



**ENERGY EFFICIENCY INDICATORS
DECEMBER 2020 EDITION**

DATABASE DOCUMENTATION

This document provides information regarding the December 2020 edition of the *Energy efficiency indicators* database. It can be found at the following link: <http://data.iea.org/>. The database is updated twice a year in June and December.

The IEA also releases a short version of this database (free) with a selection data included in the extended one. The short version contains total final energy consumption by end use (i.e. not the split by energy product), comprehends fewer end uses, and presents data for selected years, with the indicators indexed to the year 2000. It can also be downloaded at the IEA data services.

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/terms>.

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1. CHANGES FROM LAST EDITION

In order to meet increasing user's needs with more timely data, since 2019, the IEA energy efficiency indicators database is released twice a year, reflecting different timings for statistical data collection among countries. The first release (in June), features the data available at the time of publication, this year up to 2018; whereas the December release, has more complete data and expanded geographical coverage. We acknowledge and thank the enhanced commitment of our data providers.

Complementary to this documentation, the IEA has made available 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 data available in this database.

CO₂ emissions by end use

Since the June 2020 edition, the database includes end-use level estimates of CO₂ emissions from fuel combustion, covering emissions reallocated from electricity and heat generation across the four main final consumption sectors – residential, services, industry and transport. This reallocation allows for a different perspective, compared to when only direct emissions are considered, since emissions resulting from the consumption of electricity and heat across end-uses are quite significant, and vary across the final consumption sectors.

New variables

During last cycle, the IEA energy efficiency indicators template was revamped and expanded to capture new trends on the demand-side of energy systems. The December 2020 database includes for the first time data collected for several new variables for the residential and transport sectors, subject to data availability. We acknowledge the extra effort and thank our data providers. The new variables (flows) included in this edition are:

- Residential sector
 - o Solar thermal energy consumption under “Other sources”
 - o Appliance stocks of air conditioners, heat pumps, and solar thermal panels
 - o Peak power of solar photovoltaic panels
- Transport sector
 - o Passenger cars only under “Cars/light trucks”
 - o Light commercial vehicle (<3.5 t) under “Freight trucks”
 - o Metro and light rail, conventional rail, and high-speed rail under “Passenger trains”

Qualifiers

Additionally, the use of qualifiers has been made more comprehensive and systematic, compared to previous editions of the energy efficiency indicators database. The IEA has 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.

Geographical coverage

The IEA is working closely with non-member countries, including association countries¹, accession countries and other countries beyond IEA membership and association, in order to expand end-use data coverage and track energy efficiency progress beyond IEA members. This year, this database continues to expand beyond IEA member countries including four additional countries: Chile, Kazakhstan, Kyrgyzstan and Lithuania.

In the current edition, the database includes end-use energy and emissions data and efficiency indicators for IEA members, two IEA association countries (Morocco and Brazil); two OECD countries seeking accession to full IEA membership (Chile and Lithuania); and nine countries from Eastern Europe, Caucasus and Central Asia region (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Ukraine and Uzbekistan). The collection of the data for the nine latter countries has been made possible with the financial assistance of the European Union, as part of the [EU4Energy project](#).

Given the increasing importance of energy efficiency, it is our wish that more countries will share such information with IEA to be added in future editions.

¹ IEA association countries at the time of this publication are: Brazil, People's Republic of China, India, Indonesia, Morocco, Singapore, South Africa, and Thailand.

2. DATABASE STRUCTURE

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

- countries: 28 IEA member countries; 13 countries beyond IEA.
- years: 2000-2018, unless otherwise specified.

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

RESIDENTIAL-Energy	Residential energy end use (9 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 sub-sectors) (PJ);
TRANSPORT-Energy	Transport energy end use (10 products; 19 end uses) (PJ);
ACTIVITY DATA	Sectoral activity data (21 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 sub-sector (2 flows);
Transport Energy Indicators	Transport energy indicators by mode/vehicle type (11 flows);
RESIDENTIAL-Emissions	Residential end-use emissions (1 product; 17 end uses) (MtCO ₂);
SERVICES- Emissions	Services end-use emissions (1 product; 6 end uses) (MtCO ₂);
INDUSTRY-Emissions	Industry end-use emissions (1 product; 20 sub-sectors) (MtCO ₂);
TRANSPORT-Emissions	Transport end-use emissions (1 product; 17 end uses) (MtCO ₂);
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 sub-sector (2 flows);
Transport Carbon Indicators	Transport carbon indicators by mode/vehicle type (4 flows).

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

EEI RESIDENTIAL.IVT Residential sector detailed data and indicators

Residential energy end use (9 products; 21 end uses) (PJ);
Residential energy indicators (6 flows);
Residential activity data (12 flows);
Residential emissions (1 product; 17 end uses) (MtCO₂);
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 energy indicators (5 flows);
Services activity data (6 flows);
Services emissions (1 product; 6 end uses) (MtCO₂);
Services carbon indicators (4 flows);

EEI INDUSTRY.IVT Industry sector detailed data and indicators

Industry energy use (8 products; 20 sub-sectors) (PJ);
Industry energy indicators (2 flows);
Industry activity data (6 flows);
Industry emissions (1 product; 20 sub-sectors) (MtCO₂);
Industry carbon indicators (2 flows);

EEI TRANSPORT.IVT Transport sector detailed data and indicators

Transport energy end use (10 products; 22 end uses) (PJ);
Transport energy indicators (5 flows);
Transport activity data (5 flows);
Transport emissions (1 product; 17 end uses) (MtCO₂);
Transport carbon indicators (4 flows);
Transport activity indicators (6 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, sub-sectors 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: <https://www.iea.org/reports/energy-efficiency-indicators>.

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

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*: <https://www.iea.org/reports/energy-efficiency-indicators-fundamentals-on-statistics>.

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 CO₂ emissions by end use

The estimates of CO₂ 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 CO₂ 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 *CO₂ emissions from fuel combustion* database). For more detail on the emissions reallocation please see the [methodological notes](#) of the *CO₂ emissions from fuel combustion* database.

CO₂ emissions from fuel combustion

$$\text{CO}_2 = \text{Fuel consumption} * \text{Emission factor},$$

where:

Fuel consumption = amount of fuel combusted,

Emission factor = implied emission factor, based on the 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

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

balances. Emissions are then summed across all fuel categories to obtain total emissions for a given end use or sub-sector.

The IPCC methodology does not assign any CO₂ emissions to fuel use from biofuels, unless it is used in an unsustainable way. The IEA energy efficiency indicators database follows the same rationale, except in the case of the transport sector.

This is due to the fact that both “motor gasoline” and “diesel and light fuel oil” products are reported, for this energy efficiency indicators data collection, together with liquid biofuels. Hence it is not possible to split these from biofuels to estimate the respective carbon emissions. As a result, total final emissions from transport that contain any of these two energy products also include biofuels CO₂ emissions.

Emissions estimates could differ from those published in the IEA CO₂ emissions from fuel combustion database mainly because the energy consumption data may differ from the IEA energy balances (see previous section). Also, the IEA Secretariat estimates of CO₂ 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 correction¹

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).

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

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:

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.

In case of interest for more weather-related data at the global level useful to understand, analyse and model the energy sector, you can refer to [The IEA and CMCC Weather for Energy Tracker](#).

4. END USE 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.
Air conditioners	R_AC	Air conditioners is an equipment used to treat air for space cooling purposes including air conditioners which are reversible and therefore can also be used for heating purposes. Air conditioners don't include fans and household appliance refrigeration (e.g. refrigerators, freezers...).
Heat pumps	R_HEATPUMP	Heat pumps are mechanical devices that extract heat from one medium (air, water or ground) and transfer it to another (air or water) and are used as the primary equipment for either space heating or hot water production. Heat pumps don't include heat pumps used primarily for air conditioning or heat pumps for other household appliances (e.g. refrigerators, freezers, dryers...).
Solar thermal panels	R_SOLTHERM	Solar thermal panels collect and concentrate sunlight to produce the high temperature heat needed for many purposes, including heating water, air, and the interior of buildings and generating electricity.

Residential		
Flow	Short name	Definition
Photovoltaic panels	R_PV	Photovoltaic panels are non-mechanical devices that convert sunlight directly into electricity.
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 <i>Country notes</i> .

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 of 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 sub-sectors 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	<p>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).</p> <p>This division includes the manufacture of gases such as ethane, propane and butane as products of petroleum refineries.</p> <p>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).</p> <p>The manufacture of petrochemicals from refined petroleum is classified in division 20.</p>
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.
Of which: cars	P_OCARS	This includes mini and small cars (minicompact and subcompact), medium cars or small family cars (compact), large or large family cars (mid-size), executive and luxury cars (large) and sport coupés (two-seaters).
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.
Of which: metro and light rail	P_MRAIL	Metro includes high-frequency services within or at the boundaries of cities, which are fully separated from other traffic. Light rail includes tramways and other transport systems moved on tracks.
Of which: conventional rail	P_CRAIL	Includes medium- to long-distance train journeys with a maximum speed under 250 kilometres per hour and suburban train journeys connecting urban centres with surrounding areas.
Of which: high-speed rail	P_HRAIL	Includes rail services over long distances between stations, operating at a maximum speed above 250 kilometres per hour.
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.

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
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.
Of which: light commercial vehicle (< 3.5t)	F_LTRUCKS	Includes pickups, vans and small trucks with a gross vehicle weight (GVW) of less than 3.5 tonnes.
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.
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 160°C to 380°C. 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 ₃ H ₈) and butane (C ₄ H ₁₀) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene. LPG are normally liquefied under pressure for transportation and storage.
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	<p>Includes Gasoline type jet fuel and Kerosene type jet fuel as described below:</p> <p>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.</p> <p>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.</p>
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	<p>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.</p> <p>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).</p> <p>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.</p> <p>Biogases comprise landfill gas, sewage sludge gas and other biogases from anaerobic fermentation.</p> <p>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.</p> <p>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.</p> <p>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.</p>

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 <i>CHP plants</i> and <i>Heat plants</i> . The use of fuels for heat which is not sold is included under the sectors in which the fuel use occurs.
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.).
Of which: solar thermal (PJ)	E_SOLTHERM	Specifies the amount of solar thermal heat direct use for water heating reported in "Other sources" consumption for water heating purposes.
Total final energy (PJ)	E_FINAL	Represents total consumption of energy including all the products listed above.
Total Final Emissions (MtCO ₂)	C_FINAL	Represents total CO ₂ emissions from all reported energy uses of fuels, excluding emissions from non-energy use of fuels and from biofuels and waste, and including emissions reallocated from electricity and heat generation. The IPCC methodology does not assign any CO ₂ emissions to fuel use of biofuels <i>per se</i> , unless it is used in an unsustainable way. This is true for all the sectors except for the transport sector where "motor gasoline" and "diesel and light fuel oil" products also include liquid biofuels. Therefore, total final emissions from the transport flows that contain any of these 2 products also account for biofuels CO ₂ emissions.

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.
Share of occupied dwellings heated by oil products (%)	ACT_DWEL_OIL	Includes share of occupied dwellings mainly heated by oil products.
Share of occupied dwellings heated by gas (%)	ACT_DWEL_GAS	Includes share of occupied dwellings mainly heated by natural gas.
Share of occupied dwellings heated by biofuels (%)	ACT_DWEL_REN	Includes share of occupied dwellings mainly heated by biofuels.
Share of occupied dwellings heated by district heating (%)	ACT_DWEL_HEAT	Includes share of occupied dwellings mainly heated by district heating.
Share of occupied dwellings heated by electricity (%)	ACT_DWEL_ELE	Includes share of occupied dwellings mainly heated by electricity.
Residential floor area (10 ⁹ m ²)	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.
Peak power (MWp)	ACT_POWER	Peak power of photovoltaic device is the maximum electrical power that it can generate under the standard measurement conditions.
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 m ²)	ACT_S_AREA	Includes only floor area of services' buildings.

ACTIVITY DATA		
Flow	Short name	Definition
Value added (10 ⁹ USD PPP 2015)	ACT_GDP_P	Value added in USD at the price level and purchasing power parities (PPPs) ¹ of the year 2015.
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.
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.

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

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/m ²)	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/m ²)	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 2015)	EI_GDP	Energy intensity per value added (USD PPP 2015). 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 /m ²)	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 2015)	CI_GDP	Carbon intensity per value added (USD PPP 2015). 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.

1. Consistent with the IEA (2020) *CO₂ 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 2018 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 Industry, Science, Energy and Resources.

Years covered

2000-2018.

General note

All energy data refer to financial years (e.g. July 2017 to June 2018 for 2018). The macroeconomic activity data are of calendar year (e.g. January 2018 to December 2018 for 2018). 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.

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

Industry and services sectors

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

Data for value added of wood [ISIC 16], pulp and paper [ISIC 17], printing [ISIC 18] and non-metallic minerals [ISIC 23] are available from the year 2011 onwards.

Data for value added of ISIC 13-15 [textiles] are not available since the year 2017.

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 paper and printing [ISIC 17-18] and other manufacturing [ISIC 31-32] are not available.

Data for services employment are not available for the year 2018.

Data for services floor area are not available.

Transport sector

Data for passenger-kilometres of motorcycles have been revised for the whole time series.

Data for tonne-kilometres of freight trucks have been revised since 2016, and show a break for this year.

Data for vehicle stocks of buses have been revised for the whole time series.

Data for vehicle-kilometres and vehicle stocks of rails are not available.

Data for natural gas consumption of freight trains are reported under other fuels category.

Austria

Sources

Austrian Energy Agency; Odyssee database.

Years covered

2000–2018.

Residential sector

The data series for space heating since 2005 and the whole time series for lighting have been significantly revised. This may lead to some breaks in time series for these end uses.

Data for energy consumption and appliances stocks of clothes dryers are based on the IEA secretariat estimates.

Data for energy consumption and appliances stocks of refrigerators are not available.

Data for energy consumption of PCs for the years 2017-2018 includes home entertainment leading to breaks in 2017. Data for appliances stocks of 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 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.

Data for energy consumption of cement production are available from the year 2002.

Data for energy consumption for services end uses are only available for space heating.

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.

Data for energy consumption of passenger cars, buses, passenger trains, freight road transport, and freight trains for the year 2018 are based on the IEA secretariat estimates.

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

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

2000–2018.

Residential sector

Data for energy consumption of the residential sector by end use are available from the year 2010 onwards.

Data for energy consumption of residential appliances include lighting.

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

Data for stocks of freezers, refrigerator/freezer combinations and clothes dryers for 2011-2018 have been reviewed based on a recent study.

Industry and services sectors

Some data for energy consumption from natural gas and electricity for some industry sub-sectors 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 road transport modes.

Data for 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 2012 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 for 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.

Transport activity data for passenger-kilometres for cars, motorcycles and buses and for tonne-kilometres for trucks are estimated for 2018.

Canada

Sources

Natural Resources Canada, Statistics Canada.

Years covered

2000-2018.

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 sub-sectors.

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] sub-sector. For this same reason, the total CO₂ emissions estimates for those sub-sectors where provided directly by the country.

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.

Electricity consumption for the service sector have been reviewed by Statistics Canada for the whole time series

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 trans-border, but exclude other international transport.

Czech Republic

Sources

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

Years covered

2000-2018.

Residential sector

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

Data on end use energy consumption since 2016 have been collected based on a different methodology than previous time series (a new residential survey), leading to breaks on energy consumption data in 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 and stocks of clothes dryers are available from 2004 onwards.

Data for cooling degree days are not available.

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 and from 2017 to 2018.

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

Data for heat consumption for manufacture of wood & wood products [ISIC 16] have been revised from 2000 to 2002.

Data for value added of manufacture of coke and refined petroleum products [ISIC 19] are not available for the years 2000-2003, 2010-2014 and 2017-2018.

Data for services floor area are not available.

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 motorcycles, buses, and freight road transport are only available for the years 2000, 2005 and 2010.

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

2000-2018.

General note

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

Residential sector

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

Data for space cooling, refrigerators and PCs are not available.

Industry and services sectors

Data for energy consumption of rubber manufacturing [ISIC 22] for the year 2018 are not available.

Data for energy consumption of cement production are not available.

Data for energy consumption for services end uses are only available for space heating.

Transport sector

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 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

2000-2018 (partially).

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 and are discontinued since the year 2018.

Data for energy consumption by appliance type are based on IEA Secretariat estimates and are discontinued since the year 2018. Data for refrigerators and PCs are not available.

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

Data for Solar thermal panels stocks are in thousands square meters and not in million units.

Data for cooling degree days are not available.

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 sub-sectors 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.

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 passenger-kilometres (pkm) of passenger airplanes are not available since the year 2016, which affects total pkm of passenger transport. Data for tonne-kilometres for freight airplanes are not available.

Data for stocks of rail 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.

France

Sources

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

Years covered

2000-2018.

General note

From 2011 onwards, energy consumption and activity data for France 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). For the transport sector both activity and energy consumption data refer only to metropolitan France. Considering overseas departments in transport would have led to significant breaks in the data reported and corresponding indicators (especially in the case of air transport if 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 of space cooling are available from the year 2001 onwards.

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

Industry and services sectors

There may be breaks for some industry sub-sectors 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 biofuels and waste for some industry sub-sectors before the year 2004 are based on IEA Secretariat estimates.

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

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.

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.

Data for biofuels and waste for space heating in the services sector includes solar thermal since the year 2014.

Data for electricity consumption for services space heating includes electricity consumption from heat pumps.

Transport sector

Activity data for road transport refer to vehicles registered, not in circulation (in metropolitan France).

Activity data of passenger ships and freight airplanes are not available.

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

Data for energy consumption for passenger airplanes has 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

2000-2018.

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

Data for energy consumption for cooking have been reviewed for the whole time series and for space heating and water heating from 2006 onwards.

Data for space cooling are available from 2010 onwards. PCs data are not available.

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

Data for appliances stock of refrigerators and PCs are not available.

Data for cooling degree days are not available.

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 consistent with the IEA energy balances database. Work is ongoing to improve alignment between the two databases.

Data for value added for manufacturing sub-sectors for the year 2018 are based on the IEA secretariat estimates.

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

Transport sector

Data for passenger-kilometres of motorcycles are not available.

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.

Data for vehicle-kilometres and energy consumption for motorcycles, buses and trucks show a significant break in 2017 due to a revision confirmed by the country.

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

Greece

Sources

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

Years covered

2000-2018.

Residential sector

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 are not available since the year 2014, and data for energy consumption and stocks of refrigerators, clothes dryers, and PCs are not available.

Industry and services sectors

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

Value added data for the year 2018 are based on the IEA secretariat estimates. Data for value added of coke and refined manufacturing [ISIC 19] for the year 2018 are not available.

Data for energy consumption for cement production are not available since the year 2010.

Transport sector

Data for passenger-kilometres of motorcycles are based on IEA Secretariat estimates and discontinued since 2015.

Data for passenger-kilometres of domestic passenger ships are not available. Data for tonne-kilometres of domestic freight airplanes and domestic freight ships are not available.

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

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

Data for energy consumption for passenger ships and freight airplanes might be partially included under freight ships and passenger airplanes, respectively.

Hungary

Sources

Hungarian Energy and Public Utility Regulatory Authority; Odyssee database.

Years covered

2000-2018.

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

Some data for energy consumption across residential end uses for different fuels and years are based on IEA Secretariat estimates.

Data for energy consumption for other appliances includes all residential appliances and lighting, and may include cooling up to 2010. Data for energy consumption for space cooling is reported separately since the year 2011.

Data for energy consumption split by appliance type are not available.

Data for stocks of dish washers are available from 2002 onwards. Data for stocks of clothes dryers are available from 2006 onwards.

Data for unit energy consumption of appliances are not available.

Data for cooling degree days are not available.

Industry and services sectors

Data for energy consumption for rubber and plastics [ISIC 22] and for 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.

Data for energy consumption of the service sector split by end use are not available. Data for services floor area are not available.

Transport sector

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

Data for passenger-kilometres for passenger trains from 2000 to 2006 are based on IEA Secretariat estimates.

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

Data for vehicle-kilometre of passenger car and occupancy are not available after 2010. Data for vehicle-kilometres of motorcycles, buses, passenger trains, freight trucks, and freight trains are not available.

Data for vehicle stocks of rail transport are not available.

Data for activity and energy consumption of air transport are not available.

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 the year 2012.

Data for appliances stocks for refrigerators and PCs are not available.

Data for cooling degree days are not available.

Industry and services sectors

Data for value added of chemicals [ISIC 20-21] includes only [ISIC 21]. Data for value added of machinery [ISIC 25-28] includes only [ISIC 25 and 27] from the year 2015 onwards. Data for value added of services sector doesn't include [ISIC 33] from the year 2015 onwards.

Due to confidentiality issues, value added of chemicals [ISIC 20-21] and other manufacturing [ISIC 31-32] are 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 are not available, due to confidentiality issues. It is reported under basic metals [ISIC 24] together with manufacture and casting of precious and non-ferrous metals [class 2420+2432].

Data for energy consumption for cement production are not available.

Data for energy consumption of the service sector split by end use are not available. Data for services floor area are not available.

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 for passenger-kilometres of passenger cars and buses are not available from the year 2016 onwards. Data for passenger-kilometres of passenger airplanes and ships are not available.

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

Data for vehicle-kilometres and energy consumption of passenger cars also include taxis.

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

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

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

Ireland

Sources

Sustainable Energy Authority of Ireland.

Years covered

2000-2018.

Residential sector

Data for oil & oil products and electricity in the residential sector up to the year 2015 are based on IEA Secretariat estimates. Data for natural gas in the residential sector up to the year 2014 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 is available from 2016 onwards, and is based on IEA secretariat estimates for the years 2016-2017.

Data for energy consumption for space cooling, lighting and residential appliances split by appliance type are not available. Data for lighting may be reported with other appliances. Data for energy consumption for other appliances up to the year 2015 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.

Italy

Sources

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

Years covered

2000-2018.

Residential sector

Data for electricity consumption for water heating was partially revised since 2010 following national updates on electrical water heater stocks.

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

Data for energy consumption and appliances stock of refrigerators are not available.

Data for cooling degree days are not available.

Industry and services sectors

Data for energy consumption of some industry sub-sectors 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 sub-sectors [ISIC 16, 17-18, 22, 23, 24, 25-28, 31-32], manufacturing [ISIC 10-32], and the services sector for the year 2017 and 2018 are based on IEA Secretariat estimates. Data for value added of manufacture of coke and refined petroleum products [ISIC 19] are not available for 2014.

Data for services floor area are not available.

Transport sector

Data for vehicle-kilometres of buses and freight trucks are available up to 2002. Data for vehicle-kilometres of motor-cycles and rail transports are not available.

Data for vehicle stocks of rail transports are available for the years 2001-2017 and 2001-2016 respectively.

Data for energy consumption for passenger ships and freight airplanes might be partially included under freight ships and passenger airplanes, respectively.

Japan

Sources

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

Years covered

2000-2018.

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 of the residential sector, across end uses has been revised for the whole time series.

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 of dish washers are available from 2004 onwards. Data for stocks of refrigerators and freezers are not available.

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

Data for value added of textiles [ISIC 13-15] includes only [ISIC 13] and value added of paper and printing [ISIC 17-18] includes only [ISIC 17]. Data for value added of machinery [ISIC 25-28] does not include [ISIC 26] and data for value added of wood [ISIC 16] are not available.

Data for energy consumption for manufacture of rubber and plastics [ISIC 22], for cement production and for other manufacturing [ISIC 31-32] are not available.

Data for energy consumption for services end uses has been revised for the whole time series.

Data for energy consumption for lighting in the services sector is included in other building energy use in services.

Transport sector

Data for vehicle-kilometres and energy consumption for passenger cars have been revised for the whole time series.

Data for tonne-kilometres, vehicle-kilometres and energy consumption for freight trucks have been revised for the whole time series.

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

Data for vehicle-kilometres of freight trains are not available after the year 2012.

Data for vehicle stock of passenger trains are not available.

Korea

Sources

Korea Energy Economics Institute.

Years covered

2000-2018.

Residential sector

Data for energy consumption from biofuels and waste for space heating includes water heating until the year 2016.

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

Data for energy consumption of refrigerators/freezer combinations includes refrigerators before 2002. Data for stocks of refrigerators are available from 2002 onwards.

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

Industry and services sectors

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

Data for energy consumption of cement production are not available.

Transport sector

Data for passenger-kilometres of passenger cars and buses have been revised for the whole time series. Passenger-kilometres of cars are available starting in the year 2011.

Data for tonne-kilometres of freight trucks and domestic freight ships have been revised for the whole time series and are available from 2001 onwards.

Data for vehicle-kilometres of passenger cars, buses, passenger trains, domestic passenger airplanes, freight trucks and freight trains have been revised for the whole time series. Data for vehicle-kilometres of passenger cars, freight trucks are available from 2001 onwards.

Data for vehicle stocks of buses, passenger trains are available from 2001 onwards.

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

Data for energy consumption from LPG for passenger cars are based on IEA estimates.

Luxembourg

Sources

STATEC–NSI Luxembourg.

Years covered

2000-2018.

General note

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

Residential sector

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

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

Data for diffusion of appliances are available only for the years 2001 and 2011 and for stocks for the year 2011.

Data for cooling degree days are not available.

Industry and services sectors

Data for heat consumption in industry is available from 2003 onwards.

Data for energy consumption from biofuels and waste in wood manufacturing [ISIC 16] are available 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], motor vehicles [ISIC 29-30], and other manufacturing [ISIC 31-32] are not available. Value added of [ISIC 20-21] includes only [ISIC 20].

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

Data for services floor area are not available.

Transport sector

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

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

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

Data for vehicle-kilometres of motorcycles and freight trains are not available.

Data for vehicle stocks of passenger trains are not available.

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.

There were some historical revisions of data for energy consumption from motor gasoline and diesel for passenger cars, for buses, and for freight trucks.

Data for diesel and light fuel oil consumption for domestic passenger ships have been revised since 2015.

Data for diesel and light fuel oil consumption for freight trains have been revised since 2012.

Mexico

Sources

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

Years covered

2000-2018 (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 database.

Data for floor area of dwellings for the years 2016-2018 are based on IEA Secretariat estimates.

Data on appliances stocks are available only for refrigerators, clothes washers and TVs. 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-kilometres) are only available for domestic passenger airplanes, and domestic passenger ships, the latter from 2010 onwards. Passenger-kilometres of domestic passenger airplanes for the year 2018 are not available.

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

Vehicle-kilometres and passenger occupancy are not available.

Netherlands

Sources

Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO) through the Odyssee database.

Years covered

2000-2018.

Residential sector

Data for energy consumption and appliances stocks of freezers and refrigerator/freezer combinations for the years 2017-2018 are based on the IEA estimates.

Data for energy consumption and appliances stocks of TVs for the years 2017-2018 are not available.

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

Data for occupied dwellings for the years 2009 and 2010 are estimated by the IEA Secretariat.

Data for cooling degree days are not available.

Industry and services sectors

Heat consumption for casting of precious and non-ferrous metals [ISIC 2420+2432] up to the year 2011 is based on IEA Secretariat estimates.

Data for energy consumption for manufacturing of cement are available up to 2010.

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

Transport sector

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, and data for tonne-kilometres for freight airplanes are not available.

Data for vehicle-kilometres for rail transport modes are not available.

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 2018 are based on national early estimates. These data may be updated in the next edition of this database.

Years covered

2000-2018.

Residential sector

Data for natural gas consumption across end uses and for oil and oil products for space heating for the years 2013-2018 are based on country and IEA Secretariat estimates. The country is working to review these data, which may be updated in the next edition of this database.

Data for energy consumption of refrigerators and freezers are not available.

Data for unit energy consumption of televisions and PCs for 2016-2018 are based on IEA Secretariat estimates.

Industry and services sectors

Data for consumption of natural gas in manufacture of wood and wood products [ISIC 16] up to the year 2013 are based on IEA secretariat estimates.

Data for value added for chemicals [ISIC 20-21] includes rubber [ISIC 22] and manufacture of coke and refined petroleum products [ISIC 19].

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

Transport sector

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

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

Data for diesel and light fuel oil consumption for passenger and freight trains for the years 2017 and 2018 are based on IEA secretariat estimates.

Data for energy consumption of domestic freight airplanes are not available; it may be partially included in domestic passenger airplanes.

Data for value added for manufacture of coke and refined petroleum products [ISIC 19] and total manufacturing before the year 2005 are not available.

Transport sector

Data on passenger-kilometres of motorcycles are not available.

Data for vehicle-kilometres are available from 2010 onwards.

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

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.

Poland

Sources

Statistics Poland.

Years covered

2000-2018.

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 split by appliance type and for space cooling are not available.

Data for stocks of clothes dryers and PCs are not available. Data for refrigerators, freezers and refrigerator/freezer combinations stocks are based on IEA secretariat estimates for the years 2010-2011, 2013-2014, 2016-2017.

Data for cooling degree days are not available.

Industry and services sectors

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

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 area for the services sector are not available.

Portugal

Sources

Direcção Geral de Energia e Geologia.

Years covered

2000-2018.

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 the results from a household energy consumption survey.

Data for oil & oil products, natural gas and electricity of space heating up to the year 2013 are based on IEA secretariat estimates.

Data for biofuels and waste from 2005 to 2009 and natural gas for the year 2008 for water heating are based on IEA secretariat estimates.

Data for electricity consumption for cooking and lighting up to the year 2009 are based on IEA Secretariat estimates. Data for other appliances are based on IEA Secretariat estimates.

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 energy consumption of residential appliances disaggregated by appliance type are available from 2010 onwards.

Data for stocks of refrigerators and PCs are only available for years 2010-2012.

Industry and services sectors

There may be some breaks for the year 2012 for some sub-sectors (e.g. for non-metallic minerals) in energy consumption data from biofuels and waste, due to a more recent industry survey.

Data for energy consumption of the services sector split by end use are available from 2005 onwards.

Data on electricity from 2005 to 2018, natural gas from 2015 to 2016, and heat for the year 2018 for services other building energy use are based on IEA secretariat estimates.

Data on services floor area are available for the years 2005-2011.

Transport sector

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

Data for passenger-kilometres of motorcycles are not available. Data for passenger-kilometres of domestic passenger ships are available from 2014 onwards.

Data for passenger-kilometres of buses were revised from 2015 to 2016 based on national statistics publication, resulting in a break for the year 2015.

Data for tonne-kilometres of domestic freight airplanes are available from 2005 onwards. Data for tonne-kilometres of domestic freight ships are not available.

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

Data for energy consumption split by passenger and freight for 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

2000-2018.

Residential sector

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.

Data for cooling degree days 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 energy consumption of cement production are not available.

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

Data for services floor area are not available.

Transport sector

Data for passenger-kilometres of passenger cars for the year 2018 are not available.

Data for passenger-kilometres of motorcycles and for tonne-kilometres of domestic freight airplanes are not available.

Data for vehicle-kilometres of passenger trains are available between 2011-2014. Data for vehicle-kilometres of freight trucks and freight trains are not available.

Data for vehicle stocks of rail transport are not available.

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

Data for energy consumption of domestic passenger airplanes are available for the years 2004-2006.

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

2000-2018.

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. Data for appliances stock of refrigerators, clothes dryers, and PCs are not available.

Data for cooling degree days are not available.

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 energy consumption of cement production are not available.

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 vehicle stocks of rail transport are not available.

There is a break for diesel and light fuel oil consumption of freight trains in 2013 due to a change in methodology.

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.

Years covered

2000-2018.

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 oil & oil products consumption for space heating from 2005 to 2014 are based on IEA secretariat estimates.

Data for energy consumption for space cooling are not available.

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

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

Data for energy consumption of other appliances include clothes dryers, TVs and PCs. Data for other appliances up to 2015 are based on IEA secretariat estimates.

Data for stocks and diffusion of appliances for freezers, refrigerator/freezer combinations, dish washers, clothes washers and TVs are only available up to 2013. Data for stocks and diffusion of appliances for refrigerators, clothes dryers and PCs are not available.

Data for cooling degree days are not available.

Industry and services sectors

Data for oil & oil products and biofuel & waste consumption for most of sub-sectors has been revised since 2005 due to a new data survey.

Data for value added for the year 2018 for manufacturing sub-sectors and for services are based on IEA Secretariat estimates. Data for value added of coke and refined manufacturing [ISIC 19] for the year 2018 are not available.

Data for biofuels & waste from 2015 to 2018 for other building energy use in services sector are based on IEA secretariat estimates.

Transport sector

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

Data for energy consumption of both passenger and freight road transport (passenger cars, motorcycles, buses, and trucks) are not available since the year 2015.

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

Switzerland

Sources

Swiss Federal Office of Energy (SFOE).

Years covered

2000-2018.

Residential sector

Data for energy consumption for space heating includes ambient heat reported under "other" fuels.

Data on energy consumption for space cooling are not available.

Data on energy consumption for PCs have been revised in this edition of the publication.

Data for cooling degree days are not available.

Industry and services sectors

Data for energy consumption for agriculture, forestry and fishing [ISIC 01-03] have been revised.

Data for energy consumption for mining and quarrying [ISIC 05-09], wood manufacturing [ISIC 16], rubber and plastic [ISIC 22], and furniture and other manufacturing [ISIC 31-32] 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 sub-sectors.

Data for value added for manufacturing sub-sectors and for services for the year 2018 are based on IEA Secretariat estimates.

Data for cement production for the year 2017 and 2018 are based on IEA Secretariat estimates.

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.

Data for vehicle-kilometres of passenger airplanes, freight airplanes and freight ships are not available. Data for vehicle-kilometres of passenger ships are available up to 2006.

Activity data (pkm and vkm) for buses for the year 2018 are the same as the previous year, as official values are not published at the time of this release.

Data for energy consumption for passenger cars, motorcycles, buses, freight trucks, passenger trains and freight trains have been revised for the whole data series due to an update of the model used.

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

Turkey

Sources

General Directorate of Energy Affairs (GDEA).

Years covered

2000-2018.

Residential sector

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

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

Data for appliances stocks for refrigerators, freezers, dish washers, and clothes washers have been revised for the year 2017.

Data for residential floor areas are not available.

Data for cooling degree days are not available.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] are 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 energy consumption of cement production are not available.

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

Data for value added are available at the level of ISIC section (Rev. 4). Further data availability for the different manufacturing sub-sectors may be available 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.

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

Transport sector

Data for passenger-kilometres of passenger cars and buses are available for the year 2000, 2010 and from 2015 to 2018. Data for passenger-kilometres of passenger trains and domestic passenger ships are available from 2014 onwards. Data for passenger-kilometres of motorcycles and passenger airplanes are not available.

Data for tonne-kilometres of freight trucks are available from 2001 onwards. Data for tonne-kilometres of domestic freight ships and domestic freight airplanes are not available.

Data for vehicle-kilometres of passenger cars, buses, and freight trucks are available for the year 2000, 2010 and from 2015 to 2018. Data for vehicle-kilometres of passenger trains and freight trains are available from 2014 onwards. Data for vehicle-kilometres of motorcycles are not available.

Data for vehicle stocks of rail transport are available since the years 2001 onwards.

Data for energy consumption 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

2000-2018.

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

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

Data for energy consumption for lighting up to the year 2005 is based on IEA Secretariat estimates, and has been revised since 2006 the year due to new modelling results.

Data for energy consumption and appliances stocks for refrigerators, freezers, refrigerator/freezer combinations, dish washers, clothes washers and PCs have been revised for the whole time series due to new modelling results.

Data for energy consumption for clothes dryers has been revised up to 2009 due to new modelling results.

Data for energy consumption for TVs for the years 2017 and 2018 are based on IEA secretariat estimates, while data for TVs stocks are not available for these years.

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

Industry and services sectors

Data for energy consumption from biofuels and waste split by industry sub-sector except non-metallic minerals [ISIC 23] are available from 2015 onwards.

Data for electricity consumption for mining and quarrying [ISIC 05-08] for the year 2000 is based on IEA Secretariat estimates.

Data for energy consumption for manufacture of furniture and other manufacturing [ISIC 31-32] are available from 2010 onwards.

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

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

Data for vehicle-kilometres of rail transport are available from 2011 onwards.

Data for vehicle stocks of rail transport are not available.

Data for motor gasoline and diesel consumption for passenger cars, motorcycles, buses and freight trucks have been revised since the year 2015.

Data for energy consumption for freight trains and passenger trains for the year 2018 are based on IEA Secretariat estimates.

United States

Sources

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

Years covered

2000-2018.

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 for energy consumption and appliance stocks of refrigerators are not available.

Data for energy consumption from natural gas and electricity before the year 2017 across residential end uses and appliances stocks have been reviewed by the IEA Secretariat based on the latest data submitted, in order to improve time series consistency.

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 split by end use are 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 areas of services are not available for the years 2001-2007, and the year 2009.

Transport sector

Data for passenger-kilometres of passenger cars include light duty vehicles, short wheel base from the year 2007 onwards, and hence data are not comparable before and after 2007.

Data for passenger-kilometres of domestic passenger ships are not available.

Data for vehicle stocks of rail transport are not available.

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 2016 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 for motorcycles from 2014-2018 are based on IEA secretariat estimates.

Data for energy consumption of domestic passenger ships for 2000-2005 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 2018 (unless otherwise specified) 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 2019 edition another IEA association country, Brazil, was included thanks to a very close collaboration. In the current edition of this database, we are delighted to add data for Chile (an IEA accession country) and Lithuania for the first time.

Thanks to the ongoing collaboration with the IEA under the [EU4Energy programme](#), Armenia, Belarus, Republic of Moldova and Ukraine started being published in the 2018 edition of this report, while Azerbaijan, Georgia and Uzbekistan were included in the 2019 edition and Kazakhstan and Kyrgyzstan were included in the 2020 edition. 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

2000-2018 .

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 occupied dwellings and household occupancy are available starting in the year 2005. Data for occupied dwellings are not available for the year 2018.

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

There are reviews on the energy consumption across all the residential end uses and appliances and on the activity data for appliances. Those revisions are based on the results of a recent household survey (Pesquisa de Posse e Hábitos)

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 26-28], 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 non-ferrous metals [ISIC 2420+2432] also includes manufacture of fabricated metal products [ISIC 25].

Data for energy consumption of manufacturing not elsewhere specified also 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, and are based on the year 2010 unlike most other countries that have value added base year as 2015.

Data for non-building energy use in the services 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 2018, 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 and stocks of buses are available since the year 2008.

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

Data for vehicle-kilometres are only available for trucks.

Data for energy consumption of motorcycles are reported together with passenger cars.

Data for ethanol consumption are reported under other fuels under passenger cars, typically reported together with motor gasoline.

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

Chile

Sources

Ministerio de Energía, Gobierno de Chile.

Years covered

2000-2018 (partially)

Residential sector

Data for energy consumption of the residential sector split by end use are available for the years 2010 and 2018.

Data for Non-specified residential are based on the IEA energy balances except the year 2010 and 2018. The Chilean administration applied a new revise methodology for final consumption of primary solid biofuels of residential sector. This may lead to data breaks in time series between 2013 and 2014.

Data for appliances stocks and unit energy consumption are available only for the year 2018.

Data for energy consumption and appliances stocks of refrigerator/freezer combinations are not available.

Data for occupied dwellings are not available for the year 2018.

Industry and services sectors

Data for manufacture of textiles [ISIC 13-15], wood and wood products [ISIC 16], rubber and plastics [ISIC 22], machinery [ISIC 25-28] and transport equipment [ISIC 29-30] are included in manufacturing not elsewhere specified.

Data for energy consumption for manufacture of food [ISIC 10-12] are available from the year 2014 onwards, and for construction [ISIC 41-43] from 2017 onwards.

Data for energy consumption for non-metallic minerals [ISIC 23] includes only cement energy consumption.

Data for value added for several manufacturing sub-sectors are not available since the year 2013.

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

Data for services employment are available from the year 2010 onwards.

Transport sector

Data for transport activity are not available except for vehicle stocks of passenger cars, motorcycles and buses. Stocks of freight road vehicles are available only for the year 2017.

Data for transport energy consumption split by segment/ mode/ vehicle type are not available.

Lithuania

Sources

Lithuanian Energy Agency, and Odyssee database.

Years covered

2000-2018

Residential sector

Data for energy consumption for space cooling, lighting and residential appliances split by appliance type are not available. Data for lighting may be reported together with other appliances.

Data for stocks of freezers, refrigerator/freezer combinations, clothes washers and TVs are available up to the year 2009. Data for appliances stocks of dish washers are available for the year 2009. Data for appliances stocks of refrigerators, clothes dryers and PCs are not available.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastics [ISIC 22] and other manufacturing [ISIC 31-32] are available from 2008 onwards. Data for energy consumption for manufacturing of cement are not available.

Data for value added for the year 2018 are available at the level of the ISIC section (Rev. 4). Data for value added of manufacturing of coke and refined petroleum products [ISIC 19] are not available due to confidentiality reasons.

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

Data for services floor areas are not available.

Transport sector

Data for passenger-kilometres for motorcycles are not available.

Data for vehicle-kilometres for passenger cars, motorcycles, freight trucks are not available.

Data for energy consumption for domestic passenger airplanes are not available for the years 2017 and 2018.

Data for energy consumption for buses are available from 2008 onwards.

Data for energy consumption for domestic passenger ships and domestic freight airplanes are not available.

Morocco

Sources

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

Years covered

2000-2018 (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 from the year 2004 onwards.

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.

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] and other manufacturing [ISIC 31-32] are included under Manufacturing not elsewhere specified.

Data for value added for manufacturing sub-sectors are available between the year 2008 and the year 2018. Data for value added are not available for several manufacturing sub-sectors.

Data for energy consumption for the services sector split by end use are available from 2004 onwards.

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

Data for services floor areas are not available.

Transport sector

Data for passenger-kilometres and tonne-kilometres are available for rail only from the year 2004 onwards..

Data for vehicle stocks and vehicle-kilometres are based on country estimates, and are available from the year 2004 onwards.

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 from the year 2004 onwards. Data for energy consumption of passenger cars also include 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 and the total rail consumption is allocated in passenger trains.

Data for energy consumption of domestic water transport are not available.

Armenia

Sources

Statistical Committee of the Republic of Armenia, Yerevan.

Years covered

2000-2018 (partially).

General note

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

Industry and services sectors

Data split by industry sub-sector 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 sub-sectors.

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 sub-sectors.

Data for value added are available from 2012 onwards and are based on price levels and PPP of 2015. The conversion of these data into 2015 USD PPP was made by IEA Secretariat, based on country submission.

Transport sector

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

Data for passenger-kilometres of passenger cars are available from the year 2002 onwards. Data for passenger kilometres of buses and passenger trains are available from the year 2001 onwards.

Data for tonne-kilometres of freight trucks and freight trains are available from the year 2001 onwards.

Data for vehicle-kilometres of passenger cars, buses and freight trucks are available from 2001 onwards.

Data for vehicle stocks are not available.

Azerbaijan

Sources

The State Statistical Committee of the Republic of Azerbaijan.

Years covered

2000-2018 (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. Data for appliances stocks of freezers, refrigerator/freezer combinations, and clothes dryers are not available.

Data for occupied dwellings are not available.

Industry and services sectors

Data for energy consumption for manufacturing of rubber and plastic products [ISIC 22] and other manufacturing [ISIC 31-32] are included under Manufacturing not elsewhere specified.

Data for energy consumption of cement production are not available.

Data for value added are available from 2010 onwards and are based on price levels and PPP of 2015. The conversion of these data into 2015 USD PPP was made by IEA Secretariat, based on country submission.

Transport sector

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

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

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

Data for vehicle-kilometres are not available.

There is a break for vehicle stocks of passenger trains and freight trains in 2016 due to amortization of coaches expired service life.

Belarus

Sources

National Statistical Committee of the Republic of Belarus.

Years covered

2000-2018 (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. Appliances stocks data for dish washers are available from the year 2017 onwards.

Data for residential floor are available from 2010 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 en-

ergy consumption of cement production are available from 2014 onwards.

Data for value added are available from the year 2014 onwards and are based on price levels and PPP of 2015.

Transport sector

Data for transport energy consumption split by segment/ mode/ vehicle type are not available, except for passenger buses and freight road transport from 2016 onwards.

Data for passenger-kilometres of buses, passenger trains, domestic passenger airplanes, and domestic passenger ships are available from 2010 onwards. Data for passenger-kilometres of passenger cars and motorcycles are not available.

Data for tonne-kilometres, and vehicle stocks are available from 2010 onwards. Data for vehicle-kilometres are not available.

Georgia

Sources

National Statistics Office of Georgia – GEOSTAT.

Years covered

2000-2018 (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 GDP is based on SNA 2008 methodology from 2010. Data for GDP before 2010 is based on SNA 1993.

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], other manufacturing [ISIC 31-32] 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) from 2010 onwards.

Data for value added for Georgia and are based on price levels and PPP of 2015 as for other countries. 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.

Kazakhstan

Sources

Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

Years covered

2000-2018 (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.

Partial energy consumption data availability (by fuel) for residential sector before the year 2008 may lead to relatively low energy intensities. Work is ongoing to improve data availability.

Data for appliances stocks are available for the year 2018 based on the pilot survey "Household Fuel and Energy Survey Questionnaire". Data for appliances stocks of refrigerator/freezer combinations and clothes dryers are not available.

Data for occupied dwellings, residential floor area, and heating degree days are not available.

Industry and services sectors

In the result of methodological change, breaks in time series appear for many product and flows between 2014 and 2015 data.

Data split by industry sub-sector for natural gas, coal and coal products, and heat consumption in the industry sector are reported from the year 2008 onwards except basic metals [ISIC 24]. This leads to breaks in the time series for total final energy consumption of several industry sub-sectors.

Data for biofuels and waste consumption in the industry sector are not available.

Data on value added are available at the level of ISIC section (Rev. 4) before the year 2010. Data for value added are based on price levels and PPP of 2015. The conversion of these data into 2015 USD PPP was made by IEA Secretariat, based on country submission.

Partial energy consumption data availability (by fuel) for services sector before the year 2008 may lead to relatively low energy intensities. Work is ongoing to improve data availability.

Transport sector

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

Data for passenger-kilometres of domestic passenger airplanes are available from the year 2001 onwards. Data for passenger-kilometres of motorcycles are not available.

Data for tonne-kilometres of domestic freight airplanes are available from the year 2001 onwards.

Data for vehicle-kilometres are not available.

Kyrgyzstan

Sources

National Statistical Committee of the Kyrgyz Republic.

Years covered

2000-2018 (partially).

General note

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

Industry and services sectors

Data split by industry sub-sector for oil and oil products, natural gas, and heat consumption in the industry sector are

reported from the year 2005 onwards. This leads to breaks in the time series for total final energy consumption of several industry sub-sectors.

Energy consumption data split by fuel types for manufacturing sub-sectors are not available for the year 2005-2011. Only electricity consumption data is available before 2005.

Data for biofuels and waste consumption in the industry sector are not available.

Data on value added are not available for the whole time series.

Partial energy consumption data availability (by fuel) for services sector before the year 2016 may lead to relatively low energy intensities. Work is ongoing to improve data availability.

Transport sector

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

Data for passenger-kilometres of domestic passenger ships are not available.

Data for tonne-kilometres of domestic freight ships are not available.

Data for vehicle-kilometres are not available.

Data for vehicle stocks of motorcycles, buses, freight trucks, and rail transports are not available.

Republic of Moldova

Sources

National Bureau of Statistics of the Republic of Moldova.

Years covered

2000–2018 (partially).

General note

The data presented does not include the districts from the left side of the river Nistru and municipality Bender. Some discrepancies may exist between the final energy consumption in this publication and that reported in the IEA World energy balances, where official figures on natural gas imports, natural gas inputs to power plants, electricity production and consumption are modified by the IEA Secretariat to include estimates for supply and demand for the auto-

nomous region of Stînga Nistrului (also known as the Pridnestrovan Moldavian Republic or Transnistria).

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 appliances stocks of refrigerators, freezers, clothes dryers are not available. Data for appliances stocks of dish washers are available for the year 2015.

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 residential floor area are available from 2005 onwards.

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 coke and refined petroleum products [ISIC 19], manufacturing of rubber and plastic products [ISIC 22] and other manufacturing [ISIC 31-32] are available from 2015 onwards.

Data on value added are available at the level of ISIC section (Rev. 4), from the year 2010 onwards and are based on price levels and PPP of 2015.

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

2000-2018 (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 appliances stocks and diffusions of refrigerators, freezers, dish washers, clothes washers, TVs, and PCs are available for the year 2016.

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] and other manufacturing [ISIC 31-32] are included under Manufacturing not elsewhere specified.

Data for value added by manufacturing sub-sector are available since the year 2012 onwards and are based on price levels and PPP of 2015. The adjustment of these data for PPP was made by the 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 and motorcycles. Passenger-kilometres of domestic

passenger airplanes and tonne-kilometres of domestic freight airplanes are available from the year 2002 onwards.

Vehicle-kilometres of passenger cars are available from 2003 onwards. Vehicle-kilometres of buses and freight trucks are available from 2002 onwards. Vehicle-kilometres of motorcycles and rail transport are not available.

Data for vehicle stocks of passenger cars, motorcycles, buses and freight trucks are available until the year 2013.

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 sub-sector are available from 2014 to 2017.

Data for value added are available from 2010 until 2016 and are based on price levels and PPP of 2010, instead of 2015 as for other countries. 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	2.388x10 ²	2.388x10 ⁻⁵	9.478x10 ²	2.778x10 ⁻¹
gigacalorie (Gcal)	4.187x10 ⁻³	1	1.000x10 ⁻⁷	3.968	1.163x10 ⁻³
million tonnes of oil equivalent (Mtoe)	4.187x10 ⁴	1.000x10 ⁷	1	3.968x10 ⁷	1.163x10 ⁴
million British thermal units (MBtu)	1.055x10 ⁻³	2.520x10 ⁻¹	2.520x10 ⁻⁸	1	2.931x10 ⁻⁴
gigawatt hour (GWh)	3.600	8.598x10 ²	8.598x10 ⁻⁵	3.412x10 ³	1

Conversion factors for mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	1.000x10 ⁻³	9.842x10 ⁻⁴	1.102x10 ⁻³	2.205
tonne (t)	1.000x10 ³	1	9.842x10 ⁻¹	1.102	2.205x10 ³
long ton (lt)	1.016x10 ³	1.016	1	1.120	2.240x10 ³
short ton (st)	9.072x10 ²	9.072x10 ⁻¹	8.929x10 ⁻¹	1	2.000x10 ³
pound (lb)	4.536x10 ⁻¹	4.536x10 ⁻⁴	4.464x10 ⁻⁴	5.000x10 ⁻⁴	1

Conversion factors for volume

To:	gal U.S.	gal U.K.	bbbl	ft ³	l	m ³
From:	multiply by:					
U.S. gallon (gal U.S.)	1	8.327x10 ⁻¹	2.381x10 ⁻²	1.337x10 ⁻¹	3.785	3.785x10 ⁻³
U.K. gallon (gal U.K.)	1.201	1	2.859x10 ⁻²	1.605x10 ⁻¹	4.546	4.546x10 ⁻³
barrel (bbbl)	4.200x10 ¹	3.497x10 ¹	1	5.615	1.590x10 ²	1.590x10 ⁻¹
cubic foot (ft ³)	7.481	6.229	1.781x10 ⁻¹	1	2.832x10 ¹	2.832x10 ⁻²
litre (l)	2.642x10 ⁻¹	2.200x10 ⁻¹	6.290x10 ⁻³	3.531x10 ⁻²	1	1.000x10 ⁻³
cubic metre (m ³)	2.642x10 ²	2.200x10 ²	6.290	3.531x10 ¹	1.000x10 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
MtCO ₂	million tonnes of 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
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
OECD	Organisation for Economic Co-Operation and Development
UNFCCC	United Nations Framework Convention on Climate Change
..	not available