Demand-side energy data in the transport sector

IEA Demand Side Data and Energy Efficiency Indicators Workshop for Southeast Asia

Thomas ELGHOZI, Energy Data Officer, End-use data and efficiency indicators

International Energy Agency

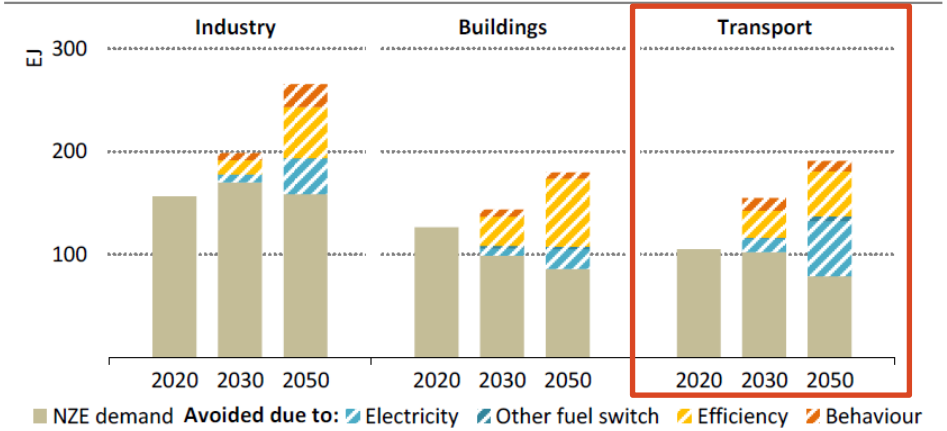
Overview

1. Importance of collecting good energy data for transport
2. Why end-use data are important?
3. How to classify segments, modes, vehicle types and fuels?
4. What can we learn from the energy balances?
5. What can we learn from vehicle-type data?
6. Developing energy efficiency indicators
7. Methods of collecting data
8. IEA tools for data capacity development.
9. Conclusion

Importance of collecting good energy data for transport

Why is the transport sector important?

Total final consumption and demand avoided by mitigation measures in the NZE



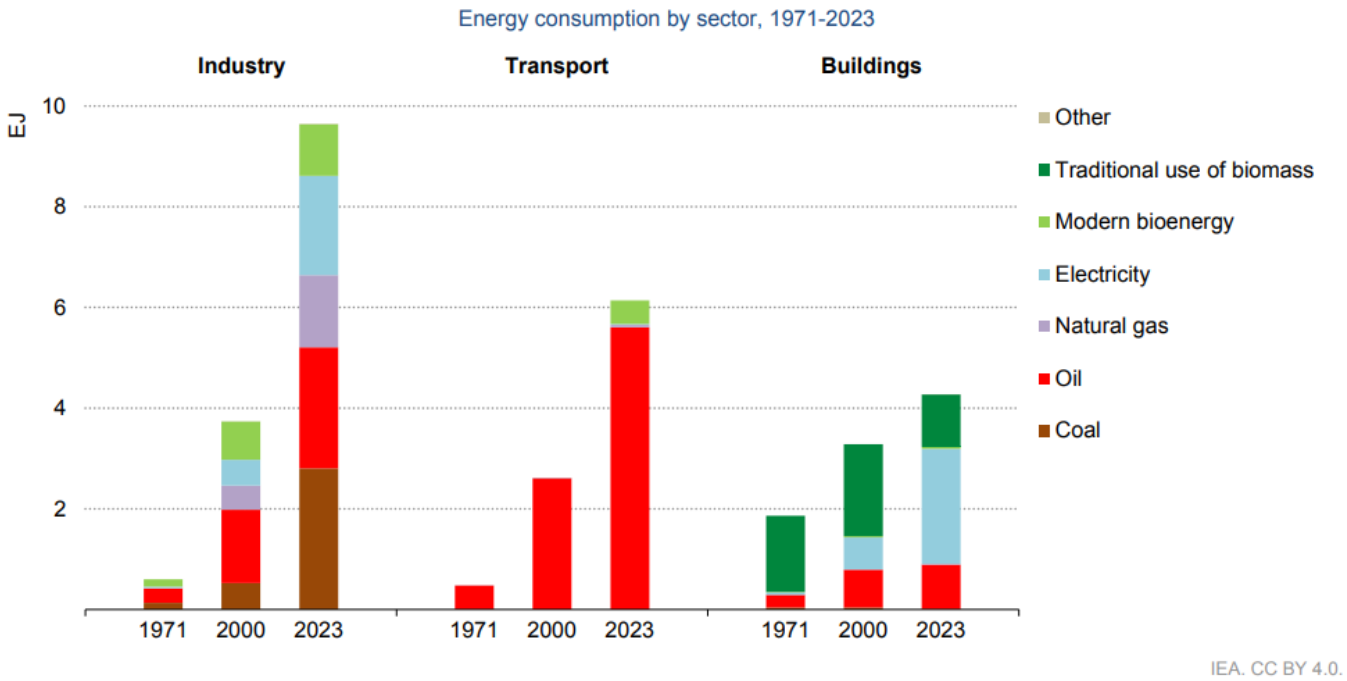
Transportation is important for multiple reasons such as economic activity and mobility.
Transport efficiency is the second driver (after electrification) to avoid emissions by 2050 towards global net zero.

Photo credits: Heinrich Damm

Source: IEA Net-zero by 2050 - https://www.iea.org/reports/net-zero-by-2050

Energy in Southeast Asia

Industry and transport have driven strong growth in energy consumption



Notes: "Transport" excludes international bunkers. "Other" fuels cover geothermal, solar thermal, district heating and non-renewable waste.

Source: IEA, Southeast Asia Energy Outlook 2024

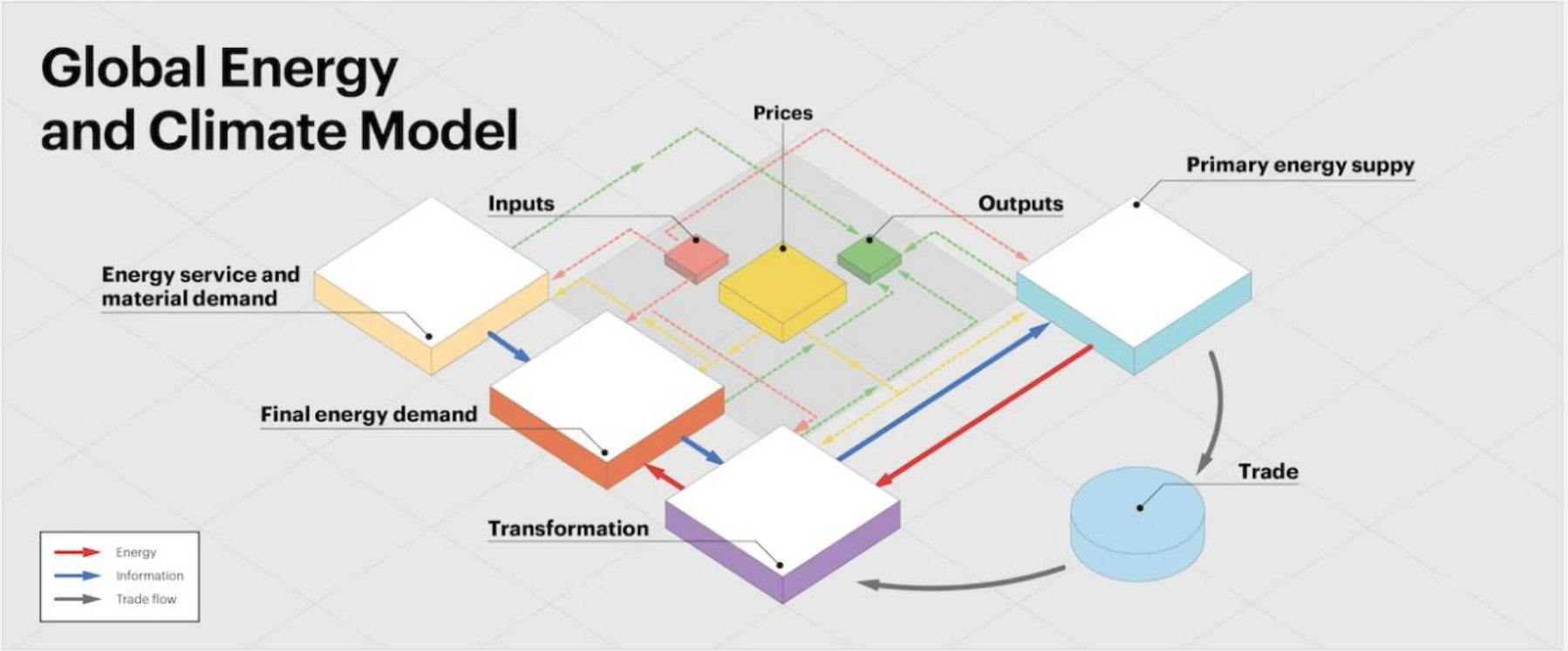
Quiz

Go to:
https://www.menti.com/
and use this code:
8269 5001

Or join using
the QR code:

Why end-use data are important?

Demand side data are the pillars of modelling and policy activities



Disaggregated data allow more precise models and therefore policies

End-use data are the basis to develop efficiency indicators

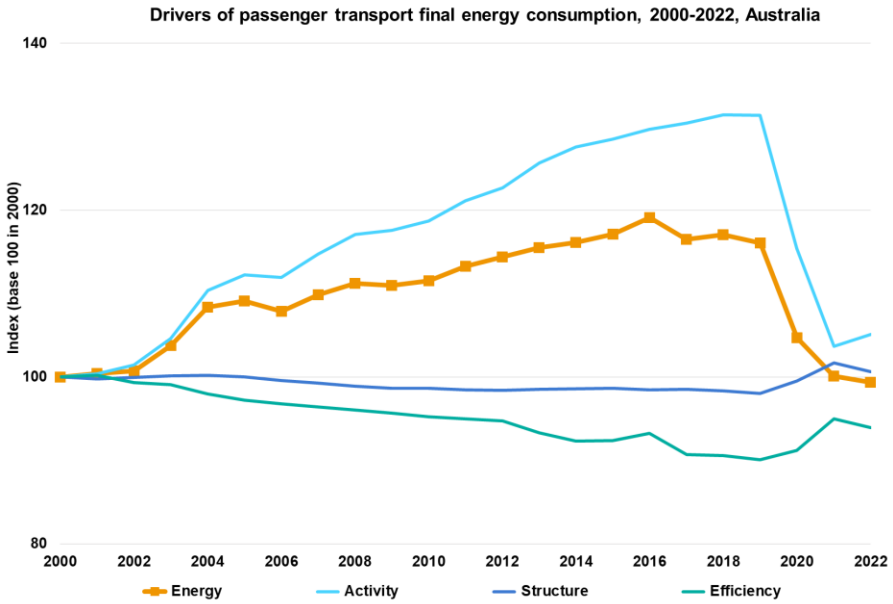
- Energy efficiency indicators are defined as a ratio between energy consumption and activity data.

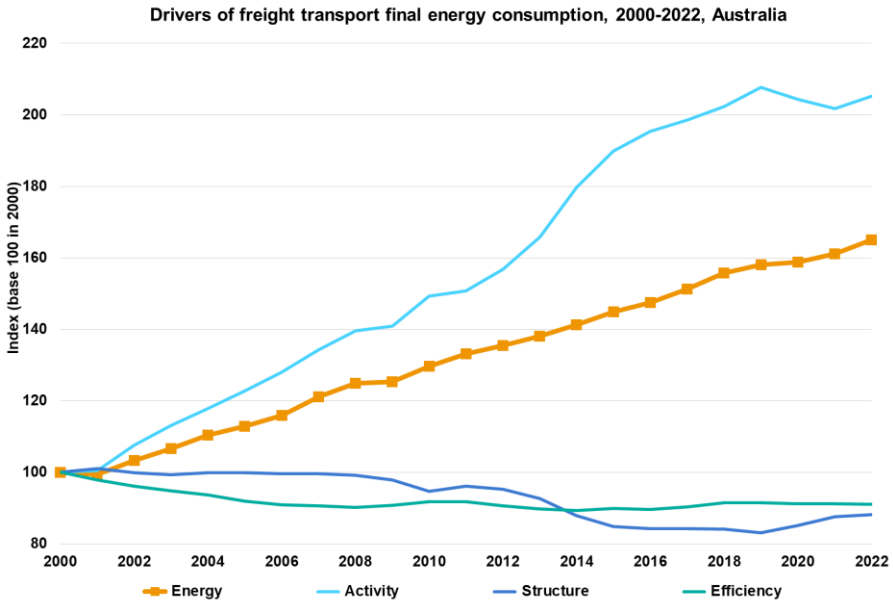
$$Energy\ efficiency\ indicator = \frac{Energy\ consumption}{Activity\ data}$$

- **Energy efficiency indicators** are computed at the **end-use or sub-sectoral level**, or at an even more disaggregated level and **require disaggregated energy consumption data.**

- For example,
  - *space cooling energy consumption per dwelling*,
  - *passenger cars energy consumption per passenger-kilometre*.

What drives the transport energy consumption?



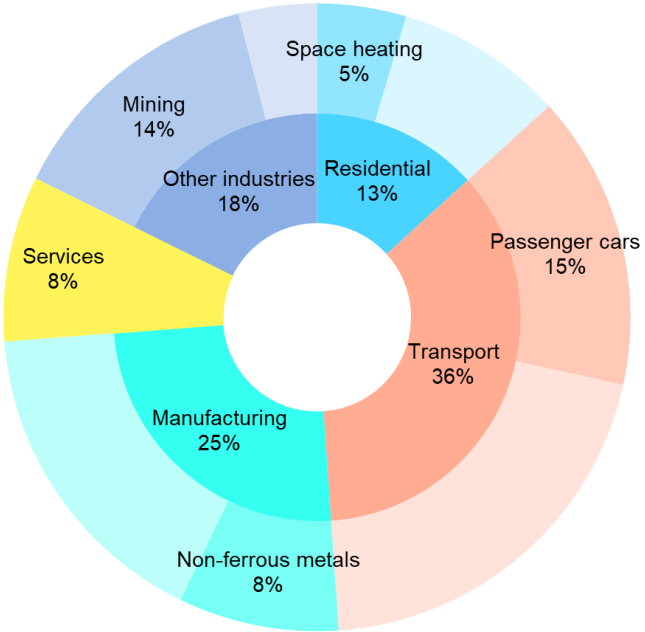


Decomposition analysis from detailed subsector and activity data gives the respective impact of key drivers of energy consumption, and providing key insights for policy design.

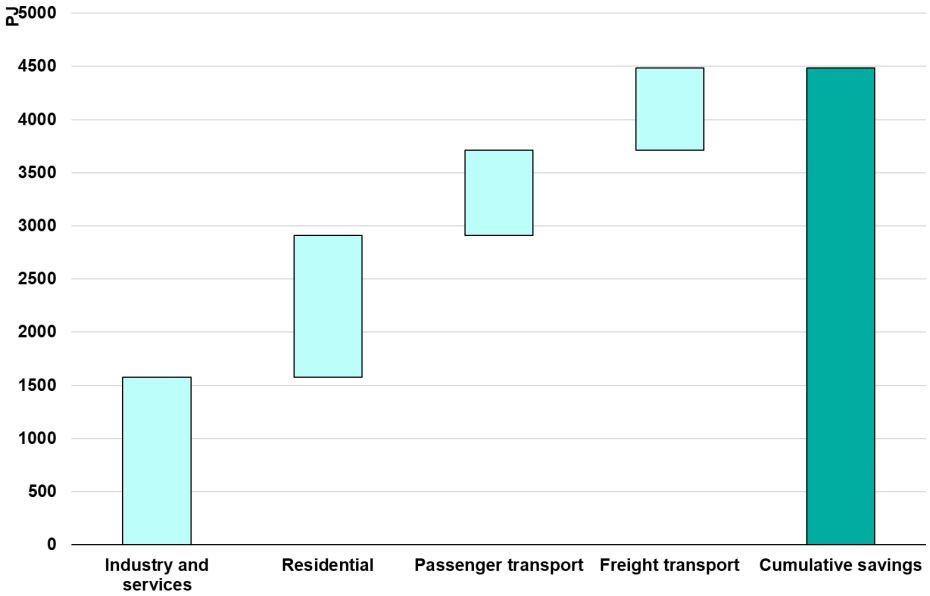
Source: IEA Energy End-Uses and Efficiency Indicators, 2024

What we can learn from efficiency indicators – key points

Largest end uses by sector, 2022, Australia



Estimated cumulative energy savings from efficiency by sector, 2000-2021, Australia



In the past two decades, Australia cumulatively saved above 14% of its 2021 energy consumption. These savings mostly come from the transport sector (on par with industry and services).

Source: IEA Energy End-Uses and Efficiency Indicators, 2024

How to classify segments, modes, vehicle types and energy products?

Energy balances are a compact source of information

2022

MILLION TONS OIL EQUIVALENT

SUPPLY AND CONSUMPTION	Coal	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Geotherm. Solar etc.	Biofuels & waste	Electricity	Heat	Total
Production	4249.8	4499.2	-	3502.6	700.3	374.0	454.2	1290.3	-	1.5	15071.9
Imports	802.5	2345.2	1365.6	1028.1	-	-	-	38.6	69.4	0.0	5649.5
Exports	-832.8	-2309.2	-1406.0	-1053.8	-	-	-	-27.3	-71.6	-0.0	-5700.8
Intl. marine bunkers	-	-	-	-	-	-	-	-	-	-	-
Intl. aviation bunkers	-	-	-	-	-	-	-	-	-	-	-
Stock changes	-113.7	14.1	-20.9	-40.0	-	-	-	-0.2	-	-	-160.7
TES	**4105.8**	**4549.3**	**-61.3**	**3436.9**	**700.3**	**374.0**	**454.2**	**1301.3**	**-2.2**	**1.5**	**14860.0**
Transfers	-7.2	-265.6	306.2	-	-	-	-	0.0	-	-	33.4
Statistical differences	-125.7	9.7	-5.4	-38.1	-	-	0.2	0.2	-9.2	8.3	-160.1
Electricity plants	-1826.5	-40.4	-147.0	-960.9	-699.7	-374.0	-379.4	-152.7	2129.1	-	-2451.5
CHP plants	-808.3	-0.0	-13.7	-326.5	-0.5	-	-4.2	-85.6	376.4	317.3	-545.0
Heat plants	-31.8	-0.5	-11.2	-62.3	-0.1	-	-2.2	-14.2	-	106.0	-16.4
Blast furnaces	-190.0	-	-0.1	-0.0	-	-	-	-0.0	-	-	-190.3
Gas works	-34.5	-	-3.7	17.6	-	-	-	-2.9	-	-	-23.5
Coke/pat. fuel/BKB plants	-84.8	-	-2.5	-0.0	-	-	-	-0.1	-	-	-87.4
Oil refineries	-	-4310.6	4212.2	-	-	-	-	-	-	-	-98.3
Petrochemical plants	-	43.5	-43.1	-	-	-	-	-	-	-	0.5
Liquefaction plants	-26.3	22.6	-	-16.9	-	-	-	-	-	-	-20.6
Other transformation	-0.7	13.9	-0.6	-23.0	-	-	-	-93.4	-0.5	-0.4	-104.6
Energy industry own use	-78.0	-8.1	-222.7	-306.3	-	-	-0.0	-13.1	-207.4	-48.8	-884.3
Losses	-1.7	-6.8	-0.2	-30.1	-	-	-0.0	-0.3	-173.1	-23.9	-236.0
TFC	**890.5**	**6.9**	**4007.0**	**1690.4**	**-**	**-**	**68.6**	**939.3**	**2113.2**	**360.0**	**10075.9**
Industry	717.7	1.8	327.3	674.5	-	-	0.8	255.2	894.9	191.9	3064.2
Transport	0.9	0.0	2539.9	123.5	-	-	-	99.4	38.8	-	2802.5
Residential	49.6	-	213.9	490.4	-	-	53.5	538.3	580.5	119.1	2045.3
Comm. and public servic	19.5	-	72.4	204.1	-	-	11.3	28.7	430.4	39.1	805.4
Agriculture/forestry	10.0	0.0	110.6	12.7	-	-	2.5	13.0	69.7	3.6	222.2
Fishing	0.0	-	6.5	0.1	-	-	0.1	0.0	0.9	0.1	7.6
Non-specified	14.4	0.0	27.4	5.9	-	-	0.4	4.7	98.1	6.3	157.3
Non-energy use	78.4	5.1	708.9	179.0	-	-	-	-	-	-	971.5

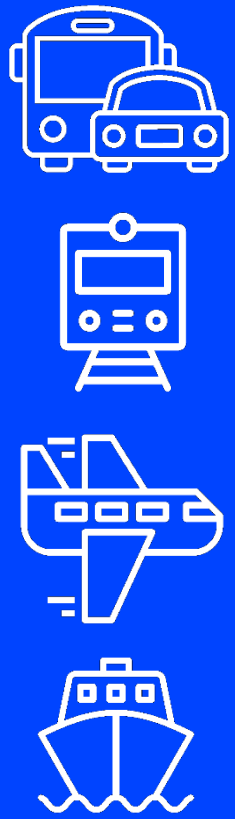
Supply

Transformation and energy industries own use

Final consumption

Demand side

Sectors, sub-sectors or end-uses of total final consumption



- Passenger transport
  - Road
    - Cars, SUVs, personal light trucks
    - Motorcycles
    - Buses
  - Trains
    - Metro and light rail
    - Conventional trains
    - High-speed trains
  - Domestic airplanes
  - Domestic ships
- Freight transport
  - Road
    - Light commercial vehicles
    - Medium trucks
    - Heavy trucks
  - Trains
  - Domestic airplanes
  - Domestic ships

International Energy Agency

Exclusions and caveats

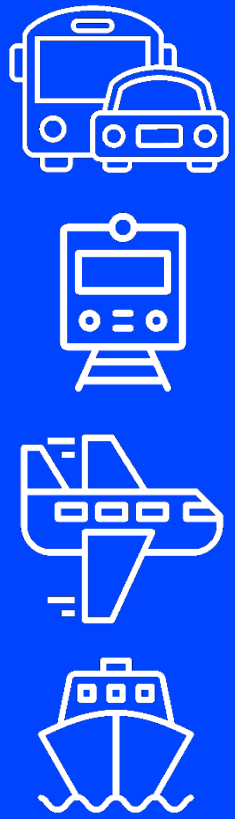
Pipeline *(own consumption)*

Fuel tourism *(transborder)*

International aviation and shipping *(bunkers)*

Misallocation of oil products *(agriculture and fisheries, construction, light residential…)* and electricity *(home charging)*

Informal trade



International Energy Agency

Products scope – detail information on coal, gases, oil, etc.

TRANSPORT				units	2018	2019	2020	2021	2022	2023	2024
Menu	Legend	Check all/none	Add remarks								
Total Energy Use in Passenger Transport											
	Motor Gasoline (including biofuels)			PJ	0	0	0	0	0	0	0
	Diesel & Light Fuel Oil				0	0	0	0	0	0	0
	LPG (Liquefied Petroleum Gas)				0	0	0	0	0	0	0
	Heavy Fuel Oil				0	0	0	0	0	0	0
	Jet Fuel & Aviation Gasoline			PJ	0	0	0	0	0	0	0
	Natural Gas			PJ	0	0	0	0	0	0	0
	Electricity			PJ	0	0	0	0	0	0	0
	Coal & Coal Products			PJ	0	0	0	0	0	0	0
	Other			PJ	0	0	0	0	0	0	0
	Total			**PJ**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Energy Use in Freight Transport											
	Motor Gasoline (including biofuels)			PJ	0	0	0	0	0	0	0
	Diesel & Light Fuel Oil				0	0	0	0	0	0	0
	LPG (Liquefied Petroleum Gas)				0	0	0	0	0	0	0
	Heavy Fuel Oil				0	0	0	0	0	0	0
	Jet Fuel & Aviation Gasoline			PJ	0	0	0	0	0	0	0
	Natural Gas			PJ	0	0	0	0	0	0	0
	Electricity			PJ	0	0	0	0	0	0	0
	Coal & Coal Products			PJ	0	0	0	0	0	0	0
	Other			PJ	0	0	0	0	0	0	0
	Total			**PJ**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Oil products

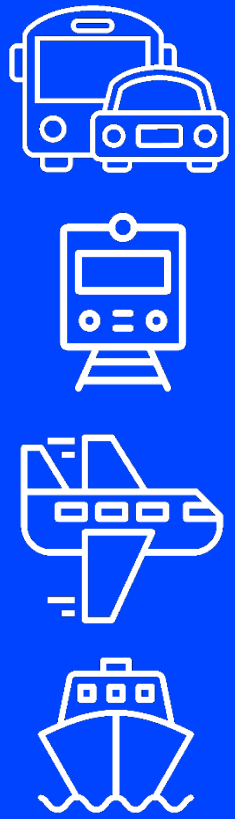
Oil products

Quiz

Go to:
https://www.menti.com/
and use this code:
8269 5001

Or join using
the QR code:

What can we learn from the energy balances?

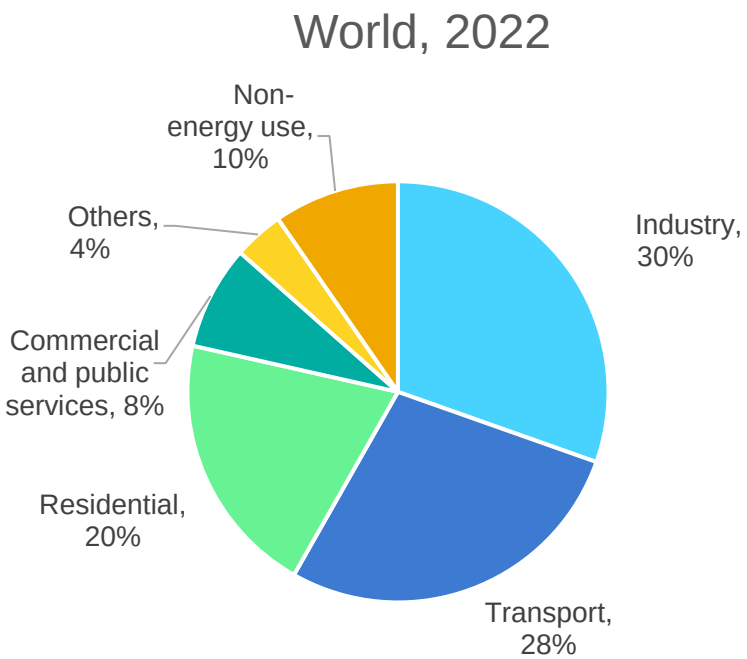


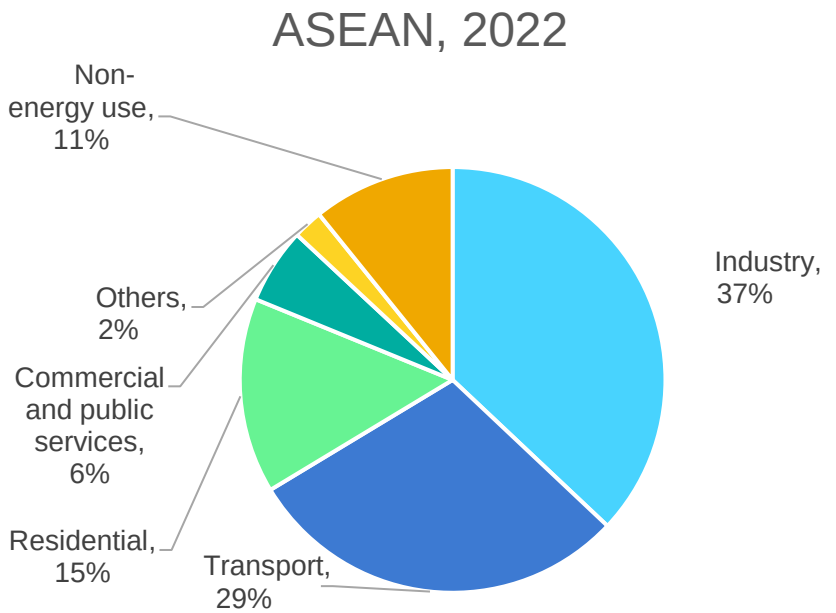
IEA Energy Balances

- Total transport
  - Road
    - Freight trucks
      - Light commercial vehicles
      - Medium trucks
      - Heavy trucks
    - Passenger road
      - Cars, SUVs, personal light trucks
      - Motorcycles
      - Buses
  - Rail
    - Freight trains
    - Passenger trains
      - Metro and light rail
      - Conventional trains
      - High-speed trains
  - Air
    - Domestic freight planes
    - Domestic passenger planes
  - Water
    - Domestic freight ships
    - Domestic passenger ships

International Energy Agency

Total final consumption (TFC) by sector





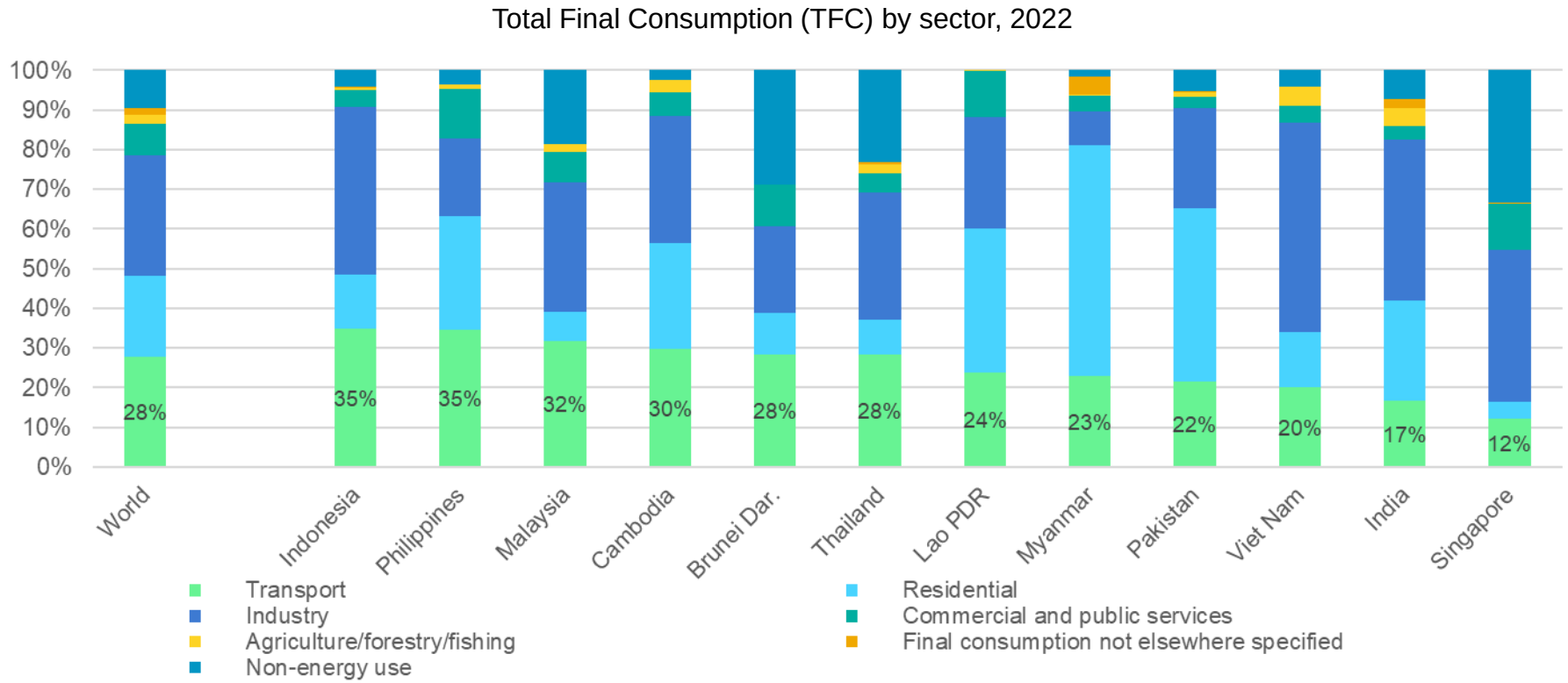
On average in the Southeast Asian countries, transport energy consumption accounts for 29% of TFC.

Source: IEA (2024), World Energy Statistics and Balances 2024, www.iea.org/statistics/.

Other includes agriculture, forestry, fishing and non-specified final consumption

Category industry here follows energy balances definitions and includes construction as well as mining and quarrying

Which sector drives domestic demand?

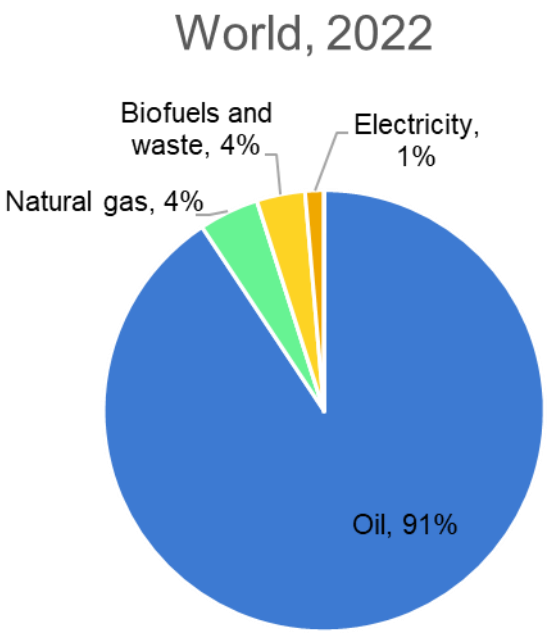


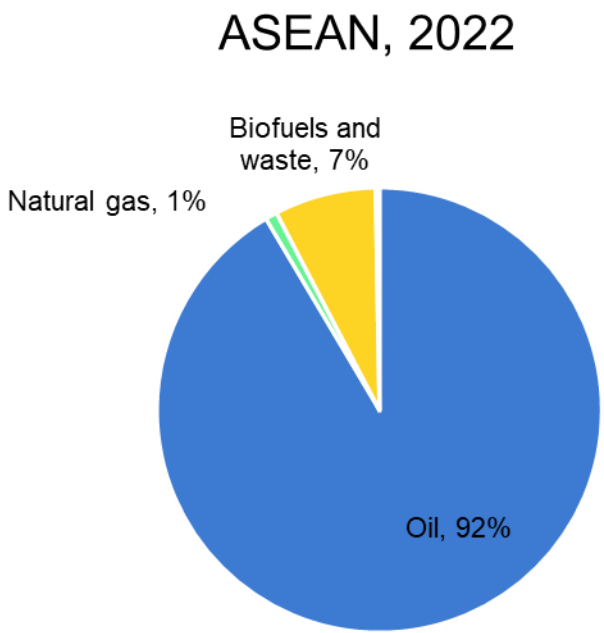
According to the IEA world energy balances, transport consumptions accounts for 12-35% of TFC.

Source: *IEA (2024), World Energy Statistics and Balances 2024, www.iea.org/statistics/.*

1) Category industry here follows energy balances definitions and includes construction as well as mining and quarrying

Transport energy consumption by fuel



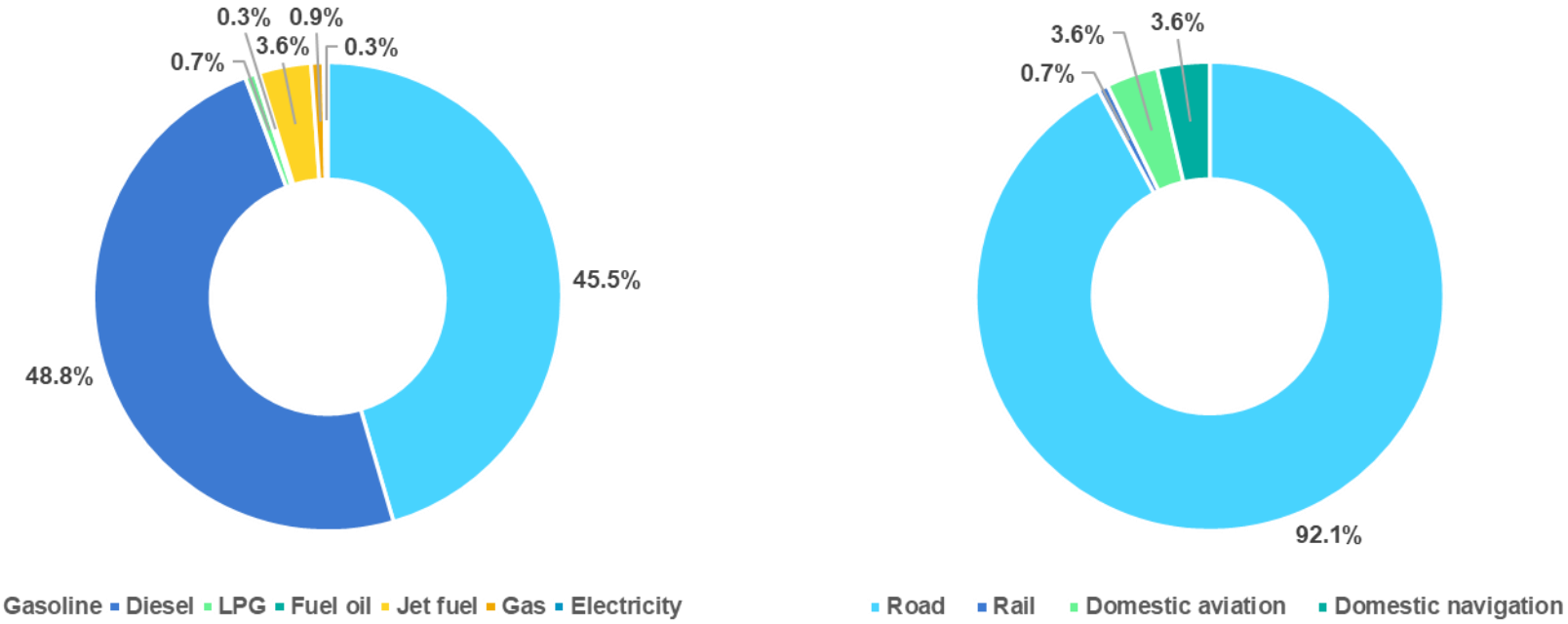


The transport sector relies on oil products for over 90% of its energy needs in Southeast Asia, with biofuels and waste accounting for most of the remaining part.

 Source: *IEA (2024), World Energy Statistics and Balances 2024, www.iea.org/statistics/.*

Transport energy consumption by modes and detailed fuels

Energy consumption in transport sector[1] in ASEAN countries, by mode (left) and by fuel (right), 2022



[1] *Transport sector on these graphs follow energy efficiency definitions and exclude pipeline transport*

Priority modes require more detailed data for energy and activity to understand its "structure". Transport consumption mostly feed road transport with gasoline and diesel.

Source: IEA World Energy Balances, 2024

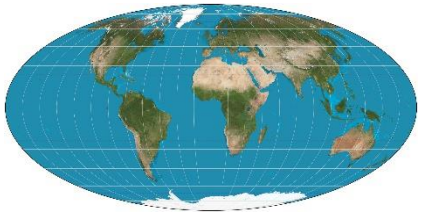
What can we learn from vehicle-type data?

What can we learn from detailed transport consumption data?

- What is the share of **passenger vs. freight** transport?

- How do **passengers travel** most **on land**: train, bus or car?

- What is the **fuel share** for each vehicle type, and the impacts on **energy security** risks?

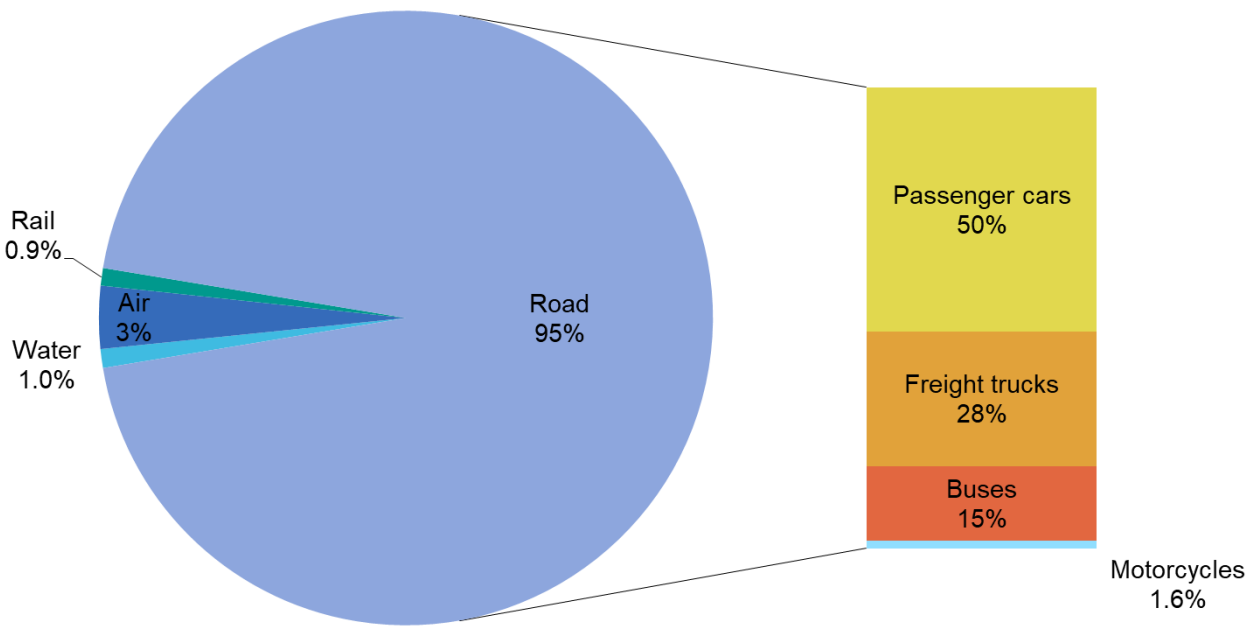


- How does it **compare** to other economies in the region?

Photo credits: Bahnfrend

Transport consumption by modes and vehicle types – Examples

Transport energy consumption by mode/vehicle type, 2022, Republic of Korea

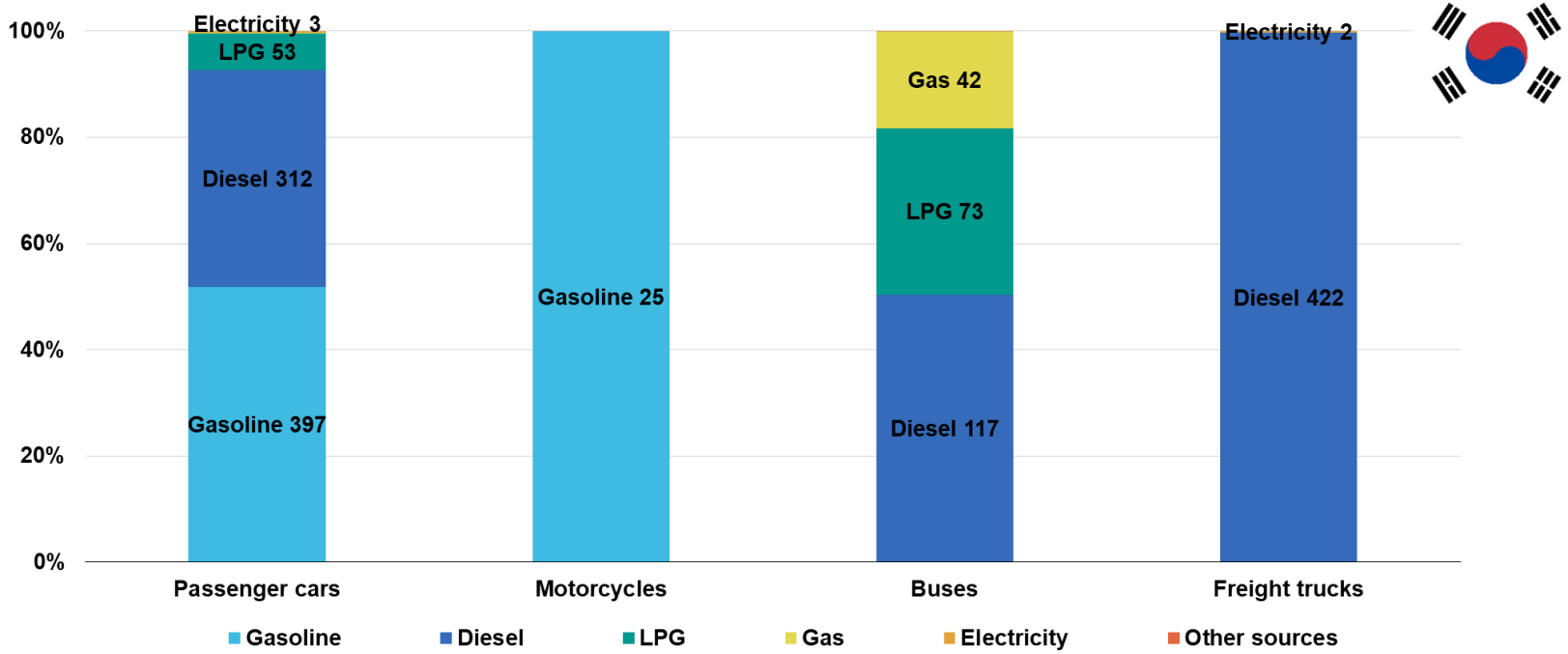


In Korea, over 95% of the transport energy consumption arise from road transport, and over 93% from passenger cars (50% alone), freight trucks and buses.

Source: IEA Energy End-Uses and Efficiency Indicators, 2024

Road consumption by fuels – Examples

Transport energy consumption in road transport by energy product, 2022, Republic of Korea

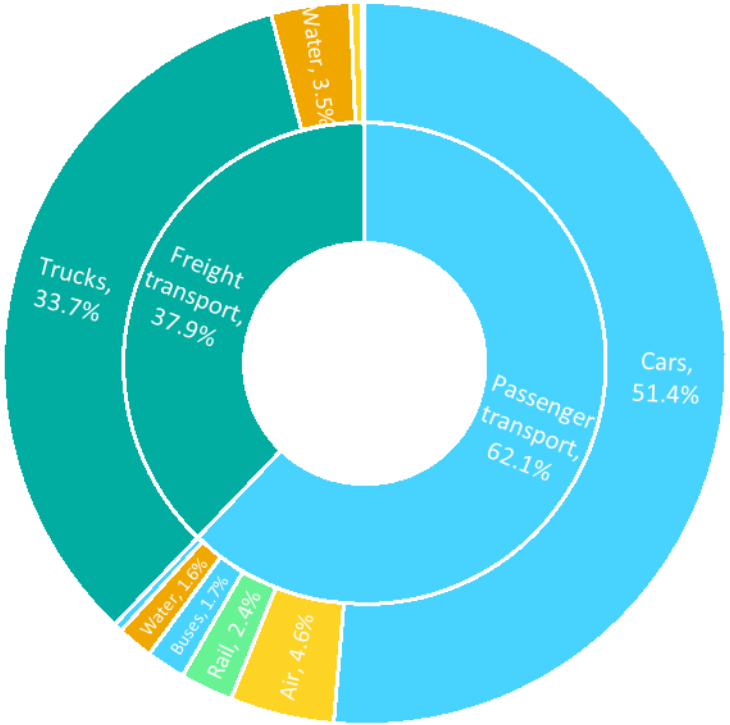


In Korea, all trucks (28% of the total) are dependent on diesel, while passenger cars and buses are fuelled by a more diverse mix but rely on significant amounts of diesel too.

Source: IEA Energy End-Uses and Efficiency Indicators, 2024

Transport consumption by modes and vehicle types – Examples

Transport energy consumption by mode/vehicle type, 2022, Japan



Cars alone represent more than half of all the transport energy consumption in Japan, while public passenger transport represent 10.4% and low intensity freight transport (rail and water) represent 3.7%.

Source: IEA Energy End-Uses and Efficiency Indicators, 2024

Quiz

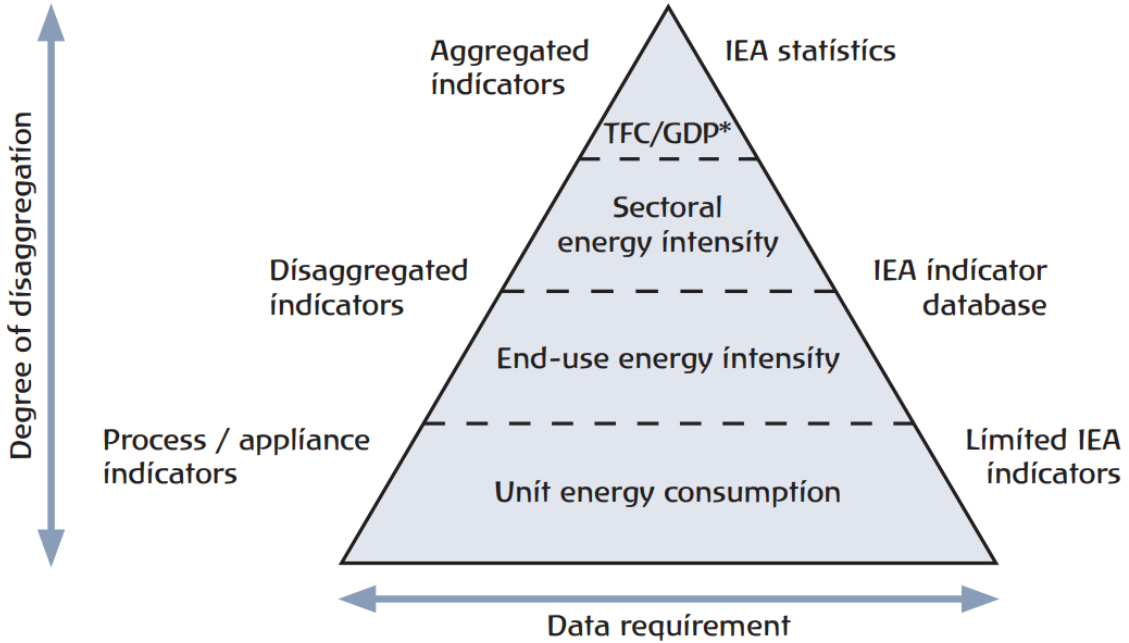
Go to:
https://www.menti.com/
and use this code:
8269 5001

Or join using
the QR code:

Developing energy efficiency indicators

Methodology to build indicators - the energy indicators pyramid

$$\text{Efficiency indicator} = \frac{\text{Energy}}{\text{Activity}}$$



Source: [Energy Efficiency Indicators: Fundamentals on Statistics]

More refined data are necessary to build detailed indicators at the sub-sectoral (or process) level.

Transport intensity indicators – coupling energy with activity data

Energy consumption data

- Transport segments
  - Passenger
  - Freight
- Transport modes
  - Road
  - Rail
  - Air
  - Water
  - Other

Activity data

- Vehicle stocks
- Passenger-kilometres
- Tonne-kilometres

Passenger

Freight

Road

Air

Rail

Water

Transport intensity indicators – coupling energy with activity data

Energy consumption data

- Transport segments
  - Passenger
  - Freight
- Transport modes
  - Road
  - Rail
  - Air
  - Water
  - Other

Activity data

- Vehicle stocks
- Passenger-kilometres
- Tonne-kilometres

Vehicle stock

Load

Distance travelled

Occupancy

Activity data in the transport sector

Passenger-km (pkm) or ***tonne-km (tkm)***

Vehicle-km (vkm)

Vehicle stock

×

Distance travelled

×

Occupancy

=

Passenger-km (pkm)

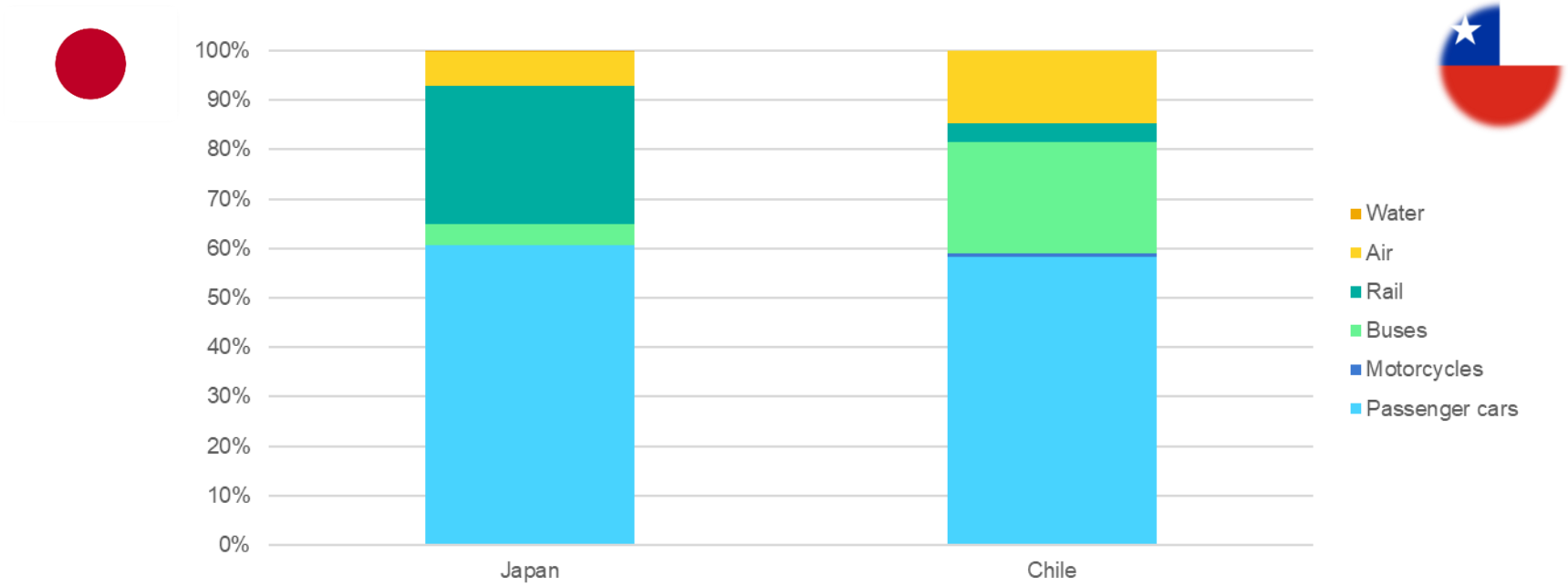
Load factor

=

Tonne-km (tkm)

Split into different modes and vehicle types – Examples

Activity share in passenger transport in Japan (left) and Chile (right), 2022



The share of passenger cars in passenger-kilometres is similar in Japan and in Chile (~60%), but buses and trains playing very different roles in the remainder.

Source: IEA Energy End-Uses and Efficiency Indicators, 2021

What indicators to use?

Indicator	Coverage	Energy data	Activity data	Code	Recommended indicator
Passenger transport energy consumption per GDP/capita	Overall	Total passenger transport energy consumption	GDP; Total population	P2a	
Passenger transport energy consumption per vehicle-kilometre	Overall	Total passenger transport energy consumption	Total number of passenger transport vkm	P2b	
	By mode / passenger vehicle type	Energy consumption of passenger transport by mode / vehicle type A	Number of vkm of passenger mode / vehicle type A	P3a	
Passenger transport energy consumption per passenger-kilometre	Overall	Total passenger transport energy consumption	Total number of pkm	P2c	
	By mode / passenger vehicle type	Energy consumption of passenger transport by mode / vehicle type A	Number of pkm of passenger mode / vehicle type A	P3b	☺
Freight transport energy consumption per GDP	Overall	Total freight transport energy consumption	GDP	F2a	
Freight transport energy consumption per vehicle-kilometre	Overall	Total freight transport energy consumption	Total number of freight transport vkm	F2b	
	By freight mode / vehicle type	Energy consumption of freight transport by mode / vehicle type α	Number of vkm of freight mode / vehicle type α	F3a	
Freight transport energy consumption per tonne-kilometre	Overall	Total freight transport energy consumption	Total number of tkm	F2c	
	By freight mode / vehicle type	Energy consumption of freight transport by freight mode / vehicle type α	Number of tkm of freight mode / vehicle type α	F3b	☺

Passenger

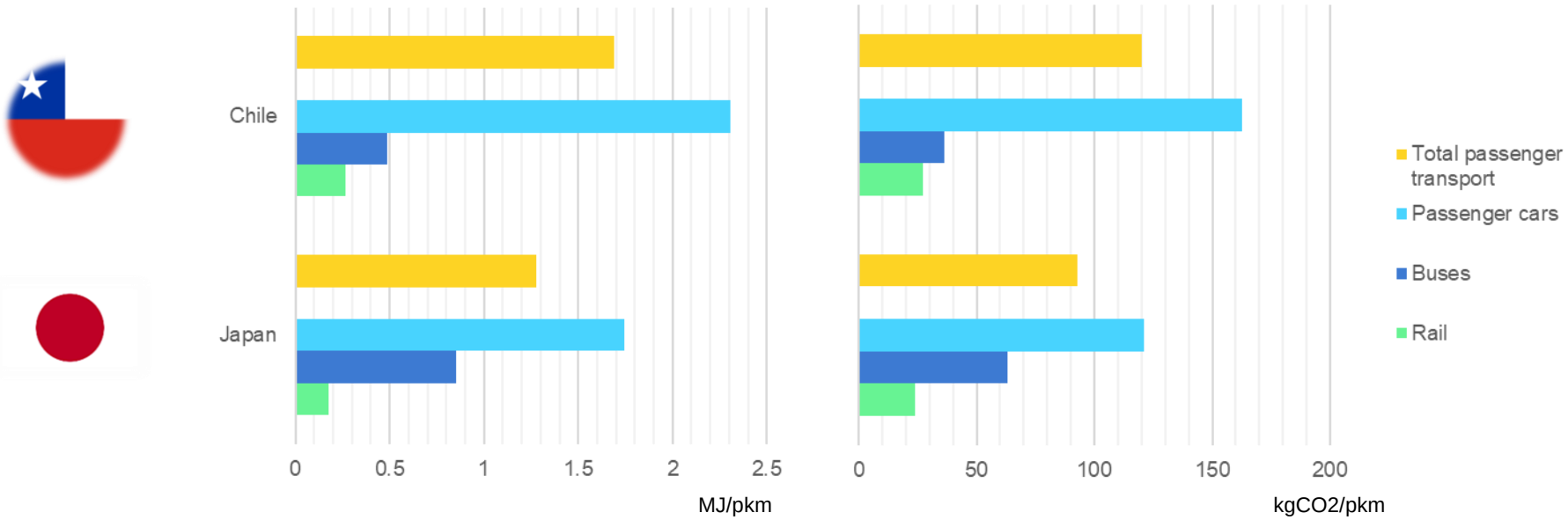
Freight

Each indicator has its benefits and drawbacks.
Best is to work with the available data, keeping in mind the hypotheses and the analysis' limitations.

Source: IEA (2014) – Energy efficiency indicators, Fundamentals on statistics

Breaking into different intensity for each mode – Examples

Passenger transport energy intensity (MJ/pkm, left) and carbon intensity (kgCO2/pkm, right) in Chile (top) and Japan (bottom), 2022



Pkm refers to passenger-kilometre, that is, the product of occupancy, vehicle stock and distance travelled.

Mode shares allow to break down energy and carbon intensities in each economy, providing key information to tailor different policies.

Source: IEA Energy End-Uses and Efficiency Indicators, 2021

Quiz

Go to:
https://www.menti.com/
and use this code:
8269 5001

Or join using
the QR code:

Methods of collecting data

Methods to collect transport end-use and activity data

Administrative sources	**Basis** as many data are often already gathered. Essential starting point.	*Transport Ministries, Vehicle registers* *Manufacturers and private sector* *International organisations (ITF, IATA, UIC, IRF…)*
Survey	Costly but **very effective**. To be **designed carefully**, ideally from existing one. **Representative sample** is key.	*Cars manufactures* *Households, mobility vehicle surveys* *Gas stations*
Measuring	Costly but **very effective**. Often **focused** on specific equipment.	*Odometer readings, tolls* *Video measuring*
Modelling	**Complementary to survey** (e.g. for higher frequency) or stand-alone. Requires **robust input** data.	*Sales and vintage to stocks* *Load factor and mileage to pkm & tkm* *Fuel economy and mileage to energy consumption*

Useful tools for modelling: COPERT model

Always check what data may be available in other institutions and how to complete existing data collection, before setting a new one up.

Icon credits: Iconiqu; Nithinan Tatah

Rail Transportation

Questionnaire Design:

Enterprises
ISIC SECTION H: Transportation and Storage:

TABLE Purchase and consumption of electricity, fuel and lubricants for rail transportation

		Unit	Total
1.	**Purchase:**		
1.1.	– gas diesel oil	t	
1.2.	– fuel oil: low sulphur content	t	
1.3.	– fuel oil: high sulphur content	t	
1.4.	– lubricants	t	
1.5.	– other, please specify	t	
2.	**Consumption in the country:**		
2.1.	– electricity	MWh	
2.2.	– gas diesel oil	t	
2.3.	– fuel oil: low sulphur content	t	
2.4.	– fuel oil: high sulphur content	t	
2.5.	– lubricants	t	
2.6.	– other, please specify	t	

Household mobility survey

- **Responsibility:** National Statistics Offices / Ministry in charge of Housing.
- **Questionnaire:** Household energy or mobility survey
- **Reporting period:** Calendar year Y-1
- **Periodicity:** Pluriannual (e.g. every 5 years)
- **Data providers:** All households or households sample
- **Source:** National Households Register

Basic Survey Questionnaire

Questions on fuel purchase

- Expenditure or quantity of fuel purchased for transport (gasoline, diesel, LPG, electricity…)
- Fuel use for non-transport use; home charging

Questions on vehicles

- Vehicles owned (mileage, vintage)
- Other vehicles used

Questions on travel habits

- Regular travel habits
- Exceptional travel

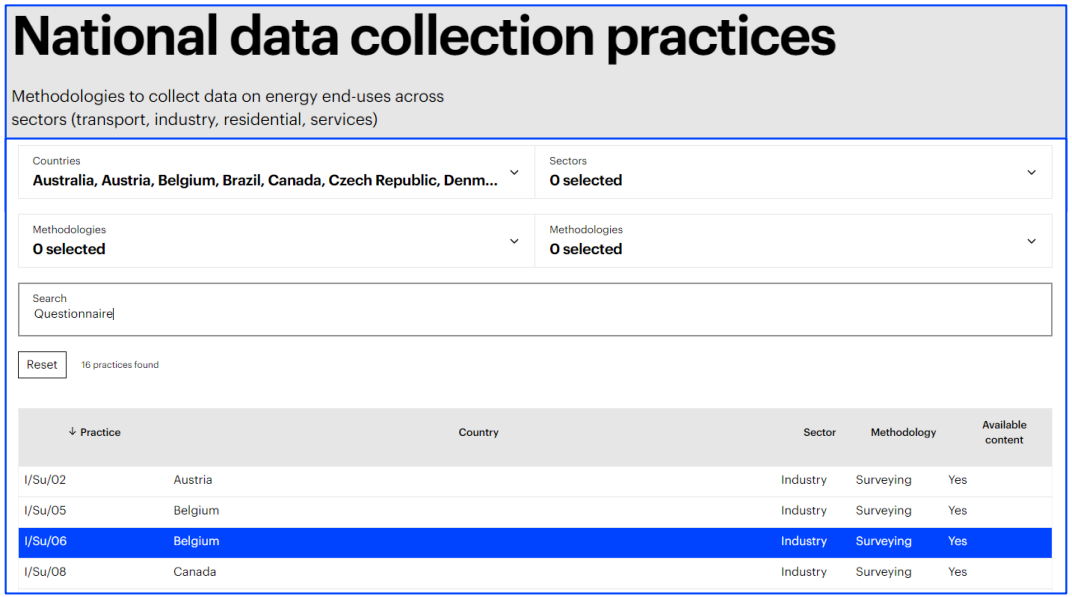
Quiz

Go to:
https://www.menti.com/
and use this code:
8269 5001

Or join using
the QR code:

IEA tools for data capacity development.

An experience database to foster dialogue with other countries



Contact us at EnergyIndicators@iea.org and share your practice

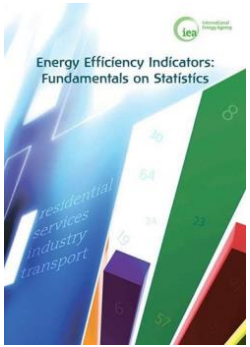
https://www.iea.org/articles/national-data-collection-practices

A searchable database, gathering data collection practices from a variety of countries, to share expertise worldwide.

IEA resources : methodologies on indicators and e-learning courses

Fundamentals on statistics:
to provide guidance on how to collect the data needed for indicators

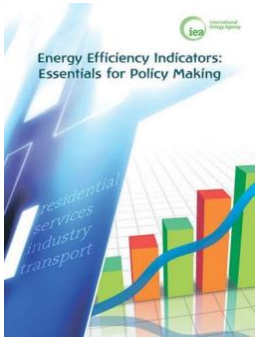
- Includes a compilation of existing practices from across the world
- https://www.iea.org/reports/energy-efficiency-indicators-fundamentals-on-statistics



Available in:
Spanish
Russian
Chinese
French

Essentials for policy makers:

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



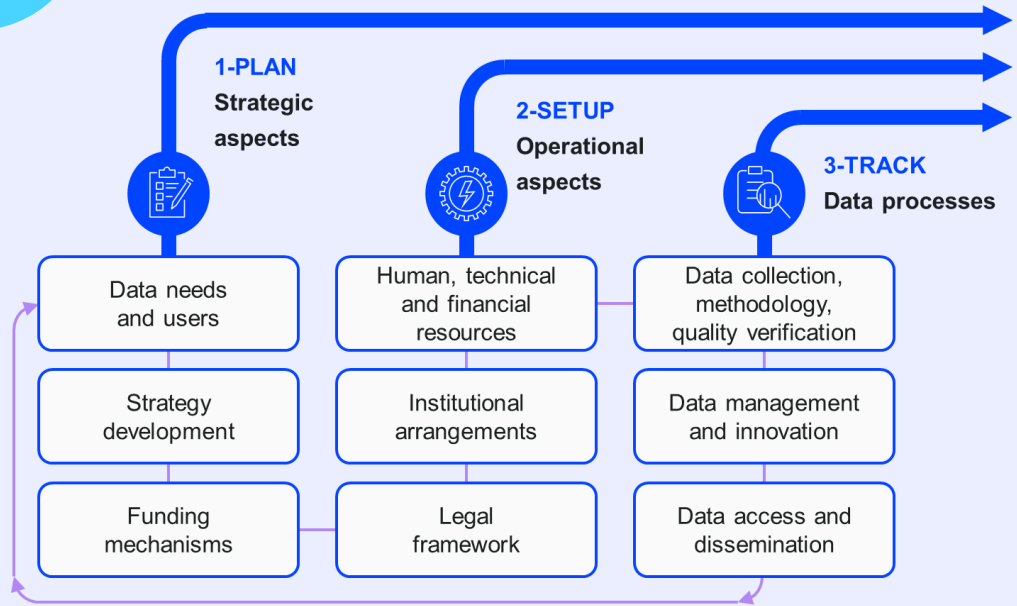
Available in:
Spanish
Russian
Chinese

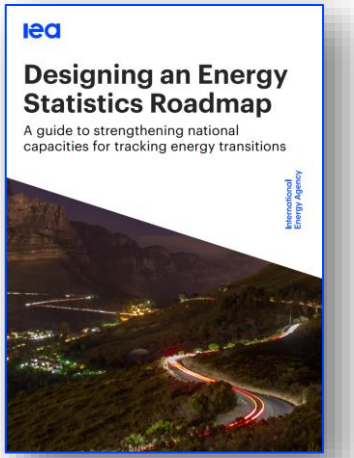
IEA e-learning courses on energy efficiency data:

- https://elearning.iea.org/

New IEA guidebook – released in September 2024

Based on IEA's **international collaborative experience**, including a **consultation** of several country data experts worldwide





https://www.iea.org/reports/designing-an-energy-statistics-roadmap

Conclusion

The importance of detailed end-use and energy demand data

- ✓ By providing detailed insights into energy consumption, demand-side data enables policymakers, researchers, and industry stakeholders to make informed decisions, track progress, and implement effective strategies.

- ✓ Reliable demand-side data also improves energy modelling, allowing for more accurate projections of future energy needs. Detailed demand-side energy data, coupled with activity data, enables the development of energy efficiency indicators that track progress and measure improvements over time.

- ✓ IEA is pleased to collaborate with countries to enhance demand-side data collection and analysis.

Thank you for your attention

Any question? EnergyIndicators@iea.org

Appendices

Energy balances are a compact source of information

2022

MILLION TONS OIL EQUIVALENT

SUPPLY AND CONSUMPTION	Coal	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Geotherm. Solar etc.	Biofuels & waste	Electricity	Heat	Total
Production	4249.8	4499.2	-	3502.6	700.3	374.0	454.2	1290.3			
Imports	802.5	2345.2	1365.6	1028.1	-	-	-	38.6			
Exports	-832.8	-2309.2	-1406.0	-1053.8	-	-	-	-27.3	-71.6	-0.0	-5700.8
Intl. marine bunkers	-	-	-	-	-	-	-	-	-	-	-
Intl. aviation bunkers	-	-	-	-	-	-	-	-	-	-	-
Stock changes	-113.7	14.1	-20.9	-40.0	-	-	-	-0.2	-	-	-160.7
TES	**4105.8**	**4549.3**	**-61.3**	**3436.9**	**700.3**	**374.0**	**454.2**	**1301.3**	**-2.2**	**1.5**	**14860.0**
Transfers	-7.2	-265.6	306.2	-	-	-	-	0.0	-	-	33.4
Statistical differences	-125.7	9.7	-5.4	-38.1	-	-	0.2	0.2	-9.2	8.3	-160.1
Electricity plants	-1826.5	-40.4	-147.0	-960.9	-699.7	-374.0	-379.4	-152.7	2129.1	-	-2451.5
CHP plants	-808.3	-0.0	-13.7	-326.5	-0.5	-	-4.2	-85.6	376.4	317.3	-545.0
Heat plants	-31.8	-0.5	-11.2	-62.3	-0.1	-	-2.2	-14.2	-	106.0	-16.4
Blast furnaces	-190.0	-	-0.1	-0.0	-	-	-	-0.0	-	-	-190.3
Gas works	-34.5	-	-3.7	17.6	-	-	-	-2.9	-	-	-23.5
Coke/pat. fuel/BKB plants	-84.8	-	-2.5	-0.0	-	-	-	-0.1	-	-	-87.4
Oil refineries	-	-4310.6	4212.2	-	-	-	-	-	-	-	-98.3
Petrochemical plants	-	43.5	-43.1	-	-	-	-	-	-	-	0.5
Liquefaction plants	-26.3	22.6	-	-16.9	-	-	-	-	-	-	-20.6
Other transformation	-0.7	13.9	-0.6	-23.0	-	-	-	-93.4	-0.5	-0.4	-104.6
Energy industry own use	-78.0	-8.1	-222.7	-306.3	-	-	-0.0	-13.1	-207.4	-48.8	-884.3
Losses	-1.7	-6.8	-0.2	-30.1	-	-	-0.0	-0.3	-173.1	-23.9	-236.0
TFC	**890.5**	**6.9**	**4007.0**	**1690.4**	**-**	**-**	**68.6**	**939.3**	**2113.2**	**360.0**	**10075.9**
Industry	717.7	1.8	327.3	674.5	-	-	0.8	255.2	894.9	191.9	3064.2
Transport	0.9	0.0	2539.9	123.5	-	-	-	99.4	38.8	-	2802.5
Residential	49.6	-	213.9	490.4	-	-	53.5	538.3	580.5	119.1	2045.3
Comm. and public servic	19.5	-	72.4	204.1	-	-	11.3	28.7	430.4	39.1	805.4
Agriculture/forestry	10.0	0.0	110.6	12.7	-	-	2.5	13.0	69.7	3.6	222.2
Fishing	0.0	-	6.5	0.1	-	-	0.1	0.0	0.9	0.1	7.6
Non-specified	14.4	0.0	27.4	5.9	-	-	0.4	4.7	98.1	6.3	157.3
Non-energy use	78.4	5.1	708.9	179.0	-	-	-	-	-	-	971.5

Supply

Transformation and energy industries own use

Final consumption

Transport related

Attention: Off-road vehicles?

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel combustion activities - sectoral approach
(Sheet 4 of 4)
Back to Index

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS	
1.A.4.b. Residential[14]				
Liquid fuels				
Solid fuels				
Gaseous fuels [6]				
Other fossil fuels[7]				
Peat[8]				
Biomass[3]				
Drop-down list:				
1.A.4.b.i. Stationary combustion				
Liquid fuels				
Solid fuels				
Gaseous fuels [6]				
Other fossil fuels[7]				
Peat[8]				
Biomass[3]				
1.A.4.b.ii. Off-road vehicles and other machinery				
Liquid fuels				
Solid fuels				
Gaseous fuels [6]				
Other fossil fuels[7]				
Biomass[3]				

5.92. *Road* refers to fuels and electricity delivered to vehicles using public roads. Fuels delivered for "off-road" use and stationary engines should be excluded. Off-road use comprises vehicles and mobile equipment used primarily on commercial industrial sites or private land, or in agriculture or forestry. The deliveries of fuels related to these uses are included under the appropriate final consumption heading. Deliveries for military uses are also excluded here but included under "not elsewhere specified". The fuel use for freight transport by road and by trolley buses is included h

Source: UN IRES

e.g. Diesel oil for non-highway use in tractors
-> Agriculture sector
Diesel used in engines by fork lifts for material handling
-> Industry sector

For a brief description of common types of off-road vehicles, refer to EEA Inventory guidebook.

Transport indicators – energy and activity data

Decomposition into drivers of energy consumption

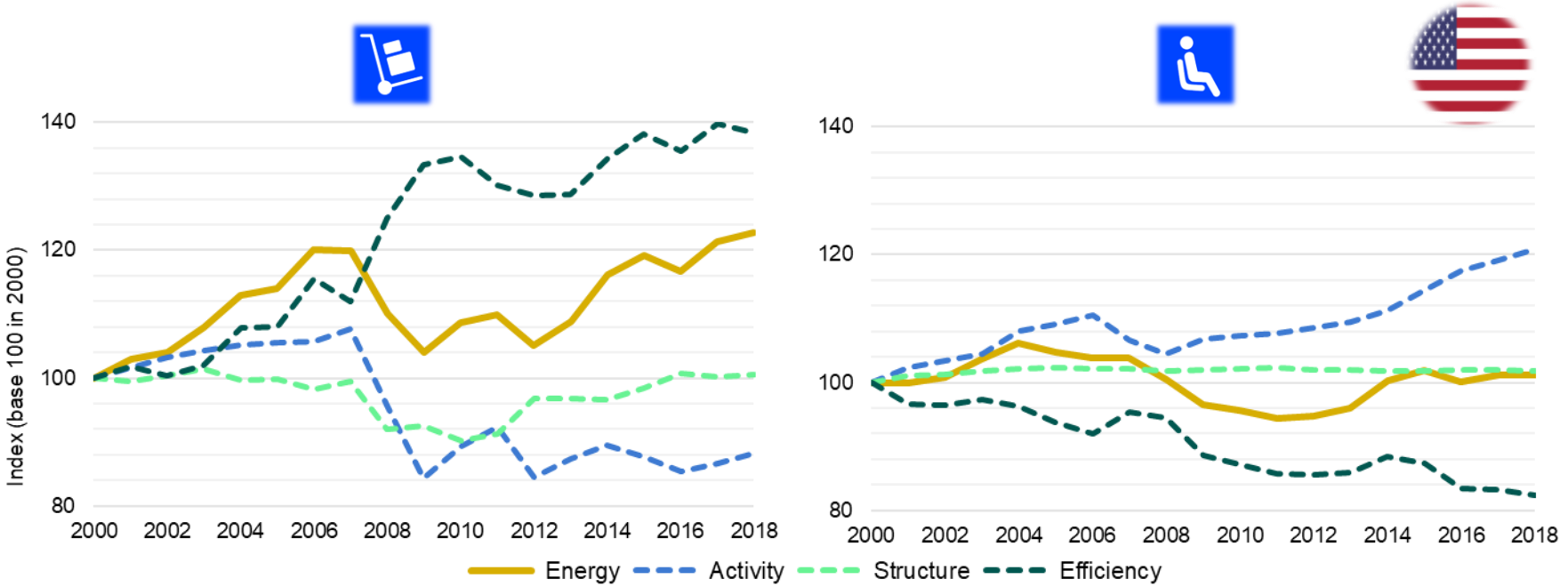
Segment	End use	Activity	Structure	Efficiency effect
Passenger transport	Cars/light trucks, buses, trains, domestic airplanes, domestic ships	Passenger-kilometres (pkm)	Share of pkm	Energy consumption per pkm
Freight transport	Trucks, trains, domestic airplanes, domestic ships	Tonne-kilometres (tkm)	Share of tkm	Energy consumption per tkm

Source: IEA Efficiency Indicators Documentation 2021

End use and activity data allow to analyse energy consumption and identify the impact of three main drivers.

Decomposition analysis for disentangling consumption drivers

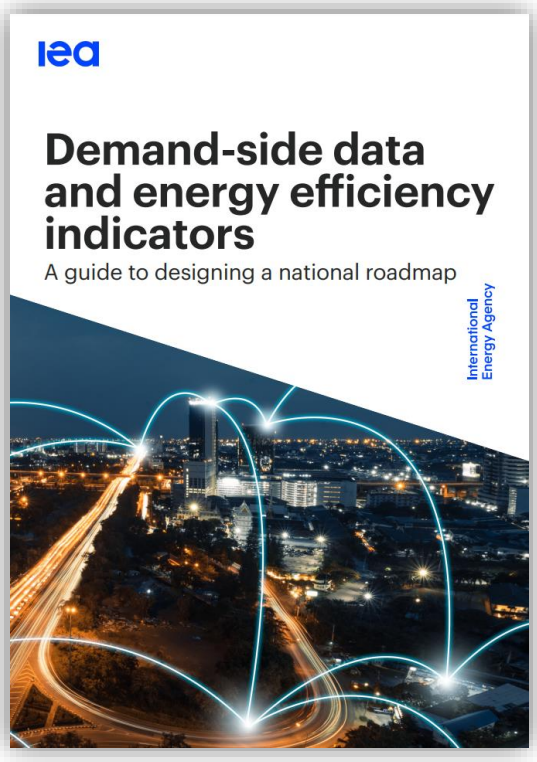
Drivers of transport energy consumption – Freight (left) and passenger (right) segments – United States (2000-2018)



The consumption of each segment is driven by very different factors, to be analysed to design performant policies.

Source: IEA Energy End-Uses and Efficiency Indicators, 2021

The IEA guide to designing a data collection roadmap



https://www.iea.org/reports/demand-side-data-and-energy-efficiency-indicators

International frameworks based on real experiences foster capacity building on disaggregated data collections.

Practical Toolkit to derive indicators from various sources

WORK IN PROGRESS

The IEA is developing a **toolkit** which will serve for countries to **model the end-use data** bridging the gap from raw data to the end use data. The countries will be trained to use them, building capacity to produce end-use data on their own.

Country balances data

Ad hoc surveys

Third party surveys

Toolkit

Model (Excel file) where to insert the input data and calculate the end-use data using some default (or tailored) assumptions. Word file with guidelines with the explanation of the assumptions to take and for the use of the tool

End-use and efficiency indicators data