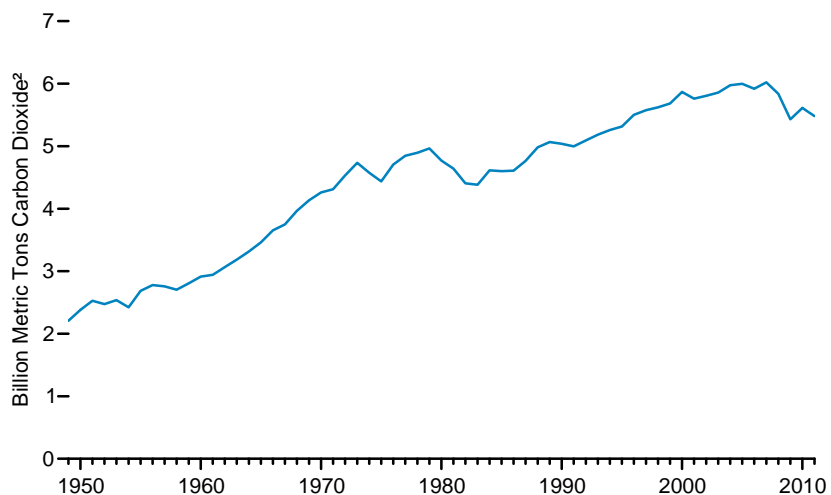


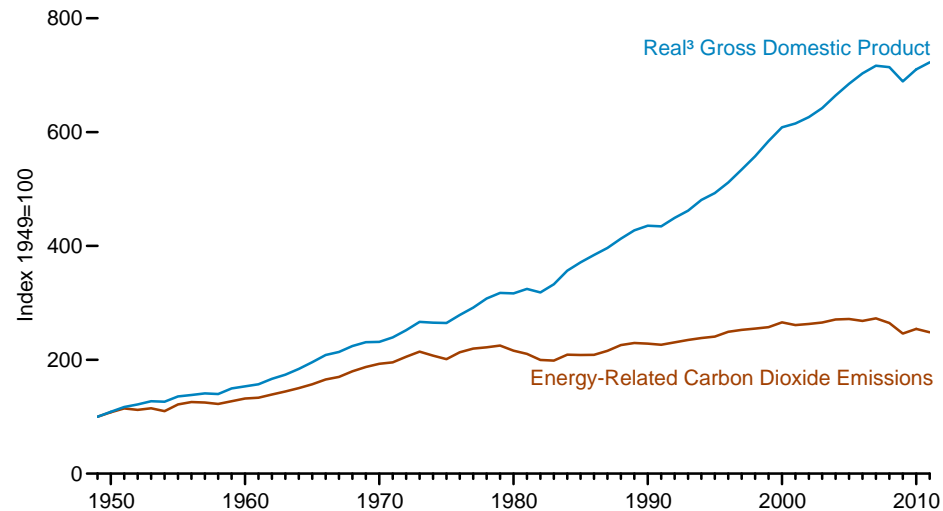
11. Environment

Figure 11.1 Carbon Dioxide Emissions From Energy Consumption

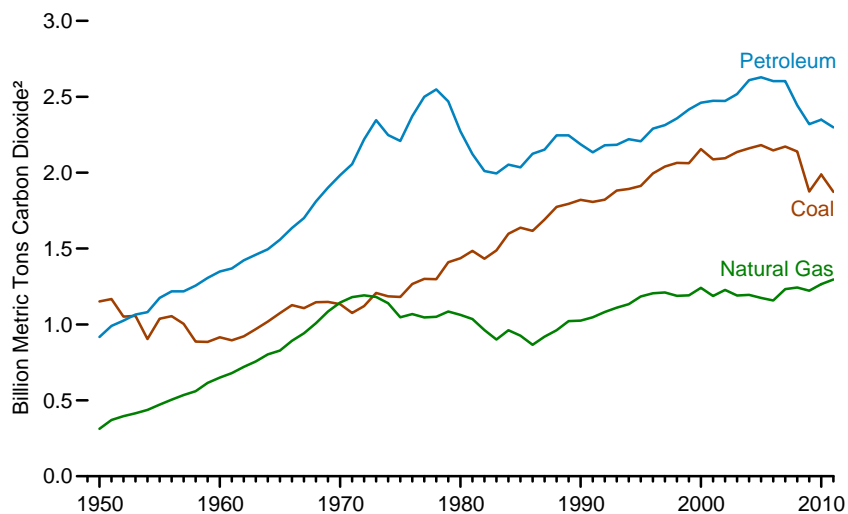
Total¹ 1949-2011



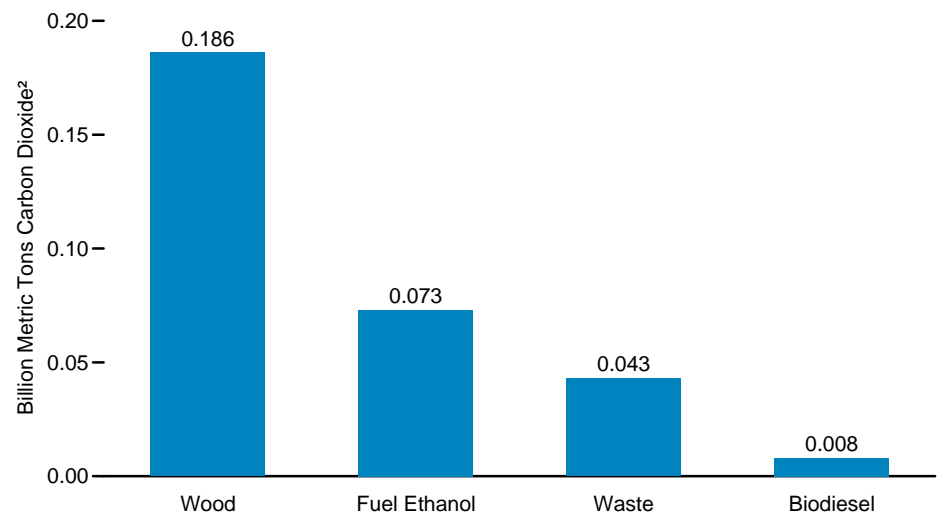
Economic Growth and Carbon Dioxide Emissions, 1949-2011



By Major Source, 1949-2011



By Biomass¹ Source, 2011



¹ Carbon dioxide emissions from biomass energy consumption are excluded from total emissions. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

² Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

³ Based on chained (2005) dollars. Sources: Tables 1.5, 11.1, and 11.2a-11.2e.

Table 11.1 Carbon Dioxide Emissions From Energy Consumption by Source, Selected Years, 1949-2011
(Million Metric Tons of Carbon Dioxide ¹)

Year	Coal ³	Natural Gas ⁴	Petroleum											Total ^{2,9}	Biomass ²				
			Aviation Gasoline	Distillate Fuel Oil ⁵	Jet Fuel	Kero-sene	LPG ⁶	Lubri-cants	Motor Gasoline ⁷	Petroleum Coke	Residual Fuel Oil	Other ⁸	Total		Wood ¹⁰	Waste ¹¹	Fuel Ethanol ¹²	Bio-diesel	Total
1949	1,118	270	12	140	NA	42	13	7	329	8	244	25	820	2,207	145	NA	NA	NA	145
1950	1,152	313	14	168	NA	48	16	9	357	8	273	26	918	2,382	147	NA	NA	NA	147
1955	1,038	472	24	247	21	48	27	10	473	13	274	38	1,175	2,685	134	NA	NA	NA	134
1960	915	650	21	291	53	41	42	10	543	29	275	45	1,349	2,914	124	NA	NA	NA	124
1965	1,075	828	15	330	87	40	57	11	627	39	289	65	1,559	3,462	125	NA	NA	NA	125
1970	1,134	1,144	7	394	141	39	78	11	789	41	396	85	1,983	4,261	134	(s)	NA	NA	134
1975	1,181	1,047	5	443	146	24	82	11	911	48	443	97	2,209	4,437	140	(s)	NA	NA	141
1976	1,266	1,068	5	488	144	25	86	13	955	47	506	103	2,372	4,705	161	(s)	NA	NA	161
1977	1,300	1,046	5	520	152	26	85	13	979	52	553	115	2,500	4,846	172	(s)	NA	NA	172
1978	1,298	1,050	5	533	154	26	83	14	1,011	50	544	127	2,548	4,896	191	(s)	NA	NA	191
1979	1,410	1,085	5	514	157	28	95	15	960	48	509	139	2,469	4,964	202	(s)	NA	NA	202
1980	1,436	1,063	4	446	156	24	87	13	900	46	453	142	2,272	4,770	232	(s)	NA	NA	232
1981	1,485	1,036	4	439	147	19	85	13	899	48	376	93	2,122	4,642	234	5	(s)	NA	240
1982	1,433	963	3	415	148	19	85	11	892	49	309	80	2,011	4,406	235	7	1	NA	244
1983	1,488	901	3	418	153	19	85	12	904	48	255	98	1,995	4,383	252	10	2	NA	264
1984	1,598	962	3	443	172	17	88	13	914	51	247	106	2,053	4,613	252	13	3	NA	267
1985	1,638	926	3	445	178	17	86	12	930	55	216	93	2,035	4,600	252	14	3	NA	270
1986	1,617	866	4	453	191	15	83	12	958	56	255	98	2,125	4,608	240	16	4	NA	260
1987	1,691	920	3	463	202	14	82	13	982	60	227	106	2,152	4,764	231	18	5	NA	253
1988	1,775	962	3	487	212	14	83	13	1,003	63	249	119	2,246	4,982	242	19	5	NA	266
1989	1,795	1,022	3	491	218	13	82	13	1,000	62	246	118	2,246	5,067	251	22	5	NA	278
1990	1,821	1,025	3	470	223	6	69	13	988	67	220	127	2,187	5,039	208	24	4	NA	237
1991	1,807	1,047	3	454	215	7	71	12	982	66	207	117	2,134	4,996	208	26	5	NA	239
1992	1,822	1,082	3	464	213	6	77	12	999	74	196	135	2,180	5,093	217	27	6	NA	250
1993	1,882	1,110	3	473	215	7	76	12	1,015	76	193	114	2,184	5,185	212	28	7	NA	246
1994	1,893	1,134	3	492	224	7	79	13	1,022	74	183	124	2,221	5,258	218	29	7	NA	255
1995	1,913	1,184	3	498	222	8	78	13	1,044	75	152	114	2,207	5,314	222	30	8	NA	260
1996	1,995	1,205	3	524	232	9	84	12	1,063	78	152	132	2,290	5,501	229	32	6	NA	266
1997	2,040	1,211	3	534	234	10	85	13	1,075	79	142	138	2,313	5,575	222	30	7	NA	259
1998	2,064	1,189	2	538	238	12	75	14	1,107	89	158	125	2,358	5,622	205	30	8	NA	242
1999	2,062	1,192	3	555	245	11	91	14	1,127	93	148	130	2,417	5,682	208	29	8	NA	245
2000	2,155	1,241	3	580	254	10	102	14	1,135	84	163	117	2,461	5,867	212	27	9	NA	248
2001	2,088	1,187	2	598	243	11	92	13	1,151	88	145	132	2,473	5,759	188	33	10	(s)	231
2002	2,095	R1,227	2	587	237	6	98	12	1,183	94	125	127	2,472	R5,806	187	36	12	(s)	235
2003	2,136	1,191	2	610	231	8	95	11	1,188	94	138	140	2,518	5,857	188	36	16	(s)	240
2004	2,160	R1,195	2	632	240	10	98	12	1,214	105	155	142	2,609	5,975	199	35	20	(s)	255
2005	2,182	1,175	2	640	246	10	94	12	1,214	105	164	141	2,628	R5,997	200	37	23	1	261
2006	2,147	R1,158	2	648	240	8	93	11	1,224	104	122	150	2,603	R5,919	R197	36	31	2	R266
2007	2,172	R1,233	2	652	238	5	94	12	1,227	98	129	148	2,603	R6,020	R194	37	39	3	R274
2008	2,139	1,243	2	615	226	2	89	11	1,166	92	111	130	2,444	5,838	R191	40	55	3	289
2009	1,876	R1,222	2	564	204	3	91	10	1,157	87	91	111	2,320	R5,429	R177	41	62	3	R284
2010	R1,988	R1,265	2	R590	R210	3	R94	11	R1,146	77	R96	R120	R2,349	R5,612	186	R43	R73	2	304
2011 ^P	1,874	1,296	2	596	209	2	92	10	1,111	75	86	116	2,299	5,481	186	43	73	8	311

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Carbon dioxide emissions from biomass energy consumption are excluded from total emissions in this table. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

³ Includes coal coke net imports.

⁴ Natural gas, excluding supplemental gaseous fuels.

⁵ Distillate fuel oil, excluding biodiesel.

⁶ Liquefied petroleum gases.

⁷ Finished motor gasoline, excluding fuel ethanol.

⁸ Aviation gasoline blending components, crude oil, motor gasoline blending components, pentanes plus, petrochemical feedstocks, special naphthas, still gas, unfinished oils, waxes, and miscellaneous petroleum products.

⁹ Includes electric power sector use of geothermal energy and non-biomass waste. See Table 11.3e.

¹⁰ Wood and wood-derived fuels.

¹¹ Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass.

¹² Fuel ethanol minus denaturant.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 million metric tons of carbon dioxide.

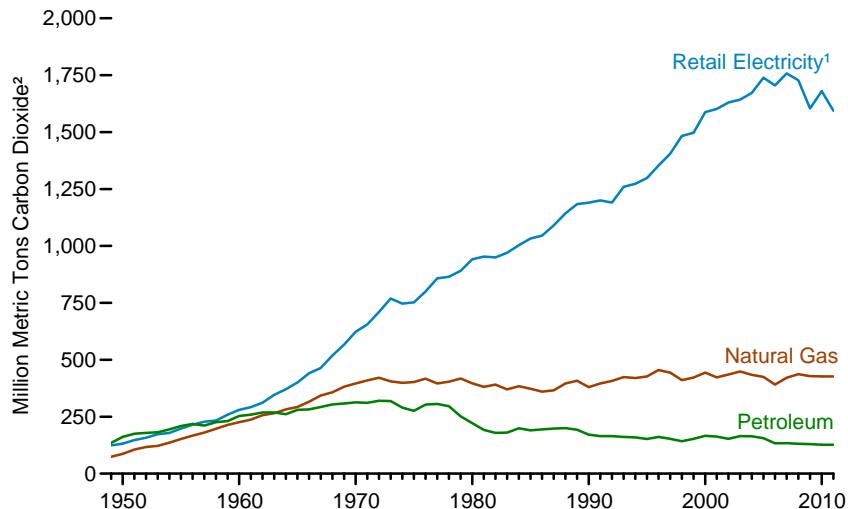
Notes: • Data are estimates for carbon dioxide emissions from energy consumption, including the non-combustion use of fossil fuels. • See "Carbon Dioxide" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/monthly/#environment> for updated monthly and annual data. • See <http://www.eia.gov/totalenergy/data/annual/#environment> for all annual data beginning in 1949. • See <http://www.eia.gov/environment/> for related information.

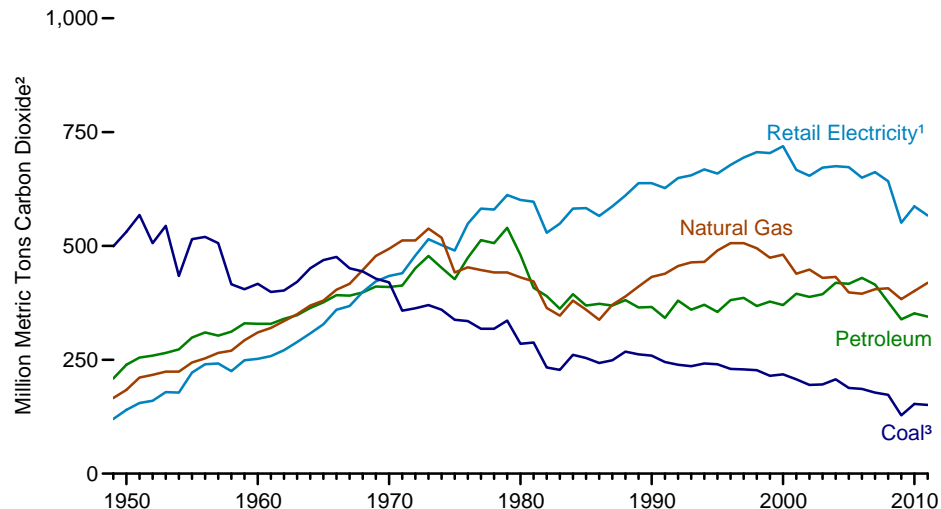
Sources: • 1949-1972—U.S. Energy Information Administration (EIA) estimates based on data in *Annual Energy Review* Tables 2.1b-2.1f, 5.12, 7.3, 7.8, 10.2a-10.2c, and A5. • 1973 forward—EIA, *Monthly Energy Review* (May 2012), Tables 12.1 and 12.7.

Figure 11.2 Carbon Dioxide Emissions From Energy Consumption by Sector, 1949-2011

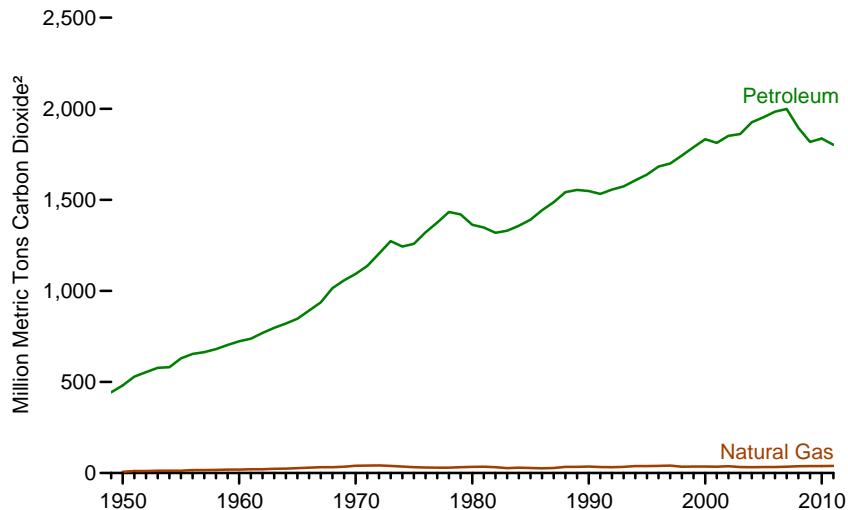
Residential and Commercial, by Major Source



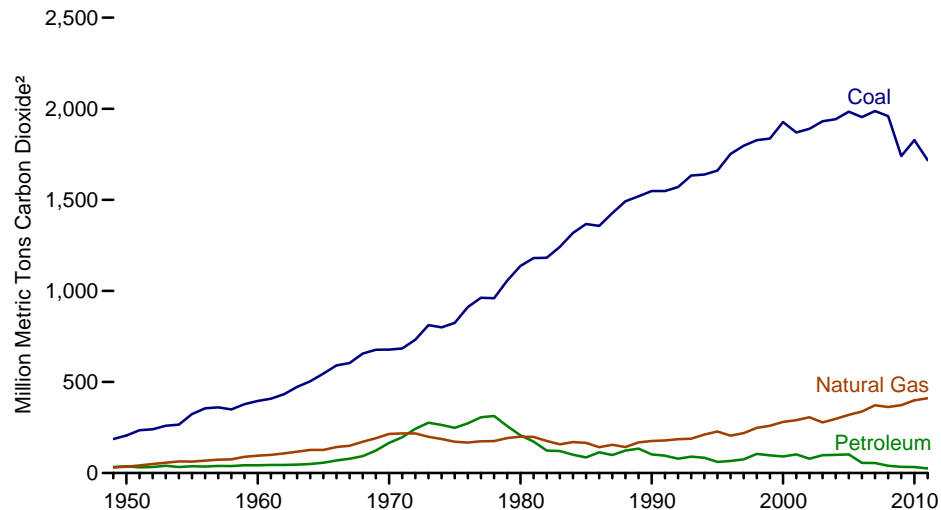
Industrial, by Major Source



Transportation, by Major Source



Electric Power, by Major Source



¹ Emissions from energy consumption in the electric power sector are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales (see Tables 8.9 and 11.2e).

² Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

³ Includes coal coke net imports.
Source: Tables 11.2a-11.2e.

Table 11.2a Carbon Dioxide Emissions From Energy Consumption: Residential Sector, Selected Years, 1949-2011

(Million Metric Tons of Carbon Dioxide ¹)

Year	Coal	Natural Gas ³	Petroleum				Retail Electricity ⁵	Total ²	Biomass ²	
			Distillate Fuel Oil ⁴	Kerosene	Liquefied Petroleum Gases	Total			Wood ⁶	Total ⁶
1949	121	55	51	21	7	80	66	321	99	99
1950	120	66	61	25	9	95	69	350	94	94
1955	83	117	87	27	13	127	110	436	73	73
1960	56	170	115	26	19	160	156	542	59	59
1965	34	214	125	24	24	174	223	644	44	44
1970	20	265	137	22	35	194	355	833	38	38
1975	6	266	132	12	32	176	419	867	40	40
1976	6	273	145	13	34	192	442	913	45	45
1977	5	261	146	12	33	191	478	935	51	51
1978	5	264	143	11	32	186	484	938	58	58
1979	4	268	119	10	21	150	496	918	68	68
1980	3	256	96	8	20	124	529	911	80	80
1981	3	245	84	6	19	109	522	878	82	82
1982	3	250	77	7	18	102	518	873	91	91
1983	3	238	68	6	22	95	531	867	91	91
1984	4	247	80	12	18	109	542	902	92	92
1985	4	241	80	11	20	111	553	909	95	95
1986	4	234	81	9	19	109	558	905	86	86
1987	4	234	85	9	22	115	581	934	80	80
1988	4	251	87	10	22	119	609	982	85	85
1989	3	260	85	8	24	117	625	1,005	86	86
1990	3	238	72	5	22	98	624	963	54	54
1991	2	248	68	5	24	97	633	980	57	57
1992	2	255	72	5	23	100	624	981	60	60
1993	2	269	71	5	25	101	667	1,040	52	52
1994	2	263	70	5	24	99	668	1,032	49	49
1995	2	263	66	5	25	96	678	1,039	49	49
1996	2	284	68	6	30	104	710	1,099	51	51
1997	2	270	64	7	29	99	719	1,090	40	40
1998	1	247	56	8	27	91	759	1,097	36	36
1999	1	257	61	8	33	102	762	1,122	37	37
2000	1	271	66	7	35	108	805	1,185	39	39
2001	1	259	66	7	33	106	805	1,172	35	35
2002	1	^R 265	63	4	34	101	835	^R 1,203	36	36
2003	1	276	66	5	34	106	847	1,230	38	38
2004	1	264	68	6	32	106	856	1,228	38	38
2005	1	262	62	6	32	101	897	1,261	40	40
2006	1	237	52	5	28	85	869	1,192	^R 36	^R 36
2007	1	257	53	3	31	87	897	^R 1,241	^R 38	^R 38
2008	1	266	49	2	35	85	878	1,229	42	42
2009	1	259	44	2	35	81	819	1,159	40	40
2010	1	^R 259	^R 43	2	^R 33	^R 78	^R 875	^R 1,212	39	39
2011 ^P	1	256	43	1	33	78	827	1,162	40	40

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Carbon dioxide emissions from biomass energy consumption are excluded from total emissions in this table. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

³ Natural gas, excluding supplemental gaseous fuels.

⁴ Distillate fuel oil, excluding biodiesel.

⁵ Emissions from energy consumption (for electricity and a small amount of useful thermal output) in the electric power sector are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See Tables 8.9 and 11.2e.

⁶ Wood and wood-derived fuels.

R=Revised. P=Preliminary.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. • See "Carbon Dioxide" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/monthly/#environment> for updated monthly and annual data. • See <http://www.eia.gov/totalenergy/data/annual/#environment> for all annual data beginning in 1949. • See <http://www.eia.gov/environment/> for related information.

Sources: • 1949-1972—U.S. Energy Information Administration (EIA) estimates based on data in *Annual Energy Review* Tables 2.1b, 5.14a, 8.9, 10.2a, and 11.2e. • 1973 forward—EIA, *Monthly Energy Review* (May 2012), Tables 12.2 and 12.7.

Table 11.2b Carbon Dioxide Emissions From Energy Consumption: Commercial Sector, Selected Years, 1949-2011

(Million Metric Tons of Carbon Dioxide ¹)

Year	Coal	Natural Gas ³	Petroleum							Retail Electricity ⁷	Total ²	Biomass ²			
			Distillate Fuel Oil ⁴	Kerosene	LPG ⁵	Motor Gasoline ⁶	Petroleum Coke	Residual Fuel Oil	Total			Wood ⁸	Waste ⁹	Fuel Ethanol ¹⁰	Total
1949	148	19	16	3	2	7	NA	28	55	58	280	2	NA	NA	2
1950	147	21	19	3	2	7	NA	33	66	63	297	2	NA	NA	2
1955	76	35	28	4	3	9	NA	38	82	88	281	1	NA	NA	1
1960	39	56	36	3	5	5	NA	44	93	124	312	1	NA	NA	1
1965	25	79	39	4	6	5	NA	51	106	177	387	1	NA	NA	1
1970	16	131	43	4	9	6	NA	56	119	268	534	1	NA	NA	1
1975	14	136	43	4	8	6	NA	39	100	333	583	1	NA	NA	1
1976	14	144	48	3	9	7	NA	45	111	358	627	1	NA	NA	1
1977	14	135	49	4	9	7	NA	46	115	380	645	1	NA	NA	1
1978	16	140	49	4	8	8	NA	42	110	381	648	1	NA	NA	1
1979	14	150	43	6	6	7	NA	40	102	395	661	1	NA	NA	1
1980	11	141	38	3	6	8	NA	44	98	412	662	2	NA	NA	2
1981	13	136	33	5	5	7	NA	33	83	431	663	2	NA	(s)	2
1982	15	141	32	2	5	6	NA	31	77	432	665	2	NA	(s)	2
1983	15	132	48	8	6	7	NA	16	85	439	671	2	NA	(s)	2
1984	16	137	54	3	5	8	NA	21	90	461	704	2	NA	(s)	2
1985	13	132	46	2	6	7	NA	18	79	480	704	2	NA	(s)	2
1986	13	126	46	4	6	8	NA	23	85	487	711	3	NA	(s)	3
1987	12	132	44	4	6	8	NA	21	83	509	736	3	NA	(s)	3
1988	12	145	44	2	6	8	NA	21	81	534	772	3	NA	(s)	3
1989	11	148	42	2	7	7	0	18	76	559	794	7	1	(s)	9
1990	12	142	39	1	6	8	0	18	73	566	793	6	2	(s)	8
1991	11	148	38	1	7	6	0	17	68	567	794	6	2	(s)	8
1992	11	152	37	1	7	6	(s)	15	65	567	796	7	2	(s)	9
1993	11	155	36	1	7	2	(s)	14	60	593	819	7	2	(s)	9
1994	11	157	37	1	7	2	(s)	14	60	605	833	7	2	(s)	9
1995	11	164	35	2	7	1	(s)	11	56	620	851	7	2	(s)	9
1996	12	171	35	2	8	2	(s)	11	57	643	883	7	3	(s)	10
1997	12	174	32	2	8	3	(s)	9	54	686	926	7	3	(s)	10
1998	9	164	31	2	7	3	(s)	7	51	724	947	6	3	(s)	9
1999	10	165	32	2	9	2	(s)	6	51	735	960	6	3	(s)	9
2000	9	173	36	2	9	3	(s)	7	58	783	1,022	7	2	(s)	9
2001	9	164	37	2	9	3	(s)	6	57	797	1,027	6	2	(s)	9
2002	9	^R 170	32	1	9	3	(s)	6	52	795	^R 1,026	6	2	(s)	9
2003	8	173	35	1	10	4	(s)	9	59	796	1,036	7	3	(s)	9
2004	10	170	34	1	10	3	(s)	10	58	816	1,054	7	3	(s)	10
2005	9	163	33	2	8	3	(s)	9	55	842	1,069	7	3	(s)	10
2006	6	154	29	1	8	3	(s)	6	48	836	1,043	6	3	(s)	9
2007	7	164	28	1	8	4	(s)	6	47	861	^R 1,078	7	3	(s)	9
2008	7	171	27	(s)	10	3	(s)	6	46	850	1,074	7	3	(s)	10
2009	6	169	30	(s)	9	4	(s)	6	49	785	1,008	7	3	(s)	10
2010	^R 6	^R 168	^R 30	(s)	9	4	(s)	^R 6	^R 49	805	^R 1,027	7	3	(s)	10
2011 ^P	5	171	30	(s)	9	4	(s)	6	49	767	992	7	3	(s)	10

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Carbon dioxide emissions from biomass energy consumption are excluded from total emissions in this table. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

³ Natural gas, excluding supplemental gaseous fuels.

⁴ Distillate fuel oil, excluding biodiesel.

⁵ Liquefied petroleum gases.

⁶ Finished motor gasoline, excluding fuel ethanol.

⁷ Emissions from energy consumption (for electricity and a small amount of useful thermal output) in the electric power sector are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See Tables 8.9 and 11.2e.

⁸ Wood and wood-derived fuels.

⁹ Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass.

¹⁰ Fuel ethanol minus denaturant.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 million metric tons of carbon dioxide.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. • See "Carbon Dioxide" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/monthly/#environment> for updated monthly and annual data. • See <http://www.eia.gov/totalenergy/data/annual/#environment> for all annual data beginning in 1949. • See <http://www.eia.gov/environment/> for related information.

Sources: • 1949-1972—U.S. Energy Information Administration (EIA) estimates based on data in *Annual Energy Review* Tables 2.1c, 5.14a, 8.9, 10.2a, and 11.2e. • 1973 forward—EIA, *Monthly Energy Review (MER)* (May 2012), Tables 12.3 and 12.7, and MER data system calculations.

Table 11.2c Carbon Dioxide Emissions From Energy Consumption: Industrial Sector, Selected Years, 1949-2011

(Million Metric Tons of Carbon Dioxide ¹)

Year	Coal	Coal Coke Net Imports	Natural Gas ³	Petroleum									Retail Elec- tricity ⁸	Total ²	Biomass ²			
				Distillate Fuel Oil ⁴	Kero- sene	LPG ⁵	Lubri- cants	Motor Gasoline ⁶	Petroleum Coke	Residual Fuel Oil	Other ⁷	Total			Wood ⁹	Waste ¹⁰	Fuel Ethanol ¹¹	Total
1949	500	-1	166	41	18	3	3	16	8	95	25	209	120	995	44	NA	NA	44
1950	531	(s)	184	51	20	4	3	18	8	110	26	239	140	1,095	50	NA	NA	50
1955	516	-1	244	72	17	10	4	24	13	122	38	299	222	1,281	59	NA	NA	59
1960	418	-1	310	74	12	17	4	27	29	123	45	329	252	1,308	64	NA	NA	64
1965	471	-2	380	83	12	24	5	24	39	123	65	376	328	1,553	80	NA	NA	80
1970	427	-7	494	89	13	31	6	21	39	126	85	410	434	1,759	96	NA	NA	96
1975	336	2	442	97	9	39	6	16	48	117	97	427	490	1,696	100	NA	NA	100
1976	335	(s)	453	111	9	41	6	15	47	141	103	474	549	1,811	114	NA	NA	114
1977	316	2	447	125	10	40	7	14	52	150	115	513	582	1,860	120	NA	NA	120
1978	304	14	442	127	11	40	7	13	48	133	127	506	580	1,846	131	NA	NA	131
1979	329	7	442	128	13	66	8	11	47	128	139	540	612	1,931	132	NA	NA	132
1980	289	-4	431	96	13	61	7	11	45	105	142	480	601	1,797	150	NA	NA	150
1981	290	-2	422	101	8	58	6	11	47	83	93	408	597	1,715	150	5	(s)	156
1982	235	-2	364	95	10	60	6	10	48	81	80	390	529	1,515	142	7	(s)	149
1983	230	-2	347	83	5	55	6	8	48	61	98	362	549	1,486	159	9	(s)	168
1984	262	-1	380	87	3	62	7	11	50	68	106	394	582	1,617	157	12	(s)	170
1985	256	-2	360	81	3	58	6	15	54	57	93	369	583	1,566	154	14	(s)	168
1986	245	-2	338	84	2	56	6	15	55	57	98	373	566	1,520	151	16	(s)	167
1987	248	1	371	83	2	53	7	15	59	45	106	369	587	1,575	148	17	(s)	165
1988	263	5	389	82	2	54	7	14	61	42	119	381	611	1,648	152	19	(s)	171
1989	259	3	411	83	2	49	7	14	60	31	118	365	638	1,677	149	12	(s)	161
1990	258	1	432	84	1	39	7	13	64	31	127	366	638	1,695	135	12	(s)	147
1991	244	1	439	79	1	39	6	14	63	24	117	342	627	1,653	132	11	(s)	143
1992	235	4	456	81	1	45	6	14	70	28	135	380	649	1,724	137	10	(s)	148
1993	233	3	464	81	1	43	6	13	68	33	114	360	655	1,715	139	11	(s)	150
1994	235	7	465	81	1	46	7	14	67	31	124	371	668	1,745	148	11	(s)	160
1995	233	7	490	82	1	45	7	14	67	24	114	355	659	1,743	155	11	(s)	166
1996	227	3	506	86	1	46	6	14	70	24	132	381	678	1,795	158	12	(s)	170
1997	224	5	506	88	1	48	7	15	68	21	138	386	694	1,815	162	10	(s)	172
1998	219	8	495	88	2	39	7	14	77	16	125	368	706	1,796	150	10	(s)	160
1999	208	7	474	86	1	48	7	11	81	14	130	378	704	1,772	152	9	(s)	161
2000	211	7	481	87	1	56	7	11	74	17	117	370	719	1,788	153	8	(s)	161
2001	204	3	439	95	2	49	6	21	77	14	132	395	667	1,709	135	12	(s)	147
2002	188	7	R448	88	1	54	6	22	76	13	127	388	654	R1,685	131	13	(s)	144
2003	190	6	430	83	2	50	6	23	76	15	140	394	672	1,692	128	13	(s)	141
2004	191	16	R432	88	2	55	6	26	82	17	142	419	675	R1,732	138	12	(s)	151
2005	183	5	398	92	3	51	6	25	80	20	141	417	673	1,675	136	13	(s)	150
2006	179	7	R395	92	2	56	6	26	82	16	150	430	650	R1,662	138	12	1	151
2007	175	3	R405	92	1	54	6	21	80	13	148	415	662	R1,661	R132	13	1	146
2008	168	5	407	93	(s)	42	6	17	76	14	130	377	642	R1,599	126	13	1	140
2009	131	-3	383	80	(s)	46	5	17	73	7	111	339	551	1,401	R113	14	1	R128
2010	R154	-1	R401	R86	R1	R50	6	R19	62	8	R120	R352	R587	R1,494	R122	15	1	139
2011 ^P	150	1	419	88	(s)	48	5	18	62	8	116	345	567	1,482	123	16	1	140

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Carbon dioxide emissions from biomass energy consumption are excluded from total emissions in this table. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

³ Natural gas, excluding supplemental gaseous fuels.

⁴ Distillate fuel oil, excluding biodiesel.

⁵ Liquefied petroleum gases.

⁶ Finished motor gasoline, excluding fuel ethanol.

⁷ Aviation gasoline blending components, crude oil, motor gasoline blending components, pentanes plus, petrochemical feedstocks, special naphthas, still gas, unfinished oils, waxes, and miscellaneous petroleum products.

⁸ Emissions from energy consumption (for electricity and a small amount of useful thermal output) in the electric power sector are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See Tables 8.9 and 11.2e.

⁹ Wood and wood-derived fuels.

¹⁰ Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass.

¹¹ Fuel ethanol minus denaturant.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 and greater than -0.5 million metric tons of carbon dioxide.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption, including the non-combustion use of fossil fuels. • See "Carbon Dioxide" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/monthly/#environment> for updated monthly and annual data. • See <http://www.eia.gov/totalenergy/data/annual/#environment> for all annual data beginning in 1949. • See <http://www.eia.gov/environment/> for related information.

Sources: • 1949-1972—U.S. Energy Information Administration (EIA) estimates based on data in *Annual Energy Review* Tables 2.1d, 5.14b, 8.9, 10.2b, and 11.2e. • 1973 forward—EIA, *Monthly Energy Review (MER)* (May 2012), Tables 12.4 and 12.7, and MER data system calculations.

Table 11.2d Carbon Dioxide Emissions From Energy Consumption: Transportation Sector, Selected Years, 1949-2011
(Million Metric Tons of Carbon Dioxide ¹)

Year	Coal	Natural Gas ³	Petroleum								Retail Electricity ⁷	Total ²	Biomass ²		
			Aviation Gasoline	Distillate Fuel Oil ⁴	Jet Fuel	LPG ⁵	Lubricants	Motor Gasoline ⁶	Residual Fuel Oil	Total			Fuel Ethanol ⁸	Biodiesel	Total
1949	161	NA	12	30	NA	(s)	4	306	91	443	6	611	NA	NA	NA
1950	146	7	14	35	NA	(s)	5	332	95	481	6	640	NA	NA	NA
1955	39	13	24	58	21	1	6	439	80	629	5	687	NA	NA	NA
1960	7	19	21	65	53	1	6	511	66	723	2	751	NA	NA	NA
1965	1	27	15	80	87	2	6	597	61	847	2	878	NA	NA	NA
1970	1	40	7	115	141	3	5	763	60	1,093	2	1,136	NA	NA	NA
1975	(s)	32	5	155	145	3	6	889	56	1,258	2	1,292	NA	NA	NA
1976	(s)	30	5	167	143	3	6	933	65	1,322	2	1,354	NA	NA	NA
1977	(s)	29	5	182	149	3	6	958	72	1,375	2	1,406	NA	NA	NA
1978	(⁹)	29	5	196	153	3	7	991	78	1,433	2	1,464	NA	NA	NA
1979	(⁹)	32	5	213	156	1	7	941	97	1,420	2	1,454	NA	NA	NA
1980	(⁹)	34	4	204	155	1	6	881	110	1,363	2	1,400	NA	NA	NA
1981	(⁹)	35	4	212	147	2	6	881	96	1,348	2	1,385	(s)	NA	(s)
1982	(⁹)	32	3	204	148	2	6	876	80	1,319	2	1,354	1	NA	1
1983	(⁹)	27	3	213	153	3	6	888	65	1,330	3	1,359	2	NA	2
1984	(⁹)	29	3	216	172	3	6	895	64	1,358	3	1,390	3	NA	3
1985	(⁹)	28	3	232	178	2	6	908	62	1,391	3	1,421	3	NA	3
1986	(⁹)	26	4	235	191	2	6	936	69	1,443	3	1,472	4	NA	4
1987	(⁹)	28	3	244	202	1	6	959	71	1,487	3	1,519	5	NA	5
1988	(⁹)	34	3	265	212	1	6	981	72	1,542	3	1,579	5	NA	5
1989	(⁹)	34	3	270	218	1	6	979	77	1,554	3	1,591	5	NA	5
1990	(⁹)	36	3	268	223	1	7	967	80	1,548	3	1,588	4	NA	4
1991	(⁹)	33	3	263	215	1	6	962	81	1,532	3	1,568	5	NA	5
1992	(⁹)	32	3	269	213	1	6	979	84	1,556	3	1,592	5	NA	5
1993	(⁹)	34	3	278	215	1	6	1,000	71	1,574	3	1,611	6	NA	6
1994	(⁹)	38	3	295	224	2	6	1,007	70	1,607	3	1,647	7	NA	7
1995	(⁹)	38	3	307	222	1	6	1,029	72	1,639	3	1,681	8	NA	8
1996	(⁹)	39	3	327	232	1	6	1,047	67	1,683	3	1,725	6	NA	6
1997	(⁹)	41	3	342	234	1	6	1,057	56	1,699	3	1,744	7	NA	7
1998	(⁹)	35	2	352	238	1	7	1,090	53	1,743	3	1,782	8	NA	8
1999	(⁹)	36	3	366	245	1	7	1,115	52	1,789	3	1,828	8	NA	8
2000	(⁹)	36	3	378	254	1	7	1,121	70	1,833	4	1,872	9	NA	9
2001	(⁹)	35	2	387	243	1	6	1,127	46	1,813	4	1,852	10	(s)	10
2002	(⁹)	37	2	394	237	1	6	1,158	53	1,851	4	1,892	11	(s)	12
2003	(⁹)	33	2	414	231	1	6	1,161	45	1,861	5	1,899	16	(s)	16
2004	(⁹)	32	2	434	240	1	6	1,185	58	1,926	5	1,962	20	(s)	20
2005	(⁹)	33	2	444	246	2	6	1,186	66	1,953	5	1,991	22	1	23
2006	(⁹)	33	2	469	240	2	5	1,194	71	1,984	5	2,022	30	2	33
2007	(⁹)	35	2	472	238	1	6	1,201	78	1,999	5	2,040	38	3	^R 41
2008	(⁹)	37	2	440	226	3	5	1,146	72	1,895	5	1,937	54	3	57
2009	(⁹)	^R 38	2	404	204	2	5	1,137	64	1,818	5	^R 1,860	61	3	64
2010	(⁹)	^R 38	2	^R 425	^R 210	2	5	^R 1,124	^R 69	^R 1,836	5	^R 1,879	^R 71	2	^R 74
2011 ^P	(⁹)	39	2	430	209	2	5	1,089	65	1,802	4	1,845	71	8	80

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Carbon dioxide emissions from biomass energy consumption are excluded from total emissions in this table. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

³ Natural gas, excluding supplemental gaseous fuels.

⁴ Distillate fuel oil, excluding biodiesel.

⁵ Liquefied petroleum gases.

⁶ Finished motor gasoline, excluding fuel ethanol.

⁷ Emissions from energy consumption (for electricity and a small amount of useful thermal output) in the electric power sector are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See Tables 8.9 and 11.2e.

⁸ Fuel ethanol minus denaturant.

⁹ Beginning in 1978, the small amounts of coal consumed for transportation are reported as industrial sector consumption.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 million metric tons of carbon dioxide.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption, including the non-combustion use of fossil fuels. • See "Carbon Dioxide" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/monthly/#environment> for updated monthly and annual data. • See <http://www.eia.gov/totalenergy/data/annual/#environment> for all annual data beginning in 1949. • See <http://www.eia.gov/environment/> for related information.

Sources: • 1949-1972—U.S. Energy Information Administration (EIA) estimates based on data in *Annual Energy Review* Tables 2.1e, 5.14c, 8.9, 10.2b, and 11.2e. • 1973 forward—EIA, *Monthly Energy Review (MER)* (May 2012), Tables 12.5 and 12.7, and MER data system calculations.

Table 11.2e Carbon Dioxide Emissions From Energy Consumption: Electric Power Sector, Selected Years, 1949-2011
(Million Metric Tons of Carbon Dioxide ¹)

Year	Coal	Natural Gas ³	Petroleum				Geo-thermal	Non-Biomass Waste ⁵	Total ²	Biomass ²		
			Distillate Fuel Oil ⁴	Petroleum Coke	Residual Fuel Oil	Total				Wood ⁶	Waste ⁷	Total
1949	187	30	2	NA	30	33	NA	NA	250	1	NA	1
1950	206	35	2	NA	35	37	NA	NA	278	1	NA	1
1955	324	63	2	NA	35	37	NA	NA	424	(s)	NA	(s)
1960	396	95	2	NA	42	43	NA	NA	535	(s)	NA	(s)
1965	546	127	2	NA	55	57	NA	NA	730	(s)	NA	(s)
1970	678	215	10	2	154	166	NA	NA	1,059	(s)	(s)	(s)
1975	824	172	17	(s)	231	248	NA	NA	1,244	(s)	(s)	(s)
1976	911	167	18	(s)	255	273	NA	NA	1,351	(s)	(s)	(s)
1977	962	174	21	(s)	285	306	NA	NA	1,442	(s)	(s)	(s)
1978	960	175	20	1	291	313	NA	NA	1,448	(s)	(s)	(s)
1979	1,056	192	13	1	244	258	NA	NA	1,505	(s)	(s)	(s)
1980	1,137	200	12	1	194	207	NA	NA	1,544	(s)	(s)	(s)
1981	1,180	198	9	(s)	163	173	NA	NA	1,551	(s)	(s)	(s)
1982	1,182	176	7	(s)	116	123	NA	NA	1,481	(s)	(s)	(s)
1983	1,242	158	7	1	113	121	NA	NA	1,521	(s)	(s)	(s)
1984	1,318	170	6	1	94	101	NA	NA	1,588	(s)	(s)	1
1985	1,367	166	6	1	79	86	NA	NA	1,619	1	(s)	1
1986	1,357	142	6	1	107	114	NA	NA	1,613	(s)	(s)	1
1987	1,427	155	7	1	91	99	NA	NA	1,680	1	(s)	1
1988	1,492	143	8	1	114	123	NA	NA	1,758	1	(s)	1
1989	1,519	168	11	2	121	134	(s)	4	1,826	9	8	17
1990	1,548	176	7	3	92	102	(s)	6	1,831	12	11	23
1991	1,548	179	6	3	86	95	(s)	7	1,830	12	13	25
1992	1,570	186	5	5	69	79	(s)	8	1,843	13	15	28
1993	1,633	188	6	8	76	90	(s)	9	1,919	14	15	29
1994	1,639	211	9	7	68	84	(s)	9	1,944	14	16	30
1995	1,661	228	8	8	45	61	(s)	10	1,960	12	17	28
1996	1,752	205	8	8	50	66	(s)	10	2,033	13	17	30
1997	1,797	219	8	10	56	75	(s)	10	2,101	13	17	30
1998	1,828	248	10	13	82	105	(s)	10	2,192	13	17	30
1999	1,836	260	10	11	76	97	(s)	10	2,204	13	17	30
2000	1,927	281	13	10	69	91	(s)	10	2,310	13	17	29
2001	1,870	290	12	11	79	102	(s)	11	2,273	12	19	31
2002	1,890	306	9	18	52	79	(s)	13	2,288	14	21	35
2003	1,931	278	12	18	69	98	(s)	11	2,319	16	21	37
2004	1,943	297	8	23	69	100	(s)	11	2,352	15	20	36
2005	1,984	319	8	25	69	102	(s)	11	2,417	17	20	37
2006	1,954	338	5	22	28	56	(s)	12	2,359	17	21	38
2007	1,987	372	7	17	31	55	(s)	11	2,426	17	22	39
2008	1,959	362	5	16	19	40	(s)	12	2,374	17	23	40
2009	1,741	373	5	14	14	34	(s)	11	2,159	17	24	41
2010	1,828	399	6	15	12	33	(s)	11	2,271	18	R24	R42
2011 ^P	1,718	411	5	14	7	25	(s)	11	2,166	16	24	41

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Carbon dioxide emissions from biomass energy consumption are excluded from total emissions in this table. See Note, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section.

³ Natural gas, excluding supplemental gaseous fuels.

⁴ Distillate fuel oil, excluding biodiesel.

⁵ Municipal solid waste from non-biogenic sources, and tire-derived fuels.

⁶ Wood and wood-derived fuels.

⁷ Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and

other biomass.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 million metric tons of carbon dioxide.

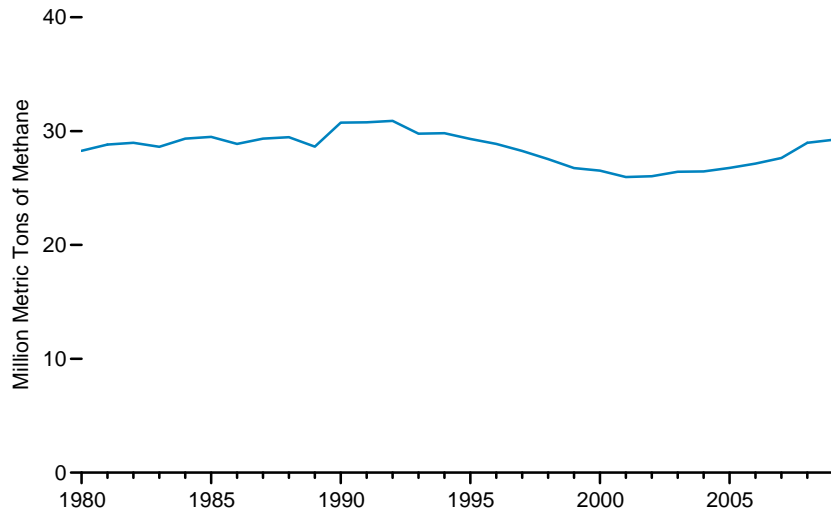
Notes: • Data are estimates for carbon dioxide emissions from energy consumption. • See "Carbon Dioxide" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/monthly/#environment> for updated monthly and annual data. • See <http://www.eia.gov/totalenergy/data/annual/#environment> for all annual data beginning in 1949. • See <http://www.eia.gov/environment/> for related information.

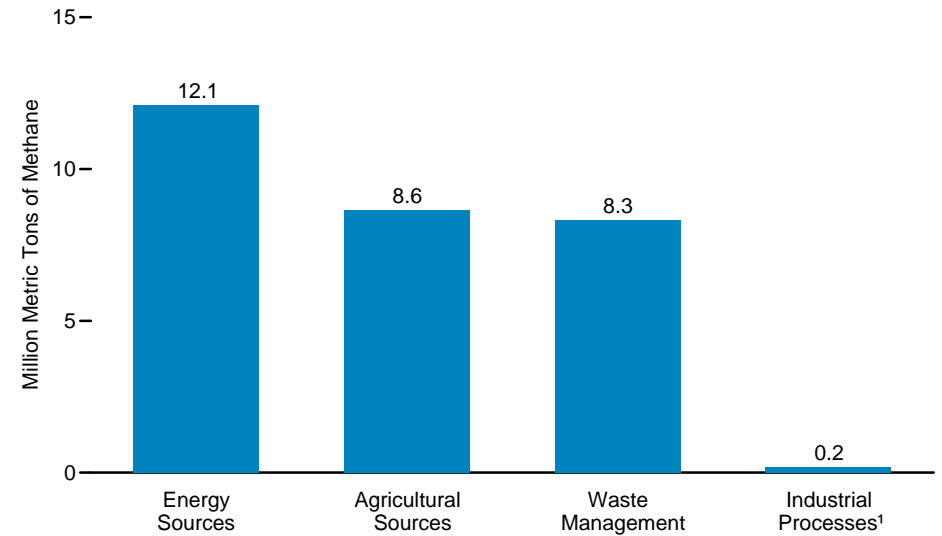
Sources: • 1949-1972—U.S. Energy Information Administration (EIA) estimates based on data in *Annual Energy Review* Tables 2.1f, 5.14c, and 10.2c. • 1973 forward—EIA, *Monthly Energy Review (MER)* (May 2012), Table 12.6 and MER data system calculations.

Figure 11.3 Methane Emissions

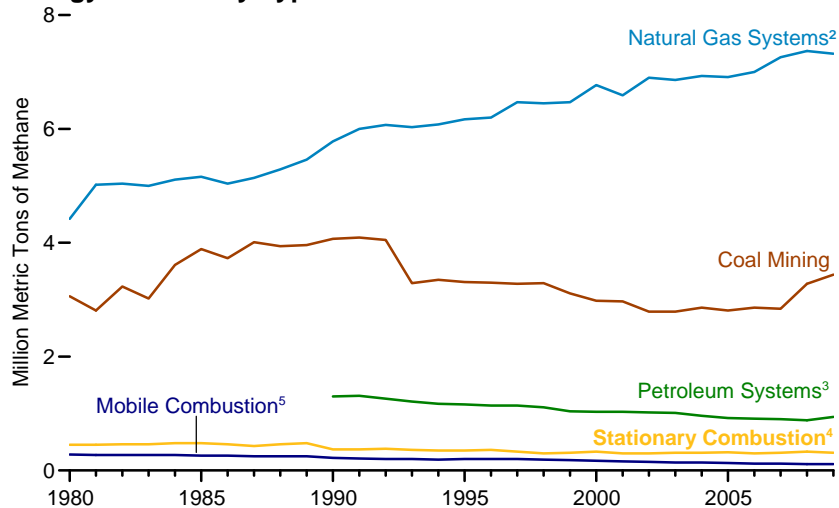
Total, 1980-2009



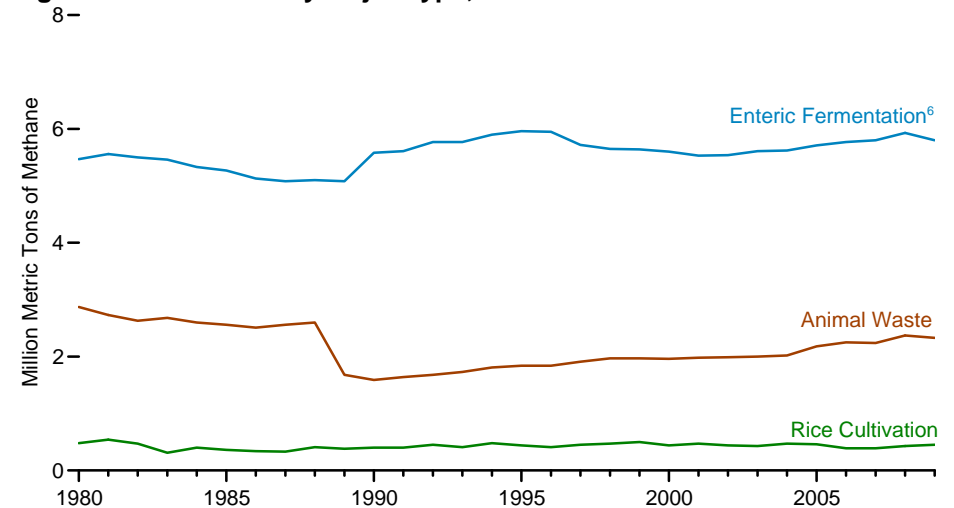
By Source, 2009



Energy Sources by Type 1980-2009



Agricultural Sources by Major Type, 1980-2009



¹ Chemical production, and iron and steel production.

² Natural gas production, processing, and distribution.

³ Petroleum production, refining, and distribution.

⁴ Consumption of coal, petroleum, natural gas, and wood for heat or electricity.

⁵ Emissions from passenger cars, trucks, buses, motorcycles, and other transport.

⁶ Methane emitted as a product of digestion in animals such as cattle, sheep, goats, and swine.

Source: Table 11.3.

Table 11.3 Methane Emissions, 1980-2009
(Million Metric Tons of Methane)

Year	Energy Sources						Waste Management			Agricultural Sources					Industrial Processes ⁹	Total ⁵
	Coal Mining	Natural Gas Systems ¹	Petroleum Systems ²	Mobile Combustion ³	Stationary Combustion ⁴	Total ⁵	Landfills	Waste-water Treatment ⁶	Total ⁵	Enteric Fermentation ⁷	Animal Waste ⁸	Rice Cultivation	Crop Residue Burning	Total ⁵		
1980	3.06	4.42	NA	0.28	0.45	8.20	10.52	0.52	11.04	5.47	2.87	0.48	0.04	8.86	0.17	28.27
1981	2.81	5.02	NA	.27	.45	8.55	10.69	.53	11.22	5.56	2.73	.54	.05	8.88	.18	28.82
1982	3.23	5.04	NA	.27	.46	9.01	10.63	.54	11.17	5.50	2.63	.47	.05	8.65	.13	28.97
1983	3.02	5.00	NA	.27	.46	8.76	10.67	.54	11.21	5.46	2.68	.31	.04	8.49	.15	28.62
1984	3.61	5.11	NA	.27	.48	9.46	10.68	.66	11.33	5.33	2.60	.40	.05	8.38	.16	29.34
1985	3.89	5.16	NA	.26	.48	9.79	10.65	.67	11.32	5.27	2.56	.36	.05	8.23	.15	29.49
1986	3.73	5.04	NA	.26	.46	9.48	10.53	.67	11.20	5.13	2.51	.34	.04	8.02	.16	28.87
1987	4.01	5.14	NA	.25	.43	9.85	10.63	.68	11.31	5.08	2.56	.33	.04	8.02	.17	29.34
1988	3.94	5.29	NA	.25	.46	9.95	10.51	.69	11.20	5.10	2.60	.41	.05	8.14	.18	29.47
1989	3.96	5.46	NA	.25	.48	10.15	10.43	.70	11.13	5.08	1.68	.38	.05	7.18	.18	28.64
1990	4.07	5.78	1.30	.22	.37	11.72	10.31	.91	11.23	5.58	1.59	.40	.05	7.62	.18	30.75
1991	4.09	6.00	1.31	.21	.37	11.98	10.00	.93	10.93	5.61	1.64	.40	.05	7.69	.19	30.78
1992	4.05	6.07	1.26	.20	.38	11.97	9.84	.95	10.79	5.77	1.68	.45	.05	7.95	.19	30.90
1993	3.29	6.03	1.21	.20	.36	11.08	9.58	.96	10.54	5.77	1.73	.41	.04	7.96	.20	29.77
1994	3.35	6.08	1.17	.19	.35	11.15	9.25	.98	10.23	5.90	1.81	.48	.05	8.23	.21	29.82
1995	3.31	6.17	1.16	.20	.35	11.20	8.62	1.00	9.61	5.96	1.84	.44	.05	8.28	.22	29.31
1996	3.30	6.20	1.14	.20	.36	11.20	8.19	1.01	9.19	5.95	1.84	.41	.05	8.25	.22	28.87
1997	3.28	6.47	1.14	.20	.33	11.42	7.45	1.02	8.47	5.72	1.91	.45	.05	8.13	.23	28.26
1998	3.29	6.45	1.11	.19	.30	11.34	6.80	1.03	7.83	5.65	1.97	.47	.05	8.14	.23	27.54
1999	3.11	6.47	1.04	.18	.31	11.11	6.21	1.05	7.25	5.64	1.97	.50	.05	8.16	.24	26.76
2000	2.98	6.77	1.03	.17	.33	11.27	5.93	1.05	6.98	5.60	1.96	.44	.05	8.05	.22	26.53
2001	2.97	6.59	1.03	.16	.30	11.05	5.65	1.05	6.70	5.53	1.98	.47	.05	8.02	.20	25.97
2002	2.79	6.90	1.02	.15	.30	11.16	5.58	1.06	6.64	5.54	1.99	.44	.05	8.03	.21	26.03
2003	2.79	6.86	1.01	.14	.31	11.11	5.97	1.06	7.03	5.61	2.00	.43	.05	8.08	.20	26.43
2004	2.86	6.93	.96	.14	.31	11.20	5.80	1.07	6.88	5.62	2.02	.47	.05	8.16	.22	26.46
2005	2.81	6.91	.92	.13	.32	11.08	6.02	1.08	7.09	5.71	2.18	.46	.05	8.40	.20	26.77
2006	2.86	7.00	.91	.12	.30	11.19	6.18	1.10	7.27	5.77	2.25	.39	.05	8.47	.20	27.14
2007	2.84	7.26	.90	.12	.31	11.43	6.40	1.11	7.51	5.80	2.24	.39	.05	8.49	.21	27.64
2008	3.28	7.37	.88	.11	.33	11.97	6.90	1.12	8.02	5.93	2.37	.43	.05	8.79	.18	28.97
2009	3.44	7.32	.94	.11	.31	12.12	7.19	1.12	8.31	5.80	2.33	.45	.06	8.64	.17	29.24

¹ Natural gas production, processing, and distribution; processing is not included in 1980 and is incompletely covered in 1981–1989.

² Petroleum production, refining, and distribution.

³ Emissions from passenger cars, trucks, buses, motorcycles, and other transport.

⁴ Consumption of coal, petroleum, natural gas, and wood for heat or electricity.

⁵ See notes on components for specific coverage, which is inconsistent prior to 1990 in some cases.

⁶ 1980–1983, domestic wastewater only; 1984 forward, industrial and domestic wastewater.

⁷ Methane emitted as a product of digestion in animals such as cattle, sheep, goats, and swine.

⁸ Estimation methods for 1990 forward reflect a shift in waste management away from liquid systems to dry-lot systems, thus lowering emissions.

⁹ Chemical production, and iron and steel production.

NA=Not available.

Notes: • Data for this table are not available for 2010. • Emissions are from anthropogenic sources.

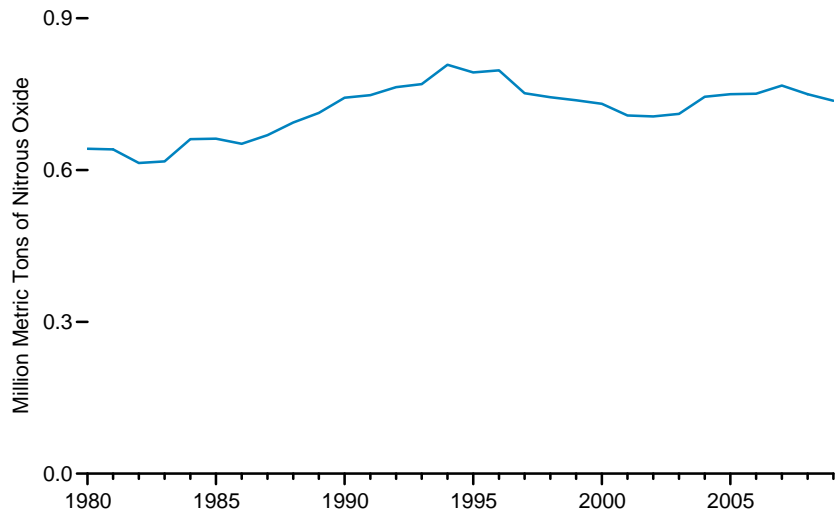
"Anthropogenic" means produced as the result of human activities, including emissions from agricultural activity and domestic livestock. Emissions from natural sources, such as wetlands and wild animals, are not included. • Under certain conditions, methane may be produced via anaerobic decomposition of organic materials in landfills, animal wastes, and rice paddies. • Totals may not equal sum of components due to independent rounding.

Web Page: For related information, see <http://www.eia.gov/environment/>.

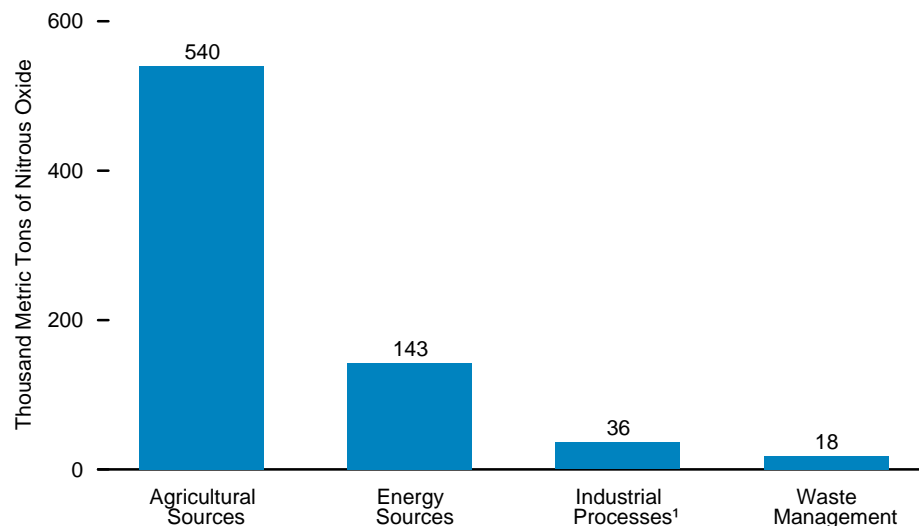
Sources: U.S. Energy Information Administration (EIA), *Emissions of Greenhouse Gases in the United States 2009* (March 2011), Tables 17–21; and EIA estimates based on the Intergovernmental Panel on Climate Change's *Guidelines for National Greenhouse Gas Inventories* (2006 and revised 1996 guidelines)—see <http://www.ipcc-nggip.iges.or.jp/public/gl/invs6.html>; and the U.S. Environmental Protection Agency's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008* (April 2010)—see <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>.

Figure 11.4 Nitrous Oxide Emissions

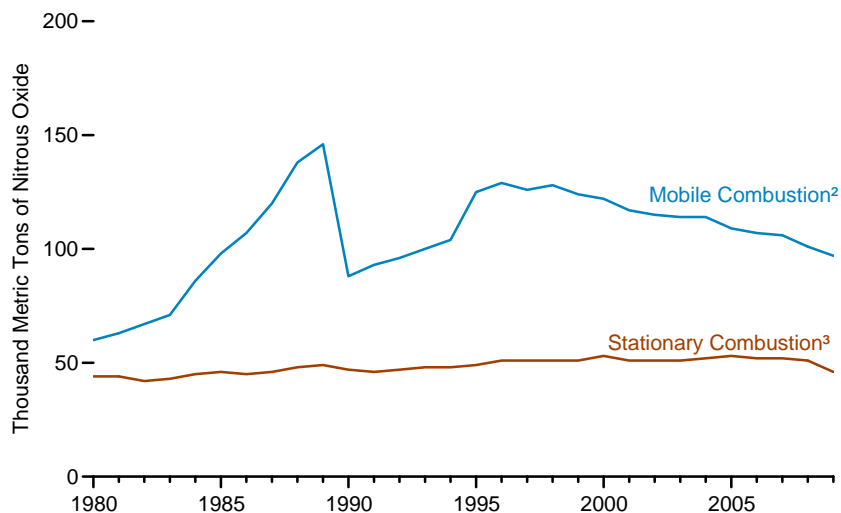
Total, 1980-2009



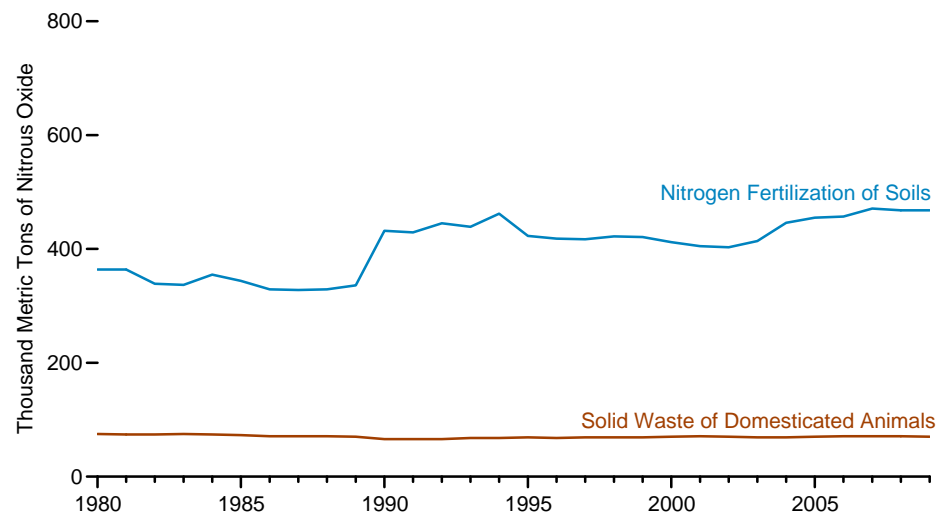
By Source, 2009



Energy Sources by Type, 1980-2009



Agricultural Sources by Major Type, 1980-2009



¹ Adipic acid production (primarily for the manufacture of nylon fibers and plastics) and nitric acid production (primarily for fertilizers).

² Emissions from passenger cars and trucks; air, rail, and marine transportation; and farm and construction equipment.

³ Consumption of coal, petroleum, natural gas, and wood for heat or electricity.
Source: Table 11.4.

Table 11.4 Nitrous Oxide Emissions, 1980-2009
(Thousand Metric Tons of Nitrous Oxide)

Year	Energy Sources			Waste Management			Agricultural Sources				Industrial Processes ³	Total
	Mobile Combustion ¹	Stationary Combustion ²	Total	Waste Combustion	Human Sewage in Wastewater	Total	Nitrogen Fertilization of Soils	Crop Residue Burning	Solid Waste of Domesticated Animals	Total		
1980	60	44	104	1	10	11	364	1	75	440	88	642
1981	63	44	106	1	10	11	364	2	74	440	84	641
1982	67	42	108	1	10	11	339	2	74	414	80	614
1983	71	43	114	1	11	11	337	1	75	413	79	617
1984	86	45	132	1	11	11	355	2	74	431	87	661
1985	98	46	143	1	11	12	344	2	73	419	88	662
1986	107	45	152	1	11	12	329	2	71	402	86	652
1987	120	46	166	1	12	13	328	1	71	400	90	669
1988	138	48	185	1	12	13	329	1	71	401	95	694
1989	146	49	195	1	12	13	336	1	70	407	98	713
1990	88	47	135	1	12	13	432	1	66	499	96	743
1991	93	46	139	1	13	14	429	1	66	497	98	748
1992	96	47	143	1	13	14	445	2	66	512	95	764
1993	100	48	148	1	13	14	439	1	68	508	100	770
1994	104	48	152	1	13	15	462	2	68	532	110	808
1995	125	49	174	1	13	15	423	1	69	494	110	793
1996	129	51	180	1	14	15	418	2	68	487	115	797
1997	126	51	178	1	14	15	417	2	69	487	72	752
1998	128	51	179	1	14	15	422	2	69	493	57	744
1999	124	51	175	1	15	16	421	2	69	492	56	738
2000	122	53	175	1	15	16	412	2	70	484	56	731
2001	117	51	168	1	15	16	405	2	71	477	46	708
2002	115	51	166	1	15	16	403	2	70	474	50	706
2003	114	51	165	1	15	16	414	2	69	485	45	711
2004	114	52	167	1	15	17	446	2	69	517	45	745
2005	109	53	162	1	16	17	455	2	70	526	45	750
2006	107	52	159	1	16	17	457	2	71	530	46	751
2007	106	52	159	1	16	17	471	2	71	544	47	767
2008	101	51	151	1	16	17	468	2	71	541	41	750
2009	97	46	143	1	16	18	468	2	70	540	36	737

¹ Emissions from passenger cars and trucks; air, rail, and marine transportation; and farm and construction equipment.

² Consumption of coal, petroleum, natural gas, and wood for heat or electricity.

³ Adipic acid production (primarily for the manufacture of nylon fibers and plastics), and nitric acid production (primarily for fertilizers).

Notes: • Data for this table are not available for 2010. • Emissions are from anthropogenic sources. "Anthropogenic" means produced as the result of human activities, including emissions from agricultural activity and domestic livestock. Emissions from natural sources, such as wetlands and wild animals, are

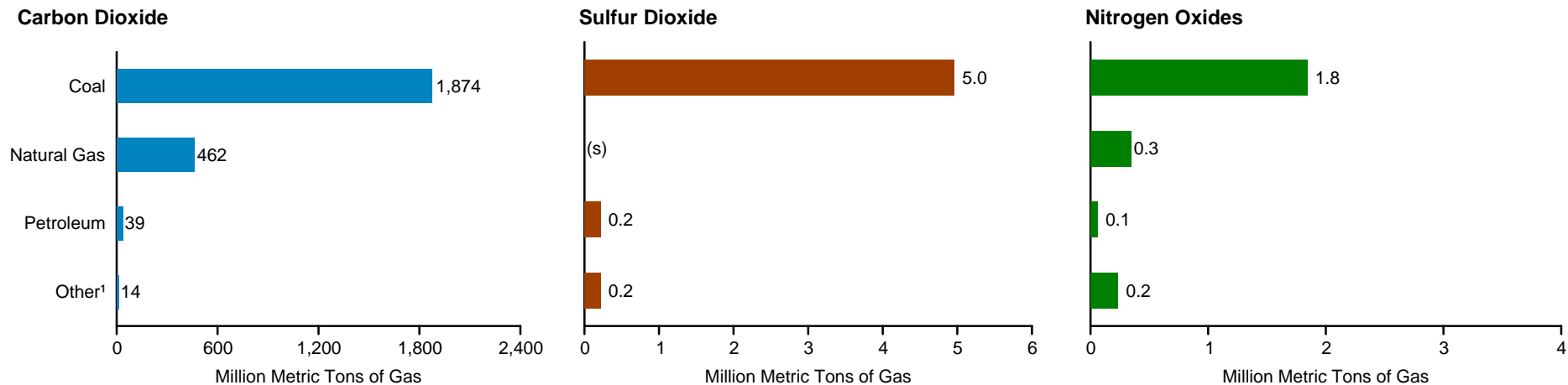
not included. • Totals may not equal sum of components due to independent rounding.

Web Page: For related information, see <http://www.eia.gov/environment/>.

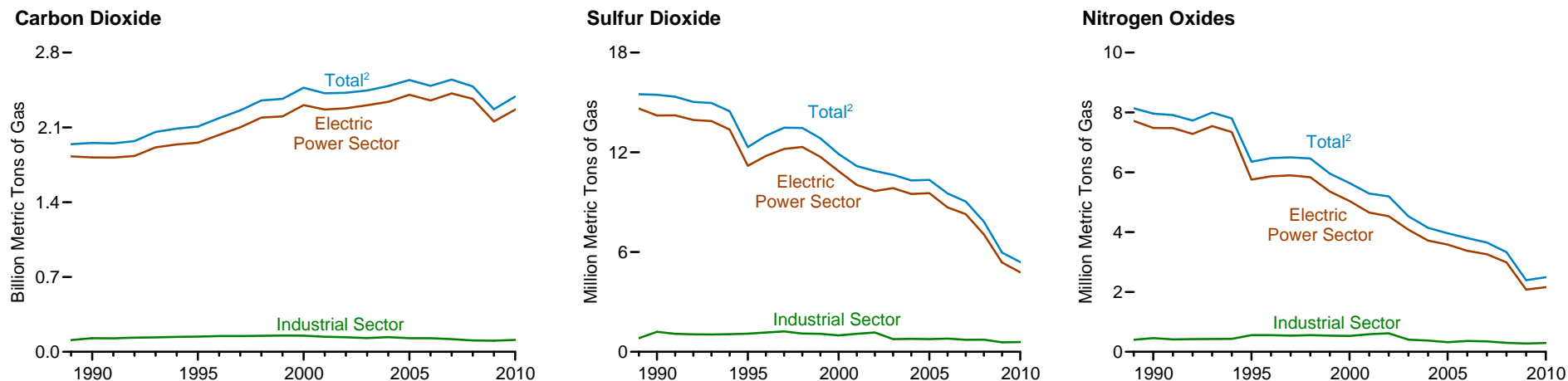
Sources: U.S. Energy Information Administration (EIA), *Emissions of Greenhouse Gases in the United States 2009* (March 2011), Table 22; and EIA estimates based on the Intergovernmental Panel on Climate Change's *Guidelines for National Greenhouse Gas Inventories* (2006 and revised 1996 guidelines)—see <http://www.ipcc-nggip.iges.or.jp/public/gl/invs6.html>; and the U.S. Environmental Protection Agency's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008* (April 2010)—see <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>.

Figure 11.5 Emissions From Energy Consumption for Electricity Generation and Useful Thermal Output

Emissions by Type of Generating Unit, 2010



Emissions by Sector, 1989-2010



¹ For carbon dioxide: municipal solid waste from non-biogenic sources; tire-derived fuel, and geothermal. For sulfur dioxide and nitrogen oxides: blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels; wood and wood-derived fuels; municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass; and chemicals, hydrogen, pitch, sulfur, and tar coal.

² Includes Commercial Sector.
(s)=Less than 0.05 million metric tons.
Sources: Tables 11.5a-11.5c.

**Table 11.5a Emissions From Energy Consumption for Electricity Generation and Useful Thermal Output:
Total (All Sectors), 1989-2010** (Sum of Tables 11.5b and 11.5c; Thousand Metric Tons of Gas)

Year	Carbon Dioxide ¹						Sulfur Dioxide					Nitrogen Oxides				
	Coal ²	Natural Gas ³	Petroleum ⁴	Geo-thermal ⁵	Non-Biomass Waste ⁶	Total	Coal ²	Natural Gas ³	Petroleum ⁴	Other ⁷	Total	Coal ²	Natural Gas ³	Petroleum ⁴	Other ⁷	Total
1989	1,573,566	218,384	145,399	363	5,590	1,943,302	14,469	1	984	39	15,493	7,281	495	269	93	8,136
1990	1,592,395	233,852	119,580	384	7,488	1,953,699	14,281	1	937	243	15,462	7,119	513	208	122	7,961
1991	1,592,186	238,084	111,351	398	8,447	1,950,466	14,240	1	856	246	15,342	7,109	498	193	113	7,913
1992	1,617,034	248,149	96,638	400	10,053	1,972,275	14,060	1	704	264	15,030	6,975	477	158	119	7,728
1993	1,687,623	250,411	108,164	415	10,439	2,057,053	13,843	1	851	271	14,966	7,225	475	173	124	7,997
1994	1,697,416	276,308	102,844	384	11,186	2,088,138	13,398	1	794	279	14,472	7,005	513	159	124	7,801
1995	1,720,062	298,601	77,032	329	11,982	2,108,006	11,188	2	826	298	12,314	5,136	653	332	234	6,355
1996	1,812,022	277,856	84,024	360	12,718	2,186,980	11,811	1	876	304	12,991	5,307	577	352	238	6,474
1997	1,858,944	293,139	93,497	374	13,368	2,259,322	12,211	1	965	303	13,480	5,322	619	326	233	6,500
1998	1,887,335	327,456	123,542	375	12,891	2,351,600	12,012	1	1,162	289	13,464	5,123	700	395	241	6,459
1999	1,894,211	343,090	115,677	381	12,943	2,366,302	11,453	1	1,101	288	12,843	4,687	632	391	245	5,955
2000	1,986,100	363,526	108,407	362	12,440	2,470,834	R ^{10,669}	1	933	300	R ^{11,904}	4,370	614	404	250	5,638
2001	1,920,901	367,146	117,196	353	13,010	2,418,607	9,905	2	1,002	265	11,174	4,096	631	294	268	5,290
2002	1,938,613	378,950	91,110	372	14,918	2,423,963	9,786	2	773	321	10,881	4,057	625	225	287	5,194
2003	1,973,597	345,119	112,065	371	13,943	2,445,094	9,688	2	717	239	10,646	3,607	453	240	232	4,532
2004	1,989,580	367,112	115,726	381	14,183	2,486,982	9,437	2	633	237	10,309	3,286	416	225	217	4,143
2005	2,028,614	383,461	117,086	377	14,299	2,543,838	9,499	2	587	251	10,340	3,135	383	221	222	3,961
2006	2,001,085	404,278	67,988	374	15,193	2,488,918	8,867	2	427	227	9,524	2,996	399	164	240	3,799
2007	2,029,804	434,536	67,769	376	14,548	2,547,032	8,389	3	422	227	9,042	2,870	382	157	242	3,650
2008	2,001,806	419,599	47,855	381	14,370	2,484,012	7,351	3	250	225	7,830	2,680	351	75	225	3,330
2009	1,781,278	432,206	41,474	386	14,163	2,269,508	5,535	2	210	223	5,970	1,769	336	66	225	2,395
2010	1,873,813	461,723	38,793	391	13,875	2,388,596	4,961	3	217	219	5,400	1,843	349	63	236	2,491

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Anthracite, bituminous coal, subbituminous coal, lignite, waste coal, and synthetic coal.

³ Natural gas, plus a small amount of supplemental gaseous fuels.

⁴ Distillate fuel oil, residual fuel oil, petroleum coke, jet fuel, kerosene, other petroleum, and waste oil.

⁵ Carbon dioxide in geothermal steam.

⁶ Municipal solid waste from non-biogenic sources, and tire-derived fuel.

⁷ Blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels;

wood and wood-derived fuels; municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass; and chemicals, hydrogen, pitch, sulfur, and tar coal.

R=Revised.

Notes: • Data are for emissions from energy consumption for electricity generation and useful thermal output. • See "Useful Thermal Output" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Page: For related information, see <http://www.eia.gov/electricity/>.

Sources: Tables 11.5b and 11.5c.

Table 11.5b Emissions From Energy Consumption for Electricity Generation and Useful Thermal Output: Electric Power Sector, 1989-2010 (Subset of Table 11.5a; Thousand Metric Tons of Gas)

Year	Carbon Dioxide ¹						Sulfur Dioxide					Nitrogen Oxides				
	Coal ²	Natural Gas ³	Petroleum ⁴	Geo-thermal ⁵	Non-Biomass Waste ⁶	Total	Coal ²	Natural Gas ³	Petroleum ⁴	Other ⁷	Total	Coal ²	Natural Gas ³	Petroleum ⁴	Other ⁷	Total
1989	1,520,230	169,653	133,546	363	4,366	1,828,158	13,815	1	810	7	14,633	7,055	390	246	25	7,717
1990	1,534,141	177,232	101,800	384	5,795	1,819,351	13,576	1	628	13	14,218	6,878	390	175	36	7,480
1991	1,534,559	180,541	95,149	398	7,207	1,817,854	13,590	1	621	15	14,227	6,886	384	165	42	7,476
1992	1,556,741	187,730	79,153	400	8,476	1,832,501	13,375	1	559	12	13,946	6,749	359	128	46	7,282
1993	1,626,161	188,291	90,400	415	8,592	1,913,860	13,133	1	735	13	13,882	6,996	357	143	49	7,544
1994	1,634,282	211,154	85,005	384	9,323	1,940,148	12,695	1	665	11	13,373	6,777	390	128	47	7,343
1995	1,656,743	228,675	61,057	329	10,015	1,956,819	10,573	1	581	34	11,189	4,974	402	282	95	5,754
1996	1,747,945	205,250	66,113	360	9,932	2,029,599	11,129	1	617	32	11,779	5,144	326	301	96	5,866
1997	1,794,629	220,174	75,079	374	10,372	2,100,628	11,515	1	653	36	12,205	5,157	370	269	98	5,894
1998	1,825,027	249,836	105,539	375	10,264	2,191,041	11,373	1	911	37	12,321	4,965	431	337	103	5,836
1999	1,831,670	262,455	97,892	381	10,312	2,202,710	10,843	1	836	42	11,722	4,535	381	332	109	5,357
2000	1,923,054	283,034	92,226	362	10,178	2,308,855	^R 10,081	1	746	45	^R 10,872	4,225	338	367	111	5,040
2001	1,862,800	291,101	102,900	353	10,900	2,268,054	9,281	2	754	5	10,041	3,878	425	253	96	4,652
2002	1,878,923	307,455	78,820	372	12,758	2,278,328	9,106	2	549	16	9,672	3,813	425	187	104	4,528
2003	1,917,303	279,300	98,208	371	11,453	2,306,635	9,255	2	579	13	9,849	3,496	282	207	98	4,082
2004	1,929,818	297,782	100,236	381	11,177	2,339,394	8,991	2	493	9	9,495	3,183	241	193	101	3,717
2005	1,970,908	320,545	102,537	377	11,257	2,405,625	9,071	2	461	10	9,543	3,051	243	189	103	3,585
2006	1,944,759	339,557	55,358	374	11,544	2,351,592	8,416	2	264	8	8,690	2,902	230	135	107	3,374
2007	1,977,528	373,268	55,545	376	11,304	2,418,022	8,002	3	265	9	8,279	2,781	236	130	112	3,259
2008	1,951,138	363,749	40,442	381	11,620	2,367,331	6,909	2	146	8	7,065	2,578	230	58	124	2,990
2009	1,736,284	374,082	33,700	386	11,256	2,155,707	5,253	2	110	9	5,374	1,688	214	50	128	2,080
2010	1,821,497	400,974	32,667	391	11,034	2,266,563	4,662	2	111	8	4,783	1,751	224	49	135	2,159

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Anthracite, bituminous coal, subbituminous coal, lignite, waste coal, and synthetic coal.

³ Natural gas, plus a small amount of supplemental gaseous fuels.

⁴ Distillate fuel oil, residual fuel oil, petroleum coke, jet fuel, kerosene, other petroleum, and waste oil.

⁵ Carbon dioxide in geothermal steam.

⁶ Municipal solid waste from non-biogenic sources, and tire-derived fuel.

⁷ Blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels; wood and wood-derived fuels; municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass; and chemicals, hydrogen, pitch, sulfur, and tar coal.

R=Revised.

Notes: • There are small differences in carbon dioxide emissions values between this table and Table 11.2e due to differences in the methodologies for calculating the data. • Data are for emissions from

energy consumption for electricity generation and useful thermal output. • The electric power sector comprises electricity-only and combined-heat-and-power (CHP) plants within the NAICS 22 category whose primary business is to sell electricity, or electricity and heat, to the public. • See Table 11.5c for commercial and industrial CHP and electricity-only data. • See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 8. • See "Useful Thermal Output" in Glossary. • Totals may not equal sum of components due to independent rounding.

Web Page: For related information, see <http://www.eia.gov/electricity/>.

Sources: **Carbon Dioxide:** U.S. Energy Information Administration (EIA) estimates based on Form EIA-923, "Power Plant Operations Report" (and predecessor forms). **Sulfur Dioxide and Nitrogen Oxides:** EIA estimates based on Form EIA-923, "Power Plant Operations Report" (and predecessor forms). Data were adjusted by the U.S. Environmental Protection Agency's Continuous Emissions Monitoring System.

Table 11.5c Emissions From Energy Consumption for Electricity Generation and Useful Thermal Output: Commercial and Industrial Sectors, 1989-2010 (Subset of Table 11.5a; Thousand Metric Tons of Gas)

Year	Carbon Dioxide ¹					Total	Sulfur Dioxide				Total	Nitrogen Oxides				Total
	Coal ²	Natural Gas ³	Petroleum ⁴	Geo-thermal ⁵	Non-Biomass Waste ⁶		Coal ²	Natural Gas ³	Petroleum ⁴	Other ⁷		Coal ²	Natural Gas ³	Petroleum ⁴	Other ⁷	
Commercial Sector ⁸																
1989	2,320	1,542	637	–	804	5,303	37	(s)	5	1	43	9	3	2	3	17
1990	2,418	2,294	706	–	959	6,377	39	(s)	4	1	45	10	6	1	4	21
1991	2,680	2,287	544	–	1,014	6,526	32	(s)	3	1	35	10	6	1	4	21
1992	2,552	2,787	474	–	1,258	7,070	32	(s)	3	1	35	10	7	1	4	21
1993	2,988	3,315	616	–	1,285	8,205	40	(s)	3	1	44	12	7	1	4	24
1994	2,932	3,722	654	–	1,292	8,601	39	(s)	3	(s)	42	11	8	1	4	24
1995	3,106	4,070	509	–	1,462	9,147	30	(s)	3	3	35	8	20	6	11	45
1996	3,639	4,369	534	–	2,023	10,565	40	(s)	3	4	47	9	23	4	14	50
1997	3,871	4,654	716	–	2,277	11,518	43	(s)	3	6	51	10	34	7	14	65
1998	3,341	4,707	829	–	2,081	10,958	37	(s)	5	4	45	10	35	5	16	66
1999	3,468	4,535	742	–	2,008	10,752	34	(s)	4	4	42	9	28	4	17	57
2000	3,635	4,605	740	–	1,684	10,665	33	(s)	4	7	43	8	38	4	16	65
2001	3,366	4,280	839	–	1,418	9,903	43	(s)	4	2	48	13	19	2	16	50
2002	3,025	4,035	571	–	1,520	9,151	41	(s)	2	2	46	13	20	2	13	48
2003	3,904	3,222	683	–	1,706	9,515	32	(s)	3	1	36	9	16	5	15	45
2004	4,018	3,916	920	–	1,962	10,817	30	(s)	3	2	35	8	18	8	16	49
2005	4,031	3,701	759	–	1,897	10,387	33	(s)	3	1	36	9	24	6	15	54
2006	3,908	3,686	445	–	1,946	9,984	33	(s)	3	1	36	9	35	3	17	64
2007	3,994	3,800	363	–	1,635	9,792	33	(s)	3	1	37	10	16	2	16	44
2008	4,155	3,589	310	–	1,953	10,006	32	(s)	1	(s)	33	9	14	1	16	40
2009	3,727	4,093	245	–	2,084	10,149	26	(s)	1	(s)	27	8	13	1	16	39
2010	3,530	4,639	206	–	2,063	10,437	25	(s)	1	(s)	27	7	14	1	15	38
Industrial Sector ⁹																
1989	51,017	47,188	11,216	–	420	109,842	616	(s)	169	32	817	218	100	21	63	403
1990	55,837	54,326	17,074	–	734	127,971	666	(s)	304	229	1,199	233	116	31	80	461
1991	54,947	55,255	15,659	–	225	126,086	618	(s)	232	230	1,080	215	108	27	66	416
1992	57,742	57,632	17,010	–	319	132,704	655	(s)	143	251	1,049	218	110	29	67	425
1993	58,474	58,805	17,148	–	562	134,988	671	(s)	113	257	1,041	219	110	29	70	429
1994	60,202	61,431	17,186	–	571	139,390	664	(s)	126	267	1,057	219	114	30	71	435
1995	60,212	65,856	15,466	–	505	142,040	585	(s)	243	262	1,090	154	231	43	128	556
1996	60,438	68,237	17,377	–	763	146,815	642	(s)	256	268	1,166	154	228	48	128	558
1997	60,444	68,311	17,701	–	719	147,175	653	(s)	309	261	1,223	155	215	50	121	541
1998	58,967	72,914	17,174	–	546	149,601	603	(s)	247	248	1,099	148	234	53	121	557
1999	59,073	76,100	17,043	–	624	152,840	576	(s)	260	243	1,080	144	223	55	120	541
2000	59,410	75,887	15,440	–	577	151,315	556	(s)	184	248	988	138	238	34	123	533
2001	54,735	71,765	13,457	–	693	140,650	581	(s)	245	259	1,085	206	187	39	156	587
2002	56,665	67,460	11,719	–	640	136,484	639	(s)	221	303	1,163	231	181	36	170	618
2003	52,390	62,598	13,173	–	783	128,944	401	(s)	135	224	761	102	155	28	119	404
2004	55,744	65,413	14,570	–	1,044	136,771	415	(s)	136	227	779	95	157	25	100	376
2005	53,675	59,216	13,791	–	1,145	127,826	395	(s)	124	241	760	75	117	27	104	322
2006	52,418	61,035	12,185	–	1,703	127,341	419	(s)	161	218	798	86	134	26	117	362
2007	48,282	57,467	11,860	–	1,609	119,218	353	1	154	217	726	79	129	26	113	346
2008	46,514	52,261	7,103	–	798	106,675	411	1	103	217	731	93	107	16	84	300
2009	41,268	54,031	7,529	–	824	103,651	256	(s)	98	214	569	73	108	15	81	277
2010	48,786	56,110	5,920	–	779	111,596	274	(s)	105	210	590	85	110	14	86	294

¹ Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.

² Anthracite, bituminous coal, subbituminous coal, lignite, waste coal, and synthetic coal.

³ Natural gas, plus a small amount of supplemental gaseous fuels.

⁴ Distillate fuel oil, residual fuel oil, petroleum coke, jet fuel, kerosene, other petroleum, and waste oil.

⁵ Carbon dioxide in geothermal steam.

⁶ Municipal solid waste from non-biogenic sources, and tire-derived fuel.

⁷ Blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels; wood and wood-derived fuels; municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass; and chemicals, hydrogen, pitch, sulfur, and tar coal.

⁸ Commercial combined-heat-and-power (CHP) and commercial electricity-only plants.

⁹ Industrial combined-heat-and-power (CHP) and industrial electricity-only plants.

– =No data reported. (s)=Less than 0.5 thousand metric tons.

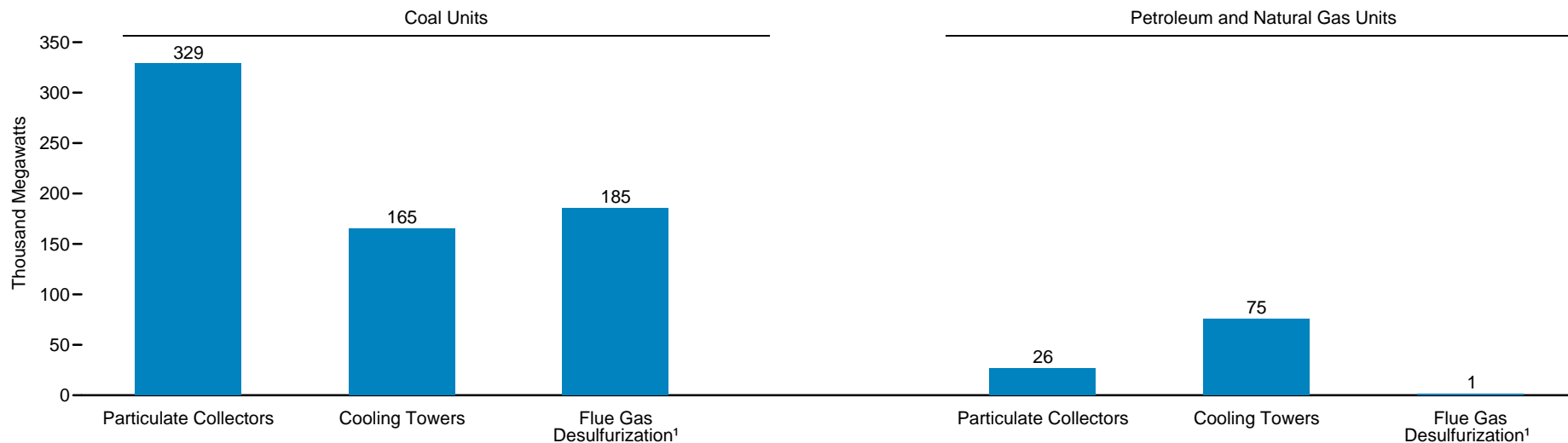
Notes: • Data are for emissions from energy consumption for electricity generation and useful thermal output. • See Table 11.5b for electric power sector data. • See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 8. • See "Useful Thermal Output" in Glossary. • Totals may not equal sums of components due to independent rounding.

Web Page: For related information, see <http://www.eia.gov/electricity/>.

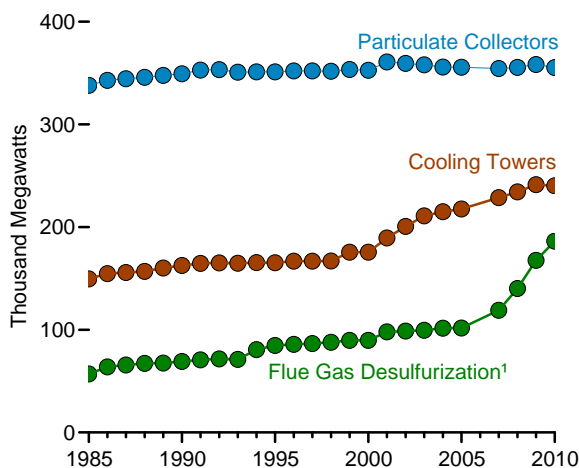
Sources: **Carbon Dioxide:** U.S. Energy Information Administration (EIA) estimates based on Form EIA-923, "Power Plant Operations Report" (and predecessor forms). **Sulfur Dioxide and Nitrogen Oxides:** EIA estimates based on Form EIA-923, "Power Plant Operations Report" (and predecessor forms). Data were adjusted by the U.S. Environmental Protection Agency's Continuous Emissions Monitoring System.

Figure 11.6 Installed Nameplate Capacity of Fossil-Fuel Steam-Electric Generators With Environmental Equipment

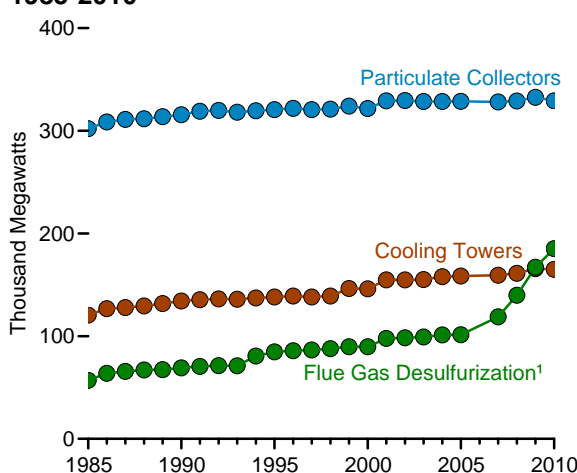
By Fuel and Equipment Type, 2010



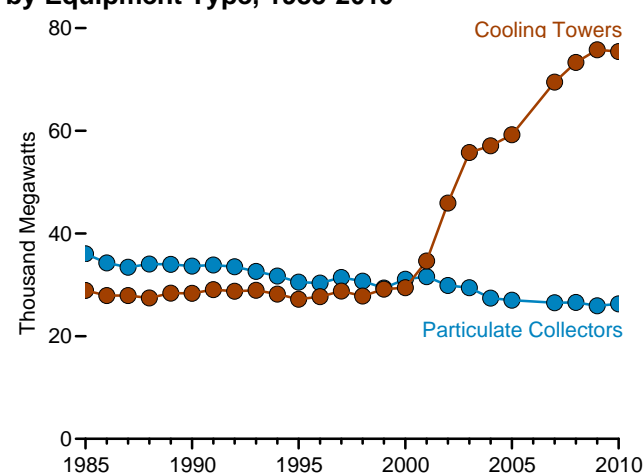
Total Units by Equipment Type, 1985-2010²



Coal Units by Equipment Type, 1985-2010²



Petroleum and Natural Gas Units by Equipment Type, 1985-2010²



¹ Also called “scrubbers.”

² Through 2000, data are for electric utility plants with fossil-fueled steam-electric capacity of 100 megawatts or greater. Beginning in 2001, data are for electric utility and unregulated generating plants (independent power producers, commercial plants, and industrial plants) in

operating or standby status, with fossil-fueled steam-electric capacity of 100 megawatts or greater, or combustible-renewable steam electric capacity of 10 megawatts or greater.

Note: • Components are not additive because some generators are included in more than one category.

Source: Table 11.6.

Table 11.6 Installed Nameplate Capacity of Fossil-Fuel Steam-Electric Generators With Environmental Equipment, 1985-2010 (Megawatts)

Year	Coal				Petroleum and Natural Gas				Total ¹			
	Particulate Collectors	Cooling Towers	Flue Gas Desulfurization (Scrubbers)	Total ²	Particulate Collectors	Cooling Towers	Flue Gas Desulfurization (Scrubbers)	Total ²	Particulate Collectors	Cooling Towers	Flue Gas Desulfurization (Scrubbers)	Total ²
1985	302,056	120,591	56,955	304,706	36,054	28,895	65	62,371	338,110	149,486	57,020	367,078
1986	308,566	126,731	63,735	311,217	34,258	27,919	65	59,618	342,825	154,650	63,800	370,835
1987	311,043	127,875	65,688	312,885	33,431	27,912	65	58,783	344,474	155,786	65,753	371,668
1988	311,776	129,366	67,156	313,618	34,063	27,434	65	58,937	345,839	156,800	67,221	372,555
1989	313,680	131,701	67,469	315,521	33,975	28,386	65	59,736	347,655	160,087	67,534	375,257
1990	315,681	134,199	69,057	317,522	33,639	28,359	65	59,372	349,319	162,557	69,122	376,894
1991	319,046	135,565	70,474	319,110	33,864	29,067	260	59,773	352,910	164,632	70,734	378,883
1992	319,856	136,266	71,336	319,918	33,509	28,764	195	59,116	353,365	165,030	71,531	379,034
1993	318,188	135,885	71,106	318,251	32,620	28,922	–	58,580	350,808	164,807	71,106	376,831
1994	319,485	137,266	80,617	319,776	31,695	28,186	–	57,123	351,180	165,452	80,617	376,899
1995	320,685	138,108	84,677	320,749	30,513	27,187	–	54,942	351,198	165,295	84,677	375,691
1996	321,805	139,065	85,842	321,869	30,349	27,685	–	55,275	352,154	166,749	85,842	377,144
1997	320,646	138,120	86,605	320,710	31,422	28,766	–	56,485	352,068	166,886	86,605	377,195
1998	321,082	139,082	87,783	321,353	30,708	27,814	–	55,764	351,790	166,896	87,783	377,117
1999	324,109	146,377	89,666	331,379	29,371	29,142	–	55,812	353,480	175,520	89,666	387,192
2000	321,636	146,093	89,675	328,741	31,090	29,427	–	57,697	352,727	175,520	89,675	386,438
2001 ³	329,187	154,747	97,804	329,187	31,575	34,649	184	61,634	360,762	189,396	97,988	390,821
2002	329,459	154,750	98,363	329,459	29,879	45,920	310	72,008	359,338	200,670	98,673	401,341
2003	328,587	155,158	99,257	328,587	29,422	55,770	310	81,493	358,009	210,928	99,567	409,954
2004	328,506	157,968	101,182	328,506	27,402	57,082	310	81,450	355,782	214,989	101,492	409,769
2005	328,720	158,493	101,338	328,720	27,005	59,214	310	83,307	355,599	217,646	101,648	411,840
2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2007	328,029	159,388	118,739	328,336	26,496	69,497	285	93,066	354,407	228,704	119,024	421,120
2008	329,099	161,234	139,877	329,513	26,565	73,315	346	96,984	355,517	234,254	140,223	426,073
2009	332,546	165,795	167,172	332,546	25,925	75,770	346	98,756	358,342	241,347	167,517	430,956
2010	329,248	165,030	185,217	329,608	26,289	75,444	1,049	98,946	355,407	240,257	186,266	428,207

¹ Totals may not equal sum of components due to independent rounding.

² Components are not additive because some generators are included in more than one category.

³ Through 2000, data are for electric utility plants with fossil-fueled steam-electric capacity of 100 megawatts or greater. Beginning in 2001, data are for electric utility and unregulated generating plants (independent power producers, commercial plants, and industrial plants) in operating or standby status, with fossil-fueled steam-electric capacity of 10 megawatts or greater.

NA=Not available. – =No data reported.

Note: See "Cooling Tower," "Flue Gas Desulfurization," and "Particulate Collectors" in Glossary.

Web Page: For related information, see <http://www.eia.gov/electricity/>.

Sources: • 1985-1996—U.S. Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report." • 1997-2005—EIA, *Electric Power Annual 2008* (January 2010), Table 3.10, and Form EIA-767, "Steam-Electric Plant Operation and Design Report." • 2007 forward—EIA, *Electric Power Annual 2010* (November 2011), Table 3.10, and Form EIA-860, "Annual Electric Generator Report."

Environment

Note. Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion. Carbon dioxide (CO₂) emissions from the combustion of biomass to produce energy are excluded from the total energy-related CO₂ emissions reported in the *Annual Energy Review* Section 11, but appear separately in Tables 11.1–11.2e. According to current international convention (see the Intergovernmental Panel on Climate Change’s “2006 IPCC Guidelines for National Greenhouse Gas Inventories”), carbon released through biomass combustion is excluded from reported energy-related emissions. The release of carbon from biomass combustion is assumed to be balanced by the uptake of carbon when the feedstock is grown, resulting in zero net emissions over some period of time. (This is not to say that biomass energy is carbon-neutral. Energy inputs are required in order to grow, fertilize, and harvest the feedstock and to produce and process the biomass into fuels.)

However, analysts have debated whether increased use of biomass energy may result in a decline in terrestrial carbon stocks, leading to a net positive release of carbon rather than the zero net release assumed by its exclusion from reported

energy-related emissions. For example, the clearing of forests for biofuel crops could result in an initial release of carbon that is not fully recaptured in subsequent use of the land for agriculture.

To reflect the potential net emissions, the international convention for greenhouse gas inventories is to report biomass emissions in the category “agriculture, forestry, and other land use,” usually based on estimates of net changes in carbon stocks over time.

This indirect accounting of CO₂ emissions from biomass can potentially lead to confusion in accounting for and understanding the flow of CO₂ emissions within energy and non-energy systems. In recognition of this issue, reporting of CO₂ emissions from biomass combustion alongside other energy-related CO₂ emissions offers an alternative accounting treatment. It is important, however, to avoid misinterpreting emissions from fossil energy and biomass energy sources as necessarily additive. Instead, the combined total of direct CO₂ emissions from biomass and energy-related CO₂ emissions implicitly assumes that none of the carbon emitted was previously or subsequently reabsorbed in terrestrial sinks or that other emissions sources offset any such sequestration.