

## EMISSIONS OF CARBON DIOXIDE (CO<sub>2</sub>)

Carbon dioxide (CO<sub>2</sub>) makes up the largest share of “greenhouse gases”. The addition of man-made greenhouse gases to the atmosphere disturbs the earth’s radiative balance. This is leading to an increase in the earth’s surface temperature and to related effects on climate, sea level rise and world agriculture.

### Definition

The table refers to emissions of CO<sub>2</sub> from burning oil, coal and gas for energy use. Carbon dioxide also enters the atmosphere from burning wood and waste materials and from some industrial processes such as cement production. Emissions of CO<sub>2</sub> from these sources are a relatively small part of global emissions and are not included in these statistics. The *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (see below) provide a fuller, technical definition of how CO<sub>2</sub> emissions have been estimated for this table. The forecasts provided in the table refer to the Reference Scenario of the *World Energy Outlook*.

### Long-term trends

Global emissions of carbon dioxide have risen by 99%, or on average 2.0% per year, since 1971, and are projected to rise by another 45% by 2030, or by 1.6% per year. In 1971, the current OECD countries were responsible for 66% of the total. As a consequence of rapidly increasing emissions in the developing world, the OECD contribution to the total fell to 46% in 2006, but this is expected to fall to 32% by 2030. By far, the largest increases in non-OECD countries occurred in Asia, where emissions in China have risen by 5.7% per annum between 1971 and 2006. The use of coal in China increased levels of CO<sub>2</sub> by 4.8 billion tonnes over the 35-year period.

Two significant downturns can be seen in OECD CO<sub>2</sub> emissions, 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 grew.

Disaggregating the emissions data shows substantial variations within individual sectors. Between 1971 and 2006, the combined share of electricity and heat generation and transport shifted from one-half to two-thirds of global emissions.

Fossil fuel shares in overall emissions changed slightly during the period. The relative weight of coal in global emissions has remained at approximately 40% since the early 1970s. The share of natural gas has increased from 15% in 1971 to 19% in 2006. Oil’s share decreased from 49% to 39%. Fuel switching and the increasing use of non-fossil energy sources reduced the CO<sub>2</sub>/total primary energy supply (TPES) ratio by 6% over the past 35 years.

### 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 across countries. On the other hand, since the estimates have been made using the same method and emission factors for all countries, in general, the comparability across countries is quite good.

### Sources

- IEA (2008), *CO<sub>2</sub> Emissions from Fuel Combustion: 2008 Edition*, IEA, Paris.
- IEA (2008), *World Energy Outlook 2008*, IEA, Paris.

### Further information

#### Analytical publications

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- IEA (2007), *Climate Policy Uncertainty and Investment Risk*, IEA, Paris.
- IEA (2007), *Energy Security and Climate Policy – Assessing Interactions*, IEA, Paris.
- IEA (2007), *Legal Aspects of Storing CO<sub>2</sub>: Update and Recommendations*, IEA, Paris.
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- ECMT (2007), *Cutting Transport CO<sub>2</sub> Emissions: What Progress?*, ECMT, Paris.
- OECD (2008), *Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments*, OECD, Paris.
- OECD (2008), *Space Technologies and Climate Change*, OECD, Paris.
- OECD (2006), *Climate Change in the European Alps: Adapting Winter Tourism and Natural Hazards Management*, OECD, Paris.

#### Statistical publications

- IEA (2008), *Energy Balances of OECD Countries*, IEA, Paris.
- IEA (2008), *Energy Balances of Non-OECD Countries*, IEA, Paris.

#### Methodological publications

- WMO, UNEP, OECD, IEA (1996), *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, IPCC/OECD/IEA, Paris.


#### Online databases

- CO<sub>2</sub> Emissions from Fuel Combustion.

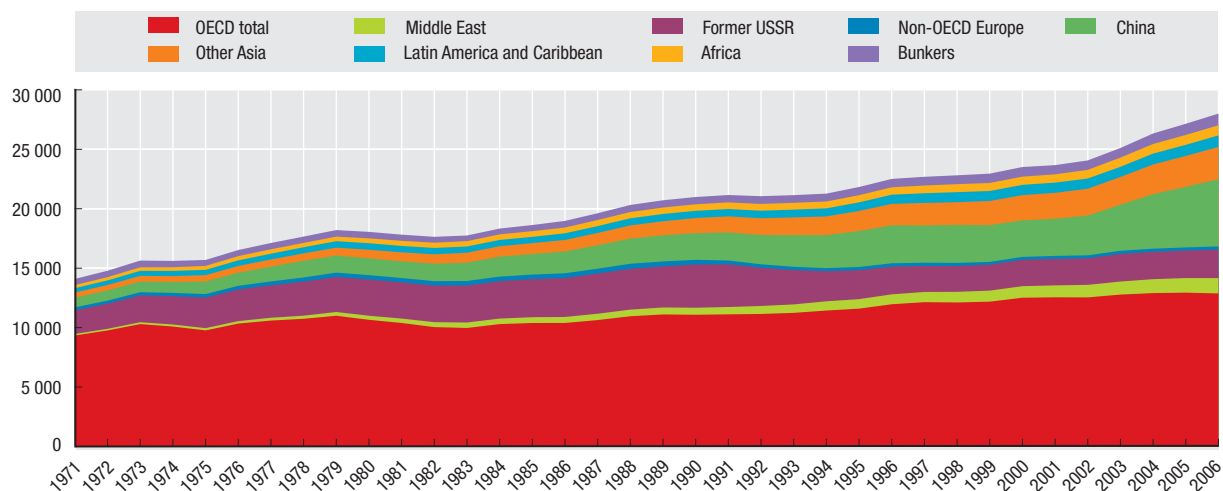

**CO<sub>2</sub> emissions from fuel combustion**

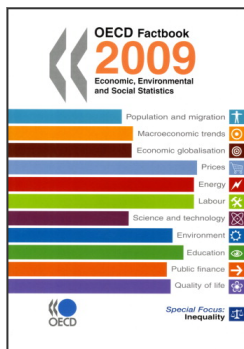
Million tonnes

	1971	1990	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2030
Australia	144	260	296	303	323	332	339	351	360	361	370	387	394	..
Austria	49	57	63	62	63	62	62	66	68	74	74	75	73	..
Belgium	117	110	128	126	129	125	127	128	119	127	124	120	117	..
Canada	339	432	480	497	500	511	533	526	534	554	550	556	539	..
Czech Republic	151	155	125	124	117	111	122	122	117	121	122	120	121	..
Denmark	55	50	71	61	57	54	50	51	51	56	51	47	55	..
Finland	40	54	62	60	57	56	54	59	62	72	67	55	67	..
France	432	352	368	362	385	376	376	384	376	384	384	387	377	..
Germany	979	950	898	867	860	829	827	845	833	842	843	811	823	..
Greece	25	70	76	77	80	80	87	90	90	94	93	95	94	..
Hungary	62	69	59	58	58	58	55	56	55	58	57	57	56	..
Iceland	1	2	2	2	2	2	2	2	2	2	2	2	2	..
Ireland	22	31	34	35	38	39	41	43	43	42	42	43	45	..
Italy	293	398	406	410	421	421	425	427	434	452	450	454	448	..
Japan	759	1 071	1 172	1 169	1 138	1 177	1 192	1 178	1 214	1 223	1 222	1 228	1 213	1 064
Korea	52	229	393	418	361	395	431	449	457	459	479	469	476	..
Luxembourg	15	10	8	8	7	7	8	8	9	10	11	11	11	..
Mexico	97	293	316	329	349	342	357	356	362	371	374	402	416	..
Netherlands	130	157	178	173	174	169	173	179	179	184	185	183	178	..
New Zealand	14	21	26	29	29	31	32	34	35	36	36	36	37	..
Norway	24	28	33	35	37	38	34	33	33	35	36	37	37	..
Poland	287	344	347	337	314	304	292	291	280	291	295	294	306	..
Portugal	14	39	47	49	53	60	59	59	63	58	60	63	56	..
Slovak Republic	39	57	41	41	40	39	37	38	38	38	37	38	37	..
Spain	120	206	223	241	249	269	284	285	302	310	327	339	328	..
Sweden	82	53	63	57	58	57	53	52	54	55	54	50	48	..
Switzerland	39	41	42	41	43	43	42	43	41	43	44	44	44	..
Turkey	41	127	169	177	178	177	201	182	192	202	207	216	240	..
United Kingdom	623	553	538	516	520	517	526	539	524	536	536	535	536	..
United States	4 291	4 863	5 299	5 477	5 475	5 501	5 693	5 673	5 614	5 689	5 772	5 785	5 697	5 804
EU27 total	..	4 063	3 974	3 889	3 887	3 818	3 842	3 916	3 886	4 005	4 010	3 979	3 983	3 755
OECD total	9 337	11 083	11 964	12 141	12 115	12 183	12 514	12 549	12 541	12 779	12 904	12 942	12 874	13 166
Brazil	91	193	257	274	283	293	303	312	311	304	321	327	332	..
China	800	2 211	3 161	3 101	3 156	3 046	3 038	3 084	3 309	3 830	4 547	5 060	5 607	11 706
India	199	589	826	870	878	942	977	986	1 017	1 043	1 114	1 161	1 250	3 293
Indonesia	25	140	209	235	232	253	265	282	291	299	316	331	335	..
Russian Federation	..	2 180	1 555	1 444	1 438	1 474	1 514	1 514	1 505	1 540	1 524	1 531	1 587	2 004
South Africa	174	255	286	299	310	291	299	284	295	321	338	330	342	..
World	14 095	20 988	22 509	22 686	22 813	22 953	23 509	23 666	24 065	25 108	26 332	27 146	28 003	40 553

 StatLink  <http://dx.doi.org/10.1787/543556343271>
**World CO<sub>2</sub> emissions from fuel combustion, by region**

Million tonnes


 StatLink  <http://dx.doi.org/10.1787/537418588611>



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