Energy Statistics*.

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** and **gas works gas** are the solid and gaseous by-products of oil

shale liquefaction. Inputs of **oil shale** to "gas works", "coke ovens" and for coal liquefaction plants, while reported separately, combined, are the inputs for retorting in liquefaction plants.

Oil

General note

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

Natural gas

Consumption

- In 2014 Estonia's main company in the chemical and petrochemical sector ceased activity, resulting in no non-energy use of 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 reopened in 2012.

Biofuels and waste

Data for **biogases** include **landfill gas** starting in 2005.

Electricity and heat

Transformation

- Inputs of fuel oil and gas works gas to transformation processes include shale oil.
- 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.

Finland

Source

Statistics Finland, Helsinki.

General note

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.
- Coal tar used for non-energy purposes or exported is not reported in either production or consumption.
- In the 2015 edition, revisions were received for some consumption flows of other bituminous coal and coke oven coke, while other recovered gases (from ferrochromium manufacture) were reported separately for the first time, with revisions back to 2000. Prior to 2000, off-gases from ferrochromium manufacture are included in blast furnace gas, and inputs of coke oven coke for ferrochromium manufacture in inputs to blast furnaces instead of non-specified transformation.
- Prior to 2008, peat products are included with peat.
- A large increase of steam coal imports in 2003 is related to a drought in Scandinavia. Thermal power plants were operated more intensively to replace hydro-generated electricity that is consumed in the country. Additionally, more coal-generated electricity was exported to other countries in the region.
- 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.

Transformation

- The significant increases and decreases of **other bituminous coal** inputs into main activity producer electricity plants from year to year are due to coal replacing imported electricity and hydro power or vice versa.
- Likewise, **peat** production is highly dependent upon favourable weather conditions and the pricing of other fuels. The decrease in **peat** and **other bituminous coal** usage in main activity electricity plants in 2008 was due to record electricity generation from hydro plants. A similar circumstance occurred in 2012.
- 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.

Oil

- In 2014, the Finnish administration revised the time series for **refinery gas** from 2000 and included flaring of petrochemical gases under *distribution losses.*
- Prior to 2002, **petroleum coke** used as *refinery fuel* was included with refinery gas.
- 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.
- **Other hydrocarbons** reported under *receipts from other sources (natural gas)* correspond to hydrogen used in refineries, also represented as the output of non-specified transformation processes in the balances format.

Consumption

Due to a new calculation model, there is a break in **fuel oil** *other consumption* between 1998 and 1999.

Natural gas

Between 1999 and 2000 there are some breaks in the time series due to a new survey system and a reclassification of the data.

Transformation

Consumption in *non-specified transformation* is mainly **natural gas** used for cracking and hydration in oil refineries.

Consumption

- Since 1995 data, the breakdown between *residential* and *commercial/public services* is available due to a new system of data collection.
- Prior to 1989, **natural gas** consumption in *residential* and *agriculture/forestry* has been estimated by the Finnish administration.

Biofuels and waste

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

Electricity and heat

Supply

- **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.
- **Other sources** include hydrogen and purchased steam.
- The increasing heat production from **heat** pumps in 2007 and 2008 is from the new Katri Vala district heating and cooling plant.
- **Heat from chemical processes** and associated electricity generation are available from 2000.

Transformation

- In the 2016 edition, the allocation of **solar photovoltaic** between main activity and autoproducer plants has been revised.
- From 2014 data, an autoproducer in the field of iron and steel industry running on **coke oven gases** and **blast furnace gases** was sold and is now reported as main-activity producer.
- The increase in heat production from **municipal waste** in 2014 is due to the opening of a new plant.
- In 2014, the new consumption of **liquid biofuels** in main activity electricity plant corresponds to biopyrolisis oil made from wood chips.
- Data on **peat products** electricity and heat generation are available since 2008. Prior to that, they are included in **peat**.
- **Heat** output from autoproducer CHP plants is available starting in 1996 and from autoproducer heat plants starting in 2000; corresponding inputs may be under-reported.
- Before 1999, all electricity production from autoproducers running on **fuelwood** is allocated to CHP plants.
- Electricity and heat production from **biogases** are available from 1996.
- Prior to 1992, outputs from the use of **combustible renewables and waste** to generate electricity and/or heat were included in peat. Therefore, the IEA Secretariat estimated the breakdown of outputs from municipal waste and solid biofuels based on reported inputs.
- Inputs of **liquid fuels** and **natural gas** to CHP plants are included with the inputs of these fuels to main activity producer electricity only and heat only plants prior to 1978.
- Electricity production from **biofuels and waste** is not available between 1974 and 1976.

Consumption

- A new survey of the *agriculture and forestry* sector leads to breaks in the **electricity** consumption between 2007 and 2008.
- The split of **heat** consumption in the different industry sectors is available starting from 2007. Prior to that, it is aggregated in *non-specified industry*.
- Prior to 2000, consumption of **heat** in *residential* includes consumption in *agriculture/forestry* and *commercial/public services.*
- Consumption of **electricity** in the industry subsector *machinery* includes consumption in transport equipment prior to 1995.

France

Source

Ministère de l'Environnement, de l'Energie et de la Mer, Paris.

General note

From 2012, the energy consumption is more detailed due to a more precise national survey.

Coal

General note

- Production and consumption of **coke oven coke** is estimated by the IEA Secretariat for 2015p based on supply of **coking coal** and pig iron production.
- Hard coal data prior to 1978 may include subbituminous 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.
- Prior to 1985, consumption of colliery gas is included with the use of coke oven gas by autoproducers.

Consumption

Final consumption in industry is estimated by the secretariat from 1986 to 2001 for some products.

Oil

- Statistical differences observed **for motorgasoline** and **naphtha** are partly due to the absence of a specific naphtha category in the customs classification.
- Statistical differences appear for **other products** as a result of different definitions used for this residual category between the customs, refineries, power plants and petrochemical industry.
- In the 2016 edition, new information is available starting from 2013 data for imports of condensates used by the petrochemical sector. These are reported under imports of **NGL**, interproduct transfers of NGL to **other product**s, and consumption of other products.
- From 1991, **additives and oxygenates** data are available.

Supply

- From 2009, transfers of **kerosene type jet fuel** to **white spirit** correspond to kerosene used as a base for making white spirit.
- From 2008 data, refinery intake of **refinery feedstock** and refinery output of **refinery gas** output figures exclude natural gas used in the steam reformer of the Gonfreville refinery.
- From 2008 data, **ethane** refinery output is reported
- From 2002 data onwards, ethylene produced in Lacq is not included in **NGL.**
- From 1998 data, a different treatment of transfers was adopted. Imported oil products needing further refinery processing are no longer reported as **refinery feedstock** imports but as oil product imports and products transferred. **Fuel oil** includes part of the amounts previously reported in **other oil products** from 1999 and various other products from 2001.

Transformation

Starting in 2012, separate data on main activity heat plants inputs are available.

Consumption

- The breakdown between international and domestic marine bunkers is estimated by the French administration.
- Between 2005 and 2006, a break is visible in LPG time series, as consumption from one chemical company was re-classified from energy use to non-energy use. Breaks in LPG time series also appear in 2001 due to improved data collection.

- From 2000 data, petroleum coke consumption in the non-ferrous metals industry is no longer available separately. Prior to 1982, no breakdown between energy and non-energy use is available for this product.
- From 1998 data, military consumption of kerosene type jetfuel is reported separately from domestic aviation.
- Prior to 1988, LPG includes ethane consumption.
- Prior to 1985, gas/diesel oil residential sector consumption is reported under commerce/public service sector as no separate data were available.

Natural gas

- Between 2008 and 2009, there are some breaks in series due to improvements in the data collection.
- Until 2007, some statistical differences reported by the French utilities were included in distribution losses. Since 2008 these amounts are included under statistical differences.
- Between 1999 and 2000, there are some breaks in series due to a new methodology for preparing the natural gas balances.

Supply

- The total imports and exports data include transit amounts. Revisions are pending.
- From 1990 to 1998, statistical difference includes gas consumption which is not broken down by sector.

Consumption

- Gas for pipelines is included in distribution losses.
- Between 2005 and 2006, there is a break in series in the industry sub-sectors.

Biofuels and waste

Transformation

- Plants using **municipal waste** were reclassified as autoproducer CHP plants from 1995, which leads to a break in series. Breaks in series in 2005 for **municipal waste** and **solid biofuels** are caused by sectoral reclassifications.
- Some **solid biofuels** autoproducer plants were reclassified as main activity plants in 2011.

Consumption

- Production and consumption of **industrial waste** are reported from 2013. Prior to that, they were included in **municipal waste**.
- The breakdown of the final energy consumption of **biogases** was estimated by the French administration from 1970 to 2003.
- A revision of the **solid biofuels** and **biogases** series created breaks in the direct use series between 2004 and 2005.
- In 2014, a new survey on **Solid biofuels** and **Biogases** causes breaks in series between 2013 and 2014. **Biogas** was previously reported under **Solid biofuels** but it is now distinguished.

Electricity and heat

Supply

- All **photovoltaic** plants with capacity above 100kWp are considered as main activity producers, while all plants with capacity below that value are considered autoproducers.
- Heat production from **heat pumps** is available starting from 2013.
- 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.
- Electricity production from **wind** is available from 1990.

Transformation

- Data for heat produced from **combustible fuels** in heat only plants are available starting from 2012.
- In 2012, several plants have been reclassified from electricity only to CHP plants. This causes breaks in the time series for **Municipal wastes** and **Solid biofuels**.
- Electricity production from **geothermal** started in 2011 and stopped in 2012 due to the maintenance of the only plant.
- The amount of heat not sold in autoproducer plants is included in total heat production up to 2010.
- In 2005, auto-producer CHP efficiencies for **biogases** drop due to the opening of a larger, less efficient plant.
- From 2000 several plants have been reclassified from electricity only to CHP plants. This causes breaks in the time series between 1999 and 2000.
- Prior to 2000, inputs and outputs of **oil products** are not available separately and are reported together under **other oil products**. 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.

- 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.
- There was re-classification on auto producer plants using **municipal waste** in 1995, which leads to a break in the time series.
- Net electricity production by auto-producer CHP plants is available from 1989.
- Net **electricity** production by autoproducers prior to 1983 includes production from combustible fuel sources only.

Consumption

- Data on **heat** distribution losses are available only starting from 2012. Prior to that, they were included in final consumption.
- Prior to 2005 data, all the **geothermal** heat consumption was reported as direct use. From 2005 data, some quantities are reported as output of heat plants, resulting in breaks in series for production, transformation and consumption.
- 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 includes exports to Monaco prior to 1992.
- The industry classifications used by the French administration were changed in 1986.
- A large part of energy industry **electricity** consumption in not elsewhere specified is consumption in uranium treatment plants; this electricity consumption is not available prior to 1980.
- There are major breaks in the time series in 1965 when more detailed breakdown of data on **electricity** consumption became available.

Germany

Source

Federal Ministry for Economic Affairs and Energy, Berlin.

General notes

- Data starts in 1960. German data include the new federal states of Germany from 1970 onwards.
- The German administration has changed the methodology for reporting heat over time:
- 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.
- Between 2003 and 2006, autoproducer heat output was provided, but no inputs.
- Between 2002 and 2003 and between 2003 and 2004, breaks in series occur, 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.

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.
- Up to 2002, **other bituminous coal** includes **anthracite**.
- Between 1998 and 2005, breaks in series may occur for **coke oven gas** and **blast furnace gas**.
- Between 1990 and 1992, breaks in series may occur due to earlier reclassification of several sectors by the German administration; this particularly affects **BKB**, **lignite** and **coke oven coke**.
- Trade data for 2015p for coal are sourced from monthly customs data.

Transformation

- In 1997, **BKB** inputs to gas works plants stopped.

- The German administration has changed the methodology for reporting heat. Between 2003 and 2006, autoproducer heat output was provided, but not 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.

Consumption

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

- From 2000 data, part of the product *Andere Rückstände* (other residues) is included with fuel oil instead of other oil products.
- Starting from 1994 data, there has been a reclassification of jet gasoline to kerosene type jet fuel.
- Prior to 1979 data, **other products** include **paraffin waxes**, **bitumen**, **white spirit** & **SBP** and **lubricants** for eastern Germany.

Consumption

- Between 2002 and 2003, breaks in series in consumption data are due to structural changes in energy statistics following the newly introduced Energy Statistics Act.
- In 1995 data, 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).
- Beginning in 1994, final consumption by individual sector has been improved due to new survey methods instituted by the *Mineröl*wirtschaftsverband.
- In 1989, end-use consumption of **gas/diesel** oil decreased due to an exceptionally warm winter and a lowering of consumer stocks.
- Prior to 1980 data, consumption of **fuel oil** in blast furnaces was included in the iron and steel sector
- Prior to 1970 data, consumption of **refinery gas** in the chemical industry is included with refineries' own consumption.

Natural gas

Between 2009 and 2010, there is a break in series due to a new, more comprehensive legal framework that resulted in methodological changes for production and new calorific values for natural gas.

Supply

Imports data for 2014p were partly estimated by the IEA Secretariat.

Transformation

Prior to 1995, inputs of natural gas for main activity producer heat plants are included with main activity producer CHP plants.

Consumption

- Between 2006 and 2007, there are some breaks in series due to the fact that information on district heating has become available.
- Since 2003, there are no official data for the construction sector.
- Since 2003, consumption in agriculture and other non-specified, which were previously estimated, are no longer shown, and losses data have been included in statistical differences.
- Since 2003, gas consumption in coke ovens was negligible.
- In 2003, there is a break in series for input to electricity and CHP plants (both autoproducers and main activity producers).
- Between 2002 and 2003, there are breaks in series for some sectors due to modifications in reporting methodology.
- Between 1994 and 1995, there are some breaks in series due to the fact that the industry sub-sector breakdown is based on the 1995 NACE classification.
- Also, prior to 1995, end-use consumption data are based on *Arbeitsgemeinschaft Energiebilanzen*.
- Before 1970 there is no detailed breakdown available for the industry sector with the exception of iron and steel and chemical industries.

Biofuels and waste

- In 2011, numerous changes to methodology and classifications have caused many breaks in series.

- Starting in 2008, **municipal waste** and **industrial waste** data were collected separately. This leads to breaks in the time series between 2004 and 2005.
- Between 1996 and 1997, a new survey for renewables causes breaks in the time series.

Supply

From 2004, trade data for **biogasoline** are available and for **biodiesels** from 2003.

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.
- Prior to 1970, **heat** production and consumption have been estimated by the Secretariat based on Energie-bilanz der Bundesrepublic für das Jahr 1990 provided by the German Institute for Economic Research.

Supply

- In some instances, electricity generation from **nuclear**, **hydro**, **solar**, **wind and biogases** in autoproducer electricity plants is confidential or not available and therefore is included in main activity producer electricity plants.
- Since 2011, due to a reclassification of **wind** energy and **solar photovoltaic** in the official legal data of the German Federal Statistical Office, the production is now only reported under main activity producer plants.
- Electricity production **from other sources** is available starting in 2003. This refers to the production of electricity from turbines which are located at pressure drops in fluid transport and from purchased waste heat.
- Prior to 1991, **electricity** trade data includes only trade of the Former Federal Republic of Germany.
- Data on electricity production from **wind** and **solar** are available from 1986 and 1990, respectively.
- Starting in 1984, small amounts of **heat** have been exported to Denmark.

Transformation

- 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**.
- From 2003 onwards all **heat** production in autoproducers is considered as non-sold (i.e. for self-use) and, therefore, not reported. Inputs for this heat production are no longer reported in the transformation sector.
- 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.
- Prior to 2003, **electricity** production in electricity plants includes production from CHP plants and heat production in CHP plants includes production from heat plants.
- 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.
- A new survey for the renewable products can cause breaks in the time series between 1998 and 1999.
- Prior to 1993, all heat production from **BKB**/**peat briquettes** is included in main activity producer CHP plants.

Consumption

- More information on district heat became available, causing breaks in the time series between 2006 and 2007.
- Data on **geothermal heat** production and direct consumption are only available starting in 2003.
- From 2002, **electricity** consumption in the commercial and public sector includes the construction sector, and the fishing, agriculture and forestry sectors for the whole time series.
- In 2000, revisions from the German administration to the **electricity** consumption data may cause breaks in the time series.
- In 1995, the German Federal Statistics Office reclassified some industrial branches which may cause a break in series in industry sub-sectors.
- Between 1971 and 1980 **electricity** consumption in coal mines includes consumption in coke ovens and BKB plants.

Greece

Source

Ministry for Environment and Energy, Athens.

Oil

General note

- In the 2016 edition, the Greek administration reclassified **gasoline type jetfuel** as **aviation gasoline** starting from 2009 data.
- Between 2012 and 2013, breaks time in series for **biodiesel**, **lubricants** and stocks appear due to the introduction of a new reporting system.

Supply

Crude oil production stopped on 30 November 1998 and started again in December 1999.

From 1986 data onwards, information on **refinery feedstocks** is available

Transformation

From 1990 onwards, there has been an increased use of **refinery gas** in electricity generation, replacing **fuel oil**.

Consumption

- In 2013 data, the drop of **gas/diesel oil** residential consumption is linked with changes in the taxation of heating oil.
- From 1993 data onwards, more information is available on the allocation of **fuel oil** to specific industrial sub-sectors. Fuel oil consumption in the agriculture and residential sectors has been replaced by **gas/diesel oil** starting in 1993.
- Prior to 1987 data, consumption in the commerce/public services sector is included with residential. Peaks in residential sector consumption in 1978 and 1982 are due to unusually cold winters.

Natural gas

General note

Natural gas produced in Greece has a higher than average gross calorific value due to a high content of C_2/C_4 hydrocarbons.

Supply

- In November 1998 the production of natural gas stopped in and started again in December 1999.
- In 1997, Greece started importing natural gas as a result of a new operational pipeline between Russia and Greece.

Consumption

- In 2011 there is a break in series for the non-ferrous metals due to a new methodology for measuring gas consumption in this sub-sector.
- In 1998, consumption in the residential sector is included with commercial/public services.

Biofuels and waste

- New information on **solid biofuels** is available from 1996 and leads to breaks between 1995 and 1996.
- Data for **biogases** are available from 1990 and data for **industrial waste** from 1992.

Supply

Transformation

- The big increase in delivery of **industrial wastes** to autoproducer CHP plant in 2010 is mainly due to the opening of a new plant.
- Inputs of **solid biofuels** to **charcoal** production are estimated for 2007 to 2010 by the IEA Secretariat assuming an efficiency of 40%.
- **Industrial waste** used in autoproducer CHP plants decreased substantially in 2006 because a plant closed.

Consumption

- **Solid biofuel** consumption in commercial/public services is included in residential until 2011.
- The consumption of **solid biofuel** in the paper, pulp and printing industry is not available from 2003 to 2012.

Electricity and heat

Supply

No production of **solar heat** is reported.

Transformation

- In 2008 a new plant using refinery gas started operating in an experimental phase, causing a low efficiency.

- Production and consumption of distributed heat (heat sold) that is produced from lignite is available from 1997.
- Data for **biofuels and waste** input and output to transformation are available from 1992.

Consumption

- In the 2016 edition of this publication, there were revisions on direct use of **geothermal** heat, mainly in the commercial and public services and residential sectors.
- Electricity consumption in road is available from 2013.
- 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.
- Electricity consumption in iron and steel and in the non-ferrous metals industry prior to 1971 has been estimated by the Secretariat.

Hungary

Source

Hungarian Energy and Public Utility Regulatory Authority, Budapest.

General notes

- Data are available starting in 1965.
- The Hungarian administration submitted questionnaires to the IEA Secretariat for the first time with 1993 data.

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**.

Transformation

Autoproducer heat and power plants using **coke oven gas** and **blast furnace gas** were reclassified in 1998 as main activity power plants.

Oil

General note

- Starting from 1998, data for additives and aviation gasoline are available.
- From 1994 onwards, other products include aromatics and other products that were previously included mainly under white spirit.

Prior to 1993, **white spirit** is included in motor gasoline. Data for **refinery gas**, **paraffin waxes** and **lubricants** are partly estimated by the Secretariat.

Consumption

- In the 2016 edition, consumption data for several oil products including **fuel oil, motor gasoline, gas/diesel oil** and **petroleum coke** was revised by the Hungarian administration from 2010 in order to reduce the breaks appearing as a result of the new energy consumption survey introduced in 2014.
- Between 2012 and 2013, breaks remain for some products in flows. In particular, information on the energy use of **naphtha** by the chemical/petrochemical industry is available only from 2013. For prior years, all is reported under non-energy use, except consumption resulting in oil backflows (transformation petrochemical plants).

Natural gas

- Between 2012 and 2013 there are some breaks in series for energy sector, transport and industry consumption due to a new methodology. Historical revisions are pending.
- Between 1996 and 1997 some breaks in series exist due to a new methodology applied by the Hungarian administration.

Transformation

Since 1997 two autoproducer heat plants have been reclassified to main activity producer heat plants.

Consumption

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; **for industrial waste** from 2003; for **biodiesel** production from 2007.

Electricity and heat

Supply

- *Other sources* electricity production is available from 2013 and represents generation from residual tail gases from the manufacturing of soot.
- **Geothermal** heat production from main activity producer heat plants is available from 1995.
- **Nuclear** electricity production in main activity producer electricity plants is available from 1983.
- Transformation
- From 2014 data, more data suppliers were involved in the process, causing new autoproducer series to appear for **geothermal** and **industrial waste** plants.
- In 2014 data, some CHP plants running on **Industrial waste** and **solid biofuels** produced only heat and were reclassified to heat plants.
- 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 subbituminous coal is included with lignite.
- Electricity and heat production from **solid biofuels** in autoproducer CHP plants is available from 1995.
- Autoproducer electricity, CHP, and heat plants using coke oven gas and blast furnace gas were reclassified as main activity power plants in 1998.

Consumption

Direct use of **geothermal** heat is available from 1990.

Direct use of **solar thermal** heat is available from 2001.

Iceland

Source

National Energy Authority, Reyjkavik.

General notes

- Prior to 1970, final consumption includes inputs and outputs to heat production.
- The industrial classifications used by the Icelandic administration were changed in 1987.

Coal

- Hard coal data prior to 1978 may include subbituminous coal.
- Data for Iceland for 2015p have been estimated by the IEA Secretariat.

Consumption:

Final consumption increased in 2000 as a new iron and steel plant came on-line.

Oil

- In 2014, the Icelandic administration revised petroleum coke data from 1990 to exclude imports of anodes for the aluminium industry.
- Oil supply and consumption data for 2008 and 2009 are estimated by the IEA Secretariat.

Biofuels and waste

Data for Iceland for 2015p have been estimated by the IEA Secretariat.

Consumption

- **Biodiesel** consumption in 2014 is estimated by relevant Icelandic authority based on 2013.
- **Biogases** used for transport purposes were reported for the first time in 2007.

Electricity and heat

Supply

The increase in **hydro** and **geothermal** electricity production from 2007 is due to the expansion of the aluminium industry.

Transformation

- The **heat** output from electric boiler was estimated for the years 2012 to 2014.
- From 2013 data, the Hellisheidi **geothermal** power plant, previously reported under main activity electricity plant, was categorised as main activity CHP plant.
- 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.

- Electricity production from **geothermal** sources in main activity producer CHP plants is available from 1992.
- Inputs of **electricity** to *electric boilers* for 2015p were estimated by the IEA Secretariat.

Consumption

- The **geothermal** consumption in the industrial sector is reported under non-specified industry, as the Icelandic Administration decided not to estimate the allocation amongst the sub-sectors of industry.
- There were reclassifications in the direct use of **geothermal** heat in 2014 which create breaks in series between 2013 and 2014.
- **Electricity** consumption in non-specified transport includes consumption for ferries and cruise lines.
- Energy industry consumption of **electricity** refers mainly to the use of electricity by the geothermal industry to pump hot water from underground sources.
- The **heat** consumption breakdown by sector for the years 1990 to 2013 was estimated based on the 2014 breakdown.
- The increase of **electricity** consumption in the construction sector from 2004 to 2007 is due to the drilling of tunnels for the Kárahnjúkar power plant.
- The consumption of **electricity** reported in other non-specified corresponds to a NATO base at Keflavik airport which closed in 2005.
- From 1991, energy industry consumption includes **electricity** used for the transport by pipeline of hot water from Nesjavellir to Reykjavik.
- Prior to 1990, all **heat** for space heating was reported in residential.
- The industrial classifications used by the Icelandic Administration changed in 1987.
- Residential sector includes agriculture prior to 1983.
- Prior to 1970, total final consumption includes inputs to and outputs from **heat** production and non-energy use. After 1970, data on inputs and outputs in CHP plants and in main activity producer heat plants (district heat plants) and for non-energy use are separately specified.

Ireland

Sources

- Department of Communications, Energy and Natural Resources, Dublin.
- Sustainable Energy Authority of Ireland, Cork.

Coal

- Due to confidentiality reasons, inputs of **anthracite**, **other bituminous coal** and **peat briquettes** for patent fuel transformation are reported with residential consumption, while production and consumption of **patent fuel** is not reported.
- Prior to 1990, possible imports of **BKB**, if present, are included with imports of **peat products**, as is the case for consumption.

Supply

- Production data for **peat products** (briquettes) are available from 1975.
- Low production of **peat** in 1985 was due to a poor "harvest", as was the case in 2012 where record lows were due to an unusually wet summer.
- 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. In 2013, production targets were met before the end of the year however production continued in order to further build stocks to alleviate the potential impacts of future weather events.
- The country of origin for imports of **other bituminous coal** is known for 2015p, but unavailable for reasons of confidentiality.

Transformation

- 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.

Oil

- From 2010, *receipts from other sources (natural gas)* of **other hydrocarbons** correspond to hydrogen used in refineries, also represented as the output of non-specified transformation processes in the balances format.
- For confidentiality reasons, inputs of **petroleum coke** into patent fuel transformation are reported with residential consumption.

Consumption

- In 2014, the drop of **fuel oil** consumption in non-metallic minerals sector is linked with the replacement of HFO boilers by natural gas boilers as the primary source of steam for alumina production.
- In 2013 and 2014, **bitumen** consumption data is not available and calculated as residual.
- Between 2008 and 2009, there is a break in series for **gas/diesel oil**, **LPG**, **kerosene type jet fuel** and **petroleum coke** due to a new methodology being applied to sectoral demand by Sustainable Energy Ireland (SEI). This change also explains breaks between 2006 and 2007 for **bitumen**, **lubricants**, **white spirit**, and **paraffin waxes**.
- Between 1989 and 1990, breaks in time series appear for consumption of **gas/diesel oil**, **LPG**, **other kerosene** and **fuel oil** as a result of a detailed consumption survey done for 1993. Data for historical years back to 1990 were revised by the national administration based on the results of this survey.
- From 1986, **gas/diesel oil** consumption in the agricultural sector is available.
- From 1970 to 1977, the split between commercial and public services and agricultural use of **other kerosene** has been estimated by the Secretariat. Consumption in commercial/public services includes quantities used by state-owned agricultural companies.

Natural gas

Supply

Since 1996, the increase in imports is due to the depletion of the Kinsale gas field and the availability of a new pipeline system to the United Kingdom.

Transformation

Since 2006, a different methodology for allocating unsold steam from autoproducer CHP is used. *Non specified transformation* corresponds to natural gas blended with refinery gas.

Consumption

- In 2011 the increase in non-ferrous metals consumption is due to a fuel switch to natural gas.
- In 2007 the increase in machinery consumption is due to changes in industry sub-sector structure and fuel usage.
- In 2004, there is a break in series in food, beverages and tobacco consumption due to a change in methodology.
- In 2003, feedstock use in the petrochemical industry stopped due to the shutdown of a fertiliser plant.
- In 2001, natural gas consumption in the iron and steel industry stopped due to the shutdown of Ireland's main steel plant.
- Prior to 1986, detailed consumption figures for the use of natural gas in industry and other sectors are not available.

Biofuels and waste

Data for **municipal waste** are available from 2009.

Data for **solid biofuels** and **biogases** are available from 1990.

Supply

Prior to 2011, production and trade of **biogasoline** and **biodiesels** cannot be distinguished due to confidentiality issues.

Transformation

In 2012 and 2013, the renewable fraction of tyre-derived fuel (12%) used by a cement plant was reported by the Administration under **renewable municipal waste**; the non-renewable fraction (88%) was reported under **industrial waste**.

Consumption

The consumption of pure **biodiesel** in the industry sector and on the road referred to one site, which did not consume biodiesel in 2014.

Electricity and heat

Supply

Electricity production from **wind** begins in 1992 and from **biogases** in 1996.

Transformation

- In the 2016 edition, revisions were introduced in the **electricity** generation by fuel from 2010 due to improved data available from the transmission system operator.
- In 2012 a new main activity electricity plant burning **municipal waste** (the Meath plant) started operation.

From 1984 to 1989, inputs of **hard coal** in autoproducer CHP plants have been estimated by the Secretariat.

Consumption

- In 2004, the increase of **electricity** consumption is due to the new light rail transit system in Dublin.
- 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.
- Prior to 1990, **electricity** consumption in agriculture is included with residential.
- **Electricity** consumption in the iron and steel industry includes consumption in the non-ferrous metals industry prior to 1990.
- Direct use of **solar thermal heat** is available from 1990.

Israel

Source

Israel Central Bureau of Statistics, Jerusalem.

General notes

- 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.
- Due to the unavailability of data for certain fuels, IEA estimations are also present in Israel data. In particular this is valid for oil data in 2014, **natural gas** data from 2012 onwards, **renewables and waste** data in 2013.

Coal

Israel was unable to provide data for 2015p. These data have been estimated by the IEA Secretariat.

Oil

- Oil data for 2014 are estimated by the IEA Secretariat based on the fuel consumption report from the Ministry of National Infrastructures, Energy and Water Resources, the financial reports of the refineries as well as the electricity inputs submitted to the IEA Secretariat.
- Supply and consumption of kerosene type jet fuel for 2011 and 2012 have been estimated by the IEA Secretariat.
- From 2007 to 2009, oil data are estimated by the IEA Secretariat based on information from the Ministry of National Infrastructures.

Supply

From 2010 onwards, white spirit is included in other products.

Consumption

From 2013, consumption data are based on a new and detailed classification system and on estimations made by the Israeli Administration.

Natural gas

From 2012, all natural gas data, except inputs to electricity production, were estimated by the IEA Secretariat.

Supply

Imports of natural gas began in 2008.

Biofuels and waste

Data for Israel for 2015p have been estimated by the IEA Secretariat.

Consumption

Imports and consumption of **charcoal** were estimated since 2012 based on figures for 2011.

Electricity and heat

Supply

Electricity production from **wind** begins in 2001.

Transformation

- For 2013 and 2014, **other oil products** inputs to autoproducers electricity plants were estimated by the IEA Secretariat.
- Input to transformation for **biogases** for 2013 and 2014 was estimated by the IEA Secretariat.

Consumption

For 2013, the split of **electricity** consumption in industry is estimated by the IEA Secretariat.

- **Solar thermal** production and direct consumption are estimated since 2012 based on 2011.
- **Electricity** own use, as well as transmission and distribution losses were estimated by the IEA Secretariat from 2010 to 2012.

Italy

Source

Ministry of Economic Development, Rome.

Terna, Rome.

General note

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.
- Due to a change in the survey system, breaks in series may occur between 1997 and 1998 for final consumption.
- 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, and coke oven efficiencies will likewise appear lower than actual.

Transformation

- Reported production of **blast furnace gas** and **other recovered gases** are inputs for electricity generation or CHP. Production of **blast furnace gas** and **other recovered gases** used elsewhere in the iron and steel industry are not reported. As such, reported production and consumption data are lower than actual. Normalisation of blast furnace efficiencies will result in inputs of **coke oven coke** and **other bituminous coal** (PCI) to blast furnaces being lower than reported, with these relocated portions reported alongside generic consumption in the iron and steel industry instead.
- For data since 2001, calorific values for imports of **other bituminous coal** and **sub-bituminous coal** are derived from inputs to main activity electricity generation.
- Prior to 2009, sub-bituminous coal used in main activity electricity plants was included with other bituminous coal.Consumption:
- 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.

Oil

General note

- For **crude oil**, statistical difference may arise as trade corresponding to stock held for Austria and Germany in the Port of Trieste are not included.
- 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*. .

Supply

- From 2009 onwards, transfers of **lubricants** could not be disaggregated from refinery output data.
- From 2004 onwards, increased production of **non-specified oil** products is due to methodological changes.
- A new survey to determine the split between international marine bunkers and domestic navigation caused a break in series for **gas/diesel oil** in 1999 and **fuel oil** in 1996.

Consumption

- For **gas/diesel oil**, non-specified use is included in commercial/public services.
- Between 1998 and 1999, due to new surveys, breaks appear in the consumption series.

Natural gas

Transformation

- Prior to 2008, inputs of natural gas to all heat production in industry were reported in final consumption.
- From 2000 to 2002, for confidentiality reasons, autoproducers are included in main activity producer plants.
- In 1996 the production of gas works gas from natural gas ceased.

Consumption

Since 2007, a more detailed breakdown of consumption for energy industry own use is available.

Biofuels and waste

Supply

Biogasoline includes **bio-ETBE**.

From 2014 edition of this publication, the distinction between trade and production became available for **other liquids biofuels**.

Transformation

In 2008, data for **biofuels and waste** were reclassified, which results in several breaks in the time series for transformation.

Consumption

In the 2016 edition, a methodology used to calculate **solid biofuels** consumption in the residential sector for 2002 to 2014 was updated and this creates a break in series between 2001 and 2002. This also affects the indigenous production of **solid biofuels**. The revisions were limited backwards to 2002 because of reliability issues.

Electricity and heat

Supply

- 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.
- 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.

Transformation

- The methodology of data collection for the **geothermal** sector changed in 2010, causing a break in time series between 2009 and 2010.
- Prior to 2009, sub-bituminous coal used in main activity electricity plants was included under other bituminous coal.
- 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.
- Prior to 2004, electricity production from orimulsion is confidential and is included with fuel oil.
- Heat production is reported starting in 2004 and includes self-generation in industry.
- 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.
- The breakdown of renewables and waste inputs into electricity, heat and CHP plants is available from 1989 only. Prior to that year, the total of the different fuels involved is reported as non-specified renewables.
- Prior to 1984, net electricity production by autoproducers includes production from combustible fuel sources only.

Consumption

- *Non specified 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.
- From 1981, consumption of electricity in transport includes electricity used for pumping in oil pipelines.

Japan

Source

The Institute of Energy Economics Japan, Tokyo.

General notes

- Starting in 1990, data are reported on a fiscal year basis (e.g. April 2014 to March 2015 for 2014).
- Between 2004 and 2007, a series of revisions were received from the Japanese Administration. 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.
- 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 past two editions, imports of other bituminous coal and coking coal from partner countries have been estimated by the IEA Secretariat for the period 1990-2015p, based on customs data and total imports by coal type.
- 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 net calorific values for coal and coal products have been recalculated by the IEA Secretariat based upon gross values submitted by Japan.

Supply

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.

Transformation

- 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 (**coke oven gas**, **blast furnace gas** and **other recovered 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.
- Coal injected in blast furnaces (PCI) is classified as **coking coal** in order to be consistent with Japanese trade statistics.

Oil

- In this edition, the Japanese Administration revised several NCVs of both primary and secondary oil products back to 1990. The Japanese administration reviews calorific values every 5 years, with the other most recent revisions occurring in 2005 and in 2013.
- In this edition, the Japanese Administration revised several consumption flows. Based on publicly available information, final consumption data in the Energy Balance Table is now based on a new annual survey. From 2005, consumption data are derived from this new survey, while prior to 2005 data are estimated based on the 2005 data.

Supply

- The high statistical difference for crude oil in 2013 and 2014 is explained by large amount of stocks held on board incoming vessels in port or at moorings in March 2014 (end of Japan’s 2013 financial

year). These amounts are included in the stock change but not in the imports in 2013 annual data.

- Orimulsion was imported for electricity generation between 1991 and 2006.

Transformation

Other hydrocarbons in non-specified transformation represents orimulsion burnt for power generation. Historical revisions are pending.

Consumption

- In this edition, the Japanese Administration revised Road consumption, which is now based on the "Automobile fuel consumption survey" from the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). In the past, the "Statistical report on motor vehicle transport" (from the same Ministry) was used.
- Lubricants consumption is estimated by the Japanese Administration since 2000.

Natural gas

Since 1990 most of the gas works gas production and consumption has been included with natural gas.

Biofuels and waste

- There was a large revision in **municipal waste** data in the 2016 edition of this publication. This revision has removed data for **municipal waste** for the entire time series up to 2010, which create breaks in series between 2009 and 2010 and explains why **municipal waste** is at zero before that.
- For **municipal waste** data, the breakdown between renewable and non-renewable **municipal waste** is estimated by the IEA Secretariat.

Supply

Stock changes in **industrial waste** represent stocked tires on the consumer side reserved for energy production.

Transformation

- Inputs of **solid biofuels** to **charcoal** production are estimated by the IEA Secretariat assuming an efficiency of 40%.
- The **industrial waste** consumption in *the transformation sector (non-specified)* surged in 2013, because of the increase in use of waste plastics for coke production increased.

Electricity and heat

Supply

- Due to the events related to the March 2011 tsunami, the Japanese authorities decided to scale back the level of their **nuclear** program. As a consequence, there was no nuclear electricity generation in 2014. The nuclear electricity generation started again in 2015 and appears in 2015p data.
- **Other sources** electricity represents electricity generated with purchased steam.
- Production of electricity from s**olar photovoltaic** and **wind** in autoproducer electricity plants is understated as it covers only plants with capacity higher than 1000 kW.
- The Japanese administration estimate the electricity input of **electric boilers** based on 100% efficiency.
- The IEA Secretariat estimated the **photovoltaic** (PV) electricity generation from autoproducers from 1992 to 2015p 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 2015. 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.
- Production of electricity from **wind** began in 1993.
- Heat produced for sale in main activity producer heat plants from **waste heat** and from **electric boilers** is available from 1977 and 1983, respectively.

Transformation

- Data on **heat** produced for sale by autoproducer heat plants are not available.
- Fuels used and corresponding 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.
- Heat production from **geothermal** and **solar thermal** sources in Japan is not reported by the Japanese administration.

- The production of electricity from **solid biofuel** is reported from 2010.
- 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**.
- Inputs of **biofuels and waste** for electricity production and related outputs are available from 1982.
- Net electricity production by autoproducers prior to 1982 includes production from **combustible fuel** sources only.
- Between 1972 and 1976, the use of **combustible fuels** in main activity producer heat plants is included in non-specified.

Consumption

- 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.
- In the 2016 edition, the consumption of **electricity** in the *industry* and *other sectors* was entirely reviewed due to the revision of the METI-EBT, which replaced the previously used estimation method by statistical surveys covering data from 2005. The data prior to 2005 was estimated by the Japanese administration based on 2005.
- Consumption of **electricity** in *non-specified industry* includes wood and wood products and construction prior to 1982.

Korea

Source

- Korea Energy Economics Institute, Ulsan.
- Korea National Oil Corporation, Ulsan.

General notes

- 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 **sub-bituminous 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.
- **Coal tar** production data prior to 2007 are not available at this time.

Transformation

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.

Consumption

- 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.

Oil

Consumption

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

Natural gas

Consumption

- Energy industry own use in liquefaction plants includes losses and measuring errors.
- Prior to 2007, consumption of natural gas in machinery was included with transport equipment.

- From 1987 to 1991, the breakdown of final consumption has been estimated by the IEA Secretariat, as well as the residential subsector for 1992.

Biofuels and waste

- 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.
- Heat data are available starting in 1993.

Transformation

- In 2007, some main activity heat plants and autoproducers in the commercial/public services sector were reclassified as main activity CHP plants, resulting in 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.

Consumption

There were re-classifications in consumption which create breaks in series between 2013 and 2014 in industrial waste, solid biofuel and biogases.

Electricity and heat

Supply

- The own use of **heat** in heat plants is very irregular due to a lack of data.
- Electricity generation reported under **other sources** is from fuel cells.
- **Heat from chemical processes** that is sold is available from 2008.
- Electricity production using **heat from chemical processes** in copper and zinc plants is available from 2005. The corresponding heat inputs were estimated until 2013 data. In 2014 the corresponding company switched to diesel oil for electricity generation.

Transformation

- From 2011 to 2013 data, the input **of industrial waste** to electricity and heat includes waste gas.
- Prior to 2009, autoproducer **heat** production includes amounts of unsold heat.
- Electricity and heat production by autoproducers using **natural gas** and **liquid fuels** are available from 2000.
- In 2000, the Korean administration started to report **heat** statistics for some heat plants which were not reported before.
- For 1993 to 1999, the breakdown of **heat** output by type of fuel has been estimated by the IEA Secretariat.
- Before 1994, **electricity** production from main activity producer CHP plants is included with main activity producer electricity only plants.

Consumption

- **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.
- **Heat** consumption by subsector was reclassified in 2010 due to new information available on heat sales from autoproducers to end-users by sector.
- 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.
- Production and consumption of **electricity** and **heat** in *oil refineries* and *LNG liquefaction/regasification* plants are included in the *industry* sector. From 2007, oil refinery **electricity** and **heat** production and consumption started to be reported under the correct energy sector.
- Direct use of **geothermal heat** is available from 2002.
- **Heat** consumption by sector is available from 2000.
- Data for **electricity** consumption in the transport equipment sector are included in machinery from 1994 to 1999.

Luxembourg

Source

STATEC, Institut national de la statistique et des études économiques du Grand-Duché du Luxembourg, Luxembourg.

Coal

- For the 2011 edition, the Luxembourgian administration revised the time series from 2000 for most **coal** and coal products. Time series for **BKB** consumption were revised from 1990.
- Prior to 1978, some **sub-bituminous coal** may be included in **hard coal**.
- Steel production from blast furnaces ceased at the end of 1997.

Natural gas

In 1982 there is a break in series in transformation and industry due to a change in methodology.

Transformation

Since 2002, the increase in the transformation sector is due to a new 350-MW combined cycle power plant.

Consumption

- The breakdown of *total final consumption* for the latest year is preliminary and will be finalised in the next edition of the book.
- Since 2012, methodology to determine final consumption was changed in order to integrate basic data from National Accounts.
- Since 2000, a more detailed breakdown of final consumption data is available due to a change in methodology.
- Since 2000 consumption in the non-ferrous metals sub-sector is included in iron and steel for reasons of confidentiality.
- Prior to 2000 residential consumption includes consumption in commercial/public services and agriculture/forestry.

Biofuels and waste

- Data on **solid biofuels** are available from 1992.
- The Luxembourgian administration changed the reporting methodology of **solid biofuels** starting with 2015p data. The trade figures of wood chips are included in solid biofuels in 2015p data. This creates breaks in time series between 2014 and 2015p.

Transformation

In 2011, the blending of **biogases** with **natural gas** started.

Electricity and heat

- Data for **solar thermal** are available starting in 2001 and for **solar PV** starting in 2000.
- A revision in the classification of power plants by type and the production and consumption data for both **electricity** and **heat** back to 2000 causes breaks in the time series.

Supply

- Most of the **hydro** production shown for Luxembourg is from the Vianden pumped storage plant and is exported directly to Germany.
- Starting in 2005, data for **electricity** transmission and distribution losses were obtained from the network operator. Prior to that, they were estimated by the national administration.

Transformation

- The production of electricity from **solid biofuel** starting in 2013 corresponds to the opening of a new plant burning wood wastes.
- In 2011, the only main activity electricity plant consuming **natural gas** met the requirements to be reclassified as a CHP plant. The plant went offline for some months in 2013.
- Electricity production from **biogases** is available from 1998 and heat production from 2010.
- In 2002, the increase in electricity production is due to a new **natural gas** combined cycle power plant.
- At the end of 1997, the iron and steel industry stopped production of **electricity**.
- Electricity data for **natural gas** autoproducer CHP plants are available starting in 1995, and for main activity CHP plants starting in 1996.
- Prior to 1990, **net electricity** production by autoproducers includes production from combustible fuel sources only.

Consumption

- A change in the data source caused some breaks in the industry **electricity** consumption time series between 2010 and 2011.
- The breakdown of **electricity** consumption in industry is not available from 1990 to 1999.

Mexico

Source

Secretaría de Energía, Mexico City.

General notes

- Data are available starting in 1971.
- 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. For prior years, data are partly estimated based on the publication *Balance Nacional - Energía*.
- In the 2016 edition, the Mexican administration completed a major work on revisions of the time series back to 1990. More revisions to historical data are pending.

Coal

- The Mexican administration is currently undertaking major work on revisions of the time series back to 1990. For several products, only revisions back to 2003 have been provided. Some of these revisions could not be implemented in the 2016 edition. Further revisions to historical data are pending. Revisions for some products include reporting of new consumption flows, increased quantities of coal and higher calorific values, resulting in increases of total primary energy supply.
- **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.
- Prior to 2003, **other bituminous coal** is either reported as **coking coal** or **sub-bituminous coal**, depending upon usage, while **anthracite** and indigenously produced **lignite** were included with **sub-bituminous coal**. Calorific values currently in use may not accurately reflect any of this.

Consumption

- Use of pulverised coal injection in blast furnaces occurs in Mexico, but is not currently reported.
- Oxygen steel furnace gas production and production of other **other recovered gases** occur as by-products of heavy industry, but are not reported**.**

IEA estimations

- In the 2015 edition, substantial revisions were submitted by Mexico on **coal** data, but were only able to be incorporated for 2013 data, and 2014 provisional data were required to be estimated by the IEA Secretariat. In this 2016 edition, further revisions from Mexico have been incorporated to all products, mostly for the period 2003 to 2014, but some revisions track back to 1990, and some IEA estimates are also present in Mexico's **coal** data, which are detailed in the following points.
- **Other bituminous coal** imports and consumption in main activity electricity generation for 2003 to 2014 have been moved from **coking coal** where they were reported by Mexico in this submission. (Previously Mexico had reported this coal as **sub-bituminous coal**).
- Imports by country of origin for other **bituminous coal** and **coking coal** are based off partner data and splits provided in earlier cycles.
- **Coke oven coke** production was estimated by the IEA for some years between 1999 and 2012 based off historical and commodities data, as were inputs of **coking coal** to coke ovens between 1990 and 2012.
- Current Mexican methodology estimates production of **coal tar** and **coke oven gas** using **coke oven coke** production as a guide. This was extended for 1990 to 2001 and for years where **coke oven coke** production was estimated by the IEA.
- **Blast furnace gas** production and consumption have been estimated by the IEA based on inputs of **coke oven coke** to blast furnaces in a ratio provided by Mexico, as are the proportions of **blast furnace gas** consumed in autoproducer electricity production, energy support for blast furnaces and consumption elsewhere in the iron and steel industry.
- Trade of **coking coal** and **other bituminous coal** were estimated by the IEA Secretariat based on partner data for 2015p. Consumption data were also estimated for these coal types, as was production and consumption of **blast furnace gas**.

Oil

- In the 2016 edition, major revisions were carried by the Ministry of Energy on the time series back to 1990 based on updated information available from PEMEX, the Mexican Institute of Petroleum and the Federal Electricity Commission (CFE). Revisions include notably crude production, refinery output, gas separation plant production,

autoproducer generation and road consumption. They lead to higher statistical differences for crude oil between 2001 and 2008.

- New data reported in **additives oxygenates** from 1990 corresponds to methyl tertiary butyl ether.
- From 1993 data, *receipts from other sources (natural gas)* of **other hydrocarbons** correspond to hydrogen used at the Minatitlan refinery, also represented as the output of non-specified transformation processes in the balances format.
- The split between domestic and international aviation consumption of kerosene type jetfuel is not available. By default, all **kerosene type jet fuel** consumption is reported under international aviation.

Supply

- **NGL** production reported in the IEA publications may be different from what is reported in the Mexican energy publications as the IEA includes in its oil data liquids produced in conjunction with natural gas.
- In the 2016 edition, **crude oil** production was revised from 2000 to 2004 based on updated information from PEMEX.
- In the 2016 edition, main revisions were carried to **NGL**, **LPG**, **naphtha**, **ethane** supply. New data became available on input of NGL to refineries prior to 2011. Data on ethane production from gas separation plants (positive transfers from NGL) was revised upwards for 1990 to 1998. LPG gas separation plant production was revised down. Naphtha refinery output was revised upwards from 1990.

Transformation

- In the 2016 edition, data for crude oil refinery input and refinery output of **gas/diesel**, **naphtha**, **refinery gas**, **bitumen**, **paraffin wax** and **other products** were revised back to 1990 (see general note).
- In the 2016 edition, data for **fuel oil** and **gas/diesel** inputs to autoproducer CHP generation became available from CFE from 1999.
- In 2003, a new facility was added to a refinery to produce **petroleum coke.**

Consumption

- In the 2016 edition, **naphtha** non-energy use consumption in the chemical/industry was revised significantly revised down from 1990 to 2008 based on PEMEX information.
- In the 2016 edition, **gas/diesel** and **motorgasoline** road consumption data was revised back to 1990 based on updated information from the Mexican Institute of Petroleum and PEMEX.
- Consumption of **lubricants**, **bitumen** and **paraffin waxes** are available from 1990 and **petroleum coke** from 1993.
- Prior to 1987, the split of **LPG** consumption between residential and commercial/public services has been estimated by the IEA Secretariat.

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.

Consumption

- Losses and pipeline transport have been included in oil and gas extraction.
- From 1993 to 1999, part of energy industry own use and *non-specified industry* data were estimated.
- Since 1993, the breakdown of the energy sector and of other sectors is available.

Biofuels and waste

Supply

Data for **bagasse** production is available from 2008.

Consumption

- 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.

Electricity and heat

Supply

- Production of main activity producer electricity plants from **wind** is available from 1994.
- Electricity production from **wind** and **solar photovoltaic** is available from 1990.

Transformation

- New autoproducer electricity plants fuelled with **coke oven gases** were put on-line in 1999.

- Electricity production from **solid biofuels** and **biogases** are available respectively from 1991 and 1997.

Consumption

- 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

Source

The Netherlands Central Bureau of Statistics, The Hague.

General notes

- The Netherlands Central Bureau of Statistics has conducted reviews and revisions of their energy balance three times; in 2005, 2011 and 2015. The 2005 revisions were to improve basic energy statistics, particularly with respect to carbon and CO_2 reporting, while the 2011 revisions were part of a harmonization program with international energy statistics. The 2015 revisions were the result of increased data collection, availability of new source information, and further alignment with international energy definitions. More details are available here: http://www.cbs.nl.
- 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 passing through these ports is intended for consumption in European countries other than the Netherlands, so constitutes neither the country of origin or destination and this data has been removed where possible.

Supply

- In the 2015 edition, a conscious decision was made by the Central Bureau of Statistics to move away from accounting for transit, to align more closely with gross trade data, as can be seen with the very large increase in both imports and exports of **other bituminous coal** in 2013 and 2014. Additionally, the majority of **coking coal** imports and exports are similarly included within **other bituminous coal** trade figures.
- In the 2013 edition, non-specified exports for 2011 were estimated by the Central Bureau of Statistics due to a lack of information from key market players.
- For data prior to 2011, stock changes for primary coal types were estimated by the Dutch administration based on trade and consumption data.
- For 1984 to 1986, production *from other sources* of **other bituminous coal** represents a stock of "smalls" washed for re-use.

Consumption

Prior to 1989, non-energy use is included with industry consumption.

Oil

- Data for gas/diesel road consumption become more difficult to collect in 2013, as the distinction in taxation between road diesel and gasoil was abolished.
- 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.

Consumption

Refinery gas includes chemical gas and is included in chemical industry consumption.

Natural gas

Supply

- In the past, the amounts reported under *production* also included quantities coming from *stock changes*. The reason was that the Dutch Administration could not distinguish between quantities of **natural gas** falling under marketable production and amounts being moved from offshore fields to onshore fields without undergoing any purification

and/or other necessary production processes. The Dutch Administration informed the IEA Secretariat that starting from 2015p the data reported distinguish between amounts to be reported as *production* and amounts that should be classified as *stock changes*.

Transformation

- The 2009 increase in input to main activity electricity consumption is due to the opening of a new plant in the second half of 2008.
- The 2008 increase in input to autoproducer CHP plant is due to a new autoproducer CHP plant which came on-stream.

Consumption

- Since 1988, commercial/public services consumption includes other non-specified consumption.

Biofuels and waste

Supply

- From 2009 to 2012, and again in 2014 the production and trade of pure **biogasoline** were confidential; net imports were estimated by the Dutch administration based on consumption.

Transformation

- Trade data for **municipal waste** are available from 2011.

Consumption

- From 2014, a better allocation of heat own use was available for **biogas** digester prewarming, and in **municipal waste** burning plants for flue gas cleaning.
- The final consumption of **solid biomass** in the residential and agriculture sector increased due to the results of new surveys and more precise |parameters.

Electricity and heat

Supply

- The decrease of electricity produced from **nuclear** in 2013 data is due to a maintenance period of two and a half months of one nuclear power plant in this year.
- Heat used for electricity production represents waste heat bought from other industries that was generated from **combustible fuels**.
- Electricity **from other sources** represents generation from expansion gases and chemical waste gases (the latter up to 2007).
- The large increase in **electricity** trade in 1999 is due to the liberalisation of the Dutch electricity market. Until 2003, trade data are based on contracted quantities instead of physical flows.
- The decrease of electricity produced from **nuclear** in 1997 is due to the closure for five months of one nuclear power plant.
- Electricity production from **solar photovoltaic** is available from 1990.

Transformation

- **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.
- Autoproducers heat plants using **refinery gases** are included with autoproducers CHP plants because data are considered confidential.
- **Heat** production in commercial and public services includes production in agriculture.
- All **municipal solid waste** autoproducer electricity and heat only plants have been reclassified by Statistics Netherlands as autoproducers CHP from 2012, causing breaks in the time series.
- Prior to 2008, a few small autoproducer electricity plants using **solid biofuels** were included with main activity plants for reasons of confidentiality.
- In 2006, some **municipal waste** plants changed ownership and were reclassified from electricity only to CHP plants as they started heat projects.
- A new main activity producer CHP plant fuelled by **refinery gas** started up in 1999 and there was a fuel reclassification in 2000.
- 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.
- Net **electricity** production by autoproducers in the energy industry is not available prior to 1993.
- Heat produced from **biofuels and waste** is available from 1990.
- Prior to 1990, all electricity and heat produced from **coal** is included in CHP plants.

- Inputs of **hard coal** for electricity production from 1981 to 1989 in terajoules (TJ) are estimated by the Secretariat based on data submitted in kilotonnes (kt) by the Dutch Administration.
- Net electricity production by autoproducers prior to 1988 includes production from **combustible fuel** sources only.
- **Heat** production by fuel in heat plants prior to 1987 are estimated by the Secretariat based on fuel inputs submitted by the Dutch Administration.
- **Heat** production from main activity producer CHP plants and heat plants is available from 1982.
- Prior to 1982, **electricity** production from and inputs to main activity producer CHP plants are included with main activity producer electricity plants.
- For 1970 to 1973, **electricity** output from autoproducer CHP plants has been included with main activity producer CHP plants.

Consumption

- **Electricity** consumption in *commercial and public services* includes small users from other sectors.
- Increasing **electricity** consumption in *agriculture/ forestry* is due to expansion of greenhouse farming.
- 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 Netherlands. 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.
- A new reporting methodology starting in 2005 causes breaks in the heat consumption series.
- Prior to 1979, **electricity** consumption in agriculture is included in commercial and public services.

New Zealand

Source

Ministry of Business, Innovation and Employment, Wellington.

General note

Prior to 1994, data refer to fiscal year (April 1993 to March 1994 for 1993). From 1994, data refer to calendar year.

Coal

- In the 2014 edition, the definition of **hard coal** was aligned with the International Recommendations for Energy Statistics. 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, and is used for agricultural purposes only.
- In the 2011 edition, the New Zealand administration has revised some of the **coal**, natural gas, oil, renewable and electricity time series back to 1990.

Supply

- A detailed breakdown of exports of **coking coal** by country of destination between 2001 and 2011 is estimated by the IEA, based on secondary sources and partner data.

Transformation

- **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.

Consumption

- In 2014, the increase in consumption of **sub-bituminous coal** in mines included the combustion of some unsold coal fines for safety reasons.
- In final consumption, some industry data are reported in non-specified industry for confidentiality reasons.

- Prior to 2010, construction is included with commercial/public services.
- Prior to 2009, mining and quarrying is included in agriculture.

Oil

- From 1998, **gas/diesel oil** includes light fuel oil. Until 1997, light fuel oil is under fuel oil.
- Until 1997, **other hydrocarbons** from natural gas sources correspond to synthetic gasoline production (ceased in February 1997).
- For reasons of confidentiality, beginning in 1994, the New Zealand administration no longer reports data on the production of methanol.

Supply

Between 2013 and 2014, the jump in imports of **jet-kerosene type jetfuel** can be explained by an anticipated strike at the refineries.

Consumption

- Between 2009 and 2010, a break in time series appears for demand of **gas/diesel** as the administration changed its methodology for commercial/public services
- For 1960 to 1973, Consumption data have been estimated by the Secretariat.

Natural gas

Transformation

- The large 1998 increase in input to autoproducer CHP plants is due to two new autoproducer CHP plants.
- In February 1997, production of synthetic gasoline from natural gas ended.

Consumption

- In 2014, non-energy consumption in the Chemical sector ran at full production for the first time in several years (mainly methanol production). This increase approximately matches the increase in natural gas production.
- Between 2012 and 2013 there are breaks in series for the final consumption breakdown due to the introduction of a new survey.
- In 2005, the decline in chemical industry consumption was due to the closure of the Motunui methanol production plant, which was then reopened in late 2008.
- Prior to 2003, gas consumed in industry includes some gas for energy industry own-use. Since 1990, detailed consumption breakdown for industry is available. From 1977 to 1979 and from 1986 to 1989, losses are included in statistical differences.

Electricity and heat

There are several breaks in the series between 1987 and 1988 due to a reorganisation of government departments during 1987.

Supply

- **Heat** outputs from main activity and autoproducer CHP plants are not available.

Transformation

- **Electricity** and **heat** production from **other sources** represents waste heat recovered and used for electricity production.
- For 2002 and 2003, **natural** gas autoproducer electricity includes generation of **electricity** from on-site heat/steam recovery during the combustion of carbon monoxide (CO) gas from the iron making reduction and melting process.
- In 1999, a reclassification of autoproducer plants causes some breaks in the time series.
- 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.
- **Electricity** production by autoproducers from **natural gas** and from **oil** has been estimated by the Secretariat from 1970 to 1973.

Consumption

- A new survey starting from the 2013 data can cause breaks in the final consumption of **electricity**.
- Direct use of **geothermal heat** is available from 1990 and direct use of **solar thermal heat** from 2002.
- From 1974 to 1993 distribution losses include the statistical differences.

- The classifications used by the administration of New Zealand were changed in 1991.
- Electricity consumption in paper, pulp and printing is included in wood and wood products prior to 1990.

Norway

Source

Statistics Norway, Oslo.

Coal

Other bituminous coal includes lignite.

Production of **coking coal**, **coke oven coke** and **coke oven gas** ceased in the late 1980s.

Supply

- The decrease of **other 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

- A major project is being carried by Statistics Norway in order to reduce the statistical differences observed between calculated supply and demand of oil in Norway. In the 2016 edition, new methodologies have been introduced for reporting crude oil, NGL and naphtha (see details below). Balances for motorgasoline, gas/diesel oil, kerosene type jet fuel an fuel oil are also under investigation.
- The IEA Secretariat estimates the net calorific value for Norwegian crude oil based on the oil product outputs of the oil refineries.
- Prior to 1990, **ethane** is included with **LPG**.

Supply

- **Crude oil** production includes condensates.
- Starting with 2014 data, Statistics Norway has changed the source for annual **crude oil** exports to include shipping information collected by the National Petroleum Directorate. Due to data unavailability, monthly export data remain based exclusively on Customs Statistics are significantly lower for 2014.
- Starting from 2014 data, there is a break in **naphtha** supply time series due to a change in reporting methodology adopted by Statistics Norway.
- Prior to 2002 data, part of **LPG** exports was reported as **NGL** exports
- Since 1986, imports of **refinery feedstocks** are reported under the relevant oil product imports.

Transformation

- From 2014 data, the breakdown between **crude oil** and **NGL** refinery intake is available in annual data.
- In 2014, the strong decrease in **crude oil** refinery intake is linked to heavy maintenance work carried in the refineries in fall 2014.
- Starting with 1990 data, **gas/diesel oil** used for autoproduced electricity on oil and gas platforms are reported under energy industry own use.
- From 1970 to 1975, **gas/diesel oil** for electricity generation have been estimated by the Secretariat.

Consumption

- Data on naphtha consumption in Norway is currently unavailable.
- Consumption of lubricants is reported in the industry, as no further breakdown is available.
- In 2005 data, breaks in petroleum coke consumption time series appear due to reallocation in the industry sector. Refinery fuel is reported from 2001 data.
- In 2003 and 1993 data, breaks in time series appear for consumption in the chemical/ petrochemical industry due to newly available information.
- Prior to 2000, gas/diesel oil used in fishing is included in agriculture/forestry.

Natural gas

For Norway, supply of natural gas is the residual of two very large and opposite amounts: 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.

Supply

- Since 2008 data on stocks are available.

Transformation

- Since 2007, gas inputs to all electricity and CHP plants are included in autoproducers electricity plants for confidentiality reasons.

Consumption

- Prior to 2008, natural gas amounts used in gas extraction by offshore platforms were not included in production data.
- Since 2002 domestic navigation is included under *non-specified transport.*
- The 2007 increase in *non-specified transport* is due to the wider use of gas-powered sea vessels.
- Before 2000, energy use in oil and gas extraction also included some final consumption amounts.
- In 1992 the increase in oil and gas extraction is due to the start-up of new fields.
- Consumption for pipeline transport is included in energy industry own use.

Biofuels and waste

- Data for industrial waste and biogases are available from 1991.
- Prior to 2007, equal shares of renewable and non-renewable municipal waste were estimated because the actual split was not known.

Supply

- In 2014, the **biodiesel** production facility closed.
- **Liquid biofuels** imports are available starting in 2006.

Consumption

Distribution losses for **biogases** are included in commercial/public services prior to 2003.

Electricity and heat

Supply

- No data on electricity production from **solar energy** are submitted separately to the IEA by the Norwegian Administration. They were estimated until 2008 based on IEA PVPS implementing agreement.
- The electricity generated from **other sources** represents electricity from waste heat.
- *Distribution losses* includes statistical differences.
- **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.
- Electricity production from **wind** is available from 1993.
- Heat production from **heat pumps** and **electric boilers** (including the electricity used for this production) is available from 1989.
- **Heat** production is not available prior to 1983.

Transformation

- In the 2016 edition Norway corrected the **industrial waste** consumption in heat plants, and reclassified some the corresponding heat output under **other sources**.
- Starting in 2007, data for **natural gas** electricity and CHP plants are aggregated in autoproducers electricity plants for confidentiality reasons.
- Breaks in the time series between 1996 and 1997 and between 2001 and 2002 are due to a reclassification of main activity producers and autoproducers.
- Heat production from **biogases** is available from 1995.
- Prior to 1991, net **electricity** production by autoproducers by industry sub-sector was estimated by the Secretariat based on data submitted by the Norwegian Administration.
- Data on inputs and outputs in **heat** plants are not available prior to 1983 for main activity heat plants and prior to 1988 for autoproducer heat plants.

Consumption

- 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

Source

Central Statistical Office, Warsaw.

Coal

Other recovered gases which appear in the balances as output from blast furnaces include off-gases from zinc and copper smelting, ceramics kilns and steel production.

Transformation

- In the past two editions, the Central Statistical Office has revised their methodology which ac-

counts for sold heat produced from autoproducer heat plants using **coking coal** and **other bituminous coal**, resulting in lower, but more accurate data for 2007 onwards.

Consumption

- Agriculture/forestry for **BKB**, and own use in power stations for **lignite** are residual flows, so may contain statistical differences and other consumption not reported elsewhere. As a consequence, changes and consumption in these time series may not be wholly representative of the activities shown.
- Prior to 2010, own use in coal mines included workers' take home allowance, which should be included in residential consumption.

Oil

From 1997, *receipts from other sources (natural gas)* of **other hydrocarbons** correspond to hydrogen used in refineries, also represented as the output of *non-specified transformation processes* in the balances format.

Natural gas

Transformation

- *Non-specified transformation* data represent natural gas used for hydrogen manufacture in catalytic reforming processes.

Consumption

- Natural gas reported in associated production contains some heavier hydrocarbons. This results in a high gross calorific value for production.
- Distribution losses may include some statistical differences. Non-specified energy includes gas used for heating and pumping operations in the distribution network.

Biofuels and waste

- Data on biodiesels are available from 2005; biogasoline data from 2003; and other liquid biofuels data from 2009.
- In 2008, a new questionnaire was administered which increased the coverage of renewable and waste data.
- Several breaks in the industrial wastes series are caused by difficulties in the classification of wastes.
- Production of **other liquid biofuels** surged in 2015 because a new company started to report their biofuel production to the Polish authorities.

Transformation

- Before 2000, **industrial wastes** were used interchangeably with **light fuel oil** in some plants, which might result in breaks in the time series.

Consumption

- Until 1998, data for industrial waste include gaseous industrial waste, causing a break between 1997 and 1998.
- Data for biogases refer only to the gas from fermentation of biomass.
- Between 1992 and 1993, due to data availability, there is a large increase in solid biofuels for residential, commercial/public services and agriculture/forestry.

Electricity and heat

Prior to 2010, **heat** supply and consumption can include autoproducers unsold heat. Previous attempts to address such issue may have caused breaks for heat production and fuel in autoproducer heat plants (1993) and in autoproducer CHP plants, and for heat consumption in industry sub-sectors.

Supply

- Electricity and heat from **chemical heat** and other sources are available from 2011. Prior to that, these amounts could be included under different categories.
- **Heat** distribution losses are available from 2010 and prior to that they are included in consumption.
- Heat production from **heat pumps** is available from 2009.

Transformation

- In 2008, a number of CHP plants were reclassified from autoproducer to main activity producer due to an industry re-organisation.
- Electricity production in autoproducer electricity plants is available from 1986.

Consumption

- **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

Source

Direcção-Geral de Energia e Geologia, Lisbon.

Coal

Hard coal data prior to 1978 may include **sub-bituminous coal**.

Consumption

- 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.

Oil

A new hydrocracking unit started operations in Sines Refinery in April 2013. This explains the 2013 increase in **refinery feedstock** imports, as well as middle distillate production.

Supply

- In the 2016 edition, Portugal started to report *receipts from other sources (natural gas)* of **other hydrocarbons** starting in 2012, corresponding to hydrogen used in refineries, also represented as the output of *non-specified transformation processes* in the balances format.

Consumption

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

Natural gas

Supply

- In February 1997, Portugal started to import natural gas.

Transformation

- Since 2012, data reported for Non-specified (Transformation) represent natural gas used for hydrogen manufacture. Prior to this year, these quantities are reported under Petroleum Refineries.
- The 2002 decrease in natural gas used for gas works 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.

Consumption

- Between 2009 and 2010 a new survey on energy consumption in households creates a break in series in the **solid biofuel** consumption in residential series.
- 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

Supply

Production of electricity from **solar photovoltaic** and **wind** are available from 1989.

Transformation

- Electricity production from **other oil products** refers to methanol.
- In 2007, some power plants that were previously reported as main activity CHP have been reclassified as autoproducer CHP.
- In 2007, the power station that burns **industrial waste** started to work as a CHP plant, whereas previously it was only producing electricity.
- New plants fuelled by **solid biofuels** and by **municipal waste** started in 1999.
- Prior to 1992, net electricity production by autoproducers includes production from combustible fuel sources only.

- Production of **electricity** in main activity producer CHP plants and the associated fuel inputs are not available prior to 1980.

Consumption

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

Slovak Republic

Source

Statistical Office of the Slovak Republic, Bratislava.

General notes

- Data are available starting in 1971.
- The Slovak Republic became a separate state in 1993 and harmonised its statistics to EU standards in 2000. These two facts lead to several breaks in time series between 1992 and 1993, and between 2000 and 2001.

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.
- Breaks in time series may exist between 2000 and 2001 as the result of the implementation of a new survey system.
- Data for **anthracite**, **patent fuel** and **coal tar** all begin in 2005. Prior to this, **anthracite** was included with other hard coals, and **patent fuel** and **coal tar** data were not reported.
- Since 2005, data for **coal tar** and **patent fuel** are based solely on trade receipts. Production of **coal tar** which is consumed within the national boundary is not reported. Consumption of **patent fuel** adopts the residual methodology for statistical differences described above.

Oil

From 2001 onwards, **kerosene type jet fuel** includes small amounts of **other kerosene**.

Transformation

- 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.

Consumption

- For **gas/diesel** oil, road data include rail use.
- Small quantities of **kerosene type jet fuel** used for domestic aviation are included in international aviation bunkers data.

Energy use of white spirit is not available.

Natural gas

Since 2009 data for losses are no longer available.

Transformation

- In 2014, the decrease in Autoproducer CHP plants consumption was due to a plant closure.
- Amounts in *other transformations* mainly represent natural gas used for production of hydrogen and in hydrocracking for gasoline.

Consumption

- In 2001, there is a break in series for energy use in oil and gas extraction due to the application of the IEA's definition starting that year.
- From 2013, the Slovak Administration adopted a new estimate of the consumption for commercial/public services. Prior to 2013, there are inconsistencies in the time series as this sub-sector was computed as a residual.

Biofuels and waste

Prior to 2001, the data reported as **industrial waste** include **biogases** and **municipal waste**.

Electricity and heat

Data for **solar photovoltaic** are available from 2010.

Transformation

- 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.
- Prior to 2001, electricity generation from primary **solid biofuels**, **municipal waste** and **biogases** are included with **industrial waste**.

Consumption

- 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

Source

- Statistical Office of the Republic of Slovenia, Ljubljana.
- A new energy data collection system was implemented in January 2001, causing some breaks in time series between 1999 and 2000.

General notes

Data for Slovenia are available starting in 1990. Prior to that, they are included in *World Energy Statistics* in Former Yugoslavia.

Oil

Supply

- Between 2013 and 2014, a break in imports and exports time series for **kerosene type jet fuel** and **fuel oil** appears due to improvements in reporting methodology. New trade corresponds to imports that are first stocked on Slovenian territory and later re-exported.

Consumption

- Time series for **motor gasoline** and **gas/diesel** consumption in road fluctuate as they are computed by the Slovenian administration as residual between the supply and the total consumption of all other categories.

Natural gas

Consumption

- In 2011 the decrease in the chemical sector consumption is due to minimal use of gas for production of methanol.
- There are inconsistencies in the time series for commercial/public services as this sub-sector is computed by the Slovenian administration as a residual.

Biofuels and waste

Consumption

- Breaks in total final consumption for **industrial waste** prior to 2008 are a result of a sectoral reclassification.
- The break in time series between 2008 and 2009 for **solid biofuels** is due to revisions based on a new household survey which is to be carried out on an annual basis.

Electricity and heat

Consumption

- Direct use of **solar thermal** and g**eothermal 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

Source

Ministerio de Industria, Energía y Tourismo, Madrid.

Coal

The calorific values for **sub-bituminous coal** are correct on an as received basis, and comply with definitions of **sub-bituminous coal** on a moist, but ash free basis.

Supply

- **Lignite** mining was halted indefinitely in 2008.

Transformation

- 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 occurred mid-1996 resulting in some breaks in series.

Supply

- The rise in crude production in 2013 is linked with the development of the Montanazo-Lubina deep off shore field.

Consumption

- A more detailed breakdown in some consumption time series appears between 2012 and 2013 due to an update and improvement in the reporting methodology.

Natural gas

Transformation

- In 1997, the increase in input to main activity producer electricity is due to two main activity producer electricity producers running on natural gas.
- Between 1993 and 1994 there is a break in series in autoproducer CHP plants consumption, since a new survey revealed a large number of CHP autoproducers that were previously included in industry consumption.
- Since 1990 the decrease of natural gas inputs into gas works gas production is due to the substitution of natural gas by manufactured gas.

Consumption

- Since 2001 the final consumption breakdown is estimated by the Spanish administration.
- Between 2005 and 2006 there are some breaks in series for the energy industry own use and for final consumption due to a change in the estimation methodology.
- Since 1988 the increase of natural gas used as feedstock is due to a substitution of naphtha for the production of fertilisers.
- Prior to 1982 natural gas consumption in textiles and leather, transportation equipment and machinery has been included in non-specified industry.

Biofuels and waste

The Spanish administration verifies that production and consumption of **industrial waste** do exist but data are not available since 2001.

Supply

- The **solid biofuels** trade is available starting in 2013.

Transformation

From 2013 data, a revision of the industry sector of some companies causes breaks in series for **solid biofuels**, **municipal wastes** and **biogases**.

Consumption

- A new reporting system leads to breaks in final consumption sectors between 1999 and 2000 and again between 2005 and 2006.
- 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 breakdown of **solid biofuel** direct use in the industry sector prior to 1999 is not available.

Electricity and heat

Supply

- Electricity reported under **other sources** is from waste heat.
- Transmission and distribution losses are estimated by the Spanish administration.
- Electricity from **solar thermal** plants is available from 2007.
- From 2005, residential rooftop **solar photovoltaic** electricity production data, previously reported under autoproducer, are included in main activity electricity plants according to the Spanish administration classification.
- 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.
- Electricity production from **wind** and **solar** are reported from 1989 when data became available.

Transformation

- In 2008, a reclassification of plants from main activity to autoproducer has led to breaks in electricity production between 2008 and 2009.
- The National Energy Commission reclassified plants that consume **biogases**, leading to breaks in series between 2007 and 2008.
- In 2000 and 2006, many plants were reclassified from main activity producer to autoproducer or vice versa.
- For 2004 and 2005, electricity production from gas/diesel oil is included with fuel oil.
- 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.
- Prior to 1989 inputs and outputs from the use of **biofuels and waste** to generate electricity and/or heat (i.e. comprising **solid and liquid biofuels**, **industrial waste**, **municipal waste** and **biogases**) are reported under non-specified **biofuels and waste**.

- Prior to 1987 **electricity** production in main activity producer CHP plants is included with production from main activity producer electricity plants.
- From 1983, net **electricity** production by autoproducers has been estimated by the Spanish Administration, and includes production from combustible fuel sources only and net electricity production by auto-producer CHP plants is included in electricity plants.

Consumption

- For 2012, the **electricity** consumption data are estimated by the Spanish administration.
- Direct use of **solar thermal heat** is available from 1994.
- Direct use of **geothermal heat** is available from 1990.

Sweden

Sources

- Statistics Sweden, Örebro.
- Swedish Energy Agency (Energimyndigheten), Eskilstuna.

Coal

- **Peat products** may be reported under the category of **peat**, particularly for imports.
- Autoproducer inputs to waste heat production that are 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.

Supply

- **Other bituminous coal** production until 1992 is coal recovered during the quarrying of clay.

Oil

General note

- Swedish stock data include peacetime crisis stocks. Since these stocks may be held in **crude oil** instead of oil products, there may be occurrences of negative stock levels for products.
- Data are available from 2003 for **refinery gas** and from 2000 for **additives** and **ethane**.
- Beginning in 2002, Sweden has changed some of the conversion factors for some products. That explains the small breaks in series between 2001 and 2002.

Transformation

- From 2014**, gas/diesel oil** inputs to main activity CHP electricity plants are confidential and aggregated with **fuel oil**.
- In 2013 data, the drop in **crude oil** refinery intake is related with maintenance in August and September 2013 at the Swedish refineries.
- From 2011, the country's gas works plants stopped using **naphtha.**

Consumption

- Starting from 1995 data, Sweden has changed its standard classification of industry sub-sectors
- Between 1985 and 1986, there are breaks in consumption time series of **fuel oil** due to more detailed reporting.
- In 1984 data, consumption of **other kerosene** in the road sector is discontinued due to product re-classification.

Natural gas

Transformation

- Since 2005, the natural gas inputs to gas works has been estimated by the IEA Secretariat.
- Autoproducer inputs to waste-heat production that is sold are reported in the respective end-use sectors and not in the transformation sector.

Consumption

- For 2013, the energy use of gas by oil refineries has been estimated by the IEA Secretariat.
- For 2008, total final consumption and its breakdown have been estimated by the IEA Secretariat based on other Statistics Sweden publications.
- Prior to 1993, road transport is included in commercial/public services.

Biofuels and waste

- 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**.

- The Swedish authority revised the reporting methodology for liquid biofuels data starting in 2015. This may create break in time series between 2014 and 2015p data.
- Data for 2015p for primary solid biofuels are taken from a quarterly survey and revisions will most probably occur when the annual survey data is available in the next edition.

Consumption

- Consumption data by sector for **biogases** are available from 2011.
- In 2011, there was a change in the reporting methodology for consumption of solid biofuels and waste in the residential sector, which is responsible for breaks in concerned time series between 2010 and 2011.
- Due to confidentiality issues, **solid biofuels** consumption in food, beverages and tobacco is reported with paper, pulp and printing for 2014 data.

Electricity and heat

Supply

- 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**.
- Information on heat for sale produced in **heat pumps** and **electric boilers** is available starting in 1992.

Transformation

- In Sweden, heat produced in **heat pumps** is sold to third parties (as district heat) and is therefore included in transformation.
- 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.
- Heat production from **solid biofuels** in autoproducer CHP includes waste heat and chemical heat.
- For 2012 and 2013, small quantities of biomethanol used to produce electricity are included in **other liquid biofuels**, under production, as well as input and output of autoproducer CHP.
- For 1997 and 1998, heat production from **liquid fuels** in main activity producer CHP plants includes heat recovered from flue-gas condensing.
- Prior to 1992, electricity production from **biogases** is included with **solid biofuels**.
- Heat produced for sale by autoproducer CHP plants is reported starting in 1992.
- From 1987, the breakdown of net **electricity** production by industry for autoproducer electricity plants is available.
- Prior to 1987 net **electricity** production by autoproducer plants includes data for CHP plants only.
- Prior to 1980, **heat** produced in main activity producer heat plants is not available.
- Prior to 1974, **heat** produced in main activity producer CHP plants is not available.

Consumption

- Consumption of electricity for distribution of district heat is included with other energy industry own use.
- Fuel inputs to the **heat** that is recovered by the heat pump are reported in the appropriate industry subsector (i.e. chemical and paper, pulp and printing).
- In 2014 data, the consumption of **electricity** in the mining and in the paper sectors was included under non-specified industry due to confidentiality issues.
- Data on direct use of **solar thermal** are available from 1989.
- Consumption of **heat** in industry and other sectors is available from 1984.

Switzerland

Sources

- Swiss Federal Office of Energy (SFOE), Ittigen.
- Carbura – Swiss Organisation for the Compulsory Stockpiling of Oil Products, Zurich.

General note

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

Coal

Calorific values for **anthracite**, **other bituminous coal** and **coke oven coke** are taken from a shared default figure. **Lignite** calorific values are also default data, but are based on dried **lignite** fines which have a higher calorific value.

Consumption

- 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.

Oil

- The statistical differences for **gas/diesel oil** are partly due to changes in consumer stocks.
- In 2004, **petroleum coke** production started due to the installation of a cracking unit in a refinery
- 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.

Transformation

- **Gas/diesel oil** *non-specified transformation* represents inputs to mobile and stationary power generators, of which the electricity output is unknown at this stage.
- In 2012, low refinery intake is due to the temporary shutdown of the refinery in Cressier in the first semester of 2012 and maintenance at Collombey refinery.
- In 1988**,** the reduction in refinery intake of refinery **feedstock**s in 1988 is partly due to a switch to crude oil and partly to a shutdown for maintenance of a refinery.

Consumption

- In the 2016 edition, the Swiss administration has revised road. **LPG** data back to 2009 based on newly available tax information.
- For 2014, the breakdown of industry consumption of **gas/diesel oil** and **residual fuel oil** was not available at the time of publication and was estimated using the breakdown as in 2013. Revisions are expected.
- In 1994, the increase in consumption of **gas/diesel** is due to consumer stock-building prior to the introduction of a value-added excise tax on heating fuels as of 1 January 1995.

Natural gas

- Between 1977 and 1978, there are breaks in series due to the introduction of a new survey by industry type.
- The Statistical difference is reported under Agriculture/Forestry but it is not possible to differentiate between the two.

Consumption

- In 2007 and 2008, there are breaks in series for main activity producers CHP plants due to the closing of a plant in 2007 and the reopening of another plant in 2008.
- In 1996, the increase of gas input to main activity CHP plants is due to more complete accounting for all producing entities.

Biofuels and waste

Consumption

- Consumption data for **biogases** in the transport sector are available from 1996.

Electricity and heat

Supply

- In the 2016 edition, **solar** electricity production was revised to reflect the lag between time of sale and time of installation of solar panels.
- **Heat** production includes heat produced by nuclear power stations and distributed to other consumers.
- Electricity production from **wind** is available from 1996.
- **Solar** electricity production by autoproducers is available from 1990.

Transformation

- From 2012, the **municipal waste** autoproducer plant previously reported as electricity plant met the CHP requirements and was reclassified as such.
- **Biogas** is no longer being used for heat production as of 2011.

- The decrease in the use of **natural gas** in main activity CHP plants in 2007 is caused by the reduced operation of one plant after the start-up of a new waste-incineration plant and the shutting down of another plant. Use increases again in 2008 due to the re-starting of a district heating plant.
- The autoproducer heat plant that produced heat for sale using **municipal waste** was closed in 2006.
- The breakdown of **electricity** and heat generation from autoproducers by sector is not available after 1990.
- Prior to 1978, **heat** output from CHP plants is not available.
- The allocation of **electricity** production in main activity producer electricity only and CHP plants between 1967 and 1973, and in main activity producer CHP and autoproducer CHP plants in 1974 are Secretariat estimates.

Consumption

- In the 2016 edition, the final consumption of **heat** was revised and the issue of the statistical difference caused by the revision of the production in previous cycle was solved.
- **Electricity** consumption in the transport equipment industry is included with machinery.
- **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.
- The breakdown of final consumption of **electricity** in the industry sector from 2000 to 2001 was estimated by the Secretariat.
- Direct use of geothermal heat and solar thermal heat is available from 1990.

Turkey

Source

- Ministry of Energy and Natural Resources (Enerji ve Tabii Kaynaklar Bakanlığı), Ankara.
- Petrol İşleri Genel Müdürlüğü, Ankara.

Coal

- 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**.
- Data from 2012 onwards utilised the latest census data, causing breaks in time series between 2011 and 2012.
- Calorific values for fuels consumed in electricity, CHP and heat plants are obtained from data submitted to the Ministry of Energy and Natural Resources (MENR) by the Turkish Electricity Transmission Company, and these values may differ significantly from production and import values provided by MENR, causing imbalances for some years.
- 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**.
- Production of **lignite** was obtained from secondary sources by the IEA for 2015p.

Transformation

In the middle of 2014, some autoproducer plants in Turkey were reclassified as main activity producer due to a change in the legislation. Amongst other things, this impacted on reporting of unsold heat and prorated inputs, as per IEA methodology.

Consumption

- Privatisation of state owned coke ovens in recent years results in incomplete information on **coke oven gas** distribution.
- Until 2012 some **coal** used in cement kilns is reported under construction instead of non-metallic minerals.

Oil

- In the 2016 edition, the Ministry of Energy revised time series for **kerosene type jetfuel** from 2013. Sales to foreign airlines, previously accounted for under exports, are now reported under international aviation according to the IEA methodology. Data could not be revised for prior years. Exports of jetkerosene up to 2012 years may include international aviation consumption.
- In the 2016 edition, the Ministry of Energy revised crude oil net calorific values from 2010 due to a new methodology for calculating them.

- *Receipts from other sources (natural gas)* of **other hydrocarbons** correspond to hydrogen used in refineries, also represented as the output of *non-specified transformation processes* in the balances format.
- From 2013, marine fuels are reported under **fuel oil** instead of **gas/diesel**.
- From 2012, **petroleum coke** data are reported.

Supply

- In 2014, the drop in **lubricants** imports and consumption is related to a legislation change effective 1st of January 2014 regarding base oil imports.
- From 2012, new information on **additives/ oxygenates** imports (MTBE) data became available.
- From 2012, no exports breakdown is available for **white spirit**, **lubricants**, **bitume**n and **other products**.
- From 2010 more accurate NCVs for Crude Oil are available due to the implementation of a new survey.
- In 1984, 1983, 1981, 1980 and 1978, international marine bunkers are included in exports.

Transformation

- **Gas/diesel oil** and **fuel oil** consumed to produce electricity are used in both oil and coal-fired plants.

Consumption

- From 2014, information on gas/diesel consumption in fishing is available.
- From 2013, additional information on **petroleum coke** cement consumption is available.
- Prior to 2012, consumption of **other oil products** in the chemical sector was included under non-specified industry.
- Between 2010 and 2011, breaks in consumption series for **LPG**, **motor gasoline** and **gas/diesel oil** appear due to improved survey methods.
- Between 1977 and 1978, the end-use classification of **gas/diesel oil** and **fuel oil** were changed in the Turkish national statistics resulting in breaks in time series.

Natural gas

Supply

- In 2008, there is a break in series for stock change due to a revision of storage capacity.

Transformation

- In the middle of 2014, some autoproducer plants in Turkey were reclassified as main activity producer due to a change in the legislation.
- *Non-specified transformation* of natural gas represents amounts used to produce hydrogen for hydrocracking in refineries.

Consumption

- In 2013, energy use of natural gas in blast furnaces was zero, as gas was replaced by coal and coke.
- From 2009, there are some breaks in series across all sectors, as consumption data started being collected by a different institution, the Turkish Energy Market Regulatory Authority.
- In 2006, there is a break in series for non-energy use in chemical industry due to improvements in the classification.
- Prior to 2000, data for commercial/public services were included in the residential sector.
- Between 1999 and 2001, the decrease in natural gas petrochemical feedstocks is linked to the activity of the fertiliser industry.
- Since 1988, natural gas consumption data in the chemical industry (for fertilisers) and in non-specified industry (dye industry) are available.
- *Non-specified industry* includes the 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.

Consumption

- Prior to 1998, consumption in the **wood and wood products** sector includes that of the paper, pulp and printing industry.

Electricity and heat

In the middle of 2014, most autoproducer electricity, heat and CHP plants in Turkey were reclassified as main activity producer due to a change in the legislation.

Supply

- *Other sources* **electricity** and **heat** production is available from 2013 and represents purchased steam (waste heat) from the industry.

- The distribution losses figures are not available yet due to the privatization of the distribution regions in Turkey.
- Electricity production from **wind** is available starting in 1998.

Transformation

- 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.
- A new gas fired main activity producer CHP plant was put into operation in 1999 and a new auto-producer electricity plant fuelled with coking coal started in 2000.
- In 1995, the Turkish administration reclassified auto-producer plants by type and source to be consistent with IEA definitions. This causes breaks between 1994 and 1995 for electricity production.
- Data for blast furnace gas for electricity and heat generation are available from 1995.
- Data on electricity generated from biofuels are available from 1991.

Consumption

- Consumption in the machinery sector includes transport equipment.
- Comprehensive data on **electricity** consumption are available from 1973. This causes a break in the series between 1972 and 1973.

United Kingdom

Source

Department of Energy and Climate Change, London.

Coal

- 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**.

Transformation

- The marked decline in use of **other bituminous coal** from 2013 onwards for autoproducer electricity generation was due to a plant being sold to a dedicated main-activity electricity producer.

Consumption

- Consumption shown for the commercial/public services includes consumption of some of *other non-specified*.

Oil

- In the 2016 edition, consumption of gas/diesel was revised back to 2012 inclusive, following the UK Administration's improved access to customs trade data, in particular duty figures for demand in agriculture. Additional information on the destination of some upstream NGL was obtained from 2008. Previously classified as exports, these amounts now appear as transfers, mainly to LPG, then as consumption in the petrochemical sector. In the 2016 edition, naphtha refinery output was revised from 2008 to better reflect the blending of naphtha in motor gasoline.
- In the 2016 edition, LPG data was revised from 2008. Revisions were made to refinery output and additional consumption in petrochemical sector was recorded. As a result new break in time series may appear from 2008.
- For international marine bunkers and domestic navigation a different bunkers methodology is applied from 2008, in line with UK's National Atmospheric Emissions Inventory. Deliveries to international marine bunkers may be underestimated for previous years.
- For consumption of oil products, the UK administration revised its methodology from 2008 to better track consumption of imported oil products and domestically refined oil products sold through third parties to final consumers.
- Breaks in time series appear in 2013 for ethane, naphtha, white spirit, lubricants, bitumen, petroleum coke and other products, as new information became available on the energy use of these products.
- From 2002 to 2004, Products Transferred includes Backflows and Interproduct Transfers. From 2005 onwards backflows were estimated by the UK Administration.

Supply

- Condensates are reported in NGL from 1980 and in crude oil until 1979.
- LPG includes ethane until 1980.

- Other hydrocarbons, reported until 1994, correspond to bitumen production from coal.

Natural gas

Since 1992, distribution losses include metering differences and losses due to pipeline leakage.

Supply

- In 2002, the increase in imports is due to increased supplies from the Norwegian sector of the North Sea through the Vesterled pipeline, which was commissioned in the 4th quarter of 2001.

Transformation

- The natural gas reported in coke oven transformation is used to form synthetic coke oven gas rather than undergoing a coking process.
- The natural gas consumed to fuel the distribution of natural gas in natural gas networks is reported under non-specified energy.

Consumption

- Before 2008, the commercial sector consumption is included in *other non-specified*, while that of public services is shown separately.
- Between 2007 and 2008 there are some breaks in series in sectoral consumption due to a new methodology of data estimation.
- Natural gas consumption includes substitute natural gas made at gas works and piped into the natural gas distribution system.
- *Non-specified industry* represent to sales by independent gas suppliers unallocated by category.
- Consumption by the mining and quarrying and the wood and wood products sectors is included in *non-specified industry*.
- Non-specified energy sector includes gas used for heating and pumping operations in the distribution network.

Biofuels and waste

In the 2016 edition, a new reporting methodology is applied from 2010 to 2014, causing breaks in series between 2009 and 2010, mostly for **municipal waste, primary solid biofuels and biogases**.

Consumption

- 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

- 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.
- The reorganisation and subsequent privatisation of the electricity supply industry in 1990 has resulted in some breaks in series.

Supply

- 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.
- In 1996, the break in electricity production from **nuclear** is due to a reclassification of plants from autoproducer to main activity producer plants.
- Data on electricity production from **wind** is available from 1989.

Transformation

- In 2007, outputs of electricity from **petroleum coke** are included in **fuel oil**.
- Prior to 2003, all outputs of electricity and heat from **oil products** are reported in the other oil products category.
- **Heat** production from autoproducers is available starting in 1999.
- Inputs and output from **natural gas** for main activity producer electricity production are included in autoproducer electricity for 1990 (for reasons of confidentiality).

Consumption

- 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.
- **Electricity** consumption in *coal mines* includes consumption in patent fuel plants.

- Data for **electricity** consumption in *transport* was 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, road vehicles consumption is included under road transport. Prior to 2004, electricity consumption in rail refers to industrial rail only. From 2004 onwards it includes both industrial and urban rail.
- Consumption in the *machinery* sub-sector includes that of the transport equipment industry before 1996.
- Starting in 1990, small amounts of **electricity** used in heat pumps have been included in *residential*.
- From 1984 onwards, the **electricity** consumption in the industry non-specified sub-sector includes that of the *wood and wood products* sub-sector and unallocated consumption.

United States

Source

U.S. Energy Information Administration, Washington D.C.

General note

End-use energy consumption data for the United States present a break in series with historical data due to a change in methodology in 2014. 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 consumption in the industrial sector and its subsectors, including the non-manufacturing industries of mining, construction and agriculture. Historical revisions are pending. Due to other changes in reporting methodologies, there are numerous breaks in series for the US data, particularly in 1992, 1999, 2001, 2002 and 2013. 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 **sub-bituminous 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

- In the 2015 edition, the US administration made the following reclassifications: olefins are reported in other oil products instead of LPG, special naphtha exports are classified under refinery feedstock instead of white spirit. Road use lubricants have been moved to industry Sector in transport Equipment, machinery, and wood and wood products. As a result, breaks in time series appear for LPG, other oil products, refinery feedstocks, white spirit, lubricants between 2012 and 2013. Historical revisions are pending.
- Breaks in series due methodology improvements and newly available information to the US administration also appear in historical data: in 1990 for fuel oil (new methodology for marine bunkers); in 1992 for LPG/NGL (specific densities); in 1993 for oxygenates (new collection system to accommodate the revised Clean Air Act); in 1994 for motor gasoline (new model from the US Department of Transportation);in 1999-2000 for industry consumption (new available data from the 2002 MECS survey); in 2001 for fuel oil (changes in methodology for classifying imports of unfinished oils) and in 2012 for refinery gas (new density).

Supply

- High statistical differences for crude oil represent "unaccounted for crude oil", the difference between the supply and disposition of crude oil.
- Stocks changes for gas/diesel oil, fuel oil and petroleum coke were estimated by the IEA Secretariat from 1996 onwards to include stock changes at utilities.

Transformation

- From 2002 onwards, the IEA Secretariat has estimated the amounts of refinery gas used for autoproducer electricity production.

Consumption

- For 2011 the breakdown of final consumption was based on the projections of the latest available Manufacturing Energy Consumption Survey (MECS) of 2010. Breaks in time series appear as a result of this change of data source. Historical revisions are pending for 2011.
- From 1995 onwards, LPG inputs to gas works are included in industry.

Natural gas

Supply

- From 1990 to 2002, the amounts of gas works gas that are blended with natural gas have been estimated on the basis of the output efficiency of the process.

Transformation

- Since 2013, data reported under *non-specified transformation processes* represent **natural gas** used for hydrogen manufacture. Prior to this year, these quantities are reported under the petrochemical sector.
- Between 1999 and 2000, there are some breaks in series for the transformation subsectors due to a new data reporting method.
- From 1990 to 2002, the amounts of gas works gas that are blended with natural gas have been estimated on the basis of the output efficiency of the process.
- Since 1989, consumption by autoproducer CHP plants is available, while consumption by autoproducer electricity and main activity producer CHP plants is available since 1991. Prior to these years, these consumptions are included with industry and commerce/public services.

Consumption

- Until 2001, agriculture and forestry consumption is included under industry.
- From 1995 to 2001, the detailed breakdown of industry consumption is estimated by the Energy Information Administration using the Manufacturing Energy Consumption Survey (MECS), which is conducted quadrennially.
- Prior to 1995 a detailed breakdown of industry consumption is not available (between 1990 and 1994, chemical consumption is estimated by the American administration).
- In 1991 data on natural gas use in the road sector were collected for the first time, and are not available for previous years.
- Other energy sector own use is gas consumed for the production of ethanol.
- Consumption in fisheries is included under industry.

Biofuels and waste

- In the 2016 edition of this publication, the US administration applied a new estimation methodology to **geothermal** and **solar thermal** for 2014 data which creates breaks in time series between 2013 and 2014.
- The methodology for reporting **liquid biofuels** is currently under review by the EIA. Therefore, discussion between the EIA and the IEA is ongoing and revisions to historical biofuels data might occur in the future. For this publication, 2015p liquid biofuels data have been estimated by the IEA Secretariat.
- **Geothermal** supply and transformation data are estimated by the IEA Secretariat starting in 2009 because of efficiency discrepancies.

Transformation

- The EIA collects generation and consumption data from all plants 1 MW or more in capacity.

Electricity and heat

Between 2001 and 2001, 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 auto-producer electricity and CHP plants are not available for all years.

Supply

- 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.

- Data for electricity absorbed by **pumping** and electricity production from **pumped storage** plants became available starting in 1987.

Transformation

- 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.
- Two **geothermal** plants were reclassified as CHP in 2014, causing new series to appear.
- The low efficiencies from 2011 for **other bituminous coal** autoproducer electricity plants are due to the fact that one unit; the Albany Brewery Power Plant only produces unsold heat.
- From 2007 to 2009, heat from **industrial waste** includes recovered heat from industrial processes. From 2010, the electricity produced from recovered heat is reported under **other sources**.
- The decline in **patent fuel** used for electricity production in 2008 and subsequent cessation of the time series in 2009 is a result of the termination of the patent fuel tax credit in 2008 which had previously made the fuel economical for electricity production.
- The US administration changed its methodology for calculating **heat** production in CHP plants, and revised data back to 2006. This leads to breaks in the time series between 2005 and 2006.
- From 2004 onwards, the EIA has reported electricity and heat production from **anthracite** under **sub-bituminous coal**. The secretariat estimated the split of output by fuel type based on the assumption that the plant efficiencies of the aggregate are equal to that of each part.
- 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.
- Prior to 2001, data on plants consuming **other bituminous coal**, **sub-bituminous coal** and **lignite** have been estimated by the secretariat using information provided in the EIA's Annual Electricity Generator Report – Utility.
- Data for **peat** are confidential between 1994 and 1998 and from 2000 are not reported.
- Prior to 2000, autoproducers include small and independent power producers which under IEA definitions are considered as main activity producers. Production from these small and independent power producers accounts for about 25% of reported production of electricity by autoproducers in the United States. This reclassification causes breaks between 1999 and 2000.
- In the 2003 edition, the US Administration reclassified some plants to autoproducers. This reclassification causes more breaks between 1998 and 1999.
- Data for **heat** produced in main activity producer heat and autoproducer CHP plants are available from 1992 to 1999.
- From 1999 onwards, the fuel used in **heat** production by autoproducers is included in final consumption because the US administration cannot distinguish between the heat used directly on-site and the heat sold. Therefore, this may underestimate the heat sold to third parties.
- 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 breakdown of fuel used and production of **heat** in main activity producer heat plants have been estimated by the secretariat for 1992 and 1993.
- Prior to 1991 some of the fuel inputs to **electricity** and **heat** production reported for autoproducer plants are reported as final consumption in the particular economic sector in which the autoproducer is operating.
- Prior to 1989, there are no data available for autoproducers.
- **Sub-bituminous coal** inputs for electricity and heat production are included in **hard coal** before 1983.

Consumption

- No data are available for **heat** sold that is consumed in residential and agriculture/forestry.
- Direct use of **solar thermal** heat in residential is available from 1999.
- Since 1995, **heat** consumption data are no longer collected and have been estimated, resulting in breaks in the time series between 1994 and 1995.
- 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.

NON-OECD COUNTRIES

In the references below, both the statistical year (2014) for which data are being published in this edition, as well as publication dates of the many documents which have been consulted during the development of this publication are mentioned. As a general rule, where specific documents or personal communications have been used, the date that is referenced is the date of publication of the document or the date of the communication, whereas, where data received through the completion of questionnaires are mentioned, the date that is referenced is the statistical year for which data are being published in this edition, namely 2014.

Data may not include all informal and/or illegal trade, production or consumption of energy products, although the IEA Secretariat makes efforts to estimate these where reliable information is available.

General references

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- *Annual Bulletin of Electric Energy Statistics for Europe*, Economic Commission for Europe (ECE), New York, 1994.
- *Annual Bulletin of Gas Statistics for Europe*, Economic Commission for Europe (ECE), New York, 1994.
- *Annual Bulletin of General Energy Statistics for Europe*, Economic Commission for Europe (ECE), New York, 1994.
- *Annual Crude Steel production*, World Steel Association, *http://www.worldsteel.org*.
- *Annual Report July 1991-June 1992*, South African Development Community (SADC), Gaborone, 1993.
- *Annual Statistical Bulletin*, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2015.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- *APEC Energy Database*, Tokyo, 2015.
- *Arab Oil and Gas Directory*, Arab Petroleum Research Centre, Paris, various editions up to 2015.
- *ASEAN Energy Review 1995 Edition*, ASEAN-EC Energy Management Training and Research Centre (AEEMTRC), Jakarta, 1996.
- *Asia Pacific Databook*, FACTS Global Energy, Singapore, various editions up to 2015.
- *Banque de données Enerdata, Fiches d'expertise des données*, Enerdata, Grenoble, September 2015.
- *Base CHELEM-PIB*, Centre d'Etudes Prospectives et d'Informations Internationales (CEPII), Bureau van Dijk, Paris, 2008 to 2016.
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- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, various editions up to 2015.
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- *Energy Statistics Yearbook 1990*, South African Development Community (SADC), Luanda, 1992.
- *Energy Statistics Yearbook 2008*, United Nations, New York, 2011.
- *External Trade of the CIS countries*, The Interstate Statistical Committee of the Commonwealth of Independent States, Moscow, 2005.
- *Forestry Data*, Food and Agriculture Organisation of the United Nations, Rome, 2000.
- *Foreign Scouting Service, Commonwealth of Independent States*, IHS Energy Group – IEDS Petroconsultants, Geneva.
- *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.
- *Global E&P Service, Commonwealth of Independent States*, IHS Energy Group – IEDS Petroconsultants, Geneva.
- *International Energy Annual*, Energy Information Administration (EIA), Washington, D.C., 1991 to 1994.
- *International Energy Data Report 1992*, World Energy Council, London, 1993.

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- *Middle East Economic Survey (MEES)*, Nicosia, various issues to June 1999.
- *Middle East Petroleum Databook*, FACTS Global Energy Group, Singapore, various editions up to 2015.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- *Natural Gas Vehicles Statistics*, International Association for Natural Gas Vehicles, online database: *www.iangv.org*.
- *Notes d'Information et Statistiques*, Banque Centrale des Etats de l'Afrique de l'Ouest, Dakar, 1995.
- *Pétrole 1994*, Comité Professionnel du Pétrole (CPDP), Paris, 1995.
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- *PlanEcon Energy Outlook for Eastern Europe and the Former Soviet Republics*, Washington, 2003.
- *PlanEcon Energy Outlook for the Former Soviet Republics*, Washington, June 1995 and 1996.
- *Prospects of Arab Petroleum Refining Industry*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, 1990.
- *Review of Wood Energy Data in RWEDP Member Countries*, Regional Wood Energy Development Programme in Asia, Food and Agriculture Organisation of the United Nations, Bangkok, 1997.
- *SIE-Afrique (Systèmes d'Information Énergétique – Afrique)*, projet promu par ECONOTEC et Institut de l'Energie et de l'Environnement de la Francophonie (IEPF), organe subsidiaire de l'Organisation Internationale de la Francophonie (OIF).
- *Solar Heat Worldwide*, AEE - Institute for Sustainable Technologies, Gleisdorf, various editions up to 2016.
- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2015.
- *Statistical Bulletin*, The InterState Statistical Committee of the Commonwealth of Independent States, Moscow, 1993 and 1994.
- *Statistiques économiques*, Banque des Etats de l'Afrique Centrale (BEAC), online database 2011.
- *Statistical Handbook 1993 - States of the Former USSR*, The World Bank, Washington, 1993.
- *Statistical Yearbook*, The Interstate Statistical Committee of the Commonwealth of Independent States, Moscow, various editions up to 2011.
- *Statistical Yearbook of the Member States of the CMEA*, Council of Mutual Economic Assistance (CMEA), Moscow, 1985 and 1990.
- *The LNG Industry*, International Group of Liquefied Natural Gas Importers (GIIGNL), Levallois, various editions up to 2015.
- *The United Nations Energy Statistics Database*, United Nations Statistical Office, New York, various editions up to 2016.
- *World Development Indicators*, The World Bank, Washington, various editions up to 2015.

Note:

- The OLADE database was used for several Non-OECD Americas countries.
- The UN database was the only source of information for time series of the countries not listed individually and included in the regions Other Africa, Other Non-OECD Americas and Other Asia. It was also used in a number of other countries as a complementary data source.

Albania

For 1993, large quantities of oil, widely reported to have moved through Albania into Former Yugoslavia, may not be included in oil trade. Although estimated to represent up to 100 per cent of domestic consumption levels, no reliable figures for this trade were available.

Starting from 2011, motor gasoline consumption is reported in residential. This consumption corresponds to motor gasoline used in electricity generators.

Sources 2011 to 2014:

- Direct communication with the National Agency of Natural Resources, Tirana.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

Sources 2005 to 2010:

- *Energy Balances 2005-2010*, Energy Department of the National Agency of Natural Resources of Albania, Tirana.
- IEA Secretariat estimates.

Sources up to 2004:

- Joint IEA/Eurostat/UNECE annual energy questionnaires 1994, 1995, 1998.
- *Energy Balances*, National Agency of Energy of Albania, 1999 to 2004.
- *The UN Energy Statistics Database.*
- Aide Memoire of World Bank Mission to Albania May/June 1991.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- The UN Energy Statistics Database.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- IEA Secretariat estimates.

Algeria

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Revisions were made to the energy balances in 2009 and 2010 which add more detail for certain products and flows. This may result in breaks in time series between 2008 and 2009.

Sources 1990 to 2014:

- Direct communication with the Ministry of Energy and Mining, Algiers.

Additional sources 2008:

- SONELGAZ, Société nationale de l'électricité et du gaz, online statistics on electricity production, Algiers.

Sources up to 1989:

- *Bilan Energétique National*, Gouvernement Algérien, Algiers, 1984.
- *Algérie Energie, No 6*, Ministère de l'Energie et des Industries Chimiques et Pétrochimiques, Algiers, 1979 to 1983.
- *Annuaire Statistique de l'Algérie 1980-1984*, Office National des Statistiques, Algiers, 1985.

Sources for Biofuels and waste:

- The UN Energy Statistics Database.
- Ministry of Energy and Mining.
- IEA Secretariat estimates.

Angola

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Sources 2003 to 2014:

- Direct communication with the Ministério da Energia e Águas (Ministry of Energy and Water), Luanda.
- *Relatório de Gestão e Contas*, Sonangol E.P, Luanda, various editions up to 2014.
- *Balanço da Produção & Informação sobre o Sector de Petróleo e Gás & Balanço da Refinaria de Luanda*, Ministério dos petróleos, Luanda, 2013.
- *Relatório de Actividades do Sector Petrolífero*, Ministério dos petróleos, Luanda, 2007 and 2008 editions.
- *Annual Report*, Southern African Power Pool, Harare, various editions up to 2012.
- IEA Secretariat estimates.

Sources 1992 to 2002:

- Direct communication with oil industry sources.
- IEA Secretariat estimates.
- *Eskom Annual Statistical Yearbook, 1993, 1994, 1995* citing Empresa Nacional de Electricidade as a source, Johannesburg, 1994-1996.
- *The UN Energy Statistics Database.*

Sources up to 1991:

- *Le Pétrole et l'Industrie Pétrolière en Angola en 1985*, Ambassade de France, Poste d'Expansion Economique de Luanda, Luanda, 1985.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from African Energy Programme of the African Development Bank, *Forests and Biomass Sub-sector in Africa*, Abidjan, 1996.

Argentina

Since 2010 a different methodology is adopted by Argentina for reporting refinery flows leading to more detailed information (*e.g.* reprocessing of some oil products). This may result in breaks in time series between 2009 and 2010.

Sources up to 2014:

- Direct communication with the Ministry of Economy, Secretariat of Energy, Buenos Aires.
- *Balance Energético Nacional,* Ministerio de Economía, Secretaria de Energía, Buenos Aires, various editions up to 2015.
- *Informe del sector eléctrico,* Ministerio de Planificación Federal, Inversión Pública y Servicios, Secretaria de Energía, Dirección Nacional de Prospectiva, Buenos Aires, various editions up to 2015.
- *Información del mercado de hidrocarburos,* Ministerio de Planificación Federal, Inversión Pública y Servicios, Secretaria de Energía, Dirección Nacional de Prospectiva, Buenos Aires, various editions up to 2015.
- *Informe Enargas,* Enargas, Buenos Aires, various editions up to 2015.
- *Camara Argentina de Biocombustibles,* online statistics.
- *Informe del sector eléctrico,* Ministerio de Economía, Secretaria de Energía, Buenos Aires, 1986 to 2003.
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- *Boletín Mensual de Combustibles,* Ministerio de Obras y Servicios Públicos, Secretaria de Energía, Buenos Aires, various editions.
- *Natural Gas Projection up to 2000,* Gas del Estado Argentina, Buenos Aires, 1970, 1984 to 1986.
- *Anuario Estadístico de la República Argentina 1970-1981,* Instituto Nacional de Estadística y Censos, Secretaria de Planificación, Buenos Aires, 1982.
- *Plan Energético Nacional 1986-2000,* Ministerio de Economía, Secretaría de Energía, Subsecretaría de Planificación Energética, Buenos Aires, 1985.
- *Anuario Estadístico,* Yacimientos Petrolíferos Fiscales, Buenos Aires, 1984 to 1987.
- *Memoria y Balance General,* Yacimientos Petrolíferos Fiscales, Buenos Aires, 1984 to 1986.

Armenia

Data for Armenia are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Data provided by Armenia are mainly supply side data except for electricity. IEA Secretariat assumptions are used to estimate consumption data.

In this edition Armenia completed the Renewables questionnaire with 2014 data. Therefore, there might be breaks in time series between 2013 and 2014 data.

Sources 2014:

- Direct communication with National Statistical Service, Yerevan.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- *Forestry Statistics,* FAO, Rome.
- IEA Secretariat estimates.

Sources 1992 to 2013:

- Direct communication with National Statistical Service, Yerevan.
- Joint IEA/Eurostat/UNECE annual energy questionnaires on Coal, Electricity and heat, Natural gas, Oil.
- *Forestry Statistics,* FAO, Rome.
- IEA Secretariat estimates.

Sources 1990 to 1991:

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *Forestry Statistics,* FAO, Rome.
- IEA Secretariat estimates.

Azerbaijan

Data for Azerbaijan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Production of natural gas may differ from the Azerbaijan national energy balance because natural gas used for production of electricity by the oil and gas extraction industry is included by the IEA Secretariat in the definition of natural gas production. Breaks in time series appear for inputs and outputs of electricity, CHP and heat plants in Azerbaijan between 2006 and 2007 due to an improved data collection methodology in the country from 2007 onwards.

For the purpose of calculating CO_2 emissions, an allocation between domestic and international aviation consumption of jet kerosene was estimated by the IEA Secretariat for 1990-2006 based on total aviation consumption reported by Azerbaijan and the 2007 allocation.

Sources 1990 to 2014:

- Direct communications with the State Committee of Statistics and the Ministry of Economics of Azerbaijan, Baku.
- Joint IEA/Eurostat/UNECE annual energy questionnaires, 1992 to 2013.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaires, 2000-2014.
- Before 2000: IEA Secretariat estimates.

Bahrain

Crude oil production includes production from the Abu Sa'fah field, which is shared with Saudi Arabia.

Consumption of natural gas for autoproducer power generation may include quantities used for non-power generation purposes.

Estimations of the use of petroleum coke in the manufacture of aluminium have been made to track this consumption from 2000 onwards. This may lead to breaks in time series between 1999 and 2000.

Sources 1992 to 2014:

- *Statistics 2005-2014,* National Oil and Gas Authority of Bahrain, Manama.
- *Online statistics 2000-2014,* Central Informatics Organization (CIO), Manama, Kingdom of Bahrain.
- *Statistical Bulletin,* Arab Union of Producers, Transporters and Distributors of Electricity, Amman, various editions up to 2014.
- Direct communication with National Oil and Gas Authority.
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- *Statistical Abstract, 1994, 1998, 1999, 2000, 2001, 2002 and 2003,* Council of Ministers, Control Statistics Organisation, Bahrain.
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Sources up to 1991:

- *Statistical Abstract 1990,* Council of Ministers, Central Statistics Organisation, Manama, 1991.
- *1986 Annual Report,* Bahrain Monetary Agency, Manama, 1987.
- *B.S.C. Annual Report,* Bahrain Petroleum Company, Manama, 1982-1984.
- *Foreign Trade Statistics,* Council of Ministers, Central Statistics Organisation, Manama, 1985.
- *Bahrain in Figures,* Council of Ministers, Central Statistics Organisation, Manama, 1983-1985.

Bangladesh

Data are reported on a fiscal year basis, beginning on the 1st of July and ending on the 30th of June of the subsequent year.

In 2013, time series were revised from 2008 to 2011 based on data retrieved from the Bangladesh Power Development Board. This may result in breaks in time series between 2007 and 2008 for electricity.

In the 2014 edition, time series were revised from 2004 to 2012 based on new data on petroleum products retrieved from the Bangladesh Petroleum Corporation and the Eastern Refinery Limited. This may result in breaks in time series between 2004 and 2005 for primary and secondary oil products.

Sources 2008 to 2014:

- *Annual Report,* PetroBangla - Bangladesh Oil, Gas and Mineral Corporation, Dhaka, various editions up to 2014.

- *Annual Report*, Bangladesh Power Development Board (BPDB), Dhaka, various editions from 2007 to 2014.
- *Annual Report*, Dhaka Electric Supply Company Limited (DESCO), Dhaka, various editions from 2008 to 2014.
- *Bangladesh Economic Review*, Ministry of Finance, Dhaka, various editions from 2008 to 2013.
- *Coal Recent Mine Activities*, Barapukuria Coal Mining Company Limited (BCMCL), Dhaka, 2013.
- *Statement of total coal production, sale, delivery and stock position*, Barapukuria Coal Mining Company Limited (BCMCL), Dhaka, 2014
- *Production Activities*, Eastern Refinery Limited, online statistics: erl.com.bd, 2014.
- *Commercial & Operation – Petroleum products*, Bangladesh Petroleum Corporation (BPC), online statistics: www.bpc.gov.bd.
- IEA Secretariat estimates.

Sources 1996 to 2007:

- U.S. Agency for International Development, Dhaka, 2003 to 2008.
- IEA Secretariat estimates.
- *Statistical Yearbook of Bangladesh 1996 to 1999*, Ministry of Planning, Bangladesh Bureau of Statistics, Dhaka, 1997 to 2000.

Sources 1992 to 1995:

- *Statistical Pocket Book of Bangladesh*, Ministry of Planning, Bangladesh Bureau of Statistics, Dhaka, 1986 to 1996.
- *The UN Energy Statistics Database*.

Sources up to 1991:

- *Bangladesh Energy Balances 1976-1981*, Government of Bangladesh, Dhaka, 1982.
- *Statistical Yearbook of Bangladesh 1991*, Government of Bangladesh, Dhaka, 1976 to 1991.
- *Monthly Statistical Bulletin of Bangladesh*, Ministry of Planning, Bangladesh Bureau of Statistics, Statistics Division, Dhaka, June 1986 and October 1989.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2014.
- IEA Secretariat estimates.

Belarus

Data for Belarus are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Since January 2010, Belarus became a member of a Customs Union with Russia and Kazakhstan. Breaks in trade time series and statistical differences appear from 2009 to 2011 as the Customs progressively shifted from one accounting system to another.

Jet Kerosene is reported under Other Products until 2012. Breaks in time series appear in gas/diesel and fuel oil between 2011 and 2012 as a result of a new classification of industrial products (heating oil re-classified under high sulphur fuel oil).

In this edition methane produced as a by-product during the petrochemical transformation of naphtha was re-classified by Belarus for the period 1998-2011 from industrial waste to refinery gas. This may lead to breaks in time series between 1997 and 1998.

Belarus reports all inputs and outputs to CHP and heat autoproducer plants including those corresponding to own use of heat.

Sources 1990 to 2014:

- Direct communication with the National Statistical Committee of Belarus, Minsk.
- Joint IEA/Eurostat/UNECE annual energy questionnaires, 1990 to 2011, Oil, Natural gas, Coal, Renewables, Electricity and heat.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaires for Renewables.
- IEA Secretariat estimates.

Benin

Member of the SIE-Afrique project.

Time series were revised from 2005 to 2009 based on data received from the Ministère des Mines, de l'Energie et de l'Hydraulique, Cotonou in 2011. Breaks in the time series may occur between 2004 and 2005 for some products.

Sources 1999 to 2014:

- Direct communication with the *Ministère des Mines, de l'Energie et de l'Hydraulique*, Cotonou, through the WEC-IEA Joint Energy Reporting Format for Africa, 1999 to 2002, 2004, 2006, 2007, 2011, 2012.
- IEA Secretariat estimates.

Sources up to 1998:

- Direct communication with the Secretariat, Direction de l'Energie, Cotonou, 1999, 2000.
- Direct communication with the electricity utility, Cotonou, 1998 to 1999.
- *The UN Energy Statistics Database.*
- *Rapport sur l'Etat de l'Economie Nationale*, Ministère de l'Economie, Cotonou, September 1993.
- IEA Secretariat estimates.

Sources for Biofuels and waste up to 1995:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

Bolivia

Data for international aviation bunkers are estimated by the IEA Secretariat based on passenger data.

Breaks in time series for solid biofuels occur between 2009 and 2010. This is due to differences in definitions between Bolivia and IEA. Solid biofuels may include other sources of renewable energy (e.g. wind, solar, etc.). Efforts are underway to resolve these definitional issues for future publications.

Sources 1992 to 2014:

- *Balance Energético Nacional 2000-2014* Ministerio de Hidrocarburos y Energía, La Paz, 2014.
- *Anuario Estadístico*, Agencia nacional de hidrocarburos, various editions from 2013 to 2014.
- *Anuario Estadístico*, Ministerio de Hidrocarburos y Energía, La Paz, 2012.
- *Boletín Estadístico*, Yacimientios Petroliferos Fiscales Bolivianos, La Paz, 2008 to 2014.
- *Informe Estadístico*, Yacimientos Petrolíferos Fiscales Bolivianos, La Paz, various editions from 1992 to 1998.
- *Anuarío Estadístico*, Autoridad de Fiscalización y Control Social de Electricidad, La Paz, 2014.
- *Anuarío Estadístico*, Superintendencia de Electricidad, La Paz, various editions from 1996 to 2007.
- *Memoria Anual*, Comité Nacional de Despacho de Carga, 2011.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Sources up to 1991:

- *Boletín Estadístico 1973-1985*, Banco Central de Bolivia, División de Estudios Económicos, La Paz, 1986.
- *Diez Anos de Estadística Petrolera en Bolivia 1976-1986*, Dirección de Planeamiento, Division de Estadística, La Paz, 1987.
- *Empresa Nacional de Electricidad S.A. 1986 Ende Memoria*, Empresa Nacional de Electricidad, La Paz, 1987.

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Bosnia and Herzegovina

Data for Bosnia and Herzegovina are available starting in 1990. Prior to that, they are included in Former Yugoslavia.

Energy statistics are available from the Agency for Statistics of Bosnia and Herzegovina from 2008 for electricity and heat and from 2009 for coal and natural gas. As a consequence, breaks in time series may occur between 2007 and 2008 for electricity and heat and 2008 and 2009 for other products.

In 2015, the Agency for Statistics of Bosnia and Herzegovina (BHAS) conducted their first household survey on biomass consumption. Due to this newly available data breaks in time series may occur between 2013 and 2014. Also, due to the ongoing work of BHAS to further improve the biomass data quality, future revisions may be expected."

In 2014, the Agency for Statistics of Bosnia and Herzegovina conducted their first survey on oil product consumption. Due to this newly available data breaks in time series may occur between 2012 and 2013.

Until 2012, the source for crude oil and secondary oil products data is the publication "Industrial Production Bosnia and Herzegovina 2012" and "Oil Trade Data" both produced by the Agency for Statistics of Bosnia and Herzegovina.

Sources 2009 to 2014:

- Direct communication with the Agency for Statistics of Bosnia and Herzegovina, Sarajevo.
- Joint IEA/Eurostat/UNECE annual energy question-naires for Oil, Natural gas, Coal, Electricity and heat. 2010-2014.
- Energy Statistics: Oil products, Issue 1, Agency for Statistics of Bosnia and Herzegovina, Sarajevo.
- PRODCOM Survey - Industrial Production, Bosnia and Herzegovina, 2009 to 2012.
- IEA Secretariat estimates.

Sources 2006 to 2008:

- European Network of Transmission System Operators for Electricity, online statistics, 2010.
- Union for the Co-ordination of Transmission of Electricity, online statistics, 2009.
- IEA Secretariat estimates.

Sources 2000 to 2005:

- *Energy Sector Study BiH*, Third Electric Power Reconstruction Project, consortium led by Energy Institute Hrvoje Pozar, Sarajevo, 2008.
- Direct communication with the Joint Power Co-ordination Centre (JPCC).
- *Statistical Yearbook of BiH*, Federation of Bosnia and Herzegovina Federal Office of Statistics, Sarajevo, 2008.
- *Power Generation and Transmission System in Bosnia Herzegovina*, International Management Group, European Commission, Sarajevo, November 2000.
- *Energy Outlook*, Federal Ministry of Energy, Mining and Industry, Sarajevo, December 2001.
- *The UN Energy Statistics Database*.

Botswana

Data for Botswana are available from 1981. Prior to that, they are included in Other Africa.

Sources 1981 to 2014:

- Direct communication with the Department of Energy, Ministry of Minerals, Energy and Water Resources, Gaborone.
- *Annual Report*, Botswana Power Corporation (BPC), Gaborone. Various editions up to 2014. Note: BPC data are published on a fiscal year basis (April to March).
- *Environment Statistics 2012*, Botswana Central Statistics Office, Gaborone.
- *Indices of the physical volume of mining production 3Q 2014*, Botswana Central Statistics Office, Gaborone.
- *Botswana in Figures 2011*, Botswana Central Statistics Office, Gaborone.
- *Statistical Yearbook 2010*, Botswana Central Statistics Office, Gaborone.*Annual Report 2009*, Department of Mines, Gaborone.
- *Energy Statistics*, Central Statistics Office, Gaborone.
- Direct communication with the Energy Affairs Division, Ministry of Minerals, Energy and Water Affairs, Gaborone.

Brazil

New information became available in 2015 which explains the types of product transfers within Brazilian refineries. The IEA has attempted to reflect these transfers as accurately as possible in the 2015 publication.

.n the IEA balance for Brazil, "Biogasoline" refers to anhydrous ethanol while "Other liquid biofuels" refers to hydrated ethanol.[12]

Although IEA's balance is based on Brazil's national statistics, differences with the national energy balance can be observed due to the different methodologies adopted for reporting nuclear, chemical heat, natural gas, renewables, blast furnaces and coke ovens.

12. The national energy balance of Brazil shows bioethanol as two separate products: anhydrous ethanol ("álcool anidro", i.e. nearly pure ethanol, containing less than 1% of water) and hydrated ethanol ("álcool hidratado", i.e. a blend of ethanol and water, in the proportion of about 95% to 5%, generally obtained from conventional distillation). While anhydrous ethanol is blended with gasoline (the blend sold at the pump generally contains 20-25% of ethanol), hydrated ethanol is sold at separate pumps as a product by itself (álcool) to be used in flex fuel cars, i.e. vehicles that can run on any mix of gasoline and ethanol.

Brazil produces a large share of its pig iron in blast furnaces that are fuelled and fed with charcoal. The blast furnace gases produced when charcoal is used as a reagent in the blast furnaces are renewable products and they have been reported in this publication under the product "Biogases from thermal processes". Additionally, only the part of these gases consumed for power generation (i.e. energy purposes) has been accounted for in the transformation sector. The remaining charcoal consumed in or used to heat the blast furnaces is reported in final consumption under the iron and steel industry with no distinction between transformation and final consumption.

Prior to the year 2000 blast furnace gases data availability is limited to the input to auto producer electricity plants. Therefore, from 1971 to 1999, the other flows (e.g. production, consumption etc…) are IEA Secretariat estimates.

The Itaipu hydroelectric plant, operating since 1984 and located on the Paraná River (which forms the border of Brazil and Paraguay) was formed as a joint venture between Eletrobrás and the Paraguayan government. Production is shared equally between Brazil and Paraguay.

Sources 1971 to 2014:

- Direct communication with the Ministério de Minas e Energia, Brasilia.
- Mauthner, F. and Weiss W., *Solar Heat Worldwide - Markets and contribution to the energy supply*, various editions up to 2015, IEA Solar Heating and Cooling Programme.

Brunei Darussalam

Sources 2006 to 2014:

- APEC Energy Database, Tokyo, 2015.
- Direct communication with the Prime Minister's Office, Strategic Planning Division, Bandar Seri Begawan.
- Direct communication to the IEA Secretariat from the Prime Minister's Office, Department of Electrical Services, Bandar Seri Begawan.
- IEA Secretariat estimates.

Sources 1992 to 2005:

- APEC Energy Database, Tokyo, 2007.
- Direct communication with the UN Statistics Division, the Office of the Prime Minister, Petroleum Unit, the Asia Pacific Energy Research Centre and the Ministry of Development, Electrical Services Department.
- *Brunei Statistical Yearbook, 1992 to 1994*, Ministry of Finance, Statistics Section, Bandar Seri Begawan, 1993, 1995.

Sources up to 1991:

- *Fifth National Development Plan 1986-1990*, Ministry of Finance, Economic Planning Unit, Bandar Seri Begawan, 1985.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database.*

Bulgaria

Non-specified transformation of natural gas to other hydrocarbons corresponds to hydrogen used in refineries.

Bulgaria has re-classified black liquor from industrial waste to solid biofuels and the renewable portion of tyres from industrial waste to municipal waste – renewables from 2008. Breaks in time series may occur between 2007 and 2008.

A break in the time series for natural gas stock changes may occur between 2003 and 2004 as cushion gas is excluded starting in 2004.

Sources 1990 to 2014:

- Direct communication with the National Statistical Institute, Sofia.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- Energy Balances, National Statistical Institute, Sofia, 1995.

Sources up to 1991:

- *Energy Development of Bulgaria*, Government of Bulgaria, Sofia, 1980 and 1984.
- *Energy in Bulgaria*, Government of Bulgaria, Sofia, 1980 to 1983.
- *General Statistics in the Republic of Bulgaria 1989/1990*, Government of Bulgaria, Sofia, 1991.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database* and Joint IEA/ Eurostat/UNECE annual energy questionnaires.

Cambodia

Data for Cambodia are available starting in 1995. Prior to that, they are included in Other Asia.

In 2015, new information regarding the imports of petroleum products in Cambodia from 2007 onwards became available. Data for these products were revised accordingly and as a result breaks in time series may occur for different products between 2007 and 2013.Sources up to 2014:

APEC annual energy questionnaires, 2010-2011.

Report on Power Sector of the Kingdom of Cambodia, Electricity Authority of Cambodia, Phnom Penh, various editions up to 2015.*Petroleum Products Imports Data from the Customs Office*, General Department of Petroleum of Cambodia, Phnom Penh, 2014.

Direct communication with the Department of Energy, Ministry of Industry, Mines and Energy, the Department of Corporate Planning and Projects, the Electricity Authority of Cambodia and Electricité du Cambodge, Phnom Penh through the APEC annual energy statistics questionnaire, 1995-2011.

IEA Secretariat estimates.

Cameroon

Member of the SIE-Afrique project.

Sources 1971 to 2014:

- Direct communication with Ministère de l'Energie et de l'Eau, Yaoundé.
- *Statistiques économiques*, Banque des Etats de l'Afrique Centrale (BEAC), online database, 2011.
- Direct communication with Société Nationale de Raffinage (SONARA).
- Direct communication with Société Nationale d'Electricité du Cameroun (*AES – SONEL)*, Douala.

The UN Energy Statistics Database.

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

People's Republic of China

Revisions of China's 2000 - 2010 energy data

In early 2016, the National Bureau of Statistics (NBS) of the People's Republic of China (China) supplied the IEA with detailed energy balances for 2000 to 2010 and the IEA revised its data accordingly.

In September 2015, the NBS published China's energy statistics for 2013, as well as revised statistics for the years 2011 and 2012. These have already been taken into account by the IEA in the "Special data release with revisions for the People's Republic of China" in November 2015

All revisions show significant changes both on the supply and demand side for a number of energy products, resulting in breaks in time series between 1999 and 2000. Most importantly, the previously significant statistical difference for coal has now been allocated in industrial consumption based on findings from a national economic census.

Calorific values were also revised for bituminous coal in this edition. Net calorific values (NCV) for coal inputs to power generation were modified from 2000 to 2013 by applying assumptions used by China on the average thermal efficiency of coal-fired power stations in these years. NCVs were also modified for bituminous coal production from 2000 to 2013 as well as for inputs to main activity heat plants from 2008 to 2013.

Starting with 2010 data, NBS increased the level of detail of the national energy balance regarding oil products and coal gases. Breaks in time series may occur between 2009 and 2010.

Methodology

A collaborative effort between NBS and IEA continues, with the objective of providing additional detail on energy production, transformation and consumption of all five different types of coal (e.g. anthracite, coking coal, other bituminous, sub-bituminous and lignite). At the moment NBS only provides quantities of raw coal and washed coal in their energy balances

and the IEA Secretariat has attributed these quantities to coking coal and other bituminous coal. It is expected that the continuing work to provide disaggregated data on the five different coals will result in greater detail in future editions.

Since 2000, imports and exports of cleaned coal are no longer reported in the national energy balance of China. The IEA Secretariat has used secondary sources of information to report this coking coal trade and corresponding quantities have been removed from bituminous coal trade. Consumption of this coking coal is assumed to be in coke ovens.

The IEA data of coal stocks for the years 1985 and 1990 as well as coal production for the years 1997-1999 are estimates and do not represent official data released by the Chinese government. Those estimates were based on the assumption that coal consumption statistics are more reliable than coal production statistics and that the production-consumption relationship should maintain a balance over time.

New information in 2012 also became available from NBS on the production and consumption of gangue, a mining waste product that has been classified as industrial waste in the IEA energy balances. This quantity of industrial waste is not likely to represent the only combustion of industrial waste in China, however, information is not available to provide more complete data on this activity.

In 2012, new information became available on how NBS accounts for international aviation and marine bunkers in the China's national energy balance. Previously international flights by Chinese airlines and ships had been excluded. A revised methodology was implemented that now includes fuel use for international airplanes and ships, regardless of whether they are foreign- or China-owned.

In the 2012 edition, new information became available on natural gas consumption in public transportation in China. This new consumption was added to the natural gas time series to ensure proper coverage of the transport sector.

Coal to liquids output was estimated based on projected production slate of operational coal-to-liquid plants. Coal to gas output is estimated based on operational capacity of coal-to-gas plants.

Electricity production from pumped storage hydro is reported from 2010 to 2014.

Time series for liquid biofuels, biogases, wind (prior to 2010), geothermal, solar photovoltaic and solar thermal generation are based on tertiary sources of information and IEA Secretariat estimates. None of these time series are reported in the national energy balance of China.

General note

In recent years, China has reported large increases in stocks for crude oil, oil products and for different types of coal. These stock increases are seen as consistent with trends in economic growth and development in China; however, information is currently lacking on the scale of the infrastructure available for this magnitude of stock increases.

Data for coal trade in this publication may not match data from secondary sources of information.

Sources 1990 to 2014:

- *China Energy Statistical Yearbook*, National Bureau of Statistics, Beijing, various editions up to 2015.
- Direct communication with the China National Renewable Energy Centre (CNREC), National Energy Administration (NEA), Beijing.
- *Solar Heat Worldwide*, AEE - Institute for Sustainable Technologies, Gleisdorf, various editions up to 2016.
- China Electricity Council, online statistics, various editions up to 2014.
- *Trends in Photovoltaic Applications*, International Energy Agency Photovoltaic Power Systems Programme, 2013 edition.
- European Photovoltaic Industry Association, Global Market Outlook for Photovoltaics 2013-2017, *Figure 1: Evolution of global cumulative installed capacity 2000-2021*, May 2014.
- Zhang G., *Report on China's Energy Development 2010*, China's National Energy Administration, Beijing, editions 2009 to 2011.
- Zheng et. al, *Steady Industrialized Development of Geothermal Energy in China: Country Update Report*, Beijing, 2005-2009.
- Lund et. al, *Direct Utilization of Geothermal Energy 2010 Worldwide Review*, World Geothermal Congress, Bali, 2010.
- *The Global Biodiesel Balance for 2012 and 2013*, *World Ethanol and Biofuels Report*, F.O. Lichts, London, Vol. 11 No. 16, Apr. 23, 2013.
- IEA Secretariat estimates.

Sources up to 1990:

- *Electric Industry in China in 1987*, Ministry of Water Resources and Electric Power, Department of Planning, Beijing, 1988.
- *Outline of Rational Utilization and Conservation of Energy in China*, Bureau of Energy Conservation State Planning Commission, Beijing, June 1987.
- *China Coal Industry Yearbook*, Ministry of Coal Industry, People's Republic of China, Beijing, 1983, 1984, 1985 and 2000.
- *Energy in China 1989*, Ministry of Energy, People's Republic of China, Beijing, 1990.
- *China: A Statistics Survey 1975-1984*, State Statistical Bureau, Beijing, 1985.
- *China Petro-Chemical Corporation (SINOPEC) Annual Report*, SINOPEC, Beijing, 1987.
- *Almanac of China's Foreign Economic Relations and Trade*, The Editorial Board of the Almanac, Beijing, 1986.

Sources for Biofuels and waste:

- IEA Secretariat estimates.

Colombia

Sources 1992 to 2014:

- Unidad de Planeación Minero Energética (UPME) Online statistics, Ministerio de Minas y Energía, various editions up to 2015.
- Direct communication with the Ministry of Mines and Energy, Energy Information Department, Bogotá.
- *Statistics 1996-2015*, Sistema de Información Eléctrico Colombiano, Ministry of Mines and Energy, online statistics, various editions up to 2015.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Sources up to 1991:

- *Boletin Minero-Energético*, Ministerio de Minas y Energía, Bogotá, December 1991.
- *Estadísticas Minero-Energéticas 1940-1990*, Ministerio de Minas y Energía, Bogotá, 1990.
- *Estadísticas Básicas del Sector Carbón*, Carbocol, Oficina de Planeación, Bogotá, various editions from 1980 to 1988.
- *Colombia Estadística 1985*, DANE, Bogotá, 1970 to 1983 and 1987.
- *Empresa Colombiana de Petróleos, Informe Anual*, Empresa Colombiana de Petróleos, Bogotá, 1979, 1980, 1981 and 1985.
- *Estadísticas de la Industria Petrolera Colombiana Bogota 1979-1984*, Empresa Colombiana de Petróleos, Bogotá, 1985.
- *Informe Estadístico Sector Eléctrico Colombiano*, Government of Colombia, Bogotá, 1987 and 1988.
- *La Electrificacion en Colombia 1984-1985*, Instituto Colombiano de Energía Electrica, Bogotá, 1986.
- *Balances Energéticos 1975-1986*, Ministerio de Minas y Energía, Bogotá, 1987.
- *Energía y Minas Para el Progreso Social 1982-1986*, Ministerio de Minas y Energía, Bogotá, 1987.

Sources for Biofuels and waste:

- Ministry of Mines and Energy, Energy Information Department, Bogotá.

Congo

In the 2015 edition, time series for the period 2000-2012 were revised based on new energy balances received from the Ministry of Energy. Breaks in time series may occur between 1999 and 2000.

The Imboulou Hydro Plant (120MW) began operating in May 2011.

Sources 1971 to 2014:

- Direct communication with the Ministère de l'Energie et de l'Hydraulique, Brazzaville, 2000 to 2014.
- Rapport annuel SIE-Congo 2014
- Direct communication with the Agence de Régulation de l'Aval Pétrolier, Brazzaville, 2008 to 2013.
- *Les chiffres caractéristiques de la Société Nationale d'Électricité 2005-2011*, SNE, Brazzaville.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Rapport annuel SIE-Congo 2014.
- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa,* African Energy Programme of the African Development Bank, Abidjan, 1996.

Costa Rica

Sources up to 2014:

- Direct communication with the Ministerio del Ambiente y Energía, San José.
- *Energy-Economic Information System (SIEE),* Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Côte d'Ivoire

Member of the SIE-Afrique project.

In the 2014 edition, new information regarding the classification of kerosene type jet fuel and other kerosene produced in Cote d'Ivoire since 1971 became available. Time series for these products were revised accordingly.

Sources 2013 to 2014:

- AFREC Energy questionnaire, African Energy Commission, 2016 submitted by Direction de l'Energie, Abidjan.
- Direct communication with Direction de l'Energie, Abidjan.
- IEA Secretariat estimates.

Sources 2009 to 2012:

- Direct communication with Direction de l'Energie, Abidjan.
- IEA Secretariat estimates.

Sources 2005 to 2008:

- WEC-IEA Joint Energy Reporting Format for Africa, questionnaire submitted by Direction de l'Energie, Abidjan.
- Direct communication with Direction de l'Energie, Abidjan.
- IEA Secretariat estimates.

Sources 2002 to 2004:

- Direct communication with the Ministry of Mines and Energy, Abidjan, 2005-2006, and IEA Secretariat estimates.

Sources 1992 to 2001:

- Direct communication with oil industry and the Ministry of Energy, Abidjan, July 2003.
- Direct communication with Société Ivoirienne de Raffinage, 2004.
- *La Côte d'Ivoire en chiffres,* Ministère de l'Economie et des Finances, Abidjan, 1996-97 edition.
- *L'Energie en Afrique,* IEPE/ENDA, Paris, 1995, in turn sourced from Ministère des Mines et de l'Energie, Abidjan.
- The UN Energy Statistics Database.

Sources up to 1991:

- *Etudes & Conjoncture 1982-1986,* Ministère de l'Economie et des Finances, Direction de la Planification et de la Prévision, Abidjan, 1987.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa,* African Energy Programme of the African Development Bank, Abidjan, 1996.

Croatia

Data for Croatia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.

Non-specified transformation of natural gas reported from 2007 refers to natural gas used by refineries for hydrogen production.

Breaks in time series may appear between 2007 and 2008 as transit data of electricity trade are not available for years prior to 2008.

Sources 1990 to 2014:

- Direct communication with the Energy Institute "Hrvoje Požar", Zagreb.
- Direct communication with the Central Bureau of Statistics, Zagreb.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

- IEA Secretariat estimates.

Cuba

Breaks in time series in the early 90s are assumed to be due to the codification into law of the embargo imposed on Cuba, in 1992.

Figures for crude oil include additives added to reduce viscosity.

Sources up to 2014:

- *Anuario Estadístico de Cuba*, Oficina Nacional de Estadísticas, Havana, various editions from 1998 to 2015.
- Estadísticas Energéticas en la Revolución, Oficina National de Estadísticas, Havana, September 2009 edition.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- Compendio estadístico de energía de Cuba 1989, Comité Estatal de Estadísticas, Havana, 1989.
- Anuario Estadístico de Cuba, Comité Estatal de Estadísticas, Havana, various editions from 1978 to 1987.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- Anuario Estadístico de Cuba, Oficina Nacional de Estadísticas, Havana, various editions from 1998 to 2015.

Curaçao

The Netherlands Antilles was dissolved on 10 October 2010, resulting in two new constituent countries, Curaçao and Sint Maarten, with the remaining islands joining the Netherlands as special municipalities. In this edition, the methodology for accounting for the energy statistics of the Netherland Antilles has been revised in order to follow the above-mentioned geographical changes. From 2012 onwards, data now account for the energy statistics of Curaçao Island only. Prior to 2012, data remain unchanged and still cover the entire territory of the former Netherland Antilles.

As the Isla Refinery in Curaçao did not operate to its maximum capacity in 2010, a break in time series might occur in that year for crude oil and oil products.

Sources 1997 to 2014:

- *Informe de Gestión Anual*, PDVSA - Petróleos de Venezuela, S.A., various editions up to 2015.
- *The Economy of* Curaçao *and Sint Maarten in Data and Charts, Yearly Overview 2004-2015*, Centrale Bank van Curaçao en Sint Maarten, Willemstad.
- *Statistical indicators 1998-2010*, Central Bank of Netherlands Antilles, Willemstad.
- Direct communication with the Isla Refinery, Emmastad, Curaçao, up to 2008.
- *Statistical Information*, Central Bureau of Statistics, Fort Amsterdam, up to 2008.
- IEA Secretariat estimates.

Cyprus

Note by Turkey:

The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Time series data from 2009-2010 for primary solid biofuels were revised based on newly available information. Breaks in time series may occur between 2008 and 2009 for these products.

Sources 1994 to 2014:

- Direct communication with the statistical service of Cyprus, Nicosia.

- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- *Electricity Authority of Cyprus Annual Report 1996*, Electricity Authority of Cyprus, Nicosia, 1997.

Sources up to 1993:

- *Electricity Authority of Cyprus Annual Report 1988*, 1992, Electricity Authority of Cyprus, Nicosia, 1989 and 1993.
- *Industrial Statistics 1988*, Ministry of Finance, Department of Statistics, Nicosia, 1989.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaires and IEA Secretariat estimates.
- Note: Data on electricity generation from solar thermal and heat production from municipal waste and wood were submitted for the first time from the year 2004.

Democratic People's Republic of Korea

Time series data for 2011 for primary coals were revised in the 2014 edition based on new information received in 2014. This may lead to breaks in the time series between 2010 and 2011 and differences in trends compared to previous editions for some products.

Sources 1971 to 2014:

- Direct communication with Korea's National Statistical Office and Korea's Energy Economics Institute, 2002 to 2014.
- *North Korea Statistics*, Korean Statistical Information Service website, www.kosis.kr, Seoul.
- *The UN Energy Statistics Database*.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database*.
- Forestry Statistics, FAO, Rome, 2016.
- IEA Secretariat estimates.

Democratic Republic of the Congo

Member of the SIE-Afrique project.

In the 2015 edition, new information and methodologies regarding biomass and charcoal became available. Breaks in time-series may occur between 2013 and 2014.

New estimations were made for biomass production in 2014. This may results in break in time series.

Sources up to 2013:

- Direct communication with the Ministère de l'Energie, Kinshasa Gombe.
- Commission Nationale de l'Energie, Ministère de l'Energie, Kinshasa Gombe, 2005.
- WEC-IEA Joint Energy Reporting Format for Africa, 1999 to 2000.
- *The UN Energy Statistics Database.*
- *L'Energie en Afrique*, IEPE/ENDA, Paris, 1995, in turn sourced from the *Annuaire Statistique Energétique 1990*, Communauté Economique des Pays des Grands Lacs, Bujumbura, 1990.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

Sources up to 2014:

- AFREC Energy questionnaire, African Energy Commission, 2015.

Dominican Republic

In 2014 the national energy balance was adopted as a primary data source. This could lead to breaks in time series between 1997 and 1998 for some flows.

Sources 1971 to 2014:

- *Balance energia neta*, Comisión nacional de energía, Santo Domingo various editions up to 2014

- *Importación de petróleo y derivados*, Ministre de Industria y Comercio (MIC), Santo Domingo, various editions up to 2012.
- *Capacidad instalada y generación del SENI por año, según tecnología, 2000-2010*, Oficina Nacional de Estadística, Santo Domingo.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Ecuador

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Ecuador has revised historical data. This may lead to different trends compared to previous editions of this publication.

In the 2015 edition new information became available regarding production and consumption of refinery fuel. This may lead to breaks in time series between 2012 and 2013 (2011 and 2012) for some oil products.

Sources 1999 to 2014:

- Direct communication with the Ministerio Coordinador de Sectores Estratégicos, Quito.
- Direct communication with the Ministerio de Recursos Naturales No Renovables, Quito, up to 2014.
- Direct communication with the Ministerio de Minas y Petróleos, Quito, up to 2011.Balance Energético Nacional – Resumen, Ministerio Coordinador de Sectores Estratégicos, Quito, various editions up to 2014.
- *Estadística del Sector Eléctrico Ecuatoriano, Agencia de Regulación y Control de Electricidad Arconel*, Quito, various editions up to 2015.
- *Informe Estadístico*, & *Informe Cifras Petroleras*, Petroecuador, Empresa Estatal Petróleos del Ecuador, Quito, various editions up to 2015.
- *Reporte del Sector Petrolero*, Banco Central del Ecuador, Quito, various editions up to 2015.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Sources 1990 to 1998:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Sources up to 1989:

- Ministerio de Energía y Minas.
- *Cuentas Nacionales*, Banco Central del Ecuador, Quito, various editions from 1982 to 1987.
- *Memoria 1980-1984*, Banco Central del Ecuador, Quito, 1985.
- *Ecuadorian Energy Balances 1974-1986*, Instituto Nacional de Energía, Quito, 1987.
- *Informacion Estadística Mensual, No. 1610*, Instituto Nacional de Energía, Quito, 1988.
- *Plan Maestro de Electrificación de Ecuador*, Ministerio de Energía y Minas, Quito, 1989.

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Egypt

Data are reported on a fiscal year basis. Data for 20134 correspond to 1 July 2014-30 June 2015.

Stock changes may include informal trade.

International marine bunkers are calculated as a residual between supply and consumption for the period 2004-2014. The IEA Secretariat has been notified by an external source that sales and consumption of marine bunkers may be significantly lower than our estimates. In this edition the Secretariat has decided to continue using the estimation methodology since no new data for international marine bunkers have been received from Egypt.

Sources 1992 to 2014:

- Direct communication with the Organisation for Energy Planning, Cairo.
- Direct communication with the Central Agency for Public Mobilization and Statistics, Cairo.
- WEC-IEA Joint Energy Reporting Format for Africa, 2000 to 2012.
- Direct submission to the IEA Secretariat from the Ministry of Petroleum, Cairo.

- *Annual Report 1995, 1997, 1998, 1999,* Ministry of Petroleum, Egyptian General Petroleum Corporation, Cairo, 1996, 1998 to 2000.
- *Annual Report of Electricity Statistics 1996/1997 to 2010/2011*, Ministry of Electricity and Energy, Egyptian Electricity Holding Company, Cairo, 1998 to 2012.
- *Arab Oil and Gas,* The Arab Petroleum Research Center, Paris, October 1997.
- *Middle East Economic Survey*, Middle East Petroleum and Economic Publications, Nicosia, February 1994, June 1996, March 1998.
- *A Survey of the Egyptian Oil Industry 1993*, Embassy of the United States of America in Cairo, Cairo, 1994.
- IEA Secretariat estimates.

Sources up to 1991:

- *Annual Report of Electricity Statistics 1990/1991*, Ministry of Electricity and Energy, Egyptian Electricity Authority, Cairo, 1992.
- *Statistical Yearbook of the Arab Republic of Egypt*, Central Agency for Public Mobilisation and Statistics, Cairo, 1977 to 1986.
- *L'Electricité, l'Energie, et le Pétrole*, République Arabe d'Egypte, Organisme Général de l'Information, Cairo, 1990.
- *Annual Report*, The Egyptian General Petroleum Corporation, Cairo, 1985.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database*
- IEA Secretariat estimates.

El Salvador

El Salvador shut down its only refinery in 2012.

Sources 1971 to 2014:

- *Balances Energeticos*, Consejo Nacional de Energia (CNE), San Salvador, various editions from 2007 to 2014.
- *Boletín de Estadísticas*, Superintendencia General de Electricidad y Telecomunicaciones (SIGET), San Salvador, various editions from 1998 to 2014.
- *Centroamérica: estadísticas de hidrocarburos, 2014.* Comisión Económica para América Latina y el Caribe (CEPAL), various editions from 2009-2014.
- Direct communication with the Ministerio de Economía, Dirección de Hidrocarburos y Minas, San Salvador.
- Direct communication with the Consejo Nacional de Energia El Salvador (CNE), San Salvador.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Eritrea

Data for Eritrea are available from 1992. Prior to that, they are included in Ethiopia.

Solid biofuels consumption data have been periodically re-estimated by Eritrea. This may result in breaks in time series for this product.

Sources 1992 to 2014:

- Direct Communication with the Ministry of Energy and Mines, Asmara.
- IEA Secretariat estimates.

Ethiopia

Ethiopia energy data include Eritrea from 1971 to 1991. From 1992, the two countries are reported separately.

Data are reported according to the Ethiopian financial year, which runs from July 1st to June 30th of the next year. .

As no data were received for 2014, data are estimated by the IEA Secretariat based on population growth for biomass and household consumption, and GDP growth for the other products.

Sources 1992 to 2013:

- Direct communication with the Ministry of Water and Energy, Addis Ababa, between 2012 and 2015.
- *Existing Power Plants*, Ethiopian Electric Power Corporation, online database, 2014.

- *Biomass Energy Strategy Formulation for Ethiopia*, European Union Energy initiative, in cooperation with the Ethiopian Ministry for Water and Energy, Germany, 2013
- Direct communication with the Ministry of Mines and Energy, Addis Ababa, 2004 to 2011.
- Direct communication with the Energy Development Follow-up and Expansion Department of the Ministry of Infrastructure, Addis Ababa, 2004 and 2005.
- Direct communication with the Ministry of Finance and Economic Development, Addis Ababa, 1998 to 2003.
- *The UN Energy Statistics Database*.
- IEA Secretariat estimates.

Sources up to 1991:

- *Ten Years of Petroleum Imports, Refinery Products, and Exports*, Ministry of Mines & Energy, Addis Ababa, 1989.
- *Energy Balance for the Year 1984*, Ministry of Mines & Energy, Addis Ababa, 1985.
- *1983 Annual Report*, National Bank of Ethiopia, Addis Ababa, 1984.
- *Quarterly Bulletin*, National Bank of Ethiopia, Addis Ababa, various editions from 1980 to 1985.

Sources for Biofuels and waste:

- *Biomass Data 2007-2012*, Ministry of Water and Energy, Addis Ababa, 2012.
- IEA Secretariat estimates up to 2006 based on 1992 data from Eshetu and Bogale, *Power Restructuring in Ethiopia*, AFREPREN, Nairobi, 1996.

Former Yugoslav Republic of Macedonia

Data for FYR of Macedonia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.

The FYR of Macedonia has changed the methodology for reporting autoproducer heat consumption for own use in 2010, which can lead to breaks in time series between 2009 and 2010.

The refinery OKTA in the FYR of Macedonia was shut down in 2014. This may lead to breaks in time series from 2013-2014.

Sources 1990 to 2014:

- Direct communication with the State Statistical Office of Macedonia, Department for Environment, Energy and Transport, Skopje.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaires, IEA Secretariat estimates,
- *UN Energy Statistics Database* and *Forestry Statistics*, FAO, Rome, 2000.

Gabon

Revisions were made to the residential fuel consumption from the time period of 2010 to 2014 to take into account newly available data. This may results in break in time series between 2009 and 2010.

Sources 1992 to 2014:

- AFREC Energy questionnaire, African Energy Commission, 2015.
- *Rapport annuel de la SEEG*, Société d'Énergie et d'Eau du Gabon, Libreville, various editions from 2000 to 2014.
- *Statistiques économiques*, Banque des Etats de l'Afrique Centrale (BEAC), online database, 2011.
- *Annuaire Statistique du Gabon*, Ministère de l'économie, du commerce, de l'industrie et du tourisme, Libreville, 2001 to 2007 and 2004 to 2008, 2011.
- Direct communication with Direction Générale de L'Energie, Libreville, 2003 to 2008.
- Direct communication with Société Gabonaise de Raffinage, Port Gentil, 1997, 2000 to 2006, 2008 to 2009.
- *Tableau de Bord de l'Economie, Situation 1997, Perspectives 1998-1999*, Direction Générale de l'Economie, Ministère des Finance, de l'Economie, du Budget et des participations, chargé de la privatisation, May 1998.
- *Rapport d'Activité*, Banque Gabonaise de Développement, Libreville, 1985, 1990, 1992 and 1993.*The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Sources up to 1991:

- *Tableau de Bord de l'Economie, Situation 1983 Perspective 1984-85*, Ministère de l'Economie et des Finances, Direction Générale de l'Economie, Libreville, 1984.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

Georgia

Data for Georgia are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Heat production has stopped in 2011 due to the shutdown of combined heat and power plants.

Time series data from 1990 to 2012 for coal were revised in 2014 due to the reclassification of other bituminous to sub-bituminous coal based on newly available information.

Data on international marine bunkers for Georgia are not currently available; however upcoming local surveys are planned and should make this information available in future years.

The gathering of energy data as well as the completion of the questionnaires is now the responsibility of the National Statistical Office (GEOSTAT), whereas it used to be the responsibility of the Energy Efficiency Centre. This may lead to breaks in time series between 2012 and 2013.

Sources2013 to 2014:

- Direct communication with GEOSTAT. The National Statistical Office started submitting Joint IEA/Eurostat/UNECE questionnaires in 2015 (2013 data).
- IEA Secretariat estimates.

Sources 2008 to 2012:

- Direct communication with the Energy Efficiency Centre Georgia, Tbilisi.
- IEA Secretariat estimates.

Sources 1990 to 2008:

- *Official Energy Balance of Georgia 1990-1999, 2000-2008*, Ministry of Economy and Ministry of Energy, Tbilisi.
- IEA Secretariat estimates.

Ghana

Primary solid biomass figures for 2000-2012 were revised in the 2015 edition, as new information became available. Breaks in time series might occur between 1999 and 2000.

Data were revised for electricity, oil products and biofuels until 2000 and from 2009 to 2012 based on new information received from the Energy Commission. Breaks in time series may occur for these products.

Sources 1992 to 2014:

- *National Energy Statistics 2000-2014*, Energy Commission, Accra, 2015.
- AFREC Energy questionnaire, African Energy Commission, 2015.
- Direct communication with the Energy Commission, Accra, 2004 and since 2009.
- *Detailed Statistics of Petroleum Products Consumption 1999-2008*, National Petroleum Authority, Accra, 2009.
- *National Energy Statistics*, Ministry of Energy and Mines, Accra, 2000.
- *Quarterly Digest of Statistics*, Government of Ghana, Statistical Services, Accra, March 1990, March 1991, March 1992, March 1995.
- *Energy Balances*, Volta River Authority, Accra, various editions from 1970 to 1985.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Ministry of Mines and Energy, *the UN Energy Statistics Database*.
- IEA Secretariat estimates.

Gibraltar

In the 2015 edition, time series for residual fuel oil and gas/diesel oil consumed as international marine bunkers were revised based on newly available information.

Sources up to 2014:

- *Abstract of Statistics*, Government of Gibraltar, Gibraltar, various editions up to 2014.

- Gibraltar Port Authority, Gibraltar, 2015. Gibraltar Electricity Authority, Gibraltar, 2008.
- IEA Secretariat estimates.

Guatemala

The Texaco refinery in Escuintla ceased operations in 2002.

Orimulsion was imported between 2004 and 2006 for electricity generation and is reported under Other Hydrocarbons.

Sources up to 2014:

- Direct communication with the Dirección Nacional de Energía, Ministerio de Energía, Guatemala City.
- *Informe Balance Energético, 2010, 2011, 2012, 2013, 2014* Ministry of Energy and Mines, Guatemala City.
- Estadísticas Energéticas – Subsector Eléctrico, 2010 to 2013 editions, Ministry of Energy and Mines, Guatemala City.
- Production, consumption, Exports and Imports of Oil products Ministry of Energy and Mines, Guatemala City, 2014.
- Energy-Economic Information System (SIEE), Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Haiti

Data for solid biofuels and waste products were revised from 2005 to 2011 based on revisions made by OLADE. Breaks in time series may occur during this period for some products.

Sources 2009 to 2014:

- Direct communication with Bureau des Mines et de l'Energie, Port-au-Prince.
- *Tableau de suivi du secteur électricité*, Ministère de l'Economie et des Finances de la République d'Haïti.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *IEA Secretariat estimates.*

Sources 2008:

- Direct communication with Table Sectorielle Énergie Électrique, Ministère des Travaux Publics, Transports et Communications, Haiti.
- IEA Secretariat estimates.

Sources 2005 to 2007:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Sources up to 2004:

- Direct communication with Bureau des Mines et de l'Energie.

Honduras

In this edition, time series data were revised for the period 2009-2013. These revisions made in OLADE data might create breaks in time series for some years.

Sources 2007 to 2014:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *Anuario Estadístico*, Empresa Nacional de Energía Eléctrica (ENEE), Tegucigalpa, several editions up to 2012
- *Centroamérica: Estadísticas de Hidrocarburos*, Comisión Económica para América y el Caribe (CEPAL), United Nations, Mexico, several editions up to 2013.
- *Centroamérica: Estadísticas de Producción del Subsector Eléctrico*, Comisión Económica para América y el Caribe (CEPAL), United Nations, Mexico, several editions up to 2013.
- IEA Secretariat estimates.

Sources up to 2006:

- Direct communication with Empresa Nacional de Energía Eléctrica, Comayagüela.
- Direct Communication with the Secretariat de Recursos Naturales y del Ambiente, Tegucigalpa.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Hong Kong, China

In the 2016 edition, trade data for various other petroleum products have been revised based on newly available information. Breaks in time series may occur between 2000 and 2001.

Sources up to 2014:

- *Hong Kong Energy Statistics - Annual Report*, Census and Statistics Department, Hong Kong Special Administrative Region, various editions up to 2015.
- *Hong Kong Merchandise Trade Statistics – Domestic Exports and Re-exports/ Imports*, Census and Statistics Department, Hong Kong Special Administrative Region, various editions up to December 2014.
- Direct communication with The Hongkong Electric Company, Ltd, Hong Kong.
- *China Light & Power - Annual Report*, China Light & Power Group, Hong Kong, several editions up to 2015.
- *China Light & Power – Facility Performance Statistics*, China Light & Power Group, Hong Kong, several editions up to 2015.
- *Hong Kong Monthly Digest of Statistics*, Census and Statistics Department, Hong Kong, various editions to 1994.
- *Towngas - Annual Report*, The Hong Kong and China Gas Company Ltd., Hong Kong, several editions up to 2013.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database*, *Hong Kong Energy Statistics - Annual Report 2003*, and IEA Secretariat estimates.
- *Hong Kong Energy End-use Data*, *EMSD*, The Electrical & Mechanical Services Department, Government of Hong Kong, several editions up to 2015.

India

Data are reported on a fiscal year basis. Data for 2014 correspond to April 1st, 2014 – March 30th, 2015.

General note

Coal

- In 2015, significant revisions of the net calorific values of the different types of coal have been made for the whole time series, based on official data as well as IEA and other expert estimates. As a result, there have been significant changes for the coal data when presented in energy units, as well as in the calculated efficiency of coal fired power generation. Data on the production and consumption of secondary coal products may have also been revised as a result.
- From 2008, due to a notable discrepancy between official coal imports from India and coal exports to India as reported by trade partners, imports of coking coal and non-coking coal are estimated by the IEA Secretariat, based on trade partners' data. The breakdown of non-coking coal imports between bituminous coal and sub-bituminous coal is estimated from 2008. This could lead to breaks in time series between 2007 and 2008.
- Coking coal figures for India do not align with IEA definitions as they include production of non-metallurgical coking coal reported by India. Figures may be revised in future editions to include only washed coking coal.
- Due to data limitations, IEA Secretariat estimates are used for some products and flows, including supply and demand of coke oven gas and blast furnace gas. Coke oven coke production is estimated from 2006 based on growth of blast furnace iron production, as official production data do not include production from small private producers.

Oil

- Information on stock changes of crude oil and oil products, available from the JODI database from April 2011, was added to the 2014 edition. Breaks in time series may appear in stock changes between 2010 and 2011.
- In the 2014 edition, based on revisions performed by the Ministry of Petroleum and Gas, refinery intake was split between crude oil and refinery feedstocks from 1999. The refinery feedstocks reported by the IEA Secretariat correspond to the quantities officially reported as "other inputs" to Reliance Refineries. They do not include additives and refinery feedstocks to other Indian refineries. These missing inputs could reach up to 2.5 million tonnes.

- In the 2014 edition, data for diesel consumption were revised based on an official survey on the end use of diesel retail sales, see references below. The IEA Secretariat classifies the diesel used in mobile phone towers and non-industry power generators as input to autoproducer electricity generation. A corresponding electricity output is estimated.
- No NGL production is officially reported by India. The NGL production estimated by the IEA Secretariat corresponds to the production of oil products from gas separation plants, known in India as "fractionators". In the IEA methodology, the output of oil products from gas separation plants comes from an input of NGL and the separation process is shown in the transfer row. Prior to 2005-06, the split of fractionator output between petroleum products is estimated by the IEA Secretariat.
- No breakdown of refinery fuel by products is currently officially available. In this edition, refinery gas production has been estimated based on expected refinery output for the years 2009-2014. In addition, refinery gas may also include other oil products used, such as residual fuel oil, in Indian refineries and not only refinery gas, as per IEA definitions.
- Due to notable breaks in official data for fuel oil, consumption of fuel oil in international marine bunkers is estimated from 1990 based on industry sources, and final consumption of fuel oil is estimated from 2004 based on 2003 data.

Natural gas

- In the 2014 edition, natural gas imports for India were revised from 2008 based on Indian Customs data, in order to include all LNG importers.
- No data are officially available on the sectoral consumption of re-gasified LNG and city gas. The breakdown is estimated by the IEA Secretariat.

Renewables

- Due to data limitations, use of biogas produced in family biogas plants for cooking is currently not estimated by the IEA Secretariat. Data for biofuels production are based on USDA-estimates for the calendar year.
- Only information on total on-grid generation from renewables is officially available. The breakdown between sources was estimated by the IEA Secretariat using official data on capacities from MNRE from 2007. Total off-grid generation and split by sources are estimated based on capacities from 2007 onward.
- According to newly available information, estimates of solar thermal output up to 2012 may include systems that were out of operation. For this reason, a break in the time series might occur between 2012 and 2013.
- In 2015, estimates of the production and consumption of charcoal have been added for the whole time series, as well as the respective inputs of fuelwood to charcoal production plants.

Electricity

- Data for total electricity generation include estimates for electricity generation from diesel by non-industrial autoproducers as well as off-grid electricity generation from renewable energy.
- In 2015, data on the electricity consumption by industrial sub-sector have been added for the years 2008-2012. 2014 data have been estimated by the IEA Secretariat.

Sources 1992 to 2014:

- Direct communication with the Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India, New Delhi.
- *Energy Statistics*, Central Statistical Office, Ministry of Statistics and Programme Implementation, New Delhi, various editions up to 2014-15.
- *Monthly Abstract of Statistics*, Ministry of Planning, Central Statistics Organisation, Department of Statistics, New Delhi, various editions from 1984 to 2000.

Coal

- Direct communication with the Coal Controller's Office, Ministry of Coal, Government of India, Kolkata.
- *Coal Directory of India*, Coal Controller's Office, Ministry of Coal, Kolkata, various editions up to 2014-2015.
- *Annual Review of Coal Statistics*, Coal Controller's Office, Ministry of Coal, Kolkata, various editions from 1993-1994 to 1998-1999.

Oil and Natural Gas

- Direct communication with the Economic Division and Petroleum Planning and Analysis Cell, Ministry of Petroleum and Natural Gas, Government of India, New Delhi.

- *Indian Petroleum and Natural Gas Statistics*, Ministry of Petroleum and Natural Gas, New Delhi, various editions from 2000-01 to 2014-15.
- *Petroleum and Natural Gas data*, website of Petroleum Planning and Analysis Cell, Ministry of Petroleum and Natural Gas, New Delhi, *www.ppac.org*.
- *Annual Report 1993-1994, 1998-1999*, Ministry of Petroleum and Natural Gas, New Delhi, 1995, 2000.
- *All India Study on Sectoral Demand of Diesel and Petrol*, Petroleum Planning and Analysis Cell, Ministry of Petroleum and Gas, New Delhi, January 2014.
- *Report of the Working Group on Fertilizer Industry for the Twelfth Plan (2012-12 to 2016-17)*, Department of Fertilizers, Ministry of Chemical & Fertilizers, Government of India, New Delhi, 2012.
- *"Vision 2030", Natural Gas Infrastructure in India, Report by Industry Group for Petroleum & Natural Gas Regulatory Board*, Petroleum & Natural Gas Regulatory Board, New Delhi, May 2013.
- *Report of the Inter-Ministerial Committee on Policy for Pooling of Natural Gas Prices and Pool Operating Guidelines*, Planning Commission, Government of India, New Delhi, August 2011.
- *LNG imports*, website of the Department of Commerce, Ministry of Commerce and Industry, New Delhi, *http://commerce.nic.in/*.
- *Commodity-wise traffic handled at major ports 2002-03 to 2012-13 (p)*, website of the Ministry of Shipping, New Delhi, *shipping.nic.in*.
- Joint Oil Data Initiative (JODI) online database.
- *India – On the Move*, World Bunkering, The International Bunker Industry Association, London, Spring 2012.

Renewables

- Direct communication with the Ministry of New and Renewable Energy, Government of India, New Delhi.
- *Physical Targets and Achievements During the 11th Plan*, Ministry of New and Renewable Energy, Open Government Data Platform India, *data.gov.in*.
- *Renewable Energy in India: Progress, Vision and Strategy*, Ministry of New and Renewable Energy, 2010.
- *Solar Water Heaters in India: Market Assessment studies and surveys for different sectors and demand segments*, report by GreenTech Knowledge Solutions, submitted to Project Management Unit, Global Solar Water Heating Project, Ministry of New and Renewable Energy, January 2010.
- *Annual Report 1994-1996, 1998-1999*, Ministry of Energy, Department of Non-Conventional Energy, New Delhi, 1996 and 1999.
- *Solar Heat Worldwide*, AEE - Institute for Sustainable Technologies, Gleisdorf, various editions up to 2016.
- *India – Biofuels Annual 2015*, Gain Report, USDA Foreign Agriculture Service, New Delhi, January 2014.
- *Energy Data Directory, Yearbook "TEDDY"*, and *Annual Report*, The Energy and Resources Institute "TERI", New Delhi, 1986-1988, 1990, 1994-2000, 2014-15.
- *India's Energy Sector, July 1995*, Center for Monitoring Indian Economy PVT Ltd., Bombay, 1995.
- *Monthly Review of the Indian Economy*, Center for Monitoring Indian Economy PVT Ltd., New Delhi, various issues from 1994 to June 1999.

Electricity

- Direct communication with the Central Electricity Authority, Ministry of Power, Government of India, New Delhi.
- *Growth of Electricity Sector in India from 1947-2013*, Central Electricity Authority, Ministry of Power, New Delhi, July 2015.
- *All India Electricity Statistics General Review 1998-99, 2000-01 to 2008-09, 2011-12*, Central Electricity Authority, Ministry of Power, New Delhi, 2000, 2002 to 2010, 2015.
- *Monthly Generation Review, March 2015*, Central Electricity Authority, Ministry of Power, New Delhi, 2015.
- *Annual Survey of Industries Volume-I 2008-2009* to *2012-13*. Ministry of Statistics and Programme Implementation, Central Statistics Office, Kolkata.

Sources up to 1991:

- *Indian Oil Corporation Limited 1987-88 Annual Report*, Indian Oil Corporation Limited, New Delhi, 1989-1992.
- *Report 1986-87*, Ministry of Energy, Department of Coal, New Delhi, 1981 to 1987.

- *Annual Report 1986-1987*, Ministry of Energy, Department of Non-Conventional Energy, New Delhi, 1987.
- *Economic Survey*, Ministry of Finance, New Delhi, various editions from 1975 to 1986.
- *Statistical Outline of India*, Ministry of Finance, New Delhi, 1983, 1984, 1986, 1987.
- *Monthly Coal Bulletin, vol xxxvi no.2.*, Ministry of Labour, Directorate General of Mines Safety, New Delhi, February 1986.
- *General Review*, Public Electricity Supply, India Statistics, Central Electricity Authority, New Delhi, 1982 to 1985.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database.*
- Forestry Statistics, FAO,Rome, 2016.
- IEA Secretariat estimates, based on a per capita average consumption from various surveys and direct communication with the former Ministry of Non-conventional Energy Sources.

Indonesia

Electricity consumption for the agricultural sector is estimated by the IEA Secretariat for 2000-2014. This may lead to breaks in time series between 1999-2000.

Discrepancies exist between official data for coal trade in Indonesia. Export figures from 2011 are based on Customs (BPS) data.

Non-specified industry consumption, high in official data, is re-estimated by the IEA Secretariat.

Because of these changes, breaks in time series may occur between 2010 and 2011, and changes in trends may occur compared to previous publications.

The production and allocation of coal among the various coal products between 2000 and 2014 are estimated by the IEA Secretariat due to data collection limitations and discrepancies in trade data.

Sources 2008 to 2014:

- Direct communication with the Data Centre and Information Technology (PUSDATIN), Ministry of Energy and Mineral Resources, Jakarta.
- *Handbook of Energy & Economic Statistics of Indonesia*, PUSDATIN, Ministry of Energy and Mineral Resources (ESDM), Jakarta, various editions up to 2015.
- *Statistik, Minyak & Gas Bumi*, Directorate General of Oil and Gas, Ministry of Energy and Mineral Resources (ESDM), Jakarta, various editions up to 2015.
- *Trade data on coal, charcoal for 1999-2014*, website of the Central Bureau of Statistics of the Republic of Indonesia.
- *Irrigation management to increase agriculture production*. Ministry of Agriculture Republic of Indonesia, Jakarta, 2012.
- *PLN Statistics*, PT.PLN (Persero), Jakarta, various editions up to 2015.
- Direct communication with PT PLN (Persero), Jakarta.
- Direct communication with the Indonesia Coal Mining Association, Jakarta.
- IEA Secretariat estimates.

Sources 1992 to 2007:

- *Indonesia Mineral and Coal Statistics*, Directorate of Coal and Mineral Resources, Jakarta, 1998 to 2007.
- Statistics on Electricity and Energy, 1998 to 2004, Directorate General of Electricity and Energy Utilisation, Jakarta, 1999 to 2005.
- Oil and Gas Statistics of Indonesia, Directorate General Oil and Gas, Jakarta, various editions 1981 to 2007.
- The Petroleum Report Indonesia, various editions, U.S. Embassy in Jakarta, Jakarta, 1986 to 2008.
- Oil and Gas Data Information, 6th Edition, Directorate General Oil and Gas, Jakarta, 2002.
- Statistik Perminyakan Indonesia 1995 to 1999, Indonesia Oil and Gas Statistics, Directorate General of Oil and Gas, Jakarta, 2001.
- Neraca energy 2000, Energy Balance of Indonesia 2000, Asean Center for Energy.
- Mining and Energy Yearbook, 1998, Ministry of Mines and Energy, Jakarta, 1998.
- APEC annual energy statistics questionnaires.
- Direct communication with Directorate General of Coal and Mineral Resources, Directorate General Oil and Gas, and Directorate General of Electricity and Energy Utilisation of the Ministry of Energy and Mineral Resources.
- Direct communication with the Indonesian Institute for Energy Economics, 2004 and 2005.

- Direct communication with the ASEAN Centre for Energy, 2005.

Sources up to 1991:

- *Indonesian Financial Statistics*, Bank of Indonesia, Jakarta, 1982.
- *Indikator Ekonomi 1980-1985*, Biro Pusat Statistik, Jakarta, 1986.
- *Statistical Yearbook of Indonesia*, Biro Pusat Statistik, Jakarta, 1978 to 1984 and 1992.
- *Statistik Pertambangan Umum, 1973-1985*, Biro Pusat Statistik, Jakarta, 1986.
- *Energy Planning for Development in Indonesia*, Directorate General for Power, Ministry of Mines and Energy, Jakarta, 1981.
- *Commercial Information*, Electric Power Corporation, Perusahaan Umum Listrik Negara, Jakarta, 1984, 1985.

Sources for Biofuels and waste:

- *GAIN Report - Indonesia biofuels Annual*, United States Department of Agriculture, various editions up to 2015.
- *The UN Energy Statistics Database* and IEA Secretariat estimates.
- Direct communication with Indonesian Biofuel Producer Association (APROBI), Jakarta.

Islamic Republic of Iran

Data are reported according to the Iranian calendar year. Data for 2014 correspond to 20 March 201 – 19 March 2015.

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Statistical differences in the Islamic Republic of Iran statistics and balances can include stock change for some coal and oil products.

More detailed information for the consumption of coke oven coke became available for 2009-2012. Breaks in time series may occur between 2008 and 2009.

Sources 1999 to 2014:

- Direct communication with the Ministry of Energy, Teheran.
- Energy Balance of Iran, Department of Energy, Teheran, various editions up to the Iranian year 1393, Teheran.
- *World Development Indicators*, The World Bank, Washington, various editions up to 2014.
- IEA Secretariat estimates.

Sources 1992 to 1998:

- Direct communication with the Ministry of Energy, Office of Deputy Minister for Energy, Teheran, 1998.
- Direct communication with the Ministry of Petroleum, Teheran, 1999.
- *Electric Power in Iran*, Ministry of Energy, Power Planning Bureau, Statistics Section, Teheran, 1992.

Sources up to 1991:

- *Electric Power in Iran*, Ministry of Energy, Power Planning Bureau, Statistics Section, Teheran, 1967 to 1977, 1988, 1990, 1991.
- Ministry of Energy, Office of Deputy Minister for Energy, Teheran, 1971 to 1991.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database*; Forestry Statistics, FAO, Rome, 2000.
- IEA Secretariat estimates.
- Direct communications with the Ministry of Energy, Teheran.

Iraq

In this edition, new data for electricity generation became available for 2010-2013. Breaks in time series may occur between 2009 and 2010.

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Crude oil export data include back-blending of fuel oil.

Sources 1998 to 2014:

- *Reconciliation Report*, Extractive Industries Transparency Initiative (EITI) for Iraq, various editions up to 2015.

- Direct communication with the Ministry of Oil, Ministry of Electricity, Ministry of Planning and Development Cooperation and with the Central Organization for Statistics and Information Technology.
- *Online Statistics*, Iraq Ministry of Oil.
- *Annual Statistical Bulletin*, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2015.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- Joint Oil Data Initiative (JODI) online database.
- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2014.
- *Iraq Weekly Status Report*, US Department of State 2003 to 2004.
- IEA Secretariat estimates.

Sources up to 1997:

- *The UN Energy Statistics Database*.
- IEA Secretariat estimates.

Jamaica

In this edition, new information became available on industrial consumption of oil products and electricity. This may lead to breaks in time series between 2007 and 2008 data as well as differences with previous editions.

Sources 2007 to 2014:

- *National energy balance & various statistics*, Ministry of Science, Technology, Energy and Mining of Jamaica, Kingston, 2012-2014.
- *Annual report*, Jamaica Public Service Company, Kingston, 2012-2014.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *Petroleum Industry Consumption Statistics Jamaica 2003-2008*, Petroleum Corporation of Jamaica, Kingston.
- *Import Statistics 2006-2007*, Petrojam limited, Kingston
- Direct communication with the Office of Utilities Regulation, Kingston, 2008.
- IEA Secretariat estimates.

Sources 1991 to 2006:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Sources up to 1990:

- *National Energy Outlook 1985-1989*, Petroleum Corporation of Jamaica, Economics and Planning Division, Kingston, 1985.
- *Energy and Economic Review*, Petroleum Corporation of Jamaica, Energy Economics Department, Kingston, September 1986, December 1986 and March 1987.
- *Production Statistics 1988*, Planning Institute of Jamaica, Kingston, 1989.
- *Statistical Digest*, Research and Development Division, Bank of Jamaica, Kingston, 1984, 1985, 1986, 1989, 1990.

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Jordan

Due to an attack on a major natural gas pipeline between Egypt and Jordan during the 2011 revolution in Egypt, Jordan relied much more on fuel oil and diesel for power generation since then.

Sources 2005 to 2014:

- Direct communication with the Ministry of Energy and Mineral Resources, Amman.
- *Annual Report*, National Electric Power Company, Amman, various editions up to 2015.
- IEA Secretariat estimates.

Sources 1992 to 2004:

- Direct communication with the National Electric Power Company, Amman.
- *Annual Report*, National Electric Power Company, Amman, 1996, 1997, 1999 to 2004.
- *Annual Report 1992, 1993*, Jordan Electricity Authority, Amman, 1993, 1994.

- *Energy and Electricity in Jordan 1992, 1993, 1994, 1995,* Jordan Electricity Authority, Amman, 1993 to 1996.
- *Statistical Yearbook, 1994,* Department of Statistics, Amman, 1995.
- *44th Annual Report* for the year ending 31st December 1999, Jordan Petroleum Refinery Company, Amman, 2000.
- IEA Secretariat estimates.

Sources up to 1991:

- *Monthly Statistical Bulletin,* Central Bank of Jordan, Department of Research Studies, Amman, various issues.
- *Statistical Yearbook,* Department of Statistics, Amman, 1985, 1986 and 1988.
- *1986 Annual Report,* Ministry of Energy and Mineral Resources, Amman, 1987.
- *1989 Annual Report,* Ministry of Energy and Mineral Resources, Amman, 1990.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2000.
- IEA Secretariat estimates.

Kazakhstan

Data for Kazakhstan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

The IEA Secretariat is working with the Agency on Statistics of the Republic of Kazakhstan to re-allocate the non-specified industry coal consumption. Therefore future revisions to coal consumption figures may be expected.

As a result of important work done by the Statistical Office of Kazakhstan, the IEA Secretariat was able to switch to the Joint IEA/Eurostat/UNECE questionnaires as a primary source for Kazakhstan's data from 2012 onwards. Breaks in time series may appear between 2011 and 2012 as a result of this change.

In 2010, Kazakhstan became a member of a Customs Union with Russia and Belarus. Breaks in trade time series appear from 2009 to 2012 as the Customs shifted from one accounting system to another.

Kazakhstan's coal data are normally not disaggregated by coal type. The disaggregation presented in the IEA energy balances is achieved by considering the typical end uses for different types of coals. This may lead to large statistical differences for some types of coal.

Natural gas production excludes re-injection but, due to data limitations, may include gas vented or flared. As a consequence, the data for natural gas use in oil and gas extraction may also include these amounts.

In order to be consistent with the Customs Union agreements between Russia and Kazakhstan, natural gas production and exports include raw gas production from the Karachaganak field (not marketable gas as per IEA definition).

Natural gas trade data have been revised by Kazakhstan leading to large statistical differences for 2012 and 2013.

Sources 2012 to 2014:

- Direct communication with the Agency on Statistics of the Republic of Kazakhstan, Astana.
- Joint IEA/Eurostat/UNECE annual energy question-naires for Coal, Oil, Natural gas, Electricity and heat and Renewables
- IEA Secretariat estimates.

Sources 1993 to 2011:

- Direct communication with the Agency on Statistics of the Republic of Kazakhstan, Astana.
- *Fuel and Energy Balance of Kazakhstan Republic,* Agency on Statistics of the Republic of Kazakhstan, Astana, various editions up to 2010.
- Joint IEA/Eurostat/UNECE annual energy questionnaires, 1993, 1995, 1997 to 2009.
- *Statistical Yearbook "Kazakhstan in 2009",* Agency on Statistics of the Republic of Kazakhstan, Astana, 2010.
- IEA Secretariat estimates.

Sources 1990 to 1992:

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *Fuel and Energy Balance of Kazakhstan Republic,* Agency on Statistics of the Republic of Kazakhstan, Astana, various editions up to 2010.
- *Forestry Statistics*, FAO, Rome, 2000.
- IEA Secretariat estimates.

Kenya

As of 2001, electricity data are reported on a fiscal year basis, beginning on the 1st of July and ending on the 30th June of the subsequent year.

Stock changes for lubricants may include informal trade.

Sources 2005 to 2014:

- *Economic Survey*, Central Bureau of Statistics, Nairobi, various editions up to 2015.
- *Annual Report and Financial Statements*, Kenya Power, various editions up to 2015.
- Direct communication with AFREPREN and Petroleum Institute of East Africa, Nairobi, up to 2008.
- *Kenya, Facts and figures*, 2006 Edition, Central Bureau of Statistics, Nairobi.
- *Annual Report and Accounts*, 2006/07 to 2013/14 the Kenya Power & Lighting Company Limited, Nairobi.
- IEA Secretariat estimates.

Sources 1992 to 2004:

- Direct communication with the Ministry of Energy, Nairobi.
- *Economic Survey, 1995 to 2004*, Central Bureau of Statistics, Nairobi.
- *Annual Report and Accounts*, 2001/02, 2002/03, 2003/2004, 2004, 2005, the Kenya Power & Lighting Company Limited, Nairobi.
- *The UN Energy Statistics Database*.

Sources up to 1991:

- *Economic Survey*, Government of Kenya, Nairobi, 1989.
- *Economic Survey 1991*, Ministry of Planning and National Development, Central Bureau of Statistics, Nairobi, 1992.
- *Kenya Statistical Digest*, Ministry of Planning and National Development, Central Bureau of Statistics, Nairobi, 1988.

Sources for Biofuels and waste:

- Data for 2000 are based on research carried out by the Ministry of Energy on consumption of solid biofuels. The results of this research were published as part of a National Energy Policy initiative.
- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

Kosovo

Data for Kosovo are available starting in 2000. Prior to that, they are included in Serbia.

2011 is the first year when electricity transit trade data are available. As a result, a break in time series occurs between 2010 and 2011.

In 2011, a desulphurization unit operated in Kosovo for a few months only. As a result, breaks in time series occur between 2010-2011 and 2011-2012.

Sources 2011-2014:

- Direct communication with the Kosovo Agency of Statistics, Pristina, Kosovo.
- Direct communication with the Ministry of Energy and Mining, Pristina, Kosovo.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

Sources 2003 to 2010:

- Kosovo National Energy Balances, Ministry of Energy and Mining Department of Strategy, Standards and Statistics from 2003 to 2010.
- IEA Secretariat estimates

Sources 2000 to 2002:

- IEA Secretariat estimates.

Kuwait

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Data for crude oil production include 50 per cent of the output of the Neutral Zone.

Information for the use of ethane in the petrochemical sector is available from 2008 onward. This may lead to breaks in time series for ethane and naphtha production and consumption between 2007 and 2008.

Sources 1992 to 2014:

- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, 2011 to 2015.
- Direct communication with the Ministry of Oil, Economic Affairs, Energy Research, Safat, 2005, 2007 to 2014.
- *Annual Electrical Statistics*, Ministry of Electricity and Water, Safat, various editions up to 2009.
- *Annual Statistical Abstract*, Central Statistical Bureau, State of Kuwait various edition up to 2014.
- *Annual Statistical Bulletin*, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2015.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- Direct communication with the Ministry of Oil, Safat, the Ministry of Planning and the Ministry of Electricity & Water, Kuwait City.
- *Monthly Digest of Statistics*, Ministry of Planning, Central Statistical Office, Kuwait, 1999.
- *A Survey of the Kuwait Oil Industry*, Embassy of the United States of America in Kuwait City, Kuwait, 1993.
- *Twelfth Annual Report 1991-1992*, Kuwait Petroleum Corporation, Kuwait, 1993.
- The UN Energy Statistics Database.
- IEA Secretariat estimates.

Sources up to 1991:

- *Quarterly Statistical Bulletin*, Central Bank of Kuwait, Kuwait, various editions from 1986 and 1987.
- *The Kuwaiti Economy*, Central Bank of Kuwait, Kuwait, various editions from 1980 to 1985.
- *Annual Statistical Abstract*, Ministry of Planning, Central Statistical Office, Kuwait, 1986 and 1989.
- *Monthly Digest of Statistics*, Ministry of Planning, Central Statistical Office, Kuwait, various editions from 1986 to 1990.
- *Economic and Financial Bulletin Monthly*, Central Bank of Kuwait, Kuwait, various editions from 1983 to 1986.
- *Kuwait in Figures*, The National Bank of Kuwait, Kuwait, 1986, 1987.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2001.
- IEA Secretariat estimates.

Kyrgyzstan

Data for Kyrgyzstan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

In the 2014 edition, time series data for electricity, oil products, and coal products for 2005 to 2011 were revised based on newly available information. This may lead to breaks in the time for some products.

Sources 2007 to 2014:

- Direct communication with the National Statistical Committee of Kyrgyzstan, Bishkek. Joint IEA/Eurostat/UNECE annual energy questionnaires for 2012 and 2013.
- *Fuel & Energy Balances*, National Statistical Committee of Kyrgyzstan, Bishkek, 2014.Direct communication with the Interstate Statistical Committee of the Commonwealth of Independent States, Moscow.
- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, 2008 to 2014.
- *Natural Gas Vehicles Statistics*, International Association for Natural Gas Vehicles, online database: *www.iangv.org*.
- The UN Energy Statistics Database.
- IEA Secretariat estimates.

Sources 1993 to 2006:

- Joint IEA/Eurostat/UNECE annual energy questionnaires, 1993 to 2006.
- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, various editions up to 2007.
- Asian Development Bank.
- IEA Secretariat estimates.

Sources 1990 to 1992:

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database.*

Latvia

Data for Latvia are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Sources 1990 to 2014:

- Direct communication with Statistics Latvia, Riga.
- Joint IEA/Eurostat/UNECE annual energy questionnaires for Oil, Natural gas, Coal, Renewables, Electricity and heat.
- Balance of Latvian Energy, EC PHARE Project Implementation Unit, Ministry of Economics, Department of Energy, Riga, 1994.
- IEA Secretariat estimates.

Lebanon

A significant share of electricity generated in Lebanon is produced using private generators. The corresponding electricity outputs and inputs are estimated by the IEA Secretariat based on ALMEE-figures (Association Libanaise pour la Maîtrise de l'Energie et l'Environnement).

Customs data for trade of oil products may be misleading due to the existence of informal trade with neighbouring countries.

Sources up to 2014:

- Direct communication with Association Libanaise pour la Maîtrise de l'Energie et l'Environnement, (ALMEE), Beirut.
- Direct communication with Lebanese Center for Energy Conservation, Beirut.
- *Les bilans énergétiques au Liban,* Association Libanaise pour la Maîtrise de l'Energie et de l'Environnement, Beirut, 2007 to 2015.
- *L'Energie au Liban,* Association Libanaise pour la Maîtrise de l'Energie et de l'Environnement, Beirut, 1994 to 2006.
- *L'Energie au Liban, le Défi,* Association Libanaise pour la Maîtrise de l'Energie, Beirut, December 1996.
- Mauthner, F. and Weiss W., *Solar Heat Worldwide - Markets and contribution to the energy supply*, various editions up to 2014, IEA Solar Heating and Cooling Programme.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *Le marché du solaire thermique au Liban,* Association Libanaise pour la Maîtrise de l'Energie et de l'Environnement, Beirut, 2010.
- *Forestry Statistics,* FAO, Rome, 2015.
- IEA Secretariat estimates.

Libya

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

New information on oil and electricity is available from 2006. Breaks in time series may occur between 2005 and 2006.

Sources 1971 to 2014:

- *Bulletin Statistique Annuel, Comite Maghrebin d'électricité (COMELEC), various editions up to 2014.*
- Statistical Bulletin, Central Bank of Libya,Tripoli, various editions up to 2015.
- Direct communication with the Ministry of Electricity and Renewable Energy, Tripoli.
- Annual Statistical Bulletin, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2014.
- Annual Statistical Report, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2014.
- Natural Gas in the World, Cedigaz, Paris, various editions up to 2015.
- Statistical Bulletin, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2014.
- Annual Report, 2008, General Electricity Company (GECOL), Tripoli.
- Statistical Abstract of Libya, 19th vol., Government of Libya, Tripoli, 1983.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- The *UN Energy Statistics Database.*
- IEA Secretariat estimates.

Lithuania

Data for Lithuania are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Lithuania shut down its only nuclear power plant in 2009 (Ignalina nuclear power plant).

In 2013 Lithuania started an industrial and municipal waste incinerator, which may lead to breaks in time series for these products.

Sources 1990 to 2014:

- Direct communication with Statistics Lithuania, Vilnius.
- Joint IEA/Eurostat/UNECE annual energy questionnaires for Oil, Natural gas, Coal, Renewables, Electricity and heat.

Malaysia

For natural gas production from the Joint-Development Areas (JDA) with Thailand and with Indonesia, Malaysia reports only the production that corresponds to Malaysia. The rest is being reported as imports. For the JDA with Viet Nam, the production reported includes all the gas produced.

Detailed information on the non-energy use by oil product is only available from 2007 to 2009. From 2010, these quantities are only presented in aggregate form under the category other non-specified oil products.

From 2009, electricity generation from co-generators, small renewable power producers and self-generators is available. As a consequence, breaks in time series may appear for electricity between 2008 and 2009.

LPG data may include ethane.

Sources 2000 to 2014:

- Direct communication with the Energy Commission, formerly known as Malaysia Energy Centre (PTM), Putrajaya.
- *National Energy Balance*, Malaysia, Energy Commission, Putrajaya, 2009 to 2014.
- *Electricity Supply Industry in Malaysia, Performance and Statistical Information*, Malaysia Energy Comission, Putrajaya, 2009 to 2014.
- *Electricity Supply Statistics, Malaysia Energy Information Hub*, website: meih.st.gov.my, 2016.
- *Monthly exports of oil palm products*, Malaysia Palm Oil Board, Kuala Lumpur.
- APEC annual energy questionnaires, 2009, 2011.
- *National Energy Balance Malaysia*, Ministry of Energy, Water and Communication, Kuala Lumpur, 2002 to 2008.

Sources up to 2000:

- Direct communication with Petroliam Nacional Berhad, Kuala Lumpur, April 2001.

Sources for Biofuels and waste:

- *Monthly exports of oil palm products*, Malaysia Palm Oil Board, Kuala Lumpur.
- *The UN Energy Statistics Database*.
- *Forestry Statistics*, FAO, Rome, 2016.
- IEA Secretariat estimates.

Malta

Revised data were submitted by Malta for 2010-2013, to correct errors that had been noted before. This may lead to breaks in time series between 2009 and 2010 for some products and flows.

In 2011, a new power generation station fuelled by biogas became operational in Malta. This may lead to breaks in time series for some products and flows.

Sources 1971 to 2014:

- Direct communication with the Central Office of Statistics, Valletta.
- Joint IEA/Eurostat/UNECE annual energy questionnaire on Oil, 1995 to 1998, 2000, 2001, 2005 to 2014.
- Joint IEA/Eurostat/UNECE annual energy questionnaire on Electricity and heat, 1994 to 1998, 2000, 2001, 2003, and 2005 to 2014.
- Joint IEA/Eurostat/UNECE annual energy questionnaire on Renewables, 2011 to 2014.
- Joint IEA/Eurostat/UNECE annual questionnaire on Coal, 1994, 1995.
- *Solar Heat Worldwide*, AEE - Institute for Sustainable Technologies, Gleisdorf, various editions up to 2010.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaire on Renewables, 2011 to 2014.

Mauritius

Sources 1971 to 2014:

- Direct communication with the Ministry of Public Utilities, Statistics Unit, Port Louis.
- Website of the Statistics Mauritius under the Ministry of Public Utilities, statsmauritius.gov.mu.
- *Energy and Water Statistics 2014*, Statistics Mauritius, Port Louis.

Moldova

Data for Moldova are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Official figures on natural gas imports, natural gas inputs to power plants, electricity production and consumption are modified by the IEA Secretariat to include estimates for supply and demand for the autonomous region of Stînga Nistrului (also known as the Pridnestrovian Moldavian Republic or Transnistria). Other energy production or consumption from this region is not included in the Moldovan data. This may lead to breaks in the time series for some products.

Due to the inclusion of estimated data in the Moldova energy balance, indicators for per capita energy consumption or energy intensity may appear inconsistent with expected trends.

In 2013, the National Bureau of Statistics revised data submitted through Joint IEA/Eurostat /UNECE questionnaires from 2005 based on the International Recommendations for Energy Statistics. This may lead to breaks in time series for some products.

In 2014, the National Bureau of Statistics revised data submitted through Joint IEA/Eurostat /UNECE questionnaires from 1993 for heat, and from 2012 for aviation bunkers, based on the International Recommendations for Energy Statistics. This may lead to breaks in time series for some products.

In 2014, solid biofuels production and consumption data were revised based on new surveys conducted in 2014. Breaks in time series between 2009 and 2010 may result because of this.

Sources 2008 to 2014:

- For Moldova, excluding Transnistria:
- Direct communication with the National Bureau of Statistics of the Republic of Moldova, Chisinau.
- Joint IEA/Eurostat/UNECE annual energy questionnaires on Coal, Oil Natural gas, Electricity and heat and Renewables
- For natural gas imports:
- Direct communication with State Statistics Service of Ukraine.
- For Transnistria electricity production:
- Website of Ministry of Economic Development of Transnistrian Moldovian Republic, *www.mepmr.org*
- IEA Secretariat estimates.

Sources 1992 to 2008:

- Joint IEA/Eurostat/UNECE annual energy questionnaire on Electricity and heat, 1991 to 2008.
- Joint IEA/Eurostat/UNECE annual energy questionnaire on Natural gas, 1991 to 2008.
- Joint IEA/Eurostat/UNECE annual energy questionnaire on Coal, 1992 to 2008.
- Joint IEA/Eurostat/UNECE annual energy questionnaire on Oil, 1993 to 1998, 2001 to 2008.
- Direct communication with the Ministry of Industry and Energy, July 1992.
- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, various editions up to 2011.
- IEA Secretariat estimates.

Sources 1990 to 1991:

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE Renewable questionnaire.
- *The UN Energy Statistics Database*.
- IEA Secretariat estimates.

Mongolia

Data for Mongolia are available starting in 1985. Prior to that, they are included in Other Asia.

New data became available in 2015 which allowed a disaggregation of coal by type. In addition time series were revised from 2005 forward. Breaks in time series

between 2004 and 2005 may result as well as differences in trends from previous editions.

Sources 1985 to 2014:

- *Mongolian Statistical Yearbook*, National Statistical Office, Ulaanbaatar, various editions up to 2015.
- *Balance of Coal & Coal Exports*, Mongolian Statistical Information Service, National Statistical Office, Ulaanbaatar, online statistical service: *www.1212.mn*.
- *Mongolian Statistical Bulletin, December 2009*, National Statistical Office, Ulaanbaatar, 2009.
- Asian Development Bank online database.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *FAO, Forestry Statistics, online database.*
- IEA Secretariat estimates.

Montenegro

Data for Montenegro are available starting in 2005. Between 1990 and 2004, they are included in Serbia. Prior to 1990, they are included in Former Yugoslavia.

Breaks in time series appearing in solid biofuels between 2010 and 2011 can be explained by a new survey carried out by Montenegro in 2013.

A new survey on energy consumption in industry was conducted by Montenegro in 2014. Due to this newly available data some breaks in time series may occur between 2013 and 2014.

Sources 2005 to 2014:

- Direct communication with the Statistical Office of Montenegro (MONSTAT), Podgorica.
- Joint IEA/Eurostat/UNECE annual energy questionnaires on Gas, Oil, Renewables, Coal, Electricity and heat.

Morocco

In this edition revisions were made in the energy balances for the period 2004-2014. This may lead to breaks in time series.

A new refinery began operations in 2009 which can accommodate new feedstocks and additives. This may lead to breaks in time series between 2009 and 2010.

Sources 1992 to 2014:

- Direct communication with Ministère de l'Energie et des Mines, Direction des Mines, Rabat.
- *Annuaire Statistique du Maroc,* Haut-Commissariat au Plan, Direction de la Statistique, Rabat, 1980, 1984, 1986 to 2011.
- Electricity consumption by economic sector from direct communication with Office National de l'Electricité, Casablanca.

Sources up to 1991:

- *Rapport d'Activité 1992*, Office National de l'Electricité, Casablanca, 1993.
- *Le Maroc en Chiffres 1986*, Ministère du Plan, Direction de la Statistique, Rabat, 1987.
- *Rapport Annuel*, Office National de Recherches et d'Exploitations Pétrolières, Maroc, 1984.
- *Rapport d'Activité du Secteur Pétrolier 1983*, Ministère de l'Energie et des Mines, Direction de l'Energie, Rabat, 1984.
- *Rapport sur les Données Energétiques Nationales 1979-1981*, Ministère de l'Energie et des Mines, Rabat, 1982.

Sources for Biofuels and waste:

- Direct communication with Ministère de l'Energie et des Mines, Direction des Mines, Rabat.
- *The UN Energy Statistics Database*.
- IEA Secretariat estimates.

Mozambique

Sources 1992 to 2014:

- Direct communication with Ministério da Energia, Maputo and the National Petroleum Institute.
- *Annual Statistical Yearbook 1993, 1994, 1995*, Eskom, Johannesburg, 1994, 1995, 1996, citing Electricidade de Mozambique, Maputo, as source.
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Sources up to 1991:

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Direct communication with Ministério da Energia, Maputo.
- IEA Secretariat estimates.

Myanmar

Some data are reported on a fiscal year basis, beginning on the 1st of April and ending on the 31th March of the subsequent year.

Sources 1992 to 2014:

- Direct communication with the Institute of Energy Economics, Japan (IEEJ), Tokyo, 2010-2014.
- *Selected Indicators*, Myanmar Central Statistical Organisation website: *www.csostat.gov.mm*.
- Joint Oil Data Initiative (JODI) online database.
- *Oil and Thailand*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, Bangkok, 2007 to 2013.
- Direct communication with the Ministry of Energy, Planning Department, Rangoon, 2006-2007.
- *Review of the Financial Economic and Social Conditions*, Ministry of National Planning and Economic Development, Central Statistical Organization, Rangoon, 1995, 1996.
- *Statistical Yearbook*, Ministry of National Planning and Economic Development, Central Statistical
  Organization, Rangoon, 1995, 1996.
- *The UN Energy Statistics Database*.
- *The ASEAN Energy Statistics Database.*
- Asian Development Bank online database.
- Natural Gas in the World, Cedigaz, Paris, various editions up to 2015.
- IEA Secretariat estimates.

Sources up to 1991:

- *Sectoral Energy Demand in Myanmar*, UNDP Economic and Social Commission for Asia and the Pacific, Bangkok, 1992.
- *Selected Monthly Economic Indicators, paper no. 3*, Ministry of Planning and Finance, Central Statistical Organization, Rangoon, 1989.

Sources for Biofuels and waste:

- Wood data have been submitted by the Ministry of Energy, from 1985 to 2003.
- IEA Secretariat estimates based on 1990 data from *UNDP Sixth Country Programme Union of Myanmar*, World Bank, Programme Sectoral Review of Energy, by Sousing et. al., Washington, D.C., 1991.

Namibia

Data for Namibia are available starting in 1991. Prior to that, data are included in Other Africa.

Sources 1991 to 2014:

- *Namibia Energy Balance 2000-2014*. Electricity Control Board, Windhoek.
- Direct communication with the Ministry of Mines and Energy, Windhoek.
- *NamPower Annual Report*, Namibia Power Corporation, Windhoek, various editions up to 2015. Note: NamPower data are published on a fiscal year basis (July to June)
- Mauthner, F. and Weiss W., *Solar Heat Worldwide - Markets and contribution to the energy supply*, various editions up to 2016, IEA Solar Heating and Cooling Programme.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- IEA Secretariat estimates.

Nepal

Data are reported on a fiscal year basis, beginning on the 1st of July and ending on the 30th June of the subsequent year (2014/15 will be treated as 2014).

Sources up to 2014:

- *Energy Sector Synopsis Report*, Water and Energy Commission Secretariat (WECS), Kathmandu, July 2010.
- *A Year in Review*, Nepal Electricity Authority, Durbar Marg, Kathmandu, various editions up to fiscal year 2014/15.

- *Imports and Sales of Petroleum Products*, Nepal Oil Corporation Limited, Kathmandu, various editions up to 2013.
- Direct communication with the Water and Energy Commission Secretariat (WECS), Ministry of Water Resources, Kathmandu.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Water and Energy Commission Secretariat (WECS), Ministry of Water Resources, Kathmandu.

Sources up to 1996:

- *The UN Energy Statistics Database*.

Nicaragua

Sources up to 2014:

- *Estadísticas de los Hidrocarburos*, Ministerio de Energía y Minas, Managua, 2008 to 2013.
- *Generación Bruta por Tipo de Planta*, Instituto Nicaragüense de Energía, Managua, 2015.
- *Consumo de Combustible por Tipo de Planta*, Instituto Nicaragüense de Energía, Managua, 2015.
- *Balance Energético Nacional*, Ministerio de Energía y Minas, Managua, 2006 to 2007.
- *Balance Energético Nacional*, Comisión Nacional de Energía (CNE), Dirección de Políticas Energéticas, Managua, 2000 to 2005.
- *Estadísticas de Suministro de los Hidrocarburos*, Instituto Nicaragüense de Energía, Managua, 1999 to 2004.
- *Informe Anual 1996: Datos Estadísticos del Sector Electrico*, INE, Managua, 1999.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *Balance Energetico Nacional*, Comision Nacional de Energia (CNE), Managua, 1999 to 2007.

Niger

In this edition, data for Niger became available from 2000 to 2014. Prior to 2000, data for Niger are presented in Other Africa.

Stock change may include statistical difference for Crude Oil.

Sources up to 2014:

- Direct communication with the Ministry of Energy and Oil.
- IEA Secretariat estimates

Sources for Biofuels and waste:

- Ministry of Energy and Oil
- IEA Secretariat estimates

Nigeria

Crude oil production and export data may include field condensate.

Statistical differences may include oil products smuggled to or from neighbouring countries.

Inputs of motor gasoline and gas/diesel to back-up electricity generation, as well as the associated electricity outputs, which may be substantial in Nigeria, may not be captured.

In the 2015 edition, new information became available indicating that on-grid power generation has been fuelled by natural gas for many years. This may lead to breaks in time series between 1996 and 1997 as well as differences in trends compared to previous editions for some oil products.

Sources 1992 to 2014:

- Direct communication with the Energy Commission of Nigeria, Abuja.
- *Annual Petroleum Bulletin*, 1998 to 2015, Nigerian National Petroleum Corporation (NNPC), Abuja.
- *Statistical Bulletin*, Central Bank of Nigeria, Abuja, 2003 to 2014.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.

- *Annual Statistical Bulletin*, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2015.
- *Monthly Petroleum Bulletin* for 2000, Nigerian National Petroleum Corporation (NNPC), Abuja.
- *Annual Report and Statement of Accounts 1995*, Central Bank of Nigeria, Lagos, 1996.
- *Nigerian Petroleum News*, Energy Publications, monthly reports, various issues up to May 1998.
- IEA Secretariat estimates.

Sources up to 1991:

- *Annual Report and Statement of Accounts*, Central Bank of Nigeria, Lagos, various editions from 1981 to 1987.
- *Basic Energy Statistics for Nigeria*, Nigerian National Petroleum Corporation, Lagos, 1984.
- *NNPC Annual Statistical Bulletin*, Nigerian National Petroleum Corporation, Lagos, 1983 to 1987.
- *The Economic and Financial Review*, Central Bank of Nigeria, Lagos, various editions.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

Oman

The interconnected nature of the Mina-Al-Fahal and Sohar oil refineries is reflected in the fuel oil data leading to breaks in time series for some products between 2007 and 2008.

Natural gas shows a break in time series for some flows between 2006 and 2007 due to a new methodology applied in both supply and demand.

Electricity output shows a break in time series between 2004 and 2005 as a national data source became available.

Sources 2005 to 2014:

- *Statistical Yearbook*, National Centre for Statistics and Information (NSCI), various editions from 1999 to 2015 (Formerly Ministry of National Economy).
- *Online statistics*, Sultanate of Oman Ministry of Oil and Gas.
- *Annual report*, Authority for Electricity Regulation, Oman, various editions from 2005 to 2014.
- *Annual report*, Oman LNG Company, various editions from 2009 to 2014.
- *Annual Report*, Central Bank of Oman, Muscat, various editions up to 2014.
- Natural Gas in the World, Cedigaz, Paris, various editions up to 2015.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2014.
- The LNG Industry, International Group of Liquefied Natural Gas Importers (GIIGNL), Levallois, 2005-2014.
- IEA Secretariat estimates.

Sources 1992-2004:

- Direct communication with the Ministry of National Economy, Muscat.
- Direct communication with the Ministry of Oil and Gas, Muscat.
- Direct communication with the Ministry of Petroleum and Minerals, Muscat, 1997, 1998, and 1999.
- Direct communication with the Ministry of Electricity & Water, Office of the Under Secretary, Ruwi, 1998 to 2001.
- *Quarterly Bulletin December 1994*, Central Bank of Oman, Muscat, 1995.
- *Annual Report*, Central Bank of Oman, Muscat, 1993.
- Statistical Yearbook, 1994, 1995, 1996, 1997, Ministry of Development, Muscat, 1995 to 1998.
- IEA Secretariat estimates.

Sources up to 1991:

- *Quarterly Bulletin*, Central Bank of Oman, Muscat, 1986, 1987, 1989 and 1995.
- *Annual Report to His Majesty the Sultan of Oman*, Department of Information and Public Affairs, Petroleum Development, Muscat, 1981, 1982, and 1984.
- *Oman Facts and Figures 1986*, Directorate General of National Statistics, Development Council, Technical Secretariat, Muscat, 1987.

- *Quarterly Bulletin on Main Economic Indicators*, Directorate General of National Statistics, Muscat, 1989.
- *Statistical Yearbook*, Directorate General of National Statistics, Development Council, Muscat, 1985, 1986, 1988 and 1992.

Pakistan

The IEA Secretariat could not obtain data for 2014 from Pakistan in time. As a consequence, most data points for 2014 have been estimated based on developments in population and GDP in Pakistan. Specific information on new installed capacity has been incorporated into these estimations.

Time series data for natural gas for the years 2004-2007 were revised in 2009 due to the inclusion of the North-West Frontier Province data (now called KPK) and Pakistan Steel Mills. Breaks in time series may occur between 2003 and 2004.

Own use of electricity by industries with autoproducer electricity plants may not be captured.

For bitumen and lubricants, data for stock variations may include unreported trade or consumption.

Sources 1992 to 2014:

- *Energy Yearbook*, Hydrocarbon Development Institute of Pakistan, Ministry of Petroleum and Natural Resources, Islamabad, various editions from 1979 to 2014.
- *Pakistan Economic Survey 1994-1995, 1996, 1997*, Government of Pakistan, Finance Division, Islamabad, 1995, 1997, 1998.
- *Statistical Supplement 1993/1994*, Finance Division, Economic Adviser's Wing, Government of Pakistan, Islamabad, 1995.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- IEA Secretariat estimates.

Sources up to 1991:

- *Monthly Statistical Bulletin, no. 12*, Federal Bureau of Statistics, Islamabad, December 1989.
- *1986 Bulletin*, The State Bank of Pakistan, Islamabad, 1987.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Household Energy Strategy Study (HESS)* of 1991.

Panama

International aviation bunkers figures for jet kerosene may include exports. The national administration is working to revise time series for jet kerosene.

From 2003 onwards there has been no output of oil products due to refinery closure.

Sources up to 2014:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *Compendio Estadístico Energético 1970-2014*, Ministerio de Economía y Finanzas, Comisión de Política Energética, Panama.
- *Boletín Estadístico Marítimo Portuario*, Autoridad Maritima de Panama (AMP), Panama, 2007 to 2014, *http://www.amp.gob.pa*.
- *Annual report*, Canal de Panamá, Panama, 2012.
- U.S. Energy Information Administration (EIA), website, marine bunkers data from 2001 to 2006.

Paraguay

The Itaipu hydroelectric plant, operating since 1984 and located on the Paraná River (which forms the border of Brazil and Paraguay) was formed as a joint venture between Eletrobrás and the Paraguayan government. Production is shared equally between Brazil and Paraguay.

From 2006 onwards, there has been no output of oil products, due to refinery closure.

Sources 1971 to 2014:

- *Balance Energético Nacional, 1971-2014*, Viceministerio de Energía y Minas, Ministerio de Obras Públicas y Comunicaciones, San Lorenzo.
- Direct communication with Ministerio de Obras Públicas y Comunicaciones, San Lorenzo.

Sources for Biofuels and waste:

- Direct communication with the Non-Conventional Energy Department of Ministerio de Obras Públicas y Comunicaciones, San Lorenzo.

Peru

Liquid biofuels are included in the energy balances from 2010 onwards.

Sources 1971 to 2014:

- Direct communication with Ministerio de Energía y Minas, Oficina Técnica de Energía, Lima.
- *Balance Nacional de Energía*, Ministerio de Energía y Minas, Lima, various editions up to 2015.
- Organismo Supervisor de la Inversión en Energía y Minería, Hidrocarburos Estadisticas 2012.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Philippines

Sources 1990 to 2014:

- *Energy Commodity Account (ECA)* and *Overall Energy Balance (OEB)*, 1990-2008, 2010-2014 submitted by the Department of Energy, Manila.
- Direct communication with the Department of Energy, Manila.
- APEC annual energy statistics questionnaires.
- *Annual Report*, Semirara Mining Corporation, 2006-2014.
- *Annual steel production 1980-2015*, World Steel Association, *www.worldsteel.org/statistics/.Philippines Energy Bulletin* 1996, 1997, 1998, 1999.
- IEA Secretariat estimates.

Sources up to 1989:

- Direct communication with the Office of Energy Affairs, Manila.
- *APEC Energy Statistics 1994*, Tokyo, October 1996.
- *1990 Power Development Program (1990-2005)*, National Power Corporation, Manila, 1990.
- *Philippine Medium-term Energy Plan 1988-1992*, Office of Energy Affairs, Manila, 1989.
- *Philippine Statistical Yearbook 1977-1983*, National Economic and Development Authority, Manila.
- *1985* and *1989 Annual Report*, National Power Corporation, Manila, 1986, 1990.
- *Philippine Economic Indicators*, National Economic and Development Authority, Manila, various editions of 1985.
- *Accomplishment Report: Energy Self-Reliance 1973-1983*, Ministry of Energy, Manila, 1984.
- *Industrial Energy Profiles 1972-1979, vol. 1-4*, Ministry of Energy, Manila, 1980.
- *National Energy Program*, Ministry of Energy, Manila, 1982-1987 and 1986-1990.
- *Philippine Statistics 1974-1981*, Ministry of Energy, Manila, 1982.
- *Energy Statistics*, National Economic and Development Authority, Manila, 1983.
- *Quarterly Review*, Office of Energy Affairs, Manila, various editions.
- *UN Energy Statistics Database.*
- IEA Secretariat estimates.

Qatar

Crude oil production and export data do not include field condensate.

Natural gas liquids (NGL) include field condensates, propane, butane and ethane production from natural gas processing plants. NGL produced from liquefied natural gas production plants and gas-to-liquids plants may be excluded.

Propane and butane from natural gas processing plants are transferred to LPG. Ethane from natural gas processing plants is transferred to ethane.

Information on the use of LPG and ethane in the petrochemical sector is from 2005 onward. This may lead to breaks in time series for these products between 2004 and 2005.

Electricity production from autoproducers includes generation by desalination plants since 1988. Own use of electricity includes use by desalination plants since

a breakdown is not available. Electricity consumption in industry includes electricity consumption by the energy sector.

Sources 1992 to 2014:

- Direct communication with Qatar Statistical Authority, Doha.
- Direct communication with Qatar Petroleum, Doha.
- Direct communication with National Minerals Information Center, U.S Geological Survey.
- *Qatar in Figures*, Qatar Statistics Authority. Doha, 2011-2015 editions.
- *Annual Statistical Abstract*, Qatar Statistics Authority, 1994 to 2012.
- *Statistics Report*, Kahramaa, Qatar General Electricity and Water Corporation, Doha, editions 2005 to 2008, 2010 to 2014.
- JODI extended database, *www.jodi.org*.
- *Statistical Bulletin*, Arab Union of Electricity, 2011-2013.
- *Annual Report* 2004-2014, Qatar Petroleum, Doha.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- *The LNG Industry*, International Group of Liquefied Natural Gas Importers (GIIGNL), various editions up to 2015.
- *Statistics Archives*, World Steel Association, *www.worldsteel.org*.
- The UN Energy Statistics Database.
- IEA Secretariat estimates.

Sources up to 1991:

- *Qatar General Petroleum Corporation 1981-1985*, General Petroleum Corporation, Doha, 1986.
- *Economic Survey of Qatar 1990*, Ministry of Economy and Commerce, Department of Economic Affairs, Doha, 1991.
- *Statistical Report 1987 Electricity & Water*, Ministry of Electricity, Doha, 1988.
- *State of Qatar Seventh Annual Report 1983*, Qatar Monetary Agency, Department of Research and Statistics, Doha, 1984.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2000.
- IEA Secretariat estimates.

Romania

Romania's methodology for estimating indigenous production of geothermal energy differs from the one that IEA has adopted. Therefore, data comparisons between Romania and other countries might be misleading.

Data on quantities of coke oven coke used in blast furnaces do not correspond to the official submission of the national administration, as they have been estimated by the IEA Secretariat to ensure a carbon balance in the blast furnace transformation.

Sources 1992 to 2014:

- Direct communication with the National Institute of Statistics, Bucharest.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- *Buletin Statistic de Informare Publica*, Comisia Nationala Pentru Statistica, Bucharest, various editions up to June 1995.
- *Renel Information Bulletin*, Romanian Electricity Authority, Bucharest, 1990, 1991, 1992, 1993, 1994.

Sources up to 1991:

- *Anuarul Statistic al Republicii Socialiste Romania*, Comisia Nationala Pentru Statistica, Bucharest, 1984, 1985, 1986, 1990, 1991.

Sources for Biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- IEA Secretariat estimates.

Russian Federation

Data for the Russian Federation are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Annual statistics are based on annual joint IEA/Eurostat/UNECE questionnaires submissions received from Rosstat, the official data provider to the IEA. Data may differ from secondary sources, and discrepancies are being investigated.

In 2007, the Federal State Statistics Service introduced a new classification, the Russian Classification

of Economic Activities (OKVED), oriented towards harmonization with the Statistical Classification of Economic Activities in the European Community (NACE Rev.1). Data for the years prior to 2005 were submitted to the IEA Secretariat according to the Russian Classification of the Industries of the Economy (OKONKH). Therefore, breaks in time series for final consumption sectors may occur between 2004 and 2005.

Condensate data provided by Rosstat are published separately from Crude Oil under NGL. Jetkerosene output is confidential and estimated based on historical refinery throughput growth rate. No information on Vacuum Gas Oil is available. LPG refinery output may include output from gas separation plants. Naphtha exports are reported by Rosstat from 2011, and are significantly lower than in secondary sources. As a consequence domestic consumption of naphtha calculated as residual in the Russian balance is likely to be overestimated. Information on international marine bunker consumption is submitted from 2010. with high fluctuation in time series. Jetkerosene consumption split between international and domestic aviation is unknown. By default consumption is equally split between the two flows.

In 2013, all consumption data were estimated by the Secretariat.

From 2009, all data concerning LNG trade and LNG production have been estimated by the Secretariat.

Oil and gas extraction includes natural gas consumed by oil refineries.

Coal statistics provided by Rosstat may differ from those collected by Rosinformugol. Blast furnace gas values since 2012 utilise a different methodology to that of prior years (where heat from other sources than blast furnace gas had been attributed to blast furnace gas). Some coal trade from partners of the Customs Union has been estimated by the IEA Secretariat and additionally removed from indigenous production where it may be reported in data of other organisations.

The 2013 data for Electricity and Heat show a substantial drop in the efficiency of autoproducer heat plants fuelled by Natural Gas as well as a decrease in production and consumption of heat. All the figures were confirmed by the Russian authorities.

Heat from other sources is produced from recovered waste heat.

Sources 1990 to 2014:

- Direct communication with the Department of Foreign Statistics and International Cooperation from the Federal State Statistics Service (Rosstat), Moscow, Russian Federation.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- Energy trade: direct communication with the Federal State Statistics Service, July 1994.
- *Statistical Yearbook of Russia 1994.* The State Committee of Statistics, Moscow, 1994.
- *The Russian Federation in 1992, Statistical Yearbook,* The Federal State Statistics Service, Moscow, 1993.
- *Russian Federation External Trade,* annual and quarterly various editions, the Federal State Statistics Service, Moscow.
- *Statistical Bulletin,* various editions, The State Committee of Statistics of the CIS, Moscow, 1993, 1994.
- *Statistical Bulletin N° 3,* The Federal State Statistics Service, Moscow, 1992.
- *Fuel and Energy Balance of Russia 1990,* The Federal State Statistics Service, Moscow, 1991.
- *Energetika,* Energo-Atomisdat, Moscow, 1981 to 1987.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- The Federal State Statistics Service.
- IEA Secretariat estimates.

Saudi Arabia

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

Data for crude oil production include 50 per cent of the output of the Neutral Zone.

Natural gas consumption for oil and gas extraction may include quantities used in oil refineries.

New data became available in 2015 allowing the estimation of natural gas consumption as a feedstock in ammonia and methanol manufacture from 1990 to 2013. The remaining natural gas consumption has

been allocated to the non-specified Industry sector. Breaks in time series may occur between 1989 and 1990 for this reason.

Electricity production from autoproducers includes generation by desalination plants since 1979.

Sources 1992 to 2014:

- *Annual Reports*, Saudi ARAMCO, Dhahran, various editions up to 2014.
- *Annual Report*, Saudi Arabian Monetary Agency, Research and Statistics Department, Riyadh, various editions up to 2015.
- Joint Oil Data Initiative (JODI) online database.
- *Annual Report*, Saudi Electricity Company, Riyadh, various editions up to 2014.
- *Electricity Data 2000-2014*, Saudi Electricity Company, Riyadh.Direct communication with the Saudi Electricity Company.
- Ministry of Petroleum and Mineral Resources, 2009.
- *Middle East Petroleum Databook*, FACTS Global Energy Group, Singapore, 2009 and 2010.
- *Electricity Growth and Development in the Kingdom of Saudi Arabia up to the year from 1416H. (1996G.), 1420 H (1999/2000G) and 1423/1424 H (2003G)*, Ministry of Industry and Electricity, Riyadh, 1997, 1998, 1999, 2004.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- *Annual Statistical Bulletin*, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2015.
- Nitrogen statistics and information, U.S. Geological Survey, *http://www.usgs.gov*.
- Direct communication from the Central Department of Statistics of the Ministry of Planning and oil industry sources.
- *A Survey of the Saudi Arabian Oil Industry 1993*, Embassy of the United States of America in Riyadh, Riyadh, January 1994.
- IEA Secretariat estimates.

Sources up to 1991:

- *Annual Reports*, Saudi ARAMCO, various editions.
- *Petroleum Statistical Bulletin 1983*, Ministry of Petroleum and Mineral Resources, Riyadh, 1984.
- *Achievement of the Development Plans 1970-1984*, Ministry of Planning, Riyadh, 1985.
- *The 1st, 2nd, 3rd and 4th Development Plans*, Ministry of Planning, Riyadh, 1970, 1975, 1980 and 1985.
- *Annual Report*, Saudi Arabian Monetary Agency, Research and Statistics Department, Riyadh, 1984, 1985, 1986, 1988, 1989.
- *Statistical Summary*, Saudi Arabian Monetary Agency, Research and Statistics Department, Riyadh, 1986.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2000.
- IEA Secretariat estimates.

Senegal

The IEA Secretariat could not obtain data for 2014 from Senegal in time. As a consequence, most data points for 2014 have been estimated based on developments in population and GDP in Senegal.

Member of the SIE-Afrique project.

In the 2014 edition the time series for solid biofuels have been revised from 2009 based on newly available information. Breaks in time series may occur between 2008 and 2009.

Sources 2009 to 2014:

- Direct communication with Ministère de l'Energie, des Mines, Dakar.
- *Bilans énergétiques du Sénégal 2009 to 2013*, Direction de l'Energie, Dakar.
- IEA Secretariat estimates.

Sources 2008:

- *Bulletin mensuel des statistiques économiques*, Agence national de la Statistique et de la Démographie (ANSD), Dakar, March 2009.
- Direct communication with Ministère de l'Energie, Dakar.

Sources 2000 to 2007:

- *Bilans énergétiques du Sénégal 2003*, *2004*, *2005*, *2006*, Direction de l'Energie, Dakar.
- IEA Secretariat estimates.

Sources 1992 to 1999:

- Direct communication with Ministère de l'Energie, des Mines et de l'Industrie, Direction de l'Energie, Dakar, 1997 to 2002.
- Direct communication with Ministère de l'Energie, des Mines et de l'Hydraulique, Comité National des Hydrocarbures, Dakar, 2002.
- Direct communication from oil industry sources, Société Africaine de raffinage.
- Direct communication from electricity industry sources, SENELEC.
- *Report of Senegal on the Inventory of Greenhouse Gases Sources,* Ministère de l'Environnement et de la Protection de la Nature, Dakar, 1994.
- Direct communication to the IEA Secretariat from ENDA - Energy Program, Dakar, 1997.
- The UN Energy Statistics Database.

Sources up to 1991:

- *Situation Economique 1985,* Ministère de l'Economie et des Finances, Direction de la Statistique, Senegal, 1986.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1994 data from *Forests and Biomass Sub-sector in Africa,* African Energy Programme of the African Development Bank, Abidjan, 1996, and from direct communication with ENDA, Senegal.

Serbia

Data for Serbia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.

Serbia energy data include Montenegro until 2004 and The United Nations Interim Administration Mission in Kosovo until 1999.

The Ministry of Mining and Energy of Republic of Serbia is currently in the process of revising time series for energy statistics. Important revisions were made in the past two years, in particular for renewables.

Breaks in time series for oil products and natural gas may appear between 2006 and 2007 due to newly available data for 2007 (see Sources).

Sources 1990 to 2014:

- Direct communication with the Ministry of Mining and Energy, Belgrade.
- Direct communication with the Statistical Office of the Republic of Serbia, Belgrade.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- Pilot study: *Energy Balances (2007 and 2008) - Oil and Derivates of Oil, Natural Gas, Geothermal Energy and Energy Balance of the Republic of Serbia,* Statistical Office of the Republic of Serbia, Belgrade, 2009.
- Direct communication with the Federal Ministry of Economy, Belgrade, 2001 and 2002.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Direct communication with the Ministry of Mining and Energy, Belgrade.
- Joint IEA/Eurostat/UNECE annual energy questionnaires on Renewables, 2004 to 2013.
- IEA Secretariat estimates.

Singapore

Some key oil products and flows are aggregated by Singapore, to avoid breach of confidentiality.

The IEA Secretariat, the Energy Market Authority and the National Climate Change Secretariat (NCCS) are working closely together on improving data quality for Singapore. Efforts are continuing on this project, therefore breaks in time series between 2008 and 2009 and differences in trends when compared to previous publications may occur for some products.

From 2009, Singapore publishes splits of refinery output between light, middle and heavy distillates and residuum only. Further breakdown between products is estimated by the IEA Secretariat. Singapore aggregates petrochemical and refinery consumption. The split between refining and petrochemical consumption is estimated by the IEA Secretariat.

Refinery input is broken down between crude oil and feedstocks. Splits of feedstock by product are not provided by Singapore. By default, IEA estimates that feedstocks come from naphtha, gas/diesel and fuel oil in equal proportions.

Other data remain aggregated due to lack of data availability. Electricity consumption in the industry sector from 2005 includes electricity consumption by refineries. Electricity consumption in transport includes all electricity consumption at airport terminals.

Municipal waste production and consumption may include biogas.

Refinery gas production and consumption may include syngas produced by the petrochemical sector.

Due to Singapore's large trade volume in comparison to its final consumption, slight misalignment of trade figures can have a significant impact on the energy balance of Singapore. The IEA Secretariat has adjusted total imports of crude oil, gas/diesel and fuel oil from 2009 to match demand.

A new coal-fired power plant started operations in 2013. This might lead to breaks in time series between 2012 and 2013.

Further revisions are expected in future editions, as energy data coverage is further extended by Singapore.

Sources 1992 to 2014:

- Direct communication with the Energy Market Authority, Singapore, from 2009.
- Direct communication with the National Climate Change Secretariat (NCCS), Singapore, from 2013.
- Direct communication with the Solar Energy Research Institute of Singapore, 2011.
- *Singapore Energy Statistics*, Energy Market Authority, Singapore, various editions up to 2016.
- *Monthly oil statistics*, IE Singapore, 2011-2014.
- *Yearbook of Statistics Singapore*, Department of Statistics, Singapore, various editions up to 2015.
- *Bunker sales*, website of The Maritime and Port Authority of Singapore: *www.mpa.gov.sg*.
- *Motor Vehicle Population by Type of Fuel Used*, website of the Land Transport Authority: *www.lta.gov.sg*.
- *Solid Waste Management Statistics*, website of The Ministry of the Environment and Water Resources: *http://app.mewr.gov.sg/*.
- *Singapore Trade Statistics*, International Enterprise Singapore, Singapore, various CD-ROM editions up to 2011.
- *Argus Fundamentals*, Argus Media, various editions up to 2012.
- *Asia Pacific Databook*, FACTS Global Energy, Singapore, various editions up to 2013.
- *The Strategist Oil Report*, Singapore, various issues up to March 1999.
- *Petroleum in Singapore 1993/1994*, Petroleum Intelligence Weekly, Singapore, 1994.
- AEEMTRC, 1996.
- Direct submissions from oil industry sources up to 1996.
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Sources up to 1991:

- *Monthly Digest of Statistics*, Department of Statistics, Singapore, various editions from 1987 to 1989.
- *Yearbook of Statistics Singapore 1975/1985*, Department of Statistics, Singapore, 1986.
- *ASEAN Oil Movements and Factors Affecting Intra-ASEAN Oil Trade*, Institute of Southeast Asian Studies, Singapore, 1988.
- *The Changing Structure of the Oil Market and Its Implications for Singapore's Oil Industry*, Institute of Southeast Asian Studies, Singapore, 1988.
- *Public Utilities Board Annual Report (1986 and 1989)*, Public Utilities Board, Singapore, 1987 and 1990.
- Sources for Biofuels and waste:
- *Singapore Energy Statistics*, Energy Market Authority, Singapore, various editions up to 2016.
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

South Africa

Outputs from gas-to-liquids and coal-to-liquids plants are presented in the "Transfers" flow.

New information became available in 2015 which allowed the separation of non-energy use of coal in Coal to Liquids (CTL) plants from the coal used for energy purposes in these same plants. Non-energy conversion efficiencies for CTL plants in South Africa are assumed to be 60%. This new methodology may lead to breaks in time series between 2010 and 2011 for these products and flows.

New information became available in 2015 on refinery output of lubricants. Data have been revised from 1998. This may lead to breaks in time series between 1997 and 1998

Breaks in time series may occur for anthracite and coking coal between 2009 and 2010 as new information became available. Prior to 2010, coking coal data may include anthracite.

Coking coal, coke oven coke, coke oven gas, gas works gas and blast furnace gas production and consumption have been estimated using reported crude steel production figures.

Breaks in time series may occur for consumption of natural gas in industrial sectors between 2009 and 2010 as new information became available.

Reported quantities of synthetic fuels output may not include quantities from PetroSA.

Sources 2010 to 2014:

- Direct communication with the Department of Energy, Pretoria, South Africa.
- *Energy statistics: Supply and demand of petroleum products*, Department of Energy, Pretoria, South Africa.
- *Statistical release on electricity generated and available for distribution*, Statistics South Africa, Pretoria.
- *South African Statistics*, Statistics South Africa, Pretoria, various editions up to 2015.
- Joint Oil Data Initiative (JODI) online database.
- *Annual Reports*, South Africa Petroleum Industry Association (SAPIA), Sandton.
- *Integrated Annual Reports*, Electricity Supply Commission (ESKOM), South Africa.
- *Analyst Book*, SASOL Limited Group, Johannesburg, various editions up to 2015.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- *Integrated Annual Reports*, PetroSA, Parow, various editions up to 2014.
- World Steel Association online statistics database.
- Mauthner, F. and Weiss W., *Solar Heat Worldwide - Markets and contribution to the energy supply*, various editions up to 2015, IEA Solar Heating and Cooling Programme.
- IEA Secretariat estimates.

Sources 1992 to 2009:

- Energy balances submitted to the IEA Secretariat from the Department of Minerals and Energy, 2003 to 2009.
- *Electricity generated and available for distribution*, Statistics South Africa, Pretoria, various editions up to 2009.
- Direct submission from the Institute for Energy Studies, Rand Afrikaans University, Pretoria, 1998 to 2001.
- *Digest of South African Energy Statistics 1998*.
- Direct submissions from the Energy Research Institute, University of Cape Town.
- *ESKOM Annual Report*, Electricity Supply Commission (ESKOM), South Africa, 1989 to 1994.
- *Statistical Yearbook*, Electricity Supply Commission (ESKOM), South Africa, 1983 to 1994.
- *South Africa's Mineral Industry*, Department of Mineral and Energy Affairs, Braamfontein, 1995.
- *South African Energy Statistics, 1950-1993*, Department of Mineral and Energy Affairs, Pretoria, 1995.
- *Wholesale Trade Sales of Petroleum Products*, Central Statistical Service, Pretoria, 1995.
- *South African Coal Statistics 1994*, South African Coal Report, Randburg, 1995.
- *Energy Balances in South Africa 1970-1993*, Energy Research Institute, Plumstead, 1995.

Sources up to 1991:

- *Statistical News Release 1981-1985*, Central Statistical Service, South Africa, various editions from 1986 to 1989.
- *Annual Report Energy Affairs 1985*, Department of Mineral and Energy Affairs, Pretoria, 1986.
- *Energy Projections for South Africa (1985 Balance)*, Institute for Energy Studies, Rand Afrikaans University, South Africa, 1986.

Sources for Biofuels and waste:

- *South African Energy Statistics 1950-1989, No. 1*, National Energy Council, Pretoria, 1989.
- IEA Secretariat estimates.

South Sudan

The IEA Secretariat could not obtain data for 2014 from South Sudan in time. As a consequence, most data points for 2014 have been estimated based on developments in population and GDP in South Sudan.

Data for South Sudan are available from 2012. Prior to 2012, they are included in Sudan.

Crude oil production and exports were halted for most of 2012, and only continued in April 2013. Both production and exports have been estimated by the IEA Secretariat for the years 2012 and 2013.

Sources 2012 to 2013:

- AFREC Energy questionnaire, African Energy Commission, 2015.

Former Soviet Union

Data for individual countries of the Former Soviet Union are available starting in 1990, and most of the information on 1990 and 1991 was estimated by the IEA Secretariat. Because of large breaks in reporting occurring in the early 1990's, breaks in time series may occur in 1990 for all regional totals.

Coal production statistics refer to unwashed and unscreened coal up to 1990. IEA coal statistics normally refer to coal after washing and screening for the removal of inorganic matter. Also, see notes under 'Classification of Fuel Uses' and 'Heat', in the section on Notes on data quality.

The commodity balances presented for the Former Soviet Union include IEA Secretariat estimates of fuel consumption in the main categories of transformation. These estimates are based on secondary sources and on isolated references in FSU literature.

In older editions of this publication, intra-FSU trade was excluded.

Sources up to 1989:

- *Statistical Yearbook,* The State Committee for Statistics of the USSR, Moscow, various editions from 1980 to 1989.
- *External Trade of the Independent Republics and the Baltic States, 1990 and 1991,* the State Committee of Statistics of the CIS, Moscow, 1992.
- *External Trade of the USSR*, annual and quarterly, various editions, The State Committee of Statistics of the USSR, Moscow, 1986 to 1990.
- *CIR Staff Paper no. 14, 28, 29, 30, 32 and 36*, Center for International Research, U.S. Bureau of the Census, Washington, 1986, 1987 and 1988.
- *Yearbook on Foreign Trade,* The Ministry of Foreign Trade, Moscow, 1986.

Sri Lanka

Breaks in time series may occur between 1999 and 2000 due to newly available energy balances provided by the Sri Lanka Sustainable Energy Authority in 2009.

Stock change may include statistical difference for certain secondary oil products.

Refinery losses may include own use of refinery fuel.

Sources 1992 to 2014:

- Direct communication with the Sri Lanka Sustainable Energy Authority, Colombo.
- *Sri Lanka Energy Balances 2000-2014*, Sri Lanka Sustainable Energy Authority, Colombo.
- *Economic and Social Statistics of Sri Lanka 2011-2014*, Central Bank of Sri Lanka, Colombo.
- *Statistical Digest 2014*, Ceylon Electricity Board, Colombo.
- Direct communication with the Department of Census and Statistics, 2003 to 2006.
- *Annual Report 1993*, Central Bank of Sri Lanka, Colombo, July 1994.
- Direct communication with the Ceylon Electricity Board, *Sri Lanka Energy Balances, 1994.*
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Sources up to 1991:

- *Energy Balance Sheet 1991, 1992*, Energy Unit, Ceylon Electricity Board, Colombo, 1992, 1993.
- *Bulletin 1989*, Central Bank of Sri Lanka, Colombo, July 1989.
- *Bulletin (monthly)*, Central Bank of Sri Lanka, Colombo, May 1992.
- *Sectoral Energy Demand in Sri Lanka,* UNDP Economic and Social Commission for Asia and the Pacific, Bangkok, 1992.
- *External Trade Statistics 1992*, Government of Sri Lanka, Colombo, 1993.

Sources for Biofuels and waste:

- Energy Conservation Fund and Ceylon Electricity Board.

Sudan

South Sudan became an independent country on 9 July 2011. From 2012 data for South Sudan are reported separately and therefore, breaks in the time series may occur between 2011 and 2012 for Sudan data.

The IEA Secretariat could not obtain data for 2014 from Sudan in time. As a consequence, some data points for 2014 have been estimated based on macroeconomic indicators for Sudan.

Sources 1992 to 2014:

- Direct communication with the Ministry of Petroleum, Khartoum.
- AFREC energy questionnaire, African Energy Commission, 2013.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2014.*Sudanese Petroleum Corporation Statistics*, Ministry of Petroleum, Khartoum, May 2012.
- *Sudan Energy Handbook 2006*, Ministry of Energy and Mines, Khartoum.
- IEA Secretariat estimates.

Sources up to 1991:

- *Foreign Trade Statistical Digest 1990*, Government of Sudan, Khartoum, 1991.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1990 data from Bhagavan (ed.) *Energy Utilities and Institutions in Africa*, AFREPREN, Nairobi, 1996.

Suriname

In this edition, data for Suriname became available from 2000 to 2014. Prior to 2000, data for Suriname are presented in Other Non-OECD Americas.

Sources up to 2014:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates

Syrian Arab Republic

Due to the on-going conflict in Syria, no official government data sources were available for 2012 to 2014. Data in this year's edition are primarily based on secondary sources, media reports and IEA Secretariat estimates.

Imports of crude oil and secondary oil products may include informal imports.

Sources 1992 to 2014:

- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- Direct Communication with the Ministry of Petroleum and Mineral Resources, 2012.
- *Statistical Abstract*, Office of the Prime Minister, Central Bureau of Statistics, Damascus, various editions up to 2011.
- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2014.
- *The UN Energy Statistics Database (until 2007).*
- *Quarterly Bulletin*, Central Bank of Syria, Research Department, Damascus, 2001.
- IEA Secretariat estimates.

Sources up to 1991:

- *Quarterly Bulletin*, Central Bank of Syria, Research Department, Damascus, 1984.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2000.
- IEA Secretariat estimates.

Chinese Taipei

Data for the period 1982-2009 were revised in 2012 based on new balances submitted by the Bureau of Energy. Breaks in time series may occur between 1981 and 1982.

Breaks in time series may also occur between 2010 and 2011 as more detailed information became available for refinery feedstocks and oil products.

Sources 1982 to 2014:

- *Energy Balances in Taiwan*, Bureau of Energy, Ministry of Economic Affairs, Taipei, various editions up to 2015.
- Direct communication with the electricity utilities.
- *Yearbook of Energy Statistics*, Ministry of Trade, Industry and Energy, Taipei, 1996.

Sources up to 1981:

- *The Energy Situation in Taiwan*, Ministry of Economic Affairs, Energy Committee, Taipei, 1986, 1987, 1988 and 1992.
- *Industry of Free China 1975-1985*, Council for Economic Planning and Development, Taipei, 1986.
- *Taiwan Statistical Data Book 1954-1985*, Council for Economic Planning and Development, Taipei, 1986.
- *Energy Policy for the Taiwan Area*, Ministry of Economic Affairs, Energy Committee, Taipei, 1984.
- *Energy Balances in Taiwan*, Ministry of Economic Affairs, Taipei, 1980 to 1981.

Sources for Biofuels and waste:

- *Energy Balances in Taiwan, Bureau of Energy, Ministry of Economic Affairs, Taipei.*
- The UN Energy Statistics Database.
- IEA Secretariat estimates.

Tajikistan

New information became available in 2016. Breaks in time series may occur between 2011 and 2012 and between 2013 and 2014.

Data for Tajikistan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Sources 1990 to 2014:

- Direct communication with the Statistical Agency under President of the Republic of Tajikistan, Dushanbe.
- Joint IEA/Eurostat/UNECE annual energy questionnaires, 1991 to 2007 and 2014.
- *Online statistics*, Statistical Agency under the President of the Republic of Tajikistan.
- *Tajikistan in Figures*, Statistical Agency under the President of Tajikistan, various editions up to 2014.
- Energy and Communal Services in Kyrgyzstan and Tajikistan: A Poverty and Social Impact Assessment. UNDP Bratislava Regional Centre 2011
- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, various editions up to 2013.
- Asian Development Bank Statistics, various editions up to 2014.
- Direct communication with the State Committee on Statistics, Republic of Tajikistan, Dushanbe.
- *Natural Gas Vehicles Statistics*, International Association for Natural Gas Vehicles, online database: *www.iangv.org*.
- *Industry of Tajikistan, Statistics*, the State Committee on Statistics of the Republic of Tajikistan, 2004.
- IEA Secretariat estimates.

Tanzania

Some of the official oil product import data (EWURA) are reported on a fiscal year basis. Data for 2014 correspond to July 1st, 2014 – June 30th, 2015.

Sources up to 2014:

- *The Economic Survey*, the Ministry of Finance, Dar Es Salaam, various editions up to 2014.
- *Annual Report*, Bank of Tanzania, Dar Es Salaam, various editions up to 2015.
- *EWURA Annual Report*, Energy and Water Utilities Regulatory Authority of the United Republic of Tanzania, Dar Es Salaam, various editions up to 2015.
- *Annual Report*, Orca Exploration Group Inc., various editions up to 2015.
- *SAPP Annual Report 2008*, Southern African Power Pool, online statistics, 2010-2011.
- *The Economic Survey*, The President's Office - Planning and Privatization, Dar Es Salaam, 2003-2007.
- Direct communication with the Ministry of Energy and Minerals and the electricity utility.

- *Tanzanian Economic Trends*, Economic Research Bureau, University of Dar-es-Salaam, 1991.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1990 data from *Energy Statistics Yearbook 1990,* Southern Africa Development Community (SADC), Luanda, 1992.

Thailand

Data for lubricants, refinery gas and non-specified oil products are not published by the Ministry of Energy and are estimated by the IEA Secretariat. Up to 2014, IEA Secretariat also estimated naphtha.

Data for production, own use and non-energy use of natural gas may include propane, butane and ethane produced in gas separation plants.

Stock changes may include statistical difference for certain products.

In the 2014 edition, new information became available for the consumption of anthracite and lignite coal in industry. Breaks in time series may occur between 2011 and 2012.

Sources for 2012 up to 2014:

- *Thailand Energy Statistics*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, Bangkok, various editions up to 2015.
- *Thailand Energy Balance Table*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, Bangkok, various editions up to 2015.
- *Thailand Alternative Energy Situation*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, Bangkok, various editions up to 2015.
- *Thailand Energy Efficiency Situation*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, Bangkok, various editions up to 2014.
- *Energy Statistics of Thailand*, Ministry of Energy, Energy Policy & Planning Office, Bangkok, various editions up to 2015.
- *Key Statistical Data*, Electricity Generation Authority of Thailand, online database: *http://www.egat.co.th*.
- *Thailand's Petroleum & Petrochemical Statistics*, Petroleum Institute of Thailand, Bangkok, various editions up to 2015.
- Direct communication with the Petroleum Institute of Thailand, Bangkok, 2015.
- Direct communication with the Ministry of Energy, Thailand, Bangkok, 2015.
- IEA Secretariat estimates.

Sources for 2002 to 2012:

- *Thailand Energy Situation*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, various editions up to 2012.
- *Key Statistical Data*, Electricity Generation Authority of Thailand, online database: *http://www.egat.co.th*.
- *Thailand Alternative Energy Situation*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, various editions up to 2012.
- *Electric Power in Thailand*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, various editions up to 2012.
- *Oil in Thailand*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, various editions up to 2012.
- Direct communication with the Petroleum Institute of Thailand, Bangkok, 2008 to 2012.
- IEA Secretariat estimates.

Sources up to 2001:

- *Electric Power in Thailand*, Ministry of Science, Technology and Energy, National Energy Administration, Bangkok, 1985, 1986, 1988 to 2001.
- *Oil in Thailand*, Ministry of Science, Technology and Energy, National Energy Administration, Bangkok, 1979 to 2001.
- *Thailand Energy Situation*, Ministry of Science, Technology and Energy, National Energy Administration, Bangkok, 1978 to 2001.

Sources for Biofuels and waste:

- *Thailand Energy Situation*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, 2002 to 2010.

- *Thailand Alternative Energy Situation*, Ministry of Energy, Department of Alternative Energy Development and Efficiency, 2009-2010.
- IEA Secretariat estimates.

Togo

Member of the SIE-Afrique project.

The IEA Secretariat could not obtain data for 2013 and 2014 from Togo in time. As a consequence, data for 2013 and 2014 have been estimated based on population growth for biomass and household consumption, and GDP growth for other products than hydro.

Official data were submitted by Togo in 2014 for the years 2009-2012. Breaks in time series between 2008 and 2009 or differences in trends compared to previous publications may occur for this reason.

Sources 1999 to 2014:

- Direct communication with Ministère de l'Equipement, des Mines, de l'Energie et des Postes et Télécommunications, Lomé.
- Bilans Energétiques du Togo, 1999 to 2012.
- Autorité de Réglementation du Secteur de l'Electricité (ARSE), 2015.
- IEA Secretariat estimates.

Sources up to 1998:

- IEA Secretariat estimates.

Trinidad and Tobago

In the 2014 edition, natural gas time series from 2000 were revised based on newly available information on the definition of production of natural gas used by Trinidad and Tobago (gross versus marketed production).

Sources 1992 to 2014:

- Direct communication with the Ministry of Energy and Energy Affairs, Port of Spain.
- *Energy Industry Consolidated Monthly Bulletins*, Ministry of Energy and Energy Affairs, Government of the Republic of Trinidad and Tobago, Port of Spain, various editions up to 2015.
- *Downstream Gas Industry Annual Report*, Ministry of Energy and Energy Affairs, Government of the Republic of Trinidad and Tobago, Port of Spain, various editions up to 2015.
- *Annual Economic Survey*, Central Bank of Trinidad and Tobago, Port of Spain, 1995 to 2015.
- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- *The LNG Industry*, GIIGNL – International Group of Liquefied Natural Gas Importers, Paris, various editions up to 2014.
- *Petroleum Industry Monthly Bulletin*, Ministry of Energy and Natural Resources, Port of Spain, various issues up to 1999.

Sources up to 1991:

- *Annual Statistical Digest*, Central Statistical Office, Port of Spain, 1983, 1984.
- *History and Forecast*, Electricity Commission, Port of Spain, 1987.
- *Annual Report*, Ministry of Energy and Natural Resources, Port of Spain, 1985, 1986.
- *The National Energy Balances 1979-1983*, Ministry of Energy and Natural Resources, Port of Spain, 1984.
- *Trinidad and Tobago Electricity Commission Annual Report*, Trinidad and Tobago Electricity Commission, Port of Spain, 1984, 1985.

Sources for Biofuels and waste:

- *Energy-Economic Information System (SIEE)*, Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- *Forestry Statistics*, FAO, Rome.

Tunisia

New information for lubricants and bitumen became available in 2015. Breaks in time series may occur between 2009 and 2010 because of this.

A significant increase in crude oil production was reported for 2007 due to the start-up of several new development wells and the beginning of production of the Oudna field.

A shutdown of the Bizerte refinery occurred between March 2010 and June 2011, resulting in breaks in time series for crude oil and oil products for the years 2009 to 2011.

Sources 1992 to 2014:

- Direct communication with the Observatoire National de l'Energie, Agence Nationale pour la Maîtrise de l'Energie, Tunis.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- *Rapport Annuel 2011*, Société Tunisienne de l'Electricité et du Gaz, Tunis.
- Société Tunisienne des Industries de Raffinage, 2009 online statistics, 2008 to 2009.
- *Statistiques d'Electricité du COMELEC, 2006, 2007*, Comité Maghrébin de l'Electricité.

Sources up to 1991:

- *Bilan Energétique de l'Année 1991*, Banque Centrale de Tunisie, Tunis, September 1992.
- *Rapport d'Activité 1990*, Observatoire National de l'Energie, Agence pour la Maîtrise de l'Energie, Tunis, 1991.
- *Rapport Annuel 1990*, Banque Centrale de Tunisie, Tunis, 1991.
- *Activités du Secteur Pétrolier en Tunisie*, Banque Centrale de Tunisie, Tunis, 1987.
- *Statistiques Financières*, Banque Centrale de Tunisie, Tunis, 1986.
- *Entreprise Tunisienne d'Activités Pétrolières (ETAP)*, Tunis, 1987.
- *Annuaire Statistique de la Tunisie*, Institut National de la Statistique, Ministère du Plan, Tunis, 1985, 1986.
- *L'Economie de la Tunisie en Chiffres*, Institut National de la Statistique, Tunis, 1984, 1985.
- *Activités et Comptes de Gestion*, Société Tunisienne de l'Electricité et du Gaz, Tunis, 1987.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Analyse du Bilan de Bois d'Energie et Identification d'un Plan d'Action*, Ministry of Agriculture, Tunis, 1998.

Turkmenistan

Data for Turkmenistan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

In 2015 new information became available indicating that previous data on refinery gas production was in fact production of kerosene. Differences in trends with previous editions may occur as a result of this change.

Sources up to 2014:

- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, David Cameron Wilson, various editions up to 2015.
- Asian Development Bank online database.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- Direct communication with the National Institute on Statistics and Forecasting of Turkmenistan, November 1999 and January 2001.
- IEA Secretariat estimates.

Ukraine

Data for Ukraine are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Due to limited information being available to the State Statistics Service of Ukraine from part of the Donetsk and Luhansk regions of Ukraine and from the Autonomous Republic of Crimea, breaks in the time series may occur between 2013 and 2014.

Statistical difference for electricity and natural gas includes electricity and natural gas supplied to the Autonomous Republic of Crimea.

The IEA Secretariat and State Statistics Committee of Ukraine are working closely and intensively on the improvement of data quality, and in particular revision of historical data. Therefore, breaks in time series may occur between 2006 and 2007.

The data for the stock draw and statistical difference of natural gas in 2010 are a consequence of the accounting method chosen by the Ukrainian administration to reflect the ruling of the Stockholm Arbitration Tribunal of March 30, 2010.

For the period 2007 to 2014 the transparency of data may be reduced because of confidentiality issues. For instance: peat includes lignite; other kerosene includes aviation fuels (aviation gasoline, gasoline-type jet fuel and kerosene-type jet fuel); other products include petroleum coke.

Large statistical differences still exist for some oil products such as transport fuels and LPG. These are due to identified reporting issues in Ukraine. The

Ukraine State Statistical Committee continues to work with data reporters to try and resolve these issues.

Information on electricity used for pumped hydro is available from 2012 only.

Charcoal production includes pyrolysis and calculated amounts of traditional production from 2008.

Due to a plant closure in 2008, a stock of lignite/peat became available, without details about its consumption. This may lead to breaks in time series and high statistical difference for 2008.

Bituminous coal "From other sources" refers to coal mined in informal sector.

Official Ukrainian coal statistics refer to unwashed and unscreened coal prior to 1995. IEA statistics normally refer to coal after washing and screening for the removal of inorganic matter. Therefore, the IEA revised Ukrainian coal supply and demand statistics downward to reflect levels of washed coal.

Sources 2007 to 2014:

- Direct communication with the State Statistics Committee of Ukraine, Kiev
- Joint IEA/Eurostat/UNECE annual energy questionnaires for Oil, Natural gas, Coal, Renewables, Electricity and heat.

Sources 1992 to 2006:

- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- Direct communication with the Ministry of Statistics, the Coal Ministry, the National Dispatching Company, 1995.
- Coal: Direct communications with the State Mining University of Ukraine, 1995, 1996.
- Natural gas: Direct communication with Ukrgazprom, February 1995.
- Direct communication with the Ministry of Statistics of the Ukraine, July 1994.
- *Ukraine in 1992, Statistical Handbook*, Ministry of Statistics of the Ukraine, Kiev, 1993.
- *Ukraine Power Demand and Supply Options,* The World Bank, Washington, 1993.
- *Power Industry in Ukraine*, Ministry of Power and Electrification, Kiev, 1994.
- *Energy Issues Paper*, Ministry of Economy, March 1995.
- *Ukraine Energy Sector Statistical Review 1993, 1994, 1995, 1996, 1997*, The World Bank Regional Office, Kiev, 1994, 1995, 1996, 1997, 1998.
- *Global Energy Saving Strategy for Ukraine*, Commission of the European Communities, TACIS, Madrid, July 1995.
- IEA Secretariat estimates.

Sources 1990 to 1991:

- IEA Secretariat estimates.

Sources for Biofuels and waste:

- Statistical Office in Kiev, The World Bank and IEA Secretariat estimates.

United Arab Emirates

Crude oil production and export data do not include field condensate. Field condensate quantities are included with natural gas liquids.

In 2013, time series on electricity imports and exports were revised due to new information available on international trade at the interconnectors for the United Arab Emirates. This may lead to revisions to these time series from 2007.

Sources 1993 to 2014:

- *Annual Statistical Bulletin*, Organization of Petroleum Exporting Countries (OPEC), Vienna, various editions up to 2014.
- *Annual Statistical Report*, Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait, various editions up to 2015.
- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2015.
- *Statistical Report 1998-2014*, Abu Dhabi Water & Electric Company (ADWEC), Abu Dhabi, 2014.
- Annual Report, Regulation & Supervision Bureau of Abu Dhabi, Abu Dhabi, various editions up to 2012.
- *Statistical Yearbook 1995, 1996, 1998*, Department of Planning, Abu Dhabi, 1998, 2001.
- Direct communication with the National Bureau of Statistics of the United Arab Emirates, Abu Dhabi.

- Direct communication with the Ministry of Electricity and Water, Abu Dhabi, March 2001.
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Sources up to 1992:

- Annual Report 1998, Ministry of Electricity & Water, Dubai.
- *Abu Dhabi National Oil Company, 1985 Annual Report,* Abu Dhabi National Oil Company, Abu Dhabi, 1986.
- *United Arab Emirates Statistical Review 1981,* Ministry of Petroleum and Mineral Resources, Abu Dhabi, 1982.
- *Annual Statistical Abstract,* Ministry of Planning, Central Statistical Department, Abu Dhabi, various editions from 1980 to 1993.

Sources for Biofuels and waste:

- *Forestry Statistics*, FAO, Rome, 2001.
- IEA Secretariat estimates.
- *Initial National Communication to the United Nations Framework Convention on Climate Change*, Ministry of Energy, United Arab Emirates, 2006.

Uruguay

The pronounced growth in production of biofuels and waste from 2007 to 2010 is a result of the development of the pulp and paper industry.

The power produced from the Salto Grande hydroelectric plant, located on the Uruguay River between Concordia in Argentina and Salto in Uruguay is equally shared between the two countries. Exports include power produced in Salto Grande and exported to Argentina.

The increased imports and decreased production of oil products in 2011 are due to a refinery shutdown, which happened between September 2011 and January 2012.

Sources 1990 to 2014:

- Direct communication with Ministerio de Industria, Energía y Minería, Montevideo.
- *Balance Energético Nacional,* Ministerio de Industria, Energía y Minería, Dirección Nacional de Energía, Montevideo, 1971 to 2014.

Sources for Biofuels and waste:

- Dirección Nacional de Energía, Ministerio de Industria, Energía y Minería, Montevideo.
- *Energy-Economic Information System (SIEE),* Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Uzbekistan

Data for Uzbekistan are available starting in 1990. Prior to that, they are included in Former Soviet Union.

Sources 1990 to 2014:

- Asian Development Bank online database.
- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, various editions up to 2014.
- Direct communication with the Interstate Statistical Committee of the Commonwealth of Independent States.
- Direct communications to the IEA Secretariat from the Institute of Power Engineering and Automation, Academy of Sciences of Uzbekistan 1994, 1996, 1998 to 2003.
- Joint IEA/Eurostat/UNECE annual energy questionnaires, 1995 to 1997.
- IEA Secretariat estimates.

Venezuela

In 2015, new information on the production and consumption of refinery gas since 2007 became available. For this reason, breaks in time series may occur between 2006 and 2007.

Data for crude oil production are obtained from Petróleos de Venezuela S.A. (PDVSA) with an estimate of lease condensate removed. Crude oil production data are comparable to data reported by the Organization of the Petroleum Exporting Countries (OPEC) and the Organización Latino Americana de Energia (OLADE); however, some other sources of information report lower crude oil production, noting other components may be included in the crude oil production data reported in the above sources.

Lease condensate quantities are included in the product NGL from 2000. This may lead to breaks in time series for some products between 1999 and 2000.

Revised data for the years 2005-2011 were provided by OLADE for Venezuela. These revisions may lead to breaks in time series between 2004 and 2005 and differences in trends in comparison to previous editions.

Sources up to 2014:

- *Natural Gas in the World*, Cedigaz, Paris, various editions up to 2015.
- Estadísticas consolidadas, Cámara Venezolana de la Industria Eléctrica, 1996 to 2007.
- Oficina de operatión de sistemas interconectados Venezuela, 2008.
- Petróleo y Otros Datos Estadísticos, Dirección General Sectorial de Hidrocarburos, Caracas, 1983 to 1991, 1993 to 2004, 2007 to 2008.
- Balance Energético de Venezuela, Dirección de Planificación Energética, Ministerio de Energía y Minas, Caracas, 1971 to 2005..
- Transformando la energía en desarrollo social, CVG EDELCA Informe Anual 2006.
- Compendio Estadístico del Sector Eléctrico, Ministerio de Energía y Minas, Dirección de Electricidad, Carbón y Otras Energías, Caracas, 1984, 1989, 1990, 1991.
- Memoria y Cuenta, Ministerio de Energía y Minas, Caracas, 1991.
- Petróleos de Venezuela S.A. 1985 Annual Report, Petróleos de Venezuela, Caracas, 1991.
- Energy-Economic Information System (SIEE), Latin American Energy Organization (OLADE), Quito, accessed May 2016. http://sier.olade.org/
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database.*

Viet Nam

Data for stock changes may contain statistical differences for some energy products.

Sources 1992 to 2014:

- Direct communication with the Institute of Energy and the Ministry of Industry and Trade, Hanoi.
- *Vietnam Energy Balance Tables*, General Directorate of Energy, Ministry of Industry and Trade, Hanoi, various editions up to 2013.
- *Statistical Yearbook of Vietnam & Statistical Handbook*, General Statistics Office of Vietnam (GSO), Hanoi, various editions up to 2014.
- *Yearbook*, Vietnam Energy (Năng Lượng Việt Nam), Hanoi, 2012.
- *Annual Report 2006*, Petrovietnam, Vietnam national Oil and Gas Group.
- Direct communications with the Center for Energy-Environment Research and Development, Pathumthami, 1997 to 1999.
- *Sectoral Energy Demand in Vietnam*, UNDP Economic and Social Commission for Asia and the Pacific, Bangkok, 1992.
- *Energy Commodity Account of Vietnam 1992*, Asian Development Bank, Manila, 1994.
- *World Economic Problems (20)*, National Centre for Social Sciences of the S.R. Vietnam, Institute of World Economy, Hanoi, 1993.
- *Vietnam Energy Review*, Institute of Energy, Hanoi, 1995, 1997, 1998.
- APEC annual energy statistics questionnaires.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1992 data from *Vietnam Rural and Household Energy Issues and Options: Report No. 161/94*, The World Bank, ESMAP, Washington, D.C., 1994.

Yemen

Oil and gas pipeline sabotage was reported in 2012 due to unrest in Yemen. Breaks in time series between 2011 and 2012 as well as between 2012 and 2013 may be observed because of this.

Sources 2011 to 2014:

- *Statistical Bulletin*, Arab Union of Producers, Transporters and Distributors of Electricity (AUPTDE), Amman, various editions up to 2014.
- *Online database*, The International Association for Natural Gas (Cedigaz). various editions up to 2015.
- *Statistical Yearbook*, Central Statistical Organization, Sana'a, various editions up to 2013.

- Household Budget Survey 2005/2006, Central Statistical Organization, Sana'a.
- Petroleum Subsidies in Yemen, IFPRI, 2011.

Sources up to 2010:

- Yemen Petroleum Company, online statistics, 2010.
- *Oil & Gas in Figures 2001 – 2007*, Ministry of Oil & Minerals, Statistics Technical Committee, Yemen, 2008.
- *Oil, Gas and Minerals Statistics, Annual Bulletin 2001, 2002, 2003, 2004, 2005 and 2006*, Ministry of Oil & Minerals, Statistics Technical Committee, Yemen, 2001 to 2007.
- Direct communications to the IEA Secretariat from the Yemen General Oil and Gas Corporation, the Public Electricity Corporation, and the National Information Center, Sana'a, 2001.
- *Statistical Indicators in the Electricity Sector*, Ministry of Planning and Development, Central Statistical Organization, Yemen, 1993.
- IEA Secretariat estimates.

Sources up to 1991:

- *Statistical Yearbook*, Government of Yemen Arab Republic, Yemen, 1988.

Sources for Biofuels and waste:

- *The UN Energy Statistics Database.*
- Forestry Statistics, FAO, Rome, 2000.
- IEA Secretariat estimates.

Former Yugoslavia

Data for individual countries of the Former Yugoslavia are available starting in 1990, and most of the information on 1990 and 1991 was estimated by the IEA Secretariat. Because of large breaks in reporting which occurred in the early 1990's, breaks in time series may occur in 1990 for all regional totals.

Sources up to 1989:

- *Statisticki Godisnjak Yugoslavije*, Socijalisticka Federativna Rebublika Jugoslavija, Savezni Zavod Za Statistiku, Beograd, 1985 to 1991.
- *Indeks*, Socijalisticka Federativna Rebublika Jugoslavija, Beograd, 1990, 1991, 1992.

Zambia

A fire damaged the sole oil refinery (Indeni) in Zambia in 2000. Therefore, breaks in time series may occur between 1999 and 2000, as well as between 2000 and 2001.

In 2015, new information on refinery yields was obtained and applied to the refinery production from 2001. Therefore, breaks in time series may occur between 2000 and 2001.

Sources 1971 to 2014:

- *Energy Sector Report.* Energy Regulation Board, Lusaka, various editions up to 2014.
- *Petroleum Industry Statistics*, Energy Regulation Board, Lusaka. Various editions up to 2014.
- *Institutional Framework and Storage and Transportation Infrastructure of the Zambian Petroleum Supply Chain (DRAFT)*, Government of the Republic of Zambia, 2007.
- *Economic Report 2003*, Ministry of Finance, Lusaka.
- *Energy Statistics Bulletin 1980-1999*, The Department of Energy, Lusaka, 2000.
- AFREPREN, 2002.
- *Annual Statistical Yearbook* 1993, 1994, 1995 (*Consumption in Zambia 1978-1983)*, Eskom, Lusaka, 1984.
- IEA Secretariat estimates.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass Sub-sector in Africa*, African Energy Programme of the African Development Bank, Abidjan, 1996.

Zimbabwe

As no data were received for 2014, data are estimated by the IEA Secretariat based on population growth for biomass and household consumption, and GDP growth for the other products.

A new mining company was commissioned in 2011, leading to a rapid increase in coal production. Due to limited availability of coal consumption data, the IEA Secretariat has estimated coal stocks for Zimbabwe. Breaks in time series may occur between 2013 and 2014 because of this.

More detailed data on energy consumption is available from the Census of Industrial Production (ZimStat) since 2009. Breaks in time series may occur between 2008 and 2009 because of this.

More detailed data on road fuel imports is available since 2011. Breaks in time series may occur between 2010 and 2011 because of this.

Sources 2006 to 2014:

- Direct communication with the Ministry of Energy and Power Development, Harare, 2016.
- *Census of Industrial Production (CIP)*, Zimbabwe National Statistics Agency (ZimStat), Harare. Various editions up to 2015.
- Direct communication with the Zimbabwe National Statistical Agency (ZimStat), Harare, 2014.
- *Annual Report*, Zimbabwe Power Company (ZPC), Harare, various editions from 2010 up to 2012.

Sources 1996 to 2005:

- Direct communication with the Ministry of Energy and Power Development, 2007, 2012.
- Direct communication with the Zimbabwe Electricity Supply Authority (ZESA), 2003, 2005, 2006.
- *African Economic Outlook 2004*, OECD, *Paris*, 2004.
- Direct communication to the IEA Secretariat from the Department of Energy Resources and Development, February 2002, AFREPREN, 2002.
- Direct communication to the IEA Secretariat from the Ministry of Environment and Tourism, Harare, 1999, 2000.
- Direct communication to the IEA Secretariat from the electricity utility.
- *Electricity Statistics Information*, Central Statistical Office, Causeway, February 1998.
- IEA Secretariat estimates.

Sources 1992 to 1995:

- *Eskom Annual Statistical Yearbook 1993, 1994, 1995*, Johannesburg, 1994, 1995, 1996, citing Zimbabwe Electricity Supply Authority, Harare as source.
- *The UN Energy Statistics Database.*

Sources up to 1991:

- *Zimbabwe Statistical Yearbook 1986,* Central Statistical Office, Harare, 1990.
- *Quarterly Digest of Statistics*, Central Statistical Office, Harare, 1990.
- *Zimbabwe Electricity Supply Authority Annual Report*, Zimbabwe Electricity Supply Authority, Harare, 1986 to 1991.

Sources for Biofuels and waste:

- IEA Secretariat estimates based on 1991 data from *Forests and Biomass* Sub-sector in Africa, African Energy Programme of the African Development Bank, Abidjan, 1996.

Other Africa

Time series for this region are obtained by summing data corresponding to individual countries (see lists in section I.5, Geographical coverage). As a consequence, intra-regional trade is included as part of total trade. Therefore, trade is likely to be overstated.

The UN Statistics Division database is the main data source for the countries not listed individually and included in the region. At the time when this edition was prepared only 2013 data were available. As a consequence, all data points for 2014 have been estimated based on developments in population and GDP in the region.

In this edition data for bagasse use in the transformation sector in autoproducer electricity plants, main activity producer CHP plants and autoproducer CHP plants became available for the years 2011-2013. This may lead to breaks in time series between 2010 and 2011.

In this edition, data for Niger are no longer included in Other Africa for the period 2000-2013. This may lead to breaks in time series between 1999 and 2000.

Sources up to 2014

- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Other Asia

Time series for this region are obtained by summing data corresponding to individual countries (see lists in section I.5, Geographical coverage). As a consequence, intra-regional trade is included as part of total trade. Therefore, trade is likely to be overstated.

The UN Statistics Division database is the main data source for the countries not listed individually and

included in the region. At the time when this edition was prepared only 2013 data were available. As a consequence, all data points for 2014 have been estimated based on developments in population and GDP in the region.

In this edition only UN data for the period 2011-2012 were uploaded which may create breaks in time series between 2010 and 2011.

Sources up to 2014

- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

Other Non-OECD Americas

Time series for this region are obtained by summing data corresponding to individual countries (see lists in section I.5, Geographical coverage). As a consequence, intra-regional trade is included as part of total trade. Therefore, trade is likely to be overstated.

The UN Statistics Division database is the main data source for the countries not listed individually and included in the region. At the time when this edition was prepared only 2013 data were available. As a consequence, all data points for 2014 have been estimated based on developments in population and GDP in the region.

The refinery in Aruba was shut down in September 2012. This may lead to breaks in time series for the period 2011-2013.

In this edition energy data for Bonaire, Saba, Saint Eustratius and Sint Maarten are included in Other Non-OECD Americas for the period 2012-2014.

In this edition, data for Suriname are no longer included in Other Non-OECD America's for the period 2000-2014. This may lead to breaks in time series between 1999 and 2000.

Sources up to 2014

- Annual Statistical Digest of the Central Bank of Aruba.
- The economy of Curacao and Sint Maarten in Data and Charts Yearly Overview
- *The UN Energy Statistics Database.*
- IEA Secretariat estimates.

8. UNITS AND CONVERSIONS

General conversion factors for energy

To:	TJ	Gcal	Mtoe	MBtu	GWh
From:	multiply by:				
terajoule (TJ)	1	2.388×10^{2}	2.388×10^{-5}	9.478×10^{2}	2.778×10^{-1}
gigacalorie (Gcal)	4.187×10^{-3}	1	1.000×10^{-7}	3.968	1.163×10^{-3}
million tonnes of oil equivalent (Mtoe)	4.187×10^{4}	1.000×10^{7}	1	3.968×10^{7}	1.163×10^{4}
million British thermal units (MBtu)	1.055×10^{-3}	2.520×10^{-1}	2.520×10^{-8}	1	2.931×10^{-4}
gigawatt hour (GWh)	3.600	8.598×10^{2}	8.598×10^{-5}	3.412×10^{3}	1

Conversion factors for mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	1.000×10^{-3}	9.842×10^{-4}	1.102×10^{-3}	2.205
tonne (t)	1.000×10^{3}	1	9.842×10^{-1}	1.102	2.205×10^{3}
long ton (lt)	1.016×10^{3}	1.016	1	1.120	2.240×10^{3}
short ton (st)	9.072×10^{2}	9.072×10^{-1}	8.929×10^{-1}	1	2.000×10^{3}
pound (lb)	4.536×10^{-1}	4.536×10^{-4}	4.464×10^{-4}	5.000×10^{-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 U.S.)	1	8.327×10^{-1}	2.381×10^{-2}	1.337×10^{-1}	3.785	3.785×10^{-3}
U.K. gallon (gal U.K.)	1.201	1	2.859×10^{-2}	1.605×10^{-1}	4.546	4.546×10^{-3}
barrel (bbl)	4.200×10^{1}	3.497×10^{1}	1	5.615	1.590×10^{2}	1.590×10^{-1}
cubic foot (ft^3)	7.481	6.229	1.781×10^{-1}	1	2.832×10^{1}	2.832×10^{-2}
litre (l)	2.642×10^{-1}	2.200×10^{-1}	6.290×10^{-3}	3.531×10^{-2}	1	1.000×10^{-3}
cubic metre (m^3)	2.642×10^{2}	2.200×10^{2}	6.290	3.531×10^{1}	1.000×10^{3}	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)

9. ABBREVIATIONS

Btu:	British thermal unit
GWh:	gigawatt hour
kcal:	kilocalorie
kg:	kilogramme
kJ:	kilojoule
Mt:	million tonnes
m^3:	cubic metre
t:	metric ton = tonne = 1,000 kg
TJ:	terajoule
toe:	tonne of oil equivalent = 10^7 kcal
CHP:	combined heat and power
GCV:	gross calorific value
GDP:	gross domestic product
HHV:	higher heating value = GCV
LHV:	lower heating value = NCV
NCV:	net calorific value
PPP:	purchasing power parity
TPES:	total primary energy supply
AfDB:	African Development Bank
EU-28:	European Union - 28
FAO:	Food and Agriculture Organisation of the United Nations
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