



# Why data matters for energy efficiency policy design and monitoring

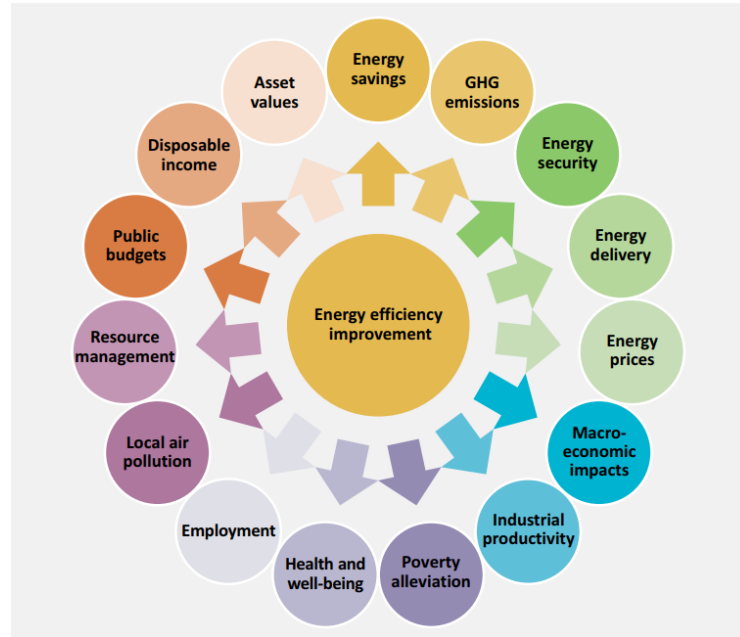
Víctor García Tapia | International Energy Agency

Joint APEC-IEA Training Workshop on End-use Energy Consumption Data, June 28<sup>th</sup> 2021

# Good data for good policies

The case for energy efficiency and energy efficiency indicators

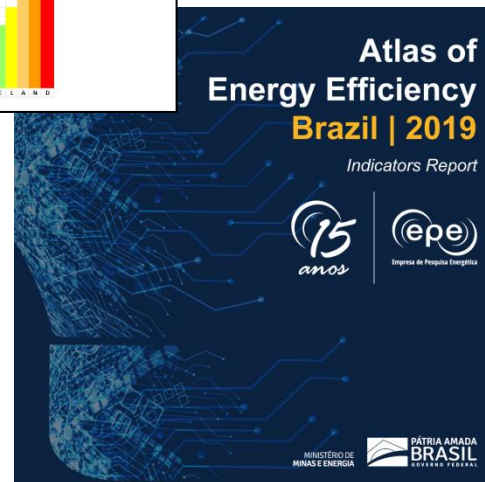
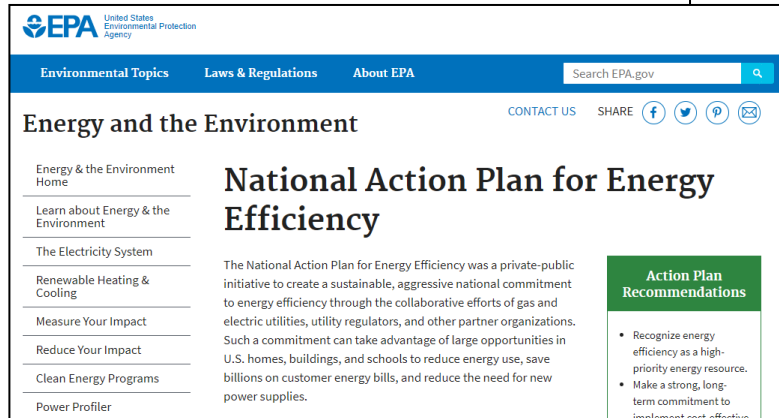
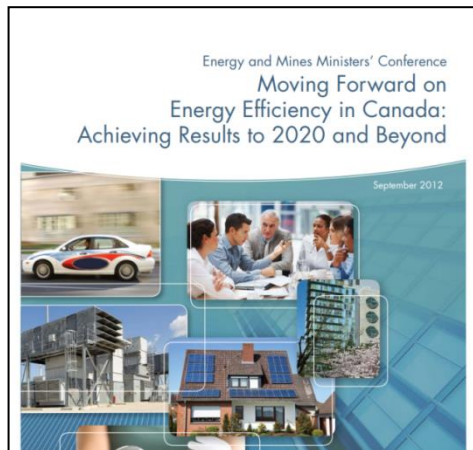
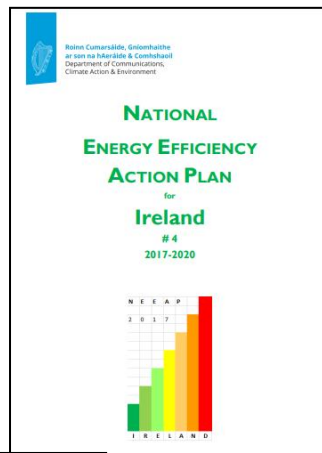
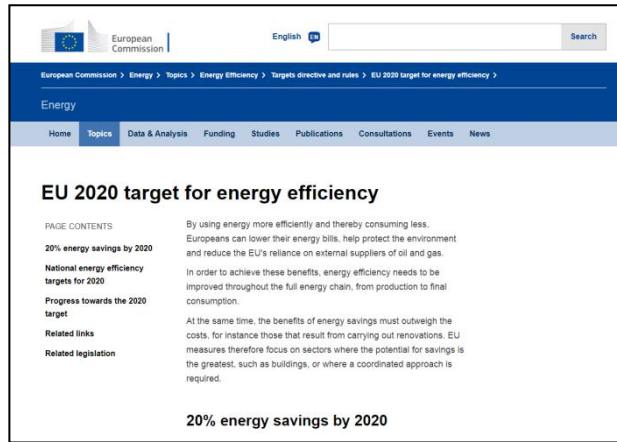
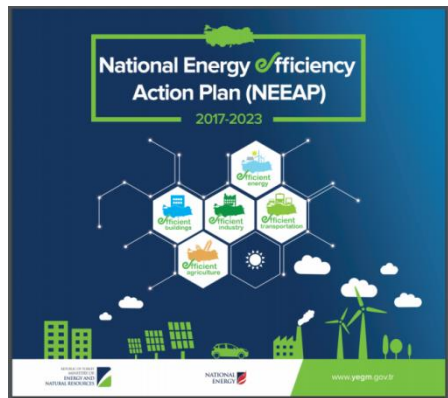
# The importance of energy efficiency – Multiple benefits



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

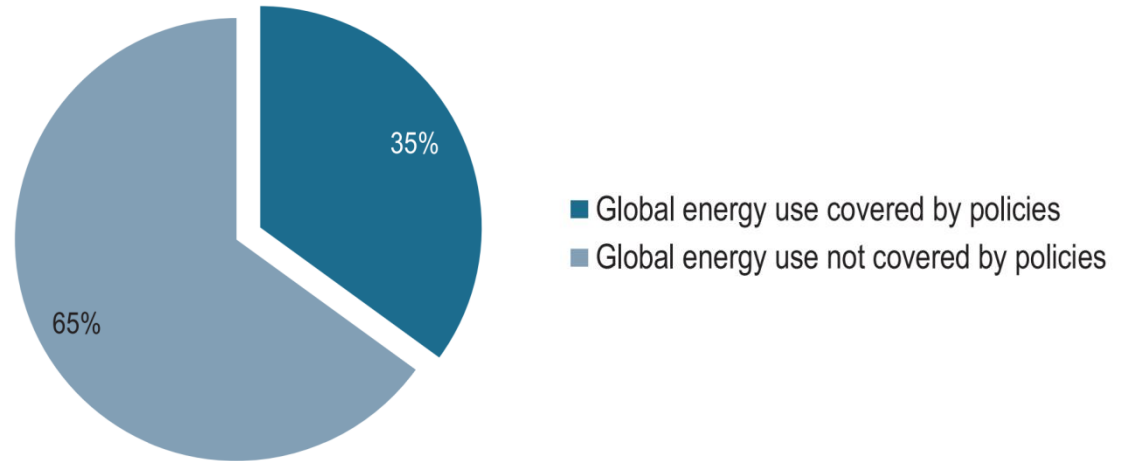
Environmental, economic and social benefits from energy efficiency

# The importance of energy efficiency – key to set targets and monitor impacts



# The importance of energy efficiency – Untapped potential

Energy consumption covered by mandatory efficiency policies and regulations

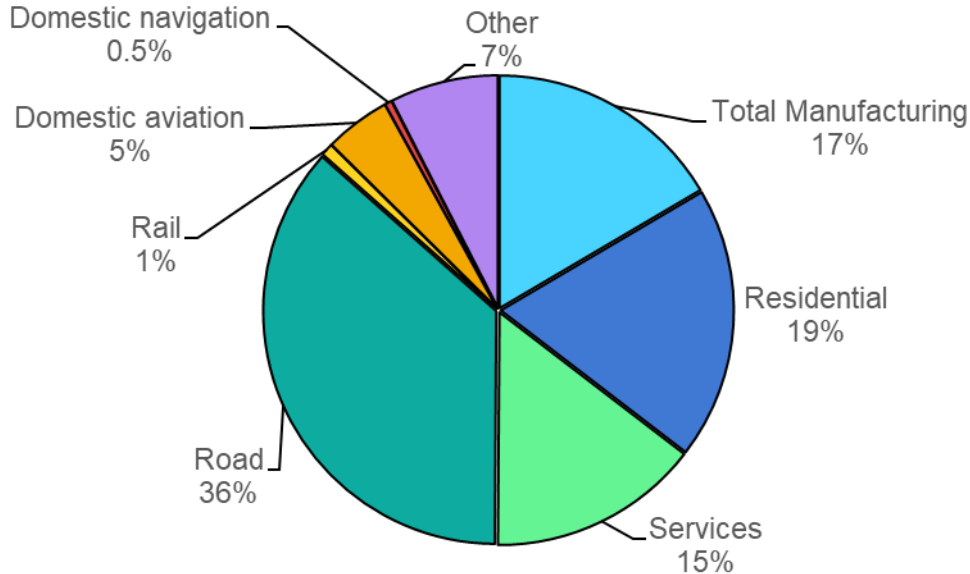


Source: IEA (2020), *Energy Efficiency Indicators Highlights*, adapted from IEA (2020) *Energy efficiency*, All rights reserved

“Still, global policy coverage leaves many opportunities untapped and could be scaled up.”

# Sectoral breakdown of TFC can help identify priorities

United States TFC by sector, 2019



Data source: IEA (2021), *World energy balances*, All rights reserved.

**Road transport  
is the most consuming.**



**How do we track  
road transport efficiency?**



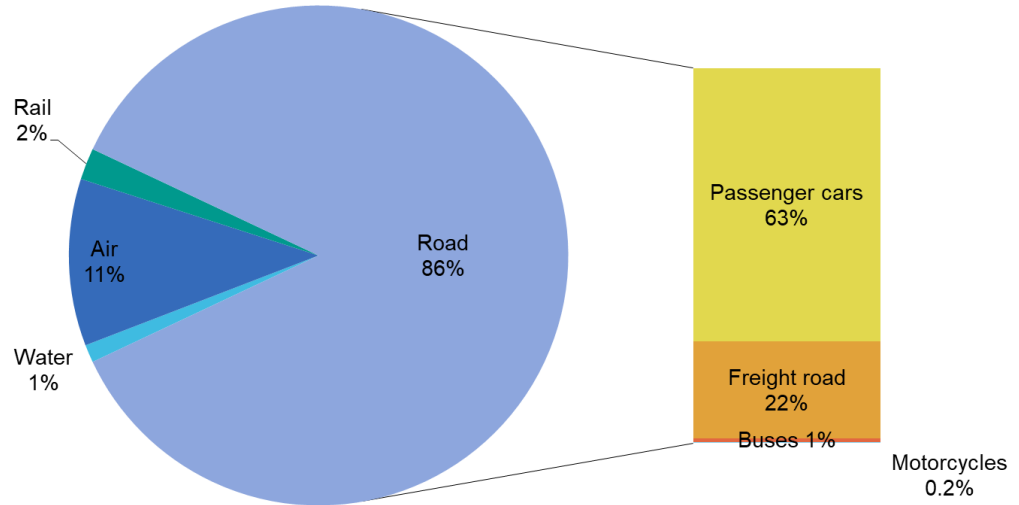
**We need more detailed data:**

- consumption by vehicle type  
e.g. cars, buses, trucks
- activity data  
e.g. distance travelled,  
passenger/tonne-kilometres

# Sub-sectoral data provides additional insights

Transport energy consumption by mode/vehicle type, 2019, United States

- What are the largest end-uses?
- How are they changing over time?
- What priority areas for policy?
- ...



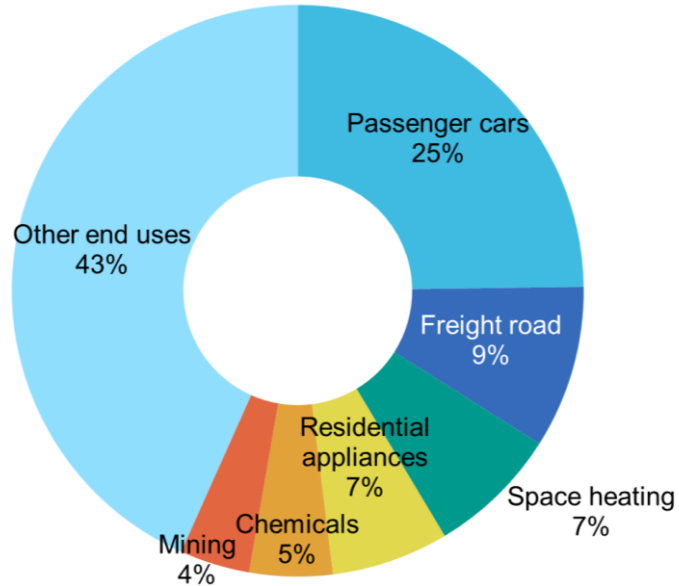
Source: IEA Energy Efficiency Indicators Highlights

**Identification of most important end uses is key for steering efficiency policies**

# Importance of understanding end-use emissions drivers

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Top six CO<sub>2</sub> emitting end uses, 2019, United States



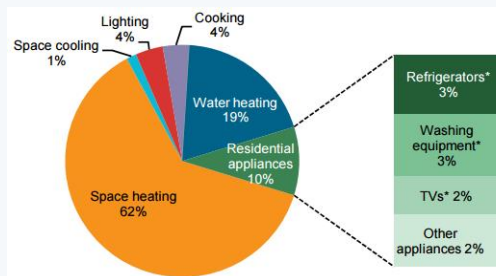
Decarbonisation policies require a clear understanding of all drivers



# Linking end-uses with activity data: example for residential

## Energy end-use 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



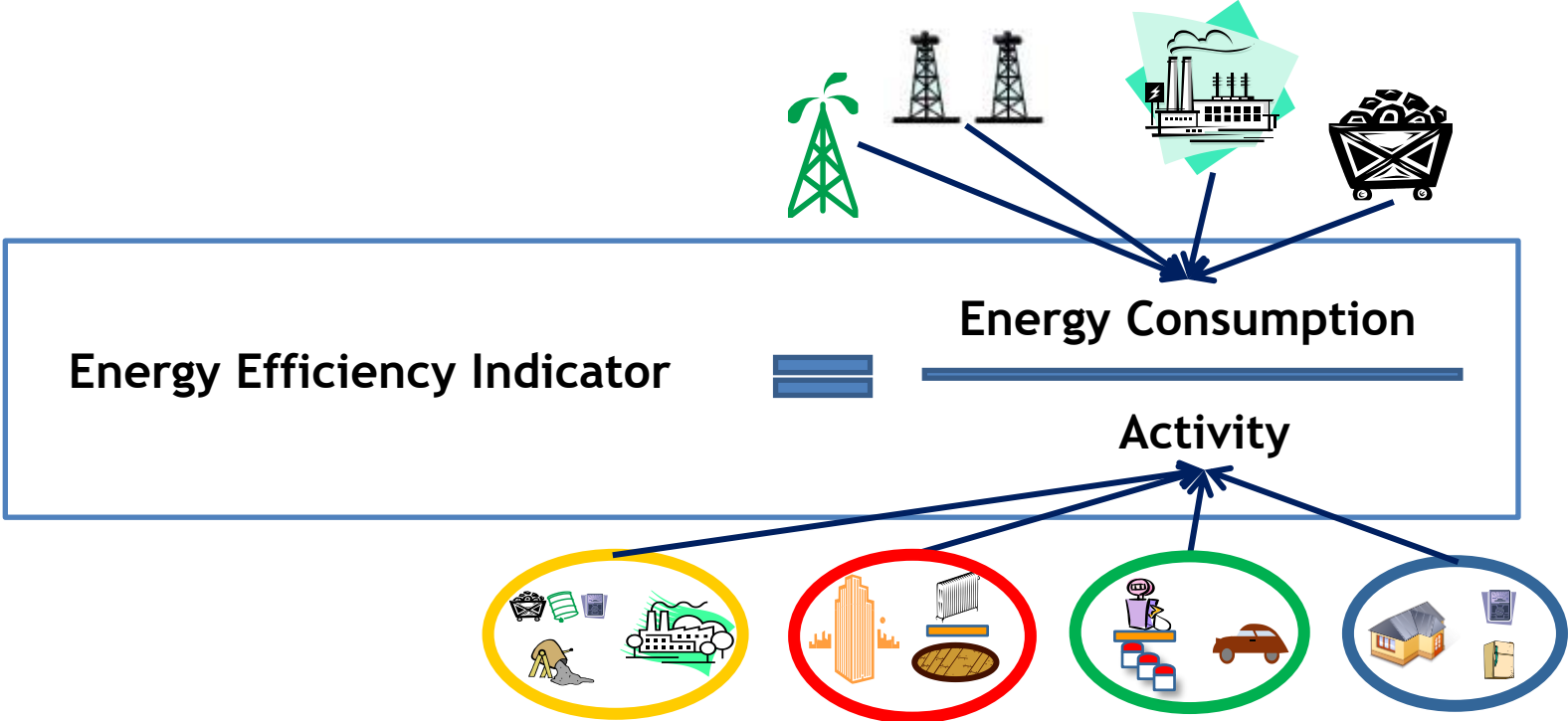
# of people    # of dwellings    Surface    # of appliances

generic  
energy efficiency  
indicator



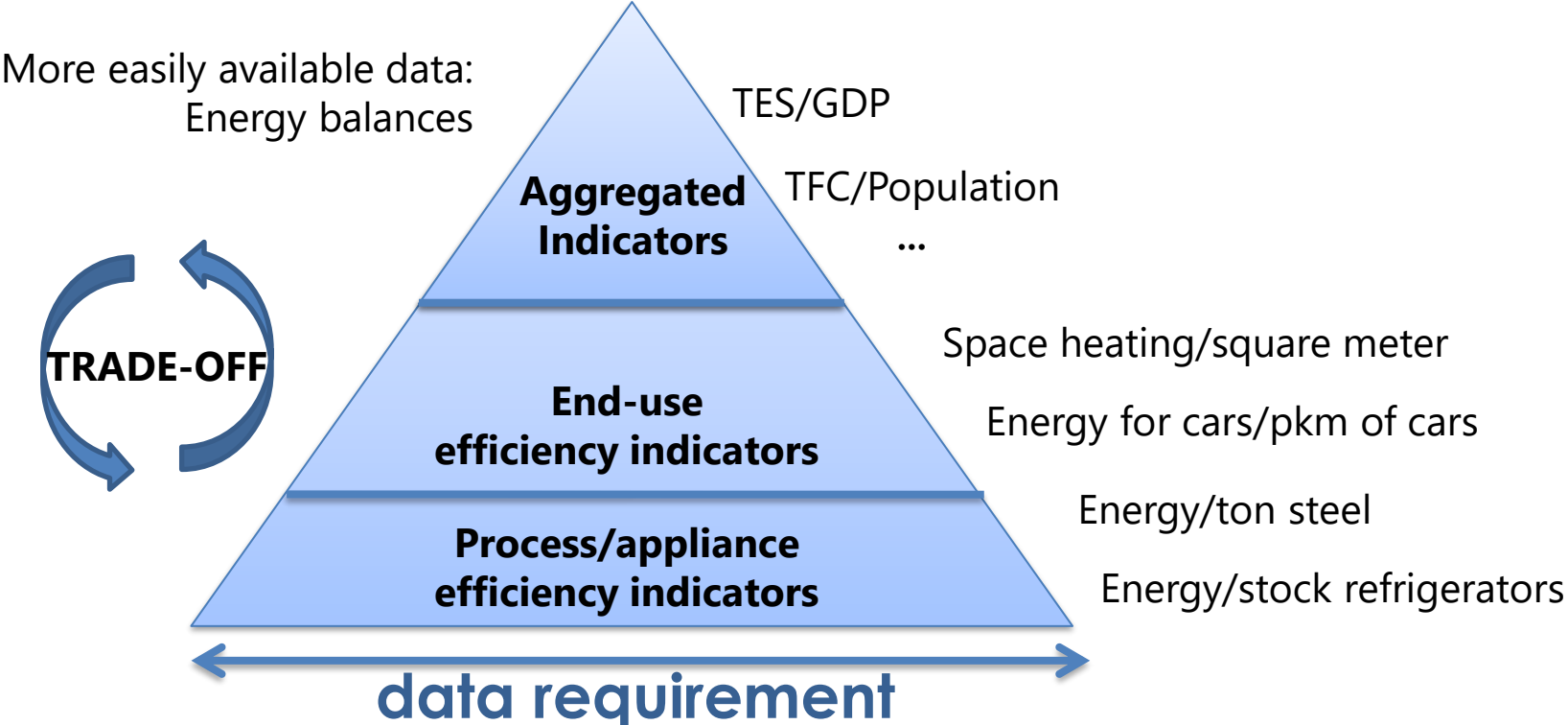
Energy end-use  
activity

# Efficiency indicators link energy to activity across end-uses



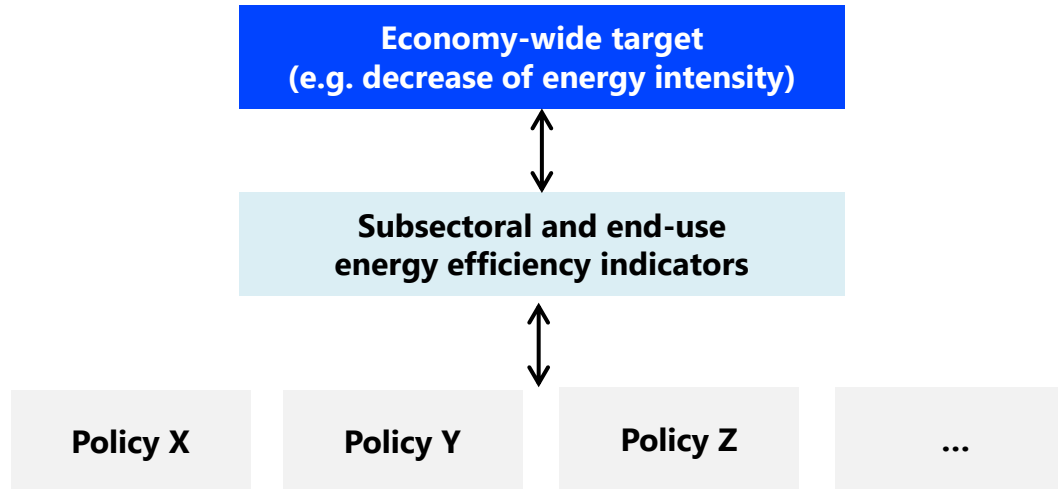
A given indicator explains how much energy is needed to provide a certain service

# Energy efficiency indicators: stronger data requirements



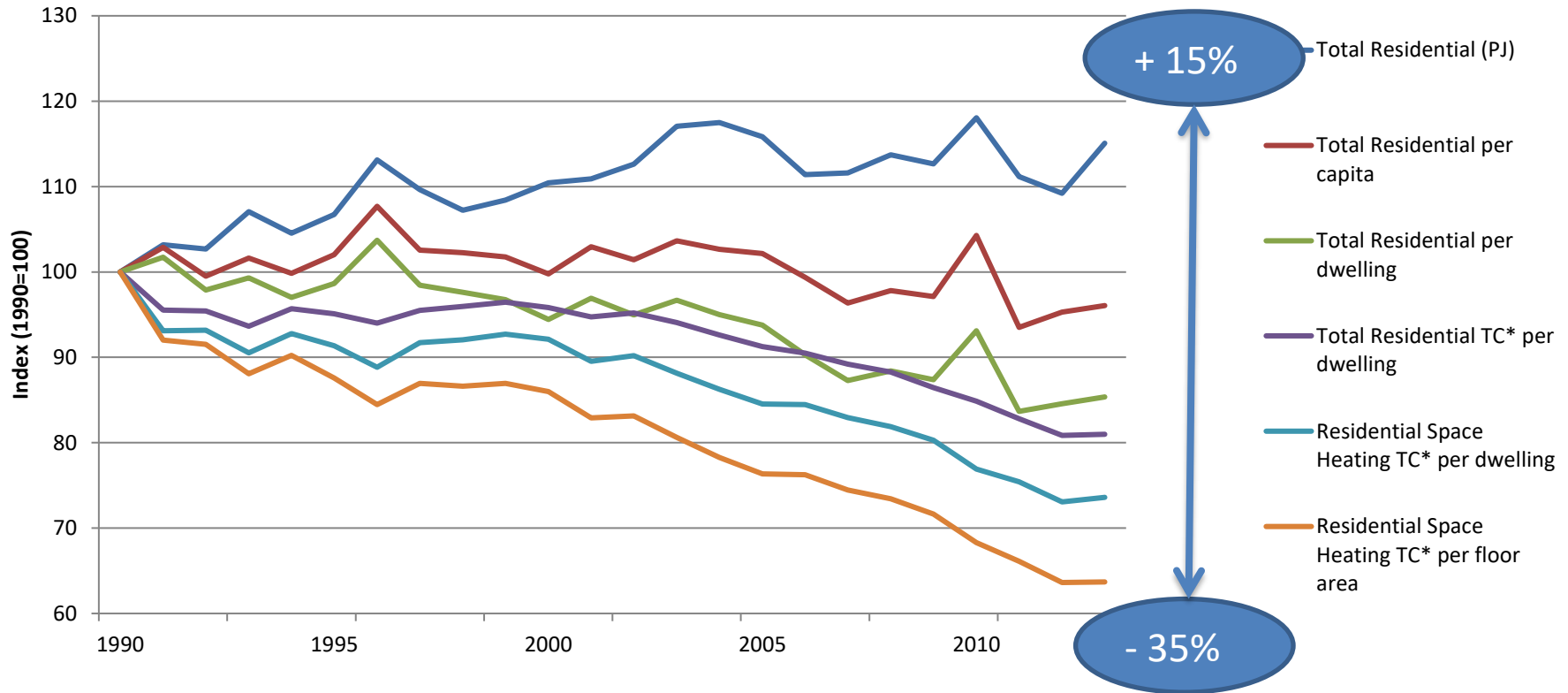
# How do the various measures impact the overall energy trends?

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**End-use energy efficiency indicators: basis to assess overall efficiency progress**

# Appropriate indicators can help uncover important trends



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).

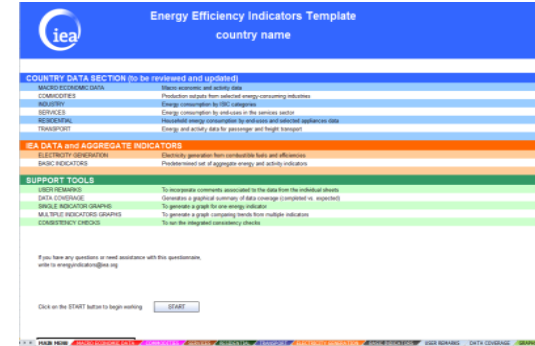
\* Temperature correction using heating degree days

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

# The IEA approach on end-use data and efficiency indicators

# IEA collects end-use data from members and beyond

- Agreed by member countries in 2009 (IEA Ministerial)
- Currently, **countries beyond IEA** also recognize the value and voluntarily collaborate
- **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** : [Energy efficiency indicators Highlights](#)



The screenshot shows the 'Energy Efficiency Indicators Template' interface. It features a blue header with the IEA logo and a field for 'country name'. Below the header, there are several sections with colored backgrounds: 'COUNTRY DATA SECTION (to be reviewed and updated)' in blue, 'IEA DATA and AGGREGATE INDICATORS' in orange, and 'SUPPORT TOOLS' in green. Each section contains a list of indicators with brief descriptions. At the bottom, there is a 'START' button and a note about contacting the IEA for assistance.

COUNTRY DATA SECTION (to be reviewed and updated)	
INDUSTRIAL PRODUCTION	Final consumption and energy data
INDUSTRIES	Production outputs from selected energy-consuming industries
INDUSTRY	Energy consumption by IED category
SERVICES	Energy consumption by end-use in the services sector
RESIDENTIAL	Final-use energy consumption by end-use and seasonal operation date
TRANSPORT	Energy and activity data for passenger and freight transport

IEA DATA and AGGREGATE INDICATORS	
ELECTRICITY CONSUMPTION	Electricity generation from combined heat and efficiency
BASIC INDICATORS	Production and aggregate energy and activity indicators

SUPPORT TOOLS	
INSTRUCTIONS	To incorporate comments associated to the data from the individual sheets
DATA CHECKSHEET	Operates a practical overview of data coverage (completed vs. expected)
SINGLE INDICATOR GRAPHING	To generate a graph for one energy indicator
MULTIPLE INDICATORS GRAPHING	To generate a graph comparing trends from multiple indicators
CONSISTENCY CHECKS	To set the integrated consistency checks

If you have any questions or need assistance with this questionnaire, write to [energydata@iea.org](mailto:energydata@iea.org)

Click on the START button to begin working



# Energy efficiency indicators data collaboration

## 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



## 2021

- 44 countries were published in the database

COUNTRY		
Argentina	Armenia	Australia
Austria	Azerbaijan	Belarus
Belgium	Brazil	Canada
Chile	Czech Republic	Denmark
Finland	France	Georgia
Germany	Greece	Hungary
Ireland	Italy	Japan
Kazakhstan	Korea	Kyrgyzstan
Lithuania	Luxembourg	Mexico
Morocco	Netherlands	New Zealand
Poland	Portugal	Republic of Moldova
Slovak Republic	Slovenia	Spain
Sweden	Switzerland	Turkey
Ukraine	United Kingdom	United States
Uruguay	Uzbekistan	

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

The IEA is keen to collaborate on end-use data and indicators!





# IEA resources : methodologies on indicators

## ➤ Fundamentals on statistics:

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

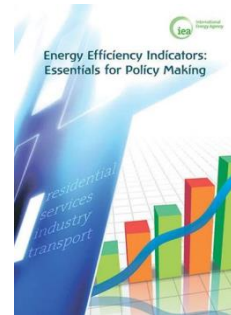
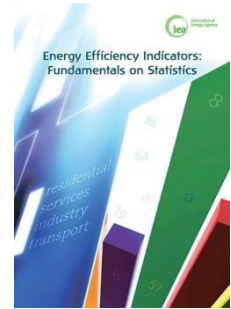
- Includes a compilation of existing practices from across the world
- <https://www.iea.org/reports/energy-efficiency-indicators-fundamentals-on-statistics>

## ➤ Essentials for policy makers:

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

**Both available also in:**

*Spanish*  
*Russian*  
*Chinese*  
*French (New!)*



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

# Key Messages

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## Detailed end-use and activity data are crucial.

WHY:

- highlighting priority subsectors,
- understanding energy efficiency trends,
- policy design and policy monitoring.

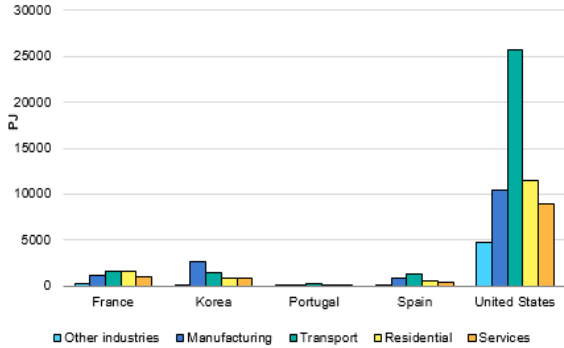
*THE IEA IS KEEN TO ASSIST AS MUCH AS POSSIBLE.*

# The IEA is keen to develop energy efficiency metrics with you



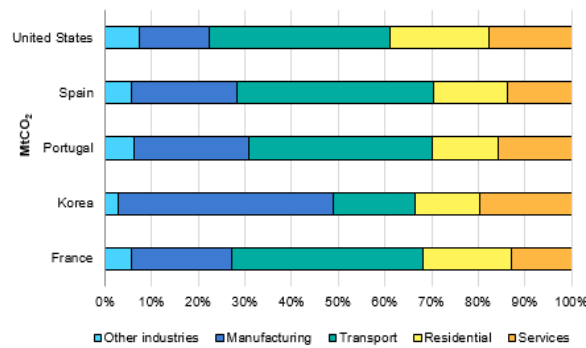
[Cross-sectoral](#)
[Residential](#)
[Industry and services](#)
[Transport](#)

Final energy consumption by sector, 2018



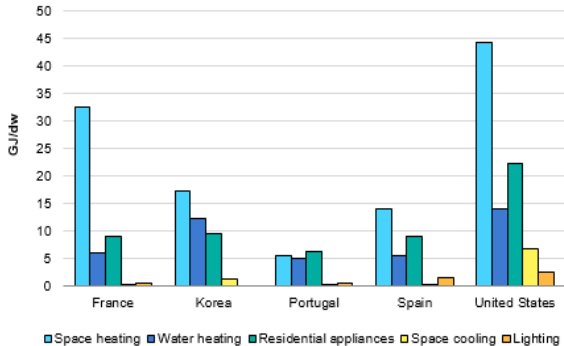
IEA. All Rights Reserved.

Final emissions by sector, 2018



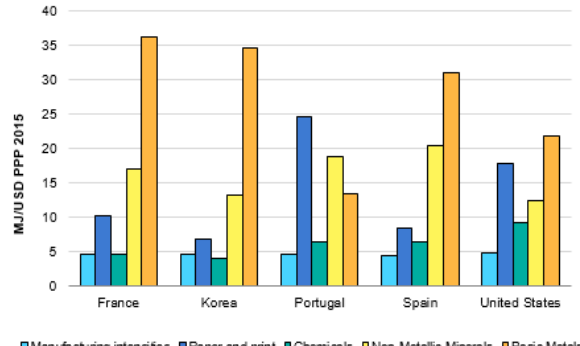
IEA. All Rights Reserved.

Residential dwelling intensities, 2018



IEA. All Rights Reserved.

Manufacturing intensities, 2018



IEA. All Rights Reserved.

**COUNTRY** 🔍 📄

Armenia	Australia	Austria
Azerbaijan	Belarus	Belgium
Brazil	Canada	Chile
Czech Republic	Denmark	Finland
France	Georgia	Germany
Greece	Hungary	Ireland
Italy	Japan	Kazakhstan
Korea	Kyrgyzstan	Lithuania
Luxembourg	Mexico	Morocco
Netherlands	New Zealand	Poland
Portugal	Republic of Moldova	Slovak Republic
Spain	Sweden	Switzerland
Turkey	Ukraine	United Kingdom
United States	Uzbekistan	

**TI...** 🔍 📄

- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018

**Note:**  
1. Only one country or region should be selected at any time.

Access the data underlying each graph by clicking on the respective button below:

Graph 1  
Final energy consumption by sector [PJ]

Graph 2  
Final emissions by sector [MtCO<sub>2</sub>]

Graph 3  
Residential dwelling intensities [GJ/dw]

Graph 4  
Manufacturing intensities [MJ/USD PPP 2015]

Graph 5  
Transport intensities [MJ/pkm or tkm]

Graph 6  
Services intensities [MJ/USD PPP 2015]

# iea



Energy Working Group

**EGEDA**  
under EWG-APEC

***Questions?***

[EnergyIndicators@iea.org](mailto:EnergyIndicators@iea.org)

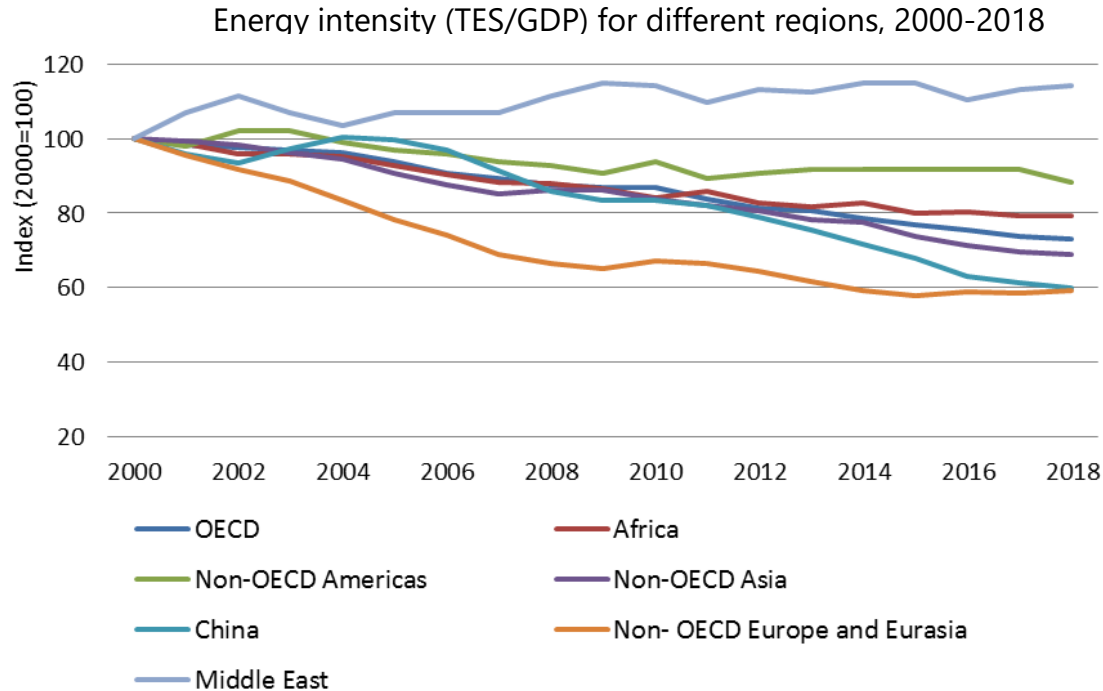


# Icebreaker/exercise: what is the contribution of energy efficiency to intensity targets

Víctor García Tapia | International Energy Agency

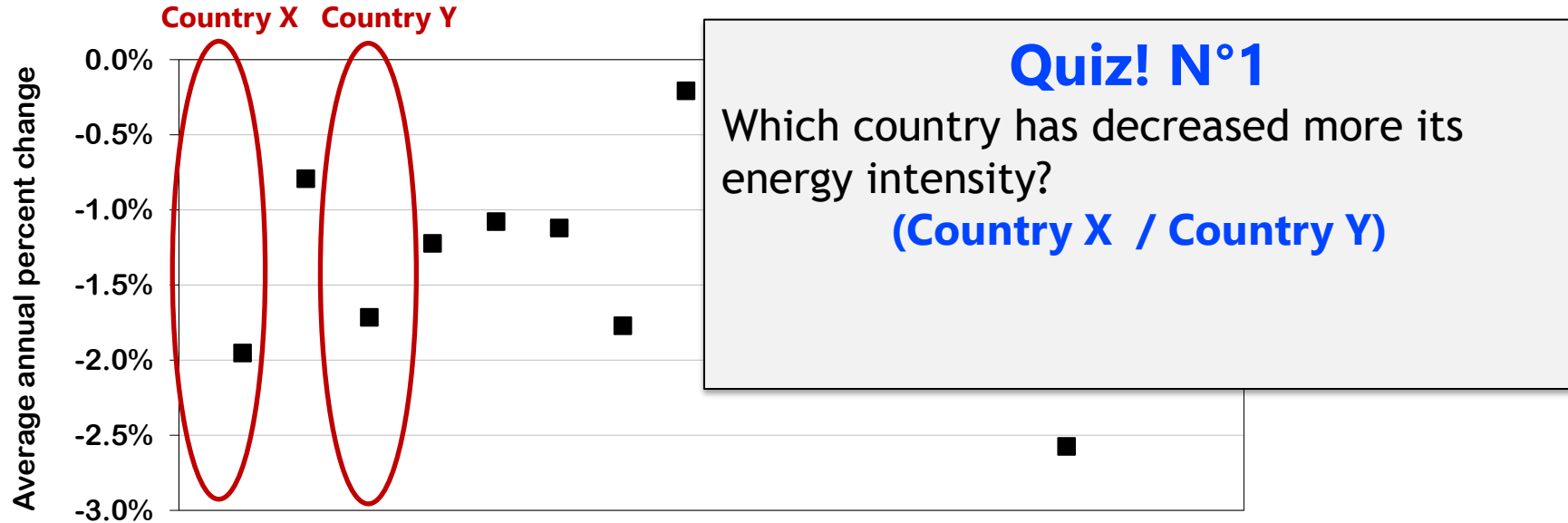
Joint APEC-IEA Training Workshop on End-use Energy Consumption Data, June 2021

# Can we use energy intensity as a proxy for efficiency ?



# Understanding aggregated indicators requires attention

Energy intensity (TFC/GDP) changes (1990-2010)

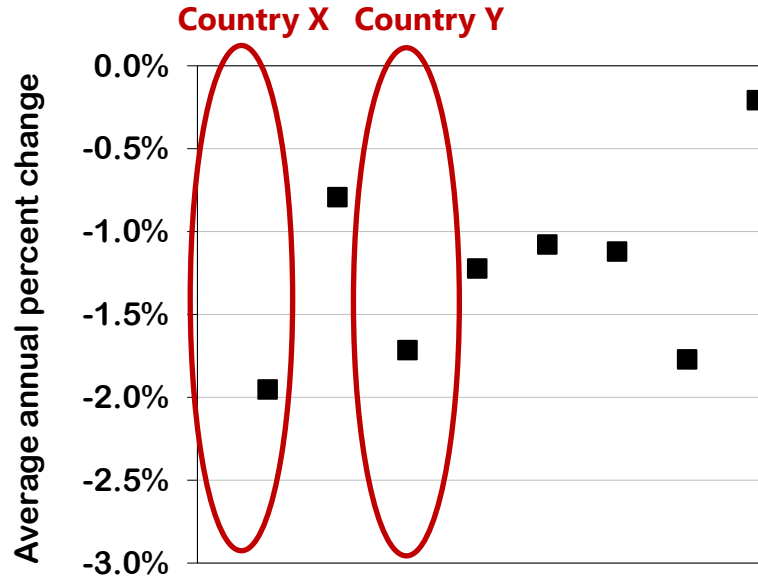


Data source: IEA, *Energy efficiency indicators*. All rights reserved.

Intensity decreased more in country X

# Understanding aggregated indicators requires attention

Energy intensity (TFC/GDP) changes (1990-2010)



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

## Quiz! N°2

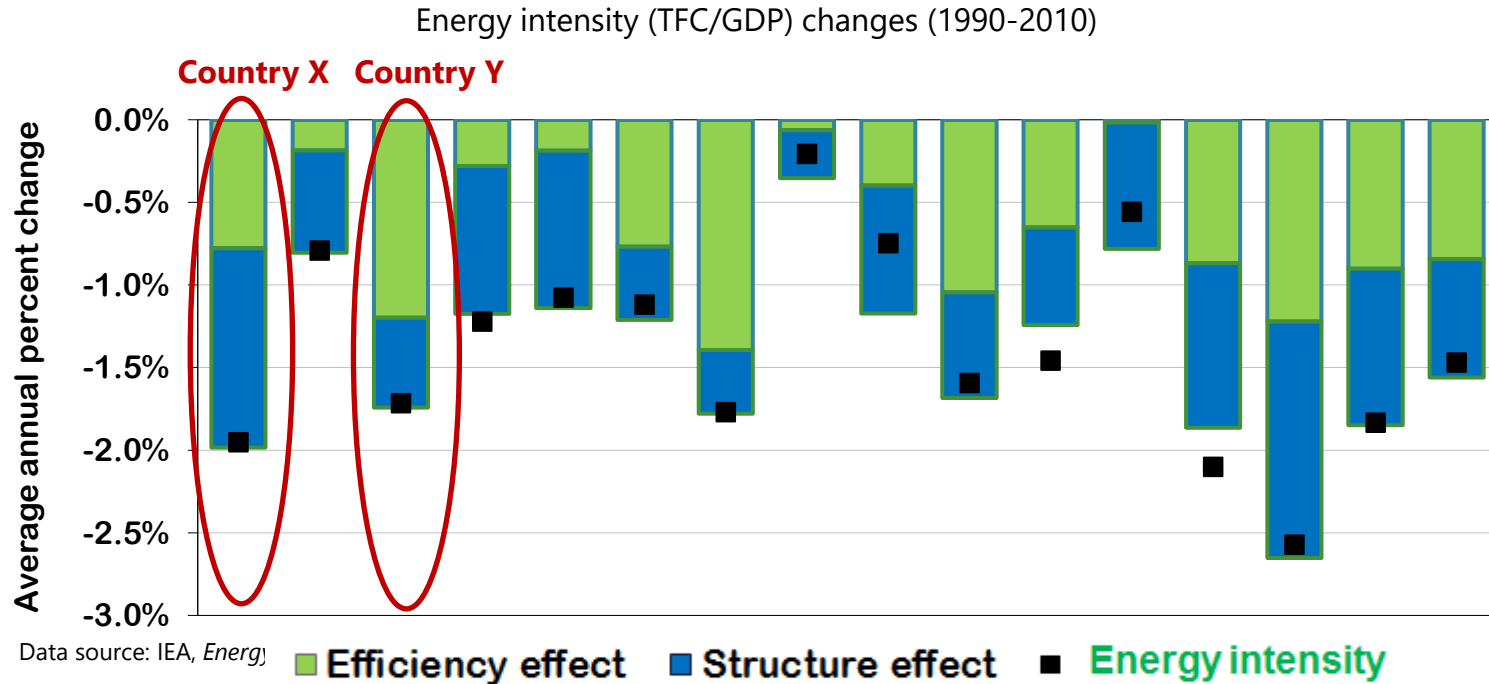
Can we say that Country X has improved more in ENERGY EFFICIENCY?

1. Yes
2. No
3. Maybe

Intensity decreased more in country X

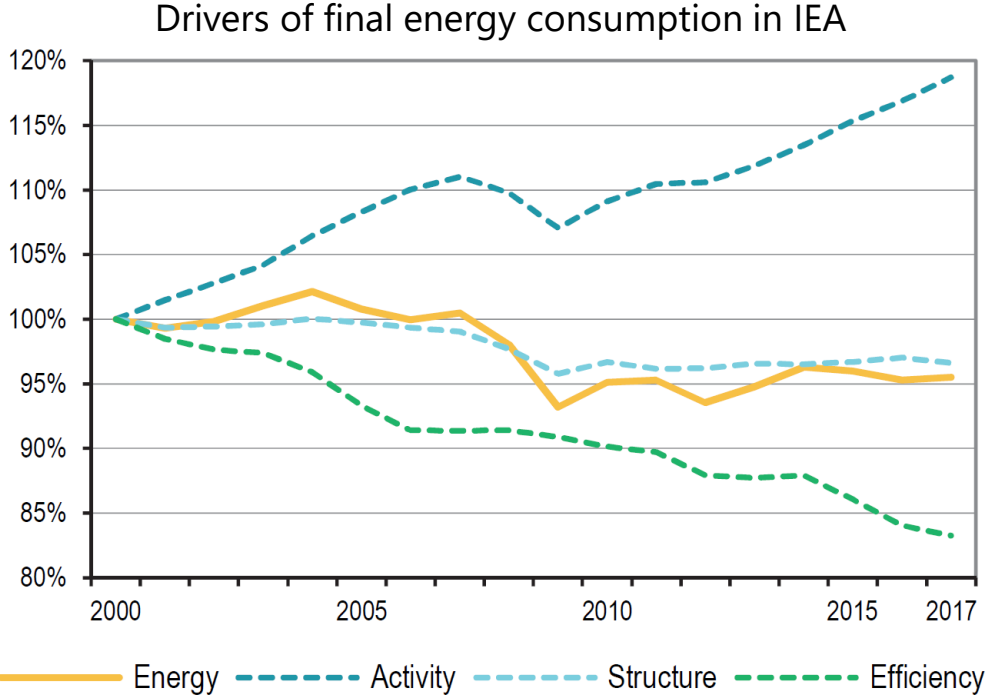


# Aggregated indicators are sometimes used inappropriately



Country X intensity reduction was mostly due to structural changes, while country Y improved more in energy efficiency.

# Disentangling efficiency from other drivers



Source: IEA (2019), *Energy Efficiency Indicators Highlights*, OECD/IEA, Paris.

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***Questions?***

[EnergyIndicators@iea.org](mailto:EnergyIndicators@iea.org)