



IEA estimates of GHG emissions from Energy

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- About IEA
- Energy and global GHG emissions
- From energy statistics to CO₂ emissions
- Estimating energy emissions – methodology
- Emissions data collaborations
- IEA capacity building work
- Key takeaways & questions

About IEA

The IEA is at the heart of the global dialogue on energy and energy transitions.

- Data collection, processing, and analysis
- Advising policymakers to contribute to energy policy development
- Capacity building and bilateral collaboration programs



G7 Heads of State Summit Jun 2022, Elmau, Germany

The IEA provides impartial data, policy advice and supports the implementation of secure, affordable and sustainable energy systems worldwide.

Energy system ▾ Topics ▾ Countries ▾ Data ▾

Energy Statistics Data Browser

The most extensive selection of IEA statistics with charts and tables on 16 energy topics for over 170 countries and regions



Data support for the Agency:

World Energy Balances

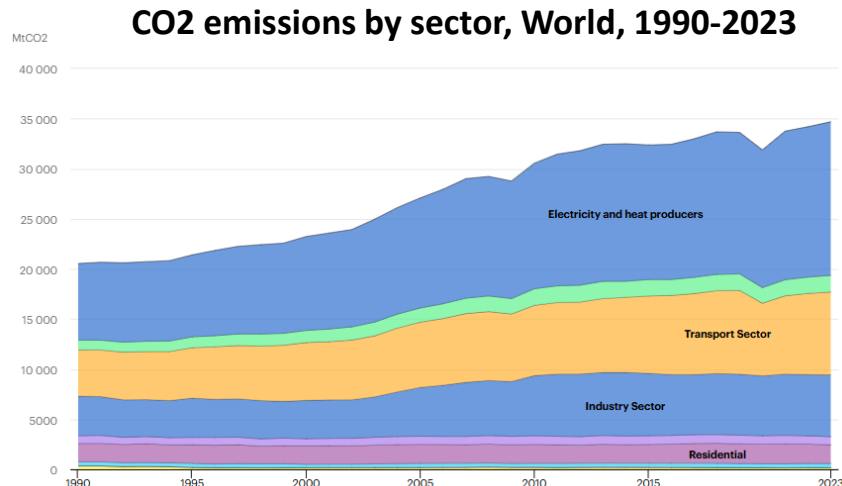
Energy balances for 156 countries and 35 regional aggregates

Greenhouse Gas Emissions from Energy Highlights

Free version of the IEA's annual time series of GHG Emissions from...

Emissions Factors 2025

Annual GHG emission factors for World countries from...



Explore our data portfolio:
<https://www.iea.org/data-and-statistics>

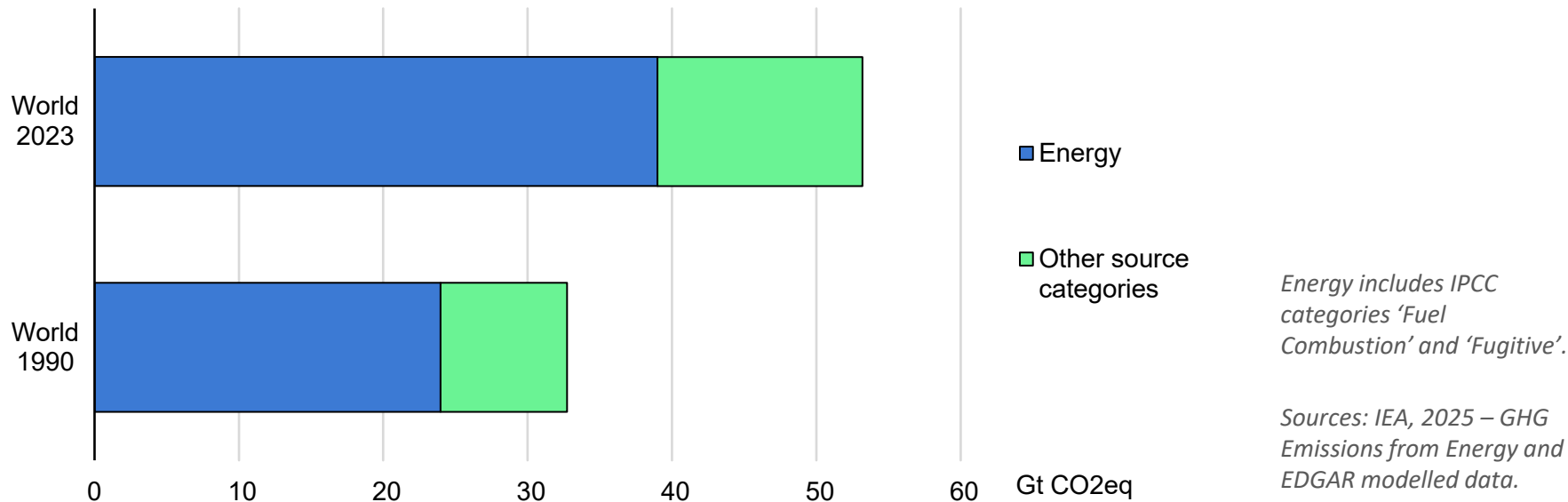
Data explorers:

- Energy Statistics Data Browser
- Greenhouse Gas Emissions from Energy
- Energy End-uses and Efficiency Indicators
- End-Use Prices
- Energy Technology RD&D Budgets

Energy and global GHG emissions

The importance of energy data in tracking GHG emissions

GHG emissions: energy VS other source categories



Energy accounts for around three quarters of the global greenhouse gas emissions

2006 IPCC Guidelines
for national
greenhouse gas
inventories

**Greenhouse
gas inventory
to UNFCCC**

1. Energy

**2. Industrial
Processes and
Product Use**

**3. Agriculture,
Forestry and
Other Land Use**

4. Waste

1A. Fuel combustion activities

1B. Fugitive emissions from fuels

1C. Carbon dioxide transport and storage

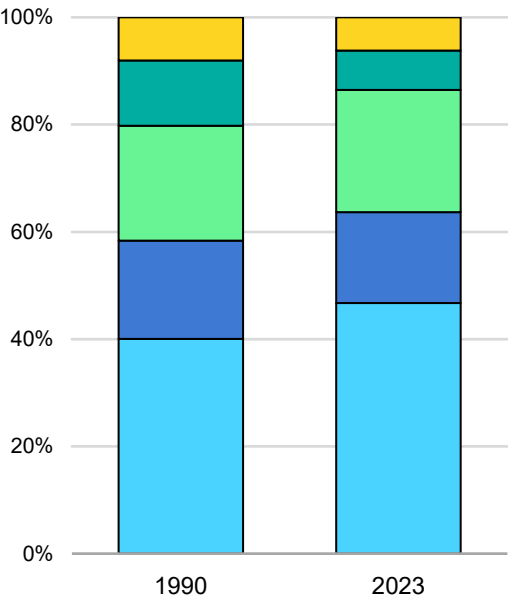
GHG emissions and related indicators – Sectoral split

The sectoral division of emissions is connected to the **economic structure** of a country.

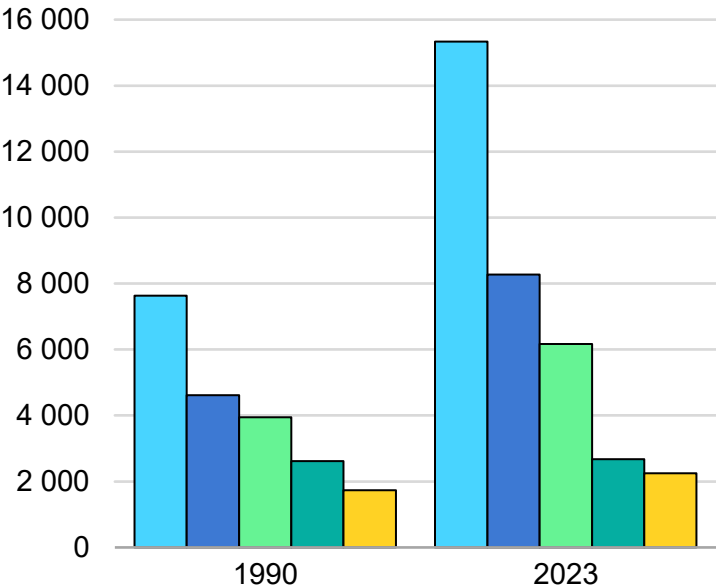
High share of emissions from power generation & other energy industries expected from countries with prominent energy industry.

Transport sector is another significant source of emissions. Connection to emissions from the power sector.

Global CO2 emissions - shares by sector



Global CO2 emissions by sector – MtCO2

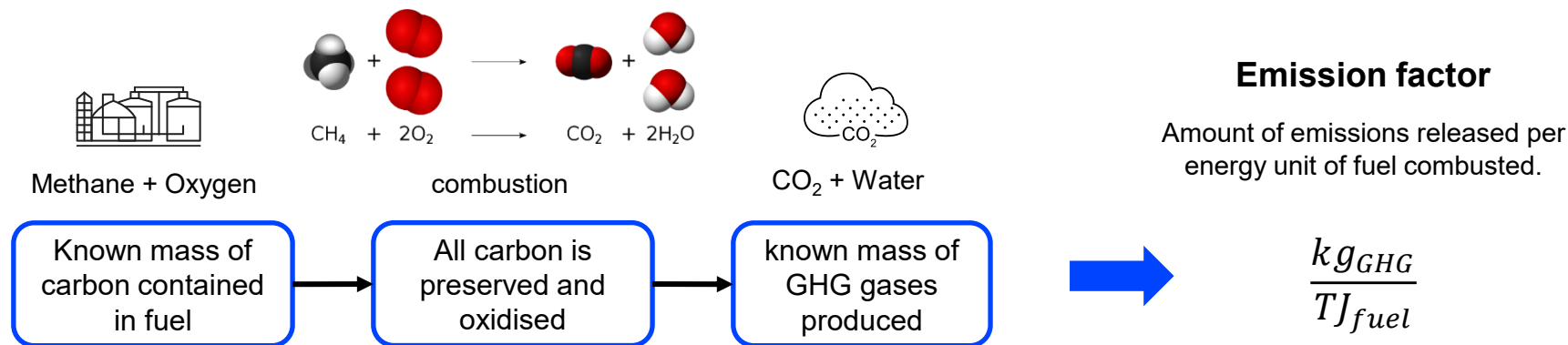


■ Power generation & energy own use ■ Industry ■ Transport ■ Buildings ■ Others

Source: IEA (2024) – GHG Emissions from Energy

The Buildings sector includes residential, commercial and public services.
The Other sector includes agriculture, forestry, fishing and non-specified consumption.

Estimating energy emissions – methodology



Estimating emissions – quality energy data required

2006 IPCC Guidelines for National GHG Inventories:
two approaches for estimating **fuel combustion** emissions

Sectoral Approach

Bottom up: from economic activity
i.e. **demand data** to emissions

	Sector 1	Sector 2	Sector 3
Product A	Transformation & Final consumption		
Product B			
Product C			



Both approaches exclude the
non-energy use of fuels!

Includes **all GHGs** from fuel combustion

Reference Approach

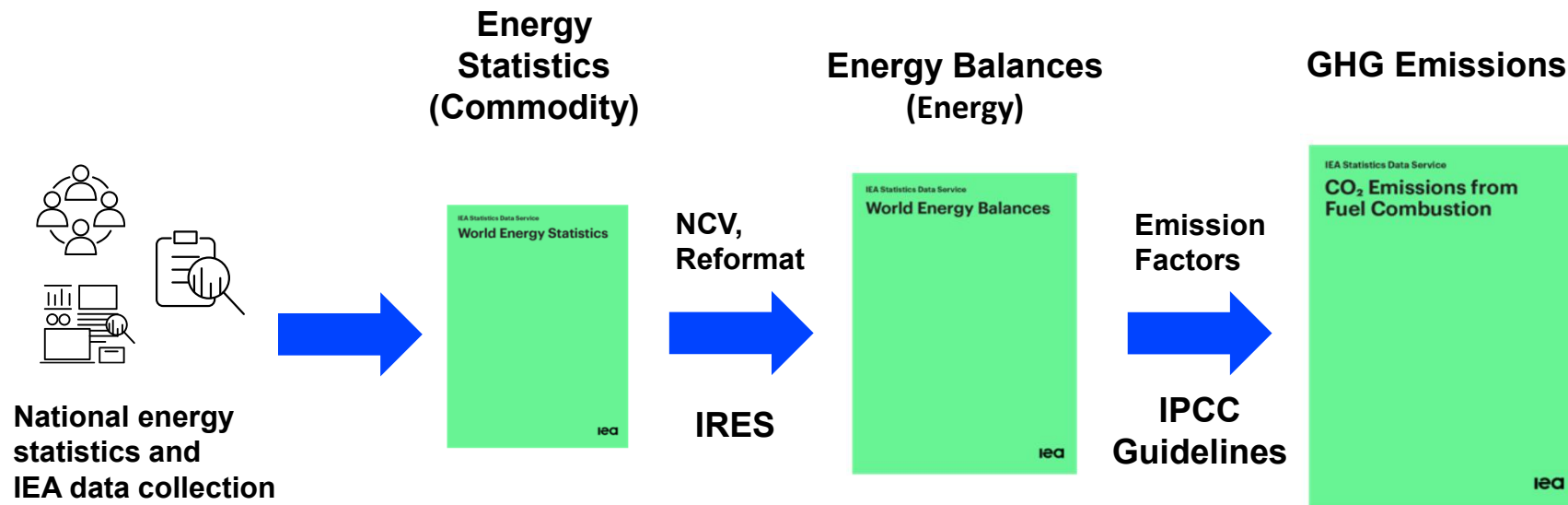
Top down: from **energy supply data** to emissions

	Supply
Product A	Energy supply
Product B	
Product C	



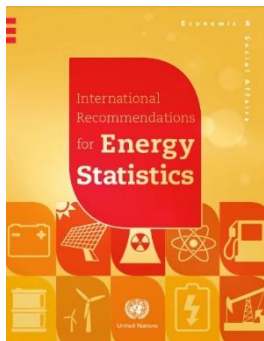
Includes only **CO₂** emissions from fuel combustion

From energy statistics to CO2 emissions



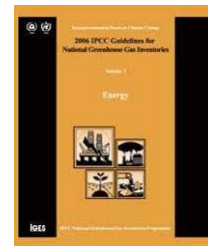
International Recommendations on Energy Statistics (IRES)

- Global reference for energy statistics methodologies



2006 IPCC Guidelines for National Greenhouse Gas Inventories

- Guidelines for estimating and reporting national GHG inventories



Volume 2 Energy

Comparability of energy statistics is key. IRES is consistent with IPCC methodologies.

IEA is a co-author of the IPCC Guidelines and contributes to the development of international standards on energy and emissions statistics.

OECD

- **5 annual Joint questionnaires**
- Annual collection on Energy efficiency, RD&D and forecasts
- Quarterly questionnaire on prices and taxes
- Monthly questionnaire
 - Electricity
 - Oil and gas (M-2)
 - Oil and gas (M-1)
- Emergency questionnaires



Non-OECD

- Voluntary
- Joint IEA/UNECE/Eurostat questionnaires used by some and growing
- Network of statistics contacts in 120 countries
- Cooperation with international organisations

Common objective for all - to improve timeliness and detail of data sent to IEA.

- Based on cooperation
- 120 countries and growing and 3 aggregate world regions – allows compilation of World energy balance
- Collected in multiple formats – whatever the country can provide: but official data
- Use of secondary sources and estimations – when country cannot provide data
- Communication with country contacts to help solve problems/confirm changes
- Data availability – for some countries energy data collection is ad-hoc process
- IEA remains the reference when it comes to energy data: others reconcile or calibrate their data/models to us.

Through its work with countries, the IEA notes key challenges that affect the quality of energy statistics and emissions estimates:

Common data challenges

- Limited information on energy consumption by sector
- Absence of country-specific calorific values
- Missing data on the non-energy use of fuels

National energy information system weaknesses

- Fragmented data collection systems
- Lack of institutional coordination and legal frameworks
- Limited human and financial resources

These constraints reduce the quality and timeliness of energy statistics and related emissions estimates, underscoring the importance of strengthening national statistical systems and inter-agency collaboration.

Emissions data collaborations

IEA contributes to climate policy transparency in several ways:

- general data sharing
- methodology reference (e.g. with IPCC)
- data analysis for the UNFCCC GHG inventories official review
- collaboration on national capacity building under the Enhanced Transparency Framework.
- **dedicated annual work to support UNFCCC GHG reviews and training activities:**

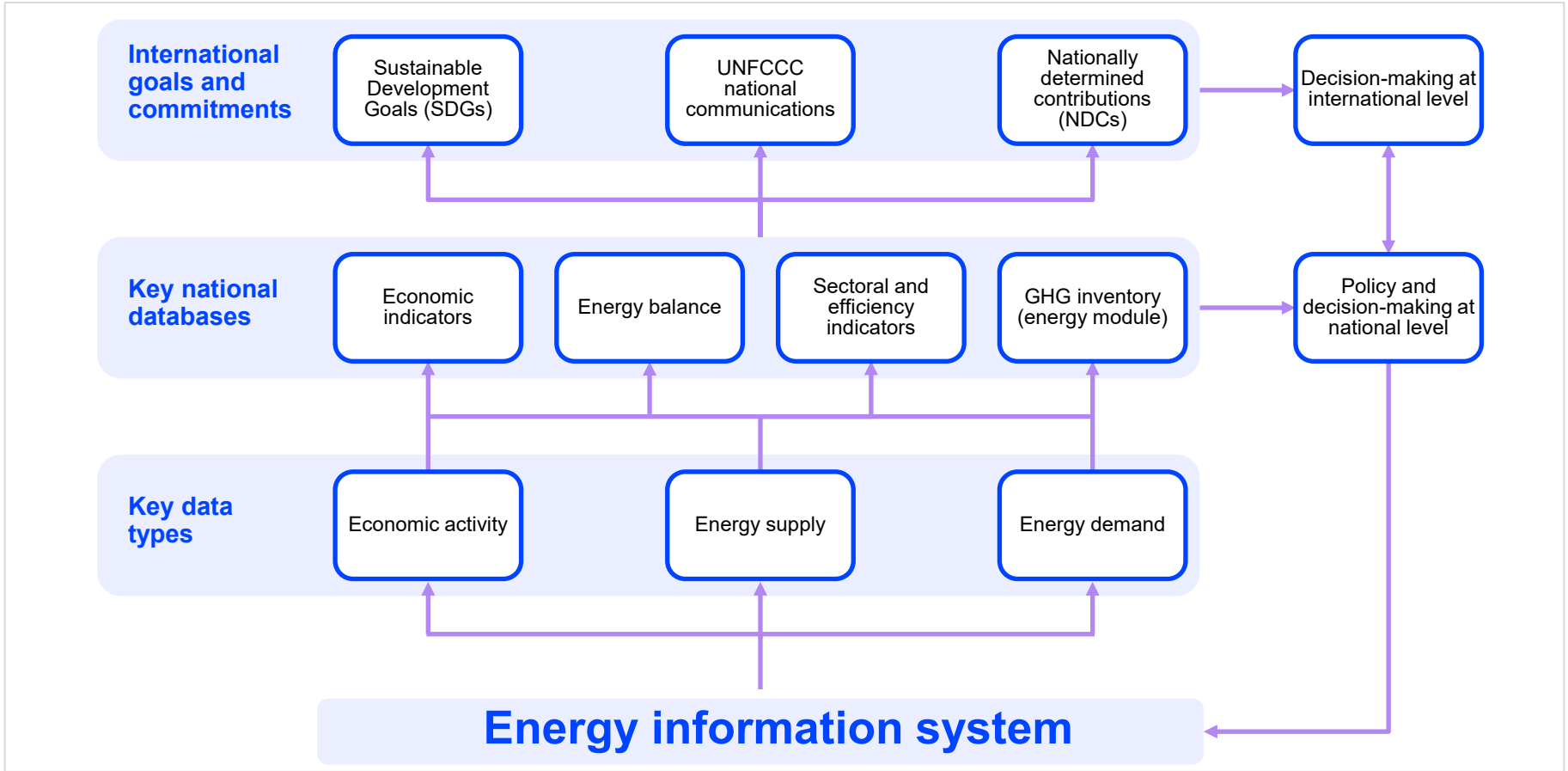
Each year, for each Party reviewed, IEA provides UNFCCC and its expert reviewers with an assessment, comparing the two international submissions.

Parties are requested to address issues within the review process.

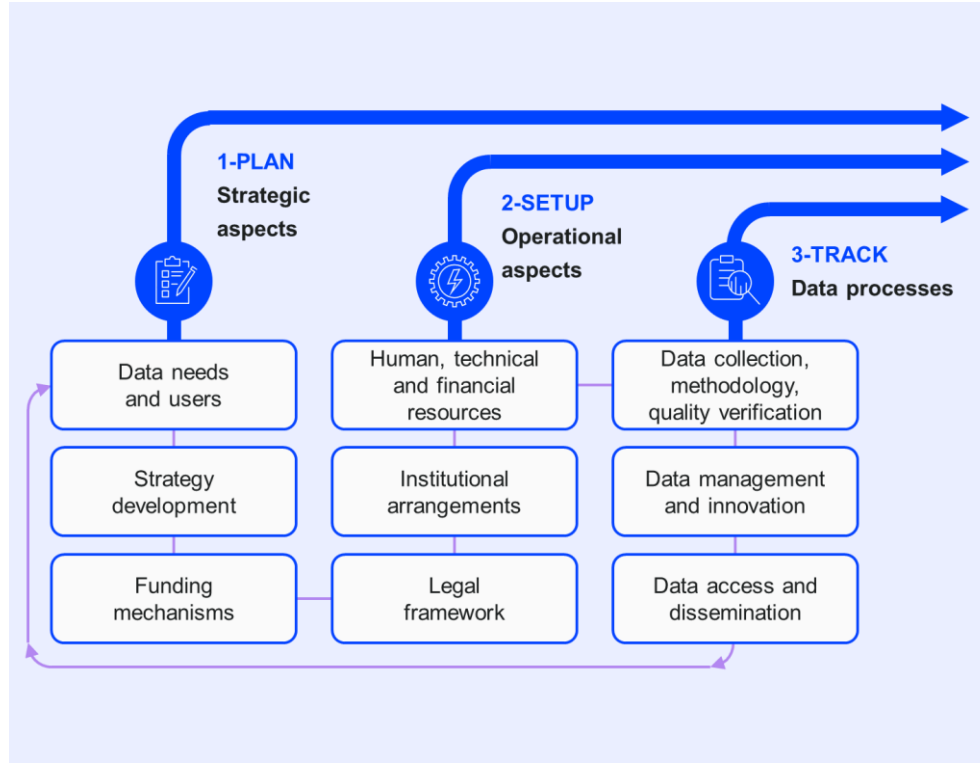
IEA supports UNFCCC on coherence of energy data and GHG inventories, to reduce burden on countries and improve data quality.

IEA capacity building work

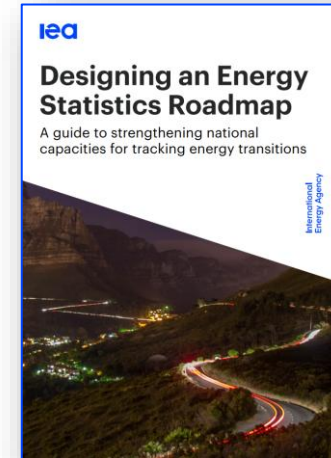
A solid information system to track national and international policies



IEA proposes bilateral collaboration to improve national statistics



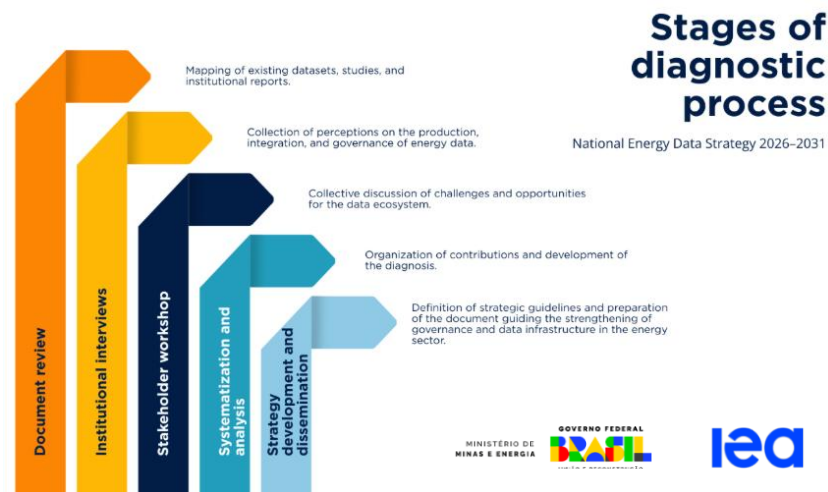
Based on IEA's **international collaborative experience**, including a **consultation** of several country data experts worldwide



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

Brazil – collaboration on Designing an Energy Data Strategy

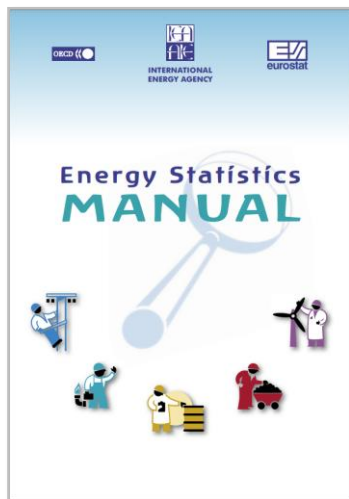
- As part of the **2025 Brazil Energy Policy Review**, Brazil worked with the IEA to apply the **Energy Data Roadmap** framework, assessing its energy data ecosystem and identifying priority actions.
 - The process highlighted the need for a **National Energy Data Strategy** as a key recommendation.
- The IEA subsequently supported the development of the **National Energy Data Strategy 2026–2031** through technical assistance, stakeholder consultations and institutional engagement.
 - Key action: **strengthen energy data governance**
- The strategy has now been launched for **public consultation**, representing a significant step towards a more integrated and modern energy data system that can support Brazil's energy transition objectives.



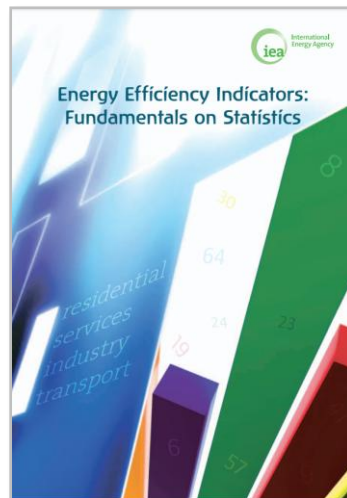
Institutional energy data ecosystem in Brazil



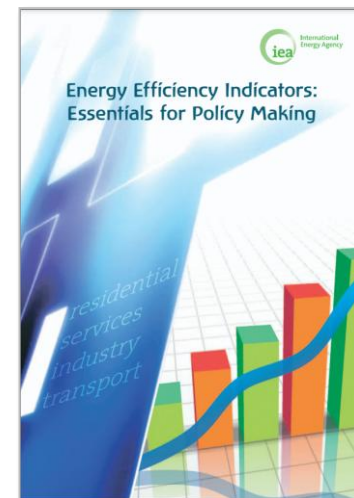
The IEA offers online resources on various energy-related topics



Energy statistics on supply, trade, stocks, transformation and demand form the basis of any sound energy policy decision. This manual is designed to give the non-specialist a basic understanding of energy statistics



The main objectives of this manual are to identify the key sectoral indicators and the data needed to build them, and to make available to everyone the survey, measurement and modelling practices that exist around the world.



This publication and its companion document, Energy Efficiency Indicators: Fundamentals on Statistics, are intended to provide the tools needed to initiate or develop in-depth indicators to support the decision-making process.

Learn more: <https://www.iea.org/about/data-and-statistics/manuals>

A searchable database gathering the data collection practices of various economies, to share expertise globally

Data collection methodologies for energy end-uses across all sectors (transport, industry, residential, services)

The aim is **to help countries and organisations** develop their own energy efficiency indicator programmes.

National Data Collection Practices

Methodologies to collect data on energy end-uses across sectors (transport, industry, residential, services)

Countries Australia, Austria, Belgium, Brazil, Canada, Czech Republic, Denm...	Sectors 0 selected
Methodologies 0 selected	Methodologies 0 selected

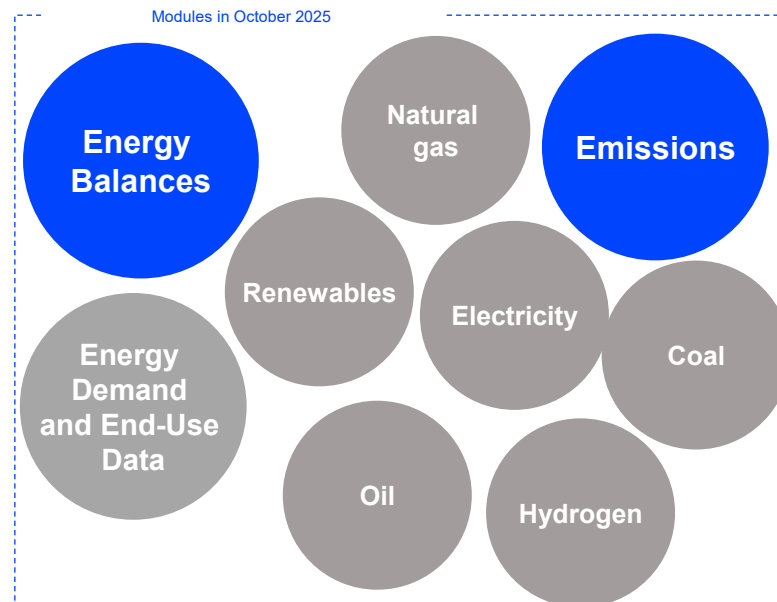
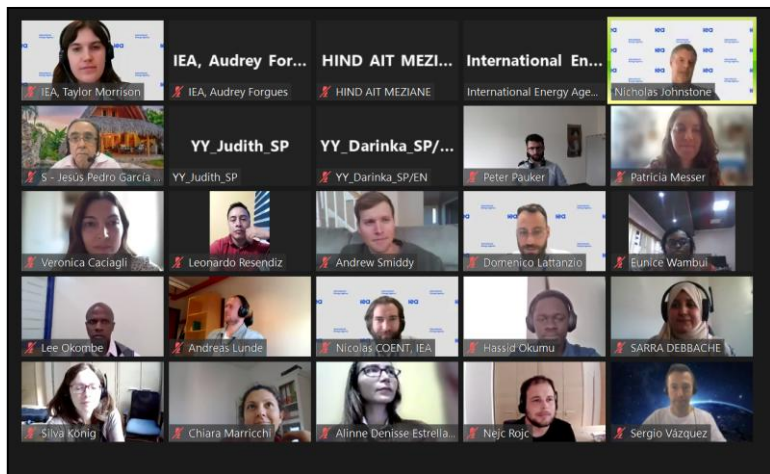
16 practices found

↓ Practice	Country	Sector	Methodology	Available content
I/Su/02	Austria	Industry	Surveying	Yes
I/Su/05	Belgium	Industry	Surveying	Yes
I/Su/06	Belgium	Industry	Surveying	Yes
I/Su/08	Canada	Industry	Surveying	Yes

Explore the database: <https://www.iea.org/data-and-statistics/data-tools/national-data-collection-practices>

This free bi-annual virtual training course provides an introduction to energy statistics, the IEA's methodologies and tools for collecting and reporting national energy statistics, including energy balances, energy demand, emissions, prices and fuel-specific data.

The next session will take place on 26–29 October 2026.



IEA is keen to collaborate with interested countries to strengthen national capacities

Events in person

Regional training: in Ethiopia for Sub-Saharan Africa, in Turkey for the MENA region (ESCWA/UNSD)

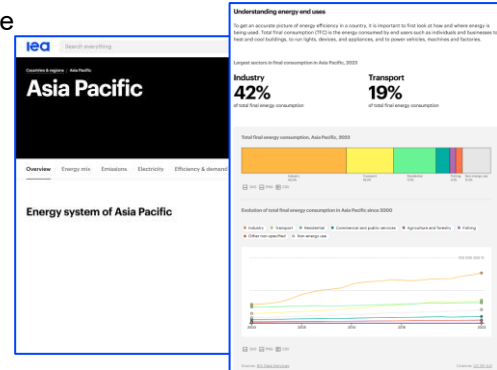
National workshops: India (with national stakeholders); in collaboration with the UNFCCC with selected countries around the world

Bilateral work with countries: Brazil (data strategy), Nigeria (sectoral demand surveys), Viet Nam (energy information system)



Dissemination

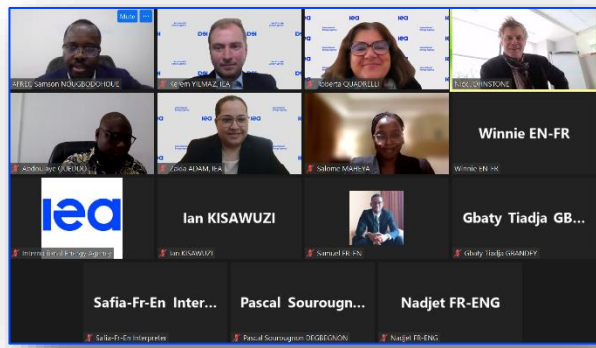
Data published on the IEA website, country profiles, etc



Webinars

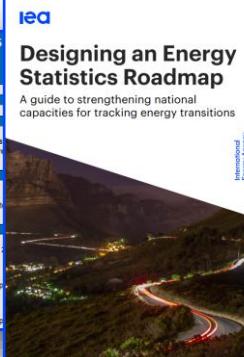
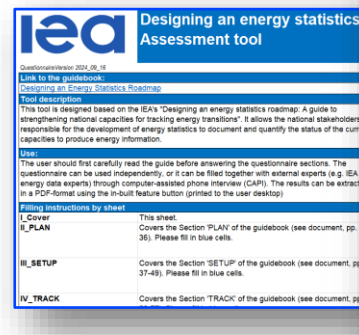
Regional: with AFREC, with AFREC/SADC, with APEC, EU4Energy

National (with UNFCCC): selected countries around the world



Capacity-building tools

- Publication of the guide “Designing an energy statistics roadmap” and its translations (French, Spanish, Arabic, Russian)
- Training videos



Key takeaways

Key takeaways for national emissions estimates

- The IEA is the main source of information for anyone trying to understand the energy and emissions landscape.
- Sectoral energy statistics are the primary source of GHG emission estimates. Strong national energy data systems are essential for credible climate reporting, effective policy monitoring and sound energy planning.
- Aligning energy and climate data requires partnerships between different institutions.
- IEA offers a broad range of support actions and materials to improve data, ranging from online courses, webinars to national capacity development activities.



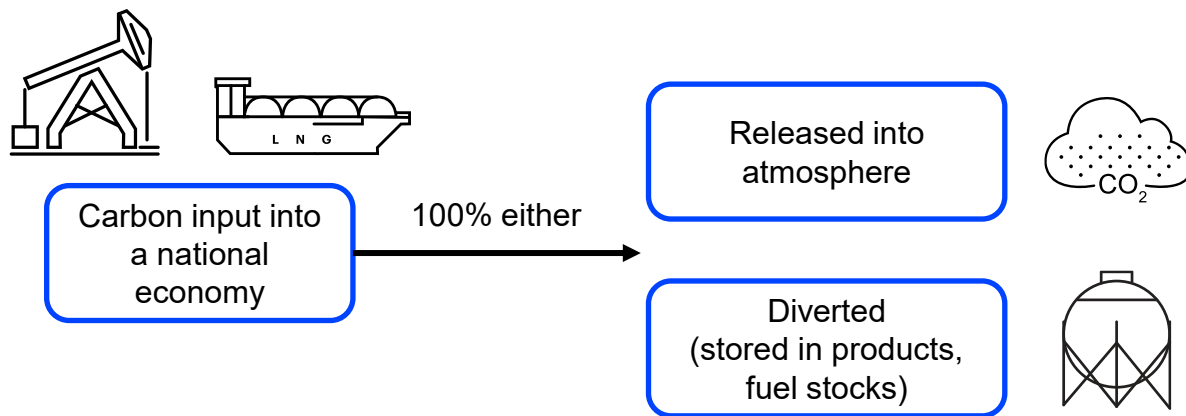


Annex

- 2006 IPCC Guidelines: **CO₂ emissions from biomass combustion are not included** in national totals corresponding to the **energy sector**, as they are estimated and reported in the ***Agriculture, Forestry and Other Land Use* sector**.
- Unlike CO₂, the **emissions of CH₄ and N₂O**, should be estimated and included in the energy sector and national totals since their effect is in addition to the stock changes estimates in the ***Agriculture, Forestry and Other Land Use* sector**.



Principle of carbon conservation



Top-down approach:

- Uses country's energy supply data
- Only CO₂ emissions
- Primarily a benchmark method, used to verify results of the more granular Sectoral Approach

IPCC TIER 1 Methodology:

Calorific values are used to convert between physical and energy units.

**Total fuel
combustion
emissions**



**sum over all
sectors and fuels**

Fuel combusted
(kt)



Net Calorific
Value (NCV)
(TJ/kt)

fuel specific



Emission factor
(kgGHG/TJ)

fuel specific,
TIER1: IPCC default factors

Net Calorific Value (NCV) is a property of fuels. It represents the practical amount of energy recovered per unit of fuel combusted.

Table 3.1

Standard International Energy Product Classification (SIEC)

SIEC Headings			Correspondences	
Section/ Division/ Group	Class	Title	CPC Ver.2	HS 2007
0		Coal		
01		Hard coal		
011	0110	Anthracite	11010*	2701.11
012		Bituminous coal		
	0121	Coking coal	11010*	2701.19
	0129	Other bituminous coal	11010*	2701.12
02		Brown coal		
021	0210	Sub-bituminous coal	11030*	2702.10*
022	0220	Lignite	11030*	2702.10*
03		Coal products		
031		Coal coke		
	0311	Coke oven coke	33100*	2704*
	0312	Gas coke	33100*	2704*
	0313	Coke breeze	33100*	2704*

The sectoral breakdown of UNFCCC CRT tables follows the IPCC source categories

1.A.3 Transport

a. Domestic aviation

b. Road transportation

- i. Cars
- ii. Light duty trucks
- iii. Heavy duty trucks and buses
- iv. Motorcycles
- v. Other (please specify)

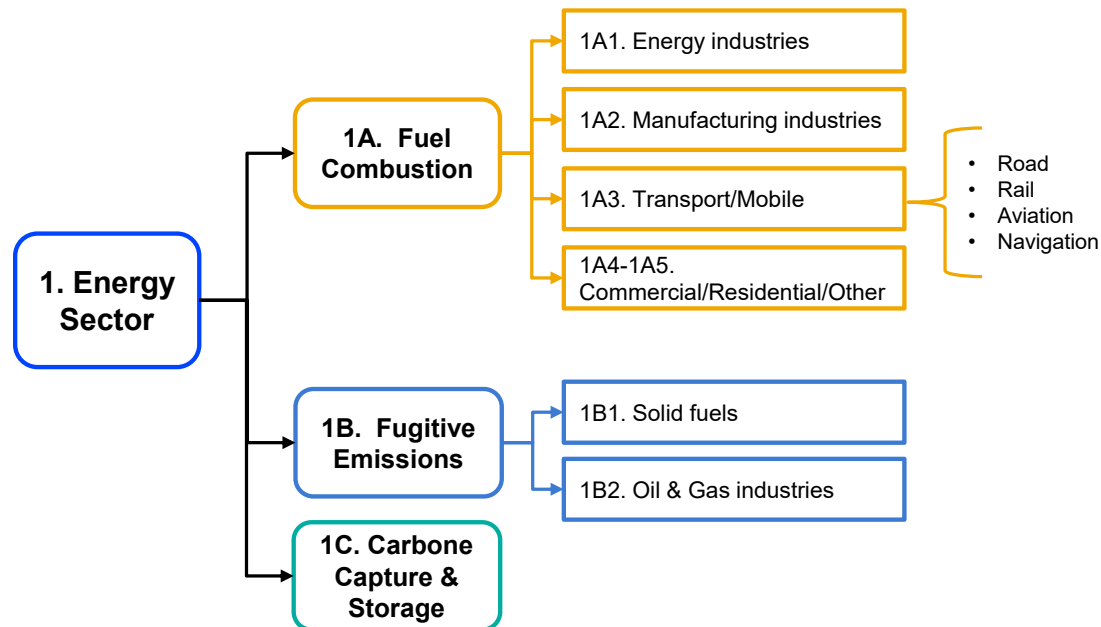
c. Railways

d. Domestic Navigation

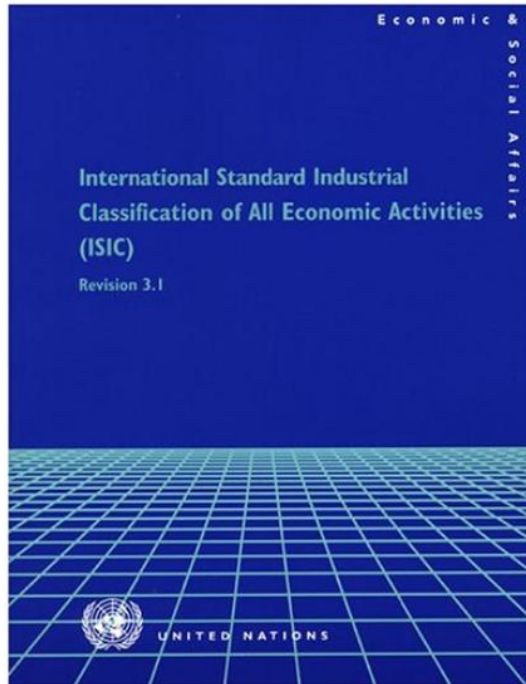
e. Other transportation (please specify)

- i. Pipeline transport
- ii. Other (please specify)

Airport ground activities



The 2006 IPCC Guidelines refer to **ISIC Rev. 3.1** classification of economic activities



UNFCCC **CRT Table 1.A(a)** (Sheet 2)

- 1.A.2 Manufacturing industries and construction
 - 1.A.2.a. Iron and steel
 - 1.A.2.b. Non-ferrous metals
 - 1.A.2.c. Chemicals
 - 1.A.2.d. Pulp, paper and print
 - 1.A.2.e. Food processing, beverages and tobacco
 - 1.A.2.f. Non-metallic minerals
 - 1.A.2.g. Other
 - 1.A.2.g.i. Manufacturing of machinery
 - 1.A.2.g.ii. Manufacturing of transport equipment
 - 1.A.2.g.iii. Mining (excluding fuels) and quarrying
 - 1.A.2.g.iv. Wood and wood products
 - 1.A.2.g.v. Construction
 - 1.A.2.g.vi. Textile and leather
 - 1.A.2.g.vii. Off-road vehicles and other machinery
 - 1.A.2.g.viii. Other