



## **International collaboration to strengthen energy efficiency data capacity**

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Joint APEC-IEA training workshop on end-use energy consumption data – Nov. 15<sup>th</sup> 2022

**Efficiency is the “first fuel” and Energy efficiency improvement will drive more than 40% of the reduction of energy-related greenhouse gas emissions over the next 20 years.**

# Where do we come from?

# The origin of the IEA data collection

The obligation for IEA members to provide the IEA with energy efficiency data was established at the **2009 Governing Board meeting at Ministerial level**. The “Action Plan” approved at that meeting included the objective to promote energy efficiency.

And therefore to gather annually, end-use data and statistics needed for developing energy efficiency indicators based on the template developed by the IEA in concert with international experts.

An ad-hoc questionnaire was developed and the data collection started in the following years.



Energy Efficiency Indicators Template country name	
<b>COUNTRY DATA SECTION (to be reviewed and updated)</b>	
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
<b>IEA DATA and AGGREGATE INDICATORS</b>	
ELECTRICITY GENERATION	Electricity generation from combustible fuels and efficiencies
BASIC INDICATORS	Predetermined set of aggregate energy and activity indicators
<b>SUPPORT TOOLS</b>	
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

**International reporting can push countries towards a more complete and higher quality efficiency data .**

# IEA collects end-use data from members and beyond

In 2022, data for **60 economies** were published in the database, including 29 beyond the IEA family.

### Energy Efficiency Indicators

Annual data from 2000 covering end-use energy consumption, now featuring end-use carbon emissions for the IEA member countries and beyond

Subscription

### Energy Efficiency Indicators Highlights

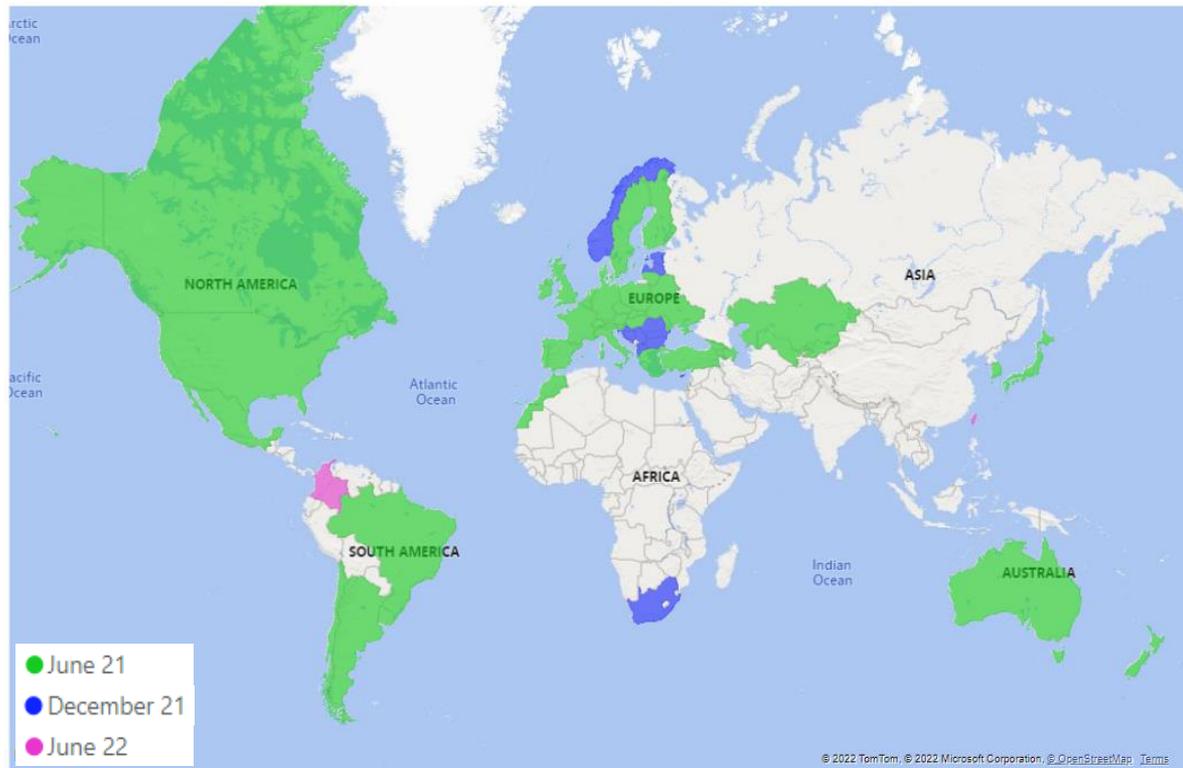
Free version of Energy Efficiency Indicators database with selected data highlights that includes total final energy consumption by end use and a selection of end uses and years

Free

COUNTRY, TERRITORY OR ECONOMY		
IEA Total	Albania	Argentina
Armenia	Australia	Austria
Azerbaijan	Belarus	Belgium
Bosnia and Herzegovina	Brazil	Bulgaria
Canada	Chile	Colombia
Croatia	Cyprus	Czech Republic
Denmark	Estonia	Finland
France	Georgia	Germany
Greece	Hungary	Ireland
Italy	Japan	Kazakhstan
Korea	Kosovo	Kyrgyzstan
Latvia	Lithuania	Luxembourg
Malta	Mexico	Republic of Moldova
Morocco	Netherlands	New Zealand
Republic of North Mace...	Norway	Poland
Portugal	Romania	Serbia
Slovak Republic	Slovenia	South Africa
Spain	Sweden	Switzerland
Chinese Taipei	Turkey	Ukraine
United Kingdom	United States	Uruguay
Uzbekistan		

Visit <https://www.iea.org/data-and-statistics/data-product/energy-efficiency-indicators>

**Countries' administrations (ministries or agencies) fill an annual questionnaires with the best available data.**



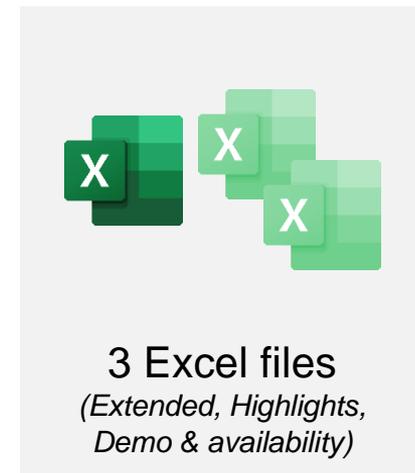
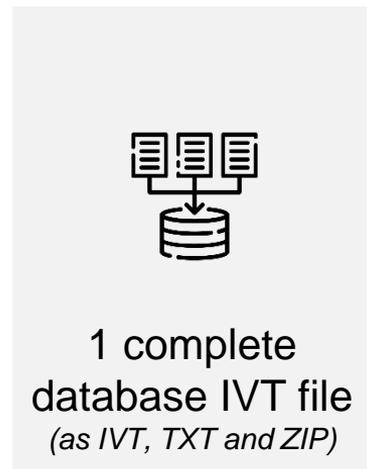
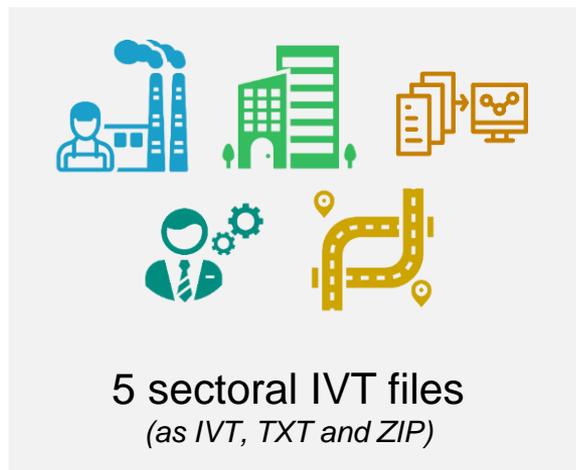
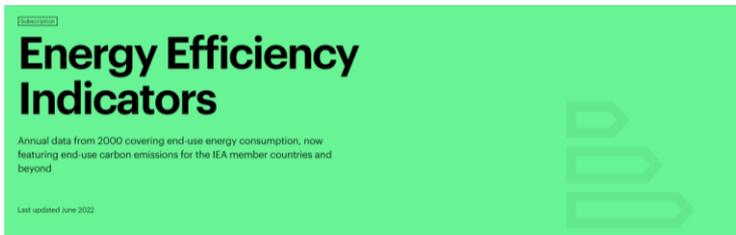
**+16 economies** in a year, including

- Colombia (accessing) in June 22
- Chinese Taipei (APEC) in June 22
- 10 European countries (Eurostat) in December 21
- **More to come...**

Now covering at least one economy in every region, including sub-saharan Africa

**+38% data points** compared to June 2021, reaching **500 000 data points** in June 2022

**Between June 2021 and a July 2022, coverage increased significantly thanks to enhanced partnerships!**



# A user-friendly, interactive publication format

The screenshot displays the IEA Energy Efficiency Indicators dashboard. At the top, navigation tabs include 'Country comparison', 'Cross-sectoral', 'Decomposition', 'Residential', 'Industry and services', 'Transport', and 'Contents'. The main content area features several charts and a data selection interface.

**Final energy consumption by sector, 2019**: A grouped bar chart showing energy consumption in TOE for Brazil, France, and Japan across five sectors: Manufacturing, Transport, Residential, Services, and Other. The y-axis ranges from 0 to 4000 TOE.

**Emissions share by sector, 2019**: A stacked bar chart showing the percentage share of emissions for Brazil, France, and Japan across the same five sectors. The x-axis ranges from 0% to 100%.

**Residential energy intensities (GJ/10k€, 2019)**: A grouped bar chart showing energy intensity for Brazil, France, and Japan across five sub-sectors: Space heating, Water heating, Residential appliances, Space cooling, and Lighting. The y-axis ranges from 0 to 35 GJ/10k€.

**Residential carbon intensities (CO<sub>2</sub>/10k€, 2019)**: A grouped bar chart showing carbon intensity for Brazil, France, and Japan across the same five sub-sectors. The y-axis ranges from 0 to 1.8 CO<sub>2</sub>/10k€.

Annotations on the screenshot include:

- 2 cross-sectoral graphs**: Points to the 'Final energy consumption by sector, 2019' and 'Emissions share by sector, 2019' charts.
- 2 graphs per sector**: Points to the 'Residential energy intensities (GJ/10k€, 2019)' and 'Residential carbon intensities (CO<sub>2</sub>/10k€, 2019)' charts.
- sector selection buttons**: Points to the 'Select a sector' dropdown menu at the top right of the residential charts.
- user-friendly interactive slicers**: Points to the 'Select countries (up to 8) and a year' dropdown menu on the left side.
- access to underlying data tables**: Points to the 'Data' buttons located on the top left of each chart.
- tabs with other cross-sectoral and sectoral graphs**: Points to the navigation tabs at the bottom of the dashboard.
- full database per country and year**: Points to the 'Contents' tab at the bottom right.

**Final energy consumption by sector, 2019 (TOE)**

Country	Manufacturing	Transport	Residential	Services	Other
Brazil	~3000	~1000	~1000	~1000	~1000
France	~1500	~1500	~1500	~1500	~1500
Japan	~2500	~1500	~1500	~1500	~1500

**Emissions share by sector, 2019 (%)**

Country	Manufacturing	Transport	Residential	Services	Other
Brazil	~60%	~20%	~10%	~5%	~5%
France	~30%	~30%	~20%	~10%	~10%
Japan	~40%	~20%	~20%	~10%	~10%

**Residential energy intensities (GJ/10k€, 2019)**

Country	Space heating	Water heating	Residential appliances	Space cooling	Lighting
Brazil	~1	~1	~1	~1	~1
France	~30	~5	~5	~5	~5
Japan	~10	~10	~10	~10	~10

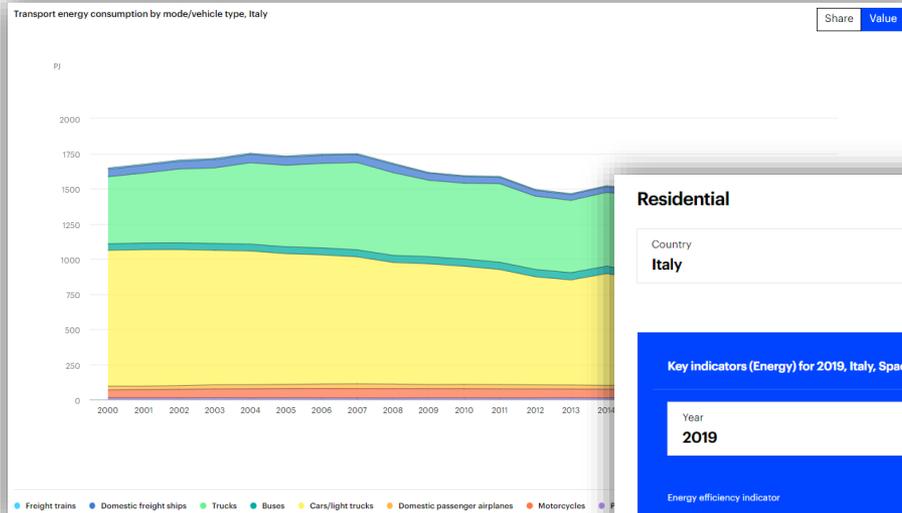
**Residential carbon intensities (CO<sub>2</sub>/10k€, 2019)**

Country	Space heating	Water heating	Residential appliances	Space cooling	Lighting
Brazil	~0.1	~0.1	~0.1	~0.1	~0.1
France	~1.1	~0.2	~0.2	~0.2	~0.2
Japan	~0.7	~0.7	~0.7	~0.7	~0.7

**Navigation tabs at the bottom:** Contents, Coverage, Methodological notes, Country comparison graphs, Cross-sectoral graphs, Decomposition graphs, Residential graphs, Industry and services graphs, Transport graphs, Residential - Energy, Services - Energy.

To increase database visibility, free version now includes **+50%** data points.

<https://www.iea.org/data-and-statistics/data-product/energy-efficiency-indicators>



### Residential

Country: Italy | Indicator: Energy | Activity data: Dwelling

Key indicators (Energy) for 2019, Italy, Space heating

Year: 2019 | End-use: Space heating

Energy efficiency indicator	Efficiency indicator value change compared to 2000
<b>35.9 GJ/dwelling</b>	<b>Down 0 %</b>
Share of country emissions	Share of fossil
<b>11.9 %</b>	<b>70 %</b>

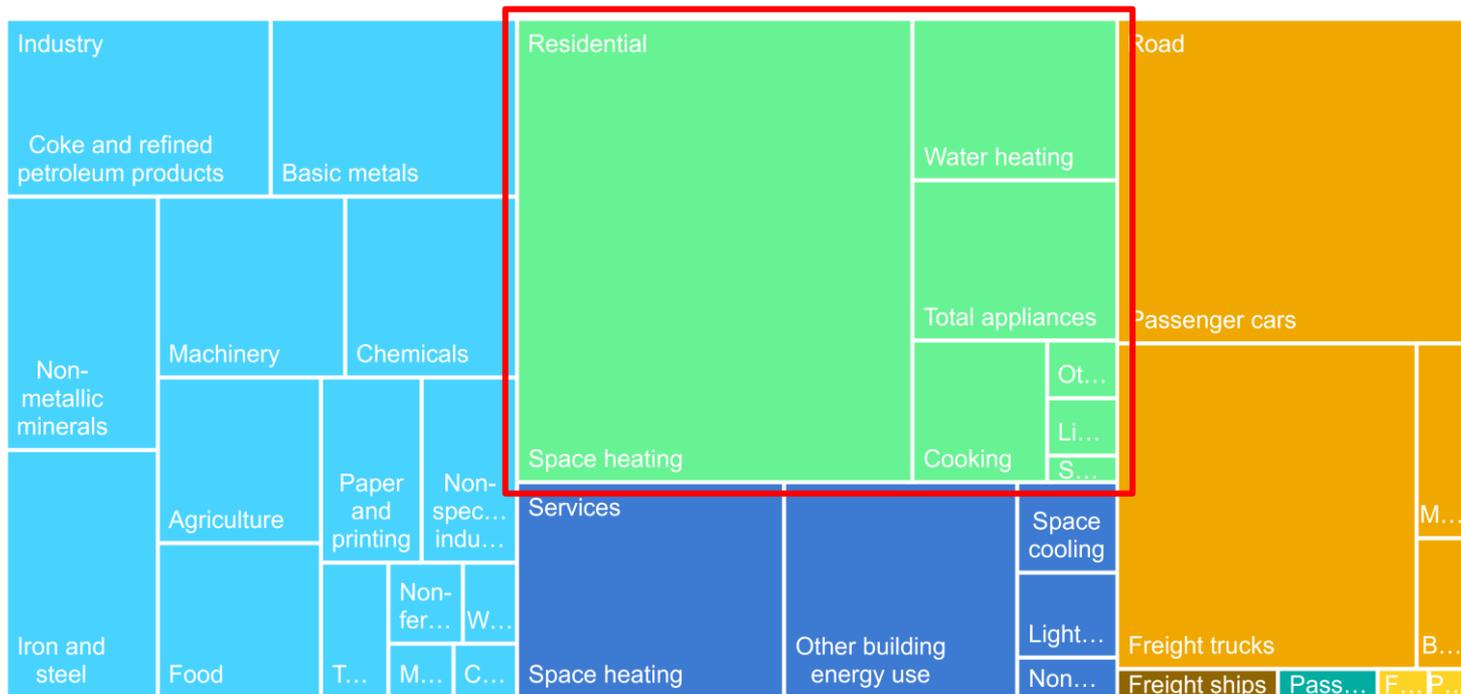
Data for residential space heating and space cooling refer to temperature-corrected data.

New online tool to explore the dataset available at  
<https://www.iea.org/data-and-statistics/data-tools/energy-efficiency-indicators-data-explorer>

# Why disaggregated data are key?

# Sectoral demand data for better modelling and inform policy

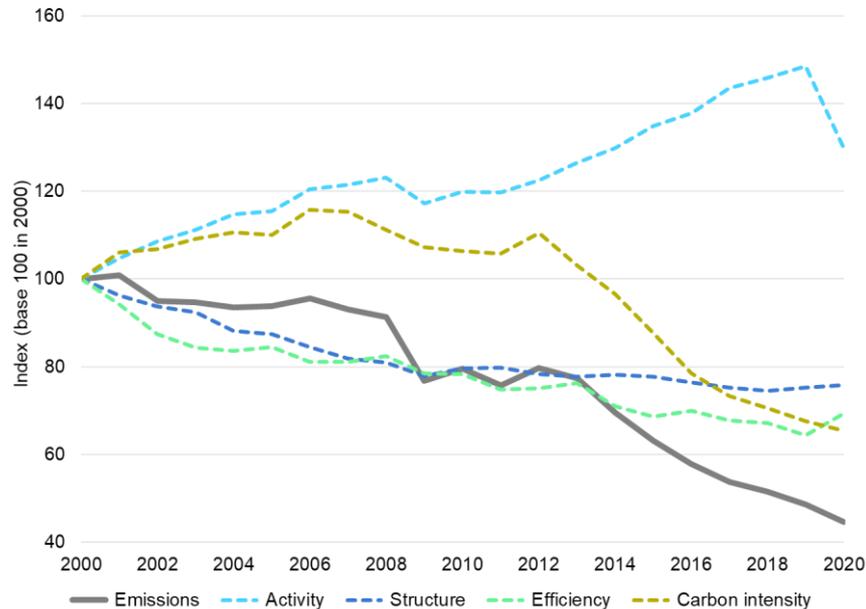
Final energy consumption by end uses (Energy efficiency indicators) - Italy



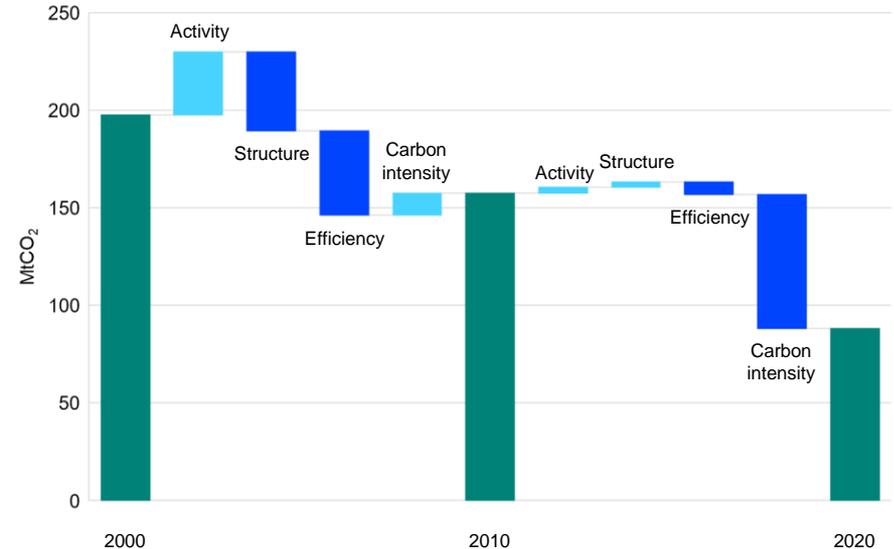
**Detailed data collection at the end-use level enables tracking of energy efficiency changes.**

## Analysis of carbon emissions in industry and services, 2000-2020, United Kingdom

### Drivers of carbon emissions

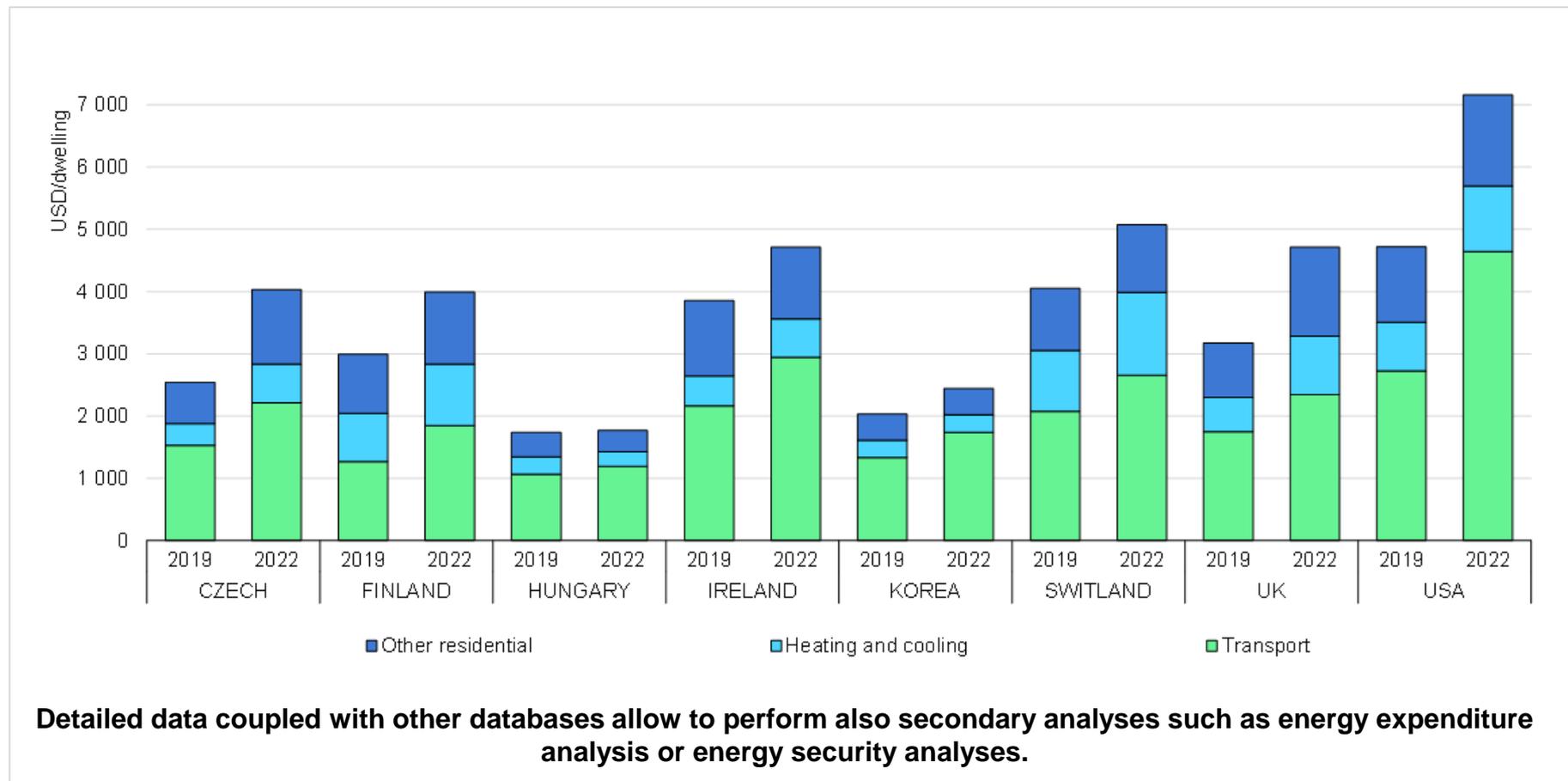


### Cumulative emission savings from each driver



**Activity data and detailed energy end-uses by fuels allows us to disentangle the effect of all the drivers of energy demand and carbon emissions.**

# Possible uses: expenditure analysis



**Detailed data coupled with other databases allow to perform also secondary analyses such as energy expenditure analysis or energy security analyses.**

## Action 8



### Accelerate energy efficiency improvements in buildings and industry

Impact: Reduces gas consumption for heat by close to an additional 2 bcm within a year, lowering energy bills, enhancing comfort and boosting industrial competitiveness.

## Action 9



### Encourage a temporary thermostat adjustment by consumers

Impact: Turning down the thermostat for buildings' heating by 1°C would reduce gas demand by some 10 bcm a year.

Measures implemented this year could bring down gas imports from Russia by over one-third, with additional temporary options to deepen these cuts to well over half while still lowering emissions.

#### Action 1



#### No new gas supply contracts with Russia

Impact: Taking advantage of expiring long-term contracts with Russia will reduce the contractual minimum take-or-pay levels for Russian imports and enable greater diversity of supply.

#### Action 2



#### Replace Russian supplies with gas from alternative sources

Impact: Around 30 bcm in additional gas supply from non-Russian sources.

#### Action 3



#### Introduce minimum gas storage obligations to enhance market resilience

Impact: Enhances the resilience of the system, although higher injection rates to refill storage in 2022 will add to gas and prop up gas prices.

#### Action 4

#### Action 5



#### Maximise generation from existing dispatchable low-emissions sources, including bioenergy and nuclear

Impact: An additional 70 TWh of power generation from existing dispatchable emissions sources, reducing gas use and electricity by 13 bcm.

#### Action 7



#### Speed up the replacement of boilers with heat pumps

Impact: Reduces gas use for heating additional 2 bcm in one year.

#### Action 9



#### Encourage a temporary thermostat adjustment by consumers

Impact: Turning down the thermostat for buildings' heating by 1°C would reduce demand by some 10 bcm a year.



# Conclusions

Disaggregated data are key to identify patterns and drivers of the energy consumption and emissions of our economies, specifically are key to:

1. **Analyse** and understand the current situation of the economy
2. **Set targets** for policies
3. **Check** policy **results**
4. **Analyse vulnerabilities** and energy security
5. **Benchmark** with other economies

Therefore **this workshop aims at understanding what data are available in each economy** and how to **use the available data at best to have a dataset as complete as possible** .

**End-use disaggregated data might be challenging to collect but are essential to ensure an equal and just energy transition. They are worth the effort. And IEA stands ready to support any economy willing work on this area**

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