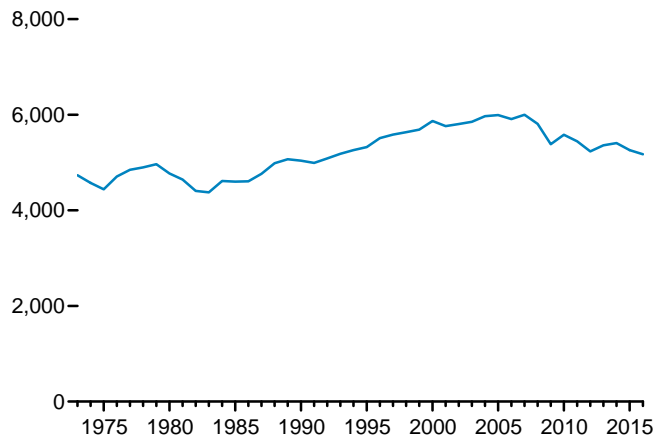


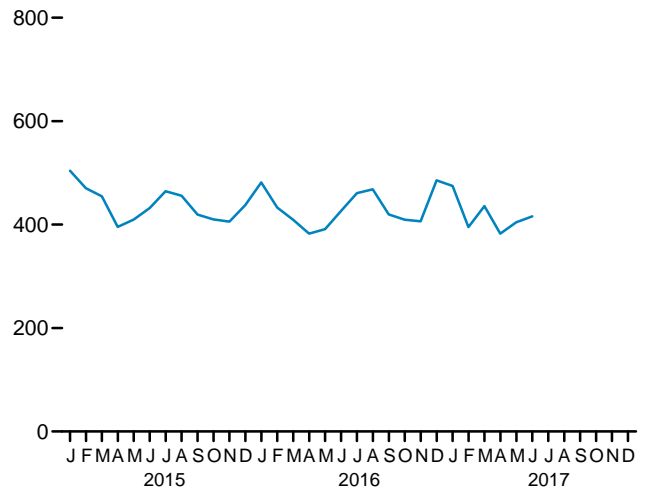
12. Environment

Figure 12.1 Carbon Dioxide Emissions From Energy Consumption by Source
(Million Metric Tons of Carbon Dioxide)

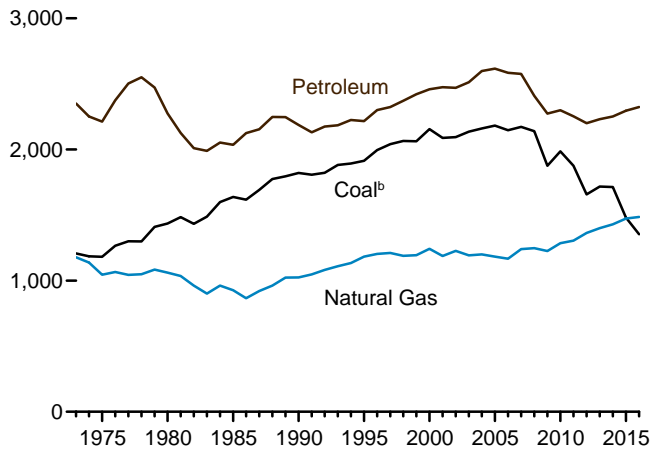
Total,^a 1973–2016



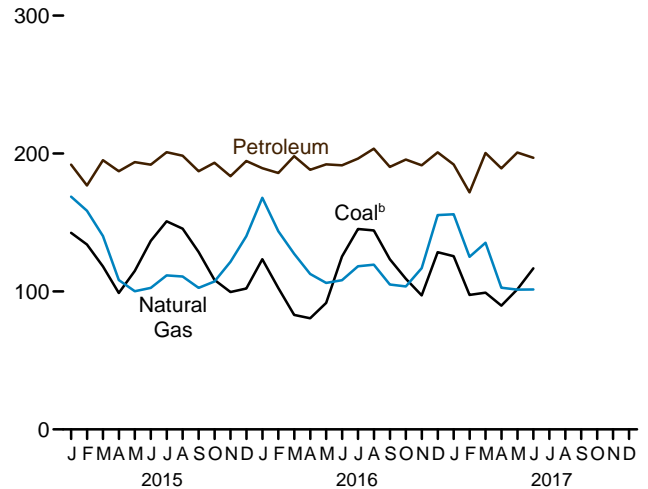
Total,^a Monthly



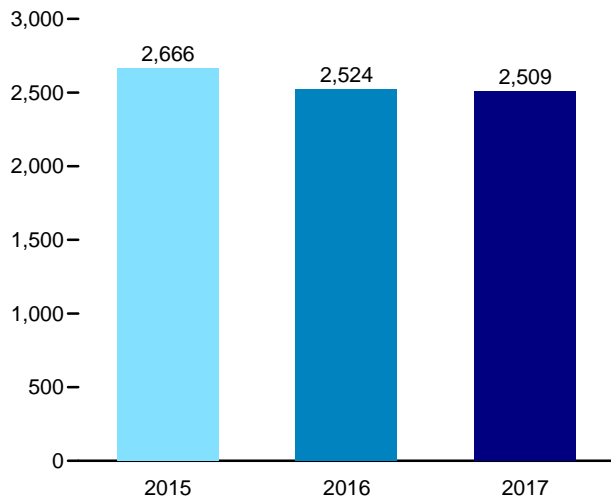
By Major Source, 1973–2016



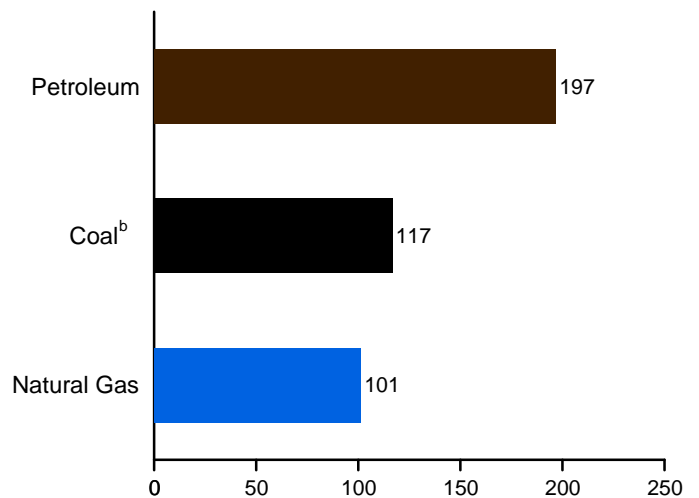
By Major Source, Monthly



Total,^a January–June



By Major Source, June 2017



^aExcludes emissions from biomass energy consumption.
^bIncludes coal coke net imports.

Web Page: <http://www.eia.gov/totalenergy/data/monthly/#environment>.
Source: Table 12.1.

Table 12.1 Carbon Dioxide Emissions From Energy Consumption by Source
(Million Metric Tons of Carbon Dioxide^a)

	Coal ^b	Natural Gas ^c	Petroleum										Total ^{h,i}	
			Aviation Gasoline	Distillate Fuel Oil ^d	HGL ^e	Jet Fuel	Kero-sene	Lubri-cants	Motor Gasoline ^f	Petroleum Coke	Residual Fuel Oil	Other ^g		Total
1973 Total	1,207	1,178	6	480	93	155	32	13	911	54	508	99	2,350	4,735
1975 Total	1,181	1,046	5	443	84	146	24	11	911	51	443	95	2,212	4,439
1980 Total	1,436	1,061	4	446	98	156	24	13	900	49	453	131	2,275	4,771
1985 Total	1,638	926	3	445	97	178	17	12	930	54	216	83	2,036	4,600
1990 Total	1,821	1,024	3	470	79	223	6	13	988	70	220	115	2,187	5,039
1995 Total	1,913	1,183	3	498	93	222	8	13	1,045	76	152	107	2,216	5,323
1996 Total	1,995	1,204	3	524	99	232	9	12	1,063	79	152	125	2,300	5,510
1997 Total	2,040	1,210	3	534	100	234	10	13	1,075	80	142	132	2,372	5,584
1998 Total	2,064	1,189	2	537	94	238	12	14	1,107	93	158	117	2,323	5,635
1999 Total	2,062	1,193	3	555	103	245	11	14	1,128	96	148	119	2,422	5,688
2000 Total	2,155	1,243	3	579	108	254	10	14	1,136	86	163	107	2,459	5,868
2001 Total	2,088	1,188	2	597	98	243	11	13	1,152	89	144	125	2,474	5,761
2002 Total	2,095	1,227	2	586	100	237	6	12	1,183	96	125	122	2,470	5,804
2003 Total	2,136	1,193	2	610	95	231	8	11	1,187	96	138	134	2,513	5,853
2004 Total	2,160	1,200	2	632	95	240	10	12	1,210	107	155	136	2,598	5,970
2005 Total	2,182	1,183	2	639	92	246	10	12	1,209	106	165	135	2,617	5,993
2006 Total	2,147	1,167	2	645	86	240	8	11	1,217	106	122	147	2,584	5,910
2007 Total	2,172	1,241	2	647	90	238	5	12	1,211	100	128	143	2,576	6,000
2008 Total	2,140	1,248	2	610	86	226	2	11	1,143	93	110	126	2,409	5,809
2009 Total	1,876	1,225	2	559	83	204	3	10	1,129	87	90	107	2,273	5,386
2010 Total	1,986	1,286	2	585	85	210	3	11	1,112	82	93	115	2,299	5,582
2011 Total	1,876	1,305	2	599	80	209	2	10	1,078	79	79	115	2,252	5,445
2012 Total	1,657	1,363	2	574	84	206	1	9	1,071	79	65	110	2,200	5,232
2013 Total	1,718	1,400	2	581	92	210	1	10	1,087	77	56	115	2,231	5,361
2014 Total	1,713	1,430	2	614	86	216	1	10	1,095	76	45	107	2,252	5,406
2015 January	143	169	(s)	54	9	17	(s)	1	90	7	4	8	192	504
February	134	159	(s)	53	8	16	(s)	1	83	4	3	9	177	470
March	118	140	(s)	53	8	19	(s)	1	94	7	4	8	195	455
April	99	108	(s)	50	7	18	(s)	1	93	7	2	9	187	395
May	115	100	(s)	49	6	19	(s)	1	96	7	4	11	194	410
June	137	103	(s)	49	7	20	(s)	1	95	7	3	10	192	432
July	151	112	(s)	50	7	21	(s)	1	99	7	5	11	201	465
August	145	111	(s)	50	7	20	(s)	1	99	8	4	9	198	456
September	129	103	(s)	51	6	18	(s)	1	94	5	4	8	187	419
October	108	107	(s)	52	8	20	(s)	1	96	6	4	7	193	410
November	100	122	(s)	47	7	18	(s)	1	92	5	4	9	184	406
December	102	140	(s)	49	9	20	(s)	1	95	5	5	10	195	438
Total	1,480	1,473	1	607	91	227	1	11	1,126	76	46	109	2,295	5,259
2016 January	123	168	(s)	R 50	10	18	(s)	1	90	R 7	5	9	189	R 482
February	102	144	(s)	48	8	18	(s)	1	90	6	3	12	R 186	R 433
March	83	127	(s)	51	8	19	(s)	1	98	7	R 5	9	198	409
April	81	113	(s)	R 47	7	19	(s)	1	93	5	7	10	188	382
May	92	106	(s)	48	7	R 20	(s)	1	98	5	5	9	192	391
June	125	108	(s)	48	6	21	(s)	1	97	4	R 5	9	R 191	426
July	145	118	(s)	46	7	21	(s)	1	100	6	R 6	9	196	R 461
August	144	119	(s)	50	7	21	(s)	1	R 101	8	5	11	R 203	R 468
September	123	105	(s)	49	7	20	(s)	1	96	5	4	10	R 190	420
October	109	104	(s)	R 51	7	20	(s)	1	95	6	5	10	196	R 410
November	97	117	(s)	49	7	20	(s)	1	93	9	R 4	9	R 191	R 406
December	128	155	(s)	52	9	21	(s)	1	R 96	7	5	10	201	486
Total	1,354	1,485	1	589	89	R 237	1	11	R 1,145	R 76	R 58	R 116	R 2,324	R 5,174
2017 January	126	156	(s)	49	10	20	(s)	1	88	8	7	9	192	475
February	97	125	(s)	45	8	17	(s)	1	84	4	4	8	172	395
March	99	135	(s)	54	8	21	(s)	1	98	3	5	11	200	436
April	90	103	(s)	47	7	19	(s)	1	93	6	5	11	189	383
May	102	101	(s)	51	7	21	(s)	1	100	6	6	10	201	405
June	117	101	(s)	49	6	21	(s)	1	98	5	6	10	197	416
6-Month Total	630	722	1	295	45	119	(s)	5	562	32	32	59	1,151	2,509
2016 6-Month Total	606	766	1	292	45	115	(s)	6	565	35	29	58	1,145	2,524
2015 6-Month Total	745	779	1	308	46	110	1	6	552	39	20	55	1,137	2,666

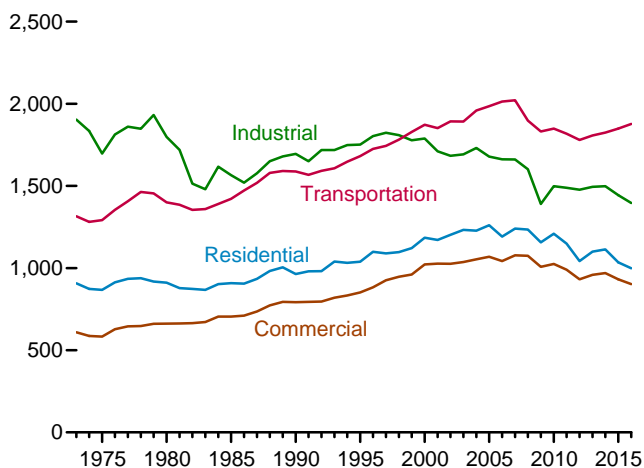
^a Metric tons of carbon dioxide can be converted to metric tons of carbon equivalent by multiplying by 12/44.
^b Includes coal coke net imports.
^c Natural gas, excluding supplemental gaseous fuels.
^d Distillate fuel oil, excluding biodiesel.
^e Hydrocarbon gas liquids.
^f Finished motor gasoline, excluding fuel ethanol.
^g Aviation gasoline blending components, crude oil, motor gasoline blending components, petrochemical feedstocks, special naphthas, still gas, unfinished oils, waxes, and miscellaneous petroleum products.
^h Includes electric power sector use of geothermal energy and non-biomass waste. See Table 12.6.
ⁱ Excludes emissions from biomass energy consumption. See Table 12.7.

R=Revised. (s)=Less than 0.5 million metric tons.
 Notes: • Data are estimates for carbon dioxide emissions from energy consumption, including the nonfuel use of fossil fuels. See "Section 12 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 12.7 and Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.
 Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973.
 Sources: See end of section.

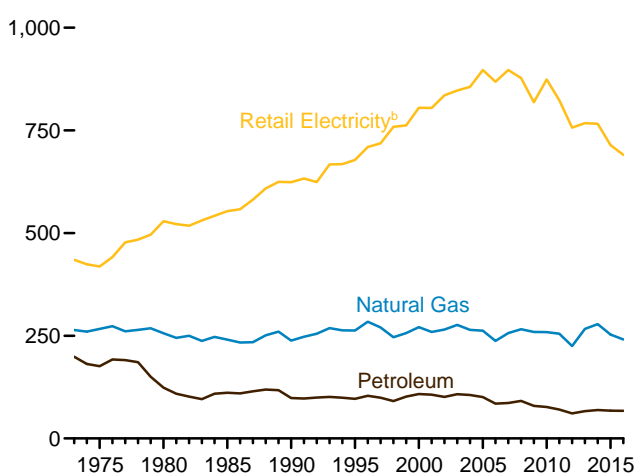
This table has been modified. The column for "HGL" has replaced that for "LPG." Data for natural gasoline (pentanes plus) have been moved from "Other" to "HGL."

Figure 12.2 Carbon Dioxide Emissions From Energy Consumption by Sector
(Million Metric Tons of Carbon Dioxide)

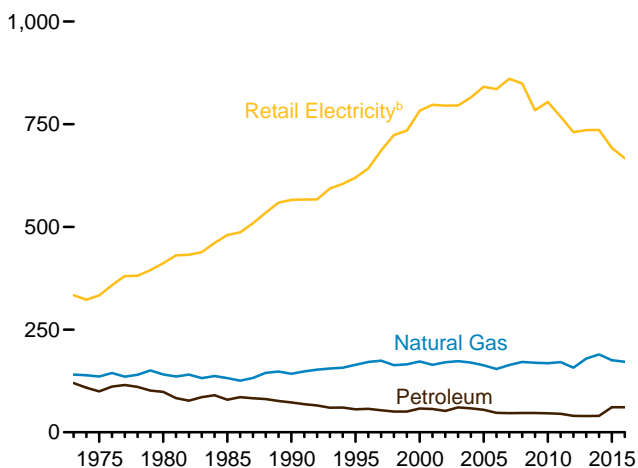
Total^a by End-Use Sector,^b 1973–2016



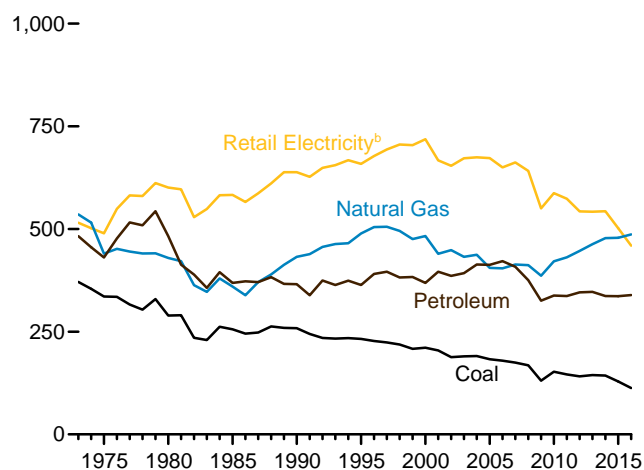
Residential Sector by Major Source, 1973–2016



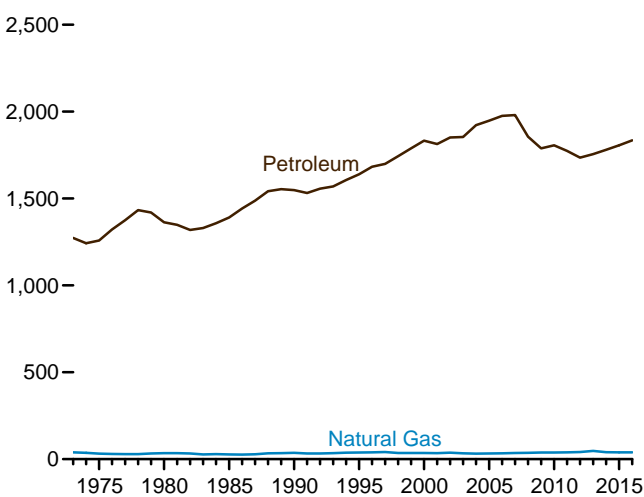
Commercial Sector by Major Source, 1973–2016



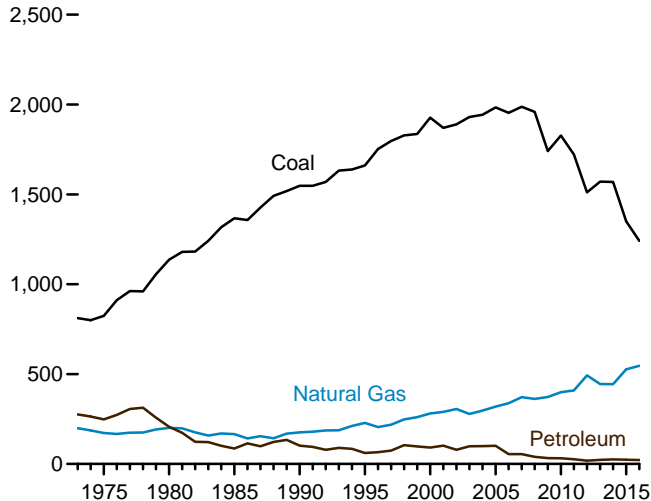
Industrial Sector by Major Source, 1973–2016



Transportation Sector by Major Source, 1973–2016



Electric Power Sector by Major Source, 1973–2016



^a Excludes emissions from biomass energy consumption.

^b 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.

Web Page: <http://www.eia.gov/totalenergy/data/monthly/#environment>.
Sources: Tables 12.2–12.6.

Table 12.2 Carbon Dioxide Emissions From Energy Consumption: Residential Sector
(Million Metric Tons of Carbon Dioxide^a)

	Coal	Natural Gas ^b	Petroleum				Retail Electricity ^e	Total ^f
			Distillate Fuel Oil ^c	HGL ^d	Kerosene	Total		
1973 Total	9	264	147	36	16	199	435	907
1975 Total	6	266	132	32	12	176	419	867
1980 Total	3	256	96	20	8	124	529	911
1985 Total	4	241	80	20	11	111	553	909
1990 Total	3	238	72	22	5	98	624	963
1995 Total	2	263	66	25	5	96	678	1,039
1996 Total	2	284	68	30	6	104	710	1,099
1997 Total	2	270	64	29	7	99	719	1,090
1998 Total	1	247	56	27	8	91	759	1,097
1999 Total	1	257	60	33	8	102	762	1,122
2000 Total	1	271	66	35	7	108	805	1,185
2001 Total	1	259	66	33	7	106	805	1,171
2002 Total	1	265	63	34	4	101	835	1,203
2003 Total	1	276	68	34	5	108	847	1,232
2004 Total	1	264	67	32	6	106	856	1,227
2005 Total	1	262	62	32	6	101	897	1,261
2006 Total	1	237	52	28	5	85	869	1,191
2007 Total	1	257	53	31	3	86	897	1,241
2008 Total	NA	266	55	35	2	91	877	1,234
2009 Total	NA	259	43	35	2	79	819	1,157
2010 Total	NA	259	41	33	2	77	874	1,210
2011 Total	NA	255	38	31	1	70	823	1,148
2012 Total	NA	225	35	25	1	61	757	1,043
2013 Total	NA	267	36	30	1	66	768	1,100
2014 Total	NA	278	39	29	1	69	766	1,113
2015 January	NA	51	6	3	(s)	8	72	132
February	NA	50	5	2	(s)	7	66	123
March	NA	35	4	2	(s)	6	57	98
April	NA	18	2	2	(s)	4	42	64
May	NA	10	2	2	(s)	5	49	63
June	NA	7	1	2	(s)	3	65	75
July	NA	6	2	2	(s)	4	81	90
August	NA	6	2	2	(s)	4	77	87
September	NA	6	2	2	(s)	4	64	74
October	NA	11	5	2	(s)	7	48	66
November	NA	22	5	2	(s)	7	44	74
December	NA	32	5	3	(s)	8	51	92
Total	NA	253	40	27	1	68	714	1,035
2016 January	NA	49	5	3	(s)	8	65	122
February	NA	38	5	2	(s)	7	52	98
March	NA	25	3	2	(s)	6	41	72
April	NA	18	3	2	(s)	5	38	61
May	NA	11	3	2	(s)	5	43	59
June	NA	7	2	2	(s)	4	66	77
July	NA	6	2	2	(s)	4	84	95
August	NA	6	2	2	(s)	4	84	93
September	NA	6	2	2	(s)	5	65	76
October	NA	10	3	2	(s)	6	50	66
November	NA	21	4	2	(s)	6	43	70
December	NA	44	6	2	(s)	8	62	115
Total	NA	241	39	27	1	R 67	690	R 999
2017 January	NA	46	6	3	(s)	8	63	117
February	NA	32	4	2	(s)	6	45	83
March	NA	32	4	2	(s)	6	46	84
April	NA	15	3	2	(s)	5	40	60
May	NA	11	2	2	(s)	4	46	61
June	NA	7	3	2	(s)	5	59	71
6-Month Total	NA	143	21	14	(s)	35	298	477
2016 6-Month Total	NA	148	21	14	(s)	35	306	489
2015 6-Month Total	NA	170	20	13	(s)	34	351	554

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

^b Natural gas, excluding supplemental gaseous fuels.

^c Distillate fuel oil, excluding biodiesel.

^d Hydrocarbon gas liquids.

^e 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 7.6 and 12.6.

^f Excludes emissions from biomass energy consumption. See Table 12.7.

R=Revised. NA=Not available. (s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. See "Section 12 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 12.7 and Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.

Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973.

Sources: See end of section.

This table has been modified. The column for "HGL" has replaced that for "LPG."

Table 12.3 Carbon Dioxide Emissions From Energy Consumption: Commercial Sector
(Million Metric Tons of Carbon Dioxide^a)

	Coal	Natural Gas ^b	Petroleum							Retail Electricity ^f	Total ^g
			Distillate Fuel Oil ^c	HGL ^d	Kerosene	Motor Gasoline ^e	Petroleum Coke	Residual Fuel Oil	Total		
1973 Total	15	141	47	9	5	6	NA	52	120	334	609
1975 Total	14	136	43	8	4	6	NA	39	100	333	583
1980 Total	11	141	38	6	3	8	NA	44	98	412	662
1985 Total	13	132	46	6	2	7	NA	18	79	480	704
1990 Total	12	142	39	6	1	8	0	18	73	566	793
1995 Total	11	164	35	7	2	1	(s)	11	56	620	851
1996 Total	12	171	35	8	2	2	(s)	11	57	643	883
1997 Total	12	174	32	8	2	3	(s)	9	54	686	926
1998 Total	9	164	31	7	2	3	(s)	7	50	724	947
1999 Total	10	165	32	9	2	2	(s)	6	51	735	960
2000 Total	9	173	36	9	2	3	(s)	7	58	783	1,022
2001 Total	9	164	37	9	2	3	(s)	6	57	797	1,027
2002 Total	9	170	32	9	1	3	(s)	6	52	795	1,026
2003 Total	8	173	36	10	1	4	(s)	9	60	796	1,037
2004 Total	10	170	34	10	1	3	(s)	10	58	815	1,053
2005 Total	9	163	33	8	2	3	(s)	9	55	841	1,069
2006 Total	6	154	29	8	1	3	(s)	6	47	835	1,043
2007 Total	7	164	28	8	1	4	(s)	6	46	861	1,078
2008 Total	8	171	28	10	(s)	3	(s)	6	47	849	1,075
2009 Total	7	169	29	9	(s)	4	(s)	6	47	784	1,007
2010 Total	7	168	29	9	(s)	3	(s)	5	46	804	1,025
2011 Total	6	171	29	9	(s)	3	(s)	4	45	768	990
2012 Total	4	157	26	9	(s)	3	(s)	2	40	731	932
2013 Total	4	179	25	10	(s)	3	(s)	2	40	736	959
2014 Total	4	190	26	10	(s)	4	(s)	1	40	736	970
2015 January	(s)	29	4	1	(s)	2	(s)	(s)	7	59	95
February	(s)	28	3	1	(s)	2	(s)	(s)	6	56	91
March	(s)	21	2	1	(s)	2	(s)	(s)	5	52	79
April	(s)	13	1	1	(s)	2	(s)	(s)	4	48	65
May	(s)	9	1	1	(s)	2	(s)	(s)	4	56	69
June	(s)	7	1	1	(s)	2	0	(s)	4	65	76
July	(s)	7	1	1	(s)	2	0	(s)	4	71	82
August	(s)	7	1	1	(s)	2	(s)	(s)	4	69	81
September	(s)	8	1	1	(s)	2	(s)	(s)	4	62	74
October	(s)	11	3	1	(s)	2	(s)	(s)	6	55	72
November	(s)	16	3	1	(s)	2	(s)	(s)	6	50	72
December	(s)	19	4	1	(s)	2	(s)	(s)	7	49	75
Total	3	176	26	9	(s)	25	(s)	(s)	61	692	932
2016 January	(s)	28	3	1	(s)	2	(s)	(s)	6	55	89
February	(s)	23	3	1	(s)	2	(s)	(s)	6	47	76
March	(s)	16	2	1	(s)	2	(s)	(s)	5	43	65
April	(s)	13	2	1	(s)	2	(s)	(s)	5	43	61
May	(s)	9	2	1	(s)	2	0	(s)	5	50	64
June	(s)	8	1	1	(s)	2	(s)	(s)	4	63	75
July	(s)	7	1	1	(s)	2	(s)	(s)	4	71	83
August	(s)	8	1	1	(s)	2	0	(s)	4	72	84
September	(s)	8	2	1	(s)	2	0	(s)	4	62	74
October	(s)	11	2	1	(s)	2	0	(s)	5	55	71
November	(s)	15	2	1	(s)	2	(s)	(s)	5	49	69
December	(s)	25	4	1	(s)	2	(s)	(s)	7	57	89
Total	2	171	26	9	(s)	26	(s)	(s)	61	667	902
2017 January	(s)	26	4	1	(s)	2	(s)	(s)	7	54	87
February	(s)	20	3	1	(s)	2	(s)	(s)	5	44	69
March	(s)	20	3	1	(s)	2	(s)	(s)	6	48	74
April	(s)	12	2	1	(s)	2	(s)	(s)	5	44	61
May	(s)	10	1	1	(s)	2	(s)	(s)	4	51	65
June	(s)	8	2	1	(s)	2	(s)	(s)	5	58	70
6-Month Total	1	95	14	5	(s)	13	(s)	(s)	32	298	426
2016 6-Month Total	1	97	14	5	(s)	13	(s)	(s)	31	301	431
2015 6-Month Total	2	108	13	4	(s)	12	(s)	(s)	30	336	476

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

^b Natural gas, excluding supplemental gaseous fuels.

^c Distillate fuel oil, excluding biodiesel.

^d Hydrocarbon gas liquids.

^e Finished motor gasoline, excluding fuel ethanol.

^f 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 7.6 and 12.6.

^g Excludes emissions from biomass energy consumption. See Table 12.7.

NA=Not available. (s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. See "Section 12 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 12.7 and Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.

Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973.

Sources: See end of section.

This table has been modified. The column for "HGL" has replaced that for "LPG."

Table 12.4 Carbon Dioxide Emissions From Energy Consumption: Industrial Sector
(Million Metric Tons of Carbon Dioxide^a)

	Coal	Coal Coke Net Imports	Natural Gas ^b	Petroleum								Retail Elec- tricity ^g	Total ^h	
				Distillate Fuel Oil ^c	HGL ^d	Kero- sene	Lubri- cants	Motor Gasoline ^e	Petroleum Coke	Residual Fuel Oil	Other ^f			Total
1973 Total	371	-1	536	106	44	11	7	18	52	144	99	483	515	1,904
1975 Total	336	2	440	97	41	9	6	16	51	117	95	431	490	1,697
1980 Total	289	-4	429	96	72	13	7	11	48	105	131	483	601	1,798
1985 Total	256	-2	360	81	69	3	6	15	54	57	83	369	583	1,566
1990 Total	258	1	432	84	49	1	7	13	67	31	115	366	638	1,695
1995 Total	233	7	489	82	60	1	7	14	67	25	107	364	659	1,751
1996 Total	227	3	505	86	61	1	6	14	71	24	125	391	678	1,803
1997 Total	224	5	505	88	63	1	7	15	70	21	132	396	694	1,824
1998 Total	219	8	495	88	58	2	7	14	80	16	117	382	706	1,809
1999 Total	208	7	475	86	60	1	7	11	85	14	119	383	704	1,778
2000 Total	211	7	483	87	63	1	7	11	76	17	107	369	719	1,788
2001 Total	204	3	440	95	55	2	6	21	79	14	125	396	667	1,711
2002 Total	188	7	448	88	56	1	6	22	79	13	122	386	654	1,683
2003 Total	190	6	432	85	49	2	6	23	78	16	134	392	672	1,692
2004 Total	191	16	437	88	52	2	6	26	85	18	136	413	674	1,731
2005 Total	183	5	405	92	49	3	6	25	82	20	135	413	672	1,678
2006 Total	179	7	404	91	48	2	6	26	85	16	147	422	650	1,662
2007 Total	175	3	414	91	50	1	6	21	83	13	143	408	662	1,661
2008 Total	168	5	412	98	39	(s)	6	17	78	13	126	376	642	1,602
2009 Total	131	-3	386	78	37	(s)	5	16	73	8	107	325	550	1,390
2010 Total	153	-1	421	84	41	1	6	17	68	6	115	338	587	1,498
2011 Total	146	1	431	90	38	(s)	5	17	65	6	115	337	574	1,489
2012 Total	141	(s)	447	93	48	(s)	5	17	70	3	110	346	543	1,477
2013 Total	144	-2	463	92	49	(s)	5	17	65	2	115	347	542	1,495
2014 Total	143	-2	478	100	45	(s)	5	14	64	2	107	337	543	1,498
2015 January	12	(s)	45	9	6	(s)	1	1	6	(s)	8	31	42	130
February	11	(s)	41	10	5	(s)	(s)	1	2	(s)	9	28	41	121
March	11	(s)	42	9	5	(s)	1	1	6	(s)	8	30	39	122
April	10	(s)	39	8	4	(s)	1	1	6	(s)	9	29	37	115
May	11	(s)	39	6	3	(s)	1	1	6	(s)	11	29	42	121
June	11	(s)	37	7	4	(s)	(s)	1	6	(s)	10	30	47	124
July	11	(s)	38	7	4	(s)	1	2	6	(s)	11	30	48	127
August	11	(s)	39	6	4	(s)	(s)	2	7	(s)	9	28	47	125
September	10	(s)	37	8	4	(s)	(s)	1	4	(s)	8	26	43	117
October	11	(s)	39	6	5	(s)	1	1	5	(s)	7	24	40	114
November	10	(s)	40	4	4	(s)	(s)	1	5	(s)	9	24	38	112
December	10	(s)	42	5	5	(s)	(s)	1	4	(s)	10	27	36	115
Total	129	-2	478	85	53	(s)	6	17	65	2	109	337	502	1,444
2016 January	10	(s)	45	8	6	(s)	(s)	1	6	(s)	9	R 31	38	R 123
February	10	(s)	41	8	5	(s)	(s)	1	5	(s)	12	R 32	33	R 116
March	10	(s)	42	R 9	4	(s)	1	1	6	(s)	9	R 30	31	R 113
April	9	(s)	39	R 6	4	(s)	(s)	1	4	(s)	10	R 26	32	R 107
May	9	(s)	39	6	4	(s)	(s)	1	4	(s)	9	R 24	36	R 109
June	9	(s)	38	R 7	3	(s)	1	1	3	(s)	9	R 25	42	R 114
July	9	(s)	39	4	4	(s)	(s)	2	5	(s)	9	R 24	46	R 118
August	9	(s)	40	7	4	(s)	(s)	2	7	(s)	11	R 31	46	R 125
September	9	(s)	38	7	4	(s)	(s)	1	4	(s)	10	27	40	114
October	9	(s)	39	R 7	4	(s)	(s)	1	5	(s)	10	29	38	R 116
November	9	(s)	41	R 7	4	(s)	(s)	1	8	(s)	9	R 30	35	R 115
December	10	(s)	45	7	5	(s)	(s)	1	6	(s)	10	R 31	39	R 124
Total	113	-2	487	83	50	(s)	R 6	17	R 64	2	R 116	R 339	459	R 1,396
2017 January	9	(s)	45	7	6	(s)	(s)	1	7	(s)	9	31	37	122
February	9	(s)	40	7	4	(s)	(s)	1	4	(s)	8	25	32	106
March	9	(s)	43	10	5	(s)	(s)	1	2	(s)	11	30	34	116
April	8	(s)	39	6	4	(s)	(s)	1	5	(s)	11	R 28	33	109
May	8	(s)	40	8	4	(s)	(s)	2	5	(s)	10	29	37	114
June	9	(s)	39	7	3	(s)	(s)	1	4	(s)	10	26	40	113
6-Month Total	53	-1	245	44	26	(s)	2	9	27	1	59	169	213	680
2016 6-Month Total	57	(s)	244	43	26	(s)	3	9	29	1	58	168	214	682
2015 6-Month Total	66	-1	242	49	27	(s)	3	8	34	1	55	177	248	732

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

^b Natural gas, excluding supplemental gaseous fuels.

^c Distillate fuel oil, excluding biodiesel.

^d Hydrocarbon gas liquids.

^e Finished motor gasoline, excluding fuel ethanol.

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

^g 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 7.6 and 12.6.

^h Excludes emissions from biomass energy consumption. See Table 12.7.

R=Revised. (s)=Less than 0.5 million metric tons and greater than -0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption, including the nonfuel use of fossil fuels. See "Section 12 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 12.7 and Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.

Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973.

Sources: See end of section.

This table has been modified. The column for "HGL" has replaced that for "LPG." Data for natural gasoline (pentanes plus) have been moved from "Other" to "HGL."

Table 12.5 Carbon Dioxide Emissions From Energy Consumption: Transportation Sector
(Million Metric Tons of Carbon Dioxide^a)

	Coal	Natural Gas ^b	Petroleum							Retail Electricity ^f	Total ^g	
			Aviation Gasoline	Distillate Fuel Oil ^c	HGL ^d	Jet Fuel	Lubricants	Motor Gasoline ^e	Residual Fuel Oil			Total
1973 Total	(s)	39	6	163	3	152	6	886	57	1,273	2	1,315
1975 Total	(s)	32	5	155	3	145	6	889	56	1,258	2	1,292
1980 Total	(h)	34	4	204	1	155	6	881	110	1,363	2	1,400
1985 Total	(h)	28	3	232	2	178	6	908	62	1,391	3	1,421
1990 Total	(h)	36	3	268	1	223	7	967	80	1,548	3	1,588
1995 Total	(h)	38	3	307	1	222	6	1,029	72	1,640	3	1,681
1996 Total	(h)	39	3	327	1	232	6	1,047	67	1,683	3	1,725
1997 Total	(h)	41	3	341	1	234	6	1,057	56	1,700	3	1,744
1998 Total	(h)	35	2	352	1	238	7	1,090	53	1,743	3	1,782
1999 Total	(h)	36	3	365	1	245	7	1,115	52	1,789	3	1,828
2000 Total	(h)	36	3	377	1	254	7	1,122	70	1,833	4	1,873
2001 Total	(h)	35	2	387	1	243	6	1,128	46	1,813	4	1,852
2002 Total	(h)	37	2	394	1	237	6	1,158	53	1,852	4	1,892
2003 Total	(h)	33	2	408	1	231	6	1,161	45	1,854	5	1,892
2004 Total	(h)	32	2	433	1	240	6	1,181	58	1,922	5	1,959
2005 Total	(h)	33	2	444	2	246	6	1,182	66	1,948	5	1,986
2006 Total	(h)	33	2	467	2	240	5	1,188	71	1,976	5	2,014
2007 Total	(h)	35	2	469	1	238	6	1,186	78	1,980	5	2,021
2008 Total	(h)	37	2	424	3	226	5	1,124	73	1,856	5	1,898
2009 Total	(h)	38	2	405	2	204	5	1,109	62	1,789	5	1,832
2010 Total	(h)	38	2	426	2	210	5	1,091	70	1,806	5	1,849
2011 Total	(h)	39	2	437	2	209	5	1,058	61	1,774	4	1,818
2012 Total	(h)	41	2	416	2	206	5	1,051	53	1,735	4	1,780
2013 Total	(h)	47	2	424	3	210	5	1,066	46	1,756	4	1,807
2014 Total	(h)	40	2	443	3	216	5	1,077	35	1,781	4	1,825
2015 January	(h)	4	(s)	35	(s)	17	1	87	3	143	(s)	148
February	(h)	4	(s)	34	(s)	16	(s)	80	(s)	131	(s)	136
March	(h)	4	(s)	37	(s)	19	1	91	3	152	(s)	156
April	(h)	3	(s)	38	(s)	18	(s)	89	2	148	(s)	152
May	(h)	3	(s)	38	(s)	19	1	93	3	154	(s)	157
June	(h)	3	(s)	39	(s)	20	(s)	91	2	153	(s)	157
July	(h)	3	(s)	41	(s)	21	1	95	4	161	(s)	164
August	(h)	3	(s)	41	(s)	20	(s)	95	4	160	(s)	163
September	(h)	3	(s)	39	(s)	18	(s)	90	3	151	(s)	154
October	(h)	3	(s)	38	(s)	20	(s)	93	3	155	(s)	158
November	(h)	3	(s)	34	(s)	18	(s)	88	4	145	(s)	149
December	(h)	4	(s)	35	(s)	20	(s)	92	4	151	(s)	155
Total	(h)	39	1	449	3	227	5	1,083	37	1,806	4	R 1,849
2016 January	(h)	4	(s)	33	(s)	18	(s)	87	4	143	(s)	R 147
February	(h)	4	(s)	32	(s)	18	(s)	86	2	139	(s)	143
March	(h)	3	(s)	36	(s)	19	(s)	94	5	R 155	(s)	159
April	(h)	3	(s)	36	(s)	19	(s)	89	6	R 150	(s)	154
May	(h)	3	(s)	R 37	(s)	R 20	(s)	R 94	4	R 156	(s)	R 160
June	(h)	3	(s)	38	(s)	21	(s)	R 93	R 4	R 157	(s)	R 160
July	(h)	3	(s)	38	(s)	21	(s)	96	R 5	162	(s)	R 165
August	(h)	3	(s)	40	(s)	21	(s)	R 97	4	R 163	(s)	R 167
September	(h)	3	(s)	37	(s)	20	(s)	92	R 3	153	(s)	156
October	(h)	3	(s)	38	(s)	20	(s)	91	4	R 154	(s)	R 157
November	(h)	3	(s)	35	(s)	20	(s)	89	R 4	R 149	(s)	R 152
December	(h)	4	(s)	35	(s)	21	(s)	93	4	R 153	(s)	158
Total	(h)	39	1	437	3	R 237	5	R 1,101	R 50	R 1,835	4	R 1,878
2017 January	(h)	4	(s)	32	(s)	20	(s)	85	6	144	(s)	149
February	(h)	3	(s)	31	(s)	17	(s)	81	3	133	(s)	137
March	(h)	4	(s)	37	(s)	21	(s)	94	5	157	(s)	161
April	(h)	3	(s)	36	(s)	19	(s)	90	4	149	(s)	152
May	(h)	3	(s)	39	(s)	21	(s)	96	5	161	(s)	164
June	(h)	3	(s)	38	(s)	21	(s)	95	5	160	(s)	163
6-Month Total	(h)	19	1	213	1	119	2	540	28	905	2	926
2016 6-Month Total	(h)	20	1	213	1	115	3	544	25	901	2	922
2015 6-Month Total	(h)	21	1	222	1	110	3	531	14	882	2	905

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

^b Natural gas, excluding supplemental gaseous fuels.

^c Distillate fuel oil, excluding biodiesel.

^d Hydrocarbon gas liquids.

^e Finished motor gasoline, excluding fuel ethanol.

^f 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 7.6 and 12.6.

^g Excludes emissions from biomass energy consumption. See Table 12.7.

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

R=Revised. (s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption, including the nonfuel use of fossil fuels. See "Section 12 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 12.7 and Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.

Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973.

Sources: See end of section.

This table has been modified. The column for "HGL" has replaced that for "LPG."

Table 12.6 Carbon Dioxide Emissions From Energy Consumption: Electric Power Sector
(Million Metric Tons of Carbon Dioxide^a)

	Coal	Natural Gas ^b	Petroleum				Geo-thermal	Non-Biomass Waste ^d	Total ^e
			Distillate Fuel Oil ^c	Petroleum Coke	Residual Fuel Oil	Total			
1973 Total	812	199	20	2	254	276	NA	NA	1,286
1975 Total	824	172	17	(s)	231	248	NA	NA	1,244
1980 Total	1,137	200	12	1	194	207	NA	NA	1,544
1985 Total	1,367	166	6	1	79	86	NA	NA	1,619
1990 Total	1,548	176	7	3	92	102	(s)	6	1,831
1995 Total	1,661	228	8	8	45	61	(s)	10	1,960
1996 Total	1,752	205	8	8	50	66	(s)	10	2,033
1997 Total	1,797	219	8	10	56	75	(s)	10	2,101
1998 Total	1,828	248	10	13	82	105	(s)	10	2,192
1999 Total	1,836	260	10	11	76	97	(s)	10	2,204
2000 Total	1,927	281	13	10	69	91	(s)	10	2,310
2001 Total	1,870	290	12	11	79	102	(s)	11	2,273
2002 Total	1,890	306	9	18	52	79	(s)	13	2,288
2003 Total	1,931	278	12	18	69	98	(s)	11	2,319
2004 Total	1,943	297	8	22	69	99	(s)	11	2,350
2005 Total	1,984	319	8	24	69	101	(s)	11	2,416
2006 Total	1,954	338	5	21	28	55	(s)	12	2,358
2007 Total	1,987	372	6	17	31	54	(s)	11	2,425
2008 Total	1,959	362	5	15	19	39	(s)	12	2,373
2009 Total	1,741	373	5	13	14	33	(s)	11	2,158
2010 Total	1,828	399	6	14	12	32	(s)	11	2,270
2011 Total	1,723	409	5	14	7	26	(s)	11	2,170
2012 Total	1,511	493	4	9	6	19	(s)	11	2,034
2013 Total	1,571	444	4	13	6	23	(s)	11	2,050
2014 Total	1,569	444	6	12	7	26	(s)	11	2,050
2015 January	130	39	1	1	1	3	(s)	1	173
February	123	36	2	1	2	5	(s)	1	164
March	107	39	(s)	1	(s)	2	(s)	1	148
April	89	36	(s)	1	(s)	1	(s)	1	127
May	104	40	(s)	1	(s)	2	(s)	1	147
June	126	49	(s)	1	(s)	2	(s)	1	177
July	140	57	(s)	1	1	2	(s)	1	200
August	135	56	(s)	1	1	2	(s)	1	194
September	118	49	(s)	1	(s)	2	(s)	1	170
October	98	43	(s)	1	(s)	2	(s)	1	144
November	89	40	(s)	1	(s)	2	(s)	1	132
December	92	42	(s)	1	(s)	1	(s)	1	136
Total	1,350	527	5	11	7	24	(s)	11	1,913
2016 January	114	42	(s)	1	1	2	(s)	1	159
February	93	38	(s)	1	1	2	(s)	1	133
March	73	41	(s)	1	(s)	2	(s)	1	116
April	71	39	(s)	1	(s)	2	(s)	1	114
May	82	44	(s)	1	(s)	2	(s)	1	129
June	116	53	(s)	1	(s)	2	(s)	1	172
July	136	63	(s)	1	1	2	(s)	1	201
August	135	63	(s)	1	1	2	(s)	1	201
September	114	50	(s)	1	(s)	2	(s)	1	167
October	100	41	(s)	1	(s)	1	(s)	1	143
November	88	36	(s)	1	(s)	2	(s)	1	127
December	119	37	(s)	1	(s)	2	(s)	1	158
Total	1,241	546	4	12	5	21	(s)	11	1,821
2017 January	116	35	(s)	1	(s)	2	(s)	1	154
February	88	30	(s)	1	(s)	1	(s)	1	121
March	90	37	(s)	1	(s)	1	(s)	1	129
April	81	34	(s)	(s)	(s)	1	(s)	1	117
May	94	38	(s)	1	(s)	2	(s)	1	134
June	108	46	(s)	1	(s)	2	(s)	1	157
6-Month Total	577	219	2	5	2	9	(s)	5	811
2016 6-Month Total	549	257	2	6	3	11	(s)	6	822
2015 6-Month Total	679	239	3	6	5	14	(s)	5	936

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

^b Natural gas, excluding supplemental gaseous fuels.

^c Distillate fuel oil, excluding biodiesel.

^d Municipal solid waste from non-biogenic sources, and tire-derived fuels. Through 1994, also includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

^e Excludes emissions from biomass energy consumption. See Table 12.7.

NA=Not available. (s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy

consumption. See "Section 12 Methodology and Sources" at end of section.

• See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 12.7 and Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.

Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973.

Sources: See end of section.

Table 12.7 Carbon Dioxide Emissions From Biomass Energy Consumption
(Million Metric Tons of Carbon Dioxide^a)

	By Source					By Sector					
	Wood ^b	Biomass Waste ^c	Fuel Ethanol ^d	Bio-diesel	Total	Residential	Commercial ^e	Industrial ^f	Transportation	Electric Power ^g	Total
1973 Total	143	(s)	NA	NA	143	33	1	109	NA	(s)	143
1975 Total	140	(s)	NA	NA	141	40	1	100	NA	(s)	141
1980 Total	232	(s)	NA	NA	232	80	2	150	NA	(s)	232
1985 Total	252	14	3	NA	270	95	2	168	3	1	270
1990 Total	208	24	4	NA	237	54	8	147	4	23	237
1995 Total	222	30	8	NA	260	49	9	166	8	28	260
1996 Total	229	32	6	NA	266	51	10	170	6	30	266
1997 Total	222	30	7	NA	259	40	10	172	7	30	259
1998 Total	205	30	8	NA	242	36	9	160	8	30	242
1999 Total	208	29	8	NA	245	37	9	161	8	30	245
2000 Total	212	27	9	NA	248	39	9	161	9	29	248
2001 Total	188	33	10	(s)	231	35	9	147	10	31	231
2002 Total	187	36	12	(s)	235	36	9	144	12	35	235
2003 Total	188	36	16	(s)	240	38	9	141	16	37	240
2004 Total	199	35	20	(s)	255	38	10	151	20	36	255
2005 Total	200	37	23	1	261	40	10	150	23	37	261
2006 Total	197	36	31	2	266	36	9	151	33	38	266
2007 Total	196	37	39	3	276	39	9	146	41	39	276
2008 Total	193	39	55	3	290	44	10	139	57	40	290
2009 Total	181	41	62	3	287	47	10	125	64	41	287
2010 Total	186	42	73	2	303	41	10	136	74	42	303
2011 Total	189	42	73	8	312	42	11	139	80	40	312
2012 Total	189	42	73	8	312	39	10	141	80	42	312
2013 Total	204	45	75	13	337	54	11	141	87	43	337
2014 Total	210	47	76	13	346	55	12	142	88	49	346
2015 January	17	4	6	(s)	28	4	1	12	6	4	28
February	15	3	6	1	26	3	1	11	7	4	26
March	16	4	7	1	28	4	1	12	7	4	28
April	16	4	6	1	27	3	1	12	7	4	27
May	16	4	7	1	28	4	1	12	8	4	28
June	16	4	7	2	28	3	1	12	8	4	28
July	17	4	7	1	29	4	1	12	8	4	29
August	17	4	7	1	29	4	1	12	8	4	29
September	16	4	7	1	28	3	1	11	8	4	28
October	16	4	7	1	28	4	1	12	8	4	28
November	16	4	7	1	28	3	1	12	7	4	28
December	17	4	7	1	29	4	1	12	8	4	29
Total	194	47	79	14	334	41	14	141	90	48	334
2016 January	16	4	6	1	27	3	1	12	7	4	27
February	15	4	6	1	26	3	1	11	7	4	26
March	15	4	7	1	R 27	3	1	11	8	4	R 27
April	14	4	6	1	26	3	1	11	7	4	26
May	15	4	7	2	28	3	1	11	8	4	28
June	15	4	7	2	28	3	1	12	8	4	28
July	16	4	7	2	29	3	1	12	9	4	29
August	16	4	7	2	29	3	1	12	9	4	29
September	15	4	7	2	27	3	1	11	8	4	27
October	15	4	7	2	27	3	1	11	8	4	27
November	15	4	7	2	28	3	1	12	8	4	28
December	16	4	7	2	29	3	1	12	9	4	29
Total	184	47	81	R 20	332	35	14	138	98	47	332
2017 January	16	4	6	1	27	3	1	12	7	4	27
February	15	4	6	1	25	3	1	11	7	4	25
March	16	4	7	1	28	3	1	12	8	4	28
April	15	4	7	2	27	3	1	11	8	4	27
May	15	4	7	2	28	3	1	11	9	4	28
June	15	4	7	2	28	3	1	11	9	4	28
6-Month Total	92	23	40	9	163	18	7	69	47	23	163
2016 6-Month Total	91	24	40	8	162	17	7	69	46	23	162
2015 6-Month Total	97	23	39	6	164	20	7	70	43	23	164

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

^b Wood and wood-derived fuels.

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

^d Fuel ethanol minus denaturant.

^e Commercial sector, including commercial combined-heat-and-power (CHP) and commercial electricity-only plants.

^f Industrial sector, including industrial combined-heat-and-power (CHP) and industrial electricity-only plants.

^g 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.

R=Revised. NA=Not available. (s)=Less than 0.5 million metric tons.

Notes: • Carbon dioxide emissions from biomass energy consumption are excluded from the energy-related carbon dioxide emissions reported in Tables 12.1–12.6. See Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Data are estimates. See "Section 12 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Totals may not equal sum of components due to independent rounding. • Geographic coverage is the 50 states and the District of Columbia.

Web Page: See <http://www.eia.gov/totalenergy/data/monthly/#environment> (Excel and CSV files) for all available annual and monthly data beginning in 1973. Sources: See end of section.

Environment

Note 1. Emissions of Carbon Dioxide and Other Greenhouse Gases. Greenhouse gases are those gases—such as water vapor, carbon dioxide (CO₂), methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride—that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface.

Energy-related carbon dioxide emissions account for about 98% of U.S. CO₂ emissions. The vast majority of CO₂ emissions come from fossil fuel combustion, with smaller amounts from the nonfuel use of fossil fuels, as well as from electricity generation using geothermal energy and non-biomass waste. Other sources of CO₂ emissions include industrial processes, such as cement and limestone production. Data in the U.S. Energy Information Administration's (EIA) *Monthly Energy Review (MER)* Tables 12.1–12.6 are estimates for U.S. CO₂ emissions from energy consumption, including the nonfuel use of fossil fuels (excluded are estimates for CO₂ emissions from biomass energy consumption, which appear in MER Table 12.7).

For annual U.S. estimates for emissions of CO₂ from all sources, as well as for emissions of other greenhouse gases, see EIA's *Emissions of Greenhouse Gases Report* at http://www.eia.gov/environment/emissions/ghg_report/.

Note 2. 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 energy-related CO₂ emissions reported in MER Tables 12.1–12.6, but appear in MER Table 12.7. 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.

Section 12 Methodology and Sources

To estimate carbon dioxide emissions from energy consumption for the *Monthly Energy Review (MER)*, Tables 12.1–12.7, the U.S. Energy Information Administration (EIA) uses the following methodology and sources:

Step 1. Determine Fuel Consumption

Coal—Coal sectoral (residential, commercial, coke plants, other industrial, transportation, electric power) consumption data in thousand short tons are from MER Table 6.2. Coal sectoral consumption data are converted to trillion Btu by multiplying by the coal heat content factors in MER Table A5.

Coal Coke Net Imports—Coal coke net imports data in trillion Btu are derived from coal coke imports and exports data in MER Tables 1.4a and 1.4b.

Natural Gas (excluding supplemental gaseous fuels)—Natural gas sectoral consumption data in trillion Btu are from MER Tables 2.2–2.6.

Petroleum—Total and sectoral consumption (product supplied) data in thousand barrels per day for asphalt and road oil, aviation gasoline, distillate fuel oil, hydrocarbon gas liquids (HGL), jet fuel, kerosene, lubricants, motor gasoline, petroleum coke, and residual fuel oil are from MER Tables 3.5 and 3.7a–3.7c. For the component products of HGL (ethane/ethylene, propane/propylene, normal butane/butylene, isobutane/isobutylene, and natural gasoline) and "other petroleum" (aviation gasoline blending components, crude oil, motor gasoline blending components, naphthas for petrochemical feedstock use, other oils for petrochemical feedstock use, special naphthas, still gas, unfinished oils, waxes, and miscellaneous petroleum products), consumption (product supplied) data in thousand barrels per day are from EIA's *Petroleum Supply Annual (PSA)*, *Petroleum Supply Monthly (PSM)*, and

earlier publications (see sources for MER Table 3.5). Petroleum consumption data by product are converted to trillion Btu by multiplying by the petroleum heat content factors in MER Tables A1 and A3.

Biomass—Sectoral consumption data in trillion Btu for wood, biomass waste, fuel ethanol (minus denaturant), and biodiesel are from MER Tables 10.2a–10.2c.

Step 2. Remove Biofuels From Petroleum

Distillate Fuel Oil—Beginning in 2009, the distillate fuel oil data (for total and transportation sector) in Step 1 include biodiesel, a non-fossil renewable fuel. To remove the biodiesel portion from distillate fuel oil, data in thousand barrels per day for refinery and blender net inputs of renewable diesel fuel (from the PSA/PSM) are converted to trillion Btu by multiplying by the biodiesel heat content factor in MER Table A1, and then subtracted from the distillate fuel oil consumption values.

Motor Gasoline—Beginning in 1993, the motor gasoline data (for total, commercial sector, industrial sector, and transportation sector) in Step 1 include fuel ethanol, a non-fossil renewable fuel. To remove the fuel ethanol portion from motor gasoline, data in trillion Btu for fuel ethanol consumption (from MER Tables 10.2a, 10.2b, and 10.3) are subtracted from the motor gasoline consumption values. (Note that about 2% of fuel ethanol is fossil-based petroleum denaturant, to make the fuel ethanol undrinkable. For 1993–2008, petroleum denaturant is double counted in the PSA product supplied statistics, in both the original product category—e.g., natural gasoline—and also in the finished motor gasoline category; for this time period for MER Section 12, petroleum denaturant is removed along with the fuel ethanol from motor gasoline, but left in the original product. Beginning in 2009, petroleum denaturant is counted only in the PSA/PSM product supplied statistics for motor gasoline; for this time period for MER Section 12, petroleum denaturant is left in motor gasoline.)

Step 3. Remove Carbon Sequestered by Nonfuel Use

The following fuels have industrial nonfuel uses as chemical feedstocks and other products: coal, natural gas, asphalt and road oil, distillate fuel oil, hydrocarbon gas liquids (ethane/ethylene, propane/propylene, normal butane/butylene, isobutane/isobutylene, and natural gasoline), lubricants (which have industrial and transportation nonfuel uses), naphthas for petrochemical feedstock use, other oils for petrochemical feedstock use, petroleum coke, residual fuel oil, special naphthas, still gas, waxes, and miscellaneous petroleum products. In the nonfuel use of these fuels, some of the carbon is sequestered, and is thus subtracted from the fuel consumption values in Steps 1 and 2.

Estimates of annual nonfuel use and associated carbon sequestration are developed by EIA using the methodology

detailed in “Documentation for *Emissions of Greenhouse Gases in the United States 2008*” at [http://www.eia.gov/environment/archive/1605/ggprt/documentation/pdf/0638\(2008\).pdf](http://www.eia.gov/environment/archive/1605/ggprt/documentation/pdf/0638(2008).pdf).

To obtain monthly estimates of nonfuel use and associated carbon sequestration, monthly patterns for industrial consumption and product supplied data series are used. For coal nonfuel use, the monthly pattern for coke plants coal consumption from MER Table 6.2 is used. For natural gas, the monthly pattern for other industrial non-CHP natural gas consumption from MER Table 4.3 is used. For distillate fuel oil, petroleum coke, and residual fuel oil, the monthly patterns for industrial consumption from MER Table 3.7b are used. For the other petroleum products, the monthly patterns for product supplied from the PSA and PSM are used.

Step 4. Determine Carbon Dioxide Emissions From Energy Consumption

Carbon dioxide (CO₂) emissions data in million metric tons are calculated by multiplying consumption values in trillion Btu from Steps 1 and 2 (minus the carbon sequestered in nonfuel use in Step 3) by the CO₂ emissions factors at http://www.eia.gov/environment/archive/1605/ggprt/excel/CO2_coefs_09_v2.xls.

Coal—CO₂ emissions for coal are calculated for each sector (residential, commercial, coke plants, other industrial, transportation, electric power). Total coal emissions are the sum of the sectoral coal emissions.

Coal Coke Net Imports—CO₂ emissions for coal coke net imports are calculated.

Natural Gas—CO₂ emissions for natural gas are calculated for each sector (residential, commercial, industrial, transportation, electric power). Total natural gas emissions are the sum of the sectoral natural gas emissions.

Petroleum—CO₂ emissions are calculated for each petroleum product. Total petroleum emissions are the sum of the product emissions. Total HGL emissions are the sum of the emissions for the component products (ethane/ethylene, propane/propylene, normal butane/butylene, isobutane/isobutylene, and natural gasoline); residential, commercial, and transportation sector HGL emissions are estimated by multiplying consumption values in trillion Btu from MER Tables 3.8a and 3.8c by the propane emissions factor; industrial sector HGL emissions are estimated as total HGL emissions minus emissions by the other sectors.

Geothermal and Non-Biomass Waste—Annual CO₂ emissions data for geothermal and non-biomass waste are EIA estimates based on Form EIA-923, “Power Plant Operations Report” (and predecessor forms). Monthly estimates are created by dividing the annual data by the number of days in the year and then multiplying by the number of days in the month. (Annual estimates for the current year are set equal to those of the previous year.)

Biomass—CO₂ emissions for wood, biomass waste, fuel ethanol (minus denaturant), and biodiesel are calculated for each sector. Total emissions for each biomass fuel are the sum of the sectoral emissions. The following factors, in million metric tons CO₂ per quadrillion Btu, are used: wood—93.80; biomass waste—90.70; fuel ethanol—68.44; and biodiesel—73.84. For 1973–1988, the biomass portion

of waste in MER Tables 10.2a–10.2c is estimated as 67%; for 1989–2000, the biomass portion of waste is estimated as 67% in 1989 to 58% in 2000, based on the biogenic shares of total municipal solid waste shown in EIA’s “Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy,” Table 1 at <http://www.eia.gov/totalenergy/data/monthly/pdf/historical/msw.pdf>.

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