Energy and Carbon Tracker

2021 edition

Users Guide

International Energy Agency

INTERNATIONAL ENERGY AGENCY

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 30 member countries, 8 association countries and beyond.

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This document provides information regarding the 2021 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-2021

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. Changes from last edition

Note: this section refers to changes of the database as compared to the 2020 edition of the IEA Energy and Carbon Tracker product.

Expanded content and category coverage

With the objective to increase the scope of greenhouse gas emissions estimations, the IEA has covered in the 2021 edition the broad set of energy-related greenhouse gases accounting for bulk of the category 1 of the 2006 IPCC Guidelines for GHG inventories. The additional coverage includes:

(a) Non-CO_2 greenhouse gas emissions from fuel combustion

Estimates for CH_4 and N_2O from fuel combustion have been added, following methodology similar to that for the estimates of CO_2 emissions from fuel combustion, and considering the type and level of disaggregation of activity data available at country level (Tier 1 methodology from the 2006 IPCC Guidelines for GHG inventories).

Please refer to the sections IEA's Greenhouse gas emissions from energy publication documentation[1] for more information on definitions, country data availability, methodology and sources

(b) Fugitive emissions

Estimates for CO_2 and CH_4 emissions for the category 1.B of the 2006 IPCC Guidelines for GHG inventories, for recent years. Data were derived from the ongoing IEA work on methane emissions[2]. For detailed information on methodologies and definitions, please consult the related section of the World Energy Model (WEM) documentation[3] for the oil and gas emissions and World Energy outlook (section 5.8) for coal emission estimates[4].

(c) Energy-related greenhouse gas emissions

[1] Available at : https://iea.blob.core.windows.net/assets/d755e4d6-9572-4549-94217d2bc377cd2f/WORLD_GHG_Documentation.pdf.
[2] Available at : https://www.iea.org/reports/methane-tracker-2021.
[3] Available at: https://iea.blob.core.windows.net/assets/8971c3c8-2664-4578-89ce-3166bc98c2e4/WEM_Documentation_WEO2021.pdf.
[4] Available at: https://iea.blob.core.windows.net/assets/98909c1b-aabc-4797-9926-35307b418cdb/WEO2019-free.pdf..

The inclusion of non-CO_2 emissions from fuel combustion and the update of fugitive emissions estimates allow this database to cover aggregated figures for total energy-related greenhouse gas emissions, based on the sum of:

- CO_2 emissions from fuel combustion
- Non-CO_2 emissions from fuel combustion
- CO_2 and CH_4 fugitive emissions from energy.

Please refer to the sections IEA's Greenhouse gas emissions from energy publication[5] for more information on definitions, country data availability, methodology and sources.

(d) Energy-related greenhouse gas emissions indicators

Following the upgrade in content, the IEA has also expanded the set of socio-economic indicators, adding new indicators based on total greenhouse gas emissions from energy.

(f) End-use carbon intensity indicators

The database now includes end-use level carbon intensity estimates across the four main final consumption sectors – residential, services, industry and transport.

Geographical and temporal coverage

The IEA continues to expand the coverage of its statistics reports and encourages more countries to collaborate on data exchange. As detailed data have become consistently available for Guyana, the associated time series are now included in the product as an individual country and have been removed from Other non-OECD Americas aggregate.

In the 2021 edition the time series are included starting year 2000 (instead of 1990), to provide space for the expansion of the content without compromising the timelines and relevance of the data.

Energy units

With the objective in facilitate the comparability of the included energy data with other sources, the energy related indicators are represented in units of Joules (J) instead of tonnes of oil equivalent (toes).

[5] Available at : https://iea.blob.core.windows.net/assets/d755e4d6-9572-4549-9421-7d2bc377cd2f/WORLD_GHG_Documentation.pdf.

2. 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 2021 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 150 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

3. How to use this product

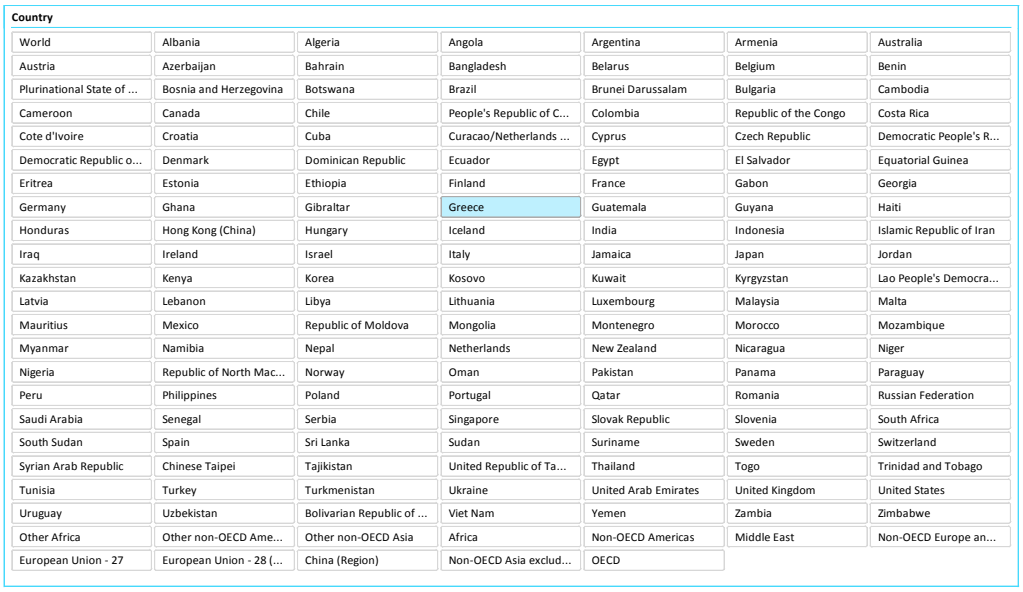
This section outlines the structure of the file and discusses its functionalities.

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.

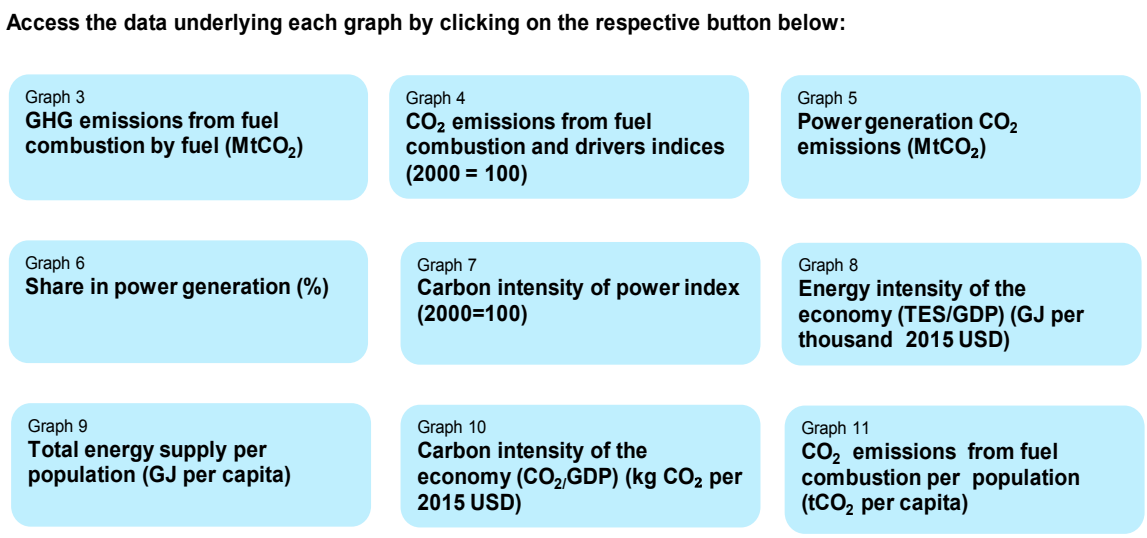
Figure 1 Example of a country menu included on the main worksheets



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



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

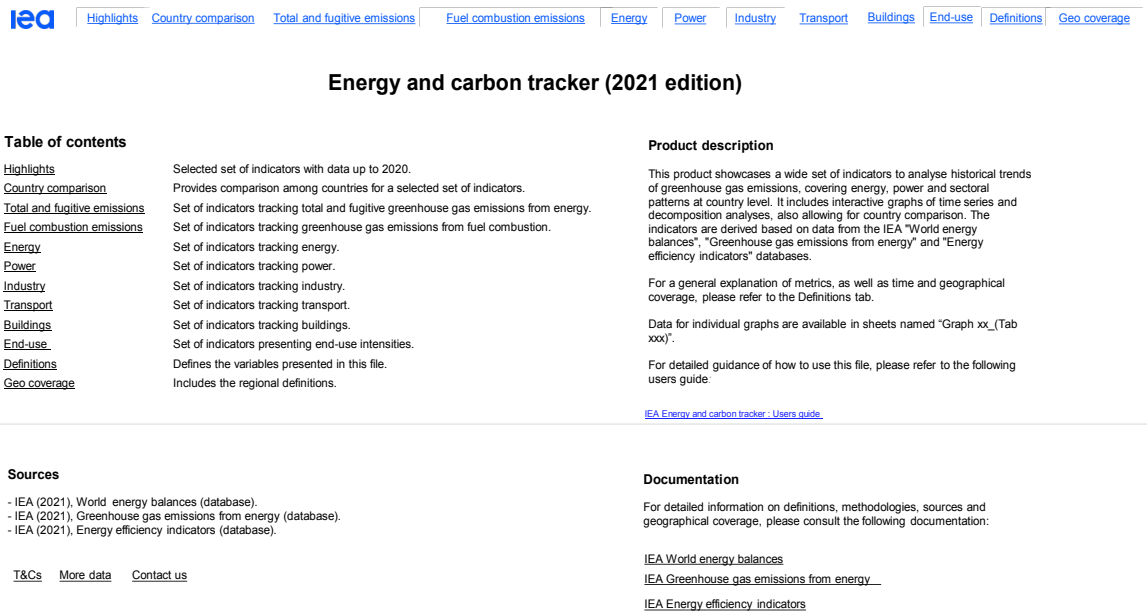
The worksheets included in the file are:

Contents

The **Contents** sheet 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 represents the structure of the **Contents** sheet.

Figure 3 Structure of the **Contents** sheet



Highlights

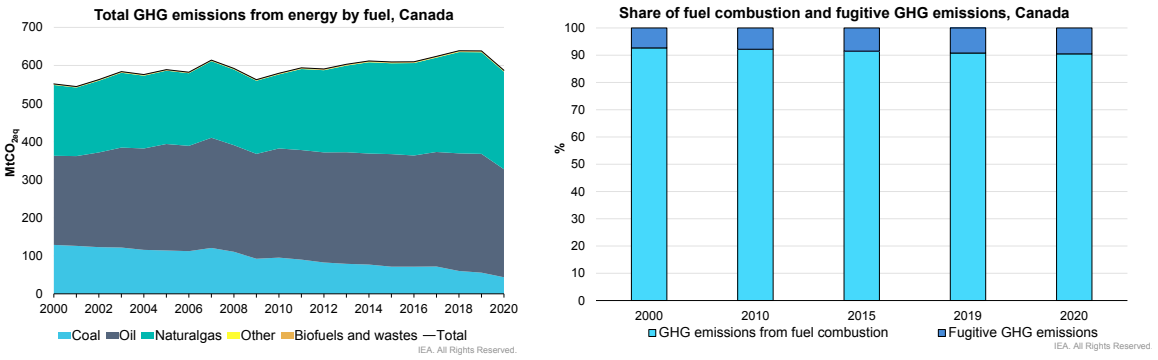
The **Highlights** sheet includes 11 interactive graphs for a selected set of indicators, with data up to the most recent year.

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 91 countries and ten regions, while the data corresponding to the other included graphs is available for the full geographical coverage of the product (149 countries and ten regions). Therefore two separate country menus are included on this sheet.

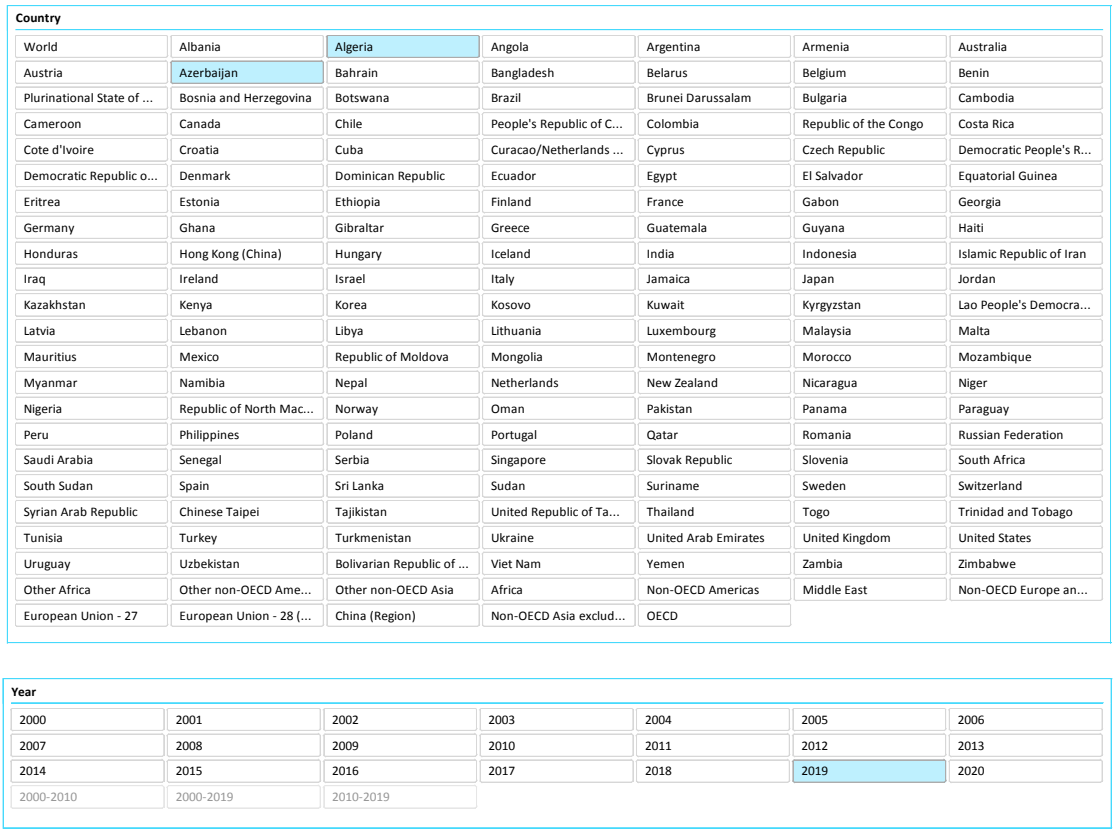
Country comparison

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

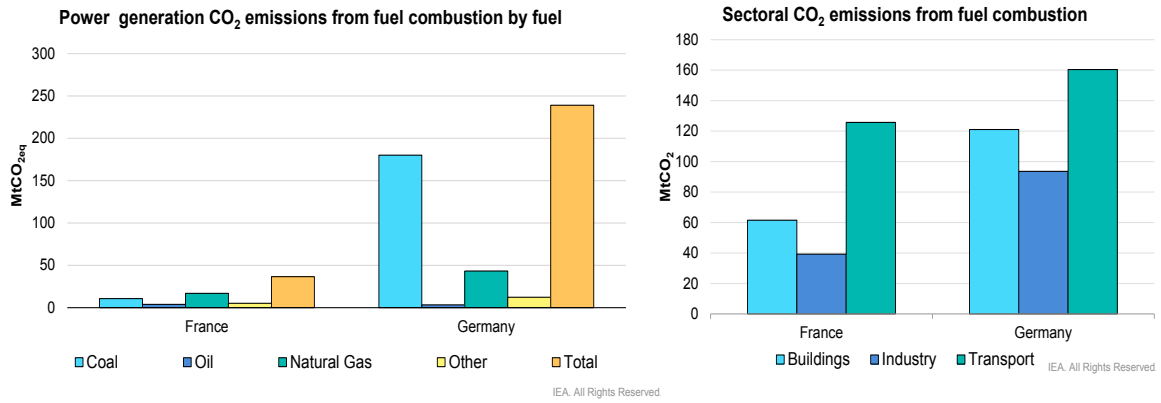


Data for all the bar charts are accessible by clicking on the relevant buttons, and included on the **Bar charts_Country comparison** sheet, while the corresponding data for all the time series are included on the **Time series_Country comparison** sheet. By referring to the graph titles, the relevant 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 91 countries and ten regions, while the data corresponding to the other included graphs is available for the full geographical coverage of the product (149 countries and ten 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[6].

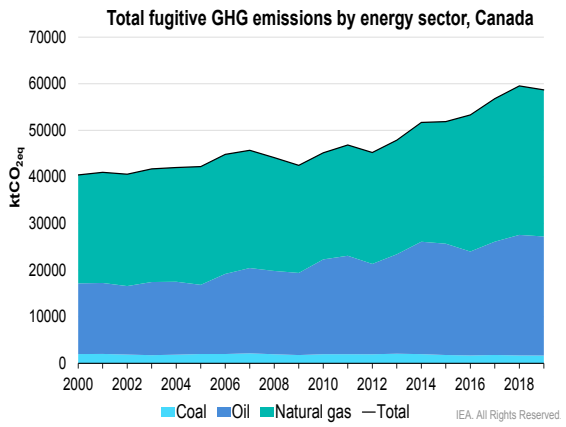
The **Total and fugitive emissions** sheet includes six interactive graphs showcasing a set of indicators tracking total energy-related GHG emissions and fugitive emissions from the energy industry. Additionally, the sheet represents a set of socio-economic indicators based on total GHG emissions from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

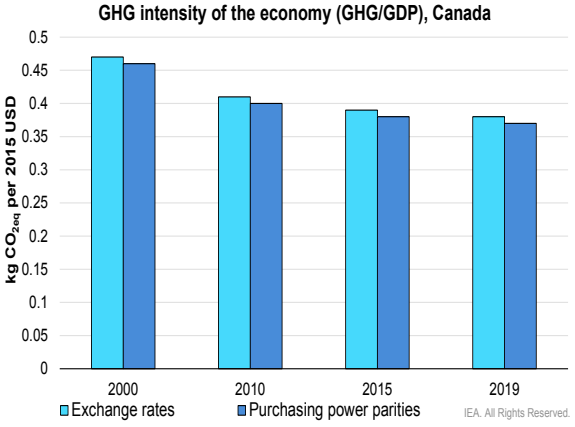
By selecting a country or region from the country list, the graphs display the corresponding indicators.

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





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,

[6] For more information refer to the IEA 2021 Methane Tracker report available at: https://www.iea.org/reports/methane-tracker-2021.

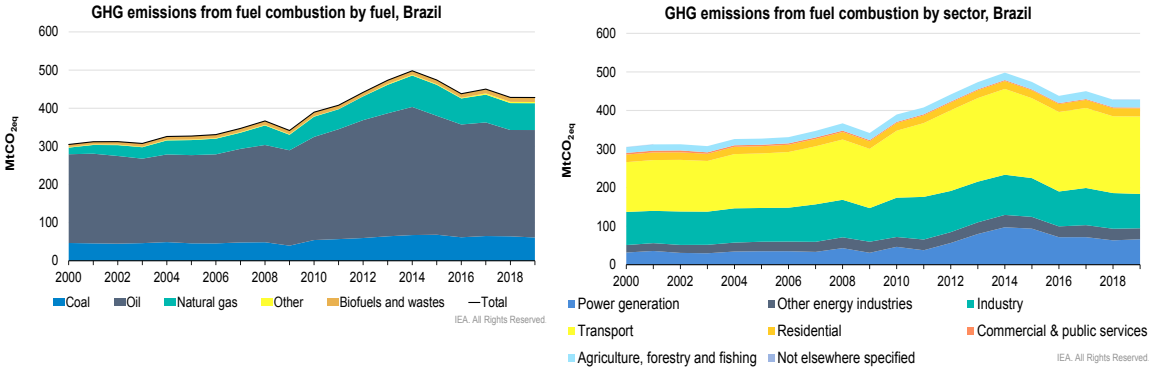
also including the decomposition of CO_2 emissions from fuel combustion into four macro-economic driving factors (Kaya identity). Please refer to "Identifying drivers of CO_2 emissions trends" included on the "Definitions" tab for more information on this decomposition analysis. Moreover, socio-economic 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.

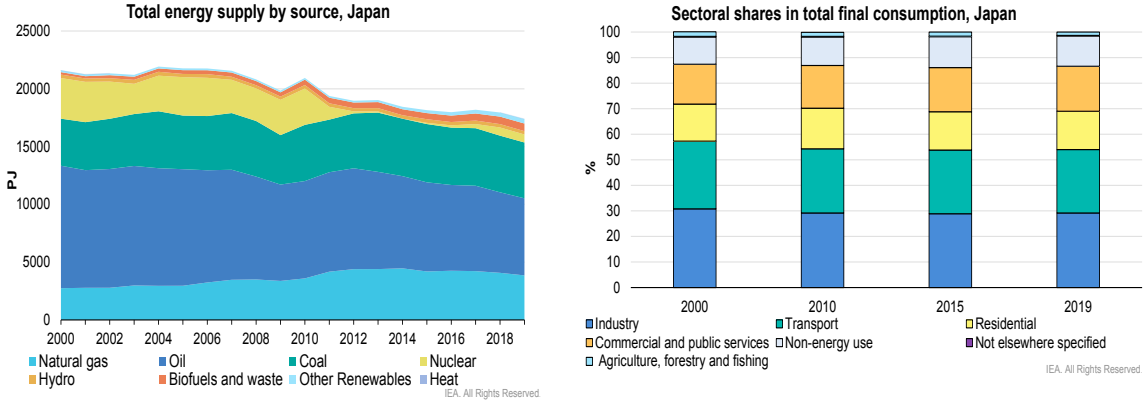
The **Energy** sheet includes five interactive graphs displaying a set of indicators tracking energy transition.

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

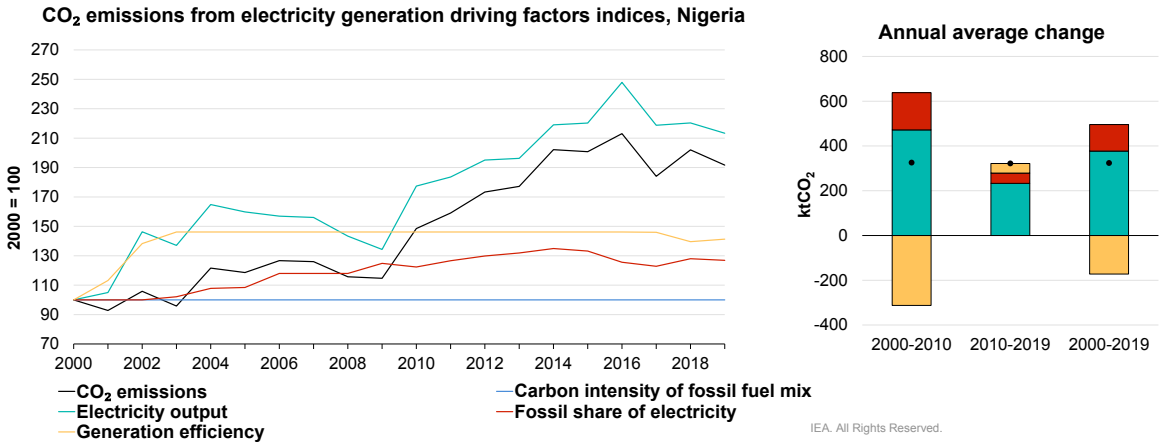
"Drivers of electricity generation emissions trends" included on the "Definitions" tab for more information on this decomposition analysis.

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

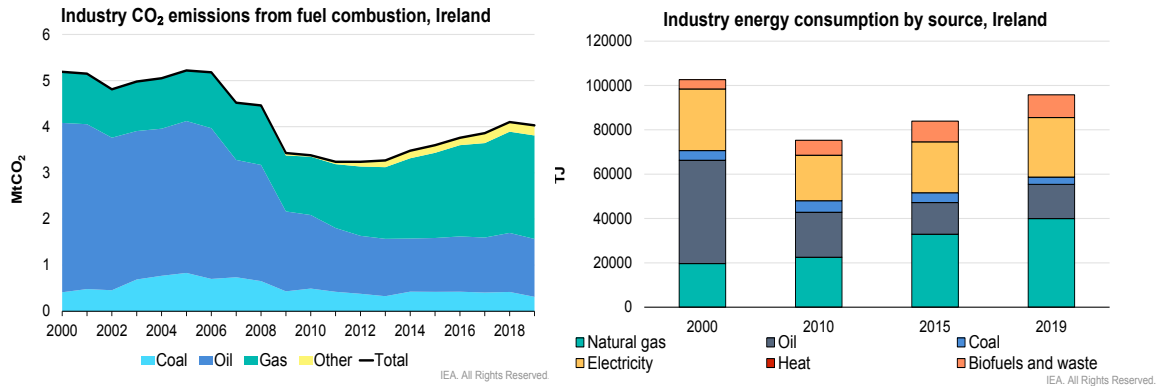
The increased demand for industrial output in recent decades has resulted in growing energy consumption and emissions. Despite improvements in industrial productivity, energy efficiency and up take of low carbon energy sources, further progress is inevitable.

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.

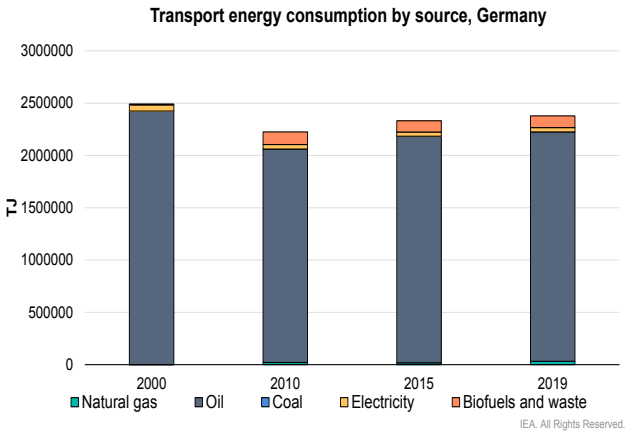
The **Transport** sheet includes four interactive graphs displaying a set of indicators tracking transport.

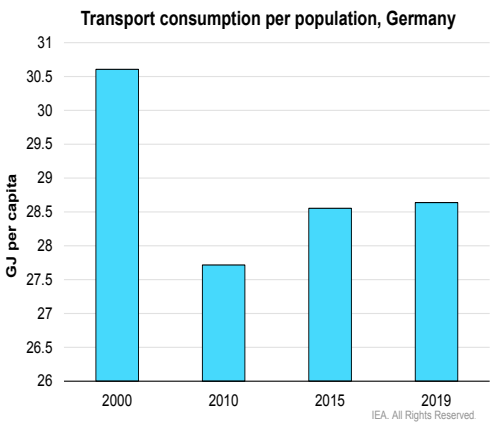
By selecting a country or region from the country list, the graphs display the corresponding indicators.

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.

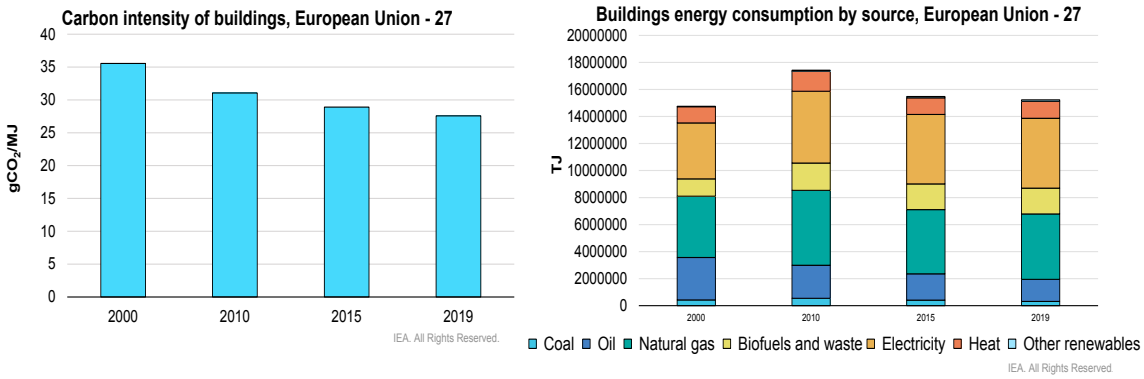
By selecting a country or region from the country list, the graphs display the corresponding indicators.

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[7] 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 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.

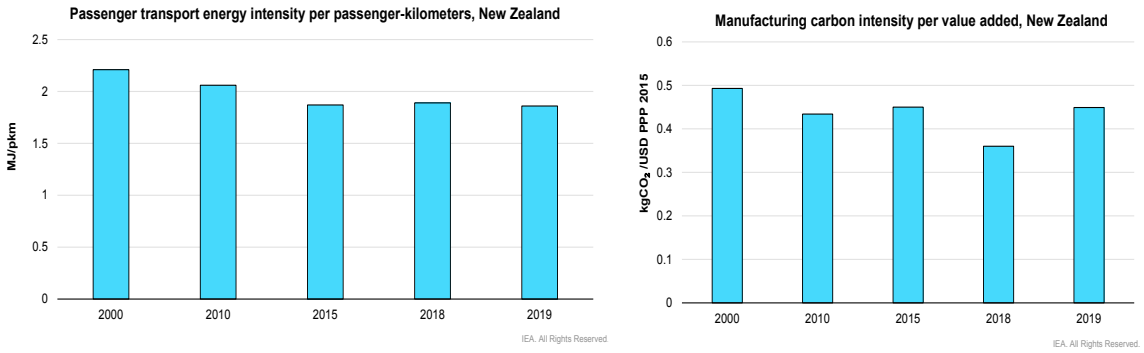
[7] ISIC corresponds to the "International Standard Industrial Classification of All Economic Activities – Revision 4" published by the Department of Economic and Social Affairs of the United Nations:.

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 2019.

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, Argentir**				**MtCO eq**		
Years	**Coal**	**Oil**	**Naturalgas**	**Other**	**Biofuels and wastes**	**Total**	
2000	4.67	64.48	81.86	0	0.27	151.28	
2001	3.76	61.12	79.94	0	0.23	145.05	
2002	3.27	56.82	77.54	0	0.23	137.86	
2003	3.53	59.02	85.83	0	0.26	148.65	
2004	4.71	64.72	92.87	0	0.26	162.56	
2005	5.72	63.29	96.59	0	0.25	165.85	
2006	5.95	69.37	98.73	0	0.22	174.28	
2007	6	76.65	98.5	0	0.22	181.37	
2008	6.71	80	99.23	0	0.22	186.17	
2009	5.14	72.14	96.65	0	0.21	174.14	
2010	6.35	81.37	96.12	0	0.34	184.19	
2011	7.25	84.47	100.95	0	0.4	193.07	
2012	6.7	84.48	103.85	0	0.42	195.45	
2013	6.66	87.06	106.05	0	0.47	200.23	
2014	7.31	83.32	105.79	0	0.49	196.92	
2015	6.8	87.09	108.62	0	0.51	203.02	
2016	5.53	85.35	109.79	0	0.54	201.2	
2017	5.83	79.54	110.97	0	0.61	196.93	
2018	6.44	77.35	111.05	0	0.59	195.42	
2019	3.98	75.95	107.79	0	0.61	188.32	
2020	4.53	70.68	101.62		0.52	177.34	

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
Row Labels	Brazil	Canada	
2000	317.18	551.56	
2001	324.23	544.63	
2002	325.21	562.86	
2003	320.49	583.76	
2004	339.21	576.14	
2005	342.7	589.08	
2006	346.02	582.25	
2007	361.8	614.06	
2008	383.04	592.14	
2009	358.55	562.7	
2010	406.65	579.49	
2011	426	593.77	
2012	461.22	590.74	
2013	493.33	603.02	
2014	520.02	611.87	
2015	496.15	609.18	
2016	459.95	609.69	
2017	471.92	623.97	
2018	449.18	638.7	
2019	450.48	638.29	

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	2019	Back to the "Country comparison" tab
Bar chart 1 - Country comparison:	**Share of fuel combustion and fugitive GHG emissions**	**(%)**
Row Labels	**Fugitive GHG emissions**	**GHG emissions from fuel combustion**
Denmark	2.8	97.2
Norway	3.1	96.9

4. Units and conversion

General conversion factors for energy

To:	TJ	Gcal	Mtoe	MBtu	GWh
From:	multiply by:				
terajoule (TJ)	1	$2.388x10^{2}$	$2.388x10^{-5}$	$9.478x10^{2}$	$2.778x10^{-1}$
gigacalorie (Gcal)	$4.187x10^{-3}$	1	$1.000x10^{-7}$	3.968	$1.163x10^{-3}$
million tonnes of oil equivalent (Mtoe)	$4.187x10^{4}$	$1.000x10^{7}$	1	$3.968x10^{7}$	$1.163x10^{4}$
million British thermal units (MBtu)	$1.055x10^{-3}$	$2.520x10^{-1}$	$2.520x10^{-8}$	1	$2.931x10^{-4}$
gigawatt hour (GWh)	3.600	$8.598x10^{2}$	$8.598x10^{-5}$	$3.412x10^{3}$	1

Conversion factors for mass

To:	kg	t	lt	st	lb
From:	multiply by:				
kilogramme (kg)	1	$1.000x10^{-3}$	$9.842x10^{-4}$	$1.102x10^{-3}$	2.205
tonne (t)	$1.000x10^{3}$	1	$9.842x10^{-1}$	1.102	$2.205x10^{3}$
long tonne (lt)	$1.016x10^{3}$	1.016	1	1.120	$2.240x10^{3}$
short tonne (st)	$9.072x10^{2}$	$9.072x10^{-1}$	$8.929x10^{-1}$	1	$2.000x10^{3}$
pound (lb)	$4.536x10^{-1}$	$4.536x10^{-4}$	$4.464x10^{-4}$	$5.000x10^{-4}$	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	$8.327x10^{-1}$	$2.381x10^{-2}$	$1.337x10^{-1}$	3.785	$3.785x10^{-3}$
UK gallon (gal UK)	1.201	1	$2.859x10^{-2}$	$1.605x10^{-1}$	4.546	$4.546x10^{-3}$
barrel (bbl)	$4.200x10^{1}$	$3.497x10^{1}$	1	5.615	$1.590x10^{2}$	$1.590x10^{-1}$
cubic foot (ft^3)	7.481	6.229	$1.781x10^{-1}$	1	$2.832x10^{1}$	$2.832x10^{-2}$
litre (l)	$2.642x10^{-1}$	$2.200x10^{-1}$	$6.290x10^{-3}$	$3.531x10^{-2}$	1	$1.000x10^{-3}$
cubic metre (m^3)	$2.642x10^{2}$	$2.200x10^{2}$	6.290	$3.531x10^{1}$	$1.000x10^{3}$	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:

www.iea.org/reports/unit-converter-and-glossary

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.

5. 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

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