

ENERGY BALANCES OF OECD COUNTRIES

DOCUMENTATION FOR BEYOND 2020 FILES

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1. CHANGES FROM LAST EDITION

Density added to Conversion factors file

Volume to mass ratio	BBLTONRATIO	This is the density used to calculate the oil demand by product (in barrels) that is published in <i>Energy Statistics of Non-OECD Countries</i> .
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2. FLOW DEFINITIONS

Supply		
Flow	Short name	Definition
Production	INDPROD	Comprises the production of primary energy, i.e. hard coal, lignite, peat, crude oil, NGLs, natural gas, biofuels and waste, nuclear, hydro, geothermal, solar and the heat from heat pumps that is extracted from the ambient environment. Production is calculated after removal of impurities (e.g. sulphur from natural gas). Calculation of production of hydro, geothermal, etc. and nuclear electricity is explained in the section <i>Units and Conversions</i> .
Imports	IMPORTS	<p>Comprise amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place.</p> <p><i>For coal:</i> 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.</p> <p><i>For oil and Natural Gas:</i> 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.</p> <p><i>For electricity:</i> 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.</p>

Supply		
Flow	Short name	Definition
Exports	EXPORTS	<p>Comprise amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place.</p> <p><i>For coal:</i> 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.</p> <p><i>For oil and Natural Gas:</i> 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.</p> <p><i>For electricity:</i> 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.</p>
International marine bunkers	MARBUNK	<p>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 <i>domestic navigation, fishing and non-specified (other)</i>.</p>
International aviation bunkers	AVBUNK	<p>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.</p>
Stock changes	STOCKCHA	<p>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. A stock build is shown as a negative number, and a stock draw as a positive number.</p>
Total primary energy supply	TPES	<p>Total primary energy supply (TPES) is made up of production + imports - exports - international marine bunkers - international aviation bunkers ± stock changes. Note, exports, bunkers and stock changes incorporate the algebraic sign directly in the number.</p>

Supply		
Flow	Short name	Definition
Transfers	TRANSFER	<p>Comprises <i>interproduct transfers</i>, <i>products transferred</i> and <i>recycled products</i>.</p> <p><i>Interproduct transfers</i> 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 <i>interproduct transfers</i> is zero.</p> <p><i>Products transferred</i> 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.</p> <p><i>Recycled products</i> 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).</p>
Statistical differences	STATDIFF	Includes the sum of the unexplained statistical differences for individual fuels, as they appear in the basic energy statistics. It also includes the statistical differences that arise because of the variety of conversion factors in the coal and oil columns.

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). Inputs to transformation processes are shown as negative numbers and output from the process is shown as a positive number. Transformation losses will appear in the “total” column as negative numbers.
Main activity producer electricity plants	MAINELEC	Refers to plants which are designed to produce electricity only. If one or more units of the plant is a CHP unit (and the inputs and outputs can not be distinguished on a unit basis) then the whole plant is designated as a CHP plant. Main activity producers generate electricity for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.
Autoproducer electricity plants	AUTOELEC	Refers to plants which are designed to produce electricity only. If one or more units of the plant is a CHP unit (and the inputs and outputs can not be distinguished on a unit basis) then the whole plant is designated as a CHP plant. Autoproducer undertakings generate electricity wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned.
Main activity producer CHP plants	MAINCHP	Refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations). If possible, fuel inputs and electricity/heat outputs are on a unit basis rather than on a plant basis. However, if data are not available on a unit basis, the convention for defining a CHP plant noted above should be adopted. Main activity producers generate electricity and/or heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.
Autoproducer CHP plants	AUTOCHP	Refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations). If possible, fuel inputs and electricity/heat outputs are on a unit basis rather than on a plant basis. However, if data are not available on a unit basis, the convention for defining a CHP plant noted above should be adopted. Note that for autoproducer CHP plants, all fuel inputs to electricity production are taken into account, while only the part of fuel inputs to heat sold is shown. Fuel inputs for the production of heat consumed within the autoproducer's establishment are not included here but are included with figures for the final consumption of fuels in the appropriate consuming sector. Autoproducer undertakings generate electricity and/or heat, wholly or partly for their own use as an activity which supports their primary activity. They may be privately or publicly owned.

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

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

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 plants	EBKB	Represents the energy used in BKB 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 sector.
Losses	DISTLOSS	Losses in gas energy distribution, transmission and transport.

Energy industry own use and Losses

Flow	Short name	Definition
Flow used in the summary balances		
Energy industry own use	OWNUSE	Is equal to the sum of EMINES, EOILGASEX, EBLASTFUR, EGASWKS, EBIOGAS, ECOKEOVS, EPATFUEL, EBKB, EREFINER, ECOALLIQ, ELNG, EGTL, EPOWERPLT, EPUMPST, ENUC, ECHARCOAL, ENONSPEC and DISTLOSS.

Final consumption		
Flow	Short name	Definition
Total final consumption	TFC	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 <i>stock changes</i>). Backflows from the petrochemical industry are not included in final consumption (see <i>from other sources</i> under supply and <i>petrochemical plants</i> in transformation). <i>Starting with the 2009 edition, international aviation bunkers is no longer included in final consumption at the country level.</i>
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 <i>non-specified (industry)</i> row has been used. Regional aggregates of industrial consumption should therefore be used with caution.

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

Final consumption		
Flow	Short name	Definition
Other	TOTOTHER	Includes residential, commercial/public services, agriculture/forestry, fishing and non-specified (other).
Residential	RESIDENT	Includes consumption by households, excluding fuels used for transport. Includes households with employed persons [ISIC Rev. 4 Divisions 97 and 98] which is a small part of total residential consumption.
Commercial and public services	COMMPUB	[ISIC Rev. 4 Divisions 33, 36-39, 45-47, 52, 53, 55-56, 58-66, 68-75, 77-82, 84 (excluding Class 8422), 85-88, 90-96 and 99]
Agriculture/forestry	AGRICULT	Includes deliveries to users classified as agriculture, hunting and forestry by the ISIC, and therefore includes energy consumed by such users whether for traction (excluding agricultural highway use), power or heating (agricultural and domestic) [ISIC Rev. 4 Divisions 01 and 02].
Fishing	FISHING	Includes fuels used for inland, coastal and deep-sea fishing. Fishing covers fuels delivered to ships of all flags that have refuelled in the country (including international fishing) as well as energy used in the fishing industry [ISIC Rev. 4 Division 03].
Non-specified (other)	ONONSPEC	Includes all fuel use not elsewhere specified as well as consumption in the above-designated categories for which separate figures have not been provided. Military fuel use for all mobile and stationary consumption is included here (e.g. ships, aircraft, road and energy used in living quarters) regardless of whether the fuel delivered is for the military of that country or for the military of another country.
Non-energy use	NONENUSE	Non-energy use covers those fuels that are used as raw materials in the different sectors and are not consumed as a fuel or transformed into another fuel. Non-energy use is shown separately in final consumption under the heading non-energy use. Note that for 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.
Non-energy use industry/transformation/energy	NEINTREN	Non-energy in industry, transformation processes and energy industry own use.
<i>Memo: feedstock use in petrochemical industry</i>	<i>NECHEM</i>	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].
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. Contrary to the <i>Basic Energy Statistics</i>, electricity production for hydro pumped storage is excluded.
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	

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

Conversion factors		
Expressed in tonne of oil equivalent / tonne , in kilojoules / kilogramme and in barrels / tonne		
Flow	Short name	Definition
Average net calorific value	NAVERAGE	Represents the average gross energy content minus the latent heat of vaporisation of 1 unit of mass.
NCV of production	NINDPROD	
NCV of imports	NIMPORTS	
NCV of exports	NEXPORTS	
NCV of coke ovens	NCOKEOVS	
NCV of blast furnaces	NBLAST	
NCV in main activity producer electricity plants	NMAIN	
NCV in autoproducer electricity plants	NAUTOELEC	
NCV in main activity CHP plants	NMAINCHP	
NCV in autoproducer CHP plants	NAUTOCHP	
NCV in main activity heat plants	NMAINHEAT	
NCV in autoproducer heat plants	NAUTOHEAT	
NCV in industry	NIND	
NCV for other uses	NOTHER	
Volume to mass ratio	BBLTONRATIO	This is the density used to calculate the oil demand by product (in barrels) that is published in <i>Energy Statistics of Non-OECD Countries</i> .

Indicators		
Flow	Short name	Notes
Energy production (Mtoe)	INDPROD	Total primary energy production, expressed in Mtoe.
Net imports (Mtoe)	NETIMP	Imports minus exports for total energy, expressed in Mtoe.
Total primary energy supply (Mtoe)	TPES	Total primary energy supply, expressed in Mtoe.
Net oil imports (Mtoe)	OILIMP	Imports of oil minus exports of oil, expressed in Mtoe.
Oil supply (Mtoe)	OILTPES	Primary supply of oil, expressed in Mtoe.
Electricity consumption (TWh)	ELECONS	Domestic consumption, i.e. gross production + imports - exports - losses, expressed in TWh.
GDP (billion 2005 USD using exchange rates)	GDP	<p>The main source of these series for 1970 to 2012 is <i>National Accounts of OECD Countries</i>, Volume 1, 2013. GDP data for Australia, France, Greece and Sweden for 1960 to 1969 and Denmark for 1966 to 1969 as well as for Netherlands for 1969 come directly from the most recent volume of <i>National Accounts</i>. GDP data for 1960 to 1969 for the other countries have been estimated using the growth rates from the series in the <i>OECD Economic Outlook No 76</i> and data previously published by the OECD. Data prior to 1986 for Chile, prior to 1990 for the Czech Republic and Poland, prior to 1991 for Hungary, and prior to 1992 for the Slovak Republic are IEA Secretariat estimates based on GDP growth rates from the World Bank.</p> <p>The GDP data have been compiled for individual countries at market prices in local currency and annual rates. These data have been scaled up/down to the price levels of 2005 and then converted to US dollars using the yearly average 2005 exchange rates.</p>
GDP (billion 2005 USD using PPPs)	GDPPPP	<p>The GDP PPP data have been compiled for individual countries at market prices in local currency and annual rates. These data have been scaled up/down to the price levels of 2005 and then converted to US dollars using the yearly average 2005 purchasing power parities (PPPs).</p> <p>Purchasing power parities are the rates of currency conversion that equalise the purchasing power of different currencies. A given sum of money, when converted into different currencies at the PPP rates, buys the same basket of goods and services in all countries. In other words, PPPs are the rates of currency conversion which eliminate the differences in price levels between different countries. The PPPs selected to convert the GDP from national currencies to US dollars were aggregated using the Geary-Khamis (GK) method and rebased on the United States. For a more detailed description of the methodology please see <i>Purchasing Power Parities and Real Expenditures</i>, GK Results, Volume II, 1990, OECD 1993.</p>

Indicators		
Flow	Short name	Notes
Population (millions)	POP	The main source of these series for 1970 to 2011 is <i>National Accounts of OECD Countries, Volume 1</i> , 2013. Data for 1960 to 1969 have been estimated using the growth rates from the population series published in the <i>OECD Economic Outlook No 76</i> . For the Czech Republic, Hungary and Poland (1960 to 1969) and Mexico (1960 to 1962), the data are estimated using the growth rates from the population series from the World Bank published in the <i>World Development Indicators CD-ROM</i> . For the Slovak Republic , population data for 1960 to 1989 are from the Demographic Research Centre, Infostat, Slovak Republic. Population for 2012 has been estimated using the population numbers submitted on the Questionnaire for country submissions for the SLT/CERT annual review of energy policies.
Industrial production index (2005=100)	IPI	The main source of these series is the OECD database <i>Main Economic Indicators</i> , May 2013. Industrial production refers to the goods produced by establishments engaged in mining (including oil extraction), manufacturing, and production of electricity, gas and water. These are categories B, C, D and E of ISIC Rev. 4 or NACE Rev. 2 classifications. From 1991, the industrial production index for Germany refers to unified Germany and has been linked to the series for western Germany. For OECD Total and OECD Europe, the IPI has been chain linked and data refer to all OECD countries from 1990 onwards; prior to 1990 Chile, Czech Republic, Estonia, Hungary, Israel, Poland, Slovak Republic, Slovenia and Switzerland are not included.
Total self-sufficiency	TOTSELF	Production divided by TPES expressed as a ratio.
Coal and peat self-sufficiency	COALSELF	Production divided by TPES expressed as a ratio.
Oil self-sufficiency	OILSELF	Production divided by TPES expressed as a ratio.
Gas self-sufficiency	GASSELF	Production divided by TPES expressed as a ratio.
TPES/GDP	TPESGDP	Expressed as toe per thousand 2005 USD.
TPES/GDP PPP	TPESGDPPP	Expressed as toe per thousand 2005 USD PPP.
TPES/population	TPESPOP	Expressed as toe per capita.
Net Oil Imports/GDP	OILIMPGDP	Expressed as toe per thousand 2005 USD.
Oil Supply/GDP	OILSUPGDP	Expressed as toe per thousand 2005 USD.
Oil supply/ population	OILSUPPOP	Expressed as toe per capita.
Electricity consumption/GDP	ELEGDP	Expressed as kWh per 2005 USD.
Electricity consumption/ population	ELEPOP	Expressed as kWh per capita.

Indicators		
Flow	Short name	Notes
Index of industry consumption/industrial production	INDIPI	Expressed as an index where 2005=100.
Index of industry oil consumption/industrial production	OILINDIPI	Expressed as an index where 2005=100.

3. PRODUCT DEFINITIONS

Coal and peat		
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 23 865 kJ/kg (5 700 kcal/kg) on an ash-free but moist basis.
Coking coal	COKCOAL	Coking coal refers to coal with a quality that allows the production of a coke suitable to support a blast furnace charge. Its gross calorific value is greater than 23 865 kJ/kg (5 700 kcal/kg) on an ash-free but moist basis.
Other bituminous coal	BITCOAL	Other bituminous coal is used for steam raising and space heating purposes and includes all bituminous coal that is not included under coking coal. It is usually more than 10% volatile matter and a relatively high carbon content (less than 90% fixed carbon). Its gross calorific value is greater than 23 865 kJ/kg (5 700 kcal/kg) on an ash-free but moist basis.
Sub-bituminous coal	SUBCOAL	Non-agglomerating coals with a gross calorific value between 17 435 kJ/kg (4 165 kcal/kg) and 23 865 kJ/kg (5 700 kcal/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 17 435 kJ/kg (4 165 kcal/kg), and greater than 31% volatile matter on a dry mineral matter free basis. Oil shale and tar sands produced and combusted directly are included in this category. 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 <i>from other sources</i> under crude oil (<i>other hydrocarbons</i>).

Coal and peat		
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 <i>other energy industries</i> .
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 <i>other energy industries</i> includes the consumption at the coking plants themselves. Consumption in the <i>iron and steel industry</i> 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 <i>blast furnaces</i>).
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. <i>Other energy industries</i> 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/peat briquettes	BKB	Brown coal briquettes are composition fuels manufactured from lignite, produced by briquetting under high pressure. These figures include peat briquettes, dried lignite fines and dust. The heading <i>other energy industries</i> includes consumption by briquetting plants.
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.
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.

Coal and peat		
Product	Short name	Definition
Other recovered gases	OXYSTGS	Oxygen steel furnace gas is obtained as a by-product of the production of steel in an oxygen furnace and is recovered on leaving the furnace. Oxygen steel furnace gas is also known as converter gas, LD gas or BOS gas. This category may also cover other recovered gases.
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.

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

Crude, NGL, refinery feedstocks		
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	NGLs are the liquid or liquefied hydrocarbons produced in the manufacture, purification and stabilisation of natural gas. These are those portions of natural gas which are recovered as liquids in separators, field facilities, or gas processing plants. NGLs include but are not limited to ethane, propane, butane, pentane, natural gasoline and 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. It is transformed into one or more components and/or finished products. This definition covers those finished products imported for refinery intake and those returned from the petrochemical industry to the refining industry.
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 biomass fractions of biogasoline, biodiesel and ethanol are not included here, but under liquid biofuels. This differs from the presentation of additives in the <i>Oil Information</i> publication.
Other hydrocarbons	NONCRUDE	Other hydrocarbons, including emulsified oils (e.g. orimulsion), synthetic crude oil, mineral oils extracted from bituminous minerals such as oil shale, bituminous sand, etc. and liquids from coal liquefaction, are included here.

Oil products		
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 <i>oil refineries in energy industry own use</i> .
Ethane	ETHANE	Ethane is a naturally gaseous straight-chain hydrocarbon (C ₂ H 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 ₃ H ₈) and butane (C ₄ H 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	MOTORGAS	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 does not include the liquid biofuel or ethanol blended with gasoline - see liquid biofuels. This differs from the presentation of motor gasoline in the <i>Oil Information</i> publication.
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.
Kerosene type jet fuel	JETKERO	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.
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.

Oil products		
Product	Short name	Definition
Gas/diesel oil	GASDIES	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 does not include the liquid biofuels blended with gas/diesel oil – see liquid biofuels. This differs from the presentation of gas/diesel oil in the <i>Oil Information</i> publication.
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).
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.

Oil products		
Product	Short name	Definition
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 "calcinated coke". This category also includes "catalyst coke" deposited on the catalyst during refining processes: this coke is not recoverable and is usually burned as refinery fuel.
Non-specified 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		
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, biogases 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	SBIOMASS	Primary solid biofuels is defined as any plant matter used directly as fuel or converted into other forms before combustion. This covers a multitude of woody materials generated by industrial process or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, sulphite lyes also known as black liquor, animal materials/wastes and other solid biofuels).
Biogases	GBIOMASS	Biogases are gases arising from the anaerobic fermentation of biomass and the gasification of solid biomass (including biomass in wastes). The biogases from anaerobic fermentation are composed principally of methane and carbon dioxide and comprise landfill gas, sewage sludge gas and other biogases from anaerobic fermentation. Biogases can also be produced from thermal processes (by gasification or pyrolysis) of biomass and are mixtures containing hydrogen and carbon monoxide (usually known as syngas) along with other components. These gases may be further processed to modify their composition and can be further processed to produce substitute natural gas. Biogases are used mainly as a fuel but can be used as a chemical feedstock.
Biogasoline	BIOGASOL	Biogasoline includes bioethanol (ethanol produced from biomass and/or the biodegradable fraction of waste), biomethanol (methanol produced from biomass and/or the biodegradable fraction of waste), bioETBE (ethyl-tertio-butyl-ether produced on the basis of bioethanol; the percentage by volume of bioETBE that is calculated as biofuel is 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.

Biofuels and waste		
Product	Short name	Definition
Biodiesels	BIODIESEL	Biodiesels includes biodiesel (a methyl-ester produced from vegetable or animal oil, of diesel quality), biodimethylether (dimethylether produced from biomass), Fischer Tropsh (Fischer Tropsh produced from biomass), cold pressed bio-oil (oil produced from oil seed through mechanical processing only) and all other liquid biofuels which are added to, blended with or used straight as transport diesel. 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 and waste	RENEWNS	This item is used when the detailed breakdown for primary biofuels and waste is not available.
Charcoal	CHARCOAL	Charcoal includes charcoal produced from solid biomass.
Memo: Renewables	MRENEW	Is equal to the sum of HYDRO, GEOTHERM, SOLARPV, SOLARTH, TIDE, WIND, MUNWASTER, SBIOMASS, GBIOMASS, BIOGASOL, BIODIESEL, OBIOLIQ, RENEWNS and CHARCOAL.

Electricity and heat		
Product	Short name	Definition
Elec/heat output from non-specified manufactured gases	MANGAS	This item is only used if the detailed breakdown is not available. It includes coke oven gas, blast furnace gas and oxygen steel furnace gas. Gas works gas is not included here.
Heat output from non-specified combustible fuels	HEATNS	This item is only used if the detailed breakdown is not available.
Nuclear	NUCLEAR	Energy released by nuclear fission or nuclear fusion.
Hydro	HYDRO	Hydro energy represents the potential and kinetic energy of water converted into electricity in hydroelectric plants.
Geothermal	GEO THERM	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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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.
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.

Electricity and heat		
Product	Short name	Definition
Heat	HEAT	<p>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.</p> <p>Fuels used to produce quantities of heat for sale are included in the transformation processes under the rows <i>CHP plants</i> and <i>Heat plants</i>. The use of fuels for heat which is not sold is included under the sectors in which the fuel use occurs.</p>

Products for summary balances		
Product	Short name	Definition
Coal and coal products	COAL	Is equal to the sum of HARDCOAL, BROWN, ANTCOAL, COKCOAL, BITCOAL, SUBCOAL, LIGNITE, PATFUEL, OVENCOKE, GASCOKE, COALTAR, BKB, GASWKSGS, COKEOVGS, BLFURGS, OXYSTGS and MANGAS. <i>Note: starting with the 2011 edition, gas works gas is included here with coal. In previous years, gas works gas was included with natural gas.</i>
Peat	PEAT	Is equal to PEAT.
Crude, NGL and feedstocks	CRNGFEED	Is equal to the sum of CRNGFEED, CRUDEOIL, NGL, REFFEEDS, ADDITIVE and NONCRUDE.
Oil products	TOTPRODS	Is equal to the sum of REFININGAS, ETHANE, LPG, MOTORGAS, AVGAS, JETGAS, JETKERO, OTHKERO, GASDIES, RESFUEL, NAPHTHA, WHITESP, LUBRIC, BITUMEN, PARWAX, PETCOKE and ONONSPEC.
Natural gas	NATGAS	Is equal to NATGAS . <i>Note: starting with the 2011 edition, gas works gas is included with coal. In previous years, gas works gas was included with natural gas.</i>
Nuclear	NUCLEAR	Is equal to NUCLEAR.
Hydro	HYDRO	Is equal to HYDRO.
Geothermal	GEO THERM	Is equal to GEO THERM.
Solar/wind/other	SOLWIND	Is equal to the sum of SOLARPV, SOLARTH, TIDE, WIND, HEATPUMP, BOILER, CHEMHEAT and OTHER.
Biofuels and waste	COMRENEW	Is equal to the sum of INDWASTE, MUNWASTER, MUNWASTEN, SBIOMASS, GBIOMASS, BIOGASOL, BIODIESEL, OBIOLIQ, RENEWNS and CHARCOAL.
Heat production from non-specified combustible fuels	HEATNS	Is equal to HEATNS.
Electricity	ELECTR	Is equal to ELECTR.
Heat	HEAT	Is equal to HEAT.
Total	TOTAL	Is equal to TOTAL.
Memo: Renewables	MRENEW	Is equal to the sum of HYDRO, GEO THERM, SOLARPV, SOLARTH, TIDE, WIND, MUNWASTER, SBIOMASS, GBIOMASS, BIOGASOL, BIODIESEL, OBIOLIQ, RENEWNS and CHARCOAL.

4. GEOGRAPHICAL COVERAGE

Countries and regions		
This document is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.		
Country/Region	Short name	Definition
Australia	AUSTRALI	Excludes the overseas territories.
Austria	AUSTRIA	
Belgium	BELGIUM	
Canada	CANADA	
Chile	CHILE	
Czech Republic	CZECH	
Denmark	DENMARK	Excludes Greenland and the Danish Faroes, except prior to 1990, where data on oil for Greenland were included with the Danish statistics. The Administration is planning to revise the series back to 1974 to exclude these amounts.
Estonia	ESTONIA	
Finland	FINLAND	
France	FRANCE	Includes Monaco, and excludes the following overseas departments and territories: Guadeloupe, Guyana, Martinique, New Caledonia, French Polynesia, Reunion, and St.-Pierre and Miquelon.
Germany	GERMANY	Includes the new federal states of Germany from 1970 onwards.
Greece	GREECE	
Hungary	HUNGARY	
Iceland	ICELAND	
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.

Countries and regions

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

Country/Region	Short name	Definition
Italy	ITALY	Includes San Marino and the Vatican.
Japan	JAPAN	Includes Okinawa.
Korea	KOREA	
Luxembourg	LUXEMBOU	
Mexico	MEXICO	
Netherlands	NETHLAND	Excludes Suriname and the Netherlands Antilles.
New Zealand	NZ	
Norway	NORWAY	
Poland	POLAND	
Portugal	PORTUGAL	Includes the Azores and Madeira.
Slovak Republic	SLOVAKIA	
Slovenia	SLOVENIA	
Spain	SPAIN	Includes the Canary Islands.
Sweden	SWEDEN	
Switzerland	SWITLAND	Includes Liechtenstein for the oil data. Data for other fuels do not include Liechtenstein.
Turkey	TURKEY	
United Kingdom	UK	Shipments of coal and oil to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of coal and oil to these islands are, therefore, included as part of UK supply. Exports of natural gas to the Isle of Man are included with the exports to Ireland.
United States	USA	Includes the 50 states and the District of Columbia. Oil statistics as well as coal trade statistics also include Puerto Rico, Guam, the U.S. Virgin Islands, American Samoa, Johnston Atoll, Midway Islands, Wake Island and the Northern Mariana Islands.

Countries and regions

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

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

5. COUNTRY NOTES

General notes

In general, more detailed notes are available for data starting in 1990.

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

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

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

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

Australia

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

For 2012 estimates, the Australian Administration provided natural gas production numbers which appeared too high. Information received after the preparation of this report suggest that 2012 production should have been about 47.03 Mtoe, an increase of 5%, not the 17% previously reported and included in this report.

All data refer to the fiscal year (*e.g.* July 2011 to June 2012 for 2012). For the 2002 data, the Australian Administration started to use a new survey methodology which caused shifts in the structure of industry consumption. The Australian Administration is planning to revise the historical series.

Coal: Data on blast furnace gas for electricity production by autoproducers begins in 1986. Consumption in wood and wood products is included in paper, pulp and print from 2001 onwards. The drop in BKB production in 2004 was due to a fire in the main production plant. Only anthracite for export is reported separately; the remainder that is consumed domestically is included with other bituminous coal. Reclassification of some coal types in 2013 were calculated on an energy basis and resulted in a net

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

Oil: Negative refinery losses are caused by differences in treatment of transfers between refineries. Imports of fuel oil have been estimated by the Australian Administration. Prior to 1992, part of the NGL production is included in crude oil. The drop in the production of crude oil in 1999 is due to a gas explosion at the Longford plant. There is a break in the series for crude oil and NGL between 2001 and 2002.

Natural Gas: Prior to 1991, natural gas data include ethane. Data for 1999 and 2000 are estimated by the Australian Administration.

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

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

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

Austria

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

Coal: In the 2012 edition, the Austrian Administration has revised the data for consumption and transformation processes for other bituminous coal, coke oven coke and coke oven gas from 2001 onwards. Blast furnace gas was revised in selected sectors from 1990. Other bituminous coal includes hard coal briquettes. "Trockenkohle" is included with BKB because of its high calorific value. Since 1996, gas works gas is reported with natural gas because it is distributed in the same network. The amount of gas works gas is negligible and it is mostly consumed by households. The last lignite mine closed in the second quarter of 2004 and lignite use for power generation ceased in 2006.

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

Natural Gas: The break in the time series for autoproducer electricity and CHP plants between 1995 and 1996 is due to the availability of more detailed data from 1996 onwards. Differences due to measurement are included with losses prior to 2000. There are inconsistencies in the time series for commercial/public services as this sub-sector is the residual of the consumption data.

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

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

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

field of electricity supply, district heating and water supply are included in *other energy industry own use*. Electricity consumption in non-specified transport represents tramways, electric buses, ski lifts and cable cars. For heat, own use is included in losses.

Belgium

Coal: Sub-bituminous coal data reported in *from other sources* refer to coal recuperated from coal dumps. Production of other bituminous coal ceased on 31 August 1992. The use of coke oven gas in chemical and petrochemical ceased in 1996. The decrease of bituminous coal and coke oven coke in the iron and steel industry in 2002 is due to the closure of several plants.

Oil: The decrease of fuel oil in industry consumption since 1993 is due to the introduction of an excise tax as well as increased use of natural gas. In 2002, patent fuel plants used fuel oil to increase the calorific value of patent fuel.

Natural Gas: The large decrease in non-specified industry in 2003 is due to improvements in data collection. New legislation for data collection has led to breaks in series for industry and energy industry own use between 2004 and 2005, and between 2007 and 2008. Starting in 2009, gas trade in Belgium includes imported LNG which is regasified and subsequently exported to other countries.

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

Electricity and Heat: For 1998 and 1999, electricity production at CHP plants with annual heat output below 0.5 TJ is reported with electricity only plants. In 2000, most autoproducer electricity plants using combustible fuels were reclassified as autoproducer CHP plants; the heat production from these plants was used for internal industrial processes and not sold to third parties until 2005. Heat from chemical processes used for electricity production is available from 2005.

Breaks in series exist between 1991 and 1992 for heat consumption in chemical and non-specified industry. Breaks in series may exist between 2007 and 2008 due to revisions of NACE classifications. There is no

heat consumption starting in 2007 in the iron and steel industry because the installation concerned became an autoproducer in July 2006 and the heat is no longer sold.

Canada

Revisions received by the Canadian Administration and incorporated into the 2002 edition have resulted in breaks in series between 1989 and 1990.

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. The Canadian Administration is planning to further refine its reporting.

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

Natural Gas: Starting in 1992, consumption of natural gas in main activity producer CHP plants includes use in three new facilities in the province of Ontario. In 2000, the increase in main activity producer electricity data is due to new generation plants in Alberta and Ontario, while the increase in autoproducer electricity is due to the addition of independent power production.

Biofuels and Waste: The IEA Secretariat has estimated the data for industrial waste from 1990 to 2007, biogasoline (ethanol) from 1998 to 2004, municipal waste from 1990 to 2004, and landfill gas from 1997 to 2006 based on information supplied by Natural Resources Canada. The IEA Secretariat estimated landfill gas production and consumption for 2007 from information supplied by Environment Canada,

Waste Management. Heat generation and input data are estimated by the Canadian Administration.

Electricity and Heat: Heat production includes heat produced by nuclear power stations for distribution to other consumers. The breakdown of electricity and heat generation between natural gas and oil products in main activity producer CHP plants has been estimated by the Canadian Administration starting in 1990. This may cause breaks in the time series between 1989 and 1990. Starting in 2009, a new source has been used for electricity production from solar, wind, and tide. This new source covers production from solar and wind only from plants with capacity higher than 500 kW. Electricity output in main activity electricity plants from other sources is electricity produced as a by-product of the transformation process from oil sands to synthetic crude oil. The net calorific value provided in the coal questionnaire has been used as the basis for estimating the total amount of terajoules used for main electricity and autoproducer electricity plants.

The Canadian Administration is allocating a large portion of 2010 and 2011 final heat consumption into statistical difference. The Secretariat has decided to allocate the final heat consumption to industry non-specified.

Chile

Data are available starting in 1971.

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

Coal: Other bituminous coal includes sub-bituminous coal.

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

Natural Gas: Inputs of natural gas to autoproducer CHP plants in 2009 are estimated by the Chilean Administration based on electricity generation. In previous years these inputs are included in autoproducer electricity. Data for gas inputs to oil refineries are not available for 2008 and 2009. Data reported in *from other sources* represent LPG injected into the natural gas distribution network. These data are available from 2009. Prior to 2007, natural gas used for oil and gas extraction was included in gas inputs to refineries.

Biofuels and Waste: Production of landfill gas ceased in 2001 as landfill sites stopped producing adequate gas to continue collection. Charcoal production and consumption have been estimated by the IEA Secretariat. Industrial waste data for 2011 have been estimated by the IEA Secretariat.

Electricity and Heat: The split of electricity generation by main activity and autoproducer by fuel was estimated by the Chilean Administration for 1990 to 2003. Electricity production from *other sources* is from a conveyor belt transporting crushed rock from a high altitude to a lower altitude in a mine, as well as waste heat. Estimates for 2011 hydro electricity production in autoproducer electricity plants were estimated by the IEA Secretariat based on preliminary data.

Czech Republic

Data are available starting in 1971.

Coal: Final consumption data were submitted by the Czech Administration starting with 1996 data. Due to economic restructuring in consumption in the late 1990s (big state enterprises subdividing and/or privatising and the utilisation of new technologies by businesses), there might be breaks in time series in these sectors. Data for 1990 to 1995 were estimated based on the Czech publication *Energy Economy Year Book*. In 1995, town gas production (included in gas works gas) ceased. Revisions by the Czech Administration have resulted in some breaks in series between 2001 and 2002. Production *from other sources* of other bituminous coal in 2004 is from coal slurries. Sub-bituminous coal is included in other bituminous coal.

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

Natural Gas: Data from 1993 onwards have been officially submitted by the Czech Statistical Office. The breaks in series between 1993 and 1994 are due to a change in the energy balance methodology between former Czechoslovakia and the Czech Republic. Prior to 1994, data in transport are for former Czechoslovakia. Natural gas inputs into gas works ceased in 1996.

From 2008, hydrogen production is reported in petrochemical feedstocks as non-energy use.

Biofuels and Waste: Data for solid biofuels are not available prior to 1990. The restructuring of the Czech electricity market leads to breaks in the time series in all sectors between 1998 and 1999. Data for liquid biofuels are available starting in 1992 and for municipal waste starting in 1999. New survey systems cause breaks in final consumption in 1999 and in 2002. Breaks in both supply and consumption of biofuels and waste occur again in 2003. Hospital waste previously reported as municipal waste is reported under industrial waste since 2008. Due to a reclassification of plant types, there is a break in series in 2011 for municipal waste used for electricity and heat generation.

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

Denmark

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

Oil: As of 1987, separate data for paraffin waxes are no longer available. Information on waste oil recycling

and final consumption begins in 1989 and is reported in *other oil products*. Prior to 1990, Greenland and the Danish Faroes are included in the oil data. Also prior to 1990, gas/diesel oil consumption and fuel oil consumption for fishing are included in domestic navigation. 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. Due to better survey methods, inputs to electricity and heat generation have been reclassified, causing a break in series between 1993 and 1994. The marked increase in inputs of fuel oil to CHP production in 1994 is due to increased electricity exports to Norway. Industry detail for 1994 and 1995 is based on a new survey. Between 1995 and 2004, other hydrocarbon imports and inputs to main activity producer CHP plants represent orimulsion. The oil inputs used in industrial sub-sectors for producing surplus heat, which is delivered to district heating networks, are allocated to these industrial sub-sectors.

Biofuels and Waste: Fish oil used in main activity producer heat plants is included with solid biofuels. The number of heating companies burning wood chips that are equipped with boilers with flue-gas condensation is increasing. This implies a very high efficiency of heat plants. Consumption of biogasoline and biodiesels has been estimated by the IEA secretariat for 2011.

Electricity and Heat: Heat produced for sale by heat pumps starts in 1994. Prior to 1994 the electricity and heat production are estimated based on fuel inputs. The amount of heat reported under *other sources* is heat recovered from industrial processes and sold for district heating.

Electricity consumption in *other energy industry own use* includes consumption in district heating plants and use for the distribution of electricity. From 1984 onwards, small amounts of heat have been imported from Germany. The breakdown of industry heat consumption is estimated by the Danish Administration for 2010 and 2011.

Estonia

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

Coal: Data reported under lignite are for oil shale. In 2013, data for lignite (oil shale) production for the

period 1991 to 1997 was revised to match Estonian GHG National Inventory values. Consumption data remained unchanged. Fuels reported as coke oven coke (semi-coke) and gas works gas are by-products of oil shale liquefaction.

Oil: For the years 1990 to 2007, oil data are based on direct communication with Statistics Estonia and UNECE.

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.

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

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

Finland

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

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

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

Natural Gas: Prior to 1989, natural gas consumption in residential and agriculture/forestry has been estimated

by the Finnish Administration. Due to a new system of data collection, the breakdown between residential and commercial/public services is available since 1995.

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

Electricity and Heat: Electricity and heat production from biogases are available from 1996. Heat output from autoproducer CHP plants is available starting in 1996 and from autoproducer heat plants starting in 2000. Heat from chemical processes and associated electricity generation are available from 2004. The decrease in electricity production in 2005 is mainly due to lower generation from coal and peat, which was offset by increased electricity imports from Sweden. The increasing heat production from heat pumps in 2007 and 2008 is from the new Katri Vala heating and cooling plant. *Other sources* includes hydrogen and purchased steam.

Consumption of electricity in non-specified transport corresponds to use for urban transport systems. Consumption of heat in residential includes consumption in agriculture/forestry and commercial/public services.

France

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

Oil: Additives and oxygenates data are available from 1991. From 1998, imported oil products needing further refinery processing are no longer reported as refinery feedstock imports but as oil product imports and products transferred. The consumption of kerosene type jet fuel includes military use as of 1998. From 1999, due to a reallocation of some products, part of the amounts previously reported in *other oil products* is now reported in fuel oil. Prior to 2000, data for non-ferrous metals are included in non-specified industry for petroleum coke. Since 2001, transfers of various oil products are reported with fuel oil in some years. Breaks in the time series in 2001 for LPG consumption

are due to improved data collection. Ethylene produced in Lacq is not included in NGL from 2002 onwards. In the 2013 edition, the French Administration has revised the data for international marine bunkers and domestic navigation back to 1995 inclusive following improved access to consumption data. At the same time, military consumption of jet kerosene was reported separately from domestic aviation in *other non-specified* since military data are no longer confidential.

Natural Gas: From 1990 to 1998, the statistical difference includes gas consumption that is not broken down by sector. From 1999 onwards, a new methodology was used for preparing the natural gas balances which leads to breaks in series between 1999 and 2000. Gas for pipelines is included in losses. There is a break in series in the industry sub-sectors between 2005 and 2006. Improvements in data collection lead to some breaks in series between 2008 and 2009.

Biofuels and Waste: Plants using municipal waste were reclassified as autoproducer CHP plants from 1995, which leads to a break in series. Some autoproducer plants solid biofuels were reclassified as main activity plants in 2011. The breakdown of the final energy consumption of biogases was estimated by the French Administration from 1970 to 2003. In the 2012 edition, data for solid biofuels and biogases were revised from 2006.

Electricity and Heat: Electricity production from wind is available from 1993. From 1995, due to a change in the economic activity classification, data have been reported in *other non-specified*. A new method of survey and a reclassification between main activity producer electricity plants and autoproducer electricity plants may cause breaks in the series for other bituminous coal between 1998 and 1999. From 2000 to 2008, there are further classification problems for inputs and output of electricity and heat from oil. The French Administration is working to reconcile their data collection methods for the inputs and the outputs for electricity generation. Due to a new survey, in the 2007 edition the French Administration revised the data back to 2000 and included heat produced from fossil fuels in CHP plants. Data for heat produced from fossil fuels in heat only plants are not available. Unfortunately it is not possible to separate out the amount of heat not sold in autoproducer plants so these amounts have been included. However, no double counting occurs since the corresponding inputs have not been included in final consumption. In 2005, autoproducer CHP efficiencies for other biogases drop due to the opening of a larger, less efficient plant.

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.

In the 2012 edition, data for direct use of solar thermal and geothermal were revised from 2006 and 2007.

Germany

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

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

Coal: Due to reclassification of several sectors by the German Administration, breaks in series may occur between 1990 and 1992; this particularly affects BKB, lignite and coke oven coke. BKB inputs to gas works plants stopped in 1997. Breaks in series may occur between 1998 and 2005 for coke oven gas and blast furnace gas. Up to 2003, other bituminous coal includes anthracite. Breaks in the series for coke oven gas from 2007 are due to a change in statistical source. Consumption of non-renewable municipal waste and other solid biofuels as a reductant occurs in German blast furnaces, but is not currently quantified. Likewise, coal tar is a by-product of coke ovens, but not currently reported.

Oil: Beginning in 1994, final consumption by individual sector has been improved due to new survey methods instituted by the *Minerölwirtschaftsverband*. In 1995, a break in gas/diesel oil consumption occurs as a result of an alignment with the Classification of the Economic Activities in the European Community (NACE). From 2000, part of the product *Andere Rückstände* (other residues) is included with fuel oil instead of *other oil products*. Breaks in series in consumption data between 2002 and 2004 are due to structural changes in energy statistics following the newly introduced Energy Statistics Act.

Natural Gas: Prior to 1995, inputs of natural gas for main activity producer heat are included with main activity producer CHP. Also prior to 1995, final consumption data are based on *Arbeitsgemeinschaft Energiebilanzen*. From 1995 onwards, the industry

sub-sector breakdown is based on the new 1995 NACE classification. This leads to a number of breaks in series between 1994 and 1995. In 2003, there is a break in series for electricity and CHP plants (both autoproducers and main activity producers). From 2003 onwards, own use of gas in coke ovens was negligible. There are no official data for construction from 2004 onwards. There is a break in series between 2009 and 2010 due to a new, more comprehensive legal framework that resulted in methodological changes for production and new calorific values for natural gas. Consumption in coke ovens, agriculture and *other non-specified*, which was previously estimated, is no longer shown starting in 2010 and losses have been included in statistical differences. In the 2013 edition, revisions back to 2003 caused breaks in series between 2002 and 2003 for all sectors.

Biofuels and Waste: A new survey for renewables causes breaks in the time series between 1998 and 1999. The German Administration submitted an incomplete annual questionnaire on renewables and waste for the years 2001 and 2002. As a consequence, the IEA Secretariat estimated the missing data based on statistics published by the Federal Environment Ministry and data submitted in the Electricity and Heat Questionnaire. Where estimation was impossible due to lack of information, the data from the previous year were used. A new reporting system leads to break in series between 2002 and 2003. The German Administration is undertaking the reconciliation of historical data. There is a large drop in the series reported for industrial waste between 2004 and 2005 because new information redistributed amounts previously reported as industrial waste into municipal waste, solid biofuels and biogases. Total final consumption of biofuels and waste by sector became available in 2007. Prior to 2008, data for municipal solid waste and industrial waste data were collected together and the split between the two types of waste had been estimated. Starting in 2008, municipal solid waste and industrial waste data were collected separately. This leads to breaks in the time series between 2007 and 2008. Data on biogasoline and biodiesels are available starting in 2004. In the 2013 edition, numerous changes to methodology and classifications have caused many breaks in series between 2010 and 2011.

Electricity and Heat: Data should be used with caution since numerous breaks in series occur from 1998 onwards. The German Administration started reporting near the surface geothermal energy in 1995, which leads to a break in series with 1994, where only deep geothermal energy is reported. From 1999 onwards,

small amounts of electricity generation that are not accounted for in the data submission have been attributed to various combustible fuels. In some instances, electricity generation from nuclear, hydro, solar and wind in autoproducer electricity plants is confidential or not available and therefore is included in main activity producer electricity plants. For 2002 and 2003, the German Administration did not submit the breakdown of electricity and heat production from combustible fuels. The data were estimated as follows: renewables and waste were taken from the Renewables and Waste Questionnaire and the other combustible fuels were estimated pro rata based on 2001 estimates. Electricity production in electricity plants includes production from CHP plants prior to 2003. Due to the implementation of the Energy Statistics Act, collection concerning heat produced in heat plants and district heating plants became more efficient and more complete. This leads to breaks in series between 2002 and 2003 and between 2003 and 2004. Prior to 1993, all heat production from BKB/peat briquettes is included in main activity producer CHP plants. Detailed data by fuel are not available for total heat production. The non-allocated part is reported as heat production from non-specified combustible fuels. In 2007, many main activity CHP plants that burn biofuels and waste were reclassified as electricity only which results in breaks in the time series between 2006 and 2007. Electricity production from *other sources* is available starting in 2009. This refers to the production of electricity from turbines which are located at pressure drops in fluid transport and from purchased waste heat. In the 2013 edition, heat production from natural gas was estimated based on the revisions of natural gas inputs by the German Administration for 1995-2000 and 2003-2006 for autoproducer CHP, main activity CHP, and main activity heat. The electricity and heat data are expected to be revised for the 2014 edition.

The German Federal Statistics Office reclassified some industrial branches which may cause a break in series in industry sub-sectors between 1994 and 1995. Revisions from the German Administration to the electricity consumption data may cause breaks in the time series between 1999 and 2000. The breakdown of heat consumption is not available from 2003 to 2006. The data for that period were estimated as follows: the transformation processes and losses were estimated based on previous years, the heat produced by autoproducers was included in non-specified industry, and the remaining consumption included in *other non-specified*.

Greece

Oil: Data on feedstocks for cracking in refineries are available from 1986. Crude oil production stopped on 30 November 1998 and started again in December 1999.

Natural Gas: Natural gas produced in Greece has a higher than average gross calorific value due to a high content of C₂/C₄ hydrocarbons. In 1997, a new pipeline between Russia and Greece became operational. In 1998, consumption in residential is included with commercial/public services. Production of natural gas stopped on 30 November 1998 and started again in December 1999.

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

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

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

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

Hungary

Data are available starting in 1965.

Coal: From 1992, the production of sub-bituminous coal has been included with lignite due to the low quality of the coal. For 1990 to 1999, the use of this domestic coal in main activity producer electricity and CHP plants has also been reclassified to lignite. Auto-producer heat and power plants using coke oven gas and blast furnace gas were reclassified in 1998 as main activity power plants.

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

are available starting from 1998. LPG end-use data for 2011 are estimated by the IEA Secretariat.

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

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

Electricity and Heat: The revision of heat production data to conform to IEA reporting methodologies may result in a mismatch of fuel inputs with electricity and heat outputs by plant type, which could cause high efficiencies. Electricity and heat production from solid biofuels in autoproducer CHP plants is available from 1995. Geothermal heat production from main activity producer heat plants is also available from 1995. The Hungarian Administration reclassified some of their plants between 1996 and 2000, which may lead to breaks in the time series. Prior to 2000, electricity output from sub-bituminous coal is included with lignite.

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

Iceland

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

Oil: Oil supply and consumption data for 2008 and 2009 are estimated by the IEA Secretariat.

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

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

Energy industry own use of electricity refers mainly to the use of electricity by the geothermal industry to pump geothermal water from underground sources. The consumption of electricity reported in *other non-specified* corresponds to a NATO base at Keflavik airport which closed in 2005. The increase of electricity consumption in construction from 2004 to 2007 is due to the drilling of tunnels for the Kárahnjúkar power plant. Starting in 2007, the Icelandic Administration decided not to estimate the allocation of geothermal consumption amongst the sub-sectors of industry as they had done from 1999 to 2006 and instead reported all industry consumption under non-specified industry. Prior to 2008, all heat for space heating was reported in residential. From 2008, a portion is estimated to be consumed in commercial and public services.

Ireland

Coal: The production of gas works gas ceased in 1987 due to fuel switching to natural gas. Other bituminous coal inputs to main activity producer electricity plants increased from 1986 due to three new generating units at Moneypoint coming on-line. A reclassification causes a break in the series for peat consumption in the energy industry own use in BKB plants from 1989 to 1990. Due to confidentiality reasons, inputs of anthracite, other bituminous coal and BKB/peat briquettes into patent fuel transformation are reported with residential consumption.

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

Natural Gas: The large increase in imports since 1996 is due to the depletion of the Kinsale gas field and the availability of a new pipeline system to the United Kingdom. The decrease in natural gas consumption in the iron and steel industry from 2001

onwards is due to the shutdown of Ireland's main steel plant. Feedstock use in the petrochemical industry stopped in 2003, due to the shutdown of a fertiliser plant. In 2011, the large increase in non-ferrous metals consumption is due to a fuel switch to natural gas.

Biofuels and Waste: Data for solid biofuels and biogases are available from 1990. Data for municipal waste are available from 2009. Prior to 2011, production and trade of biogasoline and biodiesels cannot be distinguished due to confidentiality issues.

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

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

Direct use of solar thermal heat is available from 1990.

Israel

Data are available starting in 1971.

Coal: Data for oil shale are included with lignite.

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

Natural Gas: Imports of natural gas began in 2008.

Biofuels and Waste: Inputs to transformation are estimated by the IEA Secretariat for other liquid biofuels for 2009 and 2010 and for municipal waste for 2009.

Electricity and Heat: Electricity production from wind begins in 2001. Data on the breakdown of hydroelectric plants are available from 2008. For 2009, solar photovoltaic electricity generation is estimated.

Italy

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

Coal: From 1986 onwards, figures from lignite are given using the same methodology as in the *Bilancio Energetico Nazionale*. In 1991, all industrial activities were reclassified on the basis of ISTAT/NACE 91. This has implied some transfers of activities which may result in some anomalies between 1991 and earlier years. Due to a change in the survey system, breaks in series may occur between 1997 and 1998 for final consumption. Prior to 2009, sub-bituminous coal used in main activity electricity plants was included with other bituminous coal.

Oil: Inputs to electricity and heat generation have been estimated by the IEA Secretariat for the years 1984 to 1997 based on submissions of the Electricity and Heat Questionnaire. All other data for the years 1992 to 1997 and the detailed consumption breakdown for other years have been estimated by the IEA Secretariat based on *Bilancio Energetico Nazionale*. Due to new surveys, breaks appear in the consumption series between 1998 and 1999. For gas/diesel oil, non-specified use is included in commercial/public services. A new survey to determine the split between international marine bunkers and domestic navigation caused a break in series for fuel oil in 1996 and for gas/diesel in 1999. For LPG, a new disaggregation between residential and commercial/public services has been applied starting in 2005. From 2009 onwards, transfers of lubricants could not be disaggregated from refinery output data, which results in increased production of non-specified oil products.

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

Biofuels and Waste: Data for biofuels and waste were reclassified in 2008, which results in several breaks in the time series for transformation. Data collection for wood and other solid biofuels consumption by sector was improved in 2008. In 2010, the methodology for calculating charcoal production changed, creating a break in series.

Electricity and Heat: Prior to 2004, electricity production from orimulsion is confidential and is included with fuel oil. From 2000 onwards, the Italian Administration defines electricity and heat production from autoproducers as generation from producers that consume more than 70% of their own electricity production. However, for the 2000 to 2002 period, all

electricity production from autoproducers is reported with main activity producers. With the introduction of a new survey in 2008, amounts of naphtha and other kerosene that were previously included in *other oil products* have been reported separately in autoproducer CHP plants. The production of electricity reported in the category *other fuel sources* refers to electricity produced from turbines which are located at pressure drops in fluid transport. Heat production is reported starting in 2004 and includes self-generation in industry. The methodology of data collection for photovoltaic electricity production changed in 2009 and the distinction between main activity and autoproducer plants could not be determined, causing a break in the time series. The Italian Administration plans to revise the photovoltaic electricity time series.

Other energy industry own use includes electricity consumption for blast furnaces. From 2000 it also includes consumption for the distribution of gas and prior to 1989 consumption for uranium extraction. The breakdown of heat consumption by sector has been estimated by the Italian Administration.

Japan

Between 2004 and 2007, the IEA received a series of revisions from the Japanese Administration. The first set of revisions received in 2004 increased the 1990 supply by 5% for coal, 2% for natural gas and 0.7% for oil compared to the previous data. This led to an increase of 2.5% in 1990 CO₂ emissions calculated using the Reference Approach while the Sectoral Approach remained fairly constant. For the 2006 edition, the IEA received revisions to the coal and oil data which had a significant impact on both the energy data and the CO₂ emissions. The most significant revisions occurred for coke oven coke, naphtha, blast furnace gas and petroleum coke. These revisions affected consumption rather than supply in the years concerned. As a result, the Sectoral Approach CO₂ emissions increased for all the years, however at different rates. For example, the Sectoral Approach CO₂ emissions for 1990 were 4.6% higher than those calculated for the 2005 edition while the 2003 emissions were 1.1% higher than those of the previous edition. Due to the impact these successive revisions have had on the final energy balance as well as on CO₂ emissions, the IEA was in close contact with the Japanese Administration to better understand the reasons behind these changes. These changes were mainly due to the Government of Japan's efforts to improve the

input-output balances in the production of oil products and coal products in response to inquiries from the UNFCCC Secretariat. To cope with this issue, the Japanese Administration established a working group in March 2004. The working group completed its work in April 2006. Many of its conclusions were incorporated in the 2006 edition but some further revisions to the time series (especially in industry and *other*) were submitted for the 2007 edition.

Starting in 1990, data are reported on a fiscal year basis (e.g. April 2011 to March 2012 for 2011).

Coal: The inputs of coke oven coke to blast furnaces as well as the final consumption of coke oven coke in iron and steel have been estimated by the IEA Secretariat starting in 1990. From 1998, inputs of coke oven gas, blast furnace gas and oxygen steel furnace gas into autoproducer electricity plants include the amount used to produce electricity with TRT technology (Top pressure Recovery Turbines) which was previously included in industry. Statistical differences in hard coal include stock changes since 2001. Large positive differences for several years since 2004 are partly due to stock build by final consumers. The net calorific values for coal and coal products have been recalculated by the IEA Secretariat based upon gross values submitted by Japan.

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

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

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

(IEA-PVPS) report, “Trends in Photovoltaic Applications” published in 2011. The capacity factor was based on the report “National survey report of PV Power Applications in Japan 2010”, published in 2011 by IEA-PVPS. The corresponding electricity consumption has been included with *other non-specified* consumption. Prior to 1998, the electricity produced using TRT technology (Top pressure Recovery Turbines) was included with electricity generated from solid biofuels. Starting in 1998, it is included with electricity generated from coal gases. Due to the events related to the March 2011 tsunami, the Japanese authorities decided to scale back the level of their nuclear program.

Electricity consumption in urban transport systems is included with rail.

Korea

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

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

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

Natural Gas: Prior to 2007, consumption of natural gas in machinery was included with transport equipment. There are breaks in series in industry sub-sectors

in 2008 due to a new classification. Energy industry own use in liquefaction plants includes losses and measuring errors.

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

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

Prior to 2007, production and consumption of electricity and heat in oil refineries and LNG liquefaction/regasification plants are included in industry. Prior to 2008, sales of electricity by Korea's main electricity distributor, KEPCO, to the non-ferrous metals sector are included in iron and steel consumption. Data for electricity consumption in the transport equipment sector are included in machinery from 1994 to 1999. Heat consumption by subsector was reclassified in 2010 due to new information available on heat sales from autoproducers to end-users by sector.

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

Luxembourg

Natural Gas: Prior to 2000, residential consumption includes consumption in commercial/public services and agriculture/forestry. The large increase of gas consumption in transformation from 2002 onwards is due to a new 350-MW combined cycle power plant. From 2000, consumption in the non-ferrous metals sub-sector is included in iron and steel for reasons of confidentiality.

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

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

The breakdown of electricity consumption in industry is not available from 1990 to 1999. Starting in 2005, data for electricity transmission and distribution losses were obtained from the network operator. Prior to 2005, they were estimated by the National Administration.

Mexico

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

Coal: The time series for blast furnace gas and inputs of coke oven coke to blast furnaces start in 1991. Production and some consumption of coke oven gas are estimated by the IEA Secretariat. Other bituminous coal is either reported as coking coal or sub-bituminous coal, depending upon usage.

Oil: Prior to 1987, the split of LPG consumption between residential and commercial/public services has been estimated by the IEA Secretariat. Consumption of lubricants, bitumen and paraffin waxes are available from 1990 and petroleum coke from 1993. Because of a change in the processing of the data, breaks in series occur between 1998 and 1999.

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

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

Electricity and Heat: Electricity production from wind and solar photovoltaic is available from 1990. Electricity production from biofuels and waste is available from 1998. New autoproducer electricity plants fuelled with coal gases were put on-line in 1999. Prior to 1996, gas/diesel oil inputs to autoproducer electricity plants is comprised only of diesel.

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

Direct use of solar thermal heat is available from 1990.

Netherlands

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

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

Oil: Refinery gas includes chemical gas and is included in chemical industry consumption. Motor gasoline includes other light oils until 2007. Some breaks in series occur in 2007 when the Dutch Administration has started to report the petrochemical industry according to IEA methodology. From 2008, naphtha includes aromatics, naphtha and other light oils.

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

Biofuels and Waste: In 2006, for municipal waste some plants changed ownership and were reclassified from electricity only to CHP plants as they started heat projects. Starting in 2010, production and trade of biogasoline is confidential.

Electricity and Heat: Electricity from *other sources* represents generation from the expansion of gases. Heat in non-specified transformation represents waste heat bought from other industries that is generated from combustible fuels. The corresponding electricity output is included with that of natural gas. Electricity production from solar photovoltaic is available from 1992. The decrease of electricity produced from nuclear in 1997 is due to the closure for five months of one nuclear power plant. Heat produced from biofuels and waste is available from 1990. A new main activity producer CHP plant fuelled by refinery gas started up in 1999 and there was a fuel reclassification in 2000. A new reporting methodology causes some breaks between 2004 and 2005. Prior to 1990, all electricity and heat produced from coal is included in CHP plants. For natural gas, all electricity production prior to 1998 and all heat production prior to 1995 is included in CHP plants. For biofuels and waste, all electricity and heat produced prior to 1995 is included in CHP plants.

Commercial/public services electricity consumption includes small users. Increasing electricity consumption in agriculture/forestry is due to expansion of greenhouse farming. The large increase in electricity trade in 1999 is due to the liberalisation of the Dutch electricity market. A new reporting methodology starting in 2005 causes breaks in the heat consumption series.

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

New Zealand

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

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

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

Natural Gas: In February 1997, production of synthetic gasoline from natural gas ceased. In 1998, two new autoproducer CHP plants came on-stream, accounting for the very large consumption increases in that year. A steep decline in consumption in chemical industry in 2005 was caused by closure of the Motunui methanol production plant. The Motunui plant was then reopened in late 2008 resulting in an increase in consumption in the chemical industry in 2009.

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

Electricity and Heat: The classifications used by the Administration of New Zealand were changed in 1991. Prior to 1994, data refer to fiscal year. From 1994, data refer to calendar year. Electricity production by autoproducers for geothermal is available from 1990. The New Zealand Administration has updated efficiencies for electricity production from geothermal heat from 10% to 15% from 1990 onwards; this causes a break in the time series between 1989 and 1990. Heat from chemical processes used for electricity production is available from 1990 and corresponds to acid plants in the fertiliser industry where sulphur is the main input.

Electricity consumption in paper, pulp and printing is included in wood and wood products prior to 1990. There are breaks in series between 1996 and 1997 for electricity consumption due to a new NZ Standard Industrial Classification (NZSIC).

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

Norway

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

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

Natural Gas: The large increase in the oil and gas extraction in 1992 results from the start up of new fields. Before 2000, in energy industry own use, the oil and gas extraction data included data normally included under total final consumption. Consumption for pipeline transport is included in oil and gas extraction. For Norway, supply of natural gas is the residual of two very large and opposite terms, production and

exports. As a result, large statistical differences in some years may lead to discrepancies in the growth rates of supply and demand of natural gas.

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

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

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

Poland

Coal: Prior to 2010, own use in coal mines included worker's take home allowance which should be included in residential.

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

Natural Gas: The inputs of natural gas in transformation have been inferred by the Polish Administration and for some years may be out of line with historical data. Non-specified transformation represents natural gas used for hydrogen manufacture in catalytic

reforming processes. Natural gas used in pipeline transport is partly included in energy industry own use (gas works). Distribution losses may include some statistical differences. Non-specified energy industries own use includes gas used for heating and pumping operations in the distribution network.

Biofuels and Waste: Data for industrial waste include gaseous industrial waste. Data for biogases refer only to the gas from fermentation of biomass. Due to data availability, there is a large increase in solid biofuels between 1992 and 1993 for residential, commercial/public services and agriculture/forestry. Before 2000, industrial wastes were used interchangeably with light fuel oil in some plants, which might result in breaks in the time series. Data on liquid biofuels are available starting in 2003. In 2008, a new questionnaire was administered which increased the coverage of renewable and waste data. In 2008, a reclassification of autoproducer CHP plants to main activity CHP plants caused a break in series for industrial waste.

Electricity and Heat: Heat production from autoproducer CHP plants includes the unsold heat for own use between 1988 and 1995. In order to alleviate this, the Polish Administration adopted new methods to estimate the production of heat sold in autoproducer heat plants (1993) and in autoproducer CHP plants (1995). This causes breaks between 1992 and 1993, and between 1994 and 1995 for heat production and fuel inputs in these plants and for heat consumption in industry sub-sectors. In 2008, a number of CHP plants were reclassified from autoproducer to main activity producer due to an industry re-organisation. Heat production from heat pumps is available from 2009.

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

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

Portugal

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

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

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

Biofuels and Waste: Data are available from 1994 for biogases, from 1999 for municipal waste and from 2003 for industrial waste. Data for solid biofuels were revised by the National Administration from 1990 to 2001, which may result in breaks in series between 1989 and 1990.

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

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

Slovak Republic

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

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

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

Natural Gas: The break in series for oil and gas extraction in 2001 is due to application of the IEA's definition starting in that year. Consumption in *other transformation* is mainly natural gas used for production of hydrogen and in hydrocracking for gasoline. From 2009, data for losses are no longer available. There are inconsistencies in the time series for commercial/public services as this sub-sector is the residual of the consumption data.

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

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

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

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

Slovenia

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

Natural Gas: In 2011 the decrease in consumption of natural gas in the chemical sector comes as a result of minimal use of gas for production of methanol.

Biofuels and Waste: The Slovenian Administration plans to revise the total final consumption for solid biofuels with the results from a new household survey when sources become available. Breaks in total final consumption for industrial waste are a result of a sectoral reclassification.

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

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

Spain

Coal: Lignite mining was halted indefinitely in 2008. The transformation efficiency for coke ovens is over 100% for 2009 and 2010, resulting in positive losses for these two years. Data associated with the coke oven coke transformation process are under review by Spain and revised data are expected next cycle.

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

Natural Gas: There is a break in series between 1993 and 1994 in autoproducer CHP consumption, since a new survey revealed a larger number of CHP autoproducers that had previously been included in industry consumption. The large increase in main activity producer electricity consumption in 1997 is due to two main activity producer electricity plants running on natural gas. From 2001 onwards, the final consumption breakdown is estimated by the National Administration. The consumption data for 2006 onwards have been estimated on a different basis, thus causing breaks in the energy industry own use and in final consumption.

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

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

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

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

Sweden

Coal: Other bituminous coal production is coal recovered during the quarrying of clay. Autoproducer inputs to waste heat production that is sold are reported in the respective final consumption sectors and not in transformation. Some mixture of LNG with air to form a lower calorie product is reported as gas works gas production. However, the LNG inputs are reported in natural gas consumption, resulting in some minor double counting and unrealistic transformation efficiencies for gas works gas.

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

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

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

Electricity and Heat: In Sweden, heat produced in heat pumps is sold to third parties (as district heat) and is therefore included in transformation. Inputs to heat pumps include heat recovered from industry and from ambient sources (including sewage and seawater). Ambient heat is shown as the indigenous production of heat. The electricity used to drive heat pumps is considered to be transformed and appears as output in transformation rather than as electricity used in energy industry own use. Fuel inputs to the heat that is recovered by the heat pump are reported in the appropriate industry sub-sector (*i.e.* chemical and paper, pulp and printing). Prior to 1992, electricity

production from biogases is included with solid biofuels. Information on heat for sale produced in heat pumps and electric boilers is available starting in 1992. Heat produced for sale by autoproducer CHP plants is reported starting in 1992. Heat production from liquid fuels in main activity producer CHP plants includes heat recovered from flue-gas condensing for 1997 and 1998.

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

Switzerland

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

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

Oil: As of 1993, the Swiss Administration has reported figures for naphtha that are net of quantities used for blending into motor gasoline. For 1994, 1995, 1997, 1999, 2001 and 2002 this reporting has led to negative production numbers for naphtha. For these years, the IEA Secretariat has moved the data into transfers and reduced the production of motor gasoline by corresponding amounts. Petroleum coke production started in 2004 due to the installation of a cracking unit in a refinery. In 2010, the large statistical difference for gas/diesel oil is partly due to a reduction of consumer stocks.

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

Biofuels and Waste: The autoproducer heat plant that produced heat for sale using municipal waste was closed in 2006. Landfill waste is no longer being used for heat production as of 2011. The Swiss Administration revised the time series for municipal waste from 1999, leading to a break in the time series in 1999. In the 2013 edition, consumption data for biogases in the transport sector are available from 1996.

Electricity and Heat: Heat production includes heat produced by nuclear power stations and distributed to other consumers. Solar electricity production by autoproducers is available from 1990.

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

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

Turkey

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

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

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

Electricity and Heat: In 1995, the Turkish Administration reclassified autoproducer plants by type and

source to be consistent with IEA definitions. This causes breaks between 1994 and 1995 for electricity production in these plants. Electricity production from wind is available starting in 1998. In the 2006 edition, the Turkish Statistical Office started providing electricity and heat output on the basis of a new survey that revised time series back to 2000. This causes breaks in the time series between 1999 and 2000. Not all of the input series have been revised.

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

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

United Kingdom

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

Oil: Prior to 1995, the product breakdown for transfers is estimated by the UK Administration. Beginning with 1995, the UK Administration revised their product breakdown for transfers and petrochemical reporting methodology. Breaks in series for LPG occur between 2000 and 2001 due to a re-allocation of data. Fuel oil inputs to heat production are available starting in 2000. Beginning with 2009, the UK Administration revised their product consumption data based on a new reporting methodology. Consumption data prior to 2009 are pending. Imports of motor gasoline were revised back to 2005 inclusive, following the Administration's improved access to customs trade data.

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

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

Electricity and Heat: The reorganisation and subsequent privatisation of the electricity supply industry in 1990 has resulted in some breaks in series. Inputs and output from natural gas for main activity producer electricity production are included in autoproducer electricity for 1990 (for reasons of confidentiality). For the United Kingdom, it is necessary to combine figures for main activity producers and autoproducers in order to prevent the disclosure of information relating to less than three electricity generating companies, since this information is considered confidential. For this reason, data for main activity producer CHP plants have been included with autoproducer CHP plants from 1988. Prior to 1988, electricity output from CHP plants was included with autoproducer electricity plants. Prior to 2003, all outputs of electricity and heat from oil products are reported in the *other oil products* category. From 2007 onwards, outputs of electricity from petroleum coke are included in fuel oil. In 1996, the break in electricity production from nuclear is due to a reclassification of plants from autoproducer to main activity producer plants. Electricity production from solar PV is available from 1999. The launch of a Feed-in-Tariff scheme in April 2010 resulted in a rapid increase of capacity and corresponding electricity production growth from solar PV in 2011.

Electricity consumption in coal mines includes consumption in patent fuel plants. Consumption in gas works includes electricity use in the transmission/distribution of public supply gas. Consumption in the non-metallic mineral products sector includes mining and quarrying. Starting in 1990, small amounts of electricity used in heat pumps have been included in residential. In the 2012 edition, the data for electricity consumption in transport sector was reclassified by sub-sector resulting in a break in time series between 2003 and 2004. Prior to 2004, non-specified transport includes consumption for traction by urban rails and road vehicles, and consumption for non-traction by railways and bus stations and airports. From 2004 onwards, non-specified transport includes consumption by road vehicles only. Prior to 2004, electricity consumption in rail refers to industrial rail only and from 2004 onwards it includes both industrial and urban rail.

United States

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

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

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

Natural Gas: The amounts of gas works gas that are blended with natural gas have been estimated from 1990 to 2002 on the basis of the output efficiency of the process. With the exception of petrochemical feedstocks, *other non-energy use* of natural gas is included in industry prior to 2003. A detailed breakdown of industry consumption is not available for natural gas prior to 1995. From 1995 on, this breakdown is estimated by the Energy Information Administration (EIA), using the MECS, which is conducted quadrennially. Consumption in agriculture, forestry and fisheries is included in non-specified industry.

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

Electricity and Heat: There are breaks in series concerning the total production of electricity and heat in the United States. Comprehensive data on electricity and heat production and consumption in main activity producer electricity, CHP and heat plants and autoproducer electricity and CHP plants are not available for all years. The selling of main activity producer plants to autoproducers may cause breaks in the series between 1998 and 2000. For the United States, prior to 2000, autoproducers include small and independent power producers, which under IEA definitions are considered main activity producers. In the 2003 edition, the US Administration changed what it was reporting under autoproducers. This reclassification causes more breaks between 1999 and 2000. For the 2009 edition, the EIA changed their methodology for calculating heat production in CHP plants, and revised data back to 2006. This leads to breaks in series between 2005 and 2006. Electricity generation reported under *other sources* is from purchased steam. 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. From 2007 onwards, the industrial waste category includes recovered heat from industrial processes. 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. Prior to 2008, heat produced by heat pumps was incorrectly reported as geothermal use in residential and commercial/public services.

Data for electricity absorbed by pumping and electricity production from pumped storage plants became available starting in 1987. The consumption of heat sold in industry is available from 1991 and in energy

industry own use from 1992. Prior to 1991, total consumption of heat sold referred to consumption in commercial/public services. No data are available for heat sold that is consumed in residential and agriculture/forestry.

Direct use of solar thermal heat in residential is available from 1999. Prior to 1999, solar thermal electricity production includes generation from natural gas because some natural gas units are attached to solar thermal plants and their production cannot be

separated. The IEA Secretariat estimated US photovoltaic (PV) electricity generation from autoproducers starting in 1999 by multiplying the dispersed and distributed PV capacity estimated by the EIA 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*.

6. EXPLANATORY NOTES

Unit

The IEA energy balance methodology is based on the calorific content of the energy commodities and a common unit of account. The unit of account adopted by the IEA is the tonne of oil equivalent (toe) which is defined as 10^7 kilocalories (41.868 gigajoules). This quantity of energy is, within a few per cent, equal to the net heat content of 1 tonne of crude oil. Throughout this publication 1 tonne means 1 metric ton or 1000 kg.

Conversion (from original units to toe)

The change from using the original units to tonnes of oil equivalent implies choosing coefficients of equivalence between different forms and sources of energy. This problem can be approached in many different ways. For example, one could adopt a single equivalence for each major primary energy source in all countries, e.g. 29 307 kJ/kg (7 000 kcal/kg) for hard coal, 41 868 kJ/kg (10 000 kcal/kg) for oil, etc.

The main objection to this method is that it results in distortions since there is a wide spread in calorific values between types of coal and individual coal products, and between calorific values of these fuels in different countries. The Secretariat has, therefore, adopted specific factors supplied by the national administrations for the main categories of each quality of coal and for each flow or use (i.e. production, imports, exports, electricity generation, coke ovens, blast furnaces and industry).

For crude oil, specific factors have been used for production, imports and exports based on consultations

with experts from the national administrations. Up until this year, oil products have been converted using a single set of conversion factors for all countries. This year the IEA has decided to apply regional conversion factors (in conjunction with Eurostat for the European countries) for the oil products.

Gas data in *Energy Statistics of OECD Countries* are presented in terajoules on a **gross calorific basis**. Data on biofuels & waste are presented in terajoules on a **net calorific basis** (with the exception of liquid biofuels which are in 1000 tonnes).

The balances are expressed in terms of "net" calorific value. The difference between the "net" and the "gross" calorific value for each fuel is the latent heat of vaporisation of the water produced during combustion of the fuel. For coal and oil, the net calorific value is about 5% less than gross, for most forms of natural and manufactured gas the difference is 9-10%, while for electricity and heat there is no difference as the concept has no meaning in this case. The use of net calorific value is consistent with the practice of the Statistical Offices of the European Communities and the United Nations.

Electricity data are converted from original units of gigawatt hours to million tonnes of oil equivalent using the relationship: 1 terawatt hour = 86 ktoe.

Primary energy conventions

When constructing an energy balance, it is necessary to adopt conventions for primary energy from several sources, such as nuclear, geothermal, solar, hydro, wind, etc. The two types of assumptions that have to be made are described below.

Choice of the primary energy form

For each of these sources, there is a need to define the form of primary energy to be considered; for instance, in the case of hydro energy, a choice must be made between the kinetic energy of falling water and the electricity produced. For nuclear energy, the choice is between the energy content of the nuclear fuel, the heat generated in the reactors and the electricity produced. For photovoltaic electricity, the choice is between the solar radiation received and the electricity produced.

The principle adopted by the IEA is that the primary energy form should be the first energy form downstream in the production process for which multiple energy uses are practical. The application of this principle leads to the choice of the following primary energy forms:

- **Heat** for nuclear, geothermal and solar thermal;
- Electricity for hydro, wind, tide/wave/ocean and solar photovoltaic.

Calculation of the primary energy equivalent

There are essentially two methods that can be used to calculate the primary energy equivalent of the above energy sources: the partial substitution method and the physical energy content method.

The partial substitution method: In this method, the primary energy equivalent of the above sources of electricity generation represents the amount of energy that would be necessary to generate an identical amount of electricity in conventional thermal power plants. The primary energy equivalent is calculated using an average generating efficiency of these plants. This method has several shortcomings, including the difficulty of choosing an appropriate generating efficiency and the fact that the partial substitution method is not relevant for countries with a high share of hydro electricity. For these reasons, the IEA, as most international organisations, has now stopped using this method and adopted the physical energy content method.

The physical energy content method: This method uses the physical energy content of the primary energy source as the primary energy equivalent. As a consequence, there is an obvious link between the principles adopted in defining the primary energy forms of energy sources and the primary energy equivalent of these sources.

For instance, in the case of nuclear electricity production, as heat is the primary energy form selected by the IEA, the primary energy equivalent is the quantity of heat generated in the reactors. However, as the amount of heat produced is not always known, the IEA estimates the primary energy equivalent from the electricity generation by assuming an efficiency of 33%, which is the average of nuclear power plants in Europe.

In the case of hydro and solar PV, as electricity is the primary energy form selected, the primary energy equivalent is the physical energy content of the electricity generated in the plant, which amounts to assuming an efficiency of 100%. A more detailed presentation of the assumptions used by the IEA in establishing its energy balances is given in Section 6.

The efficiency of a solar thermal power plant is the product of the collector efficiency, field efficiency and steam-cycle efficiency. The collector efficiency depends on the angle of incidence of the sunlight and the temperature in the absorber tube, and can reach values up to 75%. Field losses are usually below 10%. Altogether, solar thermal trough power plants can reach annual efficiencies of about 15%; the steam-cycle efficiency of about 35% has the most significant influence. Central receiver systems such as solar thermal tower plants can reach higher temperatures and therefore achieve higher efficiencies.

For geothermal and solar thermal, if no country-specific information is reported, the primary energy equivalent is calculated as follows:

- 10% for geothermal electricity;
- 50% for geothermal heat;
- 33% for solar thermal electricity;
- 100% for solar thermal heat.

Since these two types of energy balances differ significantly in the treatment of electricity from solar, hydro, wind, etc., the share of renewables in total energy supply will appear to be very different depending on the method used. As a result, when looking at the percentages of various energy sources in total supply, it is important to understand the underlying conventions that were used to calculate the primary energy balances.

7. UNITS AND CONVERSIONS

General Conversion Factors for Energy

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

Conversion Factors for Mass

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

Conversion Factors for Volume

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

Decimal prefixes

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

Coal

Coal has separate net calorific values for production, imports, exports, inputs to electricity/heat generation and coal used in coke ovens, blast furnaces and industry.

For electricity/heat generation, coal inputs to each type of plant (i.e. main activity electricity plant, autoproducer electricity plant, main activity CHP plant, autoproducer CHP plant, main activity heat plant, autoproducer heat plant) are converted to energy units using average factors calculated from the Annual Electricity Questionnaire. All other flows are converted using an average net calorific value.

Crude oil

Country-specific net calorific values (NCV) for production, imports and exports by country are used to calculate the balances. The average value is used to convert all the other flows to heat values.

Gases

Energy Statistics of OECD Countries expresses the following gases in terajoules, using their gross calorific value.

1 terajoule = 0.02388 ktoe.

To calculate the net heat content of a gas from its gross heat content, multiply the gross heat content by the appropriate following factor.

Gas	Ratio from GCV to NCV
Natural gas	0.9
Gas works gas	0.9
Coke oven gas	0.9
Blast furnace gas	1.0
Other recovered gases	1.0

Biofuels and waste

The heat content of primary solid biofuels, biogases, municipal waste and industrial waste, expressed in terajoules on a net calorific value basis, is presented in *Energy Statistics of OECD Countries*. The Secretariat does not receive information on volumes and other characteristics of these fuels.

1 terajoule = 0.02388 ktoe.

Data for charcoal are converted from tonnes using the average net calorific values given in the electronic tables.

Unless country-specific information has been provided, data for biogasoline are converted from tonnes using 26 800 kJ/kg. Biodiesels and other liquid biofuels are assumed to have a net calorific value of 36 800 kJ/kg unless otherwise specified.

Oil products

The IEA applies regional conversion factors (in conjunction with Eurostat for the European countries) for the oil products.

Regional net calorific values for oil products

Oil products	Europe	Americas	Asia Oceania
	kJ/kg	kJ/kg	kJ/kg
Refinery gas	49 500	48 100	48 100
Ethane	49 500	49 400	49 400
Liquefied petroleum gases	46 000	47 300	47 700
Motor gasoline	44 000	44 800	44 600
Aviation gasoline	44 000	44 800	44 600
Gasoline type jet fuel	43 000	44 800	44 600
Kerosene type jet fuel	43 000	44 600	44 500
Kerosene	43 000	43 800	42 900
Gas/diesel oil	42 600	42 600	42 600
Fuel oil	40 000	40 200	42 600
Naphtha	44 000	45 000	43 200
White spirit	43 600	43 000	43 000
Lubricants	42 000	42 000	42 900
Bitumen	39 000	40 000	38 800
Paraffin Waxes		40 000	
Petroleum Coke	32 000	32 000	33 800
Non-specified oil products		40 000	

Electricity

Figures for electricity production, trade, and final consumption are calculated using the energy content of the electricity (i.e. at a rate of 1 TWh = 86 ktoe).

Hydro-electricity production (excluding pumped storage) and electricity produced by other non-thermal means (wind, tide/wave/ocean, solar PV, etc.) are accounted for similarly using 1 TWh = 86 ktoe.

The primary energy equivalent of nuclear electricity is calculated from the gross generation by assuming a 33% conversion efficiency, i.e. 1 TWh = (86 ÷ 0.33) ktoe.

In the case of electricity produced from geothermal heat, if the actual geothermal efficiency is not known, then the primary equivalent is calculated assuming an efficiency of 10%, so 1 TWh = (86 ÷ 0.1) ktoe.

For electricity produced from solar thermal heat, the primary equivalent is calculated assuming an efficiency of 33%, so 1 TWh = (86 ÷ 0.33) ktoe, unless the actual efficiency is known.

Heat

Information on heat is supplied in terajoules and 1 terajoule = 0.02388 ktoe.

In the case of heat produced in a geothermal plant, if the actual geothermal efficiency is not known, then the primary equivalent is calculated assuming an efficiency of 50%, so 1 TJ = (0.02388 ÷ 0.5) ktoe.

For heat produced in a solar thermal plant, the primary equivalent is equal to the heat consumed, i.e. 1 TJ = 0.02388 ktoe.

For direct use of geothermal and solar thermal heat, all the heat consumed is accounted for in production and consumption.

Examples

The following examples indicate how to calculate the net calorific content (in ktoe) of the quantities expressed in original units in *Energy Statistics of OECD Countries*.

From Original Units	To ktoe (on a NCV basis)
Coking coal production (Poland) for 2011 in thousand tonnes	divide by 41 868 and then multiply by 29 582
Natural gas in terajoules (gross)	multiply by 0.02388 and then multiply by 0.9
Motor gasoline (Poland) in thousand tonnes	divide by 41 868 and then multiply by 44 000
Heat in terajoules (net)	multiply by 0.02388

8. ABBREVIATIONS

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