

Carbon Dioxide Emissions by Economic Sector 2005

Source: International Energy Agency (IEA)

Percent of Carbon Dioxide (CO2) Emissions by Sector

	Percent of Carbon Dioxide (CO2) Emissions by Sector								
	Total Carbon Dioxide Emissions (million metric tons)	Public Electricity & Heat Production	Other Energy Industries (a)	Manufacturing Industries & Construction	Internal Transportation	Residential	Other Commercial, Public, and Agricultural Sectors (b)		
	2001	2001	2001	2001	2001	2001	2001	2001	
WORLD	27,898.6	37.2	4.7	16.8	18.4	7.8	5.6		
ASIA (EXCL. MIDDLE EAST)	7,402.8	41.2	4.6	24.4	13.5	6.9	6.3		
Armenia	4.2	36.2	0.0	37.1	13.5	0.0	13.0		
Azerbaijan	27.8	49.5	5.0	9.5	8.0	13.8	8.4		
Bangladesh	32.0	30.5	0.7	34.8	11.7	12.5	6.5		
Bhutan	..	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..	..
China	3,167.3	44.6	4.5	29.3	7.4	6.9	5.6		
Georgia	3.1	29.4	5.8	18.1	36.9	20.7	10.0		
India	1,046.1	53.0	2.5	21.1	12.0	7.7	0.6		
Indonesia	290.5	22.1	13.5	20.0	23.0	16.0	3.0		
Japan	1,182.7	34.9	3.3	19.1	22.1	5.4	10.9		
Kazakhstan	127.4	45.9	4.8	25.0	5.8	0.0	12.3		
Korea, Dem People's Rep	71.3	16.5	0.1	62.1	2.2	0.2	18.8		
Korea, Rep	444.4	35.4	7.8	18.4	20.4	6.9	9.2		
Kyrgyzstan	3.8	45.8	0.0	16.2	13.9	0.0	24.1		
Lao People's Dem Rep	..	..	..	..	..	..	..
Malaysia	124.3	25.7	9.2	22.3	27.0	1.4	2.0		
Mongolia	..	..	..	..	..	..	..
Myanmar	7.1	27.0	7.0	16.7	36.7	6.7	1.4		
Nepal	3.3	0.0	0.0	37.8	22.4	28.1	11.2		
Pakistan	101.5	33.0	1.7	26.0	24.4	9.4	2.6		
Philippines	71.1	33.0	5.3	12.3	32.2	4.6	7.7		
Singapore	71.8	37.1	14.5	3.4	8.9	0.1	0.0		
Sri Lanka	10.3	25.8	1.4	11.3	53.3	2.6	8.9		
Tajikistan	4.8	13.0	0.0	0.0	54.8	0.0	32.2		
Thailand	166.4	34.6	0.7	23.7	27.0	2.7	5.3		
Turkmenistan	38.5	24.3	14.4	0.0	5.0	0.0	56.0		
Uzbekistan	120.4	30.0	3.8	16.4	8.6	28.3	9.4		
Viet Nam	48.0	24.9	0.0	31.3	25.9	6.6	10.7		
EUROPE	6,156.9	40.2	4.2	16.9	19.2	12.1	6.0		
Albania	3.3	7.3	2.4	17.0	48.0	4.0	23.1		
Austria	68.3	20.2	4.5	23.8	28.3	15.9	5.0		
Belarus	57.9	54.4	2.5	18.5	9.8	7.5	4.7		
Belgium	121.2	19.1	4.5	29.5	21.1	17.4	7.2		
Bosnia and Herzegovina	14.1	63.2	0.0	14.4	12.7	1.3	17.1		
Bulgaria	46.2	58.3	1.8	20.7	12.2	1.0	3.0		
Croatia	18.7	26.1	9.8	19.7	24.5	11.2	8.2		
Czech Rep	123.0	53.0	1.7	19.1	11.8	7.1	3.9		
Denmark	51.6	47.6	3.8	10.6	21.9	8.1	5.7		
Estonia	15.7	69.3	0.8	8.3	12.2	1.4	2.3		
Finland	59.8	44.8	3.6	19.5	20.8	5.4	6.5		
France	372.9	9.6	5.7	21.0	38.2	16.2	12.6		
Germany	861.7	39.2	3.2	14.7	19.8	15.1	6.7		
Greece	87.6	50.7	3.6	12.2	22.8	9.3	4.2		
Hungary	56.2	39.3	2.9	13.7	16.7	16.0	11.6		
Iceland	2.1	0.0	0.0	37.6	30.5	1.0	31.0		
Ireland	42.1	39.5	1.0	12.5	25.9	14.4	9.1		
Italy (c)	425.1	31.1	4.1	18.2	27.1	17.0	2.7		
Latvia	7.0	37.2	0.0	14.1	37.6	6.6	8.2		
Lithuania	12.2	32.7	12.4	17.7	27.6	4.5	3.7		
Macedonia, FYR	8.6	74.0	0.2	10.4	11.1	1.4	2.2		
Moldova, Rep	7.1	63.3	0.0	7.0	7.0	13.9	6.5		
Netherlands	175.9	32.2	7.7	19.7	18.9	11.1	11.3		
Norway	35.3	1.6	37.3	22.9	35.0	2.4	8.2		
Poland	297.2	54.7	3.3	15.0	8.7	9.7	7.1		
Portugal	59.1	35.2	4.0	19.9	30.9	3.5	6.5		
Romania	93.0	47.3	8.0	22.2	12.6	5.8	2.9		
Russian Federation	1,524.1	56.4	3.6	13.4	12.0	10.3	4.0		
Serbia and Montenegro	48.9	56.3	..	20.8	12.3	4.7	2.3		
Slovakia	40.1	30.0	11.2	24.3	13.9	10.5	8.2		
Slovenia	15.3	38.6	0.1	17.2	26.1	8.3	8.5		
Spain	286.0	30.5	4.7	20.6	33.5	5.9	4.7		
Sweden	48.3	15.4	3.6	22.1	45.0	6.0	7.3		
Switzerland	45.3	5.1	1.6	17.0	32.9	25.8	14.3		
Ukraine	353.3	27.8	1.3	27.8	5.1	16.6	8.2		
United Kingdom	556.0	34.8	6.7	12.5	22.9	15.4	5.0		
MIDDLE EAST & N. AFRICA	1,455.3	32.4	11.0	20.8	18.6	9.8	11.3		
Afghanistan	..	..	..	..	..	..	..
Algeria	70.6	25.9	19.8	9.7	10.5	14.1	16.6		
Egypt	117.9	29.6	5.2	30.9	22.1	8.7	0.0		
Iran, Islamic Rep	301.8	24.9	3.3	21.6	25.3	23.1	8.8		
Iraq	80.0	23.8	7.2	21.9	37.5	8.7	0.0		
Israel	63.6	57.7	6.3	9.1	14.9	3.3	9.2		
Jordan	14.1	37.6	4.4	14.5	25.8	12.2	6.0		
Kuwait	43.6	51.6	27.6	34.9	15.6	8.1	7.9		
Lebanon	15.4	39.8	0.0	22.7	23.9	13.6	0.0		
Libyan Arab Jamahiriya	38.7	35.1	21.6	12.5	28.4	6.2	0.0		
Morocco	31.9	38.8	1.3	16.5	5.6	11.0	26.2		
Oman	24.9	32.0	15.1	30.4	11.5	0.7	6.7		
Saudi Arabia	269.4	26.0	25.5	10.3	11.5	1.4	28.0		
Syrian Arab Rep	35.8	39.3	5.4	23.8	13.0	6.1	54.2		
Tunisia	18.2	36.2	1.2	23.2	22.4	9.2	11.3		
Turkey	190.2	40.2	3.6	21.5	17.8	10.6	5.1		
United Arab Emirates	76.3	45.2	2.9	43.2	7.3	0.3	0.0		
Yemen	9.8	18.0	4.3	5.4	51.2	17.1	0.0		

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	2001	2001	2001	2001	2001	2001	2001	2001	
SUB-SAHARAN AFRICA	467.1	47.1	2.7	17.2	18.4	3.4	2.7	2.7	
Angola	5.8	10.5	5.7	41.6	20.5	6.7	13.3	13.3	
Benin	1.6	3.2	0.0	10.3	60.9	19.9	7.7	7.7	
Botswana	..	..	..	..	..	..	..	..
Burkina Faso	..	..	..	..	..	..	..	..
Burundi	..	..	..	..	..	..	..	..
Cameroon	2.9	2.1	..	7.5	64.4	20.5	0.0	0.0	
Central African Rep	..	..	..	..	..	..	..	..
Chad	..	..	..	..	..	..	..	..
Congo	0.8	..	1.3	15.4	71.8	9.0	0.0	0.0	
Congo, Dem Rep	1.8	1.1	1.1	35.4	26.3	15.4	38.3	38.3	
Côte d'Ivoire	5.1	37.4	6.0	9.4	19.1	4.5	24.6	24.6	
Equatorial Guinea	..	..	..	..	..	..	..	..
Eritrea	0.7	26.5	0.0	5.9	36.8	10.3	19.1	19.1	
Ethiopia	3.3	0.6	0.0	27.6	54.5	16.4	0.0	0.0	
Gabon	1.6	23.5	6.2	23.5	37.0	9.3	2.5	2.5	
Gambia	..	..	..	..	..	..	..	..
Ghana	6.2	16.4	1.8	11.5	46.8	6.2	9.9	9.9	
Guinea	..	..	..	..	..	..	..	..
Guinea-Bissau	..	..	..	..	..	..	..	..
Kenya	8.1	23.1	6.5	16.7	45.5	10.9	4.1	4.1	
Lesotho	..	..	..	..	..	..	..	..
Liberia	..	..	..	..	..	..	..	..
Madagascar	..	..	..	..	..	..	..	..
Malawi	..	..	..	..	..	..	..	..
Mali	..	..	..	..	..	..	..	..
Mauritania	..	..	..	..	..	..	..	..
Mozambique	1.3	4.0	0.0	15.1	63.5	9.5	7.1	7.1	
Namibia	2.3	1.8	0.0	8.8	58.8	0.0	30.5	30.5	
Niger	..	..	..	..	..	..	..	..
Nigeria	56.1	12.0	11.5	11.0	41.6	9.3	0.0	0.0	
Rwanda	..	..	..	..	..	..	..	..
Senegal	3.7	35.4	0.8	20.7	27.2	9.8	5.4	5.4	
Sierra Leone	..	..	..	..	..	..	..	..
Somalia	..	..	..	..	..	..	..	..
South Africa	341.3	57.7	1.3	17.8	10.5	1.6	1.7	1.7	
Sudan	6.6	20.8	1.7	15.3	53.6	2.7	4.3	4.3	
Tanzania, United Rep	2.8	11.2	0.0	15.9	56.2	13.4	3.3	3.3	
Togo	0.9	6.6	0.0	49.5	31.9	12.1	0.0	0.0	
Uganda	..	..	..	..	..	..	..	..
Zambia	1.9	3.2	2.6	40.2	40.2	2.6	6.9	6.9	
Zimbabwe	12.5	53.8	0.5	15.4	15.8	1.4	12.0	12.0	
NORTH AMERICA	6,202.3	40.9	5.2	12.0	30.2	6.4	5.2	5.2	
Canada	513.0	25.9	11.2	16.8	28.8	7.7	10.8	10.8	
United States	5,689.2	42.3	4.6	11.5	30.3	6.3	4.7	4.7	
C. AMERICA & CARIBBEAN	484.8	33.3	10.7	17.0	27.0	5.6	3.4	3.4	
Belize	..	..	..	..	..	..	..	..
Costa Rica	4.9	2.1	1.0	15.9	66.0	2.9	11.3	11.3	
Cuba	30.7	40.4	0.6	44.5	6.2	3.7	6.0	6.0	
Dominican Rep	18.9	35.9	..	7.7	32.3	13.1	1.3	1.3	
El Salvador	5.5	21.5	0.9	21.5	46.0	8.2	0.0	0.0	
Guatemala	9.8	25.2	0.4	14.7	44.2	6.2	4.5	4.5	
Haiti	1.5	13.0	0.0	18.8	48.1	18.2	0.0	0.0	
Honduras	5.1	25.3	0.0	25.5	40.9	2.9	5.5	5.5	
Jamaica	10.3	53.0	0.1	5.1	18.1	2.8	15.1	15.1	
Mexico	366.8	33.8	13.4	14.2	27.8	5.6	3.1	3.1	
Nicaragua	3.7	41.4	2.5	11.8	39.7	2.5	3.0	3.0	
Panama	7.5	21.8	1.9	10.5	27.4	3.1	1.5	1.5	
Trinidad and Tobago	16.7	23.4	12.5	47.8	8.5	1.1	0.0	0.0	
SOUTH AMERICA	731.1	14.1	9.8	26.1	35.7	7.2	5.4	5.4	
Argentina	121.8	16.8	9.8	16.6	31.4	13.2	8.8	8.8	
Bolivia	9.4	20.4	10.8	8.2	30.3	8.9	10.0	10.0	
Brazil	315.1	10.1	6.7	29.7	40.8	5.4	6.3	6.3	
Chile	49.2	23.2	5.1	24.7	30.7	7.4	2.1	2.1	
Colombia	60.5	12.1	10.0	31.0	28.2	6.9	4.5	4.5	
Ecuador	21.0	14.4	1.2	16.5	45.4	8.4	1.6	1.6	
Guyana	..	..	..	..	..	..	..	..
Paraguay	3.1	0.6	0.0	8.7	86.5	5.8	0.0	0.0	
Peru	24.0	10.4	7.1	29.7	35.4	12.5	6.3	6.3	
Suriname	..	..	..	..	..	..	..	..
Uruguay	4.8	..	6.3	17.5	49.8	9.2	13.8	13.8	
Venezuela	122.2	20.5	21.7	27.7	29.8	4.2	1.3	1.3	
OCEANIA	383.9	56.7	4.9	16.0	22.6	2.0	2.5	2.5	
Australia	350.2	60.2	5.1	14.8	21.2	2.0	2.3	2.3	
Fiji	..	..	..	..	..	..	..	..
New Zealand	33.8	20.6	3.5	28.5	37.9	1.4	5.4	5.4	
Papua New Guinea	..	..	..	..	..	..	..	..
Solomon Islands	..	..	..	..	..	..	..	..
DEVELOPED	14,718.5	41.0	4.5	15.0	23.6	8.6	6.1	6.1	
DEVELOPING	8,623.7	37.6	6.6	24.5	16.4	7.4	5.8	5.8	

a. Includes emissions from fuel combusted in petroleum refineries, for the manufacture of solid fuels, coal mining, oil and gas exploration, and other energy-producing industries. b. Includes the sum of emissions from combustion of all fossil fuel types used by commercial and institutional, agriculture/forestry/fishing and international marine/aviation bunkers. c. Prior to 2002, gas use for commercial/public services in Italy was included in residential.

VARIABLE DEFINITIONS

Total Carbon Dioxide (CO₂) Emissions refers to the mass of CO₂ released from the burning (combustion) of fuel in a particular country or region. Fuels combusted include coal and coal products, oil, natural gas, industrial waste, and non-renewable municipal waste. CO₂ emissions from land use change, biomass fuels, and cement manufacture are not included here.

Percent of Carbon Dioxide (CO₂) Emissions by Sector refers to the percentage of total CO₂ emissions attributed to each sector.

Public Electricity and Heat Production includes the sum of emissions from fuel combustion used for public electricity generation, public combined heat and power generation, and public heat plants. Public utilities are defined as those undertakings whose primary activity is to supply the public. Emissions from electricity and heat production for producer use (autoproduction) are also included in this variable except where they can be attributed to the industry, transport, or "other" sectors.

Other Energy Industries include the sum of emissions from fuel combustion used by energy industries. This includes fuel combusted in petroleum refineries for the manufacture of solid fuels, coal mining, oil and gas exploration, and other energy-producing industries.

Manufacturing Industries and Construction includes emissions from fuel combustion in all manufacturing industries and construction.

Internal Transportation includes emissions from combustion of fuels for road, rail, air, and other forms of transportation, and agricultural vehicles while they are on highways. The emissions include all sectors of the economy, but do not include international aviation or ship emissions.

Residential sources include emissions from fuel combustion in households.

Other Commercial, Public, and Agricultural Sectors includes the sum of emissions from fuel combustion used in agriculture, forestry, fishing, commercial, institutional, and other activities that are not accounted for elsewhere.

METHODOLOGY

Emissions are calculated from the International Energy Agency's (IEA) Energy Balance data using the methods and emissions factors from the Revised 1996 International Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (Guidelines) available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>. More information on IEA's Energy Balances can be found at <http://data.iea.org/stats/codebook/wbaldoc.html>.

The IPCC allows countries to use either the reference approach or the sectoral approach when reporting their CO₂ emissions. The emissions shown here use the reference approach, which uses data on a country's total energy supply and captures refining, flaring, and other "fugitive emissions" that do not result directly from end-use fuel combustion. In contrast, the sectoral approach estimates emissions based on the combustion rather than the supply of fuels.

The reference approach accounts for the carbon in all fuels supplied to the economy. Apparent consumption of fuels is calculated as production minus exports plus imports. Net stock changes are either added or subtracted. Emissions from international marine and aviation bunkers (fuels used for international transport) are subtracted from national totals, as these figures are accounted for separately. Imports and exports of both primary and secondary fuels are included in the calculations.

A portion of all fuels is used as a feedstock for a non-energy use such as plastics manufacture or bitumen for road construction. Since the carbon in these fuels is not released into the atmosphere, this "stored carbon" is subtracted from the total emissions.

FREQUENCY OF UPDATE BY DATA PROVIDERS

The IEA updates carbon dioxide emissions data annually, often revising data from earlier years.

DATA RELIABILITY AND CAUTIONARY NOTES

The IEA has created CO₂ emissions estimates from energy statistics that are based on well-established and institutionalized accounting methodologies and undergo thorough review and adjustments. In a few cases, however, these estimates differ significantly (>5%) from those reported by individual countries or by the United Nations Framework Convention on Climate Change (UNFCCC). This is because individual countries may use different energy figures than the IEA or treat bunker fuels differently. Other countries may calculate emissions with specific calorific values instead of the averages used by the IEA.

The data as received from the provider do not distinguish between missing data and zero values. WRI has distinguished between the two where possible, but some values represented as zero should probably be indicated as missing and vice versa.

SOURCES

International Energy Agency (IEA), 2004. CO₂ Emissions from Fuel Combustion (2003 Edition). Electronic database available online at: <http://data.iea.org/ieastore/default.asp>. Paris: Organization for Economic Cooperation and Development (OECD).