

EMISSIONS OF CARBON DIOXIDE

Carbon dioxide (CO₂) makes up the largest share of greenhouse gases. The addition of man-made greenhouse gases to the atmosphere disturbs the earth's radiative balance (i.e. the balance between the solar energy that the earth absorbs and radiates back into space). This is leading to an increase in the earth's surface temperature and to related effects on climate, sea level and world agriculture.

Definition

The indicator refers to emissions of CO₂ from burning oil, coal and natural gas for energy use. Carbon dioxide also enters the atmosphere from burning wood and waste materials and from some industrial processes such as

Overview

Global emissions of carbon dioxide have risen by 117%, or on average 2% per year, since 1971. In 1971, the current OECD countries were responsible for 67% of world CO₂ emissions. As a consequence of rapidly rising emissions in the developing world, the OECD contribution to the total fell to 41% in 2010. By far, the largest increases in non-OECD countries occurred in Asia, where China's emissions of CO₂ from fuel combustion have risen by 5.8% per annum between 1971 and 2010. The use of coal in China increased the levels of CO₂ emissions by 6.6 billion tonnes over the 39 years to 2010.

Two significant downturns in OECD CO₂ emissions occurred following the oil shocks of the mid-1970s and early 1980s. Emissions from the economies in transition declined over the last decade, helping to offset the OECD increases between 1990 and the present. However, this decline did not stabilise global emissions as emissions in developing countries continued to grow. With the economic crisis in 2008, world CO₂ emissions declined by 1.8% in 2009. However, the growth in CO₂ emissions rebounded in 2010 increasing by 4.9%.

Disaggregating the emissions estimates shows substantial variations within individual sectors. Between 1971 and 2010, the combined share of electricity and heat generation and transport shifted from one-half to two-thirds of the total. The share of fossil fuels in overall emissions changed slightly during the period. The weight of coal in global emissions has remained at approximately 40% since the early 1970s, while the share of natural gas increased from 15% in 1971 to 20% in 2010. The share of oil decreased from 48% to 36%. Fuel switching and the increasing use of non-fossil energy sources reduced the CO₂/total primary energy supply ratio by 6% over the past 39 years.

cement production. However, emissions of CO₂ from these other sources are a relatively small part of global emissions, and are not included in the statistics shown here. The *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* provide a fuller, technical definition of how CO₂ emissions have been estimated for this indicator.

Comparability

These emissions estimates are affected by the quality of the underlying energy data. For example, some countries, both OECD and non-OECD, have trouble reporting information on bunker fuels and incorrectly define bunkers as fuel used abroad by their own ships and planes. Since emissions from bunkers are excluded from the national totals, this affects the comparability of the estimates across countries. On the other hand, since these estimates have been made using the same method and emission factors for all countries, in general, the comparability across countries is quite good.

Sources

- International Energy Agency (IEA) (2011), *CO₂ Emissions from Fuel Combustion*, IEA, Paris.

Further information

Analytical publications

- IEA (2012), *Electricity and a Climate-Constrained World: Data and Analyses*, OECD Publishing.
- IEA (2011), *Climate and Electricity Annual 2011: Data and Analyses*, IEA, Paris.
- IEA (2011), *IEA Scoreboard 2011: Implementing Energy Efficiency Policy: Progress and challenges in IEA member countries*, IEA, Paris.
- IEA (2011), *World Energy Outlook*, IEA, Paris.
- IEA (2010), *Energy Technology Perspectives*, IEA, Paris.

Statistical publications

- IEA (2012), *Energy Balances of Non-OECD Countries*, IEA, Paris.
- IEA (2012), *Energy Balances of OECD Countries*, IEA, Paris.

Methodological publications

- Intergovernmental Panel on Climate Change (IPCC) (1996), *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, Institute for Global Environmental Strategies (IGES), Japan.

Online databases

- IEA CO₂ Emissions from Fuel Combustion.



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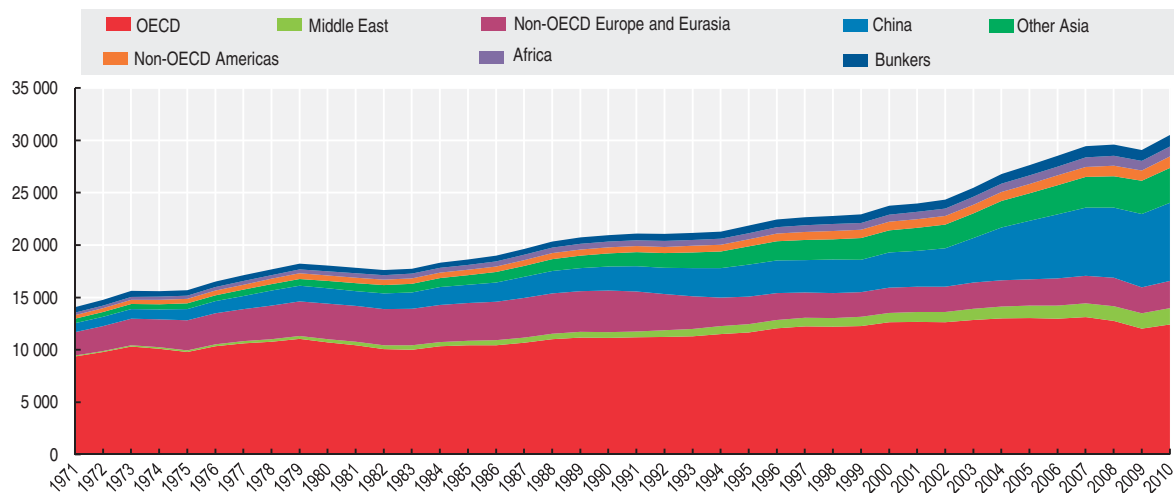
CO₂ emissions from fuel combustion

Million tonnes

	1971	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Australia	144	260	339	351	359	361	371	369	374	384	386	384	383
Austria	49	56	62	66	67	73	74	75	72	70	71	64	69
Belgium	117	108	119	119	112	120	117	113	110	106	111	101	106
Canada	340	433	533	526	533	557	554	559	544	569	551	525	537
Chile	21	31	53	50	51	53	58	58	60	67	68	65	70
Czech Republic	151	155	122	121	117	121	122	120	121	122	117	110	114
Denmark	55	50	51	52	52	57	52	48	56	51	48	47	47
Estonia	..	36	15	15	15	17	17	17	16	19	18	15	18
Finland	40	54	55	60	63	71	67	55	67	65	57	55	63
France	432	352	377	384	376	385	385	388	380	373	370	351	358
Germany	979	950	825	843	831	840	841	809	821	796	800	747	762
Greece	25	70	87	90	90	94	93	95	94	98	94	90	84
Hungary	60	66	54	56	55	57	56	56	56	54	53	48	49
Iceland	1	2	2	2	2	2	2	2	2	2	2	2	2
Ireland	22	30	41	43	42	41	42	44	45	44	44	39	39
Israel	14	34	55	56	59	61	61	59	62	64	64	64	68
Italy	293	397	426	429	435	452	459	461	464	447	435	389	398
Japan	759	1 064	1 184	1 170	1 205	1 213	1 212	1 221	1 205	1 242	1 154	1 096	1 143
Korea	52	229	438	452	446	449	470	469	477	490	502	515	563
Luxembourg	15	10	8	9	9	10	11	11	11	11	11	10	11
Mexico	97	265	349	350	356	363	369	386	395	410	404	400	417
Netherlands	130	156	172	178	178	183	185	183	178	181	183	176	187
New Zealand	14	23	31	33	33	34	33	34	34	33	34	31	31
Norway	24	28	34	35	34	37	38	36	37	38	38	37	39
Poland	287	342	291	290	279	290	293	293	304	303	299	287	305
Portugal	14	39	59	59	63	58	60	63	56	56	53	53	48
Slovak Republic	39	57	37	38	38	38	37	38	37	37	36	33	35
Slovenia	..	13	14	15	15	15	15	16	16	16	17	15	15
Spain	120	205	284	286	302	310	327	339	332	344	317	282	268
Sweden	82	53	53	52	54	55	54	50	48	46	44	41	48
Switzerland	39	41	42	43	42	44	44	45	44	42	44	42	44
Turkey	41	127	201	182	192	202	207	216	240	265	264	256	266
United Kingdom	623	549	524	537	522	534	535	533	535	523	513	466	484
United States	4 291	4 869	5 698	5 678	5 605	5 680	5 764	5 772	5 685	5 763	5 587	5 185	5 369
EU 27	..	4 050	3 831	3 905	3 875	3 992	4 009	3 977	3 993	3 940	3 865	3 571	3 660
OECD	9 370	11 157	12 634	12 670	12 635	12 877	13 025	13 032	12 977	13 131	12 787	12 023	12 440
Brazil	91	194	304	309	309	303	321	322	328	342	362	338	388
China	824	2 256	3 317	3 403	3 608	4 180	5 005	5 560	6 082	6 471	6 656	6 962	7 428
India	200	582	972	984	1 015	1 041	1 117	1 165	1 256	1 362	1 439	1 564	1 626
Indonesia	25	146	273	291	297	325	331	336	354	369	365	381	411
Russian Federation	..	2 179	1 506	1 508	1 494	1 531	1 513	1 516	1 580	1 579	1 593	1 520	1 581
South Africa	157	254	297	282	293	319	336	329	330	355	387	369	347
World	14 089	20 973	23 767	23 993	24 354	25 483	26 802	27 654	28 530	29 462	29 620	29 095	30 523

 StatLink <http://dx.doi.org/10.1787/888932709301>
World CO₂ emissions from fuel combustion, by region

Million tonnes


 StatLink <http://dx.doi.org/10.1787/888932709320>



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