International Energy Agency

IEA Energy Efficiency Indicators:

Overview and recent updates

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16th December 2019 , Berlin

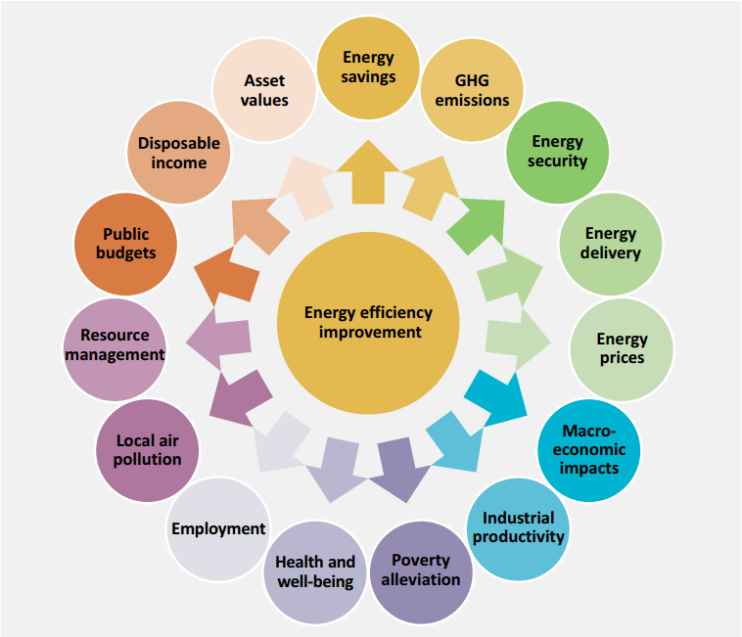
Overview

- ¾ The importance of energy efficiency indicators
- ¾ The IEA energy efficiency indicators data collection andrelated resources
- ¾ End use data and efficiency indicators:a sectoral overview and recent updates

The importance of energy efficiency indicators

The importance of energy efficiency

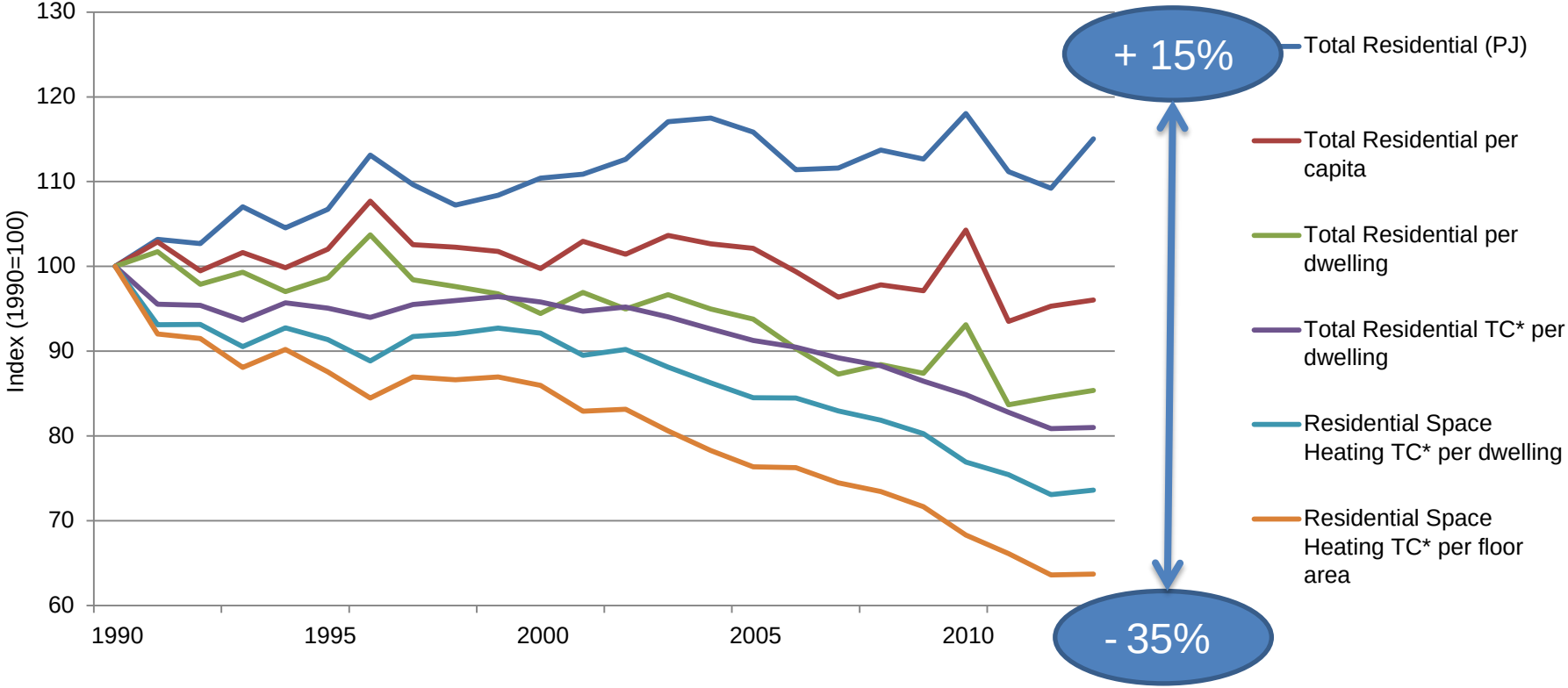
2 Multiple benefits



Source: IEA (2014), Capturing the multiple benefits of energy efficiency. All rights reserved.

Environmental, economic and social benefits from energy efficiency

Choosing appropriate indicators is essential

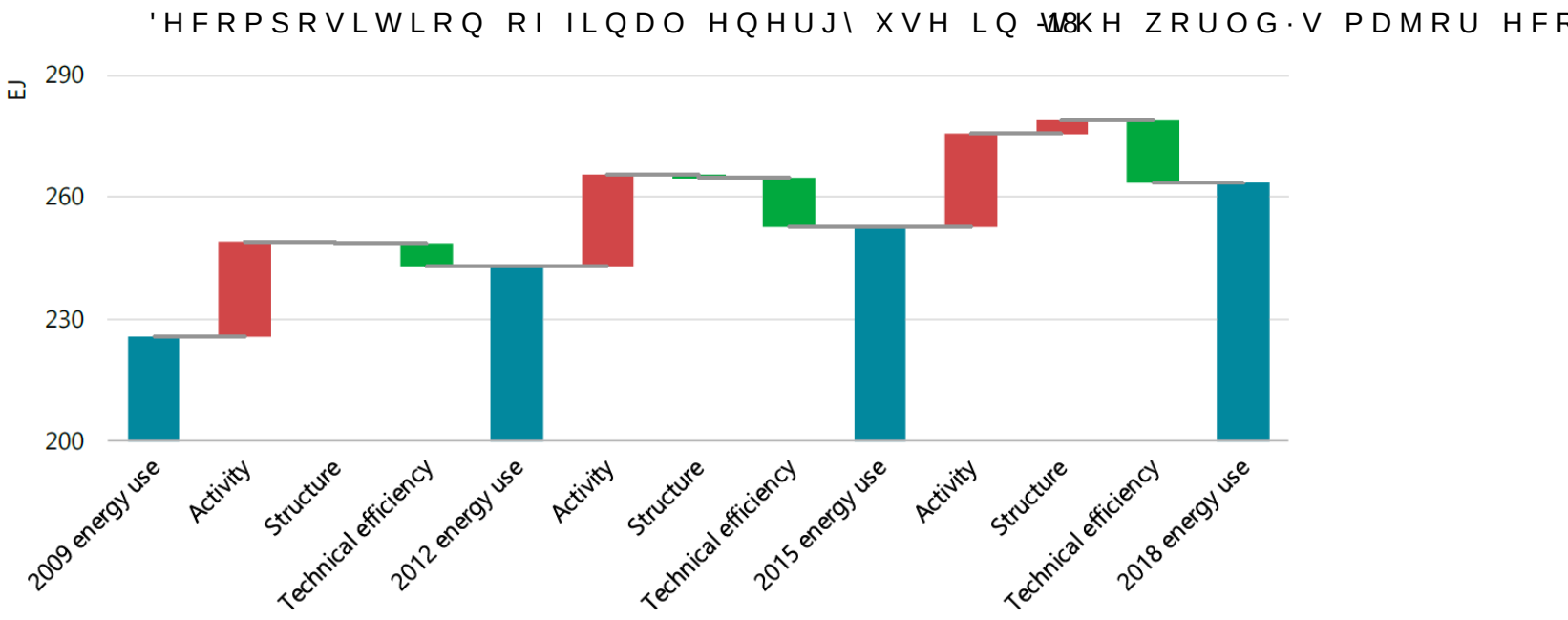


Data for IEA 20 (Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, UK, USA).

* Temperature correction using heating degree days

Data source: IEA Energy efficiency indicators, All rights reserved.

Grasping the efficiency progress in major world economies



Source: IEA (2019), Energy Efficiency. All rights reserved.

Major world economies could lead the way on energy efficiency

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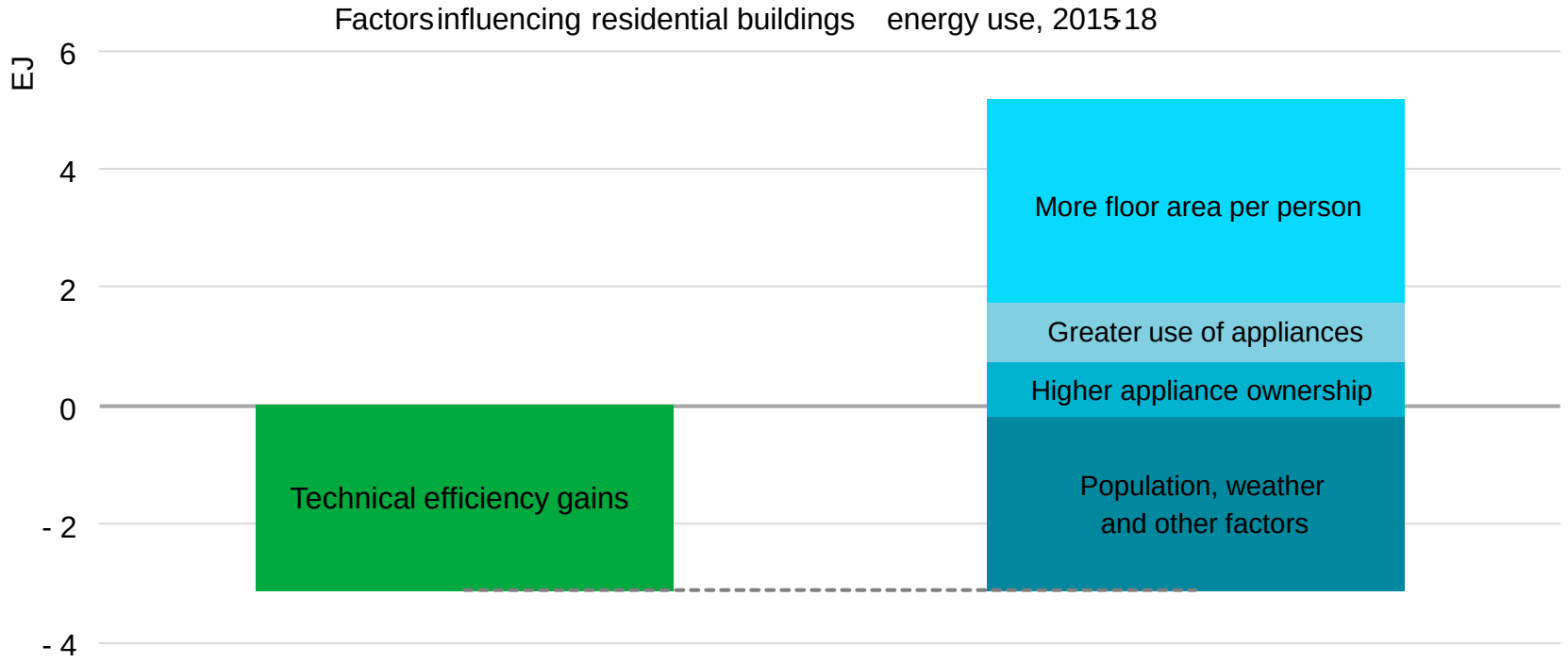
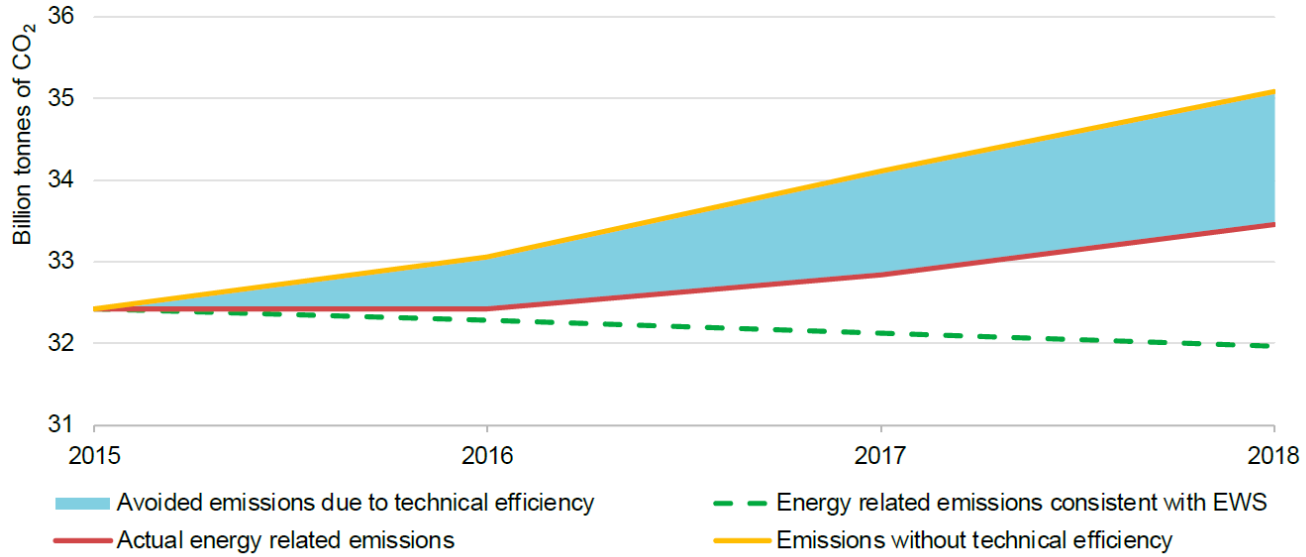


The technical efficiency of homes and appliances is improving, resulting in energy savings. However, these savings are overwhelmed by wider societal factors that create more energy use.

The efficiency impact on emissions savings

Energy-related GHG emissions, actual, without technical efficiency improvements, and avoided from technical efficiency improvements, 2015-18



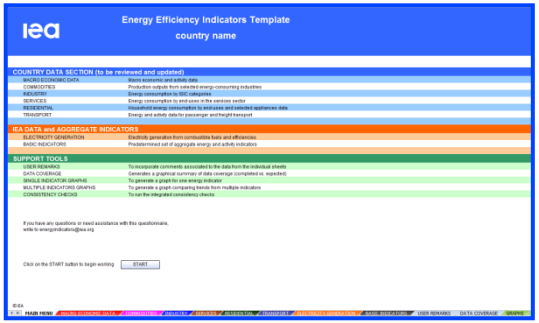
Source: IEA (2019) Energy Efficiency, All rights reserved

Technical efficiency gains from 2015 to 2018 avoided cumulative emissions of over 3.5 billion of additional tCO_2, larger than the cumulative energy-related emissions of Japan over the same period

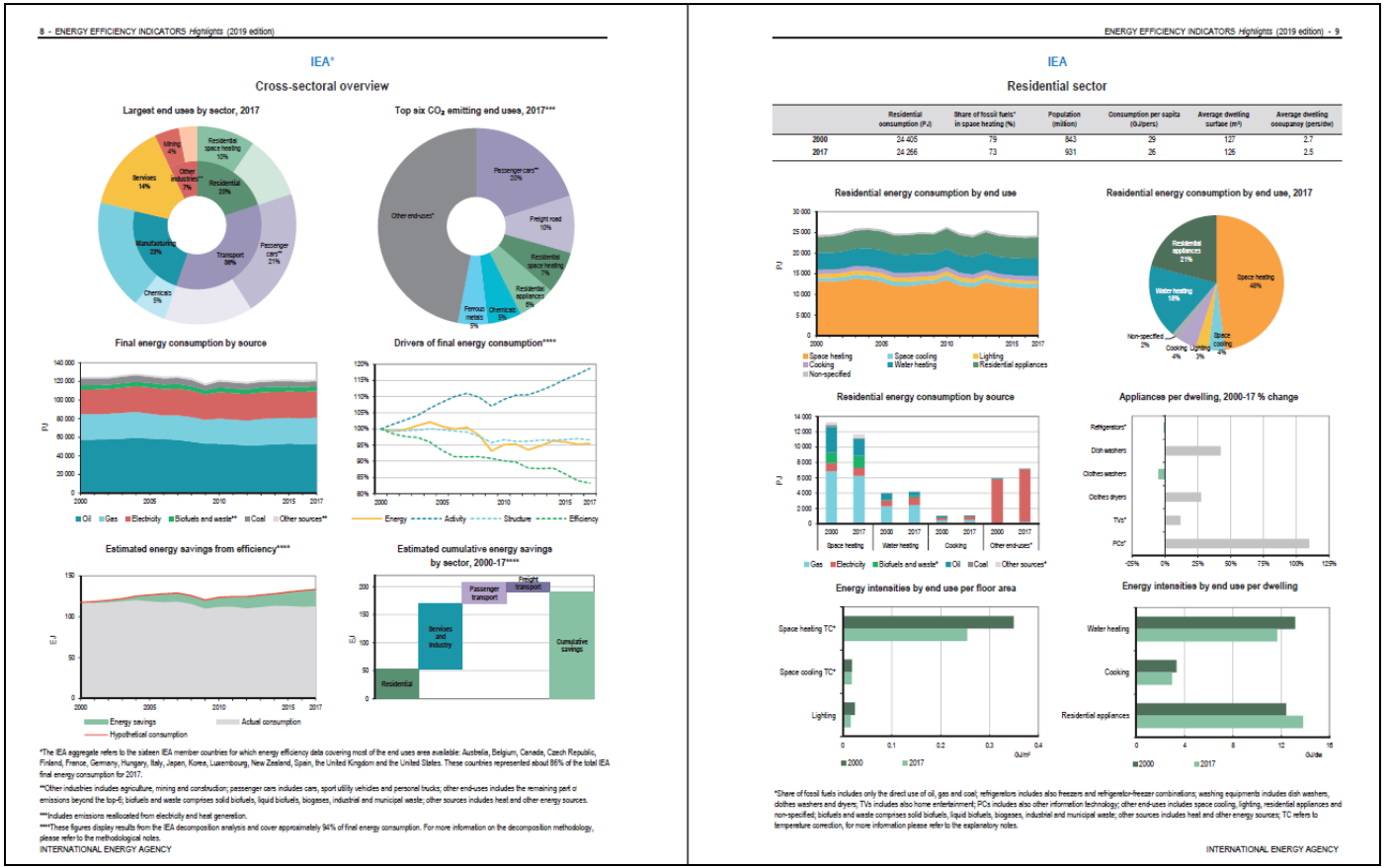
The IEA energy efficiency indicators data collection and related resources

IEA Members recognize the value of end-use data

- Data collection agreed by member countries in 2009 (IEA Ministerial)
- Developed with international community of experts , (Odyssee, LBNL, etc)
- A user-friendly Excel questionnaire (available online)
- Collects energy consumption and activity data
- Covers four sectors : residential, services, industry, transport
- Publication and database : IEA Energy efficiency indicators Highlights & Database https://www.iea.org/reports/energy-efficiency-indicators-2019



Energy Efficiency Indicators Highlights ² New edition out December 2019



8 - ENERGY EFFICIENCY INDICATORS *Highlights* (2019 edition)

IEA*

Cross-sectoral overview

Largest end uses by sector, 2017

Top six CO_2 emitting end uses, 2017***

Final energy consumption by source

Drivers of final energy consumption****

Estimated energy savings from efficiency****

Estimated cumulative energy savings by sector, 2000-17****

*The IEA aggregate refers to the sixteen IEA member countries for which energy efficiency data covering most of the end uses area available: Australia, Belgium, Canada, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Korea, Luxembourg, New Zealand, Spain, the United Kingdom and the United States. These countries represented about 86% of the total IEA final energy consumption for 2017.

**Other industries includes agriculture, mining and construction; passenger cars includes cars, sport utility vehicles and personal trucks; other end-uses includes the remaining part of emissions beyond the top-6; biofuels and waste comprises solid biofuels, liquid biofuels, biogases, industrial and municipal waste; other sources includes heat and other energy sources.

***Includes emissions reallocated from electricity and heat generation.

****These figures display results from the IEA decomposition analysis and cover approximately 94% of final energy consumption. For more information on the decomposition methodology, please refer to the methodological notes.

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ENERGY EFFICIENCY INDICATORS *Highlights* (2019 edition) - 9

IEA

Residential sector

	Residential consumption (PJ)	Share of fossil fuels* in space heating (%)	Population (million)	Consumption per capita (GJ/pers)	Average dwelling surface (m²)	Average dwelling occupancy (pers/dw)
2000	24 405	79	843	29	127	2.7
2017	24 266	73	931	26	126	2.5

Residential energy consumption by end use

Residential energy consumption by end use, 2017

Residential energy consumption by source

Appliances per dwelling, 2000-17 % change

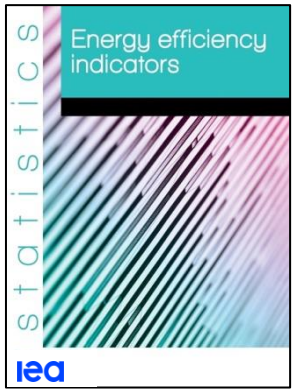
Energy intensities by end use per floor area

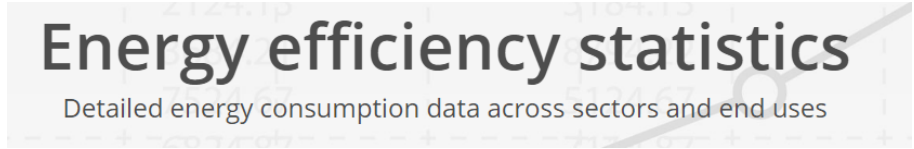
Energy intensities by end use per dwelling

*Share of fossil fuels includes only the direct use of oil, gas and coal; refrigerators includes also freezers and refrigerator-freezer combinations; washing equipments includes dish washers, clothes washers and dryers; TVs includes also home entertainment; PCs includes also other information technology; other end-uses includes space cooling, lighting, residential appliances and non-specified; biofuels and waste comprises solid biofuels, liquid biofuels, biogases, industrial and municipal waste; other sources includes heat and other energy sources; TC refers to temperature correction, for more information please refer to the explanatory notes.

INTERNATIONAL ENERGY AGENCY

Continuous development and improvement





This file mirrors the structure of the IEA Energy efficiency indicators database and provides detailed information about the available data in the database and complements the database documentation file
As an example, energy and carbon indicators data are provided as a real sample data of the database for 2000. In order to purchase the database, please visit the IEA online data services .

NEW!
July 2019

Energy efficiency indicators releases

December 2017 → December 2018 → December 2019

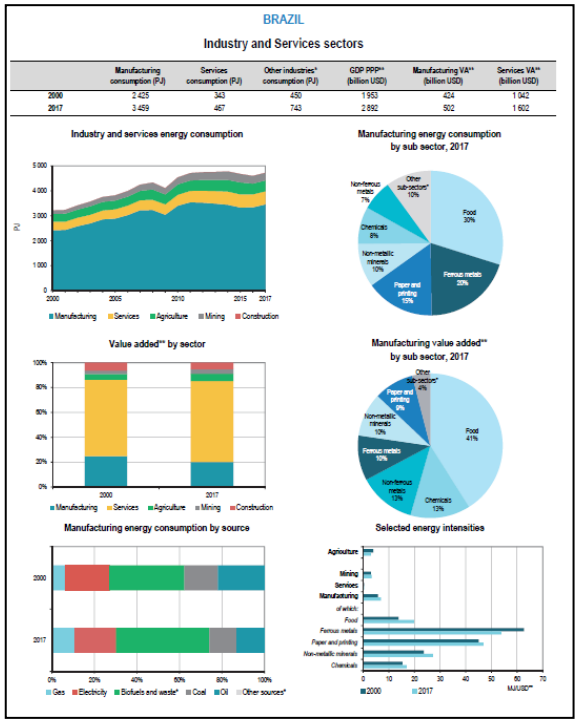
This file mirrors the structure of the IEA Energy efficiency indicators database.

Country	End use	Product	2000	2001
Australia	Residential appliances	Electricity (PJ)	✓	✓
Australia	Residential appliances	Other sources (PJ)	✓	✓
Australia	Residential appliances	Total final energy (PJ)	✓	✓
Australia	Refrigerators	Electricity (PJ)	..	..
Australia	Refrigerators	Other sources (PJ)	..	..
Australia	Refrigerators	Total final energy (PJ)	..	..
Australia	Freezers	Electricity (PJ)	✓	✓
Australia	Freezers	Other sources (PJ)	✓	✓
Australia	Freezers	Total final energy (PJ)	✓	✓

First time early data release to enhance timeliness

[2] for countries with available data

Relevance of efficiency indicators work acknowledged beyond IEA



BRAZIL

Industry and Services sectors

	Manufacturing consumption (PJ)	Services consumption (PJ)	Other industries* consumption (PJ)	GDP PPP** (billion USD)	Manufacturing VA** (billion USD)	Services VA** (billion USD)
2000	2 425	343	450	1 953	424	1 042
2017	3 459	467	743	2 892	502	1 602

Industry and services energy consumption

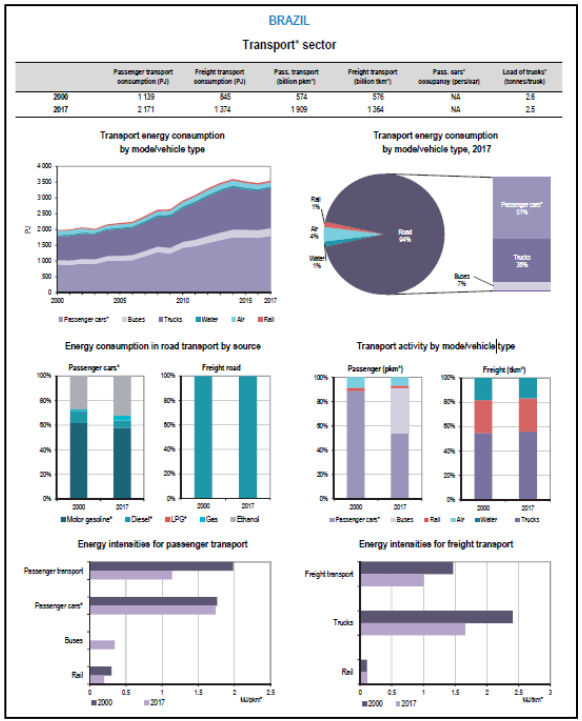
Manufacturing energy consumption by sub sector, 2017

Value added** by sector

Manufacturing value added** by sub sector, 2017

Manufacturing energy consumption by source

Selected energy intensities



BRAZIL

Transport* sector

	Passenger transport consumption (PJ)	Freight transport consumption (PJ)	Pass. transport (billion pkm*)	Freight transport (billion tkm*)	Pass. cars* occupancy (person)	Load of trucks* (tonnes/truck)
2000	1 139	848	574	576	NA	2.6
2017	2 171	1 374	1 909	1 364	NA	2.5

Transport energy consumption by mode/vehicle type

Transport energy consumption by mode/vehicle type, 2017

Energy consumption in road transport by source

Transport activity by mode/vehicle type

Energy intensities for passenger transport

Energy intensities for freight transport

This edition of the Energy Efficiency indicators database includes for the first time data for Brazil

Added value of international databases

‡Following international recommendations allows for data comparability across different countries

‡Support through additional data checks and validation, ultimately helping to improve data quality

‡Visibility for national data at international scale

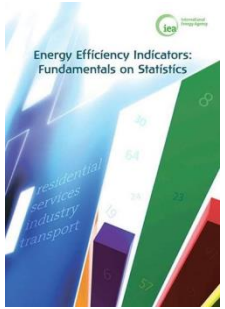
‡Helps to put things into context : national, regional and global

IEA resources : methodologies on indicators

- Fundamentals on statistics:

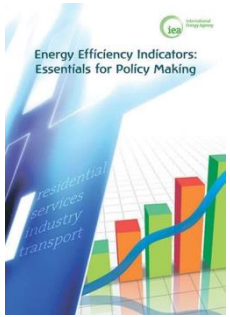
to provide guidance on how to collect the data needed for indicators

  - Includes a compilation of existing practices from across the world
  - https:// www.iea.org/reports/energy-efficiency-indicators-fundamentals-on-statistics



- Essentials for policy makers:

  - To provide guidance to develop and interpret indicators
  - https://www.iea.org/reports/energy-efficiency-indicators-essentials-for-policy-making



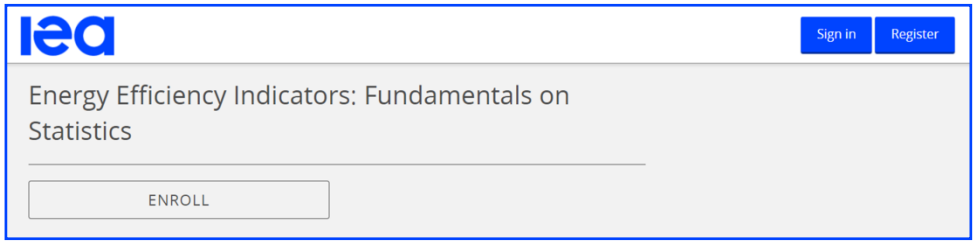
Both available also in:
Spanish
Russian
Chinese

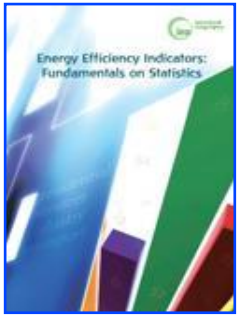
International guidelines are key to ensure comparability of data and indicators across countries

IEA e-learning courses: capacity building on energy efficiency data

{ Energy Efficiency Indicators: Fundamentals on Statistics

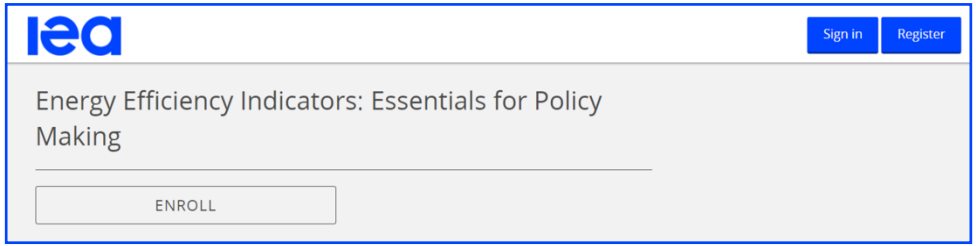
https://edx.iea.org/courses/course-v1:InternationalEnergyAgency+FS1+Open/about

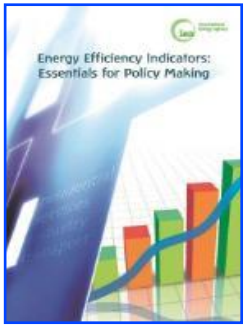




{ Energy Efficiency Indicators: Essentials for Policy Making

https://edx.iea.org/courses/course-v1:InternationalEnergyAgency+EPM1+Open/about





G20 End-use data and energy efficiency metrics initiative

Main goals :

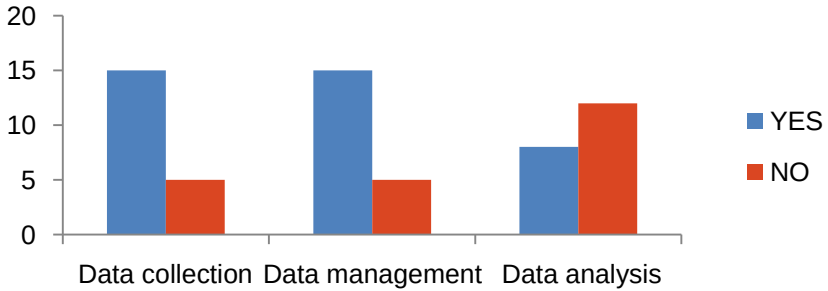
- Developing international cooperation on energy end-use data and energy efficiency metrics

2019 work plan:

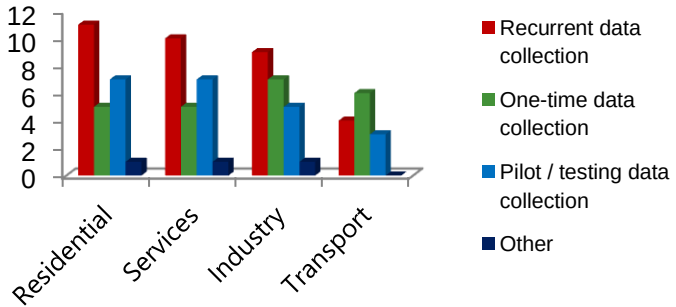
- 3rd Workshop : "Uncovering the role ofdigitalisation for energy efficiency indicators"
- Survey on the use and role of digitalisation for end-use data collection in G20 countries
- Paper including good examples of traditional data collection methodologies across sectors& the development of new technologies/ digitalisation for end-use data collection

Survey results

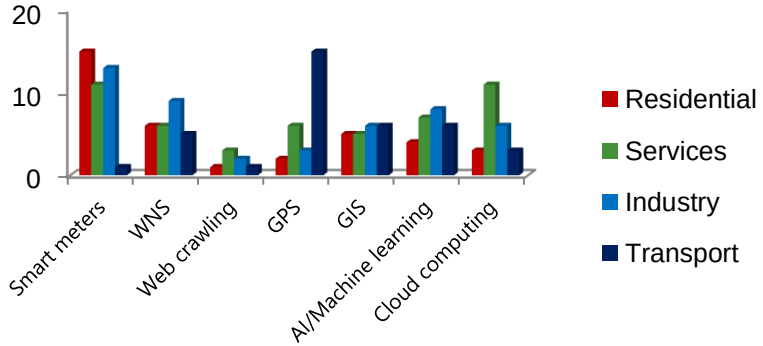
‡ Which of the three main energy data applications of digital /new technologies below have been applied in your country ?



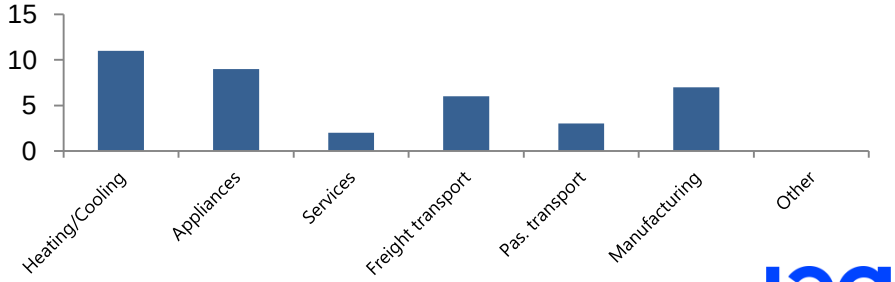
‡ In your country, what are the sectors in which digitalisation for data collection has been deployed?



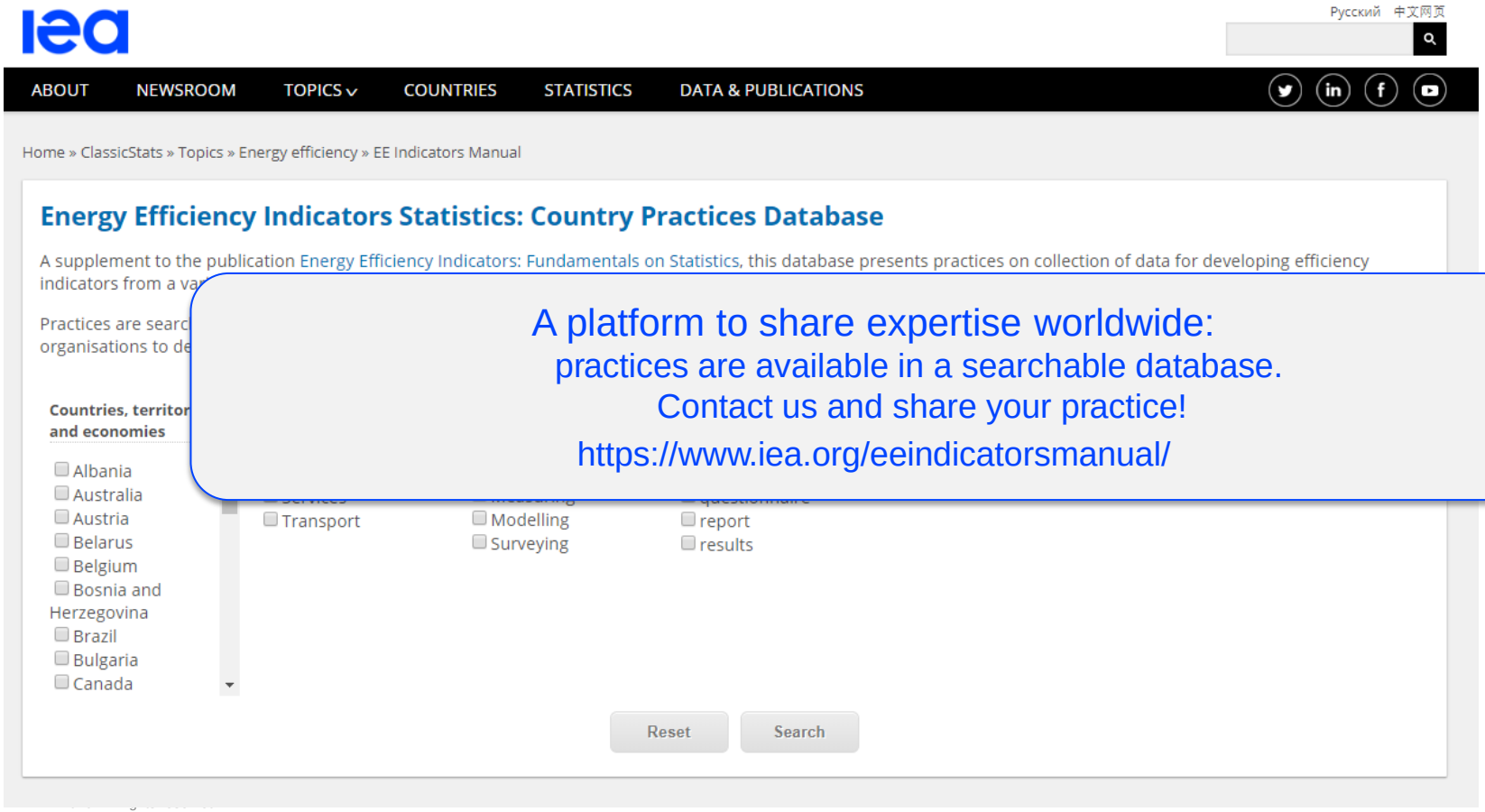
‡ To your knowledge, what digital technologies have been applied in each sector ?



‡ At a more disaggregated level , what are the two sub -sectors in which digitalisation could be more practical for end -use data collection purposes ?



Country practices database



A platform to share expertise worldwide:
practices are available in a searchable database.
Contact us and share your practice!
https://www.iea.org/eeindicatorsmanual/

End use data and efficiency indicators: A sectoral overview and recent updates

Data and indicators for the residential sector

Energy consumption data:

- Space heating*
- Space cooling*
- Water heating
- Cooking
- Lighting
- Appliances energy consumption:
  - Refrigerator
  - Freezer
  - Dishwasher
  - Clothes washer
  - Clothes dryer
  - TV
  - Computers

* Temperature corrected, using HDD & CDD

Activity data:

- Population
- Number of occupied dwellings
- Residential floor area
- Appliances stock and diffusion

# of people

# of dwellings

Surface

# of appliances

Data and indicators for the services sector

Energy consumption data

By end uses:

- Space heating*
- Space cooling*
- Lighting
- Other building use
- Non-building use

‡ Temperature corrected, using HDD & CDD

By ISIC subsectors:

- Sewerage, waste collection and remediation activities
- Wholesale and retail trade
- Warehousing, support activities for transportation, postal services
- Accommodation and food services
- Information and communication
- Financial, insurance, real estate, scientific, and administrative activities
- Public administration, excluding defence [ISIC 8422]
- Education
- Health and social work
- Arts, entertainment and recreation
- Other services activities

Activity data:

- Value added
- Service floor area
- Number of employees

Value added

Surface

# of employees

Data and indicators for the industry sector

Energy consumption data

(major ISIC sub-sectors):

- Chemical
- Iron and steel
- Non-ferrous metals
  - Aluminum
- Non-metallic minerals
  - Cement
  - Clinker
- Pulp and paper
  - Pulp
  - Paper
- .... etc.

Activity data:

- Value added
- Physical production

Value added

Volume

Data and indicators for the transport sector

Energy consumption data:

- Transport segment
  - passenger / freight
- Transport modes
  - road, rail, air, water, etc.

Activity data:

- Vehicle stocks
- Vehicle- kilometres
- Passenger-kilometers
- Tonne-kilometers

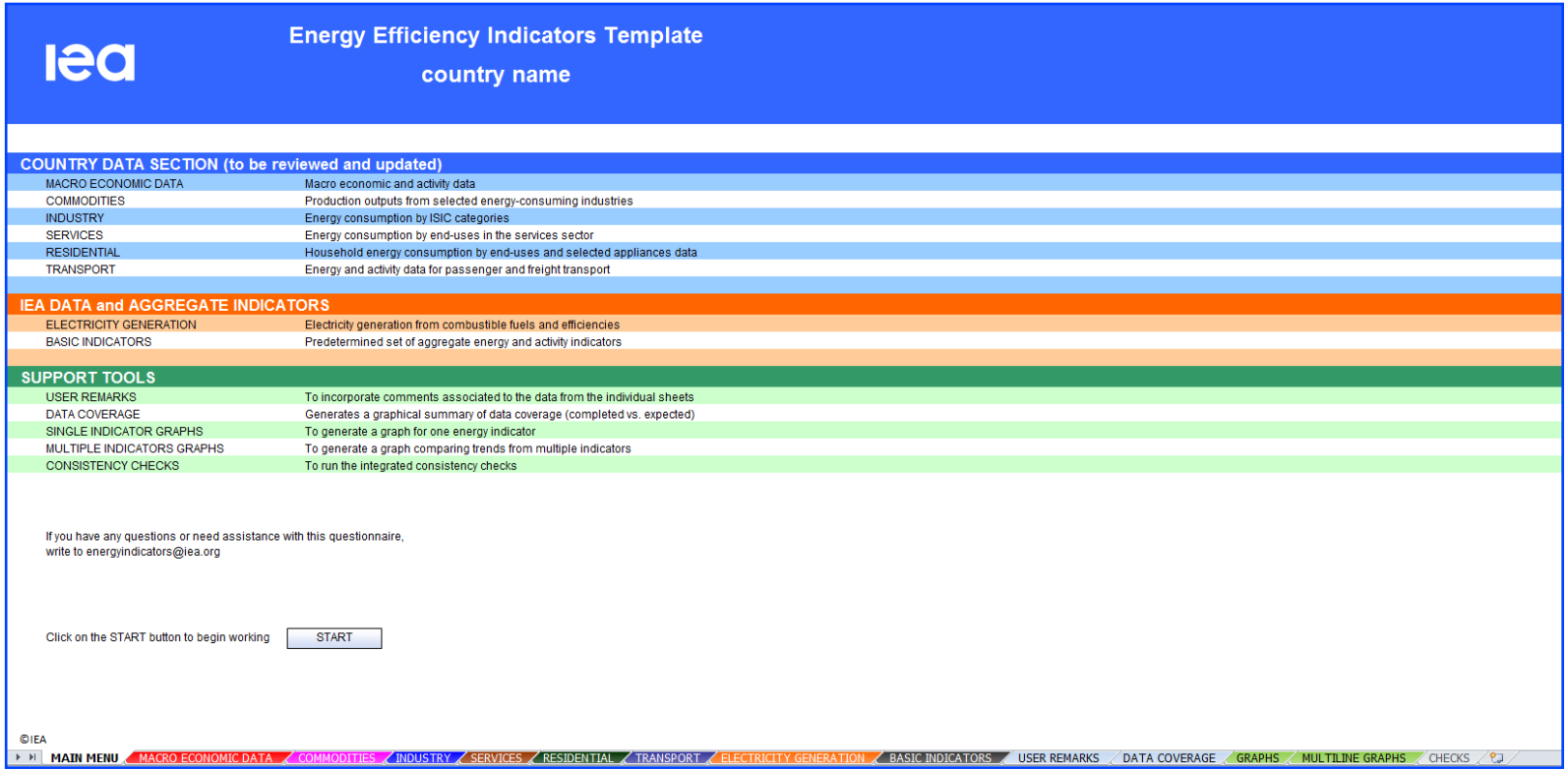
Vehicle stock

Distance travelled

Occupancy

Load

The IEA energy efficiency indicators (EEI) template [2] Recent updates



Energy Efficiency Indicators Template

country name

COUNTRY DATA SECTION (to be reviewed and updated)	
MACRO ECONOMIC DATA	Macro economic and activity data
COMMODITIES	Production outputs from selected energy-consuming industries
INDUSTRY	Energy consumption by ISIC categories
SERVICES	Energy consumption by end-uses in the services sector
RESIDENTIAL	Household energy consumption by end-uses and selected appliances data
TRANSPORT	Energy and activity data for passenger and freight transport
IEA DATA and AGGREGATE INDICATORS	
ELECTRICITY GENERATION	Electricity generation from combustible fuels and efficiencies
BASIC INDICATORS	Predetermined set of aggregate energy and activity indicators
SUPPORT TOOLS	
USER REMARKS	To incorporate comments associated to the data from the individual sheets
DATA COVERAGE	Generates a graphical summary of data coverage (completed vs. expected)
SINGLE INDICATOR GRAPHS	To generate a graph for one energy indicator
MULTIPLE INDICATORS GRAPHS	To generate a graph comparing trends from multiple indicators
CONSISTENCY CHECKS	To run the integrated consistency checks

If you have any questions or need assistance with this questionnaire,
write to energyindicators@iea.org

Click on the START button to begin working START

©IEA

MAIN MENU | MACRO ECONOMIC DATA | COMMODITIES | INDUSTRY | SERVICES | RESIDENTIAL | TRANSPORT | ELECTRICITY GENERATION | BASIC INDICATORS | USER REMARKS | DATA COVERAGE | GRAPHS | MULTILINE GRAPHS | CHECKS

Residential end -use data: New voluntary sections for 2019/2020

‡Why RESIDENTIAL?

- Residential energy use has been increasing as activity continuously increased
- Demand for cooling is increasing from rising global temperature and demand for comfort
- Appliances are expected to be a key use driving energy demand

‡What will be updated?

- Information for refurbished/ new dwellings
- Information for share of heating/ cooling systems
- New appliances stocks : Air conditioners, heat pumps, boilers
- Additional information for Solar thermal and solar photovoltaic panels

Transport end-use data: New voluntary sections for 2019/2020

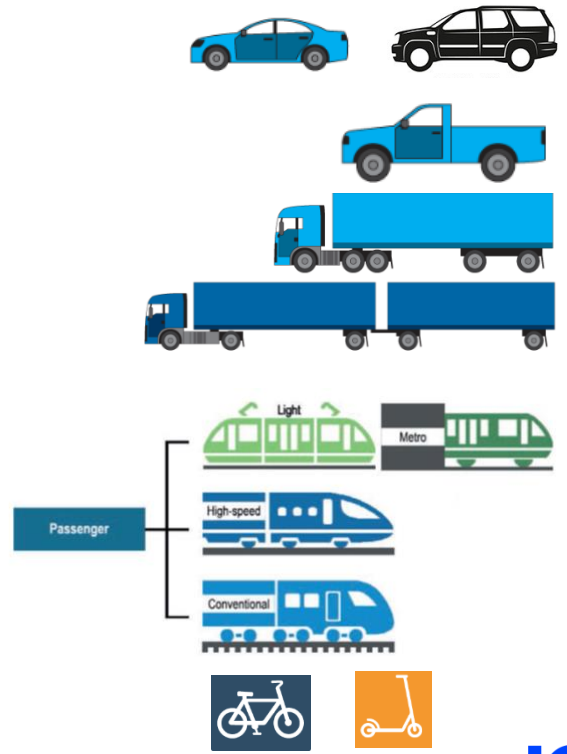
‡What will be updated?

- ‡ Added two subcategories to Cars, SUV and personal light trucks
  - ‡ Of which cars
  - ‡ Of which SUV and personal light trucks
- ‡ Added battery and plug-in hybrid electric to passenger cars

- ‡ Added three subcategories to Freight & Commercial road transport
  - ‡ Of which Light Commercial Vehicle (<3.5 t)
  - ‡ Of which Medium Freight Trucks (3.5-12 t)
  - ‡ Of which Heavy Freight Trucks (> 12 t)
- ‡ Hidden Freight transport tonnes. Considered uninformative.
- ‡ Hidden Power train for freight transport

- ‡ Added three subcategories to Passenger Trains
  - ‡ Of which metro and light rail
  - ‡ Of which conventional rail
  - ‡ Of which high-speed

- ‡ Added electric bikes and other micromobility only for pkm



Key Messages

{ Detailed end-use and activity data are crucial to track energy efficiency progress;

{ There is an increased acknowledgment of the importance of end use data collection and development of efficiency indicators from countries worldwide, also beyond IEA.

{ The IEA tries to keep continuous development and improvement of this work stream:

- Timeliness: New edition in July
- Coverage: New countries
- Relevance: Updates of the questionnaire to adapt to ever changing energy demand-side

Questions?
EnergyIndicators@iea.org