ENERGY EFFICIENCY INDICATORS 2019 EDITION

DATABASE DOCUMENTATION

This document provides information regarding the 2019 edition of the *Energy efficiency indicators* database (as of its December release). It can be found at the following link: http://data.iea.org/. The database is updated twice a year in July and December.

Please address your inquiries to EnergyIndicators@iea.org.

Please note that all IEA data are subject to the following Terms and Conditions found on the IEA's website: https://www.iea.org/t_c/termsandconditions/

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1. CHANGES FROM LAST EDITION

The IEA strives to release as complete and timely data as possible. In order to meet increasing user's data needs, in the year 2019 the IEA released two editions of the energy efficiency indicators database, with data up to the year 2017. The first release (in July), featured the data available at that time; whereas the December release, as usual, has more complete data and expanded geographical coverage, reflecting different timings for statistical data collection among countries. We acknowledge and thank the enhanced commitment of our data providers.

Additionally, there is a more comprehensive and systematic use of qualifiers in the energy efficiency indicators database. The IEA tried to the extent possible to qualify the data points that are not available, instead of showing zeroes. This work has an implicit level of uncertainty, and hence, the IEA has adopted a conservative approach of qualifying only those data points for which there was no ambiguity.

Complementary to this documentation, the IEA created the energy efficiency indicators database availability file. This file mirrors the structure of the IEA Energy efficiency indicators database and provides detailed information about the available data in the database.

Geographical coverage

The IEA is working closely with non-member countries, especially association countries, in order to try to expand end use data coverage and track energy efficiency progress in countries beyond IEA. This year, this database continues to expand, and includes one additional member of the IEA family: Brazil.

As of now, this report includes end use data and energy efficiency indicators for two IEA association countries (Morocco and Brazil); and seven countries from Eastern Europe, Caucasus and Central Asia region (Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Ukraine and Uzbekistan). The collection of these data for the seven latter countries has been made possible with the financial assistance of the European Union, as part of the EU4Energy project (https://www.eu4energy.iea.org/).

Given the increasing importance of tracking energy efficiency progress worldwide, it is our wish that more countries may be added in future editions.

2. DATABASE STRUCTURE

The *Energy efficiency indicators* database includes annual data for:

- countries: 28 IEA member countries; 9 countries beyond IEA.
- years: 2000-2017, unless otherwise specified.

In its **B2020 version**, the database includes four files, as follows:

EEI RESIDENTIAL.IVT Residential sector detailed data and indicators

Residential energy end use (8 products; 17 end uses) (PJ);

Residential activity data (6 flows);

Residential energy indicators (6 flows);

Residential carbon indicators (4 flows);

EEI SERVICES.IVT Services sector detailed data and indicators

Services energy end use (8 products; 17 end uses) (PJ);

Services activity data (6 flows);

Services energy indicators (5 flows);

Services carbon indicators (4 flows);

EEI INDUSTRY.IVT Industry sector detailed data and indicators

Industry energy use (8 products; 20 subsectors) (PJ);

Industry activity data (6 flows);

Industry energy indicators (2 flows);

Industry carbon indicators (2 flows);

EEI TRANSPORT.IVT   Transport sector detailed data and indicators

Transport energy end use (10 products; 13 end uses) (PJ);

Transport activity data (5 flows);

Transport energy indicators (5 flows);

Transport carbon indicators (4 flows);

Transport activity indicators (6 flows).

The database in **excel version** is structured into several sheets, as follows:

RESIDENTIAL-Energy	Residential energy end use (8 products; 17 end uses) (PJ);
SERVICES-Energy	Services energy end use (8 products; 17 end uses) (PJ);
INDUSTRY-Energy	Industry energy end use (8 products; 20 subsectors) (PJ);
TRANSPORT-Energy	Transport energy end use (10 products; 13 end uses) (PJ);
ACTIVITY DATA	Sectoral activity data (15 products);
Residential Energy Indicators	Residential energy indicators by end use (6 flows);
Services Energy Indicators	Services energy indicators by end use (5 flows);
Industry Energy Indicators	Industry energy indicators by subsector (2 flows);
Transport Energy Indicators	Transport energy indicators by mode/vehicle type (5 flows);
Residential Carbon Indicators	Residential carbon indicators by end use (4 flows);
Services Carbon Indicators	Services carbon indicators by end use (4 flows);
Industry Carbon Indicators	Industry carbon indicators by subsector (2 flows);
Transport Carbon Indicators	Transport carbon indicators by mode/vehicle type (4 flows).

3. METHODOLOGICAL NOTES

The IEA energy efficiency indicators data collection

In 2009, IEA Members committed to collect energy efficiency indicators data through a new annual questionnaire. The questionnaire collects energy consumption and activity data for various end uses, subsectors and modes/vehicle types across the four sectors: residential, services, industry and transport. The questionnaire is available online at the IEA energy efficiency statistics web page: www.iea.org/statistics/efficiency/.

The IEA also developed a manual on energy efficiency data and indicators, *Energy Efficiency Indicators: Fundamentals on Statistics*; and one on how to use indicators to inform policies, *Energy Efficiency Indicators: Essentials for Policy Making*, both of which can be downloaded from the above IEA web page.

Notes on data quality

The analysis of demand-side energy efficiency trends requires highly disaggregated end-use energy data across the main final consumption sectors: residential, services, transport and industry. Examples of such disaggregated data include energy consumption by end use (space heating, cooking, appliances, etc.) for the residential sector; or energy consumption by mode/vehicle type (passenger cars, motorcycle, freight trucks, etc.) for transport. Deriving energy efficiency indicators also requires consistent "activity data" covering the wide range of activities specific to each subsec-

tor/end use, such as floor area, passenger-kilometres, production of key manufacturing output (cement, aluminium, iron, etc.), number of employees in each service category, etc.

While almost all countries have developed energy statistics to produce national energy balances, more disaggregated end-use energy and activity data are not always as readily available. Therefore, the development of energy efficiency indicators generally requires additional efforts, such as mapping the different available data through administrative sources, setting up new data collections; but also establishing new institutional arrangements to share and manage the different data.

The IEA end-use data collection agreed in 2009 is still work in progress, with developing quality and coverage across Member countries. Currently, IEA countries generally have relatively detailed data for the industry sector thanks to well established data collections to develop energy balances. Relatively important progress has been observed in the coverage of the residential sector, while detailed data for the services sector still remain not available for many countries. The availability of transport data varies greatly across countries, with activity data (passenger-kilometres, tonne-kilometres, vehicle stock etc.) often requiring additional development.

Furthermore, as indicators are calculated as a ratio of energy consumption and corresponding activity, and as the various data may not be collected by the same institution, the data quality assessment is particularly important. For example, consistency of boundaries and definition between energy and activity data is essential to create meaningful indicators, and to analyse their trends. Data users should also be aware that small changes in intensities may be caused by uncertainty in measurement of energy or activity data, and thus weight should be given to long-term trends. Other important validation criteria include internal consistency, consistency

with external data sources, and plausibility (values of indicators need to fall within expected ranges to be meaningful).[1]

The IEA Secretariat is continuously working with member countries to improve the overall quality of the energy efficiency indicators database, including its consistency with the data provided by national administrations to develop the IEA energy balances and with the data reported by other organisations. We expect to keep improving data quality over time, and are grateful for the feedback to this publication received from the different data providers and data users. In any case, the Energy Efficiency Indicators database presents the most complete and updated data available.

Comparability with the IEA energy balances

This publication is based on the IEA energy efficiency indicators data collection which is additional to that used for the IEA energy balances. Due to the emphasis on final end uses across sectors, some differences occur between the final energy consumption in this publication and the total final energy consumption reported in the IEA energy balances, for the following reasons:

- In this publication, non-energy use is excluded from final energy consumption;
- Energy consumption in ferrous metals (part of basic metals and called iron and steel in the IEA balances) also includes energy consumption and losses in transformation for blast furnaces and coke ovens, which are accounted under the energy and the transformation sectors in the IEA energy balances;
- Energy consumption in mining also include energy consumed to extract oil, gas and coal;
- Transport excludes pipeline transportation and fuel tourism;
- Military energy consumption is excluded, while it is included in the total final energy consumption in the IEA Energy Balances under the other non-specified category.

Besides these systematic differences, some discrepancies might occur due to the higher data disaggregation of this publication, and to the need to adapt different approaches/methodologies (e.g. bottom-up vs top-down) to collect or estimate these data at a country level. Additionally, for some countries different offices/ institutions are responsible for preparing the energy balances and the energy efficiency data shown in this publication, which may also lead to unintended discrepancies.

For more information on IEA energy balances methodologies, please see the documentation of the *World Energy Balances* [2].

Estimates of CO_2 emissions by end use

The estimates of CO_2 emissions from fuel combustion presented in this publication are calculated using the IEA energy efficiency database, the IEA energy balances and the default methods and emission factors from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories.*

This publication presents only CO_2 emissions from fuel combustion, from all reported energy uses of fuels, excluding emissions from non-energy use of fuels and including emissions reallocated from electricity and heat generation (using the same methodology as in the IEA (2019) *CO_2 emissions from fuel combustion* publication).

CO_2 emissions from fuel combustion

CO_2 = Fuel consumption * Emission factor,

where:

Fuel consumption = amount of fuel combusted,

Emission factor = implied emission factor, based on energy balances fuel mix and default emission factors

Fossil fuel categories in the energy efficiency indicators template (coal, oil, gas) are more aggregated than those within the IEA energy balances. Country-specific implied emission factor for oil, coal and gas are computed based on the mix of individual products reported within the IEA energy balances. Emissions are then summed across all fuel categories to obtain total emissions for a given end use or subsector.

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1. For a more comprehensive discussion of validation criteria by sector, please see the chapter on *Data validation* in *Energy Efficiency Indicators: Fundamentals on Statistics*:
http://www.iea.org/publications/freepublications/publication/IEA_EnergyEfficiencyIndicatorsFundamentalsonStatistics.pdf.

2. http://wds.iea.org/wds/pdf/WORLDBAL_Documentation.pdf

Emissions estimates could differ from those published in the IEA (2019) *CO₂ emissions from fuel combustion* publication mainly because the energy consumption data may differ from the IEA energy balances (see previous section). Also, the IEA Secretariat estimates of CO_2 emissions from fuel combustion may not be the same as the figures that a country submits to the UNFCCC for a variety of reasons.

Temperature correction[1]

The amount of energy required for space heating (and space cooling) is highly dependent on the ambient temperature, and this impact on energy consumption may easily mask the effects of energy efficiency improvements. For example, a country may dramatically reduce the amount of energy needed for space heating over a year simply due to an exceptionally warm winter. The opposite may also be true. The reduction in energy consumption due to the energy efficiency improvements in heating systems may be offset by an extra energy demand due to an extremely cold winter.

Therefore, in order to accurately monitor the evolution of energy consumption for space heating in the residential sector over time, it is essential to eliminate the impact of temperature variations and to analyse temperature-corrected data. In this publication one of the most common methodologies has been adopted for such correction, namely the use of heating degree days (HDD).

HDD are a simplified measure of the intensity and duration of cold weather over a certain period in a given location. The value of HDD for a period, for example a winter, is determined by subtracting for each day the average daily temperature from a base temperature (assumed to be the temperature below which heating systems are turned on), and then adding up this difference for the days of the period for which the average outside air temperature is lower than the base temperature. When the outside air temperature is equal to or higher than the base temperature, HDD are zero. The higher heating degree days, the colder the season,

the greater the amount of energy required for space heating. HDD can be defined as:

> ### Heating degree days
>
> $$HDD = \sum_{k=1}^{n} (T_{base} - T_k)$$
> $$T_{base} > T_k,$$
>
> where:
>
> T_{base} is the base temperature,
>
> T_k is the average temperature of day *k*,
>
> n is the total number of days in the given period.

As noted above, two factors are key for the calculation of HDD. The first is the base temperature, which should be set at the level of outside air temperature at which residents of a given region tend to turn on their heating systems. This level can vary across different regions depending on many factors, such as the ability to tolerate cold temperatures, the variety of building types, the thermal properties of buildings, the density of occupants, etc. For example, the base temperature in the United Kingdom is typically 15.5°C while in the United States it is typically 65°F (equivalent to 18°C). The base temperature should be carefully determined based on the characteristics of the region, since this choice will impact the temperature correction of the energy consumption data. It may also evolve in time, for example if people already turn on their thermostat at higher outside temperatures.

The second factor is the time series of average daily temperatures. For example, if the average temperature on one day is 5 degrees below the base temperature, there are five HDD for that day. To get the annual number of HDD, all positive values of HDD are summed for each day in the year.

When the national HDD figures are available, the data of energy consumption for space heating can be corrected for temperature variations. This publication uses a simplified methodology, which assumes that the elasticity for adjusting heating requirements is 1, as shown below:

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1. See Annex C *in Energy Efficiency Indicators: Fundamentals on Statistics.*

> ## Temperature correction
>
> $$Energy_{TCi} = Energy_{actual\,i} * \frac{HDD_{period\,average}}{HDD_{year\,i}},$$
>
> where:
>
> $Energy_{TCi}$ is the temperature-corrected energy consumption for the year *i*,
>
> $Energy_{actual\,i}$ is the actual energy consumption in year *i*,
>
> $HDD_{period\,average}$ is the average heating degree days of the given period (2000-latest year), and
>
> $HDD_{year\,i}$ is the total heating degree days in the year *i*.

Such correction intends to remove the fluctuations in energy consumption due to fluctuations in temperature in the given year compared with the average temperature of a country. For example, if a year has 500 HDD and the annual average HDD for the country is 250, the corrected energy consumption for space heating would be half of the actual energy consumption. Of course, comparison of space heating efficiency indicators across countries is still difficult as a country on average experiencing colder temperatures than another country will need on average to consume more to heat the same floor area.

Similarly, cooling degree days (CDD) are a measure of the intensity of warm weather to correct energy consumption data for space cooling. In this publication, temperature correction are made only for calculating intensity indicators, therefore energy consumption data show the fluctuations due to temperature change. Space cooling is temperature corrected only for countries where CDD are data available.

4.   END USES DEFINITIONS

Residential		
Flow	**Short name**	**Definition**
Total Residential	R_TOTAL	Includes consumption by households, excluding fuels used for transport. Includes households with employed persons [ISIC Rev. 4 Divisions 97 and 98] which are a small part of total residential consumption. The different end uses within the residential sector are described below.
Residential space heating	R_SPACE_H	Represents the residential sector space heating end use. Space heating includes the different means of heating spaces, which can be achieved through many systems and fuels. Heating systems can be broadly separated into two types: central heating and dedicated area/room heating. Central heating systems can heat the entire dwelling; they include hot water and steam systems with radiators, floor or wall furnaces, district heating, heat pumps, etc. Area-dedicated heating systems can be divided into several categories: stand-alone electric heaters, fireplaces, and stand-alone stoves using oil products or other fuels, such as coal or wood. It is not rare that households use a combination of several systems, e.g. electrical heaters to complement insufficient base central systems. Heating systems can generate heat using a number of energy sources such as electricity, natural gas, coal, fuel oil, liquefied petroleum gas (LPG), kerosene, biofuels, and active or passive solar energy.
Residential space cooling	R_SPACE_C	Represents the residential sector space cooling end use. Space cooling includes all equipment used for cooling a living area, which can be divided into two broad categories: central cooling systems and room-dedicated systems. Central air conditioners feed into a duct system that could also be used by a central heating system. Wall air conditioners and split systems are used to cool a room. There are other possible cooling systems such as swamp coolers (or evaporative coolers), which cool air through evaporation of water; heat pumps that can be used in reverse mode to cool the air or district cooling. Most of the cooling systems in the residential sector run exclusively on electricity.
Residential water heating	R_WATER_H	Water heating, also known as domestic hot water, includes systems that are used for heating water for showers, bathing, washing, etc. A number of tank-based or tankless systems can be used to heat the water. Water heating can be produced alone or in combination with space heating systems. The main energy sources used by water heating systems include natural gas, LPG, electricity, biofuels and, increasingly, solar thermal energy in a growing number of countries.

Residential		
Flow	**Short name**	**Definition**
Residential cooking	R_COOKING	Cooking includes energy consumed to cook meals using a wide range of stoves, from advanced induction stoves to traditional three-stone stoves. A number of energy sources are used for cooking such as natural gas, electricity, biofuels, LPG, kerosene and coal. Beside stoves, ovens are also included in the energy consumption for cooking. Cooking appliances such as toasters and microwave ovens, due to the difficulty in separating their respective consumption, are normally reported under other appliances.
Residential lighting	R_LIGHTING	Residential lighting includes energy consumed for interior or exterior lighting of dwellings today mainly powered by electricity. Incandescent lamps, which have been around for more than a century, are slowly being replaced by more efficient fixtures, e.g. fluorescent tubes, compact fluorescent lamps and LEDs (light-emitting diodes). More and more countries are passing regulations to phase out the use of incandescent bulbs. Households that do not have any access to electricity still rely on traditional forms of lighting such as kerosene and LPG lamps, and sometimes even candles and flashlights. Moreover, off-grid solar applications for lighting may become more prominent in the future.
Residential appliances	R_APPLIANC	Residential appliances encompasses two main categories: large (or major) appliances (sometimes also called white appliances or white goods) and other (usually much smaller) appliances. Residential appliances are disaggregated as below.
Refrigerators	R_REFRIG	Refrigerator can be defined as a box, room, or cabinet in which food, drink, etc., are kept cool by means of ice or mechanical refrigeration.
Freezers	R_FREEZER	Freezers can be defined as a box, room, or cabinet held at or below 0°C (32°F).
Refrigerator/Freezer combinations	R_REFFREEZ	Refrigerator/Freezer combinations refers to a single appliance that have both a refrigerator and a freezer compartment.
Dish washers	R_DISH_W	Dish washer is a machine for washing dishes, kitchen utensils, etc., automatically.
Clothes washers	R_CLOTH_W	Clothes washers also known as washing machines are appliances for washing clothing, linens, etc.
Clothes dryers	R_CLOTH_D	Clothes dryers are appliances used to dry clothing, linens, etc.
Televisions	R_TV	Televisions, also including home entertainment devices.
Personal computers	R_PC	Personal Computers, also including other information technology devices.
Other appliances	R_OTHER	Other appliances, includes all appliances not specified above, such as hair driers, microwaves, vacuum cleaners etc. For country specific information, please refer to country notes.
Non-specified	R_NONSPEC	Non-specified includes all consumption for energy uses that are not specified above. For some countries, this category could also include data from end uses listed above. For country specific information, please refer to the chapter on *Country notes*.

Services		
Flow	**Short name**	**Definition**
Total Services	S_ALL	Services sector includes commercial activities and public services [ISIC Rev. 4 Division 33, 37-39, 45-47, 52, 53, 55, 56, 58-66, 68-75, 77-82, 84 (excluding Class 8422), 85-88, 90-96 and 99].
Services space heating	S_SPACE_H	Represents the services sector space heating end use. Space heating includes the different means of heating spaces, which can be achieved through many systems and fuels. Heating systems can broadly be separated into two types, namely central heating and dedicated area/room heating. Central heating systems can heat the entire dwelling; they include hot water and steam systems with radiators, floor or wall furnaces, district heating, heat pumps, etc. Area-dedicated heating systems can be divided into several categories: standalone electric heaters, fireplaces, and stand-alone stoves using oil products or other fuels, such as coal or wood. It is not rare that households use a combination of several systems, e.g. electrical heaters to complement insufficient base central systems. Heating systems can generate heat using a number of energy sources such as electricity, natural gas, coal, fuel oil, liquefied petroleum gas (LPG), kerosene, biofuels, and active or passive solar energy.
Services space cooling	S_SPACE_C	Represents the services sector space cooling end use. Space cooling includes all equipment used for cooling a living area, which can be divided into two broad categories: central cooling systems and room-dedicated systems. Central air conditioners feed into a duct system that could also be used by a central heating system. Wall air conditioners and split systems are used to cool a room. There are other possible cooling systems such as swamp coolers (or evaporative coolers), which cool air through evaporation of water; heat pumps that can be used in reverse mode to cool the air or district cooling. Most of the cooling systems in the residential sector run exclusively on electricity.
Services lighting	S_LIGHTING	Services lighting includes energy consumed for interior or exterior lighting in the services sector today mainly powered by electricity.
Other building energy use	S_NONSPEC	Other building energy use includes all consumption in the services sector for uses that are not space heating, space cooling and lighting. If data for one or more uses specified above (space heating, space cooling & lighting) are not available, then Other building energy use should also include data for consumption in these uses. i.e. other = total - (space heating + space cooling + lighting)
Non-building energy use	S_GENERIC	Includes all the consumption that happens in the services sector outside buildings (e.g. street lighting etc.)

Services		
Flow	**Short name**	**Definition**
Sewerage, waste and remediation [ISIC 37-39]	S_SEWWASTE	Includes sewerage, waste collection and remediation activities [ISIC Divisions 37 to 39].
Wholesale and retail [ISIC 46-47]	S_RETAIL	Includes wholesale and retail trade, except of motor vehicles and motorcycles [ISIC Divisions 46 and 47].
Warehousing, support for transport, postal [ISIC 52-53]	S_WARETRA	Includes warehousing and support activities for transportation and postal and courier activities [ISIC Divisions 52 and 53].
Accommodation and food [ISIC 55-56]	S_ACCFOOD	Includes accommodation, and food and beverage service activities [ISIC Division 55 and 56].
Information and communication [ISIC 58-63]	S_IC	Includes publishing, video and television programme production, broadcasting, telecommunications, computer programming and information service activities [ISIC Divisions 58 to 63].
Finance, insurance, real estate, science, admin [ISIC 64-82]	S_OFFICE	Includes financial service activities, insurance, real estate, legal and accounting, head offices and management consultancy, architectural and engineering, scientific research, advertising and market research, veterinary, rental and leasing, employment, travel agency, security and investigation, building and landscape and office administrative activities [ISIC Divisions 64 to 82].
Public admin, excluding defence [ISIC 84]	S_PUBLIC	Includes public administration, excluding defence activities [ISIC Division 84 (excluding Class 8422)].
Education [ISIC 85]	S_EDU	Includes all education activities [ISIC Division 85].
Health and social work [ISIC 86-88]	S_HEALTH	Includes human health, residential care and social work activities without accommodation [ISIC Division 86 to 88].
Arts, entertainment and recreation [ISIC 90-93]	S_ARTS	Includes arts, entertainment, libraries, gambling, sports, amusement and recreation activities [ISIC Division 90 to 93].
Other services [ISIC 33; 45; 94-96]	S_OTHER	Includes repair and installation of machinery and equipment [ISIC Division 33], wholesale and retail trade and repair or motor vehicles and motorcycles [ISIC Division 45], activities of membership organizations, repair of computers and household goods, and other personal service activities [ISIC Division 94 to 96].

Industry		
Flow	**Short name**	**Definition**
Manufacturing [ISIC 10-18, 20-32]	M_TOTAL	Includes all the manufacturing subsectors listed below [ISIC Rev. 4 Division 10 to 18 and 20 to 32]. Manufacture of coke and refined petroleum products [ISIC Division 19] is excluded from Manufacturing.
Food and tobacco [ISIC 10-12]	M_FOOD	Includes food, beverages and tobacco manufacturing [ISIC Divisions 10 to 12].
Textiles and leather [ISIC 13-15]	M_TEXTILE	Includes textiles and leather [ISIC Divisions 13 to 15].
Wood and wood products [ISIC 16]	M_WOOD	Includes wood and wood products (other than pulp and paper) [ISIC Division 16].
Paper pulp and printing [ISIC 17-18]	M_PAPPRINT	Includes paper, pulp and printing [ISIC Divisions 17 and 18].
Chemicals and chemical products [ISIC 20-21]	M_INDCHEMS	Includes chemical and petrochemical industry [ISIC Divisions 20 and 21] excluding petrochemical feedstocks.
Rubber and plastic [ISIC 22]	M_RUBPLAST	Includes rubber and plastics [ISIC Division 22]. If not available could be included under non-specified manufacturing.
Non-metallic minerals [ISIC 23]	M_NONMETAL	Includes non-metallic minerals such as glass, ceramic, cement, etc. [ISIC Division 23].
Of which: cement	M_CEMENT	Include the energy used for the production of cement [ISIC Division 23 Class 94]. This Class is included under Non-Metallic Minerals [ISIC Division 23].
Basic metals [ISIC 24]	M_METALS	Includes manufacture and casting of ferrous metals and non-ferrous metals [ISIC Division 24].
Ferrous metals [ISIC 2410+2431]	M_FERROUS	Covers manufacture and casting of iron and steel including energy used in blast furnaces and coke ovens [ISIC Class 2410 and Class 2431];
Non-ferrous metals [ISIC 2420+2432]	M_NONFERRO	Includes manufacture and casting of non-ferrous metals (e.g. aluminium) [ISIC Class 2420 and Class 2432].
Machinery [ISIC 25-28]	M_MACHINE	Includes machinery: fabricated metal products, machinery and equipment other than transport equipment [ISIC Divisions 25 to 28].
Transport equipment [ISIC 29-30]	M_CARS	Includes [ISIC Divisions 29 and 30].
Other manufacturing [ISIC 31-32]	M_OTHERS	Includes the manufacture of furniture and other manufacturing (e.g. jewellery) [ISIC Division 31 and 32].
Non-specified manufacturing	M_NONSPEC	Represents energy use in manufacturing that cannot be allocated to the previous categories.

Industry		
Flow	**Short name**	**Definition**
Memo: Coke and refined petroleum products [ISIC 19]	M_REFINING	This division includes the transformation of crude petroleum and coal into usable products [ISIC Division 19]. The dominant process is petroleum refining, which involves the separation of crude petroleum into component products through such techniques as cracking and distillation. This division also includes the manufacture for own account of characteristic products (e.g. coke, butane, propane, petrol, kerosene, fuel oil etc.) as well as processing services (e.g. custom refining). This division includes the manufacture of gases such as ethane, propane and butane as products of petroleum refineries. Not included is the manufacture of such gases in other units, manufacture of industrial gases (Class 2011), extraction of natural gas (methane, ethane, butane or propane) (Class 0600), and manufacture of fuel gas, other than petroleum gases (e.g. coal gas, water gas, producer gas, gasworks gas) (Class 3520). The manufacture of petrochemicals from refined petroleum is classified in division 20.
Agriculture, forestry and fishing [ISIC 01-03]	O_AGROFISH	Includes agriculture, forestry and fishing [ISIC Division 01 to 03].
Mining [ISIC 05-09]	O_MINING	Covers mining and quarrying including coal, oil and gas extraction [ISIC Division 05 to 09].
Construction [ISIC 41-43]	O_CONSTR	Includes [ISIC Divisions 41 to 43].

Transport		
Flow	**Short name**	**Definition**
Total passenger and freight transport	TOTAL	Transport covers all transport modes using commercial energy, independently of the sector where the transport activity occurs. As a consequence, cycling, walking or sailing are not covered in this sector, even though these modes could represent sizeable activities in terms of passenger-kilometres (pkm). Transport excludes international marine and aviation bunkers, pipeline transportation, and when possible fuel tourism (unlike world energy balances). The transport sector is divided by segment (passenger and freight), mode (road, rail, air and water) and by vehicle type (e.g. cars, motorcycles, etc.).
Total passenger transport	P_TOTAL	Includes all mode of transportation dedicated to transporting passengers.
Cars/light trucks	P_CARS	Includes passenger light-duty vehicles carrying up to eight persons, cars, minivans, sport utility vehicles and personal-use pickup trucks. [1] Passenger cars cover a number of categories, such as taxis, hire cars, ambulances and motor homes.
Motorcycles	P_MCYCL	Includes powered 2- to 4-wheeled road motor vehicles not exceeding 400 kilograms.
Buses	P_BUS	Includes urban, suburban and intercity mini-coaches, trolleybuses, minibuses and bus vehicles.
Passenger trains	P_RAIL	Includes any movement of passengers through railway, on a given railway network, regional, urban or suburban, within the national boundaries. Passenger rail transport includes trains, metro vehicles and trams (streetcars). Rail transport can be powered by electricity, diesel or steam.
Domestic passenger airplanes	P_AIR	Includes passenger airplanes, aircrafts configured for the transport of passengers, used for domestic travels. For country-specific coverage, please refer to country notes.
Domestic passenger ships	P_WATER	Covers the movement of passengers, by any kind of vessel, boat or ship, undertaken at sea, or on lakes and rivers, within the national boundaries. International water transport is excluded from national totals, while inland waterways transport is included. For country-specific coverage, please refer to country notes.
Total freight transport	F_TOTAL	Includes all mode of transportation dedicated to transporting goods.
Freight trucks	F_TRUCKS	Covers the movement of goods within the national boundaries by road vehicles designed, exclusively or primarily, to carry goods: light-duty freight vehicles (vans and pickups), heavy-duty goods vehicles (trucks or lorries), road tractors, and agricultural tractors permitted to use roads open to public traffic.
Freight trains	F_RAIL	Includes any movement of goods by railway vehicles on a given railway network, regional, urban or suburban, within the national boundaries. Rail transport can be powered by electricity, diesel or steam.
Domestic freight airplanes	F_AIR	Covers the movement of goods by aircrafts configured for the transport of freight or mail, operating within the national boundaries. For country-specific coverage, please refer to country notes.

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1. For some countries, pick-up trucks are reported either in passenger transport or freight transport according to their main use. For country-specific information, please refer to the chapter on *Country notes*.

Transport		
Flow	**Short name**	**Definition**
Domestic freight ships	F_WATER	Covers the movement of goods by any kind of vessel, boat, barge or ship, undertaken at sea, or over lakes and rivers, within the national boundaries. International water transport is excluded from national totals, although it has been the largest carrier of freight throughout recorded history. For country-specific coverage, please refer to country notes.
Memo: Total road	ROAD	It includes passenger (cars, motorcycles, buses) and freight (trucks) road transportation.
Memo: Total trains	RAIL	It includes passenger and freight trains transportation.
Memo: Total airplanes	AIR	It includes domestic passenger and freight airplanes.
Memo: Total ships	WATER	It includes domestic passenger and freight ships and excludes fuel used for ocean, coastal and inland fishing (included under agriculture) and military consumption.

5. PRODUCT DEFINITIONS

The Product dimension includes energy products and activity data, as described below.

PRODUCTS		
Flow	**Short name**	**Definition**
Oil and oil products (PJ)	E_OIL	Includes crude oil, natural gas liquids, refinery feedstocks, additives as well as other hydrocarbons (including emulsified oils, synthetic crude oil, mineral oils extracted from bituminous minerals such as oil shale, bituminous sand, etc., and oils from coal liquefaction), refinery gas, ethane, LPG, aviation gasoline, motor gasoline, jet fuels, kerosene, gas/diesel oil, fuel oil, naphtha, white spirit, lubricants, bitumen, paraffin waxes, petroleum coke and other oil products. Data shown for the transport sector in this publication present the disaggregation of oil products described below.
Motor gasoline (PJ)	E_GASOL	It 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). In this publication and differently from the IEA energy balances, motor gasoline for transport includes liquid biogasoline or ethanol.
Diesel and light fuel oil (PJ)	E_DIESEL	Includes diesel oil for fuel use in compression ignition (diesel) engines fitted in road vehicles. Distillation range is 160ºC to 380ºC. In this publication and differently from the IEA energy balances, diesel for transport includes liquid biodiesels.
LPG (PJ)	E_LPG	LPG are light paraffinic hydrocarbons derived from refinery processes, crude oil stabilisation plants and natural gas processing plants. They consist mainly of propane (C_3H_8) and butane (C_4H_{10}) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene. LPG are normally liquefied under pressure for transportation and storage.
Heavy fuel oil (PJ)	E_HFO	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.

PRODUCTS		
Flow	**Short name**	**Definition**
Jet fuel and aviation gasoline (PJ)	E_JETF	Includes Gasoline type jet fuel and Kerosene type jet fuel as described below: 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 naphtha in such a way that the aromatic content does not exceed 25% in volume, and the vapour pressure is between 13.7 kPa and 20.6 kPa. Additives can be included to improve fuel stability and combustibility. Kerosene type jet fuel 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 the liquid biofuels blended with jet kerosene.
Gas (PJ)	E_GAS	Gas includes natural gas (excluding natural gas liquids).
Coal and coal products (PJ)	E_COAL	Coal includes all coal, both primary (including hard coal and lignite) and derived fuels (including patent fuel, coke oven coke, gas coke, BKB, gas works gas, coke oven gas, blast furnace gas and other recovered gases), as well as peat (including peat products) and oil shale.
Biofuels and waste (PJ)	E_WOOD	Biofuels and waste comprises solid biofuels, liquid biofuels, biogases, industrial and municipal waste. Biofuels and waste data are often based on incomplete information, with particularly high caution on data quality. Solid biofuels are defined as any plant matter used directly as fuel or converted into other forms (e.g. charcoal) 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/waste and other solid biofuels). Liquid biofuels include biogasoline, biodiesel and other liquid biofuels. Liquid biofuels consumed in the transport sector are included, in this publication, under motor gasoline and diesel. Biogases comprise landfill gas, sewage sludge gas and other biogases from anaerobic fermentation. Note that biofuels refer only to the amounts of biomass specifically used for energy purposes. Therefore, the non-energy use of biofuels is null by definition. Municipal waste consists of products that are combusted directly to produce heat and/or power and comprises waste produced by households, hospitals and the tertiary sector that are collected by local authorities for incineration at specific installations. 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.

PRODUCTS		
Flow	**Short name**	**Definition**
Heat (PJ)	E_DHEAT	Heat includes all heat produced by main activity producer CHP and heat plants, as well as heat sold by autoproducer CHP and heat plants to third parties. Fuels used to produce quantities of heat for sale are included in transformation processes under the rows *CHP plants* and *Heat plants*. The use of fuels for heat which is not sold is included under the sectors in which the fuel use occurs.
Electricity (PJ)	E_ELEC	Electricity includes electricity generated from all sources.
Other sources (PJ)	E_OTHER	Other includes all the forms of energy not included in the list above (e.g. geothermal and solar thermal heat direct use etc.).
Total final energy (PJ)	E_FINAL	Represents total consumption of energy including all the products listed above.

ACTIVITY DATA		
Flow	**Short name**	**Definition**
Population (10^6)	ACT_POP	Total population.
Occupied dwellings (10^6)	ACT_DWEL_OCC	Includes only primary residences excluding unoccupied dwellings and secondary residences.
Residential floor area (10^9 m2)	ACT_R_AREA	Includes only floor area of occupied dwellings.
Heating degree days (10^3)	ACT_H_DDAYS	Heating Degree Days (HDD) are a simplified measure of the intensity and duration of cold weather over a certain period in a given location. The value of HDD for a period, for example a winter, is determined by subtracting for each day the average daily temperature from a base temperature (assumed to be the temperature below which heating systems are turned on), and then adding up this difference for the days of the period for which the average outside air temperature is lower than the base temperature. When the outside air temperature is equal to or higher than the base temperature, HDD are zero. The higher heating degree days, the colder the season, the greater the amount of energy required for space heating.
Cooling degree days (10^3)	ACT_C_DDAYS	Similarly to HDD, cooling degree days (CDD) are a measure of the intensity of warm weather to correct energy consumption data for space cooling. In this publication, temperature correction are made only for calculating intensity indicators, therefore energy consumption data show the fluctuations due to temperature change. Space cooling is temperature corrected only for countries where CDD are data available.
Stocks (million units)	ACT_STOCK	Includes stock of appliances within occupied dwellings.
Services employment (10^6)	ACT_S_EMPLOY	Includes the employment total in full-time equivalents in the services sector. The number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs. In some cases it refers to services' employment total in persons.
Services floor area (10^9 m2)	ACT_S_AREA	Includes only floor area of services' buildings.
Value added (10^9 USD PPP 2010)	ACT_GDP_P	Value added in USD at the price level and purchasing power parities (PPPs)[1] of the year 2010.
Cement production (10^6 t)	ACT_CEMENT	Includes the production of cement in tons. It excludes trades.
Steel production (10^6 t)	ACT_STEEL	Includes the production of steel in tons. It excludes trades.
Passenger-kilometres (10^9 pkm)	ACT_PKM	Pkm is a unit of measure of passenger transport activity. One passenger-kilometre represents the transport of one passenger over one kilometre. For all vehicles, it is the total distance travelled of all passengers summed up.
Tonne-kilometres (10^9 tkm)	ACT_TKM	Tkm is a unit of measure of goods transport activity. One tonne-kilometre represents the transport of one tonne over one kilometre. For all vehicles, it is the total distance travelled of all tonnes summed up.

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1. Purchasing power parities are the rates of currency conversion that equalise the purchasing power of different currencies.

ACTIVITY DATA		
Flow	**Short name**	**Definition**
Vehicle-kilometres (10^9 vkm)	ACT_VKM	Vkm is a unit of measure of vehicle activity. One vehicle-kilometre represents the movement of a vehicle over one kilometre. For all vehicles, it corresponds to the product of the number of vehicles in stock and the average distance travelled by vehicle.
Vehicle stock (10^6)	ACT_VST	Represents the total stock of vehicles (by type) registered in the country.

6.   INDICATOR DEFINITIONS

Energy and general indicators		
Flow	**Short name**	**Definition**
Per capita energy intensity (GJ/cap)	EI_PC	Energy intensity per capita calculated as energy consumption divided by total population.
Per floor area energy intensity (GJ/m2)	EI_FA	Energy intensity per floor area (residential or services) calculated as energy consumption divided by floor area.
Per floor area TC energy intensity (GJ/m2)	EI_FA_TC	Energy intensity per floor area (residential or services) calculated as energy consumption divided by floor area (temperature corrected to take into account different average temperatures in different years).
Per dwelling energy intensity (GJ/dw)	EI_PD	Energy intensity per occupied dwelling calculated as energy consumption divided by occupied dwellings.
Per dwelling TC energy intensity (GJ/dw)	EI_PD_TC	Energy intensity per occupied dwelling calculated as energy consumption divided by occupied dwellings (temperature corrected to take into account different average temperatures in different years).
Per unit equipment energy intensity (GJ/unit)	EI_PU	Energy intensity per unit of appliance. It is calculated as energy consumption divided by the number of appliances within occupied dwellings. It represents the average unit consumption of each type of appliance in the country.
Per value added energy intensity (MJ/USD PPP 2010)	EI_GDP	Energy intensity per value added (USD PPP 2010). It is calculated as the ratio between energy consumption and value added.
Per services employee energy intensity (GJ/employee)	EI_PE	Energy intensity per employee calculated as energy consumption divided by employees (services sector only).
Per physical output energy intensity (GJ/t)	EI_PHYSICAL	Energy intensity per physical output calculated as energy consumption divided production of cement or steel.
Fuel intensity (litres/100 vkm)	EI_FUEL_INT	Fuel intensity calculated as litres consumed to drive 100 km.
Passenger-kilometres energy intensity (MJ/pkm)	EI_PKM	Represents the energy consumed to drive one passenger over the distance of one kilometre.
Vehicle-kilometres energy intensity (MJ/vkm)	EI_VKM	Represents the energy consumed to drive one vehicle over the distance one kilometre.

Energy and general indicators		
Flow	**Short name**	**Definition**
Tonne-kilometres energy intensity (MJ/tkm)	EI_TKM	Represents the energy consumed to transport one tonne of goods over a distance of one kilometre.
Passenger-kilometres per capita (10^3 pkm/cap)	EI_PKM_PC	Represents the ratio between passenger-kilometre and total population.
Passenger load factor (pkm/vkm)	EI_LOAD_P	Represents the average number of passengers per vehicle. It can be calculated dividing pkm by vkm.
Vehicle-kilometres per capita (10^3 vkm/cap)	EI_VKM_PC	Represents the ratio between vehicle-kilometre and total population.
Vehicle use (10^3 vkm/vehicle)	EI_VUSE	Represents the ratio between vehicle-kilometre and vehicle stock.
Tonne-kilometres per capita (10^3 tkm/cap)	EI_TKM_PC	Represents the ratio between tonne-kilometre and total population.
Freight load factor (tkm/vkm)	EI_LOAD_F	Represents the average tonnes of goods transported by one vehicle. It can be calculated dividing tkm by vkm.

Carbon indicators		
Flow	**Short name**	**Notes**
Per capita carbon intensity (tCO$_2$/cap)	CI_PC	Carbon intensity per capita is calculated as tonnes of CO$_2$ divided by total population[1].
Per floor area carbon intensity (tCO$_2$/m2)	CI_FA	Carbon intensity per floor area is calculated as emissions divided by floor area (residential or services).
Per dwelling carbon intensity (tCO$_2$/dw)	CI_PD	Carbon intensity per dwelling is calculated as emissions divided by occupied dwellings.
Per unit equipment carbon intensity (tCO$_2$/unit)	CI_PU	Carbon intensity per unit of appliance is calculated as emissions divided by the number of appliances within occupied dwellings. It represents the average emissions from each type of appliance in the country.
Per value added carbon intensity (kgCO$_2$/USD PPP 2010)	CI_GDP	Carbon intensity per value added (USD PPP 2010). It is calculated as the ratio between emissions and value added.
Per services employee carbon intensity (tCO$_2$/employee)	CI_PE	Carbon intensity per employee calculated as emissions divided by employees (services sector only).
Per physical output carbon intensity (tCO$_2$/t)	CI_PHYSICAL	Carbon intensity per physical output calculated as emissions divided production of cement or steel.
Passenger-kilometres carbon intensity (kgCO$_2$/pkm)	CI_PKM	Represents the carbon emitted to drive one passenger over the distance of one kilometre.
Vehicle-kilometres carbon intensity (kgCO$_2$/vkm)	CI_VKM	Represents the carbon emitted to drive one vehicle over the distance one kilometre.
Tonne-kilometres carbon intensity (kgCO$_2$/tkm)	CI_TKM	Represents the carbon emitted to transport one tonne of goods over a distance of one kilometre.

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1. Consistent with the IEA (2019) *CO$_2$ emissions from fuel combustion* publication.

7. COUNTRY NOTES

IEA MEMBER COUNTRIES

GENERAL NOTES

The notes given in this section refer to data for the years 2000 to 2017 published in this book, as well as on the online data service.

Data are generally obtained from national administrations through annual submission of the energy efficiency indicators questionnaire. In case other sources are used, e.g. the Odyssee database, this is indicated in the relevant country sources section.

In case of estimates made by the IEA Secretariat, explanations of the estimates are provided in the respective country notes.

Australia

Sources

Australian Government, Department of the Environment and Energy.

Years covered

2000-2017.

General note

All energy data refer to the financial year (e.g. July 2016 to June 2017 for 2017). The macroeconomic activity data are of calendar year (e.g. January 2017 to December 2017 for 2017). There may be some discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Work is ongoing to improve consistency.

Residential sector

Data for TVs include TVs only. Data for home entertainment are reported under other appliances.

Data for energy consumption of swimming pools and spas are included under other appliances. Data for energy consumption of natural gas for swimming pools and spas are included in other appliances, other energy sources.

Industry and services sectors

Data for energy consumption and value added of paper and printing [ISIC 17-18] also include wood [ISIC 16].

Data for energy consumption and value added for chemicals [ISIC 20-21] also include rubber and plastics [ISIC 22] and manufacture of coke and refined petroleum products [ISIC 19].

Data for energy consumption and value added for machinery [ISIC 25-28] include transport equipment [ISIC 29-30].

Data for value added for other manufacturing [ISIC 31-32] are not available.

Data for value added of [ISIC 01-03], [ISIC 05-09], [ISIC 10-32], [ISIC 20-21], [ISIC 25-28], [ISIC 35-36], [ISIC 41-43], and services sector have been revised for the whole time series.

Data for value added of manufacture of textiles [ISIC 13-15], paper and printing [ISIC 17-18], and non-metallic minerals [ISIC 23] are not available for the year 2017.

Transport sector

Data for vehicle-kilometres of motorcycles have been revised since 2014, showing a break for this year.

Data for vehicle stocks of buses have been revised since 2014, and shows a break for this year.

Austria

Sources

Austrian Energy Agency; Odyssee database.

Years covered

2000-2017 (partially).

Residential sector

The whole data series for space heating and for water heating, cooking and lighting since 2005 have been revised due to changes in the Statistics Austria Energy Balances. This may lead to some breaks in time series for these end uses.

Data on energy consumption for space cooling and per appliance type, as well as data on appliances stocks and diffusion for the year 2016 are based on IEA Secretariat estimates, and are not available for the year 2017.

Industry and services sectors

Data for end use energy consumption for the services sector have been revised for the whole time series, in order to improve consistency with the energy balances database.

There were some historical revisions of energy consumption data for several industry subsectors, due to revisions in Statistics Austria Energy Balances.

Data for value added of basic metals [ISIC 24] show a significant decrease in 2009, leading to a considerably higher intensity in that year. This does not necessarily reflect physical intensities, as it is based on economic data.

Transport sector

There are some discrepancies between the IEA energy efficiency indicators and the IEA energy balances databases. Work is ongoing to improve data consistency.

Transport activity data are not available for the year 2017. Transport energy consumption data for the year 2017 are based on IEA Secretariat estimates.

Data for energy consumption and activity (passenger-kilometres and tonne-kilometres) of freight airplanes and passenger ships are not available. Their energy consumption might be partially included under passenger airplanes and freight ships data, respectively.

Belgium

Sources

Direction générale Energie – Ministry of Energy; Odyssee database.

Years covered

2000 (partially) – 2017 (partially).

Residential sector

The data for the residential sector are only available from the year 2010 onwards.

Data for energy consumption of residential appliances include lighting.

Data for energy consumption of residential appliances are available only as a total included under other appliances.

There is a break in 2010 for refrigerator/freezer combinations stocks. This is due the distinction between refrigerators and refrigerator/freezer combinations from 2010 (for the previous data, all the stock is allocated to the refrigerator/freezer combinations).

Industry and services sectors

Some data for energy consumption from natural gas and electricity for some industry subsectors are based on IEA estimates.

Transport sector

Some activity data have been revised since 2013, due to a change in the data collection methodology that affects the data for road transport modes.

Data on electricity consumption in passenger trains includes trams, while activity data (passenger-kilometre) does not. Indicators should be considered carefully in this sense.

There is a break in 2011 on the consumption of diesel and light fuel oil data for freight trains, which is under investigation, and may be subject to revisions in the future.

Data on energy consumption for domestic freight airplanes and domestic passenger ships are not available; it may be partially included in domestic passenger airplanes and domestic freight ships, respectively.

Historic data has changed for freight trains diesel consumption, due to a change in Eurostat methodology, which now

uses national net calorific values (NCV) rather than reference NCV.

Canada

Sources

Natural Resources Canada, Statistics Canada.

Years covered

2000-2017.

General notes

Differences between the IEA energy efficiency indicators and the IEA energy balances result from different timing of reporting requirements, sources used, as well as definitions and scope of coverage. Work is ongoing to align the two databases.

Detailed energy use information for Canada is available at Canada's National Energy Use Database.

Industry and services sectors

There were some revisions of energy consumption data for some industry subsectors, in this edition of the publication.

Data reported in some fuel categories has been combined with other fuels, due to confidentiality issues. For example, energy consumption from electricity and renewables and waste are combined in the food [ISIC 10-12] subsector.

The energy consumption for the non-metallic minerals [ISIC 23] for the years 2014 and 2015, as well as other some data points for energy consumption from oil products, coal, heat and electricity of ISIC 23, were estimated by the IEA Secretariat.

Data for value added for Canada are based on price levels of 2012, instead of 2010 as for other countries.

Transport sector

Data for buses include urban/local light rails (metro trains, light trains and urban buses).

Data on the energy use for air transport include both domestic and international transport. The energy use and activity data for water transport include domestic and transborder, but exclude other international transport.

Differences in road transport between the IEA energy efficiency indicators database and the IEA energy balances may be due to reallocation of energy consumption from motor gasoline and diesel between the services and the transport sector, with an impact data consistency for both sectors.

Czech Republic

Sources

Czech Statistical Office and Ministry of Industry and Trade; Odyssee database.

Years covered

2000-2017.

Residential sector

Data for energy consumption for space cooling are available from 2015 onwards.

Data on end use energy consumption have been collected based on a new methodology (a new residential survey), leading to breaks on energy consumption data for 2015 and 2016 (e.g. clothes washers and dryers), and also on appliances stocks data.

Data on energy consumption of refrigerators, refrigerators/ freezer combinations, clothes dryers, PCs and other appliances for the year 2015 are estimated by the IEA Secretariat.

Data for energy consumption of clothes dryers are available from 2004 onwards.

Industry and services sectors

Some discrepancies between the IEA energy efficiency indicators and the IEA energy balances figures might occur. Work is ongoing to improve the consistency of both databases.

Data for energy consumption for manufacture of rubber and plastics [ISIC 22] and other manufacturing [ISIC 31-32] are available from the years 2007 onwards.

Data for energy consumption for electricity, gas, steam, air conditioning supply and water collection, treatment and supply [ISIC 35-36] are only available from 2007 to 2009.

Data for heat consumption for manufacture and casting of iron and steel [ISIC 2410 and 2431] for 2015 and 2016 are based on IEA estimates.

Data for energy consumption of biofuels and waste for manufacture of non-metallic mineral products [ISIC 23] have revised from 2000 to 2013.

Transport sector

Data for vehicle-kilometres of passenger cars between 2011 and 2016, and for passenger trains and domestic passenger ships for the year 2016 are estimated by the IEA Secretariat.

Data for vehicle-kilometres of freight road transport are not available for several years.

Data on energy consumption and passenger-kilometres of motorcycles are not available.

Data for energy consumption for freight airplanes and passenger ships are not available, and might be included under passenger airplanes and freight ships, respectively.

Denmark

Sources

Danish energy agency through the Odyssee database.

Years covered

2000-2017 (partially).

General note

There may be breaks in some time series due to data revisions.

Residential sector

Data for energy consumption split by end use, and data for appliances stocks for the year 2017 are not available.

Data for biofuels and waste in space heating includes the heat contribution of heat pumps.

Data for energy consumption of water heating are included under space heating. Lighting energy consumption is included under other appliances.

Data for refrigerators and PCs are not available.

Industry and services sectors

Data for energy consumption of rubber manufacturing [ISIC 22] for the year 2016 are not available.

Data for space heating in services for the year 2017 are not available, and are reported under other energy use in the services sector for this year.

Transport sector

Data for activity and energy consumption split by segment/mode/vehicle type for the transport sector for the year 2017 are not available.

Data for passenger-kilometres of motorcycles are not available.

Data for tonne-kilometres of freight road transport include only Danish registered vehicles with a capacity of over 6 tonnes.

Data on loads of freight transport are not available.

Data on energy consumption of passenger ships and freight airplanes are not available, and may be partially included under freight ships and passenger airplanes, respectively.

Finland

Sources

Statistics Finland and Motiva.

Years covered

2000-2017.

General note

Some discrepancies between the IEA energy efficiency indicators and the IEA energy balances may occur. Work is ongoing to improve consistency between the two datasets.

Residential sector

Data on energy consumption for space heating, and also on the number of dwellings, excludes summer houses.

Data on residential floor areas includes common heated areas of buildings, and excludes summer houses.

Data for energy consumption for space cooling are available from the year 2015 onwards.

Data for appliances stocks and unit energy consumption for several years are based on IEA Secretariat estimates.

Data for energy consumption by appliance type are based on IEA Secretariat estimates. Data for PCs are not available.

Data for energy consumption for other appliances includes electric saunas and electric pre-heating of cars.

Industry and services sectors

Data for energy consumption of rubber manufacturing [ISIC 22] are not available due to confidentiality issues.

Data for energy consumption from heat for several industry subsectors up to 2006 are based on IEA Secretariat estimates.

Data for "Other building energy use in services sector" includes energy consumption for water heating, lighting, appliances, and street lighting.

Data for energy consumption of services sector have been revised for the whole time series since the last edition of this publication.

Transport sector

Data for passenger-kilometres (pkm) of motorcycles are the same as the respective vehicle-kilometre (vkm) data (the latter being based on the LIPASTO model), assuming a one-person occupancy for motorcycle trips, in the absence of more accurate data for pkm.

Data for tonne-kilometres and freight loads (tonnes carried) data for freight airplanes are not available.

Data for vehicle kilometres and stocks of rail, air, and water transport are not available.

Vehicle stocks data refer to vehicles registered in the country and not vehicles in circulation.

The energy consumption from diesel and light fuel oil for passenger ships may be reported together with domestic freight ships up to 2009.

Data on energy consumption of freight airplanes are not available and may be partially included under passenger airplanes.

Data for energy consumption of ice-breakers are included in freight ships.

Data for "Fuel use to be specified" includes energy consumption for snow mobiles, ATVs, fork lifts and lawn mowers.

France

Sources

Ministère de la transition écologique et solidaire (SDES – service de la donnée et des études statistiques); Odyssee database.

Years covered

2000-2017.

General note

From 2011 onwards, energy consumption and activity data for France now include 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). This is true

except for road and air transport, where data refer only to metropolitan France. Considering overseas departments in these two specific cases would have led to significant breaks in the data reported and corresponding indicators (especially in the case of air transport when accounting for long haul flights).

Residential sector

Data for energy consumption have been revised from the year 2010 across end uses and energy products.

Data for energy consumption for space and water heating from solar thermal and heat pumps are reported in other fuels category.

Data for energy consumption and stocks of PCs are not available.

Industry and services sectors

There may be breaks for some industry subsectors for the consumption of electricity and natural gas for the year 2011, due to a new data collection methodology based on an annual industry survey.

Some data for energy consumption from natural gas and renewables for some industry subsectors before the year 2004 are based on IEA Secretariat estimates.

Data for electricity and oil & oil products consumption for construction [ISIC 41-43] were revised from 2011 onwards, based on a new survey in 2014.

The Data for energy consumption for the services sector from biofuels and waste, heat, and electricity before the year 2014 are based on IEA Secretariat estimates.

Transport sector

Activity data for road transport refer to vehicles registered in metropolitan France.

Data for passenger kilometres for bus have been revised since the year 2007 due to a methodological change.

Data for energy consumption for road transport have been revised, with energy consumption from foreign vehicles now being reported under fuel use to be specified. Data for energy consumption for passenger airplanes has also been historically revised, due to a methodological change.

Germany

Sources

Federal Ministry for Economic Affairs and Energy, Federal Ministry for Transport and Digital Infrastructure, Federal Statistical Office, Fraunhofer-Gesellschaft.

Years covered

2000-2017.

General note

Some discrepancies between the IEA energy efficiency indicators and the IEA energy balances may occur. Some differences result from different data scope and definitions. Work is ongoing to align these two datasets.

Residential sector

There is a break in the time series for floor area of dwellings, for the year 2010, which may affect residential energy intensities. This may be due to the results of the building and housing census from 2011 onwards.

Data for space cooling are available from 2013 onwards. PCs data are not available.

Data for energy consumption from other appliances for the years 2014 and 2015 are estimated by the IEA Secretariat.

Data for biofuels and waste include direct use of geothermal and solar thermal heat.

Industry and services sectors

Data for energy consumption for electricity, gas, steam, air conditioning supply and water collection, treatment and supply [ISIC 35-36] and construction [ISIC 41-43] are not available.

Data for energy consumption of agriculture, forestry and fishing [ISIC 01-03] are based on a national survey. However, these are not compatible with the IEA energy balances database.

Data for energy consumption of the services sector split by end use are available from 2001 onwards.

Greece

Sources

Ministry for Environment and Energy (CRES) through the Odyssee database.

Years covered

2000-2017 (partially).

Residential sector

Data for energy consumption split by end use, and data for appliances stocks for the years 2016 and 2017 are not available.

In 2013, taxation on oil products for space heating increased substantially, leading to reduced consumption in the residential sector. According to external sources, the consumption of oil products has been partially replaced by non-commercial solid biofuels not yet reported. This leads to a significant reduction of total space heating consumption in 2013, affecting also the energy intensity of this end use. The space heating intensity shown should, thus, be considered with caution.

Data for the energy consumption for other appliances includes lighting.

Data for energy consumption split by appliance type is not available since the year 2014, and data for energy consumption and appliance stocks for PCs are not available.

Data on dwelling stock and residential floor areas are not available for the years 2016 and 2017.

Industry and services sectors

Data on energy consumption of rubber manufacturing [ISIC 22] are included under manufacturing not elsewhere specified.

Transport sector

Data for activity and energy consumption split by segment/mode/vehicle type for the transport sector for the years 2016 and 2017 are not available.

Data for passenger-kilometre for motorcycles are based on IEA Secretariat estimates.

Data for vehicle-kilometre of buses and freight trucks from 2000 to 2009 are based on IEA Secretariat estimates.

The full amount of energy consumption from water transport is allocated to freight ships.

The full amount of energy consumption from air transport is allocated to passenger airplanes.

Hungary

Sources

Hungarian Energy and Public Utility Regulatory Authority.

Years covered

2000-2017.

General note

Some breaks in energy consumption data may occur in 2013, resulting from an energy consumption survey introduced in 2014. For instance, some energy consumption was reallocated between industry and services sectors.

Residential sector

Data for occupied dwellings for 2000-2001 are based on IEA Secretariat estimates.

Some data points on energy consumption for space heating for different fuels and different years are based on IEA Secretariat estimates.

Data for energy consumption disaggregated by end use for the years 2011 to 2014 are estimated by the IEA Secretariat.

Data for energy consumption for other appliances includes all residential appliances, cooling and lighting. Data for energy consumption for space cooling is reported separately since the year 2015.

Industry and services sectors

Data for energy consumption for rubber and plastics [ISIC 22] and other manufacturing [ISIC 31-32] are reported separately from 2013 onwards.

There are some breaks in time series of value added data. Specifically, data for value added of basic metals [ISIC 24] show a significant decrease in 2009, leading to a considerably higher intensity in that year. This does not necessarily reflect physical intensities, as it is based on economic data.

Transport sector

Data for energy consumption and activity (passenger-kilometres) for passenger cars include motorcycles.

Data for activity (passenger-kilometre) for passenger trains from 2000 to 2006 are based on IEA Secretariat estimates.

Data for activity (tonne-kilometres) of freight transport include both domestic and international transport.

Data for passenger car vehicle-kilometre and occupancy are not available after 2010.

Data for activity of air transport are not available. Energy consumption of passenger airplanes is available from 2000 to 2010.

Data for energy consumption of passenger and freight trains from 2011 to 2014 are based on IEA Secretariat estimates.

Data for energy consumption for freight ships include passenger ships up to 2012.

Ireland

Sources

Sustainable Energy Authority of Ireland.

Years covered

2000-2017 (partially).

Residential sector

Data for electricity and oil & oil products in the residential sector up to the year 2015 are based on IEA Secretariat estimates. Energy consumption data for other fuels may show some breaks in the year 2016, due to a new data collection methodology adopted since then.

Data for energy consumption from biofuels and waste for water heating includes solar thermal. Data reported for space heating under "other" fuel corresponds to geothermal/ambient heat from heat pumps.

Data for energy consumption for space cooling, lighting and residential appliances split by appliance type are not available.

Data for appliances stocks for PCs are not available.

Industry and services sectors

Data for value added of [ISIC 20-21] includes only [ISIC 21]. Data for value added of [ISIC 25-28] includes only [ISIC 25 and 27] from the year 2015 onwards.

Due to confidentiality issues, value added of [ISIC 20-21] and [ISIC 31-32] is not available since the year 2015.

Energy consumption data for the manufacture and casting of iron and steel [class 2410+2431] since the year 2015 is not available, due to confidentiality issues.

Transport sector

Discrepancies between the IEA energy efficiency indicators and the IEA energy balances for oil products are due to different reporting sources. Work is ongoing to align the two datasets.

Data on passenger-kilometres for cars and buses for 2016 are based on IEA Secretariat estimates and are not available for 2017.

Data for tonne-kilometres of ships are not available after 2008.

Data for energy consumption of freight road transport exclude light duty vehicles.

Data for energy consumption of motorcycles and freight trains are not available.

Data for energy consumption of passenger ships and freight airplanes are not available, and may be partially included under freight ships and passenger airplanes, respectively.

Italy

Sources

Ministry of Economic Development, Terna and ENEA; Ricerca Sistema Energetico (RSE).

Years covered

2000-2017.

Residential sector

Data for electricity consumption for water heating have been revised since 2010 due to national updates on electrical water heater stocks.

Data for electricity consumption for lighting have been revised since 2009 due to updates on the estimates of the average household area.

Data for electricity consumption for freezers and refrigerator/freezer combinations have been revised since 2011 due to new data collection methodology.

Industry and services sectors

Data for energy consumption of some industry subsectors for natural gas and heat for the years 2000-2003 are based on IEA Secretariat estimates.

Data for energy consumption of manufacture of rubber and plastics [ISIC 22] are included in manufacturing not elsewhere specified.

Data for energy consumption of metal products and machinery [ISIC 25-28] includes manufacture of motor vehicles [ISIC 29-30].

Data for value added of some industry subsectors for the year 2017 are based on IEA Secretariat estimates.

Japan

Sources

Ministry of Economy Trade and Industry (METI), Agency for Natural Resources and Energy; and Institute of Energy Economics (IEEJ).

Years covered

2000-2017.

General note

There may be some discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Work is ongoing to improve consistency.

Residential sector

Data for energy consumption from biofuels and waste for water heating includes solar thermal.

Data for energy consumption for residential appliances include lighting.

Data for energy consumption of residential appliances disaggregated by appliance type are not available.

Data for stocks and diffusion of dishwashers are available from 2004 onwards.

There is a break in stocks of clothes dryers for the year 2013 as, from this year onwards, it includes bathroom dryers.

Industry and services sectors

Value added of [ISIC 13-15] includes only [ISIC 13] and value added of [ISIC 17-18] includes only [ISIC 17]. Value added of [ISIC 25-28] does not include [ISIC 26] and value added of [ISIC 16] is not available.

Transport sector

Data for passenger-kilometre and vehicle-kilometre of motorcycles are not available.

Data for vehicle-kilometre of freight trains, domestic freight airplanes and domestic freight ships are not available.

Korea

Sources

Korea Energy Economics Institute.

Years covered

2000-2017 (partially).

Residential sector

Data for the residential sector for 2017 are not available at the time of editing this publication.

Data for other appliances include electricity consumption for cooking and night-time electricity, which represents mostly space heating. This may affect related end-use indicators.

Data for energy consumption and stocks of clothes dryers are not available.

Industry and services sectors

Data for energy consumption for rubber [ISIC 22] are included under manufacturing not elsewhere specified.

Energy consumption data disaggregated by end use for the services sector are not available for the year 2017 at the time of editing this publication.

Transport sector

Energy consumption and activity data for the transport sector are not available for the year 2017 at the time of editing this publication.

Data for passenger cars include passenger vans (up to 15 passengers).

Luxembourg

Sources

STATEC–NSI Luxembourg.

Years covered

2000-2017.

General note

There may be some discrepancies between the data in this publication and the IEA energy balances.

Residential sector

Data for energy consumption disaggregated by end use are available from year 2008 onwards.

Data for energy consumption of residential appliances disaggregated by appliance type are not available.

Data for diffusion and stock of appliances are available only for year 2011 and partially for the year 2001.

Industry and services sectors

Heat consumption in industry is reported from 2003 onwards.

Energy consumption from biofuels and waste in the wood manufacturing subsector [ISIC 16] is reported from 2005 onwards.

Due to confidentiality issues, data for energy consumption of chemicals [ISIC 20-21] includes rubber [ISIC 22], whereas value added of rubber [ISIC 22] is included in the manufacture of non-metallic mineral products [ISIC 23]. For this reason the corresponding intensities are not calculated.

Data for value added of basic metals [ISIC 24], machinery [ISIC 25-28], and motor vehicles [ISIC 29-30] are not available. Value added of ISIC [20-21] includes only ISIC 20.

Energy consumption data for the services sector by end use are not available.

Transport sector

Data for passenger-kilometres for motorcycles, passenger airplanes and passenger ships are not available.

Data for tonne-kilometres of freight airplanes for the whole time series and freight ships for the year 2017 are not available.

Data for vehicle-kilometres and occupancy for passenger cars and freight road transport are available from 2008 onwards.

Data for energy consumption of motorcycles, freight airplanes and freight ships are not available.

The full amount of energy consumption in water transport is allocated to passenger ships.

Data for energy consumption have been significantly revised across modes. This may affect related indicators.

There is a break in the time series for diesel and light fuel oil consumption for freight trains for the year 2017, due a new data collection methodology. This affects the energy intensities for rail transport as a whole.

Mexico

Sources

CONUEE – Comisión Nacional para el Uso Eficiente de la Energía.

Years covered

2000-2017 (partially).

Residential sector

The data coverage of end use energy consumption of the residential sector in Mexico is limited. Work is ongoing (including a new household survey) to improve the availability of residential end use data. This should be included in future editions of this publication.

Data on floor area of dwellings for the years 2016 and 2017 and based on IEA Secretariat estimates.

Data on appliances stocks are available only for refrigerators, clothes washers and TVs, and are not available for the year 2017 at the time of this release. It refers to stocks in households, not in dwellings like for other countries.

Industry and services sectors

The electricity consumption of the services sectors may be partially included in the industry sector due to the current data collection methodology.

Data for energy consumption split by end use in the services sector are not available.

Data on floor area of services are not available.

Transport sector

Data for energy consumption split by transport mode / vehicle type are not available. Work is ongoing to publish the split of energy consumption for transports in the future.

Activity data for passenger transport (passenger-kilometre) are only available for domestic passenger airplanes, and domestic passenger ships, the latter from 2010 onwards.

Activity data for freight transport (freight-kilometres) for domestic freight airplanes and domestic freight ships are available from 2010 onwards.

Vehicle-kilometres, passenger occupancy and data on freight loads are not available.

Netherlands

Sources

Energy research Centre of the Netherlands (ECN) through the Odyssee database.

Years covered

2000-2017 (partially).

Residential sector

Data for energy consumption split by end use, and data for appliances stocks for the year 2017 are not available.

Data for number of dwellings and residential floor areas for the year 2017 are also not available.

Energy consumption and appliances stocks data for PCs are not available.

Residential floor area for the years 2010 and 2011 is estimated by the IEA Secretariat.

Industry and services sectors

Data for the split of energy consumption for paper [ISIC 17] and printing [ISIC 18] are available only up to 2009.

Heat consumption for casting of precious and non-ferrous metals [ISIC 2420+2432] up to the year 2005 is estimated by the IEA Secretariat.

Data for energy consumption for rubber [ISIC 22] are included in manufacturing not elsewhere specified.

Data for energy consumption split by end use for the services sector are not available for the year 2017. Total services energy consumption for the services sector for the year 2017 is reported in other building energy use in services sector.

Data on services floor area for the years 2016 and 2017 are not available.

Transport sector

Data for activity and energy consumption split by segment/ mode/ vehicle type for the transport sector for the year 2017 are not available.

Data for passenger-kilometres of motorcycles, passenger airplanes and passenger ships are not available.

Data for tonne-kilometres of freight road transport include national transport by Dutch vehicles and the share of international transport by Dutch vehicles taking place within Dutch borders (estimated as 100 km per international trip).

Data for tonne-kilometres for freight ships includes freight traffic only in rivers.

Data for vehicle-kilometres for the year 2016 is estimated by the IEA Secretariat, and data for vehicle-kilometres for motorcycles and buses is available only up to 2007.

Data for energy consumption for domestic passenger ships and domestic freight airplanes are not available. These may be partially included under domestic freight ships and domestic passenger airplanes, respectively.

New Zealand

Sources

Ministry of Business, Innovation & Employment (MBIE).

General note

Most of the data for 2017 are based on early national estimates. These data may be updated in the next edition of this publication.

Years covered

2000-2017.

Residential sector

Data for unit energy consumption of dish washers for the year 2016 and of televisions and PCs for 2016 and 2017 are based on IEA Secretariat estimates.

Industry and services sectors

Data for value added for chemicals [ISIC 20-21] includes rubber [ISIC 22] and refining and coke processing [ISIC 19].

Energy consumption data for the services sector by end use is not available.

Transport sector

There may be some discrepancies between the IEA energy efficiency indicators and the IEA energy balances. Work is ongoing to align the two datasets.

Poland

Sources

Statistics Poland.

Years covered

2000-2017 (partially).

Residential sector

Data on energy consumption for water heating and appliances are available from 2015 onwards.

Data on energy consumption for appliances includes lighting, and data for energy consumption for space cooling are not available.

Data for stocks of PCs and clothes dryers are not available. Data for stocks of freezers are available until 2006.

Industry and services sectors

Data for energy consumption of the services sector includes water supply and treatment [ISIC 36].

Data on natural gas consumption for services have been collected based on a new methodology for the year 2017, leading to a break in this year.

Data on floor areas of the services sector are not available.

Data for value added for [ISIC 10-12], [ISIC 13-15], [ISIC 17-18], [ISIC 20-21], [ISIC 25-28], [ISIC 29-30], and [ISIC 31-32] are not available for the year 2017.

Transport sector

Data on passenger-kilometres of motorcycles are not available. Data on passenger-kilometres of cars are not available for 2017.

Data on loads of freight road transport are not available.

Data on vehicle-kilometres have been revised and updated in the current edition of this report. It is now available from 2010 to 2016.

Data for energy consumption for the transport sector by mode/vehicle type for the year 2017 are based on IEA Secretariat estimates.

Data for energy consumption of passenger and freight trains, and domestic passenger airplanes for the year 2016 are based on IEA Secretariat estimates.

Data for energy consumption and activity of passenger ships and freight airplanes (passenger-kilometres and tonne-kilometres, respectively) are not available. Data for energy consumption for these two transport segments might be partially included under freight ships and passenger airplanes, respectively.

Portugal

Sources

Direcção Geral de Energia e Geologia.

Years covered

2000-2017 (partially).

General notes

Some transport energy consumption may be included under industry and services.

Residential sector

There is a break in series of biofuels and waste in 2010, due to results from a household energy consumption survey.

Energy intensities for cooking are significantly higher than those for other IEA member countries. This may be explained by the fact that several appliances used for cooking purposes are accounted under "cooking" instead of "other appliances". A new survey is expected in the future, which may help understanding this aspect.

Data for occupied dwellings and residential floor areas for the year 2017 are not available.

Data for energy consumption of residential appliances disaggregated by appliance type are available from 2010 until 2017.

Data for stocks of PCs are only available for years 2010-2012. Data for stocks and diffusion of appliances for the year 2017 are not available.

Industry and services sectors

Data on biofuels and waste were revised based on an industry survey, resulting in breaks in the energy consumption data for the year 2012 for some subsectors, e.g. for non-metallic minerals.

Data on value added for manufacture of food, beverages and tobacco [ISIC 10-12] are based on IEA Secretariat estimates. Data on services floor area are available for the years 2005-2011.

Transport sector

There are significant breaks in some data series (e.g. energy consumption of passenger cars for the year 2012), and similarly in related energy intensities.

Data for passenger-kilometre of passenger cars for the year 2016 are estimated by the IEA Secretariat.

Data on passenger-kilometres of passenger cars and vehicle-kilometres for all transport modes are not available for the year 2017.

Data for passenger-kilometres of motorcycles and passenger ships are not available.

Data for energy consumption split by passenger and freight for road and rail transport for the year 2017 are based on IEA Secretariat estimates.

Data for energy consumption of passenger ships and freight airplanes are not available, and may be partially included under freight ships and passenger airplanes, respectively.

Data for the stocks of freight trucks include commercial road transport, although data for tonne-kilometres of freight trucks may exclude commercial road transport.

Slovak Republic

Sources

Ministry of Economy, through Odyssee database

Years covered

2000-2017 (partially).

General note

Data for the energy consumption of transport are not available for all modes. Data for this sector are partially obtained from the country energy balance. Still, the share of transport energy use may be underestimated due to missing data.

Residential sector

Data on energy consumption disaggregated by end use and activity for the residential sector are not available for the year 2017.

Data for number of dwellings and residential floor areas for the year 2017 are not available.

Data on energy consumption for space heating include cooking.

Data on energy consumption for space cooling are not available.

Data on energy consumption for other appliances include dish washers, clothes dryers and PCs.

Data on stocks of dish washers, clothes dryers and PCs are not available.

Industry and services sectors

Data on energy consumption for rubber [ISIC 22] and other manufacturing [ISIC 31-32] are included under manufacturing not elsewhere specified, while data for value added are reported separately.

Data for services floor area are not available.

Transport sector

Energy consumption and activity data for the transport sector for the year 2017 are not available at the time of this release.

Data for passenger-kilometre of passenger cars for the year 2016 are based on IEA Secretariat estimates.

Data for passenger-kilometre of motorcycles and domestic passenger ships, tonne-kilometre of domestic freight airplanes are not available.

Data for vehicle-kilometres of passenger trains are available between 2011-2014.

Data on loads of freight transport are not available.

The disaggregation of energy consumption in transport is not available for some modes/vehicle types (e.g. freight road transport).

Data on energy consumption of domestic freight ships are available from 2006 onwards.

Energy consumption for domestic passenger airplanes is not available since 2014.

Data for energy consumption of domestic passenger ships, and domestic freight airplanes are not available. These may be partially included under freight ships and passenger airplanes, respectively.

Spain

Sources

Instituto para la Diversificación y Ahorro de la Energía (IDAE); Odyssee database.

Years covered

2000-2017.

Residential sector

There may be some breaks between 2009 and 2010 for energy consumption of different end uses, due to different data collection methodologies.

Data for energy consumption of residential appliances by appliance type are not available.

Data for stocks of residential appliances are available only up to 2002.

Industry and services sectors

Data for energy consumption for rubber [ISIC 22] and other manufacturing are included under non-specified manufacturing, while data for value added are available separately.

Data for value added for manufacture of basic metals [ISIC 24] for the year 2017 are based on IEA Secretariat estimates. Data for value added for manufacture of coke and refined petroleum products [ISIC 19] are only available up to 2014.

Transport sector

Data for passenger-kilometres for motorcycles are not available.

There is a break for passenger-kilometres for buses in 2017 due to a change in methodology.

Data for tonne-kilometres for domestic freight airplanes are not available.

Data for vehicle-kilometres and stocks of rail, air, and water transport are not available.

Energy consumption data for domestic freight airplanes and domestic passenger ships may be partially included in domestic passenger airplanes and domestic freight ships, respectively.

Sweden

Sources

Swedish Energy Agency; Odyssee database.

General note

There may be some discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Work is ongoing to improve consistency between these two databases.

Years covered

2000-2017 (partially).

General note

There may be some discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Work is ongoing to improve consistency between these two databases.

Residential sector

Data for energy consumption for space cooling are not available.

Data for energy consumption for lighting and for residential appliances by appliance type is available until the year 2013.

Data for total energy consumption of residential appliances include lighting since 2014.

Data for other appliances include clothes dryers, TVs and PCs.

Data for stocks and diffusion of appliances is only available up to 2013.

There is a break for electricity consumption for water heating in 2016 due to a change in methodology.

Industry and services sectors

Data for energy consumption from biofuels and waste for agriculture [ISIC 01-03] up to 2013 are based on IEA Secretariat estimates.

Data for value added for the year 2017 for manufacture of chemical and chemical products [ISIC 20-21] are not available.

Data for natural gas consumption in the services sector have been revised due to a new data source for consumption of this energy product.

Transport sector

Data for energy consumption of both passenger and freight road transport (passenger cars, motorcycles, buses, and trucks) are not available since 2015. Energy consumption data for domestic freight airplanes are not available for the whole time series.

Switzerland

Sources

Swiss Federal Office of Energy (SFOE).

Years covered

2000-2017 (partially).

Residential sector

Data on energy consumption for space cooling are not available.

Data on energy consumption for PCs have been revised to include new estimates for WLAN/routers.

Industry and services sectors

Data for agriculture, forestry and fishing [ISIC 01-03] have been revised in the latest edition of the publication.

Data for energy consumption for mining and quarrying [ISIC 05-09], wood manufacturing [ISIC 16], rubber and plastic [ISIC 22], furniture and other manufacturing [ISIC 31-32], and electricity, gas, steam, air conditioning, and water supply [ISIC 35-36] are not available, while data for value added are.

Data for energy consumption for machinery [ISIC 25-28] may also include transport equipment [ISIC 29-30], while value added data are available separately. The intensity figures are calculated aggregating value added data for these two subsectors.

Data for value added for several industry subsectors for the year 2017 are not available.

Transport sector

Discrepancies in energy consumption data for transport in relation to the IEA energy balances are mostly due to different accounting methodologies (e.g. fuel tourism is excluded in this publication, etc.).

Activity data (passenger and tonne-kilometres) for domestic airplanes and ships are not available.

Activity data (tonnes) for freight road and freight trains for the year 2017 are the same as last year, as official values are not published at the time of this release.

Energy consumption data reported under fuel use to be specified includes off-road fuel use (e.g. agriculture, forestry…).

Turkey

Sources

General Directorate of Energy Affairs (GDEA).

Years covered

2000-2017 (partially).

Residential sector

Data for energy consumption for space cooling and for appliances, split by appliance type are not available.

Data for total energy consumption for appliances for the year 2016 are based on IEA Secretariat estimates.

Data for appliances stocks for refrigerator/freezer combinations, clothes dryers, TVs, and PCs are not available.

Data for residential floor area are not available for the whole time series.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] is available from 2016 onwards.

There is a break in energy consumption for manufacture of non-metallic mineral products [ISIC 23] in 2017. The break is due to the reporting of petroleum coke for the first time this year.

Data for electricity consumption for manufacture of transport equipment [ISIC 29-30] are available from 2015 onwards.

Data on value added are available at the level of ISIC section (Rev. 4). Further data availability for the different manufacturing subsectors is expected in the future.

Data for employment are available from the year 2005 onwards.

Data for services floor area are not available for the whole time series.

Transport sector

Data for passenger-kilometre of passenger cars, motorcycles, buses and passenger airplanes are not available. Data for passenger-kilometre of domestic passenger ships are available from 2003 to 2016.

Data for tonne-kilometre for domestic freight ships are not available. Data for tonne-kilometre of freight trucks are available from 2001 to 2016. Data for tonne-kilometre of domestic freight airplanes are available only for 2016.

Data for vehicle stocks and vehicle-kilometres for 2017 are not available.

Data for freight loads of freight road transport are not available.

Energy consumption data split by transport mode/ vehicle type are not available. Work is ongoing in order to improve data availability by mode/ vehicle type for the transport sector.

United Kingdom

Sources

Department for Business, Energy and Industrial Strategy (BEIS); Odyssee database.

Years covered

2000-2017 (partially).

General note

There may be some historical discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Ongoing work is allowing continuous improvement of consistency between these two databases.

Residential sector

There were some revisions on the energy consumption data of all residential end uses from 2010 onwards based on a new data collection methodology. Water heating was revised for the whole time series.

Data on energy consumption for other residential appliances may include space cooling.

Energy consumption data reported for refrigerators for 2017 includes freezers and refrigerators/freezer combinations. Energy consumption data for TVs/ home entertainment in 2017 only includes TVs; and for PCs/ information and communication technologies in 2017 only includes PCs. This creates breaks in the time series.

Data on appliances stocks and unit energy consumption for the year 2017 are not available.

Data for occupied dwellings for the year 2004 are based on IEA Secretariat estimates.

Industry and services sectors

Energy consumption data for biofuels and waste split by industry subsector are available from 2015 onwards.

Electricity consumption data for manufacture of non-metallic minerals [ISIC 23] between 2010 and 2016 are based on IEA Secretariat estimates.

There are some breaks for energy consumption data of the services sector for the year 2015, due to the new BEES survey results.

Transport sector

Data for tonne-kilometre of domestic freight ships have been revised for the whole time series.

Energy consumption data for freight trains and electricity consumption for passenger trains for the year 2017 are based on IEA Secretariat estimates.

Energy consumption data for domestic passenger airplanes and freight ships have been significantly revised since the year 2015, which may lead to some breaks in the respective time series.

The energy consumption reported under domestic freight ships also includes domestic passenger ships. For this reason, energy intensities of this transport mode should be carefully considered.

United States

Sources

United States Energy Information Administration (EIA); for transport activity data: U.S. Department of Transportation (DOT).

Years covered

2000-2017.

General note

There may be some discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Work is ongoing to improve consistency between these two databases.

Data for non-marketed electricity generation from non-combustible renewable energy is estimated by EIA based on the average electric power sector fossil-fuels net heat rate. This portion of delivered electricity is converted based on the heat content of electricity.

Residential sector

Data on appliances stocks between the years covered by Residential Energy Consumption Surveys (RECS) are based on IEA Secretariat estimates. Since 2015, these data for freezers, refrigerator/freezer combinations and clothes dryers are based on the Annual Energy Outlook 2019 of the EIA.

Data reported under "other" fuels for clothes dryers refers to energy consumption from natural gas.

Industry and services sectors

Data for energy consumption of some manufacturing sub-sectors, for some fuels, prior to the year 2012 are based on IEA Secretariat estimates.

Data for energy consumption for cement production is available from 2010 onwards.

Data for energy consumption for the services sector show some breaks (e.g. lighting) for the year 2015. This is partially due to methodological changes (the incorporation of data from the 2012 Commercial Buildings Energy Consumption Survey in the new report), and partially reflecting real trends.

Data for energy consumption for the different services categories reported in other fuels include electricity and other fuels (the latter, are in gross calorific values). For this reason, the total energy consumption by services categories is higher than the total energy consumption by end use.

Data for floor area of services are not available for the years 2001-2007, and the year 2009.

Transport sector

Data for passenger-kilometres of passenger cars have been revised for the whole time series. From the year 2007 onwards, these data also include light duty vehicles, short wheel base, and hence data are not comparable before and after 2007. The aforementioned revision implied a significant decrease of the corresponding energy intensities.

Data for tonne-kilometres of freight road transport was slightly revised due to updates from the 2017 Commodity Flow Survey.

Data for energy consumption from LPG for passenger cars prior to the year 2014 are based on IEA Secretariat estimates.

Data for energy consumption for LPG and natural gas for buses show a break for the year 2015, due to updates in the national reporting from this year onwards.

Data for energy consumption for domestic passenger airplanes up to 2015 and for domestic freight airplanes up to 2008 are based on IEA Secretariat estimates.

Data for energy consumption of domestic passenger ships for 2000-2004 and consumption of domestic freight ships for 2000-2010 are based on IEA Secretariat estimates.

BEYOND IEA MEMBER COUNTRIES

GENERAL NOTES

The notes in this section refer to data for the years 2000 to 2017 for countries beyond IEA, which have voluntarily partnered with the agency on the development of energy efficiency indicators.

Morocco was included for the first time in the 2018 edition of the publication as the first IEA association country providing sub-sectoral /end-use data. In the current edition of this report, we are delighted to add another IEA association country, Brazil, to this report.

Armenia, Belarus, Republic of Moldova and Ukraine were included for the first time in the 2018 edition, thanks to the ongoing collaboration with the IEA under the EU4Energy programme. In the 2019 edition, Azerbaijan, Georgia and Uzbekistan are also included. The EU4Energy programme develops energy statistics capacity in Eastern Europe, Caucasus and Central Asia. It is our wish that more countries from the region may follow in the future.

The IEA welcomes this voluntary effort from countries beyond members with a view to strengthen global end-use data availability.

For the countries referred to above, data availability may differ from that of IEA member countries and is expected to expand over time.

Data are obtained from national administrations through direct submission of the energy efficiency indicators questionnaire, as indicated for each country under the sources section.

In case of estimates made by the IEA Secretariat, explanations are provided in the respective country notes.

Brazil

Sources

Empresa de Pesquisa Energética (EPE) and Ministério de Minas e Energia (MME).

Years covered

2000-2017.

Residential sector

Data for energy consumption split by end use are available from the year 2005 onwards.

The Brazilian residential model considers cooking and other appliances together. The split for these two purposes was estimated based on coefficients derived from the useful energy balance. The confidence in these two end uses is not the same as in the remaining ones.

Data for energy consumption and stocks of refrigerators/ freezer combinations, dish washers, clothes dryers, and PCs are not available.

Data for occupied dwellings is available starting in the year 2005. Data for household occupancy is available since the year 2010.

Data for residential floor areas and degree days are not available for the whole time series.

Industry and services sectors

Data for energy consumption for [ISIC 35] are reported in Mining and quarrying [ISIC 05-09].

Data for energy consumption for manufacture of tobacco [ISIC 12], wood and wood products [ISIC 16], rubber and plastics products [ISIC 22], machinery and equipment [ISIC 25-28], and transport equipment [ISIC 29-30] are reported in manufacturing not elsewhere specified.

Data for energy consumption of manufacture of textiles, wearing apparel and leather [ISIC 13-15] only includes textiles [ISIC 13]. ISIC 14-15 are reported under manufacturing not elsewhere specified.

Data for energy consumption of manufacture of chemicals and chemical products [ISIC 20-21] only includes ISIC 20. ISIC 21 is reported under manufacturing not elsewhere specified.

Data for energy consumption of manufacture of glass are not reported under non-metallic minerals [ISIC 23], but under manufacturing not elsewhere specified

Data for energy consumption of manufacturing not elsewhere specified includes repair of machinery and equipment [ISIC 33], typically reported in services.

Data for energy consumption of construction [ISIC 41-43] are not available.

Data for value added has similar boundaries as those from the data for energy consumption mentioned above.

Non-Building Energy use in the service sector refers to street lighting, and data are available since the year 2004. Before the year 2004, street lighting is reported under other building energy use.

Data for total and services employment are not available for the year 2017, and data on services floor areas are not available for the whole time series.

Transport sector

Data for passenger-kilometres, vehicles stocks and energy consumption of passenger cars, SUV and personal light trucks includes light commercial vehicles.

Data for passenger-kilometres, stocks and energy consumption of buses are available since the year 2008.

Data for passenger-kilometres of trains only includes metro and trams.

Data for vehicle-kilometres are available for buses since the year 2008, and for trucks.

Data for energy consumption of motorcycles is reported together with passenger cars. Data for ethanol consumption is reported under other fuels under passenger cars.

Data for energy consumption of domestic passenger airplanes may include freight domestic airplanes.

Morocco

Sources

Ministère de l'Energie, des Mines et du Développement Durable.

Years covered

2000-2017 (partially).

General note

There are some discrepancies between the IEA energy efficiency indicators and the IEA energy balances databases. Work is ongoing to improve data consistency.

Residential sector

Data for energy consumption split by end use are available between the year 2004 and the year 2016.

Data for energy consumption per appliance type are available for refrigerators, clothes washers and TVs. Data for energy consumption for other appliances are not available.

Data for appliances stocks and diffusion are not available. Instead, the publication shows the change in the rate of dwellings equipped with specific appliances types for the time period 2004-2015.

Data on dwellings refers to total dwellings instead of occupied dwellings, and are not available for the year 2017.

Data for residential floor areas are available only for the year 2012.

Data for heating and cooling degree days are not available.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] are included under Manufacturing not elsewhere specified.

Data for value added are available between the year 2007 and the year 2017. Data for value added are not available for several manufacturing subsectors.

Non-Building Energy use in the service sector refers to street lighting.

Transport sector

Data for passenger-kilometres and tonne-kilometres are available for rail only from the year 2004 until 2015. These have been estimated by the IEA Secretariat based on country submission.

Data for occupancy and loads of road transport are not available.

Data for vehicle stocks and vehicle-kilometres are based on country estimates, and are available between the year 2008 and 2016.

Data for vehicle stocks of passenger cars may include buses.

Data for energy consumption of passenger cars and freight road transport are based on country estimates, and are available between the years 2008 and 2016. Data for energy consumption of passenger cars also include motorcycles and buses.

Data for energy consumption of domestic passenger airplanes may also include domestic freight airplanes.

Data for energy consumption of rail transport split between passenger and freight rail are not available. Data for energy consumption of domestic water transport are also not available.

Armenia

Sources

Statistical Committee of the Republic of Armenia, Yerevan.

Years covered

2000-2017 (partially).

General note

Sub-sectoral data are only available for the industry sector.

Industry and services sectors

Data split by industry subsector for oil products, natural gas and biofuels and waste consumption in the industry sector are reported from the year 2014 onwards. This leads to breaks in the time series for total final energy consumption of several industry subsectors.

Data for coal and heat consumption in the industry sector are not available.

Partial energy consumption data availability (by fuel) may lead to relatively low energy intensities. Work is ongoing to improve data availability across industry subsectors.

Data for value added are available from 2012 onwards. The conversion of these data into 2010 USD PPP is made by IEA Secretariat, based on country submission.

Azerbaijan

Sources

The State Statistical Committee of the Republic of Azerbaijan.

Years covered

2000-2017 (partially).

General note

Sub-sectoral data are only available for the industry sector.

Residential sector

Data for energy consumption disaggregated by end use are not available.

Data for appliances stocks are available from the year 2001 onwards.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] are included under Manufacturing not elsewhere specified.

Data for value added are available from 2010 onwards. The conversion of these data into 2010 USD PPP is made by IEA Secretariat, based on country submission.

Belarus

Sources

National Statistical Committee of the Republic of Belarus.

Years covered

2000-2017 (partially).

Residential sector

Energy consumption data disaggregated by end use are available from 2010 onwards.

Energy consumption data for cooling, lighting and split by appliance type are not available. These are all reported together under other appliances.

Appliances stocks data are available for refrigerator/freezer combinations, clothes washers, TVs and PCs, since the year 2010.

Data on dwellings, residential floor area, household occupancy, and degree days are available from 2014 onwards.

Industry and services sectors

Data for energy consumption for paper and printing [ISIC 17-18] are allocated in full to paper production [ISIC 17].

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] are included in the manufacturing of other non-metallic products [ISIC 23].

Data for value added are available from the year 2014 onwards, and it refers to 2014 USD 2014 PPP.

Transport sector

Data for transport energy consumption split by segment/mode/vehicle type are not available, except for passenger buses and freight road transport.

Data for passenger-kilometres of passenger cars and motorcycles are not available Data for vehicle-kilometres are not available.

Georgia

Sources

National Statistics Office of Georgia – GEOSTAT.

Years covered

2000-2017 (partially).

Residential sector

Data for energy consumption disaggregated by end use are available from 2016 onwards.

Data for energy consumption for split by appliance type are not available. Energy consumption data for lighting are reported under other appliances.

Data for appliances stocks and degree days are not available.

Data for number of dwellings, residential floor areas and household occupancy are available only for the year 2014.

Industry and services sectors

Data for the split of energy consumption for paper [ISIC 17] and printing [ISIC 18], and for the manufacture of rubber and plastic [ISIC 22] and Electricity, gas, steam, air conditioning and water supply [ISIC 35-36] are available from the year 2013 onwards.

Data for energy consumption for manufacture of coke and refined petroleum products [ISIC 19] are available from the year 2015 onwards.

Data for the energy consumption for manufacturing of basic metals [ISIC 24] split by ferrous and non-ferrous metals are not available.

Data on value added are available at the level of ISIC section (Rev. 4).

Data for value added for Georgia refers to 2010 USD PPP. The PPP adjustment was done by the IEA Secretariat, based on country submission.

Transport sector

Data split by segment mode/ vehicle type for the transport sector are not available.

Republic of Moldova

Sources

National Bureau of Statistics of the Republic of Moldova.

Years covered

2000–2017 (partially).

General note

The data presented does not include the districts from the left side of the river Nistru and municipality Bender.

Residential sector

Data for energy consumption from biofuels and waste shows a break for the year 2010, which is also affecting the time series for total energy consumption of this sector. This may be due to different data collection methodologies, and work is ongoing to improve consistency of the time series.

Energy consumption data split by end use are available from the year 2015 onwards.

Data for energy consumption for lighting are included under residential appliances. Data for appliances stocks are available from the year 2010 onwards.

Data for energy consumption of residential appliances by appliance type are not available.

Data for occupied dwellings are not available. Hence, energy intensities per dwelling are calculated using total number of dwellings instead of occupied dwellings. Similarly, appliances diffusion refers to total number of dwellings.

Data for heating and cooling degree days are not available.

Industry and services sectors

Data for energy consumption from renewables are available from 2005 onwards.

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] are available from 2015 onwards.

Data on value added are available at the level of ISIC section (Rev. 4), from the year 2010 onwards. The adjustment of these data for PPP is made by IEA Secretariat, based on country submission.

Transport sector

Data split by segment mode/ vehicle type for the transport sector are not available.

Ukraine

Sources

State Statistics Service of Ukraine.

Years covered

2000-2017 (partially).

General notes

Due to limited information available to the State Statistics Service of Ukraine from the Donetsk and Luhansk regions of Ukraine and from the Autonomous Republic of Crimea, breaks in the time series occur after the year 2013.

Residential sector

Data for energy consumption split by end use are available from the year 2016 onwards.

Data for energy consumption of residential appliances include lighting, and data for energy consumption of residential appliances by appliance type are not available.

Data for degree days and occupied dwellings are not available. Hence, energy intensities per dwelling are calculated using total number of dwellings instead of occupied dwellings. Similarly, appliances diffusion refers to total number of dwellings.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] are included under Manufacturing not elsewhere specified.

Data for value added by manufacturing subsector are available since the year 2012 onwards. The adjustment of these data for PPP is made by IEA Secretariat, based on country submission.

Transport sector

Energy consumption data split by segment/ mode/ vehicle type for the transport sector are not available.

Passenger-kilometres data are not available for passenger cars. Vehicle-kilometre data are not available.

Data for vehicle stocks of passenger cars, motorcycles, buses and freight trains are available until the year 2011.

Uzbekistan

Sources

State Committee of the Republic of Uzbekistan on Statistics.

Years covered

2000-2017 (partially).

General notes

Sub-sectoral data are only available for the industry sector.

Industry and services sectors

There are discrepancies between the IEA energy efficiency indicators and the IEA energy balances data. Work is ongoing to improve consistency between these two databases.

Data split by industry subsector are available from the year 2014 onwards.

Data for value added are available from 2010 until 2016. The conversion of these data into 2010 USD PPP is made by IEA Secretariat, based on country submission.

8. UNITS AND CONVERSIONS

General conversion factors for energy

To:	TJ	Gcal	Mtoe	MBtu	GWh
From:	multiply by:				
terajoule (TJ)	1	2.388×10^2	2.388×10^{-5}	9.478×10^2	2.778×10^{-1}
gigacalorie (Gcal)	4.187×10^{-3}	1	1.000×10^{-7}	3.968	1.163×10^{-3}
million tonnes of oil equivalent (Mtoe)	4.187×10^4	1.000×10^7	1	3.968×10^7	1.163×10^4
million British thermal units (MBtu)	1.055×10^{-3}	2.520×10^{-1}	2.520×10^{-8}	1	2.931×10^{-4}
gigawatt hour (GWh)	3.600	8.598×10^2	8.598×10^{-5}	3.412×10^3	1

Conversion factors for mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	1.000×10^{-3}	9.842×10^{-4}	1.102×10^{-3}	2.205
tonne (t)	1.000×10^3	1	9.842×10^{-1}	1.102	2.205×10^3
long ton (lt)	1.016×10^3	1.016	1	1.120	2.240×10^3
short ton (st)	9.072×10^2	9.072×10^{-1}	8.929×10^{-1}	1	2.000×10^3
pound (lb)	4.536×10^{-1}	4.536×10^{-4}	4.464×10^{-4}	5.000×10^{-4}	1

Conversion factors for volume

To:	gal U.S.	gal U.K.	bbl	ft^3	l	m^3
From:	multiply by:					
U.S. gallon (gal U.S.)	1	8.327×10^{-1}	2.381×10^{-2}	1.337×10^{-1}	3.785	3.785×10^{-3}
U.K. gallon (gal U.K.)	1.201	1	2.859×10^{-2}	1.605×10^{-1}	4.546	4.546×10^{-3}
barrel (bbl)	4.200×10^1	3.497×10^1	1	5.615	1.590×10^2	1.590×10^{-1}
cubic foot (ft^3)	7.481	6.229	1.781×10^{-1}	1	2.832×10^1	2.832×10^{-2}
litre (l)	2.642×10^{-1}	2.200×10^{-1}	6.290×10^{-3}	3.531×10^{-2}	1	1.000×10^{-3}
cubic metre (m^3)	2.642×10^2	2.200×10^2	6.290	3.531×10^1	1.000×10^3	1

Decimal prefixes

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

9. ABBREVIATIONS

MJ:	megajoule (10^6 joules)
GJ:	gigajoule (10^9 joules)
PJ:	petajoule (10^{15} joules)
GWh:	gigawatt hour
CO_2:	carbon dioxide
LPG:	liquefied petroleum gases
Gas:	natural gas
m^2:	square metre
pers:	person
pass:	passenger
dw:	dwelling
PCs:	personal computers and information technologies
TVs:	televisions and home entertainment
TC:	temperature corrected
HDD:	heating degree days
CDD:	cooling degree days
USD:	United States dollar
GDP:	gross domestic product
PPP:	purchasing power parity
VA:	value added
pkm:	passenger-kilometres
tkm:	tonne-kilometres
..	not available