Energy and Carbon Tracker

2023 edition

Users Guide

iea

INTERNATIONAL ENERGY AGENCY

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The IEA examines the full spectrum of energy issues including oil, gas and coal supply and demand, renewable energy technologies, electricity markets, energy efficiency, access to energy, demand side management and much more. Through its work, the IEA advocates policies that will enhance the reliability, affordability and sustainability of energy in its
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This document provides information regarding the 2023 edition of the International Energy Agency (IEA) *Energy and Carbon Tracker* Excel database. This database can be found online at:

https://www.iea.org/data-and-statistics/data-product/iea-energy-and-carbon-tracker-2023

We would like to hear your feedback on the type of variables and functionalities which if incorporated in the next editions of this product would be beneficial to your needs.

Please address your inquiries to emissions@iea.org

Please note that all IEA data are subject to the following Terms and Conditions found on the IEA website: https://www.iea.org/terms

Contents

1. Database description

Tracking progress in the transition to low-carbon energy systems provides valuable insight into the steps needed today to achieve both short- and long-term climate goals. The IEA Energy and Carbon Tracker is an interactive product showcasing a wide set of indicators useful to analyse historical trends of greenhouse gas (GHG) emissions, covering energy, power and sectoral patterns - all at country level. This product is published in Excel format and includes graphs and associated data, also allowing for country comparison. The user-friendly design allows visual presentation of a set of analyses which help tracking decarbonisation for each country and globally.

The data are derived from the 2023 editions of the IEA World Energy Balances, Greenhouse Gas Emissions from Energy and Energy Efficiency Indicators databases. The Tracker includes annual data from up to year-1 for selected indicators and key countries (mainly OECD countries, IEA Family); and up to year-2 for the global set of indicators for over 160 countries and regions. The *Tracker* includes graphs and data for the following indicators:

- Total GHG emissions from energy by product
- Total GHG emissions from fuel combustion by sector and by product
- Total fugitive GHG emissions by energy sector and by type of gas
- Share of fuel combustion and fugitive GHG emissions in total energy related GHG emissions
- Share of CO_2 emissions from fuel combustion by product
- GHG and energy-related socio-economic indicators
- Total energy supply by source and by product
- Sectoral shares in total final consumption
- Power generation and sectoral CO_2 emissions from fuel combustion by product
- Share of power generation by product
- Drivers of CO_2 emissions from electricity generation
- Sectoral energy consumption by product
- Sectoral energy and carbon intensities
- End-use energy and carbon intensities by sector

2. How to use this product

This section outlines the structure of the file and discusses its functionalities.

The Excel file includes 13 main worksheets with compilations of interactive graphs by topic, which allow the user to select the country to be displayed and compared. In addition, there are 60 data worksheets, each which is accompanied by the underlying data associated with a given graph, in a simple table format.

In each worksheet, users can select the country to be displayed through a menu on the right side of the page. All the graphs on the sheet will automatically update, with the name of the country in the title.

Figure 1 displays an example of the country menus, which enable users to select a country and automatically update the graphs.

Figure 1   Example of a country menu included on the main worksheets

Country						
World	Albania	Algeria	Angola	Argentina	Armenia	Australia
Austria	Azerbaijan	Bahrain	Bangladesh	Belarus	Belgium	Benin
Plurinational Sta…	Bosnia and Herz…	Botswana	Brazil	Brunei Darussalam	Bulgaria	Cambodia
Cameroon	Canada	Chile	People's Republi…	Colombia	Republic of the …	Costa Rica
Cote d'Ivoire	Croatia	Cuba	Curacao/Nether…	Cyprus	Czech Republic	Democratic Peo…
Democratic Rep…	Denmark	Dominican Repu…	Ecuador	Egypt	El Salvador	Equatorial Guinea
Eritrea	Estonia	Kingdom of Esw…	Ethiopia	Finland	France	Gabon
Georgia	Germany	Ghana	Gibraltar	Greece	Guatemala	Guyana
Haiti	Honduras	Hong Kong (China)	Hungary	Iceland	India	Indonesia
Islamic Republic …	Iraq	Ireland	Israel	Italy	Jamaica	Japan
Jordan	Kazakhstan	Kenya	Korea	Kosovo	Kuwait	Kyrgyzstan
Lao People's De…	Latvia	Lebanon	Libya	Lithuania	Luxembourg	Madagascar
Malaysia	Malta	Mauritius	Mexico	Republic of Mol…	Mongolia	Montenegro
Morocco	Mozambique	Myanmar	Namibia	Nepal	Netherlands	New Zealand
Nicaragua	Niger	Nigeria	Norway	Oman	Pakistan	Panama
Paraguay	Peru	Philippines	Poland	Portugal	Qatar	Republic of Nort…
Romania	Russian Federati…	Rwanda	Saudi Arabia	Senegal	Serbia	Singapore
Slovak Republic	Slovenia	South Africa	South Sudan	Spain	Sri Lanka	Sudan
Suriname	Sweden	Switzerland	Syrian Arab Rep…	Chinese Taipei	Tajikistan	United Republic …
Thailand	Togo	Trinidad and To…	Tunisia	Republic of Turk…	Turkmenistan	Uganda
Ukraine	United Arab Emi…	United Kingdom	United States	Uruguay	Uzbekistan	Bolivarian Repu…
Viet Nam	Yemen	Zambia	Zimbabwe	Other Africa	Other Non-OEC…	Other non-OEC…

Users can easily access the underlying data for each graph by clicking on the relevant button under the country menu.

Figure 2 shows an example of the buttons to access the underlying data for each individual graph.

Figure 2   Example of the buttons included on the main worksheets for accessing data

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

Graph 3	Graph 4	Graph 5
GHG emissions from fuel combustion by fuel (MtCO$_2$)	**CO$_2$ emissions from fuel combustion and drivers indices (2000 = 100)**	**Power generation CO$_2$ emissions (MtCO$_2$)**

Graph 6	Graph 7	Graph 8
Share in power generation (%)	**Carbon intensity of power index (2000=100)**	**Energy intensity of the economy (TES/GDP) (GJ per thousand 2015 USD)**

Graph 9	Graph 10	Graph 11
Total energy supply per population (GJ per capita)	**Carbon intensity of the economy (CO$_2$/GDP) (kg CO$_2$ per 2015 USD)**	**CO$_2$ emissions from fuel combustion per population (tCO$_2$ per capita)**

Note: Macros must be enabled for this file to work properly.

The worksheets included in the file are:

Contents

The **Contents** sheet shown in Figure 3 includes the table of contents, to help users navigate through the Excel file, as well as a brief product description, links to the sources and supporting documentation.

Figure 3   Structure of the **Contents** sheet

| iea | Highlights | Country comparison | Total and fugitive emissions | Fuel combustion emissions | Energy | Power | Industry | Transport | Buildings | End-use | Definitions | Geo coverage |

Energy and carbon tracker (2023 edition)

Product description

This product showcases a wide set of indicators to analyse historical trends of greenhouse gas emissions, covering energy, power and sectoral patterns at country level. It includes interactive graphs of time series and decomposition analyses, also allowing for country comparison. The indicators are derived based on data from the IEA "World energy balances", "Greenhouse gas emissions from energy" and "Energy efficiency indicators" databases.

For a general explanation of metrics, as well as time and geographical coverage, please refer to the Definitions tab.

Data for individual graphs are available in sheets named "Graph xx_(Tab xxx)".

For detailed guidance of how to use this file, please refer to the following users guide:

IEA Energy and carbon tracker: Users guide

Table of contents

Highlights	Selected set of indicators with data up to 2022.
Country comparison	Provides comparison among countries for a selected set of indicators.
Total and fugitive emissions	Set of indicators tracking total and fugitive greenhouse gas emissions from energy.
Fuel combustion emissions	Set of indicators tracking greenhouse gas emissions from fuel combustion.
Energy	Set of indicators tracking energy.
Power	Set of indicators tracking power.
Industry	Set of indicators tracking industry.
Transport	Set of indicators tracking transport.
Buildings	Set of indicators tracking buildings.
End-use	Set of indicators presenting end-use intensities.
Definitions	Defines the variables presented in this file.
Geo coverage	Includes the regional definitions.

Sources

- IEA (2023), World energy balances (database).
- IEA (2023), Greenhouse gas emissions from energy (database).
- IEA (2023), Energy efficiency indicators (database).

T&Cs   More data   Contact us

Documentation

For detailed information on definitions, methodologies, sources and geographical coverage, please consult the following documentation:

IEA World energy balances

IEA Greenhouse gas emissions from energy

IEA Energy efficiency indicators

Highlights

The **Highlights** sheet includes 11 interactive graphs for a selected set of indicators, with data up to the most recent year.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_Highlights" and can be accessed by clicking on the relevant buttons.

Figure 4 shows samples from the interactive graphs included on the **Highlights** sheet.

Figure 4   Sample graphs from the **Highlights** sheet
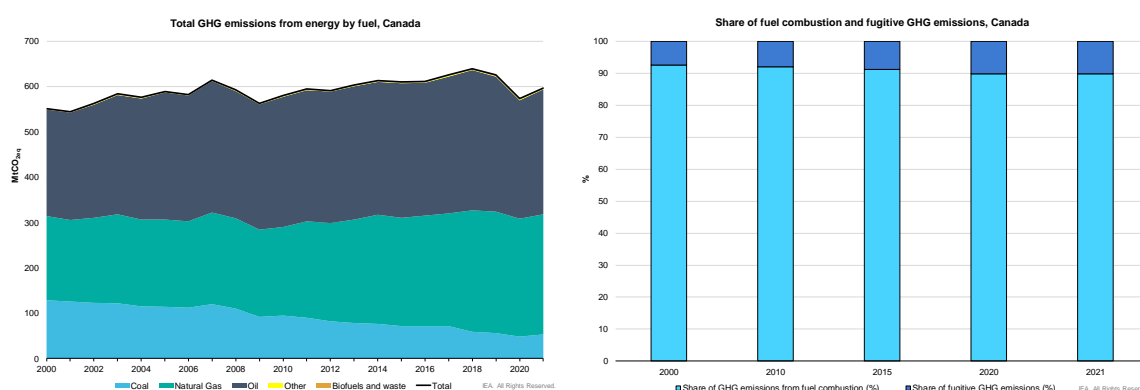
The full list of indicators included in this sheet includes:

- Total GHG emissions from energy by product
- Share of fuel combustion and fugitive GHG emissions
- GHG emissions from fuel combustion by product
- Total CO_2 emissions and drivers indices
- Power generation CO_2 emissions from fuel combustion by product
- Share of power generation by product
- Carbon intensity of power index
- Carbon intensity of the economy
- Energy intensity of the economy
- CO_2 emissions from fuel combustion per population
- Total energy supply (TES) per population.

Due to the difference in data availability among the included indicators, this sheet is divided into two sections. The data corresponding to the two graphs on top of the sheet is available

for a set of 93 countries and nine regions, while the data corresponding to the other included graphs is available for the full geographical coverage of the product (153 countries and nine regions). Therefore, two separate country menus are included on this sheet.

Country comparison

The **Country comparison** sheet includes 12 interactive graphs for a selected set of indicators, which allows for comparison among countries and regions.

By holding the Control key (CTRL) on the keyboard multiple countries/regions can be selected. Moreover, the year for the desired comparison can be selected for all graphs in bar format, while the time series graphs remain complete. The names of the countries selected will appear in the legends.

Figure 5 presents the country and year menus which allow filtering the graphs included on the **Country comparison** sheet.

Figure 5   Country and year menus from the **Country comparison** sheet

Data for all the bar charts are accessible by clicking on the relevant buttons and included on the **Bar charts_Country comparison** sheet, while the corresponding data for all the time series are included on the **Time series_Country comparison** sheet. By referring to the graph titles, the relevant data for each graph can be obtained.

Due to the difference in data availability among the included indicators, this sheet is divided into two sections. The data corresponding to the three graphs on top of the sheet is available for a set of 93 countries and ten regions, while the data corresponding to the other included graphs is available for the full geographical coverage of the product (153 countries and nine regions). Therefore, two separate country menus are included on this sheet.

Figure 6 represents samples of the interactive graphs included on the **Country comparison** sheet.

Figure 6   Sample graphs from the **Country comparison** sheet
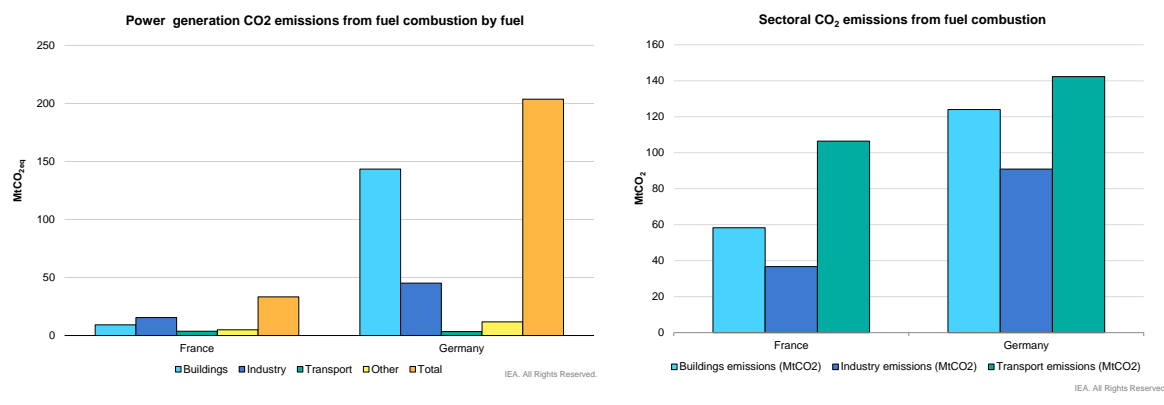
The full list of indicators included in this sheet includes:

- Total GHG emissions from energy
- Share of fuel combustion and fugitive GHG emissions
- Total fugitive GHG emissions
- Total energy supply (TES)
- GHG emissions from fuel combustion by product
- Carbon intensity of power index
- CO_2 emissions from fuel combustion by product
- Power generation CO_2 emissions by product
- Sectoral CO_2 emissions from fuel combustion
- Carbon intensity of the economy
- Energy intensity of the economy
- Final energy carbon intensity
- TES and total final consumption (TFC) per population

- CO_2 emissions from fuel combustion per population.

Total and fugitive emissions

Energy is at the core of the greenhouse gas emissions. It is estimated that energy accounts for around three-quarters of total GHG emissions globally.

Fugitive emissions correspond to around ten percent of energy-related emissions globally and reducing methane emissions could be the single most important and cost-effective way for the industry to minimise overall emissions from core oil and gas operations. However, efforts to reduce these emissions have been held back by a lack of reliable data[1].

The **Total and fugitive emissions** sheet includes six interactive graphs showcasing a set of indicators tracking total energy related GHG emissions and fugitive emissions from the energy industry. Additionally, the sheet represents a set of socio-economic indicators based on total GHG emissions from energy.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_Total&FugitiveGHG" and can be accessed by clicking on the relevant buttons.

Figure 7 represents samples from the interactive graphs included on the **Total and fugitive emissions** sheet.

Figure 7   Sample graphs from the **Total and fugitive emissions** sheet

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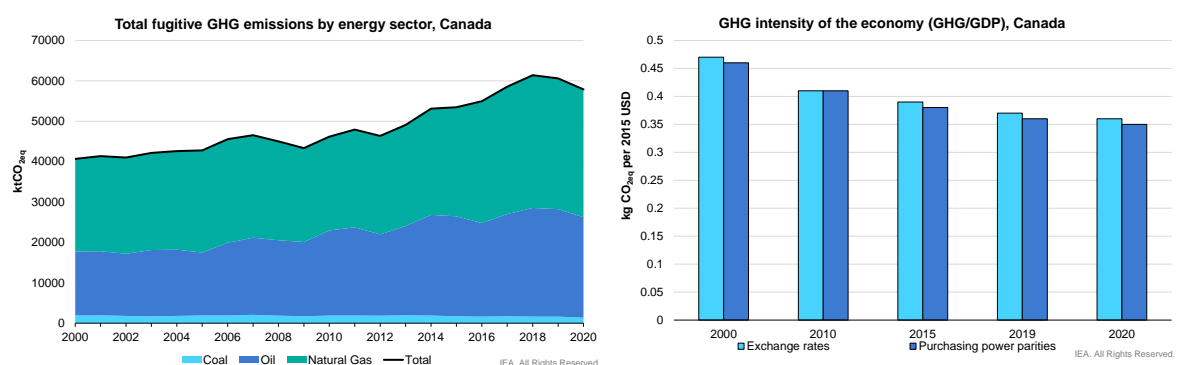
[1] For more information refer to the IEA 2023 Methane Tracker report available at: https://www.iea.org/reports/global-methane-tracker-2023

Fuel combustion emissions

Among energy-related emissions, fuel combustion emissions accounts for the largest fraction. Understanding the fuels, sectors and macro-economic factors driving these emissions trends is pivotal to address the priorities needed to achieve energy and climate targets.

The **Fuel combustion emissions** sheet includes six interactive graphs showcasing a set of indicators tracking GHG emissions from fuel combustion, also including the decomposition of CO_2 emissions from fuel combustion into four macro-economic driving factors (Kaya identity). Please refer to "Identifying drivers of CO_2 emissions trends" included on the "Definitions" tab for more information on this decomposition analysis. Moreover, socio-economic indicators based on CO_2 emissions from fuel combustion are presented.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_FuelcombustionGHG" and can be accessed by clicking on the relevant buttons.

Figure 8 represents samples from the interactive graphs included on the **Fuel combustion emissions** sheet.

Figure 8   Sample graphs from the **Fuel combustion emissions** sheet
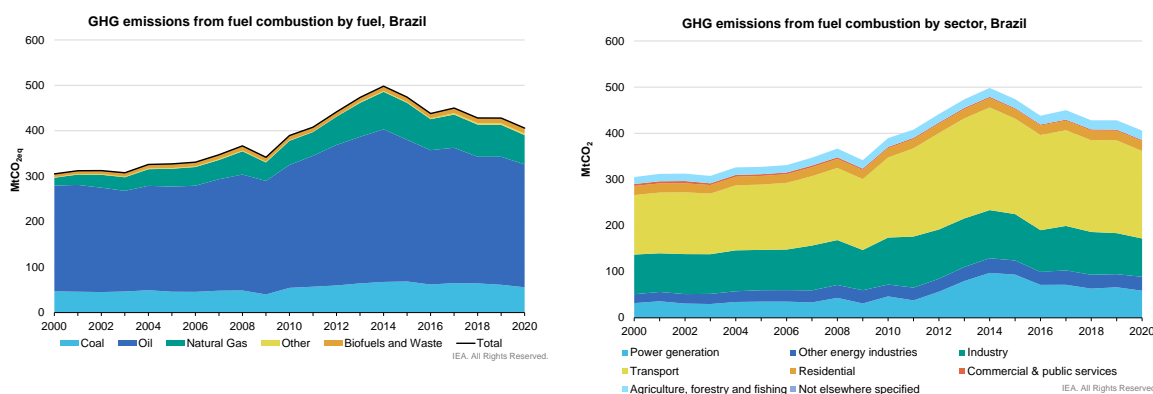
The full list of indicators included in this sheet includes:

- GHG emissions from fuel combustion by product
- GHG emissions from fuel combustion by sector
- Share of CO_2 emissions from fuel combustion by fuel
- CO_2 emissions from fuel combustion and drivers indices
- Annual average change of CO_2 emissions from fuel combustion

- Carbon intensity of the economy
- CO_2 emissions from fuel combustion per population.

Energy

Tracking the contribution of different energy sources in total energy supply (TES), alongside the share of end sectors in total final consumption (TFC), provides valuable input in energy and climate policy making. Moreover, energy-related economic metrics can help to understand the energy intensity of economies.

The **Energy** sheet includes five interactive graphs displaying a set of indicators tracking energy transition.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_Energy" and can be accessed by clicking on the relevant buttons.

Figure 9 represents samples from the interactive graphs included on the **Energy** sheet.

Figure 9   Sample graphs from the **Energy** sheet
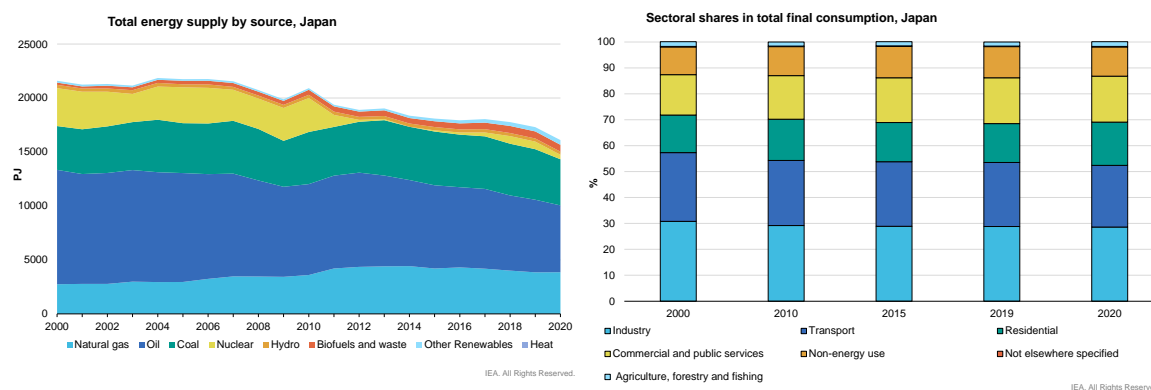
The full list of indicators included in this sheet includes:

- Total energy supply (TES) by source
- Sectoral shares in total final consumption (TFC)
- Energy per population
- Energy intensity of the economy
- Final energy carbon intensity.

Power

Transforming the power sector is critical to clean energy transitions, as the sector accounts for over 40% of CO_2 emissions from fuel combustion globally.

The **Power** sheet includes four interactive graphs outlining a set of indicators tracking electricity and heat. This includes a graph outlining the decomposition of CO_2 emissions from electricity generation into four driving factors. Please refer to "Drivers of electricity generation emissions trends" included on the "Definitions" tab for more information on this decomposition analysis.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_Power" and can be accessed by clicking on the relevant buttons.

Figure 10 represents samples from the interactive graphs included on the **Power** sheet.

Figure 10   Sample graphs from the **Power** sheet
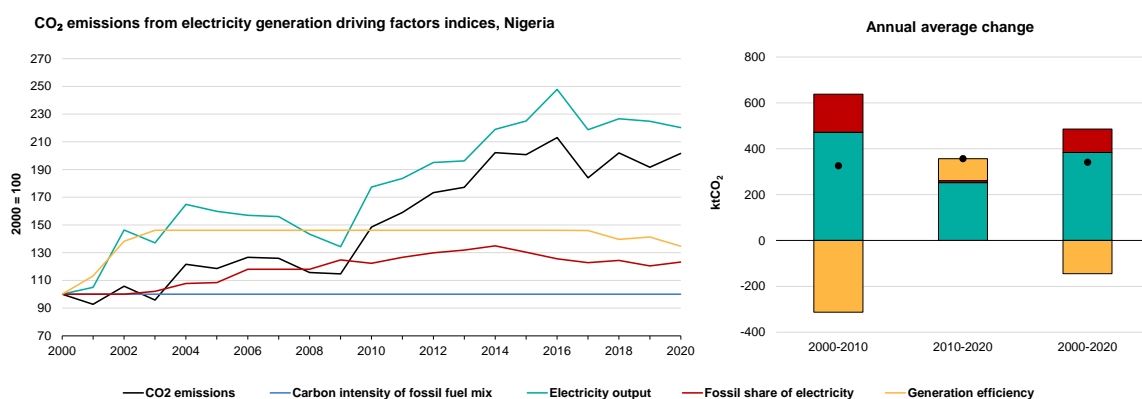
The full list of indicators included in this sheet includes:

- Power generation CO_2 emissions from fuel combustion by product
- Share of power generation by product
- Carbon intensity of power index
- CO_2 emissions from electricity generation driving factors indices
- Annual average change of power generation CO_2 emissions.

Industry

The increased demand for industrial output in recent decades has resulted in growing energy consumption and emissions. Despite improvements in industrial productivity, energy efficiency and up take of low carbon energy sources, further progress is inevitable.

The **Industry** sheet includes four interactive graphs showcasing a set of indicators tracking industry.

By selecting a country or region from the country list, the graphs display the corresponding indicators. Data for individual graphs are available in individual sheets labelled "Graph #_Industry" and can be accessed by clicking on the relevant buttons.

Figure 11 represents samples from the interactive graphs included on the **Industry** sheet.

Figure 11   Sample graphs from the **Industry** sheet
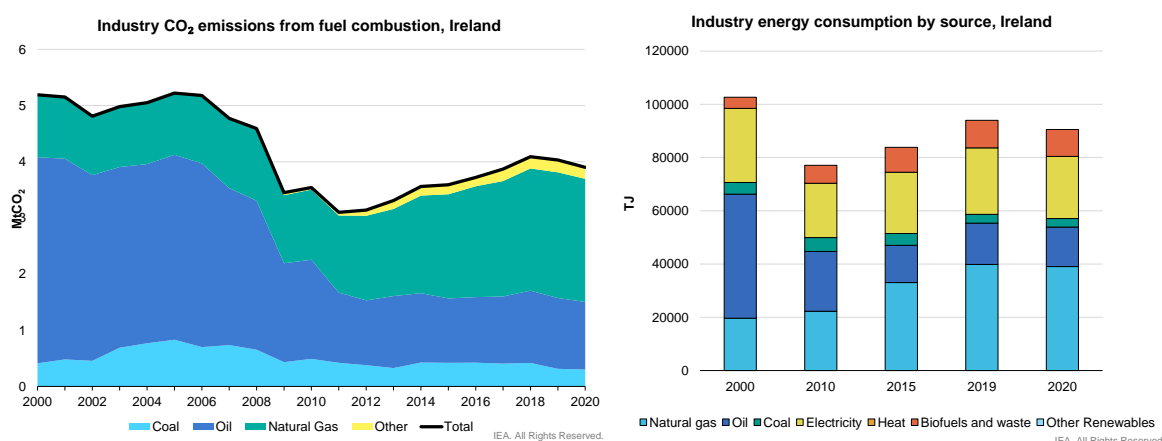
The full list of indicators included in this sheet includes:

- Industry CO_2 emissions from fuel combustion by product
- Industry energy consumption by product
- Carbon intensity of industry
- Industry consumption per population.

Transport

Despite recent trends towards electrification, greater use of biofuels and fuel efficiency improvements, transportation is still responsible for around 25% of global CO_2 emissions from fuel combustion. Tracking the sector's energy

consumption, emissions and energy intensity helps in understanding the opportunities and challenges ahead.

The **Transport** sheet includes four interactive graphs displaying a set of indicators tracking transport.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_Transport" and can be accessed by clicking on the relevant buttons.

Figure 12 represents samples from the interactive graphs included on the **Transport** sheet.

Figure 12   Sample graphs from the **Transport** sheet
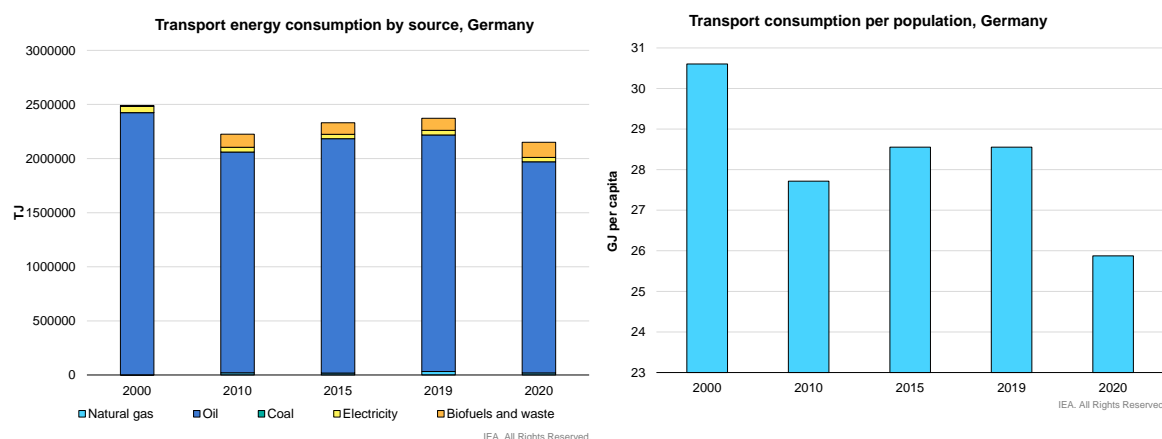
The full list of indicators included in this sheet includes:

- Transport CO_2 emissions from fuel combustion by product
- Transport energy consumption by product
- Carbon intensity of road transport
- Transport consumption per population.

Buildings

With the rise in house ownership and extreme weather conditions, energy consumption in the global buildings sector has increased in recent years. On the other hand, applying energy efficiency measures and penetration of more efficient appliances corresponds to energy and emissions savings. Tracking indicators corresponding to this end sector help to demonstrate the strengths and shortcoming of current policies.

The **Buildings** sheet includes four interactive graphs comprising a set of indicators tracking buildings.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_Buildings" and can be accessed by clicking on the relevant buttons.

*Note: **Buildings** corresponds to the sum of residential and commercial and public services sectors. You may refer to the "Definitions" sheet in the Excel file for the full list of ISIC[2] categories included in these sectors.*

Figure 13 represents samples from the interactive graphs included on the **Buildings** sheet.

Figure 13   Sample graphs from the **Buildings** sheet
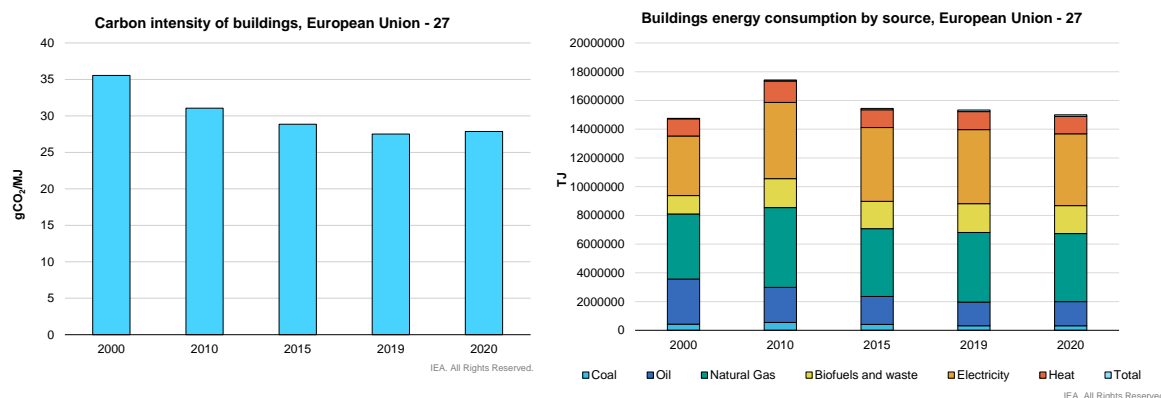
The full list of indicators included in this sheet includes:

- Buildings CO_2 emissions from fuel combustion by product
- Buildings energy consumption by product
- Carbon intensity of buildings
- Buildings consumption per population.

End use

Energy efficiency is the one energy source which all countries possess in abundance. Reliable end-use indicators provide a reliable means to understand

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[2] ISIC corresponds to the "International Standard Industrial Classification of All Economic Activities – Revision 4" published by the Department of Economic and Social Affairs of the United Nations:.

the drivers of energy demand and are crucial in informing and monitoring the effectiveness of energy efficiency policies.

The **End use** sheet includes eight interactive graphs presenting sectoral end use energy and carbon intensities.

By selecting a country or region from the country list, the graphs display the corresponding indicators.

Data for individual graphs are available in individual sheets labelled "Graph #_End use" and can be accessed by clicking on the relevant buttons.

Note: The end-use indicators are available for a selected set of countries and cover the period of 2000 to 2021.

Figure 14 represents samples from the interactive graphs included on the **End use** sheet.

Figure 14   Sample graphs from the **End use** sheet
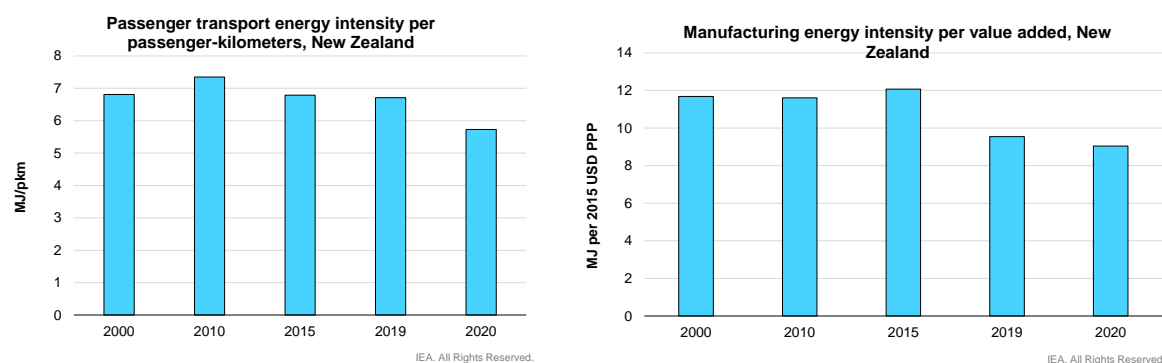
The full list of indicators included in this sheet includes:

- Passenger transport energy intensity
- Manufacturing energy intensity per value added
- Services energy intensity per value added
- Residential energy intensity per floor area (temperature corrected)
- Passenger transport carbon intensity
- Manufacturing carbon intensity per value added
- Services carbon intensity per value added
- Residential carbon intensity per floor area (temperature corrected).

Definitions

The **Definitions** sheet defines the variables and products presented in the "Tracker" file. Moreover, it includes the list of countries and regions covered.

Geo coverage

The **Geo coverage** sheet includes the regional definitions.

Graph #_sheet xxx

This series of sheets include the pivot tables comprising the data underlying individual graphs located on the **Highlights**, **Total and fugitive emissions**, **Fuel combustion emissions**, **Energy**, **Power**, **Industry**, **Transport**, **Buildings** and **End use** sheets.

As discussed in the above sections, these data sheets can be accessed by clicking on the buttons on the sheets depicting the respective graphs.

It is possible to adjust the country filter on the data sheets to obtain the data corresponding to other countries/regions without having to move back to the sheets showing the graphs. Additionally, the year filter can be adjusted on the pivot tables to view more or fewer data points.

There are buttons located on these data sheets that allow users to navigate back to the sheets depicting the corresponding graphs.

Figure 15 below shows an example of this series of sheets containing the data underlying graphs.

Figure 15   Sample table from the **Graph #_sheet xxx** data sheets

Country	Argentina		Back to the "Highlights" tab				
Graph 1 - Highlights:	**Total GHG emissions from energy by fuel, Argentina**		**MtCO$_2$eq**				
Years	**Coal**		**Natural Gas**	**Oil**	**Other**	**Biofuels and waste**	**Total**
2000		4.67	81.24	68.91	0	0.27	155.09
2001		3.76	79.38	65.95	0	0.23	149.32
2002		3.27	76.99	61.66	0	0.23	142.16
2003		3.53	85.22	63.89	0	0.26	152.9
2004		4.71	92.16	69.46	0	0.26	166.58
2005		5.73	95.91	67.62	0	0.25	169.51
2006		5.97	98.12	73.72	0	0.22	178.02
2007		6.02	97.78	80.81	0	0.22	184.83
2008		6.72	98.49	84.28	0	0.22	189.71
2009		5.14	95.99	76.04	0	0.21	177.39
2010		6.36	95.54	85.28	0	0.34	187.52
2011		7.25	100.35	88.1	0	0.4	196.11
2012		6.7	103.25	88.05	0	0.42	198.42
2013		6.67	105.46	90.52	0	0.47	203.11
2014		7.31	105.23	86.74	0	0.49	199.78
2015		6.8	108.13	90.37	0	0.51	205.82
2016		5.53	109.45	88.48	0	0.54	204
2017		5.83	110.7	82.48	0	0.61	199.61
2018		6.45	110.92	80.41	0	0.59	198.36
2019		4	107.8	79.12	0	0.61	191.54
2020		4.75	99.81	70.77	0	0.44	175.76
2021		6.6	99.38	87.84		0.46	194.28

Note: The data sheets corresponding to the graphs located in the "Country comparison" tab are structured differently. Please refer to the sections below for details.

Time series_Country comparison

This sheet includes the data corresponding to the four time series graphs placed on the **Country comparison** sheet.

As discussed in the **Country comparison** section, this data sheet can be accessed by clicking on the buttons corresponding to the time series graphs.

The year filter can be adjusted on all three pivot tables to view more or fewer data points.

The sheet contains a button that allows navigating back to the **Country comparison** sheet.

Figure 16 represents a sample table from **Time series_Country comparison** data sheet.

Figure 16   Sample table from the **Time series_Country comparison** data sheet

Time series 1 - Country comparison:	Total GHG emissions from energy		(MtCO$_{2eq}$)	Back to the "Country comparison" ta
Row Labels	**Brazil**		**Canada**	
2000		321.85	551.81	
2001		329.14	545.01	
2002		330.85	563.29	
2003		326.36	584.22	
2004		344.96	576.73	
2005		349.17	589.19	
2006		352.92	582.52	
2007		368.85	614.55	
2008		390.59	592.77	
2009		366.48	563.37	
2010		415.18	580.13	
2011		434.82	594.54	
2012		469.99	591.51	
2013		501.93	603.96	
2014		529.59	613.06	
2015		506.44	610.5	
2016		470.61	611.14	
2017		483.33	625.53	
2018		460.3	639.87	
2019		462.41	625.54	
2020		439.96	573.39	

Bar charts_Country comparison

This sheet includes the data corresponding to the nine bar charts placed on the **Country comparison** sheet.

As discussed in the **Country comparison** section, this data sheet can be accessed by clicking on the buttons corresponding to the bar charts.

It is possible to adjust the country filters of all eight pivot tables to compare the data corresponding to other countries/regions without having to move back to the sheet showing the graphs. Additionally, the year filters can be adjusted on the pivot tables to view more or fewer data points.

The sheet contains a button that allows navigating back to the **Country comparison** sheet.

Figure 17 displays a sample table from **Bar charts_Country comparison** data sheet.

Figure 17   Sample table from the **Bar charts_Country comparison** data sheet

Year	2020	Back to the "Country comparison" tab	
Bar chart 1 - Country comparison:	**Share of fuel combustion and fugitive GHG emissions**	**(%)**	
Row Labels	**Share of fugitive GHG emissions (%)**		**Share of GHG emissions from fuel combustion (%)**
Denmark		2.8	97.2
Norway		2.9	97.1

3. Units and conversion

General conversion factors for energy

To:	TJ	Gcal	Mtoe	MBtu	GWh
From:	multiply by:				
terajoule (TJ)	1	2.388×10^2	2.388×10^{-5}	9.478×10^2	2.778×10^{-1}
gigacalorie (Gcal)	4.187×10^{-3}	1	1.000×10^{-7}	3.968	1.163×10^{-3}
million tonnes of oil equivalent (Mtoe)	4.187×10^4	1.000×10^7	1	3.968×10^7	1.163×10^4
million British thermal units (MBtu)	1.055×10^{-3}	2.520×10^{-1}	2.520×10^{-8}	1	2.931×10^{-4}
gigawatt hour (GWh)	3.600	8.598×10^2	8.598×10^{-5}	3.412×10^3	1

Conversion factors for mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	1.000×10^{-3}	9.842×10^{-4}	1.102×10^{-3}	2.205
tonne (t)	1.000×10^3	1	9.842×10^{-1}	1.102	2.205×10^3
long tonne (lt)	1.016×10^3	1.016	1	1.120	2.240×10^3
short tonne (st)	9.072×10^2	9.072×10^{-1}	8.929×10^{-1}	1	2.000×10^3
pound (lb)	4.536×10^{-1}	4.536×10^{-4}	4.464×10^{-4}	5.000×10^{-4}	1

Conversion factors for volume

To:	gal U.S.	gal U.K.	bbl	ft^3	l	m^3
From:	multiply by:					
US gallon (gal US)	1	8.327×10^{-1}	2.381×10^{-2}	1.337×10^{-1}	3.785	3.785×10^{-3}
UK gallon (gal UK)	1.201	1	2.859×10^{-2}	1.605×10^{-1}	4.546	4.546×10^{-3}
barrel (bbl)	4.200×10^1	3.497×10^1	1	5.615	1.590×10^2	1.590×10^{-1}
cubic foot (ft^3)	7.481	6.229	1.781×10^{-1}	1	2.832×10^1	2.832×10^{-2}
litre (l)	2.642×10^{-1}	2.200×10^{-1}	6.290×10^{-3}	3.531×10^{-2}	1	1.000×10^{-3}
cubic metre (m^3)	2.642×10^2	2.200×10^2	6.290	3.531×10^1	1.000×10^3	1

The IEA unit converter is a tool that allows converting between units of energy, mass and volume. This tool can be found online at: http://www.iea.org/data-and-statistics/data-tools/unit-converter

Decimal prefixes

10^1	deca (da)	10^{-1}	deci (d)
10^2	hecto (h)	10^{-2}	centi (c)

10^3	kilo (k)	10^{-3}	milli (m)
10^6	mega (M)	10^{-6}	micro (μ)
10^9	giga (G)	10^{-9}	nano (n)
10^{12}	tera (T)	10^{-12}	pico (p)
10^{15}	peta (P)	10^{-15}	femto (f)
10^{18}	exa (E)	10^{-18}	atto (a)

Tonne of CO_2

The 2006 *IPCC Guidelines for GHG Inventories* and the *UNFCCC Reporting Guidelines on Annual Inventories* both ask that CO_2 emissions and removals be reported in Gg (gigagrammes) of CO_2. A million tonnes of CO_2 is equal to 1 000 Gg of CO_2, so to compare the numbers in this publication with national inventories expressed in Gg, multiply the IEA emissions by 1 000.

Other organisations may present CO_2 emissions in tonnes of carbon instead of tonnes of CO_2. To convert from tonnes of carbon, multiply by 44/12, which is the molecular weight ratio of CO_2 to C.

4. Abbreviations

CO_2	carbon dioxide
CTRL	control
g CO_2	grammes of carbon dioxide
GDP	gross domestic product
GHG	greenhouse gas
Gg	gigagramme
kg CO_2	kilogrammes of carbon dioxide
kt CO_2	thousand tonnes of carbon dioxide
kg CO_{2eq}	kilogrammes of carbon dioxide equivalent
kt CO_{2eq}	thousand tonnes of carbon dioxide equivalent
MJ	megajoule
TJ	Terajoule
PJ	Petajoule
Mt CO_2	million tonnes of carbon dioxide
OECD	Organisation for Economic Co-Operation and Development
pkm	passenger kilometre
PPP	purchasing power parity
t CO_2	tonnes of carbon dioxide
TES	total energy supply
TFC	total final consumption
toe	tonne of oil equivalent = 10^7 kcal