# IEA STATISTICS

Please note that this PDF is subject to specific restrictions that limit its use and distribution. The terms and conditions are available online at http://www.iea.org/ termsandconditionsuseandcopyright/



# CO<sub>2</sub> EMISSIONS FROM FUEL COMBUSTION

### HIGHLIGHTS



International Energy Agency



### CO<sub>2</sub> EMISSIONS FROM FUEL COMBUSTION

#### H I G H L I G H T S

In the lead-up to the UN climate negotiations in Lima, the latest information on the level and growth of  $CO_2$  emissions, their source and geographic distribution will be essential to lay the foundation for a global agreement. To provide input to and support for the UN process, the IEA is making available for free download the "Highlights" version of  $CO_2$ Emissions from Fuel Combustion.

This annual publication contains, for more than 140 countries and regions:

- estimates of CO<sub>2</sub> emissions from 1971 to 2012,
- selected indicators such as CO<sub>2</sub>/GDP, CO<sub>2</sub>/capita and CO<sub>2</sub>/TPES,
- a decomposition of CO<sub>2</sub> emissions into driving factors,
- CO<sub>2</sub> emissions from international marine and aviation bunkers, and other relevant information.

The twentieth session of the Conference of the Parties to the Climate Change Convention (COP 20), in conjunction with the tenth meeting of the Parties to the Kyoto Protocol (CMP 10), will be meeting in Lima, Peru from 1 to 12 December 2014. This volume of "Highlights", drawn from the full-scale study, was specially designed for delegations and observers of the meeting in Lima.





# CO2 EMISSIONS FROM FUEL COMBUSTION HIGHLIGHTS

#### **INTERNATIONAL ENERGY AGENCY**

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency's aims include the following objectives:

Secure member countries' access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.

- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
  - Improve transparency of international markets through collection and analysis of energy data.
    - Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
      - Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

**IEA** member countries:

Australia

Austria Belgium

Canada Czech Republic

Denmark Estonia

#### This publication reflects the views of the International Energy Agency (IEA) Secretariat but does not necessarily reflect those of individual IEA member countries. The IEA makes no representation or warranty, express or implied, in respect to the publication's contents (including its completeness or accuracy) and shall not be responsible for any use of, or reliance on, the publication.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

#### © OECD/IEA, 2014

International Energy Agency 9 rue de la Fédération 75739 Paris Cedex 15, France www.iea.org

Please note that this publication is subject to specific restrictions that limit its use and distribution. The terms and conditions are available online at http://www.iea.org/termsandconditionsuseandcopyright/

Finland France Germany Greece Hungary Ireland Italy Japan Korea (Republic of) Luxembourg Netherlands New Zealand Norway Poland Portugal Slovak Republic Spain Sweden Switzerland Turkey United Kingdom United States

iea International Energy Agency 1974-2014

Secure • Sustainable • Together

The European Commission also participates in the work of the IEA.

## FOREWORD

In the lead-up to the UN climate negotiations in Lima, Peru, the latest information on the level and growth of  $CO_2$  emissions, their source and geographic distribution will be essential to lay the foundation for a global agreement. To provide input to and support for the UN process, the IEA is making available for free download the "High-lights" version of  $CO_2$  Emissions from Fuel Combustion. The PDF publication and an EXCEL file with the tables can be downloaded for free at www.iea.org/statistics/topics/co2emissions.

Recent years have witnessed a fundamental change in the way governments approach energy-related environmental issues. Promoting sustainable development and combating climate change have become integral aspects of energy planning, analysis and policy making in many countries, including all IEA member states.

The purpose of this volume is to put our best and most current information in the hands of those who need it, including in particular the participants in the UNFCCC process. The IEA Secretariat is a contributor to the official Intergovernmental Panel on Climate Change (IPCC) methodologies for estimating greenhouse-gas emissions. The IEA's energy data are the figures most often cited in the field. For these reasons, we felt it appropriate to publish this information in a comprehensive form.

These data are only for energy-related CO<sub>2</sub>, not for any other greenhouse gases. Thus they may differ from countries' official submissions of emissions inventories to the UNFCCC Secretariat. However, the full-scale study contains data for CO<sub>2</sub> from non-energy-related sources and gas flaring, and emissions of CH<sub>4</sub>, N<sub>2</sub>O, HFC, PFC and SF<sub>6</sub>. In addition, the full-scale study also includes information on "Key Sources" from fuel combustion, as developed in the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

This report is published under my responsibility as Executive Director of the IEA and does not necessarily reflect the views of IEA member countries.

Maria Van der Hoeven Executive Director

#### What's New?

#### **Geographical coverage**

- As Estonia became an IEA member in May 2014, it is now included within the aggregate IEA Total, starting in 1990.
- The European Union aggregate now also includes Croatia, an EU member since 1 July 2013.
- The IEA continues to expand the coverage of its statistics reports and encourage more countries to collaborate on data exchange. This year data have become available for Mauritius from 1971 to 2012 and these data are presented in this edition of the publication. Therefore, Mauritius, presented individually, has been removed from the region Other Africa.
- In accordance with article 27 (1) of the Kyoto Protocol to the UNFCCC, the Government of Canada notified the Secretary-General of the United Nations of its decision to withdraw from the Kyoto Protocol. This action became effective for Canada on 15 December 2012 in accordance with article 27 (2). In this edition, Canada has been removed from the aggregate Annex I Kyoto Parties, as specified in Chapter 4: *Geographical coverage*.

#### Indicators

The GDP PPP data, as taken from external sources as specified in Chapter 3: *Indicator sources and methods*, have been revised to reflect the changes to purchasing power parity rates based on the 2011 International Comparison Program (ICP) published in 2014. The ICP has worked for six years to better estimate the value of the PPP basket of goods for all countries for which the World Bank calculates GDP PPP. For many countries this value has changed significantly in comparison to previous ICP exercises. This leads to significant revisions to GDP PPP for many countries compared to previous publications.

Due to these revisions, the  $CO_2$  / GDP PPP indicator consequently shows significant revisions for some countries and regions compared with the previous edition of this publication.

#### Products

The product aggregate "coal/peat" has been renamed as "coal". In the tables and figures presented in this publication, "coal" refers to the aggregate of coal, peat and oil shale.

### TABLE OF CONTENTS

1.	RECENT TRENDS IN CO2 EMISSIONS FROM FUEL COMBUSTION	7
2.	IEA EMISSIONS ESTIMATES	17
	Inventory quality	17
	Reference Approach vs. Sectoral Approach	17
	Differences between IEA estimates and UNFCCC submissions	
	Identifying drivers of CO <sub>2</sub> emissions trends	20
	Notes on tables and graphs for regional totals	
	Country notes	24
3.	INDICATOR SOURCES AND METHODS	27
4.	GEOGRAPHICAL COVERAGE	31
5.	SUMMARY TABLES	35
	CO <sub>2</sub> emissions: Sectoral Approach	
	CO <sub>2</sub> emissions from international marine bunkers	
	CO <sub>2</sub> emissions from international aviation bunkers	
	CO <sub>2</sub> emissions by sector in 2012	54
	CO <sub>2</sub> emissions with electricity and heat allocated to consuming sectors in 2012	57
	Total primary energy supply	60
	GDP using exchange rates	66
	GDP using purchasing power parities	69
	Population	72
	CO <sub>2</sub> emissions / TPES	75
	CO <sub>2</sub> emissions / GDP using exchange rates	
	CO <sub>2</sub> emissions / GDP using purchasing power parities	
	CO <sub>2</sub> emissions / population	
	Per capita emissions by sector in 2012	
	Electricity output	
	CO <sub>2</sub> emissions and drivers (Kaya decomposition)	
6.	REGIONAL TOTALS	111
	World	
	Annex I Parties	
	Annex II Parties	
	Economies in Transition	
	NON-AIMEX I Fames	
	AIIIICX I NYOW Parties	

#### **Important cautionary notes**

The estimates of  $CO_2$  emissions from fuel combustion presented in this publication are calculated using the IEA energy balances and the default methods and emission factors from the *Revised 1996 IPCC Guidelines* for National Greenhouse Gas Inventories. There are many reasons why the IEA Secretariat estimates may not be the same as the numbers that a country submits to the UNFCCC, even if a country has accounted for all of its energy use and correctly applied the *IPCC Guidelines*.

In Chapter 6: *Regional totals*, the IEA Secretariat presents  $CO_2$  emissions calculated using both the IPCC Reference Approach and the IPCC Tier 1 Sectoral Approach. In some of the OECD non-member countries, there can be **large differences between the two sets of calculations** due to various problems in some energy data. As a consequence, this can lead to different emission trends between 1990 and 2012 for certain countries and regional aggregates. Please see Chapter 3 for further details.

Energy data on OECD member and non-member countries<sup>1</sup> are collected by the Energy Data Centre (EDC) of the IEA Secretariat, headed by Mr. Jean-Yves Garnier. The IEA would like to thank and acknowledge the dedication and professionalism of the statisticians working on energy data in the countries. Mr. Aidan Kennedy was responsible for the  $CO_2$  emissions from fuel combustion estimates and for the preparation of the publication. Desktop publishing support was provided by Ms. Sharon Burghgraeve. Ms. Roberta Quadrelli had overall responsibility for this publication.

 $C\Omega_{2}$  emission estimates from 1960 to 2012 for the

other countries are available on CD-ROM suitable for use on Windows-based systems. To order, please see the information provided at the end of this publication.

In addition, a data service is available on the Internet. It includes unlimited access through an annual subscription as well as the possibility to obtain data on a pay-perview basis. Details are available at *www.iea.org*.

Enquiries about data or methodology should be addressed to:

Energy Data Centre - CO<sub>2</sub> emissions Telephone: (+33-1) 40-57-66-01





