

# **ENERGY STATISTICS OF OECD COUNTRIES**

## **DOCUMENTATION FOR BEYOND 2020 FILES**



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# 1. CHANGES FROM LAST EDITION

## Methodology

### International aviation bunkers

In October 2008, the IEA hosted the 3rd meeting of InterEnerStat. This group is made up of 24 international organizations that collect or use energy statistics. One of the objectives of the group is to improve the quality of energy data by harmonizing definitions for energy sources and flows. As a result of this meeting, the IEA has decided to align its energy statistics and balances with most other international organizations and to treat international aviation bunkers in the same way as international

marine bunkers. Starting with this edition, international aviation bunkers is no longer included in the transport sector at the country level. It is subtracted out of supply in the same way as international marine bunkers.

**File updated on 11 Aug 2009**

### From other sources – renewables

This flow was added to the file since Japan is reporting biogas that is blended with natural gas in a few years.



## 2. FLOW DEFINITIONS

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

<b>Supply</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
From other sources - non-specified	OSNONSPEC	Refers to both primary energy that has not been accounted for under production and secondary energy that has been accounted for in the production of another fuel. This flow is used if the source is not known.
Imports	IMPORTS	<p>Comprises 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 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>
Exports	EXPORTS	<p>Comprises 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 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	Covers those quantities delivered to ships of all flags that are engaged in international navigation. The international navigation may take place at sea, on inland lakes and waterways, and in coastal waters. Consumption by ships engaged in domestic navigation is excluded. The domestic/international split is determined on the basis of port of departure and port of arrival, and not by the flag or nationality of the ship. Consumption by fishing vessels and by military forces is also excluded. See definitions of <i>transport</i> , <i>fishing</i> , and <i>non-specified “other sectors”</i> .

<b>Supply</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
International aviation bunkers	AVBUNK	Includes deliveries of aviation fuels to aircraft for international aviation. Fuels used by airlines for their road vehicles are excluded. The domestic/international split should be determined on the basis of departure and landing locations and not by the nationality of the airline. For many countries this incorrectly excludes fuel used by domestically owned carriers for their international departures.
Stock changes	STOCKCHA	Reflects the difference between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers, energy transformation industries and large consumers. Oil and gas stock changes in pipelines are not taken into account. With the exception of large users mentioned above, changes in final users' stocks are not taken into account. A stock build is shown as a negative number, and a stock draw as a positive number.
Domestic supply	DOMSUP	Defined as <i>production + from other sources + imports - exports - international marine bunkers - international aviation bunkers ± stock changes</i> .
Transfers	TRANSFER	Comprises <i>interproduct transfers, products transferred</i> and <i>recycled products</i> . <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. <i>Products transferred</i> is intended for petroleum products imported for further processing in refineries. For example, fuel oil imported for upgrading in a refinery is transferred to the feedstocks category. <i>Recycled products</i> are finished products which pass a second time through the marketing network, <b>after</b> having been once delivered to final consumers (e.g. used lubricants which are reprocessed).
Statistical differences	STATDIFF	Defined as deliveries to <i>final consumption + use for transformation and consumption within the energy sector + distribution losses - domestic supply - transfers</i> . Statistical differences arise because the data for the individual components of supply are often derived from different data sources by the national administration. Furthermore, the inclusion of changes in some large consumers' stocks in the supply part of the balance introduces distortions which also contribute to the statistical differences.

<b>Transformation sector</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Transformation sector	TOTTRANF	The transformation sector comprises the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke, crude oil to petroleum products, and heavy fuel oil to electricity).
Main activity producer electricity plants	MAINELEC	Refers to plants which are designed to produce electricity only. If one or more units of the plant is a CHP unit (and the inputs and outputs can not be distinguished on a unit basis) then the whole plant is designated as a CHP plant. Main activity producers (formerly referred to as public supply undertakings) 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 (formerly referred to as public supply undertakings) 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.

<b>Transformation sector</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
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 (formerly referred to as public supply undertakings) 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 the transformation sector. 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.

<b>Transformation sector</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Blast furnaces	TBLASTFUR	Includes the production of town gas, 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 the <i>transformation sector</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/gas works</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.
Coke ovens	TCOKEOVS	Includes the manufacture of coke and coke oven gas.
Patent fuel plants	TPATFUEL	Includes the manufacture of patent fuels.
BKB plants	TBKB	Includes the manufacture of BKB.
Petroleum refineries	TREFINER	Includes the manufacture of finished petroleum products.
Petrochemical industry	TPETCHEM	Covers backflows returned from the petrochemical sector. 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 product 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 biomass into charcoal.

<b>Transformation sector</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Non-specified (transformation) in the detailed balances	TNONSPEC	Includes other non-specified transformation.

<b>Energy sector and distribution losses</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Energy sector	TOTENGY	The energy sector 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). Energy producing industries' own use includes energy consumed by transformation industries for heating, pumping, traction and lighting purposes [ISIC Divisions 10, 11, 12, 23 and 40].
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 the transformation sector) 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 biogas	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.
Petroleum refineries	EREFINER	Represents the energy used in petroleum 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 main activity producer electricity, CHP and heat plants.
Used for pumped storage	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.
Distribution losses	DISTLOSS	Losses in gas distribution, electricity transmission and coal transport.

<b>Final consumption</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Final consumption	FINCONS	Equal to the sum of the consumption in the end-use sectors. Energy used for transformation and for own use of the energy producing industries is excluded. Final consumption reflects for the most part deliveries to consumers (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 industry</i> in the transformation sector). Starting with the 2009 edition, international aviation bunkers is no longer included in final consumption at the country level.
Industry sector	TOTIND	Consumption of the industry sector is specified in the following sub-sectors (energy used for transport by industry is not included here but is reported under transport):
Iron and steel	IRONSTL	[ISIC Group 271 and Class 2731]
Chemical and petrochemical	CHEMICAL	[ISIC Division 24] Excluding petrochemical feedstocks.
Non-ferrous metals	NONFERR	[ISIC Group 272 and Class 2732] Basic industries.
Non-metallic minerals	NONMET	[ISIC Division 26] Such as glass, ceramic, cement, etc.
Transport equipment	TRANSEQ	[ISIC Divisions 34 and 35]
Machinery	MACHINE	[ISIC Divisions 28, 29, 30, 31 and 32] Fabricated metal products, machinery and equipment other than transport equipment.
Mining and quarrying	MINING	[ISIC Divisions 13 and 14] Mining (excluding fuels) and quarrying.
Food and tobacco	FOODPRO	[ISIC Divisions 15 and 16]
Paper, pulp and print	PAPERPRO	[ISIC Divisions 21 and 22]
Wood and wood products	WOODPRO	[ISIC Division 20] Wood and wood products other than pulp and paper.
Construction	CONSTRUC	[ISIC Division 45]
Textile and leather	TEXTILES	[ISIC Divisions 17, 18 and 19]
Non-specified (industry)	INONSPEC	[ISIC Divisions 25, 33, 36 and 37] 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</i> industry row has been used. Regional aggregates of industrial consumption should therefore be used with caution.
Transport sector	TOTTRANS	Consumption in the transport sector covers all transport activity (in mobile engines) regardless of the economic sector to which it is contributing [ISIC Divisions 60, 61 and 62], and is divided into the following sub-sectors:

<b>Final consumption</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
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 or manufactured gas, hot water or steam (ISIC Division 40) from the distributor to final users is excluded and should be reported in the <i>energy sector</i> , while the energy used for the final distribution of water (ISIC Division 41) 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>distribution 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.
Other sectors	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 Division 95] which is a small part of total residential consumption.
Commercial and public services	COMMPUB	[ISIC Divisions 41, 50-52, 55, 63-67, 70-75, 80, 85, 90-93 and 99]

<b>Final consumption</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
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 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 Division 05]. <i>Prior to last year, fishing was included with agriculture/forestry and this may continue to be the case for some countries.</i>
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.
Non-energy use ind./transf./energy	NEINTREN	Non-energy in industry sector, transformation sector and energy sector.
<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, butadiene and other hydrocarbon-based raw materials in processes such as steam cracking, aromatics plants and steam reforming [part of ISIC Group 241].
Non-energy use in transport	NETRANS	Non-energy use in the transport sector.
Non-energy use in other sectors	NEOTHER	Non-energy use in "Other Sectors".

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

<b>Heat output (TJ)</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Heat output in TJ	HEATOUT	Shows the total amount 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 plant	HEMAINH	
Heat Output-autoproducer heat plants	HEAUTOH	

<b>Net calorific values</b>		
Expressed both in <b>tonne of oil equivalent / tonne</b> and in <b>kilojoules / kilogramme</b>		
<b>Flow</b>	<b>Short name</b>	<b>Definition</b>
Average net calorific value	NAVERAGE	
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	



### 3. PRODUCT DEFINITIONS

<b>Coal and Peat</b>		
The fuels in this section are expressed in thousand tonnes.		
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/brown coal	LIGNITE	Lignite/brown coal 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> ).

<b>Coal and Peat</b>		
The fuels in this section are expressed in thousand tonnes.		
Product	Short name	Definition
Peat	PEAT	Peat is a combustible soft, porous or compressed, fossil sedimentary deposit of plant origin with high water content (up to 90% in the raw state), easily cut, of light to dark brown colour. Peat used for non-energy purposes is not included.
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 is, therefore, 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 sector</i> .
Coke oven coke and lignite 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/brown coal), coke breeze and foundry coke. The heading <i>other energy sector</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/gas works</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 sector</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	BKB are composition fuels manufactured from lignite/brown coal, produced by briquetting under high pressure. These figures include peat briquettes, dried lignite fines and dust. The heading <i>other energy sector</i> includes consumption by briquetting plants.

<b>Crude, NGL, refinery feedstocks</b>		
The fuels in this section are expressed in thousand tonnes.		
<b>Product</b>	<b>Short name</b>	<b>Definition</b>
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 biomass. 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.

## Petroleum products

The fuels in this section are expressed in thousand tonnes.

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

*Production* of petroleum products shows gross refinery output for each product.

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

Product	Short name	Definition
Refinery gas	REFINGAS	Refinery gas is defined as non-condensable gas obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. It consists mainly of hydrogen, methane, ethane and olefins. It also includes gases which are returned from the petrochemical industry. Refinery gas production refers to gross production. Own consumption is shown separately under <i>petroleum refineries</i> in the <i>energy sector</i> .
Ethane	ETHANE	Ethane is a naturally gaseous straight-chain hydrocarbon (C <sub>2</sub> H <sub>6</sub> ). It is a colourless paraffinic gas which is extracted from natural gas and refinery gas streams.
Liquefied petroleum gases	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 <sub>3</sub> H <sub>8</sub> ) and butane (C <sub>4</sub> H <sub>10</sub> ) 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 biomass. 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.

## Petroleum products

The fuels in this section are expressed in thousand tonnes.

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

*Production* of petroleum products shows gross refinery output for each product.

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

Product	Short name	Definition
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.
Kerosene	OTHKERO	Kerosene (other than kerosene used for aircraft transport which is included with aviation fuels) comprises refined petroleum distillate intermediate in volatility between gasoline and gas/diesel oil. It is a medium oil distilling between 150°C and 300°C.
Gas/diesel oil	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 biofuel blended with gas/diesel oil – see liquid biomass. This differs from the presentation of gas/diesel oil in the <i>Oil Information</i> publication.
Heavy fuel oil	RESFUEL	Heavy 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).

## Petroleum products

The fuels in this section are expressed in thousand tonnes.

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

*Production of petroleum products shows gross refinery output for each product.*

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

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

## Gases

The gases in this section are expressed in terajoules on a **gross calorific value** basis.

Product	Short name	Definition
Natural gas	NATGAS	<p>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).</p> <p>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.</p>
Gas works gas	GASWKSGS	<p>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.</p>
Coke oven gas	COKEOVGS	<p>Coke oven gas is obtained as a by-product of the manufacture of coke oven coke for the production of iron and steel.</p>
Blast furnace gas	BLFURGS	<p>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.</p>
Oxygen steel furnace gas	OXYSTGS	<p>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.</p>

## Combustible renewables and wastes

See definitions below for units.

Product	Short name	Definition
Industrial waste	INDWASTE	Expressed in terajoules on a <b>net calorific value</b> basis. 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 biomass, biogas or liquid biomass.
Municipal waste (renewable)	MUNWASTER	Expressed in terajoules on a <b>net calorific value</b> basis. 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	Expressed in terajoules on a <b>net calorific value</b> basis. 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 biomass	SBIOMASS	Expressed in terajoules on a <b>net calorific value</b> basis. Primary solid biomass 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 <i>also known as black liquor</i> , animal materials/wastes and other solid biomass).
Biogas	GBIOMASS	Expressed in terajoules on a <b>net calorific value</b> basis. Biogas is derived principally from the anaerobic fermentation of biomass and solid wastes and combusted to produce heat and/or power. Included in this category are landfill gas, sludge gas and other biogas such as biogas produced from the anaerobic fermentation of animal slurries and of wastes in abattoirs, breweries and other agro-food industries.
Biogasoline	BIOGASOL	Expressed in thousand tonnes. 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.

## Combustible renewables and wastes

See definitions below for units.

Biodiesels	BIODIESEL	Expressed in thousand tonnes. Biodiesels includes biodiesel (a methyl-ester produced from vegetable or animal oil, of diesel quality), biodimethylether (dimethylether produced from biomass), Fischer Tropsch (Fischer Tropsch 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	Expressed in thousand tonnes. Other liquid biofuels includes liquid biofuels not reported in either biogasoline or biodiesels.
Non-specified primary biomass and wastes	RENEWNS	Expressed in terajoules on a <b>net calorific value</b> basis. This item is used when the detailed breakdown for primary combustible renewables and wastes is not available.
Charcoal	CHARCOAL	Expressed in thousand tonnes. Charcoal produced from solid biomass is also included here. Since charcoal is a secondary product, its treatment is slightly different than that of the other primary biomass. Production of charcoal (an output in the transformation process) is offset by the inputs of primary biomass into the charcoal production process. The losses from this process are included in the row <i>other transformation sector</i> . Other supply (e.g. trade and stock changes) as well as consumption are aggregated directly with the primary biomass. In most countries, only the primary biomass is reported.

## Electricity and heat

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

Product	Short name	Definition
Elec/heat output from non-spec. manuf. 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 comb 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 power represents the potential and kinetic energy of water converted into electricity in hydroelectric plants.
Geothermal	GEOTHERM	Geothermal energy is the energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It is exploited at suitable sites: <ul style="list-style-type: none"> <li>• for electricity generation using dry stream or high enthalpy brine after flashing</li> <li>• directly as heat for district heating, agriculture, etc.</li> </ul>
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"> <li>• flat plate collectors, mainly of the thermosyphon type, for domestic hot water or for the seasonal heating of swimming pools</li> <li>• solar thermal-electric plants</li> </ul> Passive solar energy for the direct heating, cooling and lighting of dwellings or other buildings is not included.
Tide, wave and ocean	TIDE	Tide, wave and ocean represents the mechanical energy derived from tidal movement, wave motion or ocean current and exploited for electricity generation.
Wind	WIND	Wind energy represents the kinetic energy of wind exploited for electricity generation in wind turbines.
Heat pumps	HEATPUMP	Heat pumps should include the inputs and outputs to heat pumps corresponding to the amount of heat that is sold to third parties.
Electric boilers	BOILER	Electric boilers should include the inputs and outputs to electric boilers corresponding to the amount of heat that is sold to third parties.
Heat from chemical sources	CHEMHEAT	Heat from chemical sources corresponds to heat originating from processes without input energy, such as a chemical reaction (e.g. the treatment of zinc oxide ore with hydrochloric acid). Note that waste heat originating from energy driven processes is not considered as a primary energy source and is included with the heat produced from the corresponding fuel.

## Electricity and heat

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

Product	Short name	Definition
Other sources	OTHER	Other sources includes production now included elsewhere such as fuel cells.
Electricity	ELECTR	<p>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.</p> <p>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.</p>
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 sector 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>



## 4. GEOGRAPHICAL COVERAGE

<b>Countries and regions</b>		
<b>Country/Region</b>	<b>Short name</b>	<b>Definition</b>
Australia	AUSTRALI	Excludes the overseas territories.
Austria	AUSTRIA	
Belgium	BELGIUM	
Canada	CANADA	
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.
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	
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.

<b>Countries and regions</b>		
<b>Country/Region</b>	<b>Short name</b>	<b>Definition</b>
New Zealand	NZ	
Norway	NORWAY	
Poland	POLAND	
Portugal	PORTUGAL	Includes the Azores and Madeira.
Slovak Republic	SLOVAKIA	
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	
United States	USA	Includes the 50 states and the District of Columbia. Oil statistics as well as coal trade statistics also include Puerto Rico, Guam, the U.S. Virgin Islands, American Samoa, Johnston Atoll, Midway Islands, Wake Island and the Northern Mariana Islands.
OECD Total	OECDTOT	Includes Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.
OECD North America	OECDNAM	Includes Canada, Mexico and the United States.
OECD Pacific	OECDPAC	Includes Australia, Japan, Korea and New Zealand.
OECD Europe	OECD EUR	Includes Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey and the United Kingdom.
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. Poland is expected to become Member country in 2008 and has been included in IEA aggregates.

## 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/brown coal are available separately from 1978. Prior to 1978, only data for hard coal and lignite/brown coal/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 combustible renewables and waste (i.e. solid biomass, biogas, liquid biomass, 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 combustible renewables 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 combustible renewables and waste are reported in non-specified prior to 1989 for EU Member countries.

In December 1999, the Energy Statistics Working Group, made up of the IEA, the United Nations, the United Nations Economic Commission for Europe, Eurostat and their respective Member Governments, decided to develop a separate annual questionnaire on renewables and wastes in the hope that this would improve the quality of reporting by national administrations. As a result of this new questionnaire, it is possible that there will be breaks in renewables and waste time series between 1997 and 1998 until national statistical offices are able to revise their series. In order to improve the quality of renewables and waste statistics and to ensure data compatibility, the IEA initiated a project in 2002 with the objective to compare and harmonise historical IEA data with those of national administrations and Eurostat (for EU Member countries), where applicable.

### Australia

All data refer to the fiscal year (e.g. July 2006 to June 2007 for 2007). 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 coking coal and other bituminous coal. Use of PCI in blast furnaces occurs, but is currently not quantified.

**Combustible Renewables and Waste:** For combustible renewables 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.

**Oil:** Negative refinery losses are caused by differences in treatment of transfers between refineries. Imports of heavy 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.

**Gas:** Prior to 1991, natural gas data include ethane. Data for 1999 and 2000 are estimated by the Australian Administration. Starting from 2002, indigenous production includes colliery gas. Prior to 2006, natural gas consumption in oil and gas extraction includes consumption in liquefaction/regasification plants.

**Electricity and Heat:** Inputs and outputs from autoproducer CHP plants are not available prior to 1986. The breakdown of electricity production by fuel at autoproducer CHP plants has been estimated by the IEA Secretariat from 1992 to 2001. The production of electricity from wind is available from 1994 and solar electricity from 1999. Prior to 1995, electricity production from biogas is included in natural gas. In 2002, the Australian Administration started to use a new survey methodology and reclassified the types of plants between main activity producers and autoproducers.

Oil and gas inputs to autoproducer CHP are included in industry consumption prior to 2002. Prior to 2007, electricity consumption in the mining and quarrying sector includes consumption in liquefaction/regasification plants.

## Austria

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

**Coal:** Other bituminous coal includes hard coal briquettes. "Troddenkohle" is included with BKB because of its high calorific value. Since 1994, 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.

**Combustible Renewables and Waste:** Data for 1986 to 1989 for solid biomass, industrial waste, biogas and liquids from biomass 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. Data on wood production and consumption was revised back to 1999 based on a survey that improved the quality of consumption quantities in biomass-fired district heating plants.

**Oil:** Prior to 1990, naphtha is included with *other petroleum products*.

**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 distribution losses prior to 2000 and with statistical difference starting in 2000.

**Electricity and Heat:** Starting in 1990, small amounts of electricity used in heat pumps have been included in the residential sector. There are breaks in series between 1995 and 1996 and between 1998 and 1999 due to new methods of survey. Heat from chemical processes used for electricity production is available from 2004.

Electricity consumption in petroleum 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 sector*. For heat, own use is included in distribution losses.

## Belgium

**Coal:** Sub-bituminous coal data refer to recovered coal products. Production of other bituminous coal ceased on 31 August 1992. Production *from other sources* refers to recuperation of coal from coal dumps. The use of coke oven gas in the chemical and petrochemical sector ceased in 1996. The decrease of bituminous coal

and coke oven coke in the iron and steel sector in 2002 is due to the closure of several plants.

**Combustible Renewables 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.

**Oil:** The decrease in heavy fuel oil 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 residual fuel oil to increase the calorific value of patent fuel.

**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 the industry and energy sectors between 2004 and 2005.

**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, autoproducer electricity plants are reclassified as autoproducer CHP plants; no heat output is reported as it is all used for internal industrial processes and is not sold to third parties. Heat from chemical processes used for electricity production is available from 2005. Geothermal heat from main activity heat plants from 1990 to 2007 was previously misclassified as direct use prior to the 2009 edition.

Breaks in series exist between 1991 and 1992 for heat consumption in chemical and non-specified industry. There is no heat consumption for 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, starting in 2002, some of the disaggregation of primary coal has been estimated by the IEA Secretariat.

**Combustible Renewables and Waste:** The IEA Secretariat has estimated the data for industrial waste from 1990 to 2007, liquid biomass (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.

**Oil:** From 1988 onwards, data for several industrial sub-sectors are no longer available. Transfers for naphtha and *other petroleum 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. Canada imported orimulsion from Venezuela from 1994 to 2000.

**Gas:** Starting in 1992, consumption of natural gas in main activity producer CHP plants includes use in three new co-generation facilities in the province of Ontario. The data reported in non-specified transformation represent quantities of natural gas used for the upgrading of refined oil products. 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.

**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. The inputs of combustible renewables and waste to autoproducer electricity plants, as well as the final energy consumption in the pulp and paper sector from 1981 to 2004, were revised by the IEA Secretariat.

## Czech Republic

Data are available starting in 1971.

**Coal:** End-use consumption data were submitted by the Czech Administration starting with 1996 data.

Due to economic restructuring in the end-use consumption sectors 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. Prior to 1993, consumption was estimated by the IEA Secretariat. 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. Beginning in 1996, the Czech Administration reported gas works gas in autoproducer CHP. In 1997, coke oven gas consumption in chemical and petrochemical stopped. Revisions by the Czech Administration have resulted in some breaks in series between 2001 and 2002. Production from *other sources* of sub-bituminous coal in 2004 is from coal slurries. In the 2008 edition, the classification was changed between other bituminous coal, sub-bituminous coal and lignite for 1990 onwards.

**Combustible Renewables and Waste:** Data for combustible renewables are not available prior to 1991. Solid biomass inputs to main activity producer electricity plants and CHP plants include industrial waste and biogas for 1995 and 1996. The restructuring of the Czech electricity market leads to breaks in the time series in all sectors between 1998 and 1999. Data for liquid biomass 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 combustible renewables and waste occur again in 2003. The exports of biodiesel increased in 2005 driven by high prices for the commodity.

**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.

**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 the transport sector are for former Czechoslovakia. Natural gas inputs into gas works ceased in 1996.

**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 the residential and commercial/public services sectors. 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 and electricity production from lignite is included with sub-bituminous coal. Heat production prior to 1990 excludes heat sold by industry. The breakdown of heat production between main activity producer CHP and heat plants is not available prior to 1990. Accordingly, all heat production is reported in main activity producer heat plants. Data on biogas and wastes in main activity producer CHP and autoproducer heat plants start in 1993. 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 combustible renewables 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.

**Combustible Renewables and Waste:** Fish oil used in main activity producer heat plants is included with solid biomass. 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. In the 2009 edition, production and transformation of solar thermal was revised downwards for 1996 to 2006 because in previous editions, consumption of electricity from solar photovoltaic in the residential sector had erroneously been doubled counted as inputs of solar thermal to autoproducer electricity plants.

**Oil:** As of 1987, separate data for paraffin waxes are no longer available. Information on waste oil recycling and end-use consumption begins in 1989 and is reported in *other petroleum products*. Prior to 1990, Greenland and the Danish Faroes are included in the oil data. Also prior to 1990, gas/diesel oil consumption

and heavy fuel oil consumption for fishing are included in domestic navigation, while after this date they are reported in the agriculture sector. 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 heavy fuel oil to CHP production in 1994 is due to increased electricity exports to Norway. Industry sector detail for 1994 and 1995 is based on a new survey. Orimulsion imports (used for electricity generation) began in 1995 and ceased in 2003. 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.

**Electricity and Heat:** From 1984 onwards, small amounts of heat have been imported from Germany. 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 non-specified energy sector includes consumption in district heating plants and use for the distribution of electricity.

## 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. 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.

**Combustible Renewables and Waste:** Data for biogas 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. The Finnish

National Administration is working on harmonizing combustible renewables and waste data for the years 2004 to 2007.

**Oil:** In 1995, there is a break in series for petroleum 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 heavy fuel oil consumption in *other sectors* between 1998 and 1999. Prior to 2002, petroleum coke used as refinery fuel was included with refinery gas.

**Gas:** Prior to 1989, natural gas consumption in the residential and agricultural sectors 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.

**Electricity and Heat:** Electricity and heat production from biogas 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 used for electricity production is available from 2004. The amount of heat reported under other sources is steam from hydrogen in industrial processes. 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.

Consumption of heat in residential includes consumption in agriculture 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.

**Combustible Renewables and Waste:** Plants using municipal waste were reclassified as autoproducer CHP plants from 1995, which leads to a break in time series. The breakdown of the final energy consumption of biogas was estimated by the French Administration from 1970 to 2003.

**Oil:** Additives and oxygenates data are available from 1991. From 1998, imported petroleum 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 petroleum products* is now reported in fuel oil. Starting in 2000, data for non-ferrous metals are included in non-specified industry for petroleum coke. Since 2001, transfers of the various oil products are reported with heavy fuel oil. 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.

**Gas:** From 1990 to 1998, 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. There is a break in series for commercial/public services and residential in 2001. Gas for pipelines is included in distribution losses. There is a break in series in the industry sub-sectors between 2005 and 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 non-specified *other sectors*. 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. For 2001 to 2004, there are further classification problems for inputs and output of electricity 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. Unfortunately it is not possible to separate out the amount of heat not sold in autoproducer CHP plants so these amounts have been included. However, no double counting occurs since the corresponding inputs have not been included in final consumption.

Consumption of electricity for oil and gas extraction includes that used in oil refineries from 1988 to 2000. Non-specified *other sectors* consumption includes exports to Monaco prior to 1992.

## Germany

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

**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 1999 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 biomass 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.

**Combustible Renewables 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 biomass and biogas.

**Oil:** Beginning with 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 petroleum 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 Law.

**Gas:** Prior to 1995, inputs of natural gas for main activity producer heat are included with main activity producer CHP. Also prior to 1995, end-use 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, gas consumption in coke ovens was negligible. There are no official data for the construction sector from 2004 onwards.

**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 time 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 combustible renewables and waste were reclassified as electricity only which result in breaks in the time series between 2006 and 2007.

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 onwards. The data were estimated as follows: the transformation and distribution losses were estimated based on previous years, the heat produced by autoproducers was included in non-specified industry, and the remaining consumption included in non-specified other sectors.

## Greece

**Coal:** Production of gas works gas ceased in 1997. Lignite is used in main activity producer CHP plants since 1997.

**Combustible Renewables and Waste:** Wood consumption in commercial/public services is included in residential. Data for biogas are available from 1990 and data for industrial waste from 1992. New information on solid biomass is available from 1996 and leads to breaks between 1995 and 1996.

**Oil:** Data on feedstocks for cracking in refineries are available from 1986. From 1993, a better allocation of oil used in specific industrial sub-sectors is available. Due to changes in reporting methods, more detailed end-use information has become available starting in 1996. Crude oil production stopped in November 1998 and started again in December 1999.

**Gas:** Natural gas produced in Greece has an average gross calorific value of around 53 188 kJ/m<sup>3</sup>, due to a high content of C<sub>2</sub>/C<sub>4</sub> hydrocarbons. In 1997, a new pipeline between Russia and Greece became operational. In 1998, consumption in the residential sector is included with commercial/public services.

**Electricity and Heat:** A break in series exists between 1991 and 1992 for electricity consumption in the transport sector. Data on combustible renewables and waste are available from 1992. Production or consumption of distributed heat (heat sold) that is produced from lignite is available from 1997.

## Hungary

Data are available starting in 1965.

**Coal:** Due to sale of an autoproducer power plant, breaks in series occur for coke oven gas and blast furnace gas between 1997 and 1998. From 1990, the production of sub-bituminous coal has been included with lignite/brown coal due to the low quality of the coal. The use of this domestic coal in main activity producer electricity and CHP plants has also been reclassified to lignite/brown coal. The time series for coke oven coke transformed into blast furnace gas and consumed for energy purposes in the iron and steel industry have been adjusted by the IEA Secretariat using standard modelling.

**Combustible Renewables and Waste:** Data for biogas are available from 2000. For the 2009 edition, the

Hungarian Administration revised the data on the consumption of solid biomass in the residential sector from 1991 to 2001 based on updated information.

**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.

**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.

**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 biomass 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 for 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.

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

## Iceland

**Coal:** Final consumption increased in 2000 due to a new iron and steel plant coming on-line.

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

**Oil:** Oil supply and consumption data for 2007 are estimated by the IEA Secretariat.

**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.

Energy sector consumption 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 non-specified *other sectors* corresponds to a NATO base at Keflavik airport which closed in 2005. The increase of electricity consumption in the construction sector from 2003 to 2005 is due to the drilling of tunnels for the Kárahnjúkar power plant. In 2007, the Icelandic Administration decided not to estimate the allocation of geothermal consumption amongst the sub-sectors of the industry sector as they had done from 1999 to 2006 and instead reported all industry consumption under non-specified industry.

## 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 sector in BKB plants from 1989 to 1990. Patent fuel data from 2007 is confidential.

**Combustible Renewables and Waste:** Data on solid biomass and biogas are available from 1990.

**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 heavy fuel oil. There is a break in series between 2006 and 2007 for white spirit, lubricants, bitumen and paraffin waxes due to a new methodology being applied to sectoral demand by Sustainable Energy Ireland (SEI).

**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. Consumption in the chemical industry fell in 2003, due to

the shutdown of a fertilizer plant. The high consumption in food, beverages and tobacco in 2003 is due to a new methodology. A more detailed breakdown of industry sub-sectors in 2006 is due to a new survey.

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

Direct use of geothermal and solar thermal heat is available from 1989 and 1990 respectively.

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.

## Italy

**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. From 2000 onwards, the Italian Administration defines electricity production from autoproducers as including generation from producers consuming more than 70% of their own production.

**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 the commercial/public services sector.

**Gas:** The production of gas works gas from natural gas ceased in 1996.

**Electricity and Heat:** Prior to 2004 electricity production from orimulsion is confidential and is included with residual fuel oil. From 2000 onwards, the Italian Administration defines electricity production from autoproducers as including generation from producers

consuming more than 70% of their own production. However, for the 2000 to 2002 period, all electricity production from autoproducers is reported with main activity producers. The production of electricity reported in the category *other fuel sources* refers to electricity produced from the regasification of LNG or heat recovered from industrial processes. From 2000 onwards, electricity generation from synthetic gas produced in the oil tar gasification process is included under generation from oil products. Heat production is reported starting in 2004.

*Other energy sector* includes electricity consumption for blast furnaces; prior to 1989 consumption for uranium extraction was also included.

## Japan

For four consecutive years, the IEA received revisions from the Japanese Administration. The first set of revisions received in 2004 increased the 1990 supply by 5% for coal, 2% for natural gas and 0.7% for oil compared to the previous data. This led to an increase of 2.5% in 1990 CO<sub>2</sub> emissions calculated using the Reference Approach while the Sectoral Approach remained fairly constant. For the 2006 edition, the IEA received revisions to the coal and oil data which had a significant impact on both the energy data and the CO<sub>2</sub> emissions. The most significant revisions occurred for coke oven coke, naphtha, blast furnace gas and petroleum coke. These revisions affected consumption rather than supply in the years concerned. As a result, the Sectoral Approach CO<sub>2</sub> emissions increased for all the years, however at different rates. For example, the Sectoral Approach CO<sub>2</sub> emissions for 1990 were 4.6% higher than those calculated for the 2005 edition while the 2003 emissions were 1.1% higher than those of the previous edition. Due to the impact these successive revisions have had on the final energy balance as well as on CO<sub>2</sub> 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 sectors) were submitted for the 2007 edition.

Starting in 1990, data are reported on a fiscal year basis (e.g. April 2006 to March 2007 for 2006).

**Coal:** The inputs of coke oven coke to blast furnaces as well as the final consumption of coke oven coke in the iron and steel sector 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 the industry sector. In the 2009 edition, the net calorific values for coal for 1990 onwards have been recalculated by the IEA Secretariat based upon gross values submitted by Japan and default values used by the IEA. Statistical differences in hard coal since 2004 are primarily due to a stock build by final consumers.

**Combustible Renewables and Waste:** Inputs to charcoal production are estimated by the IEA Secretariat assuming an efficiency of 40%. For the 2009 edition, the Japanese Administration revised the time series for landfill gas and reported amounts that were blended with natural gas in the transformation sector from 1990 to 1998.

**Oil:** Orimulsion imports for electricity generation begin in 1991.

**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 Japanese Administration estimated the production of electricity from solar photovoltaic from 1998 to 2004 due to the suspension of national surveys, which restarted in 2005, thus causing a break in the time series between 2004 and 2005. Prior to 1998, the electricity produced using TRT technology (Top pressure Recovery Turbines) was included with electricity generated from wood, wood waste and other solid waste. Starting in 1998, it is included with electricity generated from coal gases.

## Korea

Data are available starting in 1971. Data for 2002 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). Data on sub-bituminous coal were estimated by the IEA Secretariat based on statistics of the exporting countries. Consumption of imported coke oven coke is reported under non-specified industry. Consumption of manufactured gases in the iron and steel industry after 2002 includes the consumption in blast furnaces, oxygen steel furnaces and other iron and steel processing plants. Coke oven gas and blast furnace gas used for energy purposes in coke ovens prior to 2002 and 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.

**Combustible Renewables 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 cause a break in the time series between 2006 and 2007.

**Oil:** Inputs of residual fuel oil and naphtha to autoproducer electricity and autoproducer CHP are included with end-use consumption.

**Gas:** Prior to 2007, consumption of natural gas in machinery was included with transport equipment.

**Electricity and Heat:** Electricity statistics from 1971 to 1993 have been estimated by the 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 2001, the Korean Administration started to report heat statistics for

some heat plants which were not reported before. This can lead to breaks in series between 2000 and 2001 and between 2001 and 2002. Electricity and heat production by autoproducers using natural gas and liquid fuels were reported for the first time in 2002. Heat from chemical processes used for electricity production is available from 2005. Electricity generation reported under other sources is from fuel cells.

Prior to 2007, production and consumption of electricity and heat in petroleum refineries and LNG liquefaction/regasification plants are included in the industry sector.

## Luxembourg

**Coal:** Steel production from blast furnaces ceased at the end of 1997. As a consequence, Luxembourg no longer uses coke oven coke and blast furnace gas.

**Combustible Renewables and Waste:** Data on solid biomass are available from 1992.

**Gas:** Residential sector consumption includes consumption in commercial and agriculture. The large increase of gas consumption in the transformation sector from 2002 onwards is due to a new 350-MW combined cycle power plant.

**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 and heat production from natural gas for autoproducer CHP plants are available starting in 1995. Electricity and heat production from biogas are available from 1999. Data for solar thermal are available starting in 1999. The increase in electricity production in 2002 is due to a new natural gas combined cycle power plant.

The iron and steel industry stopped production of electricity at the end of 1997.

## 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:** Data for coke oven gas and blast furnace gas are reported for the first time in 1999.

**Combustible Renewables and Waste:** Data on biogas are available from 1998.

**Oil:** Prior to 1987, the split of LPG consumption between the residential and commercial/public services sectors has been estimated by the IEA Secretariat. Inputs of oil for autoproducer electricity and heat generation have been included in industry. Because of a change in the processing of the data, breaks in series occur between 1998 and 1999.

**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. Distribution losses have been included in oil and gas extraction. Beginning with 1993, data have been submitted by the "Secretaría de Energía".

**Electricity and Heat:** Electricity production from wind and solar photovoltaic is available from 1990. Electricity production from combustible renewables and waste is available from 1998. Starting in 1998, the CRE (Comisión Reguladora de Energía) has published new data for electricity generation by autoproducers. This may lead to breaks in the time series between 1997 and 1998. New autoproducer electricity plants fuelled with coal gases were put on-line in 1999.

Direct use of solar thermal is available from 1998.

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

## Netherlands

In the national statistical system of the Netherlands, use of fuel in manufacturing industries for CHP production is considered to be consumption in the transformation sector. 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:** Paper, pulp and print includes furniture. The breakdown of anthracite, coking coal and other bituminous coal has been provided on a preliminary basis and data will be revised.

**Combustible Renewables 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. For 2006 and 2007, the Dutch Administration only reported consumption of biogasoline; the IEA Secretariat has estimated the production and import data as equal shares. Biodiesel import data are net imports which include exports and stock changes.

**Oil:** Refinery gas includes chemical gas and is included in chemical industry consumption. Refinery gas inputs to main activity producer CHP plants begin in 1995. Motor gasoline includes other light oils. Some breaks in series occur in 2007 when the Dutch Administration has started to report the petrochemical industry according to IEA methodology.

**Gas:** From 2003 onwards, an improved method to allocate unsold steam from autoproducer CHP has been used; data are therefore not comparable with the earlier years. All heat plants were converted to CHP plants in 1990. Consumption in the commercial/public services sector includes consumption from *other sectors* starting in 1988.

**Electricity and Heat:** Electricity from *other sources* includes power from chemical waste gases and heat bought from other industries. 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 combustible renewables 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. In the 2007 edition, the Dutch Administration implemented a reporting methodology which causes some breaks between 2004 and 2005. Prior to 2005, all electricity and heat produced from coal, oil and natural gas are included in CHP plants.

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

## New Zealand

Where data refer to the fiscal year, April 1994 to March 1995 is shown as 1994.

**Coal:** Peat, although produced in New Zealand, is not used as a fuel. It is used for agricultural purposes only. In final consumption, non-ferrous metals is included with iron and steel; wood and wood products

is included with pulp, paper and print; mining and quarrying is included in agriculture, and construction is included with commercial/public services. Sub-bituminous coal inputs into blast furnaces refers to coal that is merged with iron sand to form the inputs for the multi-hearth-furnace (Glenbrook Steel Site).

**Combustible Renewables and Waste:** Data prior to 1993 are for the fiscal year. In 1999, a reclassification of autoproducer plants leads to breaks in the time series.

**Oil:** Gas/diesel oil consumption in the road sector includes use by railways. 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 heavy fuel oil until 1997. As of 1998, light fuel oil is included in gas/diesel oil.

**Gas:** Main aggregates in transformation, energy, transport, industry and *other sectors* are estimated by the National Administration. 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.

**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 1995. The New Zealand Administration updated efficiencies for electricity production from geothermal heat from 10% to 15% in 2000; this causes a break in the time series between 1999 and 2000. Heat from chemical processes used for electricity production is available from 2004 and corresponds to acid plants in the fertiliser industry where sulphur is the main input.

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

For electricity, distribution losses include the statistical difference. Electricity consumption in paper, pulp and printing is included in wood and wood products prior to 1991. There are breaks in series between 1996 and 1997 for electricity consumption due to a new NZ Standard Industrial Classification (NZSIC). Blast furnace gas inputs to autoproducer CHP plants refers to manufactured gases coming from multi-hearth-furnaces using iron sand during the steel making process.

## 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.

**Combustible Renewables and Waste:** Data for industrial waste and biogas are available from 1991. Data for biodiesel are confidential until 2005. Only biodiesel imports are available starting in 2006.

**Oil:** The IEA Secretariat calculates the net calorific value for Norwegian crude oil based on the petroleum product outputs of the oil refineries. Since 1986, imports of refinery feedstocks are reported under the relevant petroleum product imports. Due to revisions from the Norwegian Administration, there are breaks in series between 1989 and 1990. 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 prior to 2000.

**Gas:** The large increase in the oil and gas extraction sector in 1992 results from the start up of new fields. Before 2000, in the energy sector, the oil and gas extraction data included data normally included under total final consumption. From 2002 onwards, domestic navigation is included under non-specified transport. 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.

**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. However, electricity production from wind is available from 1992. Heat production from biogas 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 waste heat is shown separately from 1990.

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. Heat produced by autoproducer heat plants from chemical processes and from other sources and used for electricity production was estimated by the IEA Secretariat for the period 1990 to 2006.

## Poland

**Combustible Renewables and Waste:** Data for industrial waste include gaseous industrial waste. Data for biogas refer only to the gas from fermentation of biomass. Due to data availability, there is a large increase in solid biomass between 1992 and 1993. Some changes in the data collection process lead to breaks between 1996 and 1997. 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.

**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.

**Gas:** The inputs of gas in the transformation sector have been inferred by the Polish Administration and for some years may be out of line with historical data. Gas used in oil refineries includes natural gas used for hydrogen manufacture in catalytic reforming processes. Prior to 2000, natural gas used in pipeline transport was partly included in energy sector (gas works). The increase in non-specified transport in 2007 is due to increased use of gas-powered sea vessels.

**Electricity and Heat:** 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.

Direct use of geothermal becomes available in 2000 and direct use of solar thermal in 2002.

Heat consumption in the energy sector includes process heat not sold before 1995.

## Portugal

**Coal:** Since 1998, sub-bituminous coal is not used. As of 2000, gas works gas in the commercial/public services and residential sectors is gradually being replaced by natural gas. The iron and steel industry closed 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.

**Combustible Renewables and Waste:** Data are available from 1994 for biogas, from 1999 for municipal waste and from 2003 for industrial waste. Solid biomass consumption in the residential sector includes the non-commercial part of solid biomass consumed in households. Data for solid biomass were revised by the National Administration from 1990 to 2001, which may result in breaks in series between 1989 and 1990.

**Oil:** As of 1995, there is no longer any production and consumption of refinery gas. Consumption of gas/diesel oil in industry and commercial/public services represents diesel use in the mobile fleets of these sectors.

**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.

**Electricity and Heat:** To conform to IEA methodology, heat produced from combustible renewables 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 biomass 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 and geothermal heat is available from 1989 and 1994 respectively.

## 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.

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

**Oil:** Kerosene type jet fuel includes other kerosene from 2001 onwards. International aviation 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.

**Gas:** Consumption in *other transformation* between 1994 and 2004 is mainly natural gas used as a feedstock in refineries to make LPG.

**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.

Direct use of geothermal is available from 2001.

## Spain

**Coal:** Other bituminous coal use in the iron and steel industry ceased in 1991 and started again in 1996. Consumption of BKB also ended in 1991. Consumption of blast furnace gas in the chemical industry stopped in 1993 while chemical industry use of coke oven gas ceased between 1993 and 2000. Natural gas inputs into gas works gas stopped in 1999.

**Combustible Renewables 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 are reclassified from main activity producer to autoproducer or vice versa. Prior to 2006, inputs of biogas used to generate process heat were erroneously included as inputs to the transformation sector when they should have been reported in the appropriate industry in final consumption.

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

**Gas:** The increase of natural gas used as feedstock starting in 1988 reflects a substitution of naphtha for the production of fertilisers. 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 in 1997. From 2001 onwards, the end-use consumption breakdown is estimated by the National Administration. The consumption data for 2006 and 2007 have been estimated on a different basis, thus causing breaks in the energy sector and in final consumption.

**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. Electricity output from sub-bituminous coal has been included with lignite prior to 1999. Electricity from solar thermal plants is available from 2007. The time series for heat consumption and heat production in autoproducer plants that were included in previous editions have been removed in the 2009 edition because the Spanish Administration has indicated that all the heat generated was for self-use.

Direct use of solar thermal and geothermal 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 end-use sectors and not in the transformation sector.

**Combustible Renewables and Waste:** Data for biogas begin in 1992. Heat production from solid biomass in autoproducer CHP includes waste heat and chemical heat. Prior to 2007, 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.

**Oil:** Beginning in 1995, Sweden has changed its standard classification of industry sub-sectors. Data are available from 2000 for additives, from 2001 for ethane and from 2003 for refinery gas.

**Gas:** Prior to 1993, road transport is included in commercial/public services.

**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 the transformation sector rather than as electricity used in the energy sector. 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 biogas is included with solid biomass. Information on heat for sale produced in heat

pumps and electric boilers is available starting in 1992. Heat produced for sale by autoproducer heat plants is reported starting in 1992. However, the associated inputs are included in industry consumption. 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 sector*. There are breaks in series for heat consumption between 1991 and 1992.

## 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.

**Combustible Renewables and Waste:** The autoproducer heat plant that produced heat for sale using municipal waste was closed in 2006.

**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.

**Gas:** The breakdown of the sub-sectors in industry was estimated by the IEA Secretariat for 2000 and by the National Administration for 2001 to 2007.

**Electricity and Heat:** Heat production is overstated because a part of the production corresponds to heat produced and used by the consumer. Heat production includes heat produced by nuclear power stations and distributed to other consumers. Solar electricity production by autoproducers is available from 1990. Electricity production from wind and pumped storage by autoproducers is available from 1996.

Direct use of geothermal 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.

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

## 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 the industry and residential sectors 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.

**Combustible Renewables 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 combustible renewables and waste series.

**Gas:** Data for commercial/public services were included in the residential sector prior to 2001. 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.

**Electricity and Heat:** Data on electricity generated from combustible renewables and waste are available from 1991. 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 provided 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 sector includes that of the paper, pulp and printing industry.

## United Kingdom

**Coal:** Consumption shown for the commercial/public services sector includes consumption of some of the non-specified sector. Prior to 1994, the consumption of substitute natural gas is included with natural gas while its production is included with gas works gas. Due to reclassifications, there are breaks in the series between 1998 and 1999 and between 2000 and 2001 for blast furnace gas.

**Combustible Renewables 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.

**Oil:** Prior to 1995, the product breakdown for transfers is estimated by the U.K. Administration. Beginning with 1995, the U.K. 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. Heavy fuel oil inputs to heat production are available starting in 2000.

**Gas:** From 1992 onwards, distribution losses include metering differences and losses due to pipeline leakage. The consumption of natural gas in the commercial sector is included with non-specified *other sectors* while the public services sector is shown separately. Natural gas consumption includes substitute natural gas made at gas works and piped into the natural gas distribution system. Data in the non-specified industry sub-sector 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.

**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 main activity producer electricity plants. 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 is available from 1999. Heat output is available starting in 1999.

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 the residential sector.

## United States

Due to problems in reporting, there are numerous breaks in series for the U.S. 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.

**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. Since the Energy Information Administration (EIA) and the U.S. 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.

**Combustible Renewables and Waste:** The EIA collects generation and consumption data from all plants 1 MW or more in capacity. The EIA acknowledges that exports of biodiesel do exist, however reporting procedures are not yet in place to collect such statistics.

**Oil:** International marine bunkers of heavy fuel oil show a large increase in 1990 due to a change in the data collection and reporting methodology of the U.S. 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 U.S. 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 U.S. 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, LPG inputs to gas works are included in the industry sector. As a result of the new Manufacturing Energy Consumption Survey (MECS), there are breaks in series between 1999 and 2000 for the industry sector, and again between 2000 and 2001 as the MECS percentages were revised due to revisions in electric cogeneration. There were significant revisions to residual fuel oil and unfinished oils for 2001 data. Primarily, the changes are a result of importers misclassifying unfinished oils as residual fuel oil. For 2002 to 2004, the IEA Secretariat has estimated the amounts of refinery gas for electricity production, which includes gases with a low average calorific value.

**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.

**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 U.S. 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. Historical revisions are pending. Electricity generation reported under other sources is from purchased steam. For 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, 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 percent in main activity producer CHP plants.

Data for electricity absorbed by pumping and electricity production from pumped storage plants became available starting in 1987. The consumption of heat sold in the industry sector is available from 1991 and in the energy sector from 1992. Prior to 1991, total consumption of heat sold referred to consumption in the commercial/public services sector. No data are

available for heat sold that is consumed in the residential and agriculture sectors.

Direct use of solar thermal 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. Solar PV electricity production is reported only for grid-connected installations.

## 6. ABBREVIATIONS

Btu:	British thermal unit
GWh:	gigawatt hour
kcal:	kilocalorie
kg:	kilogramme
kJ:	kilojoule
kt:	kilotonne
Mt:	million tonnes
m <sup>3</sup> :	cubic metre
t:	metric ton = tonne = 1000 kg
TJ:	terajoule
toe:	tonne of oil equivalent = 10 <sup>7</sup> 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