WORLD ENERGY BALANCES
FEBRUARY 2020 EDITION
(SELECTED ECONOMIES)

DATABASE DOCUMENTATION
In an effort to provide users with more timely information, with the February 2020 edition of the World Energy Balances database the IEA is releasing balances for those selected economies of the OECD and beyond for which data up to 2018 have been already received and validated.

This document provides information on the February 2020 edition of the IEA World Energy Balances database (selected economies). Further 2020 editions are expected to include a progressively broader coverage: the April 2020 edition will cover the full set of OECD plus other selected emerging economies; the August edition will cover the global set of data.

Please address your inquiries to balances@iea.org.

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1. CHANGES FROM LAST EDITION

In an effort to enhance timeliness of data, the IEA is pleased to include full coverage of selected OECD and emerging economies in this early release. The countries included are:

OECD: Austria, Belgium, France, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Slovenia, United Kingdom and United States

Non-OECD: Algeria, Belarus, Brazil, Bulgaria, Croatia, Cyprus, Ecuador, Guatemala, Indonesia, Montenegro, Romania, Serbia, Tunisia, Uruguay

Flows

A new industry sector aggregate (“Manufacturing”) has been added. To accommodate this change, the industry sub-sectors have been reordered.

The aggregated flow ‘Other’ is removed from the database. The sub-sectors previously aggregated to form it, namely “Residential”, “Commercial and public services”, “Agriculture/forestry”, “Fishing”, “Non-specified (other)”, are still shown separately in the database. The flow “Non-specified (other)” is renamed as “Final Consumption not elsewhere specified”

In accordance with the OECD National Accounts Statistics database, the base year for the constant GDP and GDP PPP timeseries was changed from 2010 to 2015

<table>
<thead>
<tr>
<th>Old longname</th>
<th>New longname</th>
<th>Shortname</th>
<th>Old shortname (if changed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturing</td>
<td>MANUFACT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>TOTOTHER</td>
<td></td>
</tr>
<tr>
<td>Non-specified (other)</td>
<td>Final Consumption not elsewhere specified</td>
<td>ONONSPEC</td>
<td></td>
</tr>
<tr>
<td>GDP (billion 2010 USD using exchange rates)</td>
<td>GDP (billion USD 2015 prices and ex rates)</td>
<td>GDP</td>
<td></td>
</tr>
<tr>
<td>GDP (billion)</td>
<td>GDP (billion USD 2015 prices and PPPs)</td>
<td>GDPPPP</td>
<td></td>
</tr>
<tr>
<td>2010 USD using PPPs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. DATABASE STRUCTURE

This release of the database *World Energy Balances* includes annual data for selected economies and contains the following:

- **countries:** 28 countries (see section 5: Geographical coverage);
- **years:** 1960-2018, unless otherwise specified.

The database includes the following four files:

**EARLYBAL.IVT**  **Summary energy balances**

Energy balances in matrix form (19 product categories; 62 flows) (ktoe; TJ);
Electricity and heat output by type of producer (10 flows) (GWh; TJ/ktoe).

**EARLYBIG.IVT**  **Extended energy balances**

Energy balances in matrix form (67 products and 83 flows) (ktoe; TJ);
Electricity and heat output by type of producer (10 flows) (GWh; TJ/ktoe).

**EARLYIND.IVT**  **Indicators**

48 energy, economic and coupled indicators (various units).

**EARLYCONV.IVT**  **Conversion factors of OECD countries:**

- net calorific values by flow for 15 coal, peat, oil shale products (toe/t; kJ/kg);
- average net calorific values for 23 oil products and 4 biofuel products (toe/t; kJ/kg);
- volume to mass ratio for 22 oil products and 3 biofuel products (barrels/tonne).
3. FLOW DEFINITIONS

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>INDPROD</td>
<td>Comprises the production of primary energy, i.e. hard coal, lignite, peat, crude oil, NGLs, natural gas, biofuels and waste, nuclear, hydro, geothermal, solar and the heat from heat pumps that is extracted from the ambient environment. Production is calculated after removal of impurities (e.g. sulphur from natural gas). Calculation of production of hydro, geothermal, etc. and nuclear electricity is explained in the section 8 Units and Conversions.</td>
</tr>
</tbody>
</table>
| Imports      | IMPORTS    | Comprise amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place.  
For coal: Imports comprise the amount of fuels obtained from other countries, whether or not there is an economic or customs union between the relevant countries. Coal in transit should not be included.  
For oil and natural gas: Quantities of crude oil and oil products imported under processing agreements (i.e. refining on account) are included. Quantities of oil in transit are excluded. Crude oil, NGL and natural gas are reported as coming from the country of origin; refinery feedstocks and oil products are reported as coming from the country of last consignment.  
For electricity: Amounts are considered as imported when they have crossed the national territorial boundaries of the country. If electricity is “wheeled” or transited through a country, the amount is shown as both an import and an export. |
### Supply

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports</td>
<td>EXPORTS</td>
<td>Comprise amounts having crossed the national territorial boundaries of the country whether or not customs clearance has taken place. For coal: Exports comprise the amount of fuels supplied to other countries, whether or not there is an economic or customs union between the relevant countries. Coal in transit should not be included. For oil and natural gas: Quantities of crude oil and oil products exported under processing agreements (i.e. refining on account) are included. Re-exports of oil imported for processing within bonded areas are shown as an export of product from the processing country to the final destination. For electricity: Amounts are considered as exported when they have crossed the national territorial boundaries of the country. If electricity is “wheeled” or transited through a country, the amount is shown as both an import and an export.</td>
</tr>
<tr>
<td>International marine bunkers</td>
<td>MARBUNK</td>
<td>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 domestic navigation, fishing and non-specified (other).</td>
</tr>
<tr>
<td>International aviation bunkers</td>
<td>AVBUNK</td>
<td>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.</td>
</tr>
<tr>
<td>Stock changes</td>
<td>STOCKCHA</td>
<td>Reflects the difference between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers, energy transformation industries and large consumers. A stock build is shown as a negative number, and a stock draw as a positive number.</td>
</tr>
<tr>
<td>Total primary energy supply</td>
<td>TPES</td>
<td>Total primary energy supply (TPES) is made up of production + imports - exports - international marine bunkers - international aviation bunkers ± stock changes. Note, exports, bunkers and stock changes incorporate the algebraic sign directly in the number.</td>
</tr>
<tr>
<td>Flow</td>
<td>Short name</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Transfers</td>
<td>TRANSFER</td>
<td>Comprises interproduct transfers, products transferred and recycled products. Interproduct transfers results from reclassification of products either because their specification has changed or because they are blended into another product, e.g. kerosene may be reclassified as gasoil after blending with the latter in order to meet its winter diesel specification. The net balance of interproduct transfers is zero. Products transferred is intended for oil products imported for further processing in refineries. For example, fuel oil imported for upgrading in a refinery is transferred to the feedstocks category. Recycled products are finished products which pass a second time through the marketing network, after having been once delivered to final consumers (e.g. used lubricants which are reprocessed).</td>
</tr>
<tr>
<td>Statistical differences</td>
<td>STATDIFF</td>
<td>Includes the sum of the unexplained statistical differences for individual fuels, as they appear in the basic energy statistics. It also includes the statistical differences that arise because of the variety of conversion factors in the coal and oil columns.</td>
</tr>
</tbody>
</table>
### Transformation processes

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformation processes</td>
<td>TOTTRANF</td>
<td>Transformation processes comprise the conversion of primary forms of energy to secondary and further transformation (e.g. coking coal to coke, crude oil to oil products, and fuel oil to electricity). Inputs to transformation processes are shown as negative numbers and output from the process is shown as a positive number. Transformation losses will appear in the “total” column as negative numbers.</td>
</tr>
<tr>
<td>Main activity producer electricity plants</td>
<td>MAINELEC</td>
<td>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 cannot be distinguished on a unit basis) then the whole plant is designated as a CHP plant. Main activity producers generate electricity for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.</td>
</tr>
<tr>
<td>Autoproducer electricity plants</td>
<td>AUTOELEC</td>
<td>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 cannot 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.</td>
</tr>
<tr>
<td>Main activity producer CHP plants</td>
<td>MAINCHP</td>
<td>Refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations). If possible, fuel inputs and electricity/heat outputs are on a unit basis rather than on a plant basis. However, if data are not available on a unit basis, the convention for defining a CHP plant noted above should be adopted. Main activity producers generate electricity and/or heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.</td>
</tr>
<tr>
<td>Autoproducer CHP plants</td>
<td>AUTOCHP</td>
<td>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.</td>
</tr>
<tr>
<td>Flow</td>
<td>Short name</td>
<td>Definition</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Main activity producer heat plants</td>
<td>MAINHEAT</td>
<td>Refers to plants (including heat pumps and electric boilers) designed to produce heat only and who sell heat to a third party (e.g. residential, commercial or industrial consumers) under the provisions of a contract. Main activity producers generate heat for sale to third parties, as their primary activity. They may be privately or publicly owned. Note that the sale need not take place through the public grid.</td>
</tr>
<tr>
<td>Autoproducer heat plants</td>
<td>AUTOHEAT</td>
<td>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.</td>
</tr>
<tr>
<td>Heat pumps</td>
<td>THEAT</td>
<td>Includes heat produced by heat pumps in transformation. Heat pumps that are operated within the residential sector where the heat is not sold are not considered a transformation process and are not included here – the electricity consumption would appear as residential use.</td>
</tr>
<tr>
<td>Electric boilers</td>
<td>TBOILER</td>
<td>Includes electric boilers used to produce heat.</td>
</tr>
<tr>
<td>Chemical heat for electricity production</td>
<td>TELE</td>
<td>Includes heat from chemical processes that is used to generate electricity.</td>
</tr>
<tr>
<td>Blast furnaces</td>
<td>TBLASTFUR</td>
<td>Includes the production of recovered gases (e.g. blast furnace gas and oxygen steel furnace gas). The production of pig-iron from iron ore in blast furnaces uses fuels for supporting the blast furnace charge and providing heat and carbon for the reduction of the iron ore. Accounting for the calorific content of the fuels entering the process is a complex matter as transformation (into blast furnace gas) and consumption (heat of combustion) occur simultaneously. Some carbon is also retained in the pig-iron; almost all of this reappears later in the oxygen steel furnace gas (or converter gas) when the pig-iron is converted to steel. In the 1992/1993 annual questionnaires, Member Countries were asked for the first time to report in transformation processes the quantities of all fuels (e.g. pulverised coal injection [PCI] coal, coke oven coke, natural gas and oil) entering blast furnaces and the quantity of blast furnace gas and oxygen steel furnace gas produced. The Secretariat then needed to split these inputs into the transformation and consumption components. The transformation component is shown in the row blast furnaces in the column appropriate for the fuel, and the consumption component is shown in the row iron and steel, in the column appropriate for the fuel. The Secretariat decided to assume a transformation efficiency such that the carbon input into the blast furnaces should equal the carbon output. This is roughly equivalent to assuming an energy transformation efficiency of 40%.</td>
</tr>
<tr>
<td>Gas works</td>
<td>TGASWKS</td>
<td>Includes the manufacture of town gas. Note: in the summary balances this item also includes other gases blended with natural gas (TBLENDGAS).</td>
</tr>
<tr>
<td>Coke ovens</td>
<td>TCOKEOVS</td>
<td>Includes the manufacture of coke and coke oven gas.</td>
</tr>
<tr>
<td>Transformation processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flow</strong></td>
<td><strong>Short name</strong></td>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>Patent fuel plants</td>
<td>TPATFUEL</td>
<td>Includes the manufacture of patent fuels.</td>
</tr>
<tr>
<td>BKB/peat briquette</td>
<td>TBKB</td>
<td>Includes the manufacture of BKB and peat briquettes.</td>
</tr>
<tr>
<td>plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil refineries</td>
<td>TREFINER</td>
<td>Includes the manufacture of finished oil products.</td>
</tr>
<tr>
<td>Petrochemical plants</td>
<td>TPETCHEM</td>
<td>Covers backflows returned from the petrochemical industry. Note that backflows from oil products that are used for non-energy purposes (i.e. white spirit and lubricants) are not included here, but in non-energy use.</td>
</tr>
<tr>
<td>Coal liquefaction</td>
<td>TCOALLIQ</td>
<td>Includes coal, oil and tar sands used to produce synthetic oil.</td>
</tr>
<tr>
<td>plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas-to-liquids</td>
<td>TGTL</td>
<td>Includes natural gas used as feedstock for the conversion to liquids, e.g. the quantities of fuel entering the methanol production process for transformation into methanol.</td>
</tr>
<tr>
<td>(GTL) plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For blended natural</td>
<td>TBLENDGAS</td>
<td>Includes other gases that are blended with natural gas.</td>
</tr>
<tr>
<td>gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charcoal production</td>
<td>TCHARCOAL</td>
<td>Includes the transformation of solid biofuels into charcoal.</td>
</tr>
<tr>
<td>plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-specified</td>
<td>TNONSPEC</td>
<td>Includes other non-specified transformation.</td>
</tr>
<tr>
<td>(transformation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Flows used in the summary balances**

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

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-specified (energy)</td>
<td>ENONSPEC</td>
<td>Represents use in non-specified energy sector.</td>
</tr>
<tr>
<td>Losses</td>
<td>DISTLOSS</td>
<td>Losses in energy distribution, transmission and transport.</td>
</tr>
</tbody>
</table>

### Flow used in the summary balances

| Energy industry own use      | OWNUSE     | Is equal to the sum of EMINES, EOILGASEX, EBLASTFUR, EGASWKS, EBIOGAS, ECOKEOVS, EPATFUEL, EBKB, EREFINER, ECOALLIQ, ELNG, EGTL, EPOWERPLT, EPUMPST, ENUC, ECHARCOAL, ENONSPEC and DISTLOSS. |
## Final consumption

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total final consumption</td>
<td>TFC</td>
<td>Equal to the sum of the consumption in the end-use sectors and non-energy uses. Energy used for transformation processes and for own use of the energy producing industries is excluded. Final consumption reflects for the most part deliveries to consumers (see note on stock changes). Backflows from the petrochemical industry are not included in final consumption (see from other sources under supply and petrochemical plants in transformation). Starting with the 2009 edition, international aviation bunkers is no longer included in final consumption at the country level.</td>
</tr>
<tr>
<td>Industry</td>
<td>TOTIND</td>
<td>Industry consumption is specified by sub-sector as listed below: (Note - energy used for transport by industry is not included here but is reported under transport. Non-energy use in industry is not included here but reported separately.)</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>MINING</td>
<td>[ISIC Rev. 4 Divisions 07 and 08 and Group 099] Mining (excluding fuels) and quarrying.</td>
</tr>
<tr>
<td>Construction</td>
<td>CONSTRUC</td>
<td>[ISIC Rev. 4 Divisions 41 to 43]</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>MANUFACT</td>
<td>Manufacturing refers to the sum of the following industrial sub-sectors: • Iron and Steel • Chemical and petrochemical • Non-ferrous metals • Non-metallic minerals • Transport equipment • Machinery • Food and tobacco • Paper, pulp and printing • Wood and wood products • Textile and leather • Not elsewhere specified (industry) Definitions of the sub-sectors can be found under the listing for each respective sub-sector below.</td>
</tr>
<tr>
<td>Iron and steel</td>
<td>IRONSTL</td>
<td>[ISIC Rev. 4 Group 241 and Class 2431]</td>
</tr>
<tr>
<td>Chemical and petrochemical</td>
<td>CHEMICAL</td>
<td>[ISIC Rev. 4 Divisions 20 and 21] Excluding petrochemical feedstocks.</td>
</tr>
<tr>
<td>Non-ferrous metals</td>
<td>NONFERR</td>
<td>[ISIC Rev. 4 Group 242 and Class 2432] Basic industries.</td>
</tr>
<tr>
<td>Non-metallic minerals</td>
<td>NONMET</td>
<td>[ISIC Rev. 4 Division 23] Such as glass, ceramic, cement, etc.</td>
</tr>
<tr>
<td>Transport equipment</td>
<td>TRANSEQ</td>
<td>[ISIC Rev. 4 Divisions 29 and 30]</td>
</tr>
<tr>
<td>Machinery</td>
<td>MACHINE</td>
<td>[ISIC Rev. 4 Divisions 25 to 28] Fabricated metal products, machinery and equipment other than transport equipment.</td>
</tr>
<tr>
<td>Flow</td>
<td>Short name</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Food and tobacco</td>
<td>FOODPRO</td>
<td>[ISIC Rev. 4 Divisions 10 to 12]</td>
</tr>
<tr>
<td>Paper, pulp and print</td>
<td>PAPERPRO</td>
<td>[ISIC Rev. 4 Divisions 17 and 18]</td>
</tr>
<tr>
<td>Wood and wood products</td>
<td>WOODPRO</td>
<td>[ISIC Rev. 4 Division 16] Wood and wood products other than pulp and paper.</td>
</tr>
<tr>
<td>Textile and leather</td>
<td>TEXTILES</td>
<td>[ISIC Rev. 4 Divisions 13 to 15]</td>
</tr>
<tr>
<td>Non-specified (industry)</td>
<td>INONSPEC</td>
<td>[ISIC Rev. 4 Divisions 22, 31 and 32] Any manufacturing industry not included above. Note: Most countries have difficulties supplying an industrial breakdown for all fuels. In these cases, the non-specified (industry) row has been used. Regional aggregates of industrial consumption should therefore be used with caution.</td>
</tr>
<tr>
<td>Transport</td>
<td>TOTTRANS</td>
<td>Consumption in transport covers all transport activity (in mobile engines), excluding non-energy use, regardless of the economic sector to which it is contributing [ISIC Rev. 4 Divisions 49 to 51], and is specified as follows:</td>
</tr>
<tr>
<td>Domestic aviation</td>
<td>DOMESAIR</td>
<td>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;</td>
</tr>
<tr>
<td>Road</td>
<td>ROAD</td>
<td>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;</td>
</tr>
<tr>
<td>Rail</td>
<td>RAIL</td>
<td>Includes quantities used in rail traffic, including industrial railways;</td>
</tr>
<tr>
<td>Pipeline transport</td>
<td>PIPELINE</td>
<td>Includes energy used in the support and operation of pipelines transporting gases, liquids, slurries and other commodities, including the energy used for pump stations and maintenance of the pipeline. Energy for the pipeline distribution of natural gas or coal gases, hot water or steam (ISIC Rev. 4 Division 35) from the distributor to final users is excluded and should be reported in energy industry own use, while the energy used for the final distribution of water (ISIC Rev. 4 Division 36) to household, industrial, commercial and other users should be included in commercial/public services. Losses occurring during the transport between distributor and final users should be reported as losses;</td>
</tr>
<tr>
<td>Flow</td>
<td>Short name</td>
<td>Definition</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Domestic navigation</td>
<td>DOMESNAV</td>
<td>Includes fuels delivered to vessels of all flags not engaged in international navigation (see <em>international marine bunkers</em>). 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;</td>
</tr>
<tr>
<td>Non-specified (transport)</td>
<td>TRNONSPE</td>
<td>Includes all transport not elsewhere specified. Note: <em>International marine bunkers</em> and <em>international aviation bunkers</em> are shown in <em>Supply</em> and are not included in the transport sector as part of final consumption.</td>
</tr>
<tr>
<td>Other</td>
<td>TOTOTHER</td>
<td>Includes residential, commercial/public services, agriculture/forestry, fishing and non-specified (other). It excludes non-energy use.</td>
</tr>
<tr>
<td>Residential</td>
<td>RESIDENT</td>
<td>Includes consumption by households, excluding fuels used for transport. Includes households with employed persons [ISIC Rev. 4 Divisions 97 and 98] which is a small part of total residential consumption.</td>
</tr>
<tr>
<td>Commercial and public services</td>
<td>COMMPUB</td>
<td>[ISIC Rev. 4 Divisions 33, 36-39, 45-47, 52, 53, 55-56, 58-66, 68-75, 77-82, 84 (excluding Class 8422), 85-88, 90-96 and 99]</td>
</tr>
<tr>
<td>Agriculture/forestry</td>
<td>AGRICULT</td>
<td>Includes deliveries to users classified as agriculture, hunting and forestry by the ISIC, and therefore includes energy consumed by such users whether for traction (excluding agricultural highway use), power or heating (agricultural and domestic) [ISIC Rev. 4 Divisions 01 and 02].</td>
</tr>
<tr>
<td>Fishing</td>
<td>FISHING</td>
<td>Includes fuels used for inland, coastal and deep-sea fishing. Fishing covers fuels delivered to ships of all flags that have refuelled in the country (including international fishing) as well as energy used in the fishing industry [ISIC Rev. 4 Division 03].</td>
</tr>
<tr>
<td>Final Consumption not elsewhere specified</td>
<td>ONONSPEC</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Final consumption

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-energy use</td>
<td>NONENUSE</td>
<td>Non-energy use covers those fuels that are used as raw materials in the different sectors and are not consumed as a fuel or transformed into another fuel. Non-energy use is shown separately in final consumption under the heading non-energy use. Note that for biomass commodities, only the amounts specifically used for energy purposes (a small part of the total) are included in the energy statistics. Therefore, the non-energy use of biomass is not taken into consideration and the quantities are null by definition.</td>
</tr>
<tr>
<td>Non-energy use industry/ transformation/ energy</td>
<td>NEINTREN</td>
<td>Non-energy in industry, transformation processes and energy industry own use.</td>
</tr>
<tr>
<td>Memo: Non-energy use in industry</td>
<td>NEIND</td>
<td>Non-energy in industry (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in iron and steel</td>
<td>NEIRONSTL</td>
<td>Non-energy use in iron and steel (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use chemical/petrochemical</td>
<td>NECHEM</td>
<td>The petrochemical industry includes cracking and reforming processes for the purpose of producing ethylene, propylene, butylene, synthesis gas, aromatics, butadene and other hydrocarbon-based raw materials in processes such as steam cracking, aromatics plants and steam reforming [part of ISIC Rev. 4 Group 201].</td>
</tr>
<tr>
<td>Memo: Non-energy use in non-ferrous metals</td>
<td>NENONFERR</td>
<td>Non-energy use in non-ferrous metals (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in non-metallic minerals</td>
<td>NENONMET</td>
<td>Non-energy use in non-metallic minerals (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in transport equipment</td>
<td>NETRAINSEQ</td>
<td>Non-energy use in transport equipment (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in machinery</td>
<td>NEMACHINE</td>
<td>Non-energy use in machinery (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in mining and quarrying</td>
<td>NEMINING</td>
<td>Non-energy use in mining and quarrying (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in food/beverages/tobacco</td>
<td>NEFOODPRO</td>
<td>Non-energy use in food/beverages/tobacco (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in paper/pulp and printing</td>
<td>NEPAPERPRO</td>
<td>Non-energy use in paper/pulp and printing (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in wood and wood products</td>
<td>NEWOODPRO</td>
<td>Non-energy use in wood and wood products (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in construction</td>
<td>NECONSTRUC</td>
<td>Non-energy use in construction (please see above for more details on industry sub-sector definitions).</td>
</tr>
</tbody>
</table>
## Final consumption

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memo: Non-energy use in textiles and leather</td>
<td>NETEXTILES</td>
<td>Non-energy use in textiles and leather (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Memo: Non-energy use in non-specified industry</td>
<td>NEINONSPEC</td>
<td>Non-energy use in non-specified industry (please see above for more details on industry sub-sector definitions).</td>
</tr>
<tr>
<td>Non-energy use in transport</td>
<td>NETRANS</td>
<td>Non-energy use in transport.</td>
</tr>
<tr>
<td>Non-energy use in other</td>
<td>NEOTHER</td>
<td>Non-energy use in other sectors such as residential, commercial/public services, agriculture/forestry and fishing.</td>
</tr>
</tbody>
</table>

## Electricity output (GWh)

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity output (GWh)</td>
<td>ELOUTPUT</td>
<td>Shows the total number of GWh generated by power plants separated into electricity plants and CHP plants. Consistent with Energy Statistics, electricity production for hydro pumped storage is excluded within the Energy Balances.</td>
</tr>
<tr>
<td>Electricity output (GWh) -main activity producer electricity plants</td>
<td>ELMAINE</td>
<td></td>
</tr>
<tr>
<td>Electricity output (GWh) -autoproducer electricity plants</td>
<td>ELAUTOE</td>
<td></td>
</tr>
<tr>
<td>Electricity output (GWh) -main activity producer CHP plants</td>
<td>ELMAINC</td>
<td></td>
</tr>
<tr>
<td>Electricity output (GWh) -autoproducer CHP plants</td>
<td>ELAUTOC</td>
<td></td>
</tr>
</tbody>
</table>

## Heat output

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat output</td>
<td>HEATOUT</td>
<td>Shows the total heat generated by plants separated into CHP plants and heat plants.</td>
</tr>
<tr>
<td>Heat output-main activity producer CHP plants</td>
<td>HMAINC</td>
<td></td>
</tr>
<tr>
<td>Heat output-autoproducer CHP plants</td>
<td>HEAUTOC</td>
<td></td>
</tr>
<tr>
<td>Heat output-main activity producer heat plants</td>
<td>HEMAINH</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Heat output-autoproducer heat plants</td>
<td>HEAUTOH</td>
<td></td>
</tr>
</tbody>
</table>
## Conversion factors: calorific values and density

Expressed in **tonne of oil equivalent / tonne** and **kilojoules / kilogramme**; volume to mass in **barrels / tonne**

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average net calorific value</td>
<td>NAVERAGE</td>
<td>Represents the average gross energy content minus the latent heat of vaporisation of 1 unit of mass.</td>
</tr>
<tr>
<td>NCV of production</td>
<td>NINDPROD</td>
<td></td>
</tr>
<tr>
<td>NCV of imports</td>
<td>NIMPORTS</td>
<td></td>
</tr>
<tr>
<td>NCV of exports</td>
<td>NEXPORTS</td>
<td></td>
</tr>
<tr>
<td>NCV of coke ovens</td>
<td>NCOKEOVS</td>
<td></td>
</tr>
<tr>
<td>NCV of blast furnaces</td>
<td>NBLAST</td>
<td></td>
</tr>
<tr>
<td>NCV in main activity producer electricity plants</td>
<td>NMAIN</td>
<td></td>
</tr>
<tr>
<td>NCV in autoproducer electricity plants</td>
<td>NAUTOELEC</td>
<td></td>
</tr>
<tr>
<td>NCV in main activity CHP plants</td>
<td>NMAINCHP</td>
<td></td>
</tr>
<tr>
<td>NCV in autoproducer CHP plants</td>
<td>NAUTOCHP</td>
<td></td>
</tr>
<tr>
<td>NCV in main activity heat plants</td>
<td>NMAINHEAT</td>
<td></td>
</tr>
<tr>
<td>NCV in autoproducer heat plants</td>
<td>NAUTOHEAT</td>
<td></td>
</tr>
<tr>
<td>NCV in industry</td>
<td>NIND</td>
<td></td>
</tr>
<tr>
<td>NCV for other uses</td>
<td>NOTHER</td>
<td></td>
</tr>
<tr>
<td>Volume to mass ratio</td>
<td>BBLTONRATIO</td>
<td>This ratio (barrels/tonne) is the inverse of density</td>
</tr>
</tbody>
</table>
## Indicators

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total primary energy supply (TPES) (Mtoe)</td>
<td>TPES</td>
<td>Total primary energy supply, expressed in Mtoe.</td>
</tr>
<tr>
<td>Total final consumption (TFC) (Mtoe)</td>
<td>TFC</td>
<td>Total final consumption, expressed in Mtoe.</td>
</tr>
<tr>
<td>Population (millions)</td>
<td>POP</td>
<td><strong>For OECD Countries:</strong>&lt;br&gt;The main source of these series for 1970 to 2018 when available is the OECD <em>National Accounts Statistics</em> database [ISSN: 2221-433X (online)], last published in book format as <em>National Accounts of OECD Countries, Volume 2019 Issue 2: Detailed Tables</em>, OECD 2019. Data for 1960 to 1969 have been estimated using the growth rates from the population series published in the <em>OECD Factbook 2015</em> (online database version). Growth rates from the <em>OECD Factbook 2015</em> were also used to estimate data for Slovenia (prior to 1995). Data for Latvia (prior to 1995) and Lithuania (prior to 1995) are IEA Secretariat estimates based on GDP growth rates from the World Bank.&lt;br&gt;<strong>For non-OECD Countries:</strong>&lt;br&gt;The main source of the population data is <em>World Development Indicators</em>, The World Bank, Washington D.C., 2019. Population data for Cyprus are taken from the Eurostat online database.</td>
</tr>
</tbody>
</table>
### Indicators

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (billion 2015 USD using exchange rates)</td>
<td>GDP</td>
<td><strong>For OECD Countries:</strong>&lt;br&gt;The main source of these series for 1970 to 2018 is the OECD National Accounts Statistics database [ISSN: 2221-433X (online)], last published in book format as National Accounts of OECD Countries, Volume 2019 Issue2: Detailed Tables, OECD 2019. GDP data for France and the United Kingdom for 1960 to 1969 were taken from the same source. GDP data for 1960 to 1969 for the other countries have been estimated using the growth rates from the series in the OECD Economic Outlook No 98 and other data previously published by the OECD. Growth rates from these sources were also used to estimate data for Hungary (prior to 1991) and Poland (prior to 1990). &lt;br&gt;The GDP data have been compiled for all individual countries at market prices in 2015 US dollars.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>For non-OECD Countries:</strong>&lt;br&gt;The main source of the GDP data is World Development Indicators, The World Bank, Washington D.C., 2019. GDP figures for Bulgaria (1971-1979), Croatia (1990-1994), Cyprus (1971-1974), Romania (1971-1989) and Serbia (1990-1994) have been estimated based on the growth rates of the CHELEM-CEPII online database, Bureau van Dijk, 2019. The GDP data have been compiled for all individual countries at market prices in 2015 US dollars.</td>
</tr>
</tbody>
</table>
## Indicators

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (billion 2015 USD using PPPs)</td>
<td>GDPPPP</td>
<td><strong>For OECD Countries:</strong> Purchasing power parities are the rates of currency conversion that equalise the purchasing power of different currencies. A given sum of money, when converted into different currencies at the PPP rates, buys the same basket of goods and services in all countries. In other words, PPPs are the rates of currency conversion which eliminate the differences in price levels between different countries. The PPPs selected to convert the GDP from national currencies to US dollars were aggregated using the Éltető, Köves and Szulc (EKS) Eurostat-OECD method and rebased on the United States. For a more detailed description of the methodology please see <em>Eurostat-OECD Methodological Manual on Purchasing Power Parities, 2012 edition</em>, European Union / OECD 2012. See GDP using exchange rates for sources. Note that Data for Latvia (prior to 1995) and Lithuania (prior to 1995) are IEA secretariat estimates based on GDP growth rates from the World Bank or from data previously published by OECD. <strong>For non-OECD Countries:</strong> The main source of the GDP PPP data is <em>World Development Indicators</em>, The World Bank, Washington, D.C., 2019. However, this source is available for GDP PPP (constant 2011 US dollars scaled to the levels of 2015 using current PPP US dollars) only from 1990. Therefore, prior to 1990 GDP PPP data have been calculated based on the PPP conversion factor (GDP) to market exchange rate ratio. The GDP PPP data have been converted from GDP using purchasing power parity rates. These data have been scaled to the price levels of 2015. GDP PPP figure for Croatia (1900-1994), has been estimated using the ratio of GDP PPP and GDP data based on CHELEM-CEPII online database, Bureau van Dijk, 2019. The data have been scaled to the price levels of 2015. The GDP PPP reflect the changes to power purchasing parity rates based on the 2011 International Comparison Program (ICP), published in 2014. The ICP has worked for 6 years to better estimate the value of the PPP ‘basket of goods’ for all countries for which the World Bank calculates GDP PPP. For many countries, this value has significantly changed in comparison to previous ICP exercises. This leads to significant revisions to GDP PPP for many countries compared to previous publications.</td>
</tr>
<tr>
<td>Energy production (Mtoe)</td>
<td>INDPROD</td>
<td>Total primary energy production, expressed in Mtoe.</td>
</tr>
<tr>
<td>Net imports (Mtoe)</td>
<td>NETIMP</td>
<td>Imports minus exports for total energy, expressed in Mtoe.</td>
</tr>
</tbody>
</table>
### Indicators

<table>
<thead>
<tr>
<th>Flow</th>
<th>Short name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil supply (Mtoe)</td>
<td>OILTPES</td>
<td>Primary supply of oil, expressed in Mtoe.</td>
</tr>
<tr>
<td>Net oil imports (Mtoe)</td>
<td>OILIMP</td>
<td>Imports of oil minus exports of oil, expressed in Mtoe.</td>
</tr>
<tr>
<td>Electricity generation (TWh)</td>
<td>ELOOUTPUT</td>
<td>Shows the total amount of electricity generated by power plants separated into electricity plants and CHP plants, expressed in TWh.</td>
</tr>
<tr>
<td>Electricity consumption (TWh)</td>
<td>ELECONS</td>
<td>Domestic consumption, i.e. gross production + imports - exports - losses, expressed in TWh.</td>
</tr>
<tr>
<td>Total self-sufficiency</td>
<td>TOTSELF</td>
<td>Production divided by TPES expressed as a ratio.</td>
</tr>
<tr>
<td>Coal self-sufficiency</td>
<td>COALSELF</td>
<td>Production divided by TPES expressed as a ratio. Includes coal, peat and oil shale.</td>
</tr>
<tr>
<td>Oil self-sufficiency</td>
<td>OILSELF</td>
<td>Production divided by TPES expressed as a ratio.</td>
</tr>
<tr>
<td>Gas self-sufficiency</td>
<td>GASSELF</td>
<td>Production divided by TPES expressed as a ratio.</td>
</tr>
<tr>
<td>Share of fossil in TPES</td>
<td>FOSSILTPES</td>
<td>TPES of fossil fuels divided by total TPES expressed as a ratio. Fossil fuels include coal, oil and natural gas.</td>
</tr>
<tr>
<td>Share of fossil in electricity generation</td>
<td>FOSSILELE</td>
<td>Output of electricity produced based on fossil fuels divided by total output of electricity expressed as a ratio. Fossil fuels include coal, oil and natural gas.</td>
</tr>
<tr>
<td>Share of renewable sources in TPES</td>
<td>RENTPES</td>
<td>Renewable sources TPES divided by total TPES, expressed as a ratio. Renewable sources include hydro, geothermal, solar, wind, tide, wave, biofuels and the renewable fraction of municipal waste.</td>
</tr>
<tr>
<td>Share of renewable sources in electricity generation</td>
<td>RENEL</td>
<td>Output of electricity produced from renewable sources divided by total output of electricity, expressed as a ratio. Renewable sources include electricity from hydro, geothermal, solar, wind, tide, wave, biofuels and the renewable fraction of municipal waste.</td>
</tr>
<tr>
<td>TPES/population</td>
<td>TPESPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>TPES/GDP</td>
<td>TPESGDP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>TPES/GDP PPP</td>
<td>TPESGDPPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Oil supply/ population</td>
<td>OILSUPPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>Oil Supply/GDP</td>
<td>OILSUPGDGP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>Oil Supply/GDP PPP</td>
<td>OILSUPGDPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Net oil imports/GDP</td>
<td>OILIMPGDGP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>Net oil imports/GDP PPP</td>
<td>OILIMPGDPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Electricity consumption/ population</td>
<td>ELEPOP</td>
<td>Expressed as kWh per capita.</td>
</tr>
<tr>
<td>Flow</td>
<td>Short name</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Electricity consumption/GDP</td>
<td>ELEGDP</td>
<td>Expressed as kWh per 2015 USD.</td>
</tr>
<tr>
<td>Electricity consumption/GDP PPP</td>
<td>ELEGDPPP</td>
<td>Expressed as kWh per 2015 USD.</td>
</tr>
<tr>
<td>TFC/population</td>
<td>TFCPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>TFC/GDP</td>
<td>TFCGDP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>TFC/GDP PPP</td>
<td>TFCGDPPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Transport/population</td>
<td>TRANPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>Transport/GDP</td>
<td>TRANGDP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>Transport/GDP PPP</td>
<td>TRANGDPPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Residential/population</td>
<td>RESPOPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>Residential/GDP</td>
<td>RESGDP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>Residential/GDP PPP</td>
<td>RESGDPPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Services/population</td>
<td>SERVPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>Services /GDP</td>
<td>SERVGDP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>Services /GDP PPP</td>
<td>SERVGDPPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Industry/population</td>
<td>INDPOP</td>
<td>Expressed as toe per capita.</td>
</tr>
<tr>
<td>Industry /GDP</td>
<td>INDGDP</td>
<td>Expressed as toe per thousand 2015 USD.</td>
</tr>
<tr>
<td>Industry /GDP PPP</td>
<td>INDGDPPPP</td>
<td>Expressed as toe per thousand 2015 USD PPP.</td>
</tr>
<tr>
<td>Industrial production index (2015=100)</td>
<td>IPI</td>
<td>The main source of these series is the OECD database Main Economic Indicators, January 2020. Industrial production refers to the goods produced by establishments engaged in mining (including oil extraction), manufacturing, and production of electricity, gas and water. These are Sections B, C, D and E of ISIC Rev. 4 or NACE Rev. 2 classifications. Prior to 1990 Hungary and Poland are not included.</td>
</tr>
<tr>
<td>Index of industry consumption/industrial production</td>
<td>INDIPI</td>
<td>Expressed as an index where 2015=100.</td>
</tr>
<tr>
<td>Index of industry oil consumption/industrial production</td>
<td>OILINDIPI</td>
<td>Expressed as an index where 2015=100.</td>
</tr>
<tr>
<td>Total thermal efficiency of electricity only plants (main and auto) (%)</td>
<td>THERMELE</td>
<td></td>
</tr>
<tr>
<td>Flow</td>
<td>Short name</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------</td>
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</tr>
<tr>
<td>Total thermal efficiency of electricity and heat plants (%)</td>
<td>THERMEFF</td>
<td></td>
</tr>
</tbody>
</table>
## 4. PRODUCT DEFINITIONS

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard coal (if no detail)</td>
<td>HARDCOAL</td>
<td>This item is only used if the detailed breakdown is not available. It includes anthracite, coking coal and other bituminous coal.</td>
</tr>
<tr>
<td>Brown coal (if no detail)</td>
<td>BROWN</td>
<td>This item is only used if the detailed breakdown is not available. It includes lignite and sub-bituminous coal.</td>
</tr>
<tr>
<td>Anthracite</td>
<td>ANTCOAL</td>
<td>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 equal to or greater than 24 000 kJ/kg on an ash-free but moist basis.</td>
</tr>
<tr>
<td>Coking coal</td>
<td>COKCOAL</td>
<td>Coking coal refers to bituminous coal with a quality that allows the production of a coke suitable to support a blast furnace charge. Its gross calorific value is equal to or greater than 24 000 kJ/kg on an ash-free but moist basis.</td>
</tr>
<tr>
<td>Other bituminous coal</td>
<td>BITCOAL</td>
<td>Other bituminous coal is used mainly for steam raising and space heating purposes and includes all bituminous coal that is not included under coking coal nor anthracite. It is characterized by higher volatile matter than anthracite (more than 10%) and lower carbon content (less than 90% fixed carbon). Its gross calorific value is equal to or greater than 24 000 kJ/kg on an ash-free but moist basis.</td>
</tr>
<tr>
<td>Sub-bituminous coal</td>
<td>SUBCOAL</td>
<td>Non-agglomerating coals with a gross calorific value between 20 000 kJ/kg and 24 000 kJ/kg containing more than 31% volatile matter on a dry mineral matter free basis.</td>
</tr>
<tr>
<td>Lignite</td>
<td>LIGNITE</td>
<td>Lignite is a non-agglomerating coal with a gross calorific value of less than 20 000 kJ/kg and greater than 31% volatile matter on a dry mineral matter free basis. &lt;br&gt;&lt;em&gt;Note: starting with the 2014 edition, oil shale is presented separately and not included with lignite any longer.&lt;/em&gt;</td>
</tr>
<tr>
<td>Patent fuel</td>
<td>PATFUEL</td>
<td>Patent fuel is a composition fuel manufactured from hard coal fines with the addition of a binding agent. The amount of patent fuel produced may, therefore, be slightly higher than the actual amount of coal consumed in the transformation process. Consumption of patent fuels during the patent fuel manufacturing process is included under other energy industries.</td>
</tr>
</tbody>
</table>
### Coal

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coke oven coke</td>
<td>OVENCOKE</td>
<td>Coke oven coke is the solid product obtained from the carbonisation of coal, principally coking coal, at high temperature. It is low in moisture content and volatile matter. Coke oven coke is used mainly in the iron and steel industry, acting as energy source and chemical agent. Also included are semi-coke (a solid product obtained from the carbonisation of coal at a low temperature), lignite coke (a semi-coke made from lignite), coke breeze and foundry coke. The heading other energy industries includes the consumption at the coking plants themselves. Consumption in the iron and steel industry does not include coke converted into blast furnace gas. To obtain the total consumption of coke oven coke in the iron and steel industry, the quantities converted into blast furnace gas have to be added (these are included in blast furnaces).</td>
</tr>
<tr>
<td>Gas coke</td>
<td>GASCOKE</td>
<td>Gas coke is a by-product of hard coal used for the production of town gas in gas works. Gas coke is used for heating purposes. Other energy industry own use includes the consumption of gas coke at gas works.</td>
</tr>
<tr>
<td>Coal tar</td>
<td>COALTAR</td>
<td>Coal tar is a result of the destructive distillation of bituminous coal or of the low-temperature carbonisation of brown coal. Coal tar from bituminous coal is the liquid by-product of the distillation of coal to make coke in the coke oven process. Coal tar can be further distilled into different organic products (e.g. benzene, toluene, naphthalene), which normally would be reported as a feedstock to the petrochemical industry.</td>
</tr>
<tr>
<td>BKB</td>
<td>BKB</td>
<td>Brown coal briquettes are composition fuels manufactured from lignite, produced by briquetting under high pressure with or without the addition of a binding agent.</td>
</tr>
<tr>
<td>Gas works gas</td>
<td>GASWKSGS</td>
<td>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.</td>
</tr>
<tr>
<td>Coke oven gas</td>
<td>COKEOVGS</td>
<td>Coke oven gas is obtained as a by-product of the manufacture of coke oven coke for the production of iron and steel.</td>
</tr>
<tr>
<td>Blast furnace gas</td>
<td>BLFURGS</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Coal

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other recovered gases</td>
<td>OGASES</td>
<td>By-product of the production of steel in an oxygen furnace, recovered on leaving the furnace. The gases are also known as converter gas, LD gas or BOS gas. The quantity of recuperated fuel should be reported on a gross calorific value basis. Also covers non-specified manufactured gases not mentioned above, such as combustible gases of solid carbonaceous origin recovered from manufacturing and chemical processes not elsewhere defined.</td>
</tr>
</tbody>
</table>

### Peat and peat products

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

### Oil shale

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil shale and oil sands</td>
<td>OILSHALE</td>
<td>Oil shale and oil sands are sedimentary rock which contains organic matter in the form of kerogen. Kerogen is a waxy hydrocarbon-rich material regarded as a precursor of petroleum. Oil shale may be burned directly or processed by heating to extract shale oil. Oil shale and tar sands used as inputs for other transformation processes are included here (this includes the portion consumed in the transformation process). Shale oil and other products derived from liquefaction are included in from other sources under crude oil (other hydrocarbons).</td>
</tr>
<tr>
<td>Product</td>
<td>Short name</td>
<td>Definition</td>
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</tr>
<tr>
<td>Product</td>
<td>Short name</td>
<td>Definition</td>
</tr>
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<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Crude/NGL/ feedstocks (if no detail)</td>
<td>CRNGFEED</td>
<td>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.</td>
</tr>
<tr>
<td>Crude oil</td>
<td>CRUDEOIL</td>
<td>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.</td>
</tr>
<tr>
<td>Natural gas liquids</td>
<td>NGL</td>
<td>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.</td>
</tr>
<tr>
<td>Refinery feedstocks</td>
<td>REFFEEDS</td>
<td>A refinery feedstock is a processed oil destined for further processing (e.g. straight run fuel oil or vacuum gas oil) other than blending in the refining industry. With further processing, it will be transformed into one or more components and/or finished products. This definition also covers returns from the petrochemical industry to the refining industry (e.g. pyrolysis gasoline, C4 fractions, gasoil and fuel oil fractions).</td>
</tr>
<tr>
<td>Additives/blending components</td>
<td>ADDITIVE</td>
<td>Additives are non-hydrocarbon substances added to or blended with a product to modify its properties, for example, to improve its combustion characteristics. Alcohols and ethers (MTBE, methyl tertiary-butyl ether) and chemical alloys such as tetraethyl lead are included here. The biomass fractions of biogasoline, biodiesel and ethanol are not included here, but under liquid biofuels. This differs from the presentation of additives in the Oil Information publication.</td>
</tr>
<tr>
<td>Other hydrocarbons</td>
<td>NONCRUDE</td>
<td>This category includes synthetic crude oil from tar sands, shale oil, etc., liquids from coal liquefaction, output of liquids from natural gas conversion into gasoline, hydrogen and emulsified oils (e.g. Orimulsion).</td>
</tr>
</tbody>
</table>
## Oil products

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refinery gas</td>
<td>REFIN GAS</td>
<td>Refinery gas is defined as non-condensable gas obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. It consists mainly of hydrogen, methane, ethane and olefins. It also includes gases which are returned from the petrochemical industry. Refinery gas production refers to gross production. Own consumption is shown separately under oil refineries in energy industry own use.</td>
</tr>
<tr>
<td>Ethane</td>
<td>ETHANE</td>
<td>Ethane is a naturally gaseous straight-chain hydrocarbon (C₂H₆). It is a colourless paraffinic gas which is extracted from natural gas and refinery gas streams.</td>
</tr>
<tr>
<td>Liquefied petroleum gases (LPG)</td>
<td>LPG</td>
<td>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 (C₃H₈) and butane (C₄H₁₀) 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.</td>
</tr>
<tr>
<td>Motor gasoline excl. bio</td>
<td>NONBIOGASO</td>
<td>Motor gasoline is light hydrocarbon oil for use in internal combustion engines such as motor vehicles, excluding aircraft. Motor gasoline is distilled between 35°C and 215°C and is used as a fuel for land based spark ignition engines. Motor gasoline may include additives, oxygenates and octane enhancers, including lead compounds such as TEL (tetraethyl lead) and TML (tetramethyl lead). Motor gasoline excluding bio does not include the liquid biofuel or ethanol blended with gasoline - see liquid biofuels.</td>
</tr>
<tr>
<td>Aviation gasoline</td>
<td>AVGAS</td>
<td>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.</td>
</tr>
<tr>
<td>Gasoline type jet fuel</td>
<td>JETGAS</td>
<td>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.</td>
</tr>
<tr>
<td>Kerosene type jet fuel excl bio</td>
<td>NONBIOJETK</td>
<td>Kerosene type jet fuel is a medium distillate used for aviation turbine power units. It has the same distillation characteristics and flash point as kerosene (between 150°C and 300°C but not generally above 250°C). In addition, it has particular specifications (such as freezing point) which are established by the International Air Transport Association (IATA). It includes kerosene blending components. Kerosene type jet fuel excluding bio does not include the liquid biofuels blended with jet kerosene.</td>
</tr>
</tbody>
</table>
### Oil products

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other kerosene</td>
<td>OTHKERO</td>
<td>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.</td>
</tr>
<tr>
<td>Gas/diesel oil excl. bio</td>
<td>NONBIODES</td>
<td>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 distills between 180°C and 380°C. Several grades are available depending on uses: diesel oil for diesel compression ignition (cars, trucks, marine, etc.), light heating oil for industrial and commercial uses, and other gas oil including heavy gas oils which distil between 380°C and 540°C and which are used as petrochemical feedstocks. Gas/diesel oil excluding bio does not include the liquid biofuels blended with gas/diesel oil – see liquid biofuels.</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>RESFUEL</td>
<td>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.</td>
</tr>
<tr>
<td>Naphtha</td>
<td>NAPHTHA</td>
<td>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).</td>
</tr>
<tr>
<td>White spirit &amp; SBP</td>
<td>WHITESP</td>
<td>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.</td>
</tr>
<tr>
<td>Lubricants</td>
<td>LUBRIC</td>
<td>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.</td>
</tr>
</tbody>
</table>
## Oil products

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitumen</td>
<td>BITUMEN</td>
<td>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.</td>
</tr>
<tr>
<td>Paraffin waxes</td>
<td>PARWAX</td>
<td>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.</td>
</tr>
<tr>
<td>Petroleum coke</td>
<td>PETCOKE</td>
<td>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 &quot;green coke&quot; and &quot;calcinated coke&quot;. This category also includes &quot;catalyst coke&quot; deposited on the catalyst during refining processes: this coke is not recoverable and is usually burned as refinery fuel.</td>
</tr>
<tr>
<td>Non-specified oil products</td>
<td>ONONSPEC</td>
<td>Other oil products not classified above (e.g. tar, sulphur and grease) are included here. This category also includes aromatics (e.g. BTX or benzene, toluene and xylene) and olefins (e.g. propylene) produced within refineries.</td>
</tr>
<tr>
<td>Product</td>
<td>Short name</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>Industrial waste</td>
<td>INDWASTE</td>
<td>Industrial waste of non-renewable origin consists of solid and liquid products (e.g. tyres) combusted directly, usually in specialised plants, to produce heat and/or power. Renewable industrial waste is not included here, but with solid biofuels, biogases or liquid biofuels.</td>
</tr>
<tr>
<td>Municipal waste (renewable)</td>
<td>MUNWASTER</td>
<td>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.</td>
</tr>
<tr>
<td>Municipal waste (non-renewable)</td>
<td>MUNWASTEN</td>
<td>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.</td>
</tr>
<tr>
<td>Primary solid biofuels</td>
<td>PRIMSBIO</td>
<td>Primary solid biofuels is defined as any plant matter used directly as fuel or converted into other forms before combustion. This covers a multitude of woody materials generated by industrial process or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, sulphite lyes also known as black liquor, animal materials/wastes and other solid biofuels).</td>
</tr>
<tr>
<td>Biogases</td>
<td>BIOGASES</td>
<td>Biogases are gases arising from the anaerobic fermentation of biomass and the gasification of solid biomass (including biomass in wastes). The biogases from anaerobic fermentation are composed principally of methane and carbon dioxide and comprise landfill gas, sewage sludge gas and other biogases from anaerobic fermentation. Biogases can also be produced from thermal processes (by gasification or pyrolysis) of biomass and are mixtures containing hydrogen and carbon monoxide (usually known as syngas) along with other components. These gases may be further processed to modify their composition and can be further processed to produce substitute natural gas. Biogases are used mainly as a fuel but can be used as a chemical feedstock.</td>
</tr>
<tr>
<td>Biogasoline</td>
<td>BIOGASOL</td>
<td>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-tertiobutyl-ether produced on the basis of bioethanol; the percentage by volume of bioETBE that is calculated as biofuel is 47%) and bioMTBE (methyl-tertiobutyl-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.</td>
</tr>
<tr>
<td>Product</td>
<td>Short name</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------------------------------</td>
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</tr>
<tr>
<td>Biodiesels</td>
<td>BIODIESEL</td>
<td>Biodiesels includes biodiesel (a methyl-ester produced from vegetable or animal oil, of diesel quality), biodimethylether (dimethylether produced from biomass), Fischer Tropsh (Fischer Tropsh produced from biomass), cold pressed bio-oil (oil produced from oil seed through mechanical processing only) and all other liquid biofuels which are added to, blended with or used straight as transport diesel or in electricity and heat generation. Biodiesels includes the amounts that are blended into the diesel - it does not include the total volume of diesel into which the biodiesel is blended.</td>
</tr>
<tr>
<td>Other liquid biofuels</td>
<td>OBIOLIQ</td>
<td>Other liquid biofuels includes liquid biofuels not reported in either biogasoline or biodiesels.</td>
</tr>
<tr>
<td>Non-specified primary biofuels and waste</td>
<td>RENEWNS</td>
<td>This item is used when the detailed breakdown for primary biofuels and waste is not available.</td>
</tr>
<tr>
<td>Charcoal</td>
<td>CHARCOAL</td>
<td>It covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.</td>
</tr>
<tr>
<td>Memo: Renewables</td>
<td>MRENEW</td>
<td>Is equal to the sum of HYDRO, GEOTHERM, SOLARPV, SOLARTH, TIDE, WIND, MUNWASTER, SBIOMASS, GBIOMASS, BIOGASOL, BIODIESEL, OBIOLIQ, RENEWNS and CHARCOAL.</td>
</tr>
</tbody>
</table>
## Electricity and heat

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elec/heat output from non-specified manufactured gases</td>
<td>MANGAS</td>
<td>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.</td>
</tr>
<tr>
<td>Heat output from non-specified combustible fuels</td>
<td>HEATNS</td>
<td>This item is only used if the detailed breakdown is not available.</td>
</tr>
<tr>
<td>Nuclear</td>
<td>NUCLEAR</td>
<td>Energy released by nuclear fission or nuclear fusion.</td>
</tr>
<tr>
<td>Hydro</td>
<td>HYDRO</td>
<td>Hydro energy represents the potential and kinetic energy of water converted into electricity in hydroelectric plants.</td>
</tr>
<tr>
<td>Geothermal</td>
<td>GEOTHERM</td>
<td>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:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• for electricity generation using dry stream or high enthalpy brine after flashing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• directly as heat for district heating, agriculture, etc.</td>
</tr>
<tr>
<td>Solar photovoltaics</td>
<td>SOLARPV</td>
<td>Electricity from photovoltaic cells.</td>
</tr>
<tr>
<td>Solar thermal</td>
<td>SOLARTH</td>
<td>Solar energy is the solar radiation exploited for hot water production and electricity generation, by:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• flat plate collectors, mainly of the thermosyphon type, for domestic hot water or for the seasonal heating of swimming pools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• solar thermal-electric plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passive solar energy for the direct heating, cooling and lighting of dwellings or other buildings is not included.</td>
</tr>
<tr>
<td>Tide, wave and ocean</td>
<td>TIDE</td>
<td>Tide, wave and ocean represents the mechanical energy derived from tidal movement, wave motion or ocean current and exploited for electricity generation.</td>
</tr>
<tr>
<td>Wind</td>
<td>WIND</td>
<td>Wind energy represents the kinetic energy of wind exploited for electricity generation in wind turbines.</td>
</tr>
<tr>
<td>Other sources</td>
<td>OTHER</td>
<td>Other sources include production not included elsewhere such as fuel cells.</td>
</tr>
<tr>
<td>Electricity</td>
<td>ELECTR</td>
<td>Gross electricity production is measured at the terminals of all alternator sets in a station; it therefore includes the energy taken by station auxiliaries and losses in transformers that are considered integral parts of the station. The difference between gross and net production is generally estimated as 7% for conventional thermal stations, 1% for hydro stations, and 6% for nuclear, geothermal and solar stations. Production in hydro stations includes production from pumped storage plants.</td>
</tr>
</tbody>
</table>
### Electricity and heat

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat</td>
<td>HEAT</td>
<td>Heat production includes all heat produced by main activity producer CHP and heat plants, as well as heat sold by autoproducer CHP and heat plants to third parties. Fuels used to produce quantities of heat for sale are included in the transformation processes under the rows <em>CHP plants</em> and <em>Heat plants</em>. The use of fuels for heat which is not sold is included under the sectors in which the fuel use occurs.</td>
</tr>
</tbody>
</table>
## Products for summary balances

<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal and coal products</td>
<td>COAL</td>
<td>Is equal to the sum of HARDCOAL, BROWN, ANTICOAL, COKCOAL, BITCOAL, SUBCOAL, LIGNITE, PATFUEL, OVENCoke, GASCOKE, COALTAR, BKB, GASWKSGS, COKEOVGS, BLFURGS, OXYSTGS and MANGAS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: starting with the 2011 edition, gas works gas is included here with coal. In previous years, gas works gas was included with natural gas. Starting with the 2014 edition, oilshale is presented separately and not included with lignite any longer.</td>
</tr>
<tr>
<td>Peat and peat products</td>
<td>PEAT</td>
<td>Is equal to the sum of PEAT and PEATPROD.</td>
</tr>
<tr>
<td>Oil shale and oil sands</td>
<td>OILSHALE</td>
<td>Is equal to OILSHALE.</td>
</tr>
<tr>
<td>Crude, NGL and feedstocks</td>
<td>CRNGFEED</td>
<td>Is equal to the sum of CRNGFEED, CRUDEOIL, NGL, REFFFEEDS, ADDITIVE and NONCRUDE.</td>
</tr>
<tr>
<td>Oil products</td>
<td>TOTPRODS</td>
<td>Is equal to the sum of REFINAGAS, ETHANE, LPG, MOTORGAS, AVGAS, JETGAS, JETKERO, OTHKERO, GASDIES, RESFUEL, NAPHTHA, WHITESP, LUBRIC, BITUMEN, PARWAX, PETCOKE and ONONSPEC.</td>
</tr>
<tr>
<td>Natural gas</td>
<td>NATGAS</td>
<td>Is equal to NATGAS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: starting with the 2011 edition, gas works gas is included with coal. In previous years, gas works gas was included with natural gas.</td>
</tr>
<tr>
<td>Nuclear</td>
<td>NUCLEAR</td>
<td>Is equal to NUCLEAR.</td>
</tr>
<tr>
<td>Hydro</td>
<td>HYDRO</td>
<td>Is equal to HYDRO.</td>
</tr>
<tr>
<td>Geothermal</td>
<td>GEOTHERM</td>
<td>Is equal to GEOTHERM.</td>
</tr>
<tr>
<td>Solar/wind/other</td>
<td>SOLWIND</td>
<td>Is equal to the sum of SOLARPV, SOLARTH, TIDE, WIND, HEATPUMP, BOILER, CHEMHEAT and OTHER.</td>
</tr>
<tr>
<td>Biofuels and waste</td>
<td>COMRENEW</td>
<td>Is equal to the sum of INDWASTE, MUNWASTER, MUNWASTEN, SBIOMASS, GBIOMASS, BIOGASOL, BIODIESEL, OBIOLIQ, RENEWNS and CHARCOAL.</td>
</tr>
<tr>
<td>Heat production from non-specified</td>
<td>HEATNS</td>
<td>Is equal to HEATNS.</td>
</tr>
<tr>
<td>combustible fuels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>ELECTR</td>
<td>Is equal to ELECTR.</td>
</tr>
<tr>
<td>Heat</td>
<td>HEAT</td>
<td>Is equal to HEAT.</td>
</tr>
</tbody>
</table>
| Total                                      | TOTAL      | Is equal to TOTAL of all the previous energy sources.  
<p>|                                            |            | Is also equal to the sum of MTOTSOLID, MTOTOIL, NATGAS, NUCLEAR, HYDRO, COMRENEW and MTOTOTHER.                                                                                                        |</p>
<table>
<thead>
<tr>
<th>Product</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memo: Renewables</td>
<td>MRENEW</td>
<td>Is equal to the sum of HYDRO, GEOTHERM, SOLARPV, SOLARTH, TIDE, WIND, MUNWASTER, SBIOMASS, GBIOMASS, BIOGASOL, BIODIESEL, OBIOLIQ, RENEWNS and CHARCOAL.</td>
</tr>
<tr>
<td>Memo: Coal, peat and oil shale</td>
<td>MTOTSOLID</td>
<td>Is equal to the sum of COAL, PEAT and OILSHALE.</td>
</tr>
<tr>
<td>Memo: Primary and secondary oil</td>
<td>MTOTOIL</td>
<td>Is equal to the sum of CRNGFEED and TOTPRODS.</td>
</tr>
<tr>
<td>Memo: Geothermal, solar/wind/other, heat, electricity.</td>
<td>MTOTOTHER</td>
<td>Is equal to the sum of GEOTHERM, SOLARWIND, HEAT and ELECTR.</td>
</tr>
</tbody>
</table>
## 5. GEOGRAPHICAL COVERAGE

### Countries and regions

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

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>ALGERIA</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>AUSTRIA</td>
<td></td>
</tr>
<tr>
<td>Belarus</td>
<td>BELARUS</td>
<td>Data for Belarus are available starting in 1990. Prior to that, they are included in Former Soviet Union.</td>
</tr>
<tr>
<td>Belgium</td>
<td>BELGIUM</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>BRAZIL</td>
<td>Brazil joined the IEA as an Association country in October 2017.</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>BULGARIA</td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>CROATIA</td>
<td>Data for Croatia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.</td>
</tr>
</tbody>
</table>
| Cyprus         | CYPRUS     | **Note by Turkey:**  
The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus” issue.  
**Note by all the European Union Member States of the OECD and the European Union:**  
The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this report relates to the area under the effective control of the Government of the Republic of Cyprus. |
| Ecuador        | ECUADOR    |            |
## Countries and regions

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

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>FRANCE</td>
<td>France includes Monaco and excludes the overseas collectivities: New Caledonia; French Polynesia; Saint Barthélemy; Saint Martin; Saint Pierre and Miquelon; and Wallis and Futuna. Energy data for the following overseas departments: Guadeloupe; French Guiana; Martinique; Mayotte; and Réunion are included for the years 2011-2017, and excluded for earlier years. Economic indicators data for France includes the aforementioned overseas departments for the whole time series.</td>
</tr>
<tr>
<td>Guatemala</td>
<td>GUATEMALA</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>HUNGARY</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>INDONESIA</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>IRELAND</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>ITALY</td>
<td>Includes San Marino and the Holy See.</td>
</tr>
<tr>
<td>Latvia</td>
<td>LATVIA</td>
<td>Latvia became an OECD Member in July 2016. Accordingly, Latvia appears in the list of OECD Members and is included in the zone aggregates for data starting in 1990, starting with the 2017 edition. Prior to 1990, data for Latvia are included in Former Soviet Union.</td>
</tr>
<tr>
<td>Lithuania</td>
<td>LITHUANIA</td>
<td>Lithuania became an OECD Member in July 2018. Accordingly, Lithuania appears in the list of OECD Members and is included in the zone aggregates for data starting in 1990, starting with the 2019 edition. Prior to 1990, data for Lithuania are included in Former Soviet Union.</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>LUXEMBOU</td>
<td></td>
</tr>
<tr>
<td>Montenegro</td>
<td>MONTENEGRO</td>
<td>Data for Montenegro are available starting in 2005. Between 1990 and 2004, data for Montenegro are included in Serbia. Prior to 1990, they are included in Former Yugoslavia.</td>
</tr>
<tr>
<td>Poland</td>
<td>POLAND</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>PORTUGAL</td>
<td>Includes the Azores and Madeira.</td>
</tr>
<tr>
<td>Romania</td>
<td>ROMANIA</td>
<td></td>
</tr>
<tr>
<td>Serbia</td>
<td>SERBIA</td>
<td>Data for Serbia are available starting in 1990. Prior to that, they are included in Former Yugoslavia. Serbia includes Montenegro until 2004 and Kosovo until 1999.</td>
</tr>
<tr>
<td>Slovenia</td>
<td>SLOVENIA</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>TUNISIA</td>
<td></td>
</tr>
</tbody>
</table>
### Countries and regions

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

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Short name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>UK</td>
<td>Shipments of coal and oil to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of coal and oil to these islands are, therefore, included as part of UK supply. Exports of natural gas to the Isle of Man are included with the exports to Ireland.</td>
</tr>
<tr>
<td>United States</td>
<td>USA</td>
<td>Includes the 50 states and the District of Columbia but generally excludes all territories, and all trade between the U.S. and its territories. Oil statistics include Guam, Puerto Rico and the United States Virgin Islands; trade statistics for coal include international trade to and from Puerto Rico and the United States Virgin Islands. Starting with 2017 data, inputs to and outputs from electricity and heat generation include Puerto Rico.</td>
</tr>
<tr>
<td>Uruguay</td>
<td>URUGUAY</td>
<td></td>
</tr>
</tbody>
</table>
6. COUNTRY NOTES AND SOURCES

OECD COUNTRIES

General notes

The notes given in this document refer to data for the years 1960 to 2018 published in the book, as well as in the on-line data service. In general, more detailed notes are available for data starting in 1990.

Data are obtained through annual submission of five fuel questionnaires from national administrations, as indicated for each country in the section on sources. In some instances it has been necessary for the IEA Secretariat to estimate some data; explanations of the estimates are provided in the country notes. For more information on fuel-specific methodologies, please refer to the various IEA information books.

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

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

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

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

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

Austria

Source

Bundesanstalt Statistik Österreich, Vienna.

General notes

- Starting with the 2016 edition and following, widespread data revisions were received due to enhanced reporting from 2005 onwards as a consequence of improved Austrian Final Energy Consumption surveys. For some time series, these revisions were extrapolated back to 1990. As a consequence, there may be breaks between 2004 and 2005, and 1989 and 1990. For more details on the methodologies in the revisions in the energy balance, there is more information here: http://www.statistik.at/wcm/idc/idcplg?IdcService=GET_PDF_FILE&RevisionSelectionMethod=LatestReleased&dDocName=036412. For more details on the methodologies related to consumption in households, there is more information here: http://www.statistik.at/wcm/idc/idcplg?IdcService=GET_PDF_FILE&RevisionSelectionMethod=LatestReleased&dDocName=078265
Coal

General notes

- In the 2019 edition, revisions concerning the iron and steel industry were received for data since 2005. The revisions impacted the energy sector for coke oven gas and blast furnace gas.
- In 2018 provisional data, blast furnace gas decreased following maintenance work in one of the blast furnaces. Additionally, other recovered gases (LD-gas) are now reported separately following an improvement in reporting. Historical revisions are pending.
- In the 2016 edition, revisions concerning the iron and steel industry were received for data since 1990. The following flows were impacted by these revisions: inputs to blast furnaces, the breakdown between transformation and own-use energy support, and calorific values.
- The last lignite mine closed in the second quarter of 2004 and lignite use for power generation ceased in 2006.
- Since 1996, gas works gas data are 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.
- “Trockenkohle” is included with BKB because of its high calorific value.
- LD gas, which should normally be reported as other recovered gases, is reported with blast furnace gas.

Natural gas

Supply

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

Transformation

- In the 2018 edition, the time series for blast furnaces was reclassified from 1990 onwards, and thus moved from the Transformation to the Energy sector. This has resulted in increasing the efficiency of the blast furnaces process.
- Between 1995 and 1996 there is a break in time series for autoproducer electricity and CHP plants due to the availability of more detailed data.

Consumption

- In the 2019 edition, Austrian administration revised oil and gas extraction and oil refinery natural gas consumption data for 2005 onwards based on data reported to the Emissions Trading Scheme (ETS). Additionally, it revised data since 2005 for other sectors’ flows since 2005 and industry sector since 2012 based on a combination of the results of sample surveys and data from the regulator.
- Any inconsistencies in the time series for commercial/public services until 2011 are the result of this sub-sector being computed as a residual. Since 2012 the commercial/public services consumption figures are surveyed annually and the consumption quantities in small and medium enterprises in industry are the projected results of biannual sample surveys. The increase in pipeline transport consumption for 2013 is due to a new methodology of data collection. Historical revisions are pending. Prior to 2000, differences due to measurement are included with distribution losses.

Biofuels and waste

General notes

- Data for 1986 to 1989 for solid biofuels, industrial waste, biogases and liquid biofuels are IEA Secretariat estimates based on information published by OSTAT in Energieversorgung Österreichs Endgültige Energiebilanz.
Consumption

- In the 2016 edition, improvement in the iron and steel industry data have allowed more precision in the consumption, among other for industrial waste in blast furnaces.
- In the 2016 edition, the consumption of solid bio-fuels in the residential sector was revised down from 2005 data.

Electricity and heat

Supply

- Amounts for both net electricity production and plant own use are calculated by the Austrian administration by applying a fixed percentage multiplier to the gross production of all plants in the public grid, regardless of plant type or fuel.
- Electricity production from geothermal main electricity plants only refers to electricity that is fed into the grid. Total production is not known as these plants are below the reporting threshold.

Transformation

- Electricity plants data may include some CHP plants operating in electricity only mode.
- Fluctuating efficiencies from year to year for solid biofuel and industrial waste plants are related to operational decisions which are governed by a formula described in the Standard documentation Meta information on Energy balances for Austria and the Laender of Austria published in June 2016 on the Statistics Austria website.
- In the 2018 edition, electricity production from municipal waste main activity electricity plants was revised from 2003-2009. Additionally, electricity production from municipal waste main activity CHP plants was revised in 2014.
- A large autoproducer electricity plant was reclassified as an autoproducer CHP plant and therefore creates a break in time series for municipal waste in 2011.
- In 2009, inputs of other oil products to autoproducer CHP plants were reclassified as refinery gas and natural gas.
- Due to a change in the survey methodology, the heat produced in small plants (capacity inferior to 1 MW) is not reported starting in 2002.
- Heat from chemical processes used for electricity production is available from 2000.
- Electricity generation from geothermal started in 2002.
- Prior to 2002, data for biogases only include plants of 1 MW or larger.
- Prior to 1981, inputs to main activity producer electricity plants include inputs to CHP plants. All electricity production by CHP plants is included in electricity plants, and only production from combustible fuel sources is taken into account. Autoproducer CHP heat production is included in main activity producer CHP plants. For heat, own use is included in distribution losses.

Consumption

- In the 2020 edition, Austria revised consumption data back to 2013 based on a new methodology for disaggregating consumption across sectors.
- In the 2020 edition, a large portion of electricity consumption in blast furnaces was reallocated to iron and steel sector from 1990 to 2004. This creates breaks in-series in these timeseries between 2004 and 2005. Revisions to data for 2005 onwards are expected in a future edition.
- Electricity consumption in Road includes trams, trolleybuses, subways, cableways, chair- and drag-lifts, as well as 100% electric vehicles.
- In the 2019 edition, Austria revised data back to 2005 in order to present international reporting as consistent as possible with the national energy balances. In addition, consumption figures were revised based on more recent surveys of energy consumption in small and medium-sized enterprises. Outliers and the extrapolation methodology will be revised following the results of the next survey.
- Electricity consumption in oil refineries includes consumption in gas works plants prior to 1991.
- From 1990 to 2009, small amounts of electricity used in heat pumps have been included in the residential sector.
- Starting in 1990, consumption of electricity in the field of electricity supply, district heating and water supply are included in other energy industry own use, prior to that it was included in commercial/public services.
- Also prior to 1991, electricity consumption in the iron and steel industry includes consumption in coke ovens and blast furnaces.
Belgium

Source
Observatoire de l’Energie, Brussels.

Coal

General notes
- In the 2020 edition, data from 2013 was revised, and sub-bituminous coal figures are now reported under this category, whilst previously they were under other bituminous coal. BKB figures has also been revised back to 2013.
- In the 2016 edition, improved data collection has led to some breaks in time series. These revisions include hard coal classifications, products and processes in integrated iron and steel manufacture and may be extended further back in future editions.
- Data for anthracite prior to 2014 may include a small portion of other bituminous coal.
- Hard coal data prior to 1978 may include sub-bituminous coal.
- Other bituminous coal and sub-bituminous coal data reported in from other sources refer to coal recuperated from coal dumps.

Supply
- Supply-side data are obtained through surveying questionnaires instead of customs data.
- In the 2019 edition, the calorific values of imported bituminous coal were revised upwards by the Belgian administration since 2015, resulting in a significant increase in the coal primary energy supply. Historical revisions are pending.
- 2018 provisional data include “Oil shale & Oil sands” production from other sources to capture previously unknown quantities of low-grade coal products (“tailings”). Historical revisions are pending. Conventional production of other bituminous coal ceased on 31 August 1992.

Transformation
- In the 2019 edition, anthracite previously reported as consumption in the iron and steel industry was reclassified as part of the transformation process in blast furnaces since 2013.
- In 2016, the decrease of other bituminous coal inputs to main activity producer electricity plants was due to the permanent closure of Langerlo, Belgium’s last coal-fired main activity electricity.
- In 2015, the decrease of coke oven gas inputs to autoproducer CHP plants is due to a power plant closure in 2015.
- In 2014 and 2015, coking coal inputs to coke ovens decreased due to a coke oven closure in June 2014.
- In 2014, the decrease of other bituminous coal inputs to main activity producer electricity plants is due to a power plant closure in 2014.

Consumption
- In the 2018 edition, industrial consumption for the period 2013 through 2015 was revised for coking coal and anthracite, as more accurate consumption data became available. Data for coking coal prior to 2013 may include a small portion of anthracite.
- The decrease of other bituminous coal and coke oven coke in the iron and steel industry in 2002 is due to the closure of several plants.
- The use of coke oven gas in chemical and petrochemical activities ceased in 1996.

Oil

General notes
- Between 2008 and 2009 breaks in series occur for naphtha and LPG in both transformation and final consumption in the petrochemical sector as a result of methodological improvements made by the Belgian administration.
- Data on biofuels are not available before 2009.
- Other hydrocarbons reported under from other sources natural gas correspond to pure hydrogen used in refineries, also represented as the output of non-specified transformation in the balances format.

Supply
- In 2018, increase in imports and deliveries for international marine bunkers of residual fuel oil is due to the inclusion of volumes of aromatic oils.
- In 2017 new legislation increased the biofuel blending target for motor gasoline from 4% of volume to 8.5% of volume. As part of this E10 gasoline was introduced and became the new standard product in the country.
In the 2019 edition, the Belgian administration included new companies in their reporting; some of which are particularly active in the production and trade of lubricants and bitumen.

Consumption in international marine bunkers dipped in 2014 and 2015 due to the closure of several bunkering companies. During 2015 these were replaced by new companies which became fully operational in 2016.

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

**Transformation**

In 2017 the upgrade project of Antwerp refinery and petrochemical plant was completed. Two key projects were completed: new refinery capacity for the conversion of heavy fuel oil into low sulphur light products and increasing steam cracker flexibility to maximize the processing of low cost advantaged feedstock. The latter is reflected in feedstock needs. Output of lighter end products as well as petroleum coke is impacted by these upgrades.

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

**Consumption**

In 2018, a project in a petrochemical plant in Antwerp has started in which refinery gases are treated to recover valuable hydrocarbons. These quantities are reported under LPG and reflect the increase observed for non-energy use in the petrochemical industry in 2018.

The decrease of fuel oil in industry consumption since 1993 is due to the introduction of an excise tax as well as increased use of natural gas.

**Natural gas**

**Supply**

In the 2019 edition, 2018p trade data include transit figures as a result of a change in methodology.

Since 2009 gas trade in Belgium includes imported LNG which is regasified and subsequently exported to other countries.

In the 2019 edition, the LNG consumption data in international marine bunkers are confidential.

**Transformation**

The Belgian administration is in the process of revising 2010 and 2011 transformation sector data. As such, an unusually high quantity of natural gas is reported under not elsewhere specified (transformation).

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

**Biofuels and waste**

**General notes**

Renewable municipal waste includes a share of renewable industrial waste.

Data for biodiesels and biogasoline are available starting in 2009.

**Supply**

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

**Transformation**

In 2015, part of the law regulating the blending of biodiesel with diesel was temporarily suspended but in 2016, this law was reinstated.

**Consumption**

Consumption of bioethanol increased in 2017 due to legislation coming into effect on 1 January 2017, which increased the blending obligation for gasoline products.

Industrial waste consumption in the chemical sector started in 2011.

Other liquid biofuels consumed in power plants reported before 2011 can include biodiesel.

New data on consumption cause breaks in time series for primary solid biofuels between 2011 and 2012.
Electricity and heat

General notes
- In the 2020 edition, Belgium revised data back to 2014. Revisions to additional years are pending.

Supply
- Electricity production from other sources mainly comprises production at a gas expansion station with heat recovery and at a hydraulic turbine in a waste water treatment plant.
- From 2013 onwards, reported heat distribution losses decreased due to a more precise estimation method.
- The production of electricity from wind is available from 1987.

Transformation
- In 2018, electricity output from nuclear decreased due to outages at a number of reactors.
- Langerlo, Belgium’s last coal-fired main activity electricity producer closed permanently in March 2016.
- Heat production from chemical processes used for electricity production is available from 2005.
- In 2012, heat production from chemical sources has been estimated by the IEA Secretariat.
- 2009 was the first year of offshore wind production in Belgium. 2010 is the first year data are available.
- Prior to 2009 some unsold heat was reported in natural gas autoproducer CHP plants, together with the associated natural gas input. This causes the drop in efficiency in 2009.
- In 2007 data, no information was available on heat production in main activity CHP plants for industrial waste.
- In 2003, combustion of municipal waste for electricity and heat generation purposes increased significantly. However, because a large portion of the heat produced is not used (sold), plant efficiencies dropped significantly between 2002 and 2003.
- In 2000, most autoproducer electricity plants using combustible fuels were reclassified as autoproducer CHP plants; the heat production from these plants was used for internal industrial processes and not sold to third parties until 2005.
- For 1998 and 1999, electricity production at main activity producer CHP plants with annual heat output below 0.5 TJ is reported with main activity producer electricity only plants.
- Prior to 1982, electricity production in main activity producer CHP plants is included in production from electricity plants. Also, inputs of fuels for electricity generation in main activity producer electricity plants include inputs for heat production in CHP plants.

Consumption
- In 2018, the methodology use to allocating heat consumption between the residential, commercial and public services, and agriculture and forestry sectors by one data provider was changed, resulting in some breaks in-series.
- In the 2019 edition, revisions were implemented for the direct use of solar thermal in other sectors back to 2010 due to improved data availability.
- For 2012, electricity consumption in the mining and quarrying sector has been estimated by the IEA Secretariat.
- For 2012, oil refineries electricity consumption has been estimated by the IEA Secretariat based on refinery activity data. Part of the estimated amount has been removed from consumption in the chemical and petrochemical sector.
- Breaks in time series may exist between 2007 and 2008 due to revisions of the Classification of the Economic Activities in the European Community (NACE) classifications.
- There is no heat consumption starting in 2007 in the iron and steel industry because the installation concerned became an autoproducer in July 2006 and the heat is no longer sold.

France

Source
Ministère de la Transition Écologique et Solidaire, Paris.

General notes
- In the 2018 edition, data for France were revised back to 2011 following changes in methodology and procedures used by the energy statistics sub-department (SDSE) within the Ministry for the ecological and inclusive transition. As a result, the revisions, to bring the reporting more in line with the international standards, impacted all fuels. Additional details are given under each fuel.
• From 2012, the energy consumption is more detailed due to a more precise national survey.
• From 2011 data onwards, France now includes Monaco, and the following overseas departments (Guadeloupe; French Guiana; Martinique; Mayotte; and Réunion); and excludes the overseas collectivities (New Caledonia; French Polynesia; Saint Barthélemy; Saint Martin; Saint Pierre and Miquelon; and Wallis and Futuna).

Coal

General notes
• Due to confidentiality reasons, blast furnace gas includes blast furnaces gas, coke oven gas and other recovered gases for 2018. This aggregation may lead to unusual figures and efficiencies in the energy balance and CO2 emissions.
• The losses of blast furnace gas, coke oven gas and other recovered gases are included under statistical difference until 2016. From 2017 onwards these losses are reported under “other energy uses”.
• In 2018 edition, the calorific value of coking coal has been revised in agreement with Eurostat and the IEA. The revision was made for the period 1990 to 2016.
• In the 2017 edition, the French administration undertook comprehensive revisions on sectoral coal consumption back to 2011. Starting this edition, new information became available for anthracite, BKB and other recovered gases.
• From 2012, the energy consumption is more detailed due to a more precise national survey.
• Prior to 2011, other manufactured gases (oxygen steel furnace gas) are included in blast furnace gas.
• For 1989 to 1998, the IEA Secretariat has estimated industry consumption based on Consommations d’Energie dans l’Industrie, SESSI.
• Prior to 1985, consumption of colliery gas is included with the use of coke oven gas by autoproducers.
• Hard coal data prior to 1978 may include sub-bituminous coal.

Transformation
• In 2017 the use of other bituminous coal into transformation for electricity increased by more than 20% to compensate lower generation from nuclear and hydro plants.
• In 2016 the company that consumed blast furnace gas for electricity and heat generation ceased its activity.

Consumption
• In the 2018 edition, the split of energy consumption between the residential sector and the commerce and public services sector has been revised back to 1990 by the French administration for other bituminous coal, lignite, coke oven coke, BKB and patent fuel.
• Blast furnace gas and coke oven gas used for energy purposes in blast furnaces are no longer reported under the iron and steel industry. As of the 2018 edition these quantities are reported under the energy sector.
• Final consumption in industry is estimated by the Secretariat from 1986 to 2001 for some products.

Oil

General notes
• Statistical differences observed for motor gasoline and naphtha are partly due to the absence of a specific naphtha category in the customs classification.
• Statistical differences appear for other products as a result of different definitions used for this residual category between the customs, refineries, power plants and petrochemical industry.
• From 2013, information is available for imports of condensates used by the petrochemical sector. These are reported under imports of NGL, interproduct transfers of NGL to other oil products, and consumption of other products.
• From 1991, additives and oxygenates data are available.

Supply
• Higher than usual seasonal maintenance in the spring of 2018 impacted refinery intake and output.
• From 2009, transfers of kerosene type jet fuel to white spirit correspond to kerosene used as a base for making white spirit.
• From 2008 data, refinery intake of refinery feedstock and refinery output of refinery gas output figures exclude natural gas used in the steam reformer of the Gonfreville refinery.
• From 2008 data, ethane refinery output is reported.
• From 2002 data onwards, ethylene produced in Lacq is not included in NGL.
• From 1998 data, a different treatment of transfers was adopted. Imported oil products needing further refinery processing are no longer reported as refinery feedstock imports but as oil product imports and products transferred. Fuel oil includes part of the amounts previously reported in other oil products from 1999 and various other products from 2001.

**Transformation**

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

**Consumption**

• In 2018, there is a decrease in deliveries to the petrochemical sector due to plant shutdowns for maintenance.
• The breakdown between international and domestic marine bunkers is estimated by the French administration.
• Between 2005 and 2006, a break is visible in LPG time series, as consumption from one chemical company was re-classified from energy use to non-energy use. Breaks in LPG time series also appear in 2001 due to improved data collection.
• From 2000 data, petroleum coke consumption in the non-ferrous metals industry is no longer available separately. Prior to 1982, no breakdown between energy and non-energy use is available for this product.
• From 1998 data, military consumption of kerosene type jet fuel is reported separately from domestic aviation.
• Prior to 1988, LPG includes ethane consumption.
• Prior to 1985, the residential sector consumption of gas/diesel oil is reported under the commerce/public services sector, as no separate data were available.

**Natural gas**

**General notes**

• In the 2019 edition, the French administration revised the demand side from 2011 onwards by improving the methodology with the consolidation of data from SDSE surveys and additional official sources.
• Until 2007, some statistical differences reported by the French utilities were included in distribution losses. Since 2008, these amounts are included under statistical differences.
• Between 1999 and 2000, there are some breaks in time series due to a new methodology for preparing the natural gas balances.
• The data include the French overseas departments, however natural gas is neither produced, nor consumed in these departments.

**Supply**

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

**Consumption**

• The increase in natural gas consumption in the electricity sector for 2016 and 2017 has been mainly driven by the decrease in nuclear generation due to maintenance operations, which was compensated by gas-fired power plants.
• Gas for pipelines is included in distribution losses.
• Between 2005 and 2006, there is a break in the time series of the industry sub-sectors.

**Biofuels and waste**

**General notes**

• In the 2018 edition, following an analysis of biogases in the energy sector by the French administration, there are revisions in biogas indigenous production, inputs to the transformation sector, heat production and final consumption back to 2005. Electricity production from biogases is revised back to 2011. This causes breaks in time series between 2004 and 2005 as well as 2010 and 2011.
• Indigenous production, transformation and final consumption of industrial waste are reported from 2013. In the 2018 edition, indigenous pro-
duction and transformation of industrial waste were added from 2007 - 2012. It follows that there is a break in time series between 2012 and 2013.

- In the 2018 edition, solid biofuels’ indigenous production and inputs to main activity and autoproducer heat plants have been revised back to 2007. Electricity production has been revised back to 2013. This causes breaks in time series between 2006 and 2007 as well as 2012 and 2013.

- In the 2018 edition, indigenous production and inputs to main activity heat plants have been revised back to 2007 for municipal waste. Electricity production has been revised back to 2011. This causes breaks in time series between 2006 and 2007 as well as 2010 and 2011.

- Prior to 2007, production and consumption of industrial waste were included in municipal waste.

**Transformation**

- Plants using municipal waste were reclassified as autoproducer CHP plants from 1995, which leads to a break in time series.

- Breaks in time series in 2005 for municipal waste and solid biofuels are caused by sectoral reclassifications.

**Consumption**

- A revision of the solid biofuels and biogases time series created breaks in the direct use time series between 2004 and 2005.

- The breakdown of the final energy consumption of biogases was estimated by the French administration from 1970 to 2003.

**Electricity and heat**

**Supply**

- In the 2019 edition, heat supply and consumption data were revised due to improved information on heat production from renewables.

- All solar photovoltaic plants with capacity above 1 MWp are considered as main activity producers, while all plants with capacity below that value are considered autoproducers.

- Electricity production from other sources is available starting in 2007, representing production of electricity from purchased steam, and from 2018, hydrogen. The input is shown under non-specified transformation.

- Data on electricity production from wind are available from 1990. For 2013, the split between electricity generation from main activity and autoproducer wind plants has been estimated, pending receipt of revised data.

**Transformation**

- For 2018, inputs and outputs of coke oven gas, and other recovered gases are included under blast furnace gas for confidentiality purposes.

- For 2014 onwards, the implied efficiencies of heat pumps are much lower than expected. This is under investigation by the French Administration, and revisions are expected in future editions.

- The methodology for reporting inputs to CHP plants is under currently under review by the French administration and historical revisions are expected.

- For the 2018 edition, revisions for heat production in all plant types were received and accepted for many fuels from 2007 onwards, with the exception of natural gas, where the planned revisions for 2007 and 2008 are still pending implementation by the Secretariat.

- In the 2018 edition, electricity production from hydro was revised back to the year 2000, in some cases only amounting to plant reclassification.

- Electricity production from the Bouillante geothermal main electricity plant in Guadeloupe is included from 2011 onwards, when data coverage for France is extended to include the overseas departments. Electricity production from autoproducer geothermal started in 2011 and stopped in 2012 due to the maintenance of the only plant. This production restarted in 2016.

- The amount of heat not sold in autoproducer plants is included in total heat production up to 2007.

- In 2005, autoproducer CHP efficiencies for biogases drop due to the opening of a larger, less efficient plant.

- From 2000 several plants have been reclassified from electricity only to CHP plants. This causes breaks in the time series between 1999 and 2000.

- Prior to 2000, inputs and outputs of oil products are not available separately and are reported together under other oil products. From 2000 to 2008, there are further classification problems for inputs and outputs of electricity and heat from oil products. The French administration is working to
reconcile their data collection methods for the inputs and the outputs for electricity generation.

- A new method of survey and a reclassification between main activity producer electricity plants and autoproducer electricity plants may cause breaks in the time series for other bituminous coal between 1998 and 1999.
- There was re-classification on autoproducer plants using municipal waste in 1995, which leads to a break in the time series.
- Net electricity production by autoproducer CHP plants is available from 1989.
- Net electricity production by autoproducers prior to 1983 includes production from combustible fuel sources only.

Consumption

- Electricity consumption in Road includes consumption by 100% electric vehicles. These amounts are estimated by the French Administration based on vehicle numbers, and expected electricity usage. Consumption includes domestic charging - however, these amounts are currently subtracted from non-specified transport, rather than residential consumption.
- In the 2019 edition, revisions for 2011 onwards were received for all electricity consumption flows, based on a correction to a survey. This has introduced a wider statistical difference than previously published, and is under review.
- In the 2018 edition, revisions for 2011 onwards were received for all electricity consumption flows, based on an improved survey. This has led to breaks in time series between 2010 and 2011. Similarly, heat consumption from 2007 onwards was revised to account for autoproducer own use heat generation in its correct economic activity.
- In the 2017 edition, the French administration undertook comprehensive revisions on sectoral electricity consumption time series, for some sectors revising back to 1990. Electricity consumption at railway and bus stations, shipping piers and airports is no longer included in the transport sector but in the commercial and public services sector. Road electricity consumption has also been revised back to 1990, following an extended review of NACE sector encoding by the administration. These revisions created breaks in time series for several sectors, which the administration anticipates to address in subsequent reporting cycles.
- For the 2014 edition of this publication, the French administration revised electricity consumption data in the agriculture sector back to 2004, resulting in breaks in time series.
- Consumption of electricity in uranium treatment plants is confidential for the period 2003 through 2010, and unavailable prior to 1980.
- Data on heat distribution losses are available only starting from 2007. Prior to that, they were included in final consumption.
- Prior to 2005, all the geothermal heat consumption was reported as direct use. From 2005 data, some quantities are reported as output of heat plants, resulting in breaks in time series for production, transformation and consumption.
- Consumption of electricity for oil and gas extraction includes that used in oil refineries from 1988 to 2000.
- Non-specified other consumption includes exports to Monaco prior to 1992 and defence-related activities, among others.
- The industry classifications used by the French administration were changed in 1986.
- There are major breaks in the time series in 1965 when more detailed breakdown of data on electricity consumption became available.

Hungary

Source
Hungarian Energy and Public Utility Regulatory Authority, Budapest.

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

Coal

General notes
- In the 2020 edition, revisions back to 2014 were done for blast furnace gas to report separately the energy consumption for the support of blast furnaces. Previously, this consumption was reported as final consumption in the industry iron & steel.
- From 1992, the production of sub-bituminous coal has been included with lignite due to the low quality of the coal. From 1990 to 1999, the use of...
this domestic coal in main activity producer electricity and CHP plants has also been reclassified to lignite. Since 2017, imports, transformation and consumption of sub-bituminous coal was reclassified as lignite by the Hungarian administration to align with foreign trade statistics.

**Transformation**
- In 2017, a main activity CHP plant using other bituminous coal was merged with an industrial unit of the pulp, paper and print sector and was since reclassified as an autoproducer.
- Autoproducer heat and power plants using coke oven gas and blast furnace gas were reclassified in 1998 as main activity power plants.

**Oil**

**General notes**
- From 2010, from other sources - natural gas of other hydrocarbons correspond to hydrogen used in refineries for hydrodesulphurization, also represented as the output of non-specified transformation in the balances format.
- Starting from 1998, data for additives and aviation gasoline are available.
- From 1994 onwards, other products include aromatics and other products that were previously included mainly under white spirit. Prior to 1993, white spirit is included in motor gasoline. Data for refinery gas, paraffin waxes and lubricants are partly estimated by the Secretariat.

**Consumption**
- In the 2016 and 2017 editions, revisions to consumption data back to 2010 were provided by the Hungarian administration following a survey introduced in 2014. This results in breaks in time series between 2009 and 2010.

**Natural gas**

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

**Supply**
- Imports and Exports data are reported according to the TSO’s data, which include transit volumes.

**Transformation**
- Since 2010, data reported for non-specified transformation represent natural gas used for hydrogen manufacture used in refineries for hydrodesulphurization. Prior to this year, these quantities are reported under oil refineries.
- Since 1997 two autoproducer heat plants have been reclassified to main activity producer heat plants.

**Biofuels and waste**

**General notes**
- Data for biogases are available from 2000; for industrial waste from 2003; for biodiesel production from 2007.

**Supply**
- A 2012 change in biogasoline reporting methodology results in break in time series between 2011 and 2012.

**Consumption**
- In the 2018 edition, the Hungarian administration has revised solid biofuels consumption in other sectors back to 2005 based on the new survey from Hungarian Central Statistical Office (HCSO). This resulted in break in time series between 2004 and 2005.
- A new reporting methodology for the direct use of geothermal energy was applied from 2014 resulting in break in time series between 2013 and 2014.
Electricity and heat

Supply

- For 2017 onwards, inputs and outputs from power plants are reported at a unit level, while for prior years, data are reported at a plant level. As a result, breaks in series are observed between 2016 and 2017. In particular, for electricity output from main activity producer CHP and main activity producer nuclear power plants, and for heat output from industrial waste at autoproducer CHP and autoproducer heat plants.
- In 2017, a main activity producer CHP plant was reclassified as an autoproducer. As a result, declines are observed in heat production from other bituminous coal and industrial waste, as heat reported as previously sold may now be considered as used onsite.
- Other sources electricity and heat production is available from 2013 and represents generation from residual tail gases from the manufacturing of soot as well as from hydrogen.
- Geothermal heat production from main activity producer heat plants is available from 1995.
- Nuclear electricity production in main activity producer electricity plants is available from 1983.

Transformation

- In late 2017, a new geothermal power plant began operations.
- For 2017, the decline in heat production from industrial waste is partly due to the reclassification of a main activity producer as an autoproducer.
- Heat and electricity consumption by military services is reported under Other sectors - non-specified for the first time in 2015. The change is due to the recent authorization to disseminate these data. Previously they were included under Commercial and public services.
- From 2014 data onwards, more data suppliers were involved in submitting energy data to the national administration, causing new autoproducer time series to appear for geothermal and industrial waste plants.
- In 2014 data, some CHP plants running on solid biofuels produced only heat and were reclassified to heat plants.
- The Hungarian administration reclassified some of their plants between 1996 and 2000, which may lead to breaks in the time series.
- Prior to 2000, electricity output from sub-bituminous coal is included with lignite.
- Data on electricity and heat production from solid biofuels in autoproducer CHP plants are available from 1995.
- Autoproducer electricity, CHP, and heat plants using coke oven gas and blast furnace gas were reclassified as main activity power plants in 1998.

Consumption

- Data for direct use of solar thermal heat are available from 2001 and from 1990 for geothermal heat.

Ireland

Sources

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

Coal

General notes

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

Supply

- Rainfall in 2012 led to the lowest peat harvest since IEA records began in 1960, requiring large stock drawdown and increased use of biofuels for electricity generation. In 2013, production targets were met before the end of the year however production continued in order to further build stocks to alleviate the potential impacts of future weather events.
- Low production of peat in 1985 was due to a poor “harvest”, due to an unusually wet summer.
- Production data for peat products (briquettes) are available from 1975.
Transformation

- A reclassification caused a break in the time series for peat consumption in the energy industry own use in BKB/peat product plants from 1989 to 1990.
- 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.

General notes

- In the 2018 edition the Irish administration revised the methodology for reporting final consumption of oil products. This leads to some breaks in series between 2015 and 2016.
- From other sources - natural gas of other hydrocarbons correspond to natural gas blended with refinery gas.
- For confidentiality reasons, inputs of petroleum coke into patent fuel transformation are reported with residential consumption.

Supply

- In the 2020 edition, the Irish administration revised gas/diesel oil and fuel oil consumption in international marine bunkers from 2006 onwards.

Consumption

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

Natural gas

General notes

Since April 2017 there is no gas storage facility in Ireland.

Supply

- Natural gas production has been increasing since 2015, as the Corrib Gas field began production at the end of that year.
- Since 1996, the increase in imports is due to the depletion of the Kinsale gas field and the availability of a new pipeline system to the United Kingdom.

Transformation

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

Consumption

- In the 2019 edition, the Irish administration revised the distribution losses based on new data coming from the Emissions Trading Scheme (ETS), which had a knock-on effect in the final consumption data, primarily for the industry sector.
- In 2011 the increase in non-ferrous metals consumption is due to a fuel switch to natural gas.
- Since 2009, the disaggregation of consumption into all the industry sub sectors excluding non-ferrous metals is done according to data from the Census of Industrial Production (CIP). The last energy consumption data available from the CIP are from 2009 and therefore the 2009-2015 subsector breakdown is the same every year.
• In 2007 the increase in machinery consumption is due to changes in industry sub-sector structure and fuel usage.
• In 2004, there is a break in the time series in food, beverages and tobacco consumption due to a change in methodology.
• In 2003, feedstock use in the chemical and petrochemical industry stopped due to the shutdown of a fertiliser plant.
• In 2001, natural gas consumption in the iron and steel industry stopped due to the shutdown of Ireland’s main steel plant.
• Prior to 1986, detailed consumption figures for the use of natural gas in industry and other sectors are not available.

Biofuels and waste

General notes
• Data for municipal waste are available from 2009.
• Data for solid biofuels and biogases are available from 1990.

Supply
• Due to increased demand from a second waste to energy electricity plant which began operation in 2017, production of municipal waste increased sharply starting in late 2017.
• Prior to 2011, production and trade of biogasoline and biodiesels cannot be distinguished due to confidentiality issues.

Transformation
• Starting in 2016, the increase of electricity production of solid biofuels is a result of a decarbonisation programme and comes from a plant which is co-firing peat and biomass.
• In 2012 and 2013, the renewable fraction of tyre-derived fuel (12%) used by a cement plant was reported by the administration under renewable municipal waste; the non-renewable fraction (88%) was reported under industrial waste.

Consumption
• In the 2020 edition, Ireland started reporting Pipeline transport based on the Emissions Trading Scheme data, available since 2005. The increase in 2016 is due to the coming on stream of the Corrib gas field.
• The Biofuels Obligation Scheme places an obligation on suppliers of mineral oil to ensure that 8.695% (by volume) of the gas/diesel oil they place on the market in Ireland is produced from renewable sources, e.g. bioethanol and biodiesel. The obligation was increased from the 1st January, 2017, from the previous level of 6.383%.
• Despite the Biofuels Obligation Scheme, bioethanol consumption decreased in 2017 because there was a reduction in overall motor gasoline use and of fuel tourism.
• Increases in biodiesel consumption in 2017 are related to the Biofuels Obligation Scheme and to increases in road freight, which is heavily dependent on diesel oil.
• The consumption of pure biodiesel in the industry sector and in road transport refers to one site, which is no longer in operation since 2014.

Electricity and heat

Supply
• In the 2019 edition, revisions were made by the Irish administration for the indigenous production of solar thermal for the years 2011 – 2016.
• Electricity production from wind begins in 1992 and from biogases in 1996. For wind, data for autoproducers are included in main activity producers prior to 2002 for confidentiality reasons.

Transformation
• In 2018, electricity output from other bituminous coal declined due to a 3-month shutdown at Moneypoint power station.
• In 2017, a new municipal waste-fired main activity producer electricity plant (Dublin waste-to-energy) began operations.
• In the 2016 edition, revisions were introduced in the electricity generation by fuel from 2010 due to improved data available from the transmission system operator.
• In 2015, a new combined cycle gas turbine plant began commercial operations at Great Island power station, replacing the existing heavy fuel oil power plant.
• In 2012, a new municipal waste-fired main activity producer electricity plant (Meath waste-to-energy) began operations.
In 2011, very little electricity was produced from pumped hydro following Turlough Hill, Ireland’s pumped storage station, being taken offline in late 2010 up until February 2012. The 2011 values appear as zero due to rounding.

From 1984 to 1989, inputs of hard coal in auto-producer CHP plants have been estimated by the Secretariat.

**Consumption**

- In 2004, the increase of electricity consumption is due to the new light rail transit system in Dublin.
- The decrease of electricity consumption in the iron and steel sector from 2001 onwards is due to Ireland’s main steel plant ceasing production.
- Prior to 1990, electricity consumption in agriculture/forestry is included with residential.
- Electricity consumption in the iron and steel industry includes consumption in the non-ferrous metals industry prior to 1990.
- Data for direct use of geothermal heat and solar thermal heat are available from 1989 and 1990, respectively.

**Italy**

**Sources**

Ministry of Economic Development, Rome.
Terna, Rome.

**General note**

- A change in methodology lead to breaks in time series for industry and transformation between 2003 and 2004.

**Coal**

**General notes**

- The increase in production of coke oven gas in 2012 was the consequence of improvements in scope of reporting. As such, coke oven gas data in prior years should be viewed as under-representing production and consumption, and coke oven efficiencies will likewise appear lower than actual.
- Due to a change in the survey system, breaks in time series may occur between 1997 and 1998 for final consumption.

**Supply**

From 1986 onwards, figures from lignite are given using the same methodology as in the Bilancio Energetico Nazionale.

**Coal**

In the 2018 edition, production of coke oven coke, coke oven gas, coal tar and other recovered gases was revised back to 2014 due to new available information. The revisions increased efficiencies of coke ovens and blast furnaces and led to breaks between 2013 and 2014.

**Other bituminous coal** production ceased in 2016 due to the closure of the one coal mine in 2015.

**Transformation**

- Breaks in the time series between 2014 and 2015 for coke oven gas, blast furnace gas and other recovered gases are due to a reclassification of main activity producers and autoproducers.
- Prior to 2009, sub-bituminous coal used in main activity electricity plants was included with other bituminous coal consumption.
- For data since 2001, calorific values for imports of other bituminous coal and sub-bituminous coal are derived from inputs to main activity electricity generation.

**Consumption**

- In 1991, all industrial activities were reclassified on the basis of ISTAT/NACE 91. This has implied some transfers of activities which may result in some anomalies between 1991 and earlier years.

**Oil**

**General notes**

- For crude oil, statistical difference may arise as trade corresponding to stock held for Austria and Germany in the Port of Trieste are not included.
- Inputs to electricity and heat generation have been estimated by the IEA Secretariat for the years 1984 to 1997 based on submissions of the Electricity and heat Questionnaire. All other data for the years 1992 to 1997 and the detailed consumption breakdown for other years have been estimated by the IEA Secretariat based on Bilancio Energetico Nazionale.

**Supply**

- In 2016 and 2017, the closure of the Val d’Agri oil centre lasting several months led to a decrease in production of crude oil.
From 2009 onwards, transfers of lubricants could not be disaggregated from refinery output data.

From 2004 onwards, increased production of non-specified oil products is due to methodological changes.

A new survey to determine the split between international marine bunkers and domestic navigation caused a break in time series for gas/diesel oil in 1999 and fuel oil in 1996.

**Consumption**

For gas/diesel oil, non-specified use is included in commercial/public services.

Between 1998 and 1999, due to new surveys, breaks appear in the consumption time series.

**Natural gas**

**Transformation**

Prior to 2008, inputs of natural gas to all heat production in industry were reported in final consumption.

Between 2003 and 2004 there are breaks in time series in industry and transformation due to a new data reporting methodology.

From 2000 to 2002, for confidentiality reasons, autoproducers are included in main activity producer plants.

In 1996 the production of gas works gas from natural gas in gas works (transformation) ceased.

**Consumption**

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

**Biofuels and waste**

**Supply**

Biogasoline includes bio-ETBE.

From 2014, a distinction between trade and production became available for other liquid biofuels.

**Transformation**

In 2018, a new biomethane plant was installed leading to increases in biogas blending with natural gas.

2017 is the first year that biogas is blended with natural gas.

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

**Consumption**

From the 2018 data onwards, the increase in biodiesel demand is related to blending obligations.

The final consumption of biogas has been constant from 2013 to 2015, as these figures are the result of a survey which is not carried out annually. Figures are expected to be revised after the next survey.

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

**Electricity and heat**

**Supply**

For 2017, more information became available on fossil fuel use in heat plants allowing additional inputs to be reported for this category. This causes breaks in time series between 2016 and 2017.

The production of electricity reported in the category other fuel sources refers to electricity produced from turbines which are located at pressure drops in fluid transport.

The methodology of data collection for photovoltaic electricity production changed in 2009 and the distinction between main activity and autoproducer plants could not be determined, causing a break in the time series.

Electricity trade with Malta commenced in 2015, following the opening of the Malta-Sicily interconnector submarine power cable in the same year.

**Transformation**

For 2018, the decrease in electricity output from Solar PV was due to lower than solar radiation.

Prior to 2000, electricity used for pumped storage (mixed plants) is included under used for pumped storage (pure hydro pumping plants).

In 2016, the decline in autoproducer electricity generation and sold heat production by oil re-
fineries is partly due to the activities of these units being split off and reclassified as main activity enterprises.

- The methodology of data collection for the geothermal sector changed in 2010, causing a break in time series between 2009 and 2010.
- Prior to 2009, sub-bituminous coal used in main activity electricity plants was included under other bituminous coal.
- With the introduction of a new survey in 2008, amounts of naphtha and other kerosene that were previously included in other oil products have been reported separately in autoproducer CHP plants.
- Prior to 2004, electricity production from orimulsion is confidential and is included with fuel oil.
- Heat production is reported starting in 2004 and includes self-generation in industry.
- From 2000 onwards, the Italian administration defines electricity and heat production from autoproducers as generation from producers that consume more than 70% of their own electricity production. However, for the 2000 to 2002 period, all electricity production from autoproducers is reported with main activity producers.
- The breakdown of renewables and waste inputs into electricity, heat and CHP plants is available from 1989 only. Prior to that year, the total of the different fuels involved is reported as non-specified renewables.
- Prior to 1984, net electricity production by autoproducers includes production from combustible fuel sources only.

**Consumption**

- Some breaks in-series for heat consumption are observed between 2017 and 2018. This is because some large heat producers reported consumption of heat in 2018 in sectors different to those they had reported in previous years.
- Non specified energy industry own use includes electricity consumption for blast furnaces. From 2000, it also includes consumption for the distribution of gas and prior to 1989 consumption for uranium extraction.
- The breakdown of heat consumption by sector is estimated by the Italian administration.
- Revisions of the final consumption of heat by the Italian administration led to breaks between 2010 and 2011.

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

**Latvia**

**Source**
Central Statistical Bureau, Riga.

**General notes**

- Data for Latvia are available starting in 1990. Prior to that, they are included in Former Soviet Union in the publication World Energy Statistics.
- Breaks in the time series appear for inputs to and outputs from electricity generation between 2016 and 2017 due to a change in methodology. This is most notable for main activity producer CHP and Heat plants. Data for 2017 onwards are reported on a unit basis, whereas data for previous years are reported on a plant basis.

**Coal**

**Supply**

- The increase of distribution losses for peat in 2003 is due to a fire in one of the warehouses.

**Consumption**

- The drop in the iron and steel industry in 2014 is due to the bankruptcy of the major company in the market.

**Oil**

**Supply**

- Other hydrocarbons data represent shale oil.
- In 2018, amendments to the legislation mandated a biofuel blending target of at least 4.5% of volume for gas/diesel oil used in temperate and severe winter conditions leading respectively to an increase of its consumption for road transport.
- In 2018 one of the main players in marine bunkering at Latvia’s largest port ceased operations. As a result deliveries of oil products to marine bunkers decreased in that year. As of 2019 the issues have been resolved and bunkering activity is expected to resume.
Natural gas

Consumption

• The consumption in the iron and steel industry decreased in 2014 due to the bankruptcy of the major company in the market.

Transformation

• In 2017 there was a steep decrease/break reported in main activity producer CHP consumption and a respective increase/break in main activity producer heat consumption due to the classification of natural gas inputs according to the individual units of the plants instead of the plants as a whole that was previously used.

Biofuels and waste

Supply

• For 2018 data, the increase in the indigenous production of solid biofuels is due to wood pellet production.

• In 2017, a biodiesel producer exported amounts produced in 2017 and also some amounts from stocks.

Transformation

• Due to a reclassification in 2004, there was break in time series of electricity production from auto-producer electricity plant fuelled by biogas between 2003 and 2004.

Consumption

• The increase in consumption of solid biofuels in not elsewhere specified (industry) in 2018 is related to increases in the manufacture of furniture sector.

• The increase in inland consumption of biodiesel in 2018 data are related to the implementation of favourable legislation (the “Biofuel Law”).

• The increase in supply for solid biofuels from 2016 to 2017 is due to increased usage in the industry sector.

• From 2014, biodiesel consumption has been decreasing due to policies which support the sale of arctic diesel fuel without renewable additives.

Electricity and heat

Supply

• For 2017, higher rainfall resulted in a significant increase in electricity output from hydro, and a decrease in both imports of electricity and output from combustible fuels.

• Heat production from other sources represents waste heat recovered from industry, and heat produced by condensing economisers.

Transformation

• From 2012 onwards, the increase in electricity production from solid biofuels is due to the deployment of six new main activity producer CHP plants running on wood chips.

Consumption

• Prior to 2018 data, electricity consumed by trams at one of Latvia’s three tram operators was included under road.

• For 2012, the increase in electricity consumption in the iron and steel sector is due to a facility switching from an open hearth furnace to an electric arc furnace.

Lithuania

Source

Statistics Lithuania, Vilnius.

General notes

• Data for Lithuania are available starting in 1990. Prior to that, they are included in Former Soviet Union in the publication World Energy Statistics.

Natural gas

Supply

• The export quantities since 2014 represent imported LNG which is regasified and subsequently exported to other countries.

Transformation

• Not elsewhere specified (transformation) data represent natural gas used for methanol manufacture, which is used as input in oil refineries.
Consumption

- **Natural gas** consumption for power generation has been falling significantly from 2010 onwards as gas-fired power and heating plants are being retired, largely replaced by biomass.
- There is a break between 2010 and 2011 in the not elsewhere specified (energy) timeseries due to natural gas being consumed for heat that was used to destroy radioactive waste after the decommissioning of the only Lithuanian nuclear plant at the end of 2009.

Biofuels and waste

**Supply**

- The production of charcoal has been over-estimated prior to 2017 due to the fact that it was not possible to report data less than 1 kt.
- Starting from 2016, some industrial waste (renewable) was collected via sorting. These wastes consist of non-recyclable paper, textiles and wood wastes and their production is included in solid biofuels.

Transformation

- The Fortum Klaipėda CHP plant produces electricity and heat from industrial waste (non-renewable), municipal waste and solid biofuels since the end of 2013. Since its inception, structural optimisation has been sought. Additionally, before 2016, calorific values of the fuels were calculated by taking samples of fuels and after this period, calculations were made from steam. For these reasons, there are fluctuations in fuel inputs, energy production and fuel ratios between industrial waste (non-renewable), municipal waste and solid biofuels since 2013.
- In 2013, an incinerator combusting industrial waste (non-renewable) and municipal waste began operations.

Electricity and heat

**Transformation**

- In 2009, the Ignalina nuclear power plant, the only nuclear plant in Lithuania, closed down.
- In March 2017, the Geoterma geothermal heat plant, the only geothermal heat plant in Lithuania, closed down.

Luxembourg

Source

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

Coal

**General notes**

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

Oil

**Consumption**

- In the late 1970s, the reduction in consumption of fuel oil in the iron and steel industry was due to substitution by coal.

Natural gas

**General notes**

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

Transformation

- In the 2017 edition a main activity producer CHP plant was reclassified as one main activity electricity producer plant and one main activity producer heat plant. Data were revised back to 2014.
- Since 2002, the increase in the transformation sector is due to a new 350-MW combined cycle power plant.
- The last main activity producer electricity gas-consuming plant closed in 2016.

Consumption

- In 2015, Luxembourg integrated supplementary data from ETS companies and industrial consumption was revised back to the year 2000.

INTERNATIONAL ENERGY AGENCY
• The breakdown of total final consumption for the latest year is preliminary and will be finalised in the next edition of the book.
• Since 2012, the methodology to determine final consumption was changed in order to integrate basic data from National Accounts.
• Since 2000, a more detailed breakdown of final consumption data is available due to a change in methodology.
• Since 2000, consumption in the non-ferrous metals sub-sector is included in iron and steel for reasons of confidentiality.
• Since 2000 consumption in not elsewhere specified (Industry) includes activity of companies re-classified to preserve the confidentiality.
• Prior to 2000, residential consumption includes consumption in commercial/public services and agriculture/forestry.

Biofuels and waste

General notes
• The Luxembourgian administration started including trade figure of wood chips in trade figure of solid biofuels from 2015 data. This creates breaks in time series between 2014 and 2015.
• Data on solid biofuels are available from 1992.

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

Electricity and heat

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

Supply
• Most of the hydro production shown for Luxembourg is from the Vianden pumped storage plant and is exported directly to Germany.
• Starting in 2005, data for electricity transmission and distribution losses were obtained from the network operator. Prior to that, they were estimated by the Luxembourgian administration.
• In the 2017 edition, following plant reclassification, heat production by main activity plants was revised from 2011 onwards.

Transformation
• A natural gas-fired, main activity electricity plant (TGV Twerinerg) closed in 2016.
• The production of electricity from solid biofuels from 2013 corresponds to the opening of a new plant burning wood wastes.
• Data on electricity production from biogases are available from 1998 and heat production from 2010.
• In 2002, the increase in electricity production is due to a new natural gas combined cycle power plant.
• In 2002, the increase in electricity production is due to a new natural gas combined cycle power plant.

Consumption
• Heat consumption in industry is estimated based on National Accounts. When not available, heat consumption figures for the most recent year reported are estimated based on data for the preceding year.
• In 2015, the observed declines in the heat used in the textiles and leather and chemical and petrochemical sectors lead to the closure of two industrial main CHP plants. The heating needs of these sectors were met through direct purchase of natural gas, due in part to attractive pricing during this period.
• In 2015, following the procurement of new information, data for heat distribution losses and heat consumption in industry and energy sectors were revised from 2000 onwards.
• A change in the data source caused some breaks in the industry electricity consumption time series between 2010 and 2011.
• The breakdown of electricity consumption in industry is not available from 1990 to 1999.
Poland

Source
Central Statistical Office, Warsaw.

Coal

General notes
- Other recovered gases which appear in the balances as output from blast furnaces also include off-gases from zinc and copper smelting, ceramics kilns and steel production, thus artificially increasing the overall efficiency of blast furnaces when calculated.
- Prior to 2016 data, other bituminous coal includes anthracite.

Transformation
- For the 2018 and 2019 editions, the Central Statistical Office has revised their methodology which accounts for sold heat produced from autoproducer heat plants using coking coal and other bituminous coal, resulting in lower, but more accurate data for 2007 onwards.

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

Oil

General notes
- From 1997, production from other sources (natural gas) of other hydrocarbons corresponds to hydrogen used in refineries, also represented as the output of non-specified transformation in the balances format.

Supply
- Between 2016 and 2017, a break in series for stocks of refinery feedstocks results from a change in reporting methodology.
- In 2018 new legislation introduced a biofuel blending obligation for liquid fuels. The effects of this policy can be seen throughout 2017, as companies prepared for the implementation of the new directive, and in 2018 once the directive came into force.

Transformation
- In 2017 lower refinery activity is linked to maintenance activities at several refinery installations across the country.
- Prior to 1998, inputs of gas/diesel oil and heavy fuel oil to autoproducer CHP in petroleum refineries have been included in the transformation.

Consumption
- In 2016 regulatory changes affecting the customs and tax authorities meant that consumption of fuel in the informal economy decreased.
- In 2015, a new flue-gas desulphurisation unit was installed. As this unit facilitates high sulphur fuel oil burning in place of natural gas, this explains the increase in fuel oil consumption in oil refineries.

Natural gas

Supply
- Exports include all the natural gas sold by companies operating in Poland (these are mainly re-exports).
- Natural gas reported in associated production contains some heavier hydrocarbons. This results in a high gross calorific value for production.

Transformation
- Non-specified transformation data represent natural gas used for hydrogen manufacture. This hydrogen is used for hydrodesulphurization in oil refineries.
- In 2013 and 2014 some CHP plants were used as backup reserve plants, resulting in a decrease in consumption under main activity producers CHP plants.
In 2004 and 2005 small amounts of natural gas were used to start up main activity electricity plants.

In the 2017 data, local small-CHP & heat plants were reclassified from the commercial/public services to the transformation sector and the residential sub-sector.

**Consumption**

- Distribution losses may include some statistical differences.
- Non-specified energy includes gas used for heating and pumping operations in the distribution network.

**Biofuels and waste**

**General notes**

- Several breaks in the industrial waste time series are caused by difficulties in the classification of wastes.
- In the 2018 edition, solid biofuels were corrected for 2015 data.
- There is a break in time series between 2015 and 2016 for biogases due to reclassification from autoproducer to main activity plants.
- The increases in municipal wastes starting in 2016 are related to two new plants.
- Data on biodiesels are available from 2005; biogasoline data from 2003; and other liquid biofuels data from 2009.
- In 2008, a new questionnaire was launched which increased the coverage of renewable and waste data.

**Supply**

- Under current Polish law, only producers and importers of biodiesel are obliged to fulfil the National Indicative Target of share of biofuels in the total usage of transportation fuels. Since the regulation is currently not applied to retail distributors they, for economic reason, rather export the biodiesel than sell it domestically. This results in low domestic consumption and increase of exports in 2016.
- Production of other liquid biofuels increased in 2015 because new companies started to report their biofuels production to the Polish administration.

**Transformation**

- In 2017, heat production from autoproducer CHP and heat plants burning municipal wastes increased due to two new plants.
- Before 2000, industrial waste was used interchangeably with light fuel oil in some plants, which might result in breaks in the time series.

**Consumption**

- The decrease in the consumption of biodiesel in the road sector in 2017 is related to an unfavourable pricing scheme on the domestic market, causing consumers to choose diesel and producers to export or blend the biodiesel they produced.
- The consumption of solid biofuels in non-metallic minerals decreased in 2017 because modern clinker ovens have been replacing solid biofuels with municipal wastes.
- Increases in consumption of biodiesel in 2016 are related to a policy change in the middle of the year.
- Data for biogases refer only to the gas from fermentation of biomass.
- Until 1998, data for industrial waste include other recovered gases which have to be reported in Coal questionnaire, causing a break between 1997 and 1998.
- Between 1992 and 1993, due to data availability, there is a large increase in solid biofuels for residential, commercial/public services and agriculture/forestry.

**Electricity and heat**

**General notes**

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

**Supply**

- Electricity and heat from chemical heat and other sources are available from 2011. Prior to that, these amounts could be included under different categories.
• **Heat** distribution losses are available from 2004. Prior to that they are included in consumption.

• **Heat** production from heat pumps is available from 2009.

**Transformation**

• Starting with 2017 edition and following, the Polish administration revised electricity production data from power plants run by combustible fuels, reclassifying those that were previously reported as main activity CHP as main activity electricity plants. These revisions mainly affected coal-fired power plants and created breaks in time series from 2004 onwards.

• State support for biomass co-firing was reduced in 2016, resulting in electricity production from solid biofuels falling during this period.

• Due to a reclassification of plant types, there is a break in time series in 2015 for the generation of heat in autoproducer CHP plants in the iron and steel sector.

• In 2008 and 2014, a number of CHP plants were reclassified from autoproducer to main activity producer due to an industry re-organisation.

• Data for electricity production in autoproducer electricity plants are available from 1986.

• Prior to 2013, electricity used for pumped storage (mixed plants) is included under used for pumped storage (pure hydro pumping plants).

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

• Data for direct use of geothermal heat are available from 2000 and direct use of solar thermal heat in commercial/public services from 2002 and in residential from 2009.

• In the 2017 edition, the Polish administration reclassified some amounts of electricity consumption from the chemical and petrochemical sector to oil refineries, following access to improved survey methods.

**Consumption**

• Electricity consumption in Road refers to consumption in designated public charging spots. Charging of vehicles in a residential setting is included in Residential consumption.

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**Portugal**

**Source**

Direcção-Geral de Energia e Geologia, Lisbon.

**Coal**

**General notes**

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

**Consumption**

• Between 1997 and 2001 gas works gas was gradually replaced by natural gas in the commercial/public service and residential sectors.

• The production of pig iron ceased in the first quarter of 2001, leading to decreases in supply and consumption of coking coal, coke oven coke, coke oven gas and blast furnace gas in 2001.

**Oil**

**General notes**

• The increase in refinery throughput in 2015 is a result of increased refinery capacity linked to the expansion of the Sines refinery.

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

**Supply**

• Production from other sources (natural gas) of other hydrocarbons corresponds to hydrogen used in refineries, also represented as the output of non-specified transformation in the balances format.

• Scheduled oil refinery maintenance lasting two months in 2018 affected the production and exports of secondary oil products.

**Consumption**

• Due to an investment to increase capacity, petrochemical plant operations were stopped for almost five months, thereby decreasing the consumption of naphtha and LPG for non-energy use in 2018.
• Consumption of gas/diesel oil in industry and commercial/public services represents diesel use in mobile fleets.

Natural gas

Supply
• In February 1997, Portugal started to import natural gas.
• The surge in 2017 imports is attributed to the consumption of gas-fired power plants that filled in the gap of decreased hydro-generation due to a drought.

Transformation
• Since 2012, data reported for non-specified transformation represent natural gas used for hydrogen manufacture. Prior to this year, these quantities are reported under oil refineries.
• The 2002 decrease in natural gas used for gas works (transformation) is due to the closing of the Lisbon gas works plant in May 2001.

Biofuels and waste

General notes
• Charcoal data for 2018 (indigenous production and residential sector) are delayed. Revisions are expected in the future.
• Data for solid biofuels were revised in a previous publication by the National administration from 1990 to 2001, which may result in breaks in time series between 1989 and 1990.
• Data are available from 1994 for biogases, from 1999 for municipal waste and from 2003 for industrial waste.

Consumption
• The use of biogasoline for blending decreased in 2017 because it is no longer compulsory to use biofuels in gasoline.
• Data for solid biofuels were further revised based on a new survey on industry, resulting in breaks in sub-sectoral consumption for 2012.
• Between 2009 and 2010 a new survey on energy consumption in households creates a break in time series in the solid biofuels consumption in residential time series.

Electricity and heat

Supply
• Data for production of electricity from solar photovoltaic and wind are available from 1989.
• The large decrease in electricity output from hydro for 2017 is due to decreased rainfall.

Transformation
• For 2016 data onwards, heat and electricity production from chemical sources have been reclassified as autoproducer CHP production from industrial waste, causing cessation of the heat and electricity generated from heat from chemical processes time series, and causing breaks in the industrial waste time series between 2015 and 2016.
• Electricity production from other oil products refers to methanol.
• In the 2017 edition, the data for production of electricity by autoproducer hydro plants were revised between 1990 and 1999, according to a new national methodology.
• In 2007, some power plants that were previously reported as main activity CHP have been reclassified as autoproducer CHP.
• In 2007, the power station that burns industrial waste started to work as a CHP plant, whereas previously it was only producing electricity.
• New plants fuelled by solid biofuels and by municipal waste started in 1999.
• Prior to 1992, data for electricity production by autoproducers include production from combustible fuel sources only.
• Data for production of electricity in main activity producer CHP plants and the associated fuel inputs are not available prior to 1980.

Consumption
• In the 2017 edition, the Portuguese administration reclassified some amounts of heat consumption from the residential to the commercial and public services sector for the period 1998 to 2014 following a new national methodology.
• Data for direct use of solar thermal heat is available from 1989 and direct use of geothermal heat from 1994.
Slovenia

Source
Statistical Office of the Republic of Slovenia, Ljubljana.

General notes
- Breaks in the time series appear for inputs to and outputs from electricity generation between 2017 and 2018 due to a change in methodology. This is most notable for lignite-fired main activity producer CHP and electricity-only plants. Data for 2018 onwards are reported on a unit basis, whereas data for previous years are reported on a plant basis.
- A new energy data collection system was implemented in January 2001, causing some breaks in time series between 1999 and 2000.
- Data for Slovenia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.

Coal

Transformation
- From 2018, there is a change in methodology for reporting CHP generation which reflects in new figures in only-electricity production. Revisions prior to 2018 are not expected.
- In 2015, one of the main activity electricity plants burning lignite ceased its operations.

Oil

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

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

Natural gas

Transformation
- In 2014, improvements in a main activity producer CHP plant resulted in a substantial reduction of natural gas consumption in this sector.

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

Biofuels and waste

Consumption
- Increases in consumption of biodiesel starting from 2017 are the result of an amended energy policy, which went into effect in mid-2017.
- The break in time series between 2008 and 2009 for solid biofuels is due to revisions based on a new household survey which is to be carried out on an annual basis.
- Breaks in total final consumption for industrial waste prior to 2008 are a result of a sectoral re-classification.

Electricity and heat

Consumption
- Breaks occur between 2017 and 2018 for electricity consumption data (in particular, for Machinery and Construction) due to a change in the sample frames and sample sizes used in surveys.
- Data on electricity consumption in Road are available from 2017.
- In 2017, the apparent increase in electricity consumption in Rail is due to improved data provided by a new survey launched by the Ministry of Infrastructure in 2018.
- Direct use of solar thermal and geothermal heat is available from 2009.
- Surveys for data on heat consumption are available from 2003 onwards for the residential, industry and energy sectors. Prior to 2003, the data have been estimated by the Slovenian administration.
United Kingdom

Source
Department for Business, Energy and Industrial Strategy (BEIS), London.

Coal

General notes
- In light of the changes to the coal industry in recent years, the statistical differences for other bituminous coal and coking coal could be significant in 2018 data. Closures of coal distributors and mines reduce the sample that inputs into some models. A more accurate breakdown will be provided in the next year publication.
- Oxygen steel furnace gas data are reported with blast furnace gas rather than as other recovered gases.
- In the 2017 edition, calorific values of other bituminous coal were revised for the period 2002-2015 due to a change in the methodology, impacting all flows.
- Prior to 1994, the consumption of substitute natural gas is included with natural gas while its production is included with gas works gas.

Supply
- Underground production of other bituminous coal in 2016 decreased due to the closure of Hatfield, Thoresby and Kellingley mines.

Transformation
- The consumption of solid biofuels increased in 2015, as the largest power station in the UK converted a further unit from coal to biomass mid-year, and the previously converted unit had a full year of operation in 2015 rather than just the last few months of 2014.
- The market decline in use of other bituminous coal from 2013 onwards for autoproducer electricity generation was due to a plant being sold to a dedicated main-activity electricity producer.

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

Oil

General notes
- There is a break in series between 2015 and 2016 due to a change in methodology and estimation process applied in the 2020 edition, which involves including data from trade body members and major suppliers.
- Breaks in time series occur for LPG between 2007 and 2008 due the inclusion of additional information from the petrochemical sector.
- For international marine bunkers and domestic navigation, a different bunkers methodology is applied from 2008, in line with UK’s National Atmospheric Emissions Inventory. From 2013 onwards, improved data are available for international marine bunkers. Deliveries to international marine bunkers may be underestimated in previous years.
- For consumption of oil products, the UK administration revised its methodology from 2008 to better track consumption of imported oil products and domestically refined oil products sold through third parties to final consumers.
- Breaks in time series appear in 2013 for ethane, naphtha, white spirit, lubricants, bitumen, petroleum coke and other oil products, as new information became available on the energy use of these products.

Supply
- Indigenous production of crude oil and natural gas liquids increased in 2018 primarily due to multiple new projects coming online at the end of 2017.
- Refinery output of total oil products decreased in 2018 due to relatively high levels of maintenance throughout 2018.
- From 2008 data on naphtha and motor gasoline better reflects the blending of these products. Breaks in series may appear between 2007 and 2008.
- Between 2007 and 2008 breaks in time series appear for NGL as a result of the UK administration obtaining additional information on the destination of some upstream NGL. Previously classified as exports, these amounts now appear as transfers, mainly to LPG, then as consumption in the petrochemical sector.
- Between 2002 and 2004 products transferred include backflows and interproduct transfers. From 2005 onwards backflows are estimated by the UK administration.
- Condensates are reported in NGL from 1980 and in crude oil until 1979.
- LPG includes ethane until 1980.
- Other hydrocarbons, reported until 1994, correspond to bitumen production from coal.

**Consumption**
- Breaks in time series may occur in the consumption of gas/diesel oil between 2011 and 2012, following the UK administration’s improved access to customs trade data, in particular duty figures for demand in agriculture.

**Natural gas**
- Since 1992, distribution losses include metering differences and losses due to pipeline leakage.

**Supply**
- In the 2018 edition, UK administration revised the supply balance back to 2008 to update Norwegian imports from two terminals previously reported as indigenous production.
- In 2002, the increase in imports is due to increased supplies from the Norwegian sector of the North Sea through the Vesterled pipeline, which was commissioned in the 4th quarter of 2001.
- In 2017 data the decreased closing stock level is related to the cessation of storage operations in Rough, UK’s single largest storage facility.

**Transformation**
- The natural gas reported in coke-oven (transformation) is used to form synthetic coke oven gas rather than undergoing a coking process.

**Consumption**
- In the 2018 edition, natural gas consumption in the sectors of industry, residential, commercial/public services, was revised back to 2008 to include information from other data sources such as the Purchases Inquiry, EU ETS and ONS Index of Services and Production.
- In the 2019 edition, the UK administration proceeded to revisions back to 2015 based on improved data from the Purchases Inquiry annual survey of the Office of National Statistics (ONS).
- Before 2008, the commercial sector consumption is included in non-specified other, while that of public services is shown separately.
- Between 2007 and 2008 there are some breaks in time series in sectoral consumption due to a new methodology of data estimation.
- Natural gas consumption includes substitute natural gas made at gas works and piped into the natural gas distribution system.
- Non-specified industry represent to sales by independent gas suppliers unallocated by category.
- Consumption by the mining and quarrying and the wood and wood products sectors is included in non-specified industry.
- Non-specified energy includes gas used for heating and pumping operations in the distribution network.

**Biofuels and waste**
- In the 2017 edition, the UK government revised the data time series for municipal waste and solid biofuels back to 2001. As a result, breaks in time series may occur between 2000 and 2001.

**General notes**
- In the 2017 edition, the UK administration started collecting data from the main-activity solar PV companies. Prior to this, all data were included under autoproducers.
- The consumption of solid biofuels has increased in 2015, as the largest power station in the UK halfway through the year converted a further unit from coal to biomass, plus the previously converted unit had a full year of operation in 2015 rather than just the last few months of 2014.
- Prior to 2013, due to data confidentiality reasons, one or two main-activity municipal waste plants had to be included within the autoproducer plant category. Since 2013, as there have been at least three main-activity companies, these plants have been reclassified from autoproducer plant to main activity electricity plant, with some CHP plants included under main electricity due to confidentiality reasons.
**Consumption**

- The UK administration undertook a survey of domestic wood consumption in 2015 and revised figures back to 2008. This resulted in breaks in time series for **solid biofuels** consumption in residential between 2007 and 2008.
- In the 2020 edition, there are some unusual patterns in the *industry* sector for **municipal wastes** and **solid biofuels**, however revisions are expected in the following cycle.
- In the 2018 edition, following a review of the consumption of **biogases** and **municipal wastes** for 2015 and 2016 data, data that were allocated to other sectors have been reallocated to the industry sectors. This has caused a break in time series between 2014 and 2015.

**Electricity and heat**

**General notes**

- For the United Kingdom, it is necessary to combine figures for main activity producers and autoproducers in order to prevent the disclosure of information relating to less than three electricity generating companies, since this information is considered confidential. For this reason, data for main activity producer CHP plants have been included with autoproducer CHP plants from 1988. Prior to 1988, electricity output from CHP plants was included with autoproducer electricity plants.
- The re-organisation and subsequent privatisation of the electricity supply industry in 1990 has resulted in some breaks in time series.

**Supply**

- Data for **off-grid solar PV** are currently not available in the United Kingdom but the addition of this data is expected in the future.
- Large declines in electricity generation from **coal**-fired power since 2013 are due to concrete plans to phase out coal use for electricity generation entirely by 2025. Alternative generation has been supplied by increases from other sources, including **biomass**, **natural gas**, **nuclear**, **solar** and **wind** generation, and increases in imports through undersea HVDC interconnectors.
- Electricity production data for **solar PV** are available from 1999.
- The launch of a feed-in-tariff scheme in April 2010 resulted in a rapid increase of capacity and corresponding electricity production growth from **solar PV** in the following years.
- In 1996, the break in electricity production from **nuclear** is due to a reclassification of plants from autoproducer to main activity producer plants.
- Data on electricity production from **wind** is available from 1989.

**Transformation**

- For 2018, the decrease in electricity output from **nuclear** was due to plant outages for maintenance.
- **Electricity** used for pumped storage (mixed plants) is included under used for pumped storage (pure hydro pumping plants) for confidentiality reasons.
- In 2007, outputs of electricity from **petroleum coke** are included in **fuel oil**.
- Prior to 2003, all outputs of electricity and heat from **oil products** are reported in the other oil products category.
- **Heat** production from autoproducers is available starting in 1999.
- Inputs and output from **natural gas** for main activity producer electricity production are included in autoproducer electricity for 1990 (for reasons of confidentiality).

**Consumption**

- For the 2019 edition, a change in methodology was applied for **heat** consumption figures from 2015 onwards. Due to new information regarding the purchasing and reselling of heat, consumption previously included under the **Commercial and Public services** sector was reallocated to the **Residential** sector.
- For 2017, the decrease in electricity consumption in **mining and quarrying** is due to omission of one company from dataset.
- Prior to 2010, consumption in **mining and quarrying** is included in the **non-metallic minerals** sector.
- **Electricity** consumption in **coal mines** includes consumption in **patent fuel plants**.
- Data for **electricity** consumption in transport was classified by sub-sector only starting from 2004 resulting in a break in time series between 2003 and 2004. Prior to 2004, **non-specified transport** includes consumption for traction by urban rails.
and road vehicles, and consumption for non-traction by railways and bus stations and airports. From 2004 onwards, road vehicles consumption is included under road transport. Prior to 2004, electricity consumption in rail refers to industrial rail only. From 2004 onwards it includes both industrial and urban rail.

- Consumption in the machinery sub-sector includes that of the transport equipment industry before 1996.
- Starting in 1990, small amounts of electricity used in heat pumps have been included in residential.
- From 1984 onwards, the electricity consumption in the non-specified industry sector includes that of the wood and wood products sub-sector (except 2010-2014, when estimates were supplied by the UK) and unallocated consumption. The unallocated consumption comes from data reported as ‘Other industries’ by companies and includes Standard Industrial Classification (SIC) codes 7, 22, 31, 32, 33.19, 36, 38.3.
- Electricity consumption in energy non-specified sub-sector is primarily made up of ‘gas and electricity supply’ and includes Standard Industrial Classification (SIC) codes 24.46 and 35. However, prior to 1990, consumption in gas works includes electricity use in the transmission/distribution of public supply gas.
- For autoproducers, due to data availability constraints, heat is assumed to be consumed within the same sector as it is generated.

### United States

**Source**
US Energy Information Administration, Washington D.C.

**General notes**
- Starting with 2017 data, inputs to and outputs from electricity and heat generation include Puerto Rico.
- End-use energy consumption data for the United States present a break in time series with historical data due to a change in methodology in 2014. The break in time series occurs between 2011 and 2012 for oil; and between 2001 and 2002 for electricity and natural gas. The new methodology is based on the last historical year of the most recent Annual Energy Outlook (AEO) publication. Changes occur primarily in reported end-use energy consumption in the industrial sector and its subsectors, including the non-manufacturing industries of mining, construction and agriculture. Historical revisions are pending. Due to other changes in reporting methodologies, there are numerous breaks in time series for the US data, particularly in 1992, 1999, 2001, 2002 and 2013. Care should be taken when evaluating consumption by sector since inputs of fuel to autoproducers are included in final consumption for some years. No data are available for most energy products in the construction and mining and quarrying industries.

### Coal

**General notes**
- The statistical difference for anthracite is significant for some parts of the time series as some consumption falls below the reporting thresholds, such as residential usage.
- Since the Energy Information administration (EIA) and the US Department of Commerce do not collect separate data on patent fuel exports by country, total exports data of patent fuel are included in the exports of other bituminous coal.
- Coal tar as a by-product of coke ovens is not currently reported.
- In 2002, the United States reported “synfuel” production as patent fuel for the first time. Prior to 2002, the consumption of this fuel was reported with other bituminous coal. Production ceased in 2007 for economic reasons.

**Supply**
- Other sources coal production represents coal production that does not have a Mine Health and Safety Administration (MSHA) identifier.

### Oil

**General notes**
- In the 2018 edition, the US administration revised data back to 2011 for several products owing to the introduction of a number of methodological changes. This results in a number of breaks in the time series between 2010 and 2011, particularly in the consumption data.
• From 2011 onwards, olefins are reported under other oil products instead of LPG.

• Breaks in time series due to methodology improvements and newly available information to the US administration also appear in historical data: in 1990 for fuel oil (new methodology for marine bunkers); in 1992 for LPG/NGL (specific densities); in 1993 for oxygenates (new collection system to accommodate the revised Clean Air Act); in 1994 for motor gasoline (new model from the US Department of Transportation); in 1999-2000 for industry consumption (new available data from the 2002 MECS survey); in 2001 for fuel oil (changes in methodology for classifying imports of unfinished oils) and in 2011 for refinery gas (new density).

Supply

• Deliveries to international marine bunkers of gas/diesel oil have been estimated by the IEA Secretariat for 2016 and 2017 based on information provided by the EIA.

• In the 2018 edition, the breakdown of exports by destination of low sulphur fuel oil and high sulphur fuel oil is not available. The time series was revised back to 2011.

• Completion of the Utopia pipeline from Ohio to Ontario has facilitated more ethane exports to Canada in 2018.

• High statistical differences for crude oil represent “unaccounted for crude oil”, the difference between the supply and disposition of crude oil.

• From 2013, the US administration reports exports of refinery feedstocks, some of which were previously reported under white spirit and SBP.

• Stocks changes for gas/diesel oil, fuel oil and petroleum coke were estimated by the IEA Secretariat from 1996 onwards to include stock changes at utilities.

Transformation

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

Consumption

• In 2018 demand for petrochemical feedstocks derived from oil products increased following new ethylene production capacity coming online and the ramp up in polyethylene capacity. This trend is expected to continue through 2019 as further ethylene capacity comes online.

• Between 2010 and 2011, end-use energy consumption data for the United States present a break in time series due to a change in methodology. For the period 2011-2016, quantities of non-energy use of LPG in chemical and petrochemical, and of other oil products in non-specified industry have been estimated by the IEA Secretariat.

• From 2013 onwards, road use lubricants are reported under non-energy consumption in transport equipment, machinery, and wood and wood products. Previously, such quantities were reported under non-specified industry.

• From 1995 onwards, LPG inputs to gas works are included in industry.

Natural gas

General notes

• Puerto Rico is currently not included in US data for natural gas with the exception of gas consumed for electricity generation. LNG imports into Puerto Rico are reported in the Other non-OECD Americas regional aggregate.

Supply

• In the 2017 edition of this publication, the indigenous production data for 2014 was revised by the US administration creating a break in the time series between 2013 and 2014 due to a change in methodology. In addition, this increased the statistical difference that remained high in 2015 and 2016.

• The exports have been increasing since 2015, due to new liquefaction capacity (i.e. Sabine Pass) coming online at the end of that year.

Transformation

• Since 2012, data reported under non-specified transformation represent natural gas used for hydrogen manufacture. Prior to 2012, these quantities are reported under the chemical and petrochemical sector.

• Between 1999 and 2000, there are some breaks in time series for the transformation subsectors due to a new data reporting method.

• Between 1990 and 2002, the amounts of gas works gas that are blended with natural gas have
been estimated on the basis of the output efficiency of the process.

- Since 1989, consumption by autoproducer CHP plants is available, while consumption by autoproducer electricity and main activity producer CHP plants is available since 1991. Prior to these years, these consumptions are included with industry and commerce/public services.

**Consumption**

- In the 2019 edition, revisions were made to the industry sector from 2015 onwards, by reallocating natural gas consumption to the chemical and petrochemical sub-sector from other industrial sub-sectors.
- Due to revisions made to the iron and steel model, there is a break in the time series between 2014 and 2015 for the consumption in blast furnaces (energy).
- Until 2001, agriculture/forestry consumption is included under industry.
- From 1995 to 2001, the detailed breakdown of industry consumption is estimated by the Energy Information administration using the Manufacturing Energy Consumption Survey (MECS), which is conducted quadrennially.
- Prior to 1995 a detailed breakdown of industry consumption is not available (between 1990 and 1994, chemical consumption is estimated by the American administration).
- In 1991 data on natural gas use in the road sector were collected for the first time, and are not available for previous years.
- Non-specified energy industry own use represents natural gas consumed for the production of ethanol.
- Consumption in fisheries is included under industry.

**Biofuels and waste**

**General notes**

- The EIA assumes all industrial waste is non-renewable.
- Due to the change in reporting methodology for liquid biofuels, breaks in time series occur between 2009 and 2010. This is especially noticeable in the biodiesel time series.

- Supply

- Data for production of industrial waste have been decreasing since May 2014 due to reclassification, resulting in a break in series between 2013 and 2014.
- Indigenous production of biodiesel is estimated in 2010 based on the EIA’s Monthly Energy Report.

**Transformation**

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

**Consumption**

- Due to an improved estimation, there are some breaks in time series of the industry sector and other sectors between 2009 and 2010: for industry, geothermal, biogases and industrial waste (paper, pulp and printing); for other sectors, geothermal and solar thermal.

**Electricity and heat**

**General notes**

- Geothermal supply and inputs to transformation data are estimated by the IEA Secretariat starting in 2009 because of efficiency discrepancies.
- Between 2001 and 2002, there are breaks in time 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.

**Supply**

- There is a break in series for geothermal and solar thermal direct use data between 2017 and 2018 as a new methodology for reporting these data was adopted with 2018 data.
- The IEA Secretariat estimated US solar PV electricity generation from autoproducers starting in 1999 by multiplying the dispersed and distributed PV capacity estimated by the US administration by an average capacity factor of 12%. The capacity factor was based on a report published in 2007 by the IEA Photovoltaic Power Systems Programme, Cost and Performance Trends in Grid-Connected Photovoltaic Systems and Case Studies. The corresponding consumption of electricity has been included under non-specified other.
- Data for electricity inputs to and outputs from pumped storage hydro plants became available starting in 1987.
- Discrepancies occur between respective reported figures for electricity trade between the US and Mexico from 2013 onwards, and between the US and Canada from 2016 onwards. This is in part due to a change in source for US electricity trade figures, which creates a break in series between 2015 and 2016.

**Transformation**

- **Electricity** inputs to both mixed hydro and pure pumped storage pumping plants are reported under inputs to pure pumped storage.
- **Offshore wind** production began in 2016.
- Beginning with 2016 data, the calculation for heat production in CHP plants has changed, resulting in breaks in time series. The United States administration is currently unable to apply this methodology to historic years, so will only cover heat data for 2016 onwards. As a result of this methodology change, several combustible fuel power plants have their overall efficiency values increased, recording increased heat production. The previous methodology existed for the years 2006 to 2015, so further breaks exist between 2005 and 2006.
- For 2016, electricity and heat generation from some types of coal and some plant types were estimated by the IEA Secretariat, based on initial submission from the US administration and subsequent reclassification of portions of this coal between coal types.
- Accurate accounting of coke oven gas and refinery gas inputs is not always possible, which can lead to efficiencies of over 100% in main activity producer CHP plants.
- **Other sources electricity** production represents purchased steam and waste heat from industries.
- The low efficiencies from 2011 for other bituminous coal autoproducer electricity plants are due to the fact that one unit; the Albany Brewery Power Plant only produces unsold heat, and is reported in the wrong category of plant.
- From 2007 to 2009, heat from industrial waste includes recovered heat from industrial processes. From 2010, the electricity produced from recovered heat is reported under other sources.
- The decline in patent fuel used for electricity production in 2008 and subsequent cessation in 2009 is a result of the termination of the “synthetic fuel from coal” tax credit in 2008, which had been in the order of $20 to $25 USD per tonne, and while intended to deal with coal liquefaction and similar technologies, it had spawned an industry of cosmetic upgrading as a tax minimisation vehicle.
- From 2004 to 2013, the EIA reported electricity and heat production from anthracite under other bituminous coal. The Secretariat estimated the split of generation output by fuel type based on the assumption that the plant efficiencies of the aggregate are equal to that of each part.
- Starting in 2002, autoproducer electricity output for oil includes generation from refinery gases with a low average calorific value. Prior to 2002, this output was not accounted for.
- Prior to 2001, some data on plants consuming subbituminous coal and lignite have been estimated by the Secretariat using information provided in the EIA’s Annual Electricity Generator Report – Utility.
- Data for peat are confidential between 1994 and 1998 and from 2000 are not reported.
- Prior to 2000, autoproducers include small and independent power producers which under IEA definitions are considered as main activity producers. Production from these small and independent power producers accounts for about 25% of reported production of electricity by autoproducers in the United States. This reclassification causes breaks between 1999 and 2000.
- In the 2003 edition, the United States administration reclassified some plants to autoproducers. This reclassification causes more breaks between 1998 and 1999.
- From 1999 onwards, the fuel used in heat production by autoproducers is included in final consumption because the US administration cannot distinguish between the heat used directly on-site and the heat sold. Therefore, this may underestimate the heat sold to third parties.
- Prior to 1999, solar thermal electricity production includes generation from natural gas because some natural gas units are attached to solar ther-
nal plants and their production could not be separated.

- Prior to 1991 some of the fuel inputs to electricity and heat production reported for autoproducer plants are reported as final consumption in the particular economic sector in which the autoproducer is operating.

- Prior to 1989, there are no generation data available from autoproducers.

- Sub-bituminous coal inputs for electricity and heat production are included in hard coal before 1983.

**Consumption**

- Consumption breakdown data for electricity are modelled based on data obtained from the Annual Energy Outlook and conversion factors. These data are based on fiscal values rather than physical tonnage, so if commodity prices increase or decrease between AEO versions and the conversion factors are not updated, derived changes in consumption may appear that are not supported by physical changes in production, or actual changes in consumption. For example in 2016, production of steel in electric arc furnaces increased by 6%, however consumption of electricity in the iron and steel industry was reported as declining by 17%.

- For the 2019 edition, the breakdown of final electricity consumption for 2017 was based on the results of the Annual Energy Outlook (AEO) of 2018. The model used in the 2018 edition of the Outlook was updated to incorporate the results of the 2014 Manufacturing Energy Consumption Survey (MECS). The MECS values were last updated in 2010, and in the intervening period, several industries had changed significantly. For industry sub-sectors where disaggregated AEO2018 values are unavailable e.g. non-ferrous metals, textiles, and non-metallic minerals, consumption was extrapolated from the MECS 2014 values at the same rate as shipments in that industry. Breaks in time series occur across several sectors between 2016 and 2017.

- Similarly, the breakdown of final electricity consumption for 2015 was based on the results of the Annual Energy Outlook (AEO) of 2016. Breaks in time series appear in the mining and agricultural electricity consumption sectors as a result of introduction of individual industry benchmarking for 2015 results. Changes in iron and steel, and pulp and paper data from 2014 to 2015 are the result of fundamental revisions of the iron and steel and pulp and paper models between AEO2014 and AEO2016 as well as the use of individual industry benchmarking for AEO2016. These changes are a few notable examples of series changes, and any series can change between AEO releases because of data updates and methodology changes.

- Prior to 1991, total consumption of heat sold referred to consumption in commercial/public services.

- No data are available for heat sold that is consumed in the residential and agriculture/forestry sectors for any year.

- Data for direct use of solar thermal heat in residential are available from 1999.

- Since 1995, heat consumption data by sector are no longer collected, and have been estimated by the Secretariat, resulting in breaks in time series between 1994 and 1995, and 1999 and 2000.

- Data for consumption of heat sold in industry are available from 1991 and in energy industry own use from 1992.

**NON-OECD COUNTRIES**

Before 2016, the IEA Secretariat published separately “Energy balances of non-OECD countries” and “Energy balances of OECD countries”. The two were combined into “World energy balances” in 2016.

When making references to “this publication”, it includes “Energy balances for non-OECD countries” produced until 2016.

In the references below, both the statistical year (2018) for which data are being published in this edition, as well as publication dates of the many documents which have been consulted during the development of this publication are mentioned. As a general rule, where specific documents or personal communications have been used, the date that is referenced is the date of publication of the document or the date of the communication, whereas, where data received through the completion of questionnaires are mentioned, the date that is referenced is the statistical
year for which data are being published in this edition, namely 2018.

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

**General references**

- *CIS and East European Energy Databook*, Eastern Bloc Research Ltd, Tolsta Chaolais, various editions up to 2014.


• SIE-Afrique (Systèmes d’Information Énergétique – Afrique), projet promu par ECONOTEC et Institut de l’Énergie et de l’Environnement de la Francophonie (IEPF), organe subsidiaire de l’Organisation Internationale de la Francophonie (OIF) up to 2009.


• Statistiques économiques, Banque des Etats de l’Afrique Centrale (BEAC), online database 2011.


• Statistical Yearbook, The Interstate Statistical Committee of the Commonwealth of Independent States, Moscow, various editions up to 2011.

• Statistical Yearbook of the Member States of the CMEA, Council of Mutual Economic Assistance (CMEA), Moscow, 1985 and 1990.

• The LNG Industry, International Group of Liquefied Natural Gas Importers (GIIGNL), Levallois, various editions up to 2019.


• World Development Indicators, The World Bank, Washington, various editions up to 2019.

Note:

• EU4Energy is a 5-year (2016-2021) EU-funded programme working to support evidence-based energy policy and decision making in the areas of energy security, energy markets and sustainable development in 11 focus countries - Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Uzbekistan and Ukraine. The IEA is responsible for the programme’s energy-data management and data use in policy design.

• The OLADE database was used for several Non-OECD Americas countries.

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

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

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

In 2018 Sonatrach, the national oil and gas company, acquired a refinery in Italy. Crude oil input and refined oil products output, such as gas oil and gasoline, from this facility might be included in Algeria’s national production.

Sources
Sources 1990 to 2018:
- Direct communication with the Ministry of Energy and Mining, Algiers.

Additional sources 2008:
- SONELEGAZ, Société nationale de l’électricité et du gaz, online statistics on electricity production, Algiers.

Sources up to 1989:

Sources for biofuels and waste:
- The UN Energy Statistics Database.
- Direct communication with the Ministry of Energy and Mining, Algiers.
- IEA Secretariat estimates.

Belarus

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

Belarus is one of the 11 EU4Energy focus countries.

In the 2020 edition, the whole time series for natural gas liquids (NGL) was revised to include the volumes of gas obtained in the process of oil stabilization.

In the 2020 edition, from 2016 onwards wood waste from furniture was reallocated to industrial waste in primary solid biofuels. This may lead to breaks in the non-renewable industrial waste time series between 2015 and 2016.

In the 2019 edition, coke oven coke use between 1998 and 2017 was revised as non-energy use was formerly reported in the Food, Beverage and Tobacco sector.

In the 2016 edition, methane produced as a by-product during the petrochemical transformation of naphtha was re-classified by Belarus for the period 1998-2011 from industrial waste to refinery gas. This may lead to breaks in time series between 1997 and 1998.

In 2016, due to reclassification of enterprises’ economic activities break in time series can be observed in autoproducers’ electricity, CHP plant and non-specified industry sector.

Imports of refinery feedstocks were recorded for the first time in 2015.

Jet kerosene was reported under “other products” until 2012. Breaks in time series appear in gas/diesel and fuel oil between 2011 and 2012 as a result of a new classification of industrial products (heating oil re-classified under high sulphur fuel oil).

Oil trade in 2010 shows a significant drop due to higher customs fee of imported quantities of crude oil from Russian Federation.

Since January 2010, Belarus became a member of a Customs Union with Russia and Kazakhstan. Breaks in trade time series and statistical differences appear from 2009 to 2011 as the Customs progressively shift-
ed from one accounting system to another. Belarus reports all inputs and outputs to CHP and heat auto-producer plants including those corresponding to own use of heat.

Sources

Sources 1990 to 2018:

- Direct communication with the National Statistical Committee of Belarus, Minsk.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

Sources for biofuels and waste:

- Joint IEA/Eurostat/UNECE annual energy questionnaires on renewables.
- IEA Secretariat estimates.

Brazil

General notes

Brazil joined the IEA as an Association country in October 2017.

The split between domestic and international marine bunkers is done based on flag (nationality) of ships.

In the 2020 edition new information became available, leading to revisions to 2017 and 2018 data in coal, oil and electricity. Data on biogas in transformation processes has been revised since 2008, oil product densities since 2014, and biodiesel and diesel data since 2011.

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

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

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

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

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

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

Sources

Sources 1971 to 2018:

- Direct communication with the Ministério de Minas e Energia, Brasilia.
**Bulgaria**

**General notes**

With this edition, data on the use of Refused Derived Fuel (RDF) is included in Bulgaria’s waste statistics. Thereby, the renewable part of this fuel is allocated to municipal waste renewable, while the non-renewable part is allocated to industrial waste (non-renewable). The National Statistical Institute is currently reviewing their methodology for this reporting.

Non-specified transformation of natural gas to other hydrocarbons corresponds to hydrogen used in refineries. Bulgaria has re-classified black liquor from industrial waste to solid biofuels and the renewable portion of tyres from industrial waste to municipal waste – renewables from 2008. Breaks in time series may occur between 2007 and 2008.

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

**Sources**

**Sources 1990 to 2018:**
- Direct communication with the National Statistical Institute, Sofia.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

**Sources up to 1991:**

**Sources for biofuels and waste:**
- Joint IEA/Eurostat/UNECE annual energy questionnaires on renewables.
- The UN Energy Statistics Database.

**Croatia**

**General notes**

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

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

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

**Sources**

**Sources 1990 to 2018:**
- Direct communication with the Energy Institute “Hrvoje Požar”, Zagreb.
- Direct communication with the Central Bureau of Statistics, Zagreb.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- IEA Secretariat estimates.

**Cyprus**

**General notes**

Note by Turkey:

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

Note by all the European Union member states of the OECD and the European Union:

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

In the 2020 edition, the time series of primary solid biofuels were revised from 2009-2010 based on new-
ly available information. Breaks in the time series may occur between 2008 and 2009 for these products.

**Sources**

**Sources 1994 to 2018:**
- Direct communication with the statistical service of Cyprus, Nicosia.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

**Sources up to 1993:**

**Sources for biofuels and waste:**
- Joint IEA/Eurostat/UNECE annual energy questionnaires on renewables.
- IEA Secretariat estimates.

**Guatemala**

**General notes**

In the 2020 edition, data from 2001 to 2009 were revised to take into account new information from the Ministry of Energy and Mines. Breaks in time series may occur between 2000 and 2001.

**Sources**

**Sources 2000 to 2018:**
- Direct communication with the Instituto de Investigación Geológico y Energético, Quito.
- IEA Secretariat estimates.

**Sources up to 1999:**
- Ministerio de Energía y Minas.
- *Estadística del Sector Eléctrico Ecuatoriano*, Agencia de Regulación y Control de Electricidad Arconel, Quito.
- *Cuentas Nacionales*, Banco Central del Ecuador, Quito, various editions from 1982 to 1987.
In the 2019 edition, data on the production and export of liquid biofuels were added for the years 2005-2017. New information on the domestic consumption of jet kerosene became available in the year 2019 edition for the years 2010-2017. The consequent revisions may lead to break in time series between 2009 and 2010.

In the 2018 edition, data for 2010 to 2015 were revised to take into account new information from the ministry of energy and mines.

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

Electricity generation from Primary Solid Biofuels from 1998 to 2000 is in mobile harvest year, which does not fully coincide with calendar year. Harvest year Y-1/Y corresponds to year Y in IEA data.

The Texaco refinery in Escuintla ceased operations in 2002.

**Sources**

**Sources up to 2018:**

- Direct communication with the Dirección Nacional de Energía, Ministerio de Energía y Minas, Guatemala City.
- *Compendio Estadístico Ambiental* 2012, Instituto Nacional de Estadística, Guatemala City.
- IEA Secretariat estimates.

**Indonesia**

**General notes**

Indonesia joined the IEA as an Association country in November 2015.

Non-specified industry consumption is estimated by the IEA Secretariat.

Coking coal production and exports data are estimated by the IEA Secretariat.

In the 2020 edition, new information on coal sales has led to revisions of the coal consumption in industry, as well as to coal production, for both other bituminous coal and sub-bituminous coal. This leads to breaks in time series between 1999 and 2000 as well as 2010 and 2011.

In the 2020 edition, the IEA Secretariat integrated new information on the classification of power plants for the year 2018. This might lead to breaks in time series between 2017 and 2018.

Further, the Ministry of Energy and Mineral Resources has, for 2018 data and for the first time, provided the Secretariat with estimates for Indonesia’s off grid electricity production. This information has been added to the 2018 electricity data and leads to breaks in time series, foremost but not exclusively for solid biofuels data.

In the 2019 edition, the IEA Secretariat came across new information regarding the use of coal in Indonesia’s industry sector. First estimates of this use may lead to breaks in time series between 2015 and 2016, as well as between 2016 and 2017.

In the 2018 edition, new information on the use of municipal waste and solid biofuels for power generation became available to the Ministry of Energy and Mineral Resources. This leads to a break in time series between 2016 and 2017.

The data on electricity generation from other vegetal materials and residues includes some electricity generation from waste until the year 2016.
In 2015, data reported for coal consumption in pulp and paper industry might also include coal consumed in the textile and fertilizers sectors. This may create breaks in time series.


From 2011 onwards, coal exports data from BPS are used. This results in breaks in time series for 2010-2011.

The production and allocation of coal among the various coal types and products since 2000 are estimated by the IEA Secretariat due to data collection limitations.

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

Sources
Sources 2008 to 2018:

- Direct communication with the Data Centre and Information Technology (PUSDATIN), Ministry of Energy and Mineral Resources, Jakarta.
- Statistik, Minyak & Gas Bumi, Directorate General of Oil and Gas, Ministry of Energy and Mineral Resources (ESDM), Jakarta, various editions up to 2019.
- PLN Statistics, PT.PLN (Persero), Jakarta, various editions up to 2019.
- Direct communication with PT PLN (Persero), Jakarta.
- Direct communication with the Indonesia Coal Mining Association, Jakarta.
- IEA Secretariat estimates.

Sources 1992 to 2007:

- APEC annual energy statistics questionnaires.
- Direct communication with the Indonesian Institute for Energy Economics, 2004 and 2005.
- Direct communication with the ASEAN Centre for Energy, 2005.

Sources up to 1991:

**Sources for Biofuels and waste:**
- *GAIN Report - Indonesia biofuels Annual*, United States Department of Agriculture, various editions up to 2019.
- The UN Energy Statistics Database
- IEA Secretariat estimates.
- Direct communication with Indonesian Biofuel Producer Association (APROBI), Jakarta.

**Montenegro**

**General notes**
Data for Montenegro are available starting in 2005. Between 1990 and 2004, they are included in Serbia. Prior to 1990, they are included in Former Yugoslavia.

In the 2020 edition, solid biofuel transformation data were revised for the whole time series due to new information becoming available.

Charcoal imports data might include minor quantities of charcoal produced domestically until the year 2017.

Breaks in time series appearing in solid biofuels between 2010 and 2011 can be explained by a new survey carried out by Montenegro in 2013.

A survey on energy consumption in industry was conducted by Montenegro in 2014. Breaks in time series may therefore occur between 2004 and 2005.

**Sources**

**Sources 2005 to 2018:**
- Direct communication with the Statistical Office of Montenegro (MONSTAT), Podgorica.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

**Serbia**

**General notes**
Data for Serbia are available starting in 1990. Prior to that, they are included in Former Yugoslavia.


**Sources**

**Sources 1990 to 2018:**
- Direct communication with the Ministry of Mining and Energy, Belgrade.
- Direct communication with the Statistical Office of the Republic of Serbia, Belgrade.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.

**Romania**

**General notes**
Romania’s methodology for estimating indigenous production of geothermal energy differs from the one that IEA has adopted. Therefore, data comparisons between Romania and other countries might be misleading.

Data on quantities of coke oven coke used in blast furnaces do not correspond to the official submission of the national administration, as they have been estimated by the IEA Secretariat to ensure a carbon balance in the blast furnace transformation.

**Sources**

**Sources 1992 to 2018:**
- Direct communication with the National Institute of Statistics, Bucharest.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- IEA Secretariat estimates.
- Direct communication with the Federal Ministry of Economy, Belgrade.
- IEA Secretariat estimates.

**Sources for biofuels and waste:**
- Direct communication with the Ministry of Mining and Energy, Belgrade.
- IEA Secretariat estimates.

## Tunisia

### General notes

New information for lubricants and bitumen became available in 2015. Breaks in the time series may occur between 2009 and 2010 because of this.

A significant increase in crude oil production was reported for 2007 due to the start-up of several new development wells and the beginning of production of the Oudna field.

A shutdown of the Bizerte refinery occurred between March 2010 and June 2011, resulting in breaks in time series for crude oil and oil products for the years 2009 to 2011.

In 2009, new data on charcoal production became available. A break in time series for wood inputs and charcoal outputs can be observed between 2008 and 2009.

Revisions in heat data between 2013 and 2014 from the 2017 edition are based on a survey of autoproducers.

### Sources

**Sources 1992 to 2018:**
- Direct communication with the Observatoire National de l'Energie et des Mines, Ministère de l'Energie, des Mines et des Energies Renouvelables, Tunis.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- Société Tunisienne des Industries de Raffinage, online statistics, 2008 to 2009.

**Sources up to 1991:**
- *Statistiques Financières*, Banque Centrale de Tunisie, Tunis, 1986.

### Sources for biofuels and waste:


## Uruguay

### General notes

In the 2020 edition, historical data across multiple years and products were revised in line with the latest historical data available from Dirección Nacional de Energía. Data were revised from 1971 onwards for coal, oil, oil products and electricity, from 1981 onwards for Hydro, from 1998 onwards for Natural Gas and from 2010 onwards for Solar.

In 2017, La Teja refinery was mostly inactive which leads to sharp decrease in refinery outputs. Refinery activity recovered in 2018.

The pronounced growth in production of biofuels and waste from 2007 to 2010 results from the development of the pulp and paper industry.

**Sources 1992 to 2018:**
- Direct communication with the Observatoire National de l'Energie et des Mines, Ministère de l'Energie, des Mines et des Energies Renouvelables, Tunis.
- Joint IEA/Eurostat/UNECE annual energy questionnaires.
- Société Tunisienne des Industries de Raffinage, online statistics, 2008 to 2009.
The power produced from the Salto Grande hydroelectric plant, located on the Uruguay River between Concordia in Argentina and Salto in Uruguay is equally shared between the two countries. Exports include power produced in Salto Grande and exported to Argentina.

The refinery was shut down for maintenance in 1993-1994. This explains the low refinery output observed in 1993 and the absence of output in 1994.

**Sources**

**Sources up to 2018:**
- Direct communication with Dirección Nacional de Energía, Ministerio de Industria, Energía y Minería, Montevideo.
- IEA Secretariat estimates.
7. METHODOLOGICAL NOTES

This publication is based on the data in physical units of the IEA World Energy Statistics publication and on the IEA energy balance methodology, briefly summarised below.

Energy balance: key concepts

Energy statistics expressed in physical units in the form of commodity balances, balances of supply and use of each energy commodity, are a simple way to assemble the main statistics so that key data are easily obtained, and that data completeness can be quickly assessed. However, because energy products are mainly bought for their heat-raising properties and can be converted into other energy products, presenting data in energy units is very powerful. The format adopted is called energy balance.

The energy balance takes the form of a matrix, where columns present all the different energy sources and rows represent all the different “flows”, grouped in three main blocks: energy supply, transformation/energy use and final consumption.

To develop an energy balance from the set of energy commodity balances, the two main steps are: i) all the data are converted to a common energy unit – and also a “total” product is computed; and ii) some reformatting is performed to avoid double counting when summing products together. For example, while the production of secondary products (e.g. motor gasoline) is shown in the production row in commodity balances, it is reported as an output of the relevant transformation (e.g. oil refineries) in an energy balance, where the production row only refers to production of primary products (e.g. crude oil).

The methodological assumptions underlying energy balances discussed in the next section are particularly important to understand differences across balances formulated by different organisations starting from the same energy commodity data.

IEA energy balances methodology

The unit adopted by the IEA is the tonne of oil equivalent (toe) which is defined as $10^7$ kilocalories (41.868 gigajoules). This quantity of energy is, within a few per cent, equal to the net heat content of 1 tonne of crude oil. Conversion of the IEA energy balances to other energy units would be straightforward.

The main methodological choices underlying energy balances that can differentiate balances across organisations are: i) “net” versus “gross” energy content; ii) calorific values; and iii) primary energy conventions.

Net versus gross energy content

The IEA energy balances are based on a “net” energy content, which excludes the energy lost to produce water vapour during combustion. All the elements of the energy balance are expressed on the same net basis to ensure comparability. Even elements (e.g. natural gas) that in commodity balances may be already in energy units but on a different basis (e.g. “gross”) are converted (e.g. from “gross” to “net”).

The difference between the “net” and the “gross” calorific value for each fuel is the latent heat of vaporisation of the water produced during combustion of the fuel. For coal and oil, the net calorific value is about 5% less than gross, for most forms of natural and manufactured gas the difference is 9-10%, while
for electricity and heat there is no difference as the concept has no meaning in this case.

**Calorific values**

Generally, the IEA adopts country-specific, time-varying, and for some products flow-dependent, net calorific values supplied by national administrations for most products; and regional default values (in conjunction with Eurostat for the European countries) for the oil products. More detailed explanations on the IEA conversion to energy units for the different energy sources are given in section 8 Units and Conversions.

**Primary energy conventions**

A very important methodological choice is the definition of the “primary energy equivalent” for the electricity and heat produced from non-combustible sources, such as nuclear, geothermal, solar, hydro, wind. The information collected is generally the amount of electricity and heat produced, represented in the balance as an output of transformation. Conventions are needed to compute the most appropriate corresponding primary energy, input to the transformation, both in form and in amount.

The principle adopted by the IEA is that the primary energy form is the first energy form downstream in the production process for which multiple energy uses are practical. For example, the first energy form that can be used as energy in the case of nuclear is the nuclear heat of the reactor, most of which is then transformed into electricity. The application of this principle leads to the choice of the following primary energy forms:

- **Electricity** for primary electricity (hydro, wind, tide/wave/ocean and solar photovoltaic).
- **Heat** for heat and secondary electricity (nuclear, geothermal and solar thermal).

Once the primary energy form is identified for all electricity and heat generated from non-combustible sources, the IEA adopts the physical energy content method to compute the corresponding primary energy equivalent amounts: the primary energy equivalent is simply the physical energy content of the corresponding primary energy form.

For primary electricity, such as hydro and solar PV, as electricity is identified as the primary energy form, the primary energy equivalent is simply the gross electricity generated in the plant.

For nuclear electricity, the primary energy equivalent is the quantity of heat generated in the reactors. In the absence of country-specific information, the IEA estimates the primary energy equivalent from the electricity generated by assuming an efficiency of 33%, derived as the average efficiency of nuclear power plants across Europe. Note that the principle of using the heat from nuclear reactors as the primary energy form for the energy statistics has an important effect on any indicators of energy supply dependence. Under the present convention, the primary nuclear heat appears as an indigenous resource. However, the majority of countries using nuclear power import their nuclear fuel, and if this fact could be taken into account, it would lead to an increase in the supply dependence on other countries.

For geothermal electricity, the primary energy equivalent is the quantity of heat and a similar back-calculation is used where the quantities of steam supplied to the plant are not measured, assuming a thermal efficiency of 10%. This figure is only approximate and reflects the fact that the steam from geothermal sources is generally of low quality. If data for the steam input to geothermal power plants are available, they are used directly as primary energy equivalent.

Similarly, for solar thermal plants the heat supply is back-calculated assuming a 33% efficiency of conversion of heat into electricity, reflecting relatively low working temperatures, although central receiver systems can reach higher temperatures and therefore higher efficiencies.

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

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

Alternative methods to the physical energy content method exist, such as the partial substitution method, used in the past by the IEA. In this case, the primary energy equivalent of the above sources of electricity generation would be computed as the hypothetical amount of energy necessary to generate an identical amount of electricity in conventional thermal power plants, considering an average generating efficiency. The principle was abandoned by the IEA and
many other international organisations because it had little meaning for countries in which hydro electricity generation was a significant supply source, and because the actual substitution values were hard to establish as they depended on the marginal electricity production efficiencies. Partial substitution also had unreal effects on the energy balance as transformation losses appeared which had no physical basis.

Since the two methods differ significantly in the treatment of electricity from solar, hydro, wind, etc., the share of renewables in total energy supply will appear to be very different depending on the method used. To interpret shares of various energy sources in total supply, it is important to understand the underlying conventions used to calculate the primary energy supply.
8. UNITS AND CONVERSIONS

General conversion factors for energy

<table>
<thead>
<tr>
<th>From:</th>
<th>To:</th>
<th>TJ</th>
<th>Gcal</th>
<th>Mtoe</th>
<th>MBtu</th>
<th>GWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>terajoule (TJ)</td>
<td></td>
<td>1</td>
<td>2.388x10^2</td>
<td>2.388x10^3</td>
<td>9.478x10^3</td>
<td>2.778x10^3</td>
</tr>
<tr>
<td>gigacalorie (Gcal)</td>
<td></td>
<td>4.187x10^-3</td>
<td>1</td>
<td>1.000x10^-1</td>
<td>3.968</td>
<td>1.163x10^-3</td>
</tr>
<tr>
<td>million tonnes of oil equivalent (Mtoe)</td>
<td></td>
<td>4.187x10^-6</td>
<td>1.000x10^-7</td>
<td>1</td>
<td>3.968x10^-7</td>
<td>1.163x10^-4</td>
</tr>
<tr>
<td>million British thermal units (MBtu)</td>
<td></td>
<td>1.055x10^-3</td>
<td>2.520x10^-1</td>
<td>2.520x10^-4</td>
<td>1</td>
<td>2.931x10^-4</td>
</tr>
<tr>
<td>gigawatt hour (GWh)</td>
<td></td>
<td>3.600</td>
<td>8.598x10^2</td>
<td>8.598x10^5</td>
<td>3.412x10^7</td>
<td>1</td>
</tr>
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</table>

Conversion factors for mass

<table>
<thead>
<tr>
<th>From:</th>
<th>To:</th>
<th>kg</th>
<th>t</th>
<th>lt</th>
<th>st</th>
<th>lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>kilogramme (kg)</td>
<td></td>
<td>1</td>
<td>1.000x10^3</td>
<td>9.842x10^-4</td>
<td>1.102x10^-3</td>
<td>2.205</td>
</tr>
<tr>
<td>tonne (t)</td>
<td></td>
<td>1.000x10^-7</td>
<td>1</td>
<td>9.842x10^-1</td>
<td>1.102</td>
<td>2.205x10^-3</td>
</tr>
<tr>
<td>long ton (lt)</td>
<td></td>
<td>1.016x10^-7</td>
<td>1.016</td>
<td>1</td>
<td>1.120</td>
<td>2.240x10^-3</td>
</tr>
<tr>
<td>short ton (st)</td>
<td></td>
<td>9.072x10^-7</td>
<td>9.072x10^-1</td>
<td>8.929x10^-1</td>
<td>1</td>
<td>2.000x10^-3</td>
</tr>
<tr>
<td>pound (lb)</td>
<td></td>
<td>4.536x10^-1</td>
<td>4.536x10^-4</td>
<td>4.464x10^-4</td>
<td>5.000x10^-4</td>
<td>1</td>
</tr>
</tbody>
</table>

Conversion factors for volume

<table>
<thead>
<tr>
<th>From:</th>
<th>To:</th>
<th>gal U.S.</th>
<th>gal U.K.</th>
<th>bbl</th>
<th>ft^3</th>
<th>l</th>
<th>m^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. gallon (gal U.S.)</td>
<td></td>
<td>1</td>
<td>8.327x10^-1</td>
<td>2.381x10^-2</td>
<td>1.337x10^-3</td>
<td>3.785</td>
<td>3.785x10^-3</td>
</tr>
<tr>
<td>U.K. gallon (gal U.K.)</td>
<td></td>
<td>1.201</td>
<td>1</td>
<td>2.859x10^-2</td>
<td>1.605x10^-1</td>
<td>4.546</td>
<td>4.546x10^-3</td>
</tr>
<tr>
<td>barrel (bbl)</td>
<td></td>
<td>4.200x10^1</td>
<td>3.497x10^1</td>
<td>1</td>
<td>5.615</td>
<td>1.590x10^1</td>
<td>1.590x10^-1</td>
</tr>
<tr>
<td>cubic foot (ft^3)</td>
<td></td>
<td>7.481</td>
<td>6.229</td>
<td>1.781x10^-1</td>
<td>1</td>
<td>2.832x10^-7</td>
<td>2.832x10^-2</td>
</tr>
<tr>
<td>litre (l)</td>
<td></td>
<td>2.642x10^-1</td>
<td>2.200x10^-1</td>
<td>6.290x10^-3</td>
<td>3.531x10^-7</td>
<td>1</td>
<td>1.000x10^-3</td>
</tr>
<tr>
<td>cubic metre (m^3)</td>
<td></td>
<td>2.642x10^-3</td>
<td>2.200x10^-3</td>
<td>6.290</td>
<td>3.531x10^-1</td>
<td>1.000x10^-3</td>
<td>1</td>
</tr>
</tbody>
</table>

INTERNATIONAL ENERGY AGENCY
Decimal prefixes

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

Energy content

Coal

Coal has separate net calorific values for production, imports, exports, inputs to electricity/heat generation and coal used in coke ovens, blast furnaces and industry. Stock changes are converted using a weighted average of the supply calorific values.

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

Crude oil

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

Gases

*World Energy Statistics* expresses the following gases in terajoules, using their gross calorific value.

$$1 \text{ terajoule} = 0.02388 \text{ ktoe}.$$  

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

<table>
<thead>
<tr>
<th>Gas</th>
<th>Ratio from GCV to NCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>0.9</td>
</tr>
<tr>
<td>Gas works gas</td>
<td>0.9</td>
</tr>
<tr>
<td>Coke oven gas</td>
<td>0.9</td>
</tr>
<tr>
<td>Blast furnace gas</td>
<td>1.0</td>
</tr>
<tr>
<td>Other recovered gases</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Biofuels and waste

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

$$1 \text{ terajoule} = 0.02388 \text{ ktoe}.$$  

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

Oil products

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

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

Figures for electricity production, trade, and final consumption are calculated using the energy content of the electricity. Electricity is converted as follows:

Data in TWh x 0.086 = data in Mtoe.

Hydro-electricity production (excluding pumped storage) and electricity produced by other non-thermal means (wind, tide/wave/ocean, solar PV, etc.) are accounted for similarly. Gross electricity generation in TWh x 0.086 = primary energy equivalent in Mtoe.

The primary energy equivalent of nuclear electricity is calculated from the gross generation by assuming a 33% conversion efficiency. The calculation to be carried out is the following:

\[
gross\ electricity\ generation\ in\ TWh\times 0.086 / 0.33 = primary\ energy\ equivalent\ in\ Mtoe.\]

In the case of electricity produced from geothermal heat, if the actual geothermal efficiency is not known, then the primary equivalent is calculated assuming an efficiency of 10%. The calculation to be carried out is the following:

\[
gross\ electricity\ generation\ in\ TWh\times 0.086 / 0.10 = primary\ energy\ equivalent\ in\ Mtoe.\]

For electricity produced from solar thermal heat, the primary equivalent is calculated assuming an efficiency of 33% unless the actual efficiency is known. The calculation to be carried out is the following:

\[
gross\ electricity\ generation\ in\ TWh\times 0.086 / 0.33 = primary\ energy\ equivalent\ in\ Mtoe.\]

**Heat**

Information on heat is supplied in terajoules and is converted as follows:

Data in TJ / 41 868 = Data in Mtoe.

In the case of heat produced in a geothermal plant, if the actual geothermal efficiency is not known, then the primary equivalent is calculated assuming an efficiency of 50%. The calculation to be carried out is the following:

\[
heat\ production\ in\ TJ\times 0.0000238 / 0.50 = primary\ energy\ equivalent\ in\ Mtoe.\]

For heat produced in a solar thermal plant, the primary equivalent is equal to the heat consumed.

Data in TJ / 41 868 = data in Mtoe.

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

**Examples**

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

<table>
<thead>
<tr>
<th>From Original Units</th>
<th>To ktoe (on a NCV basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coking coal production (Poland) for 2017 in thousand tonnes</td>
<td>divide by 41 868 and then multiply by 29 644</td>
</tr>
<tr>
<td>Natural gas in terajoules (gross)</td>
<td>multiply by 0.02388 and then multiply by 0.9</td>
</tr>
<tr>
<td>Motor gasoline (Poland) in thousand tonnes</td>
<td>divide by 41 868 and then multiply by 44 000</td>
</tr>
<tr>
<td>Heat in terajoules (net)</td>
<td>multiply by 0.02388</td>
</tr>
</tbody>
</table>
9. ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Btu</td>
<td>British thermal unit</td>
</tr>
<tr>
<td>GWh</td>
<td>gigawatt hour</td>
</tr>
<tr>
<td>kcal</td>
<td>kilocalorie</td>
</tr>
<tr>
<td>kg</td>
<td>kilogramme</td>
</tr>
<tr>
<td>kJ</td>
<td>kilojoule</td>
</tr>
<tr>
<td>kt</td>
<td>kilotonne</td>
</tr>
<tr>
<td>Mt</td>
<td>million tonnes</td>
</tr>
<tr>
<td>m³</td>
<td>cubic metre</td>
</tr>
<tr>
<td>t</td>
<td>metric ton = tonne = 1000 kg</td>
</tr>
<tr>
<td>TJ</td>
<td>terajoule</td>
</tr>
<tr>
<td>toe</td>
<td>tonne of oil equivalent = 10⁷ kcal</td>
</tr>
<tr>
<td>CHP</td>
<td>combined heat and power</td>
</tr>
<tr>
<td>GCV</td>
<td>gross calorific value</td>
</tr>
<tr>
<td>HHV</td>
<td>higher heating value = GCV</td>
</tr>
<tr>
<td>LHV</td>
<td>lower heating value = NCV</td>
</tr>
<tr>
<td>NCV</td>
<td>net calorific value</td>
</tr>
<tr>
<td>PPP</td>
<td>purchasing power parity</td>
</tr>
<tr>
<td>IEA</td>
<td>International Energy Agency</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>ISIC</td>
<td>International Standard Industrial Classification</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-Operation and Development</td>
</tr>
<tr>
<td>OLADE</td>
<td>Organización Latinoamericana de Energía</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNIPEDE</td>
<td>International Union of Producers and Distributors of Electrical Energy</td>
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<tr>
<td>c</td>
<td>confidential</td>
</tr>
<tr>
<td>e</td>
<td>estimated</td>
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<td>..</td>
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<tr>
<td>x</td>
<td>not applicable</td>
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</table>