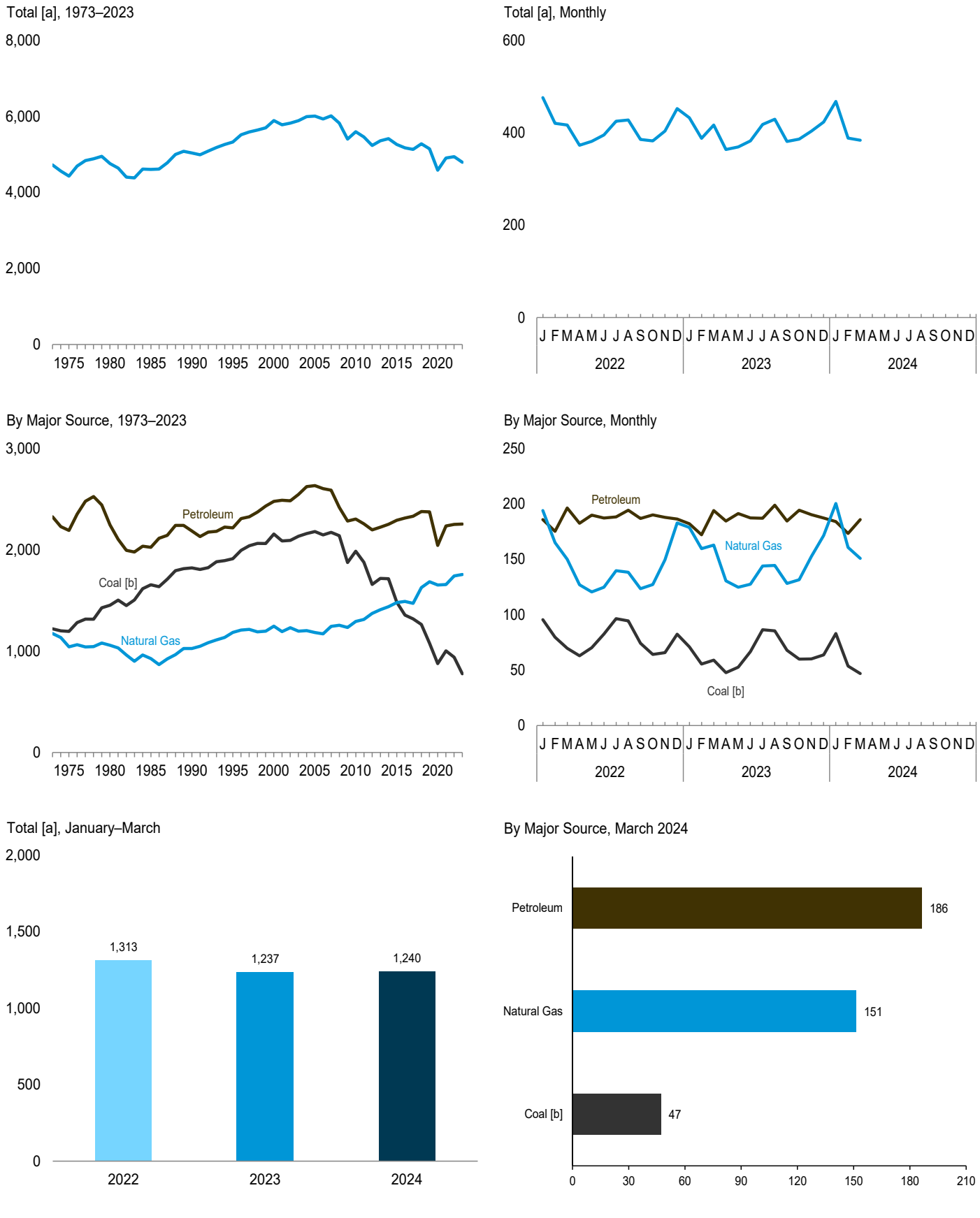
11. Environment

Figure 11.1 Carbon Dioxide Emissions From Energy Consumption by Source

(Million Metric Tons of Carbon Dioxide)



[a] Excludes emissions from biomass energy consumption.
[b] Includes coal coke net imports.

Web Page: http://www.eia.gov/totalenergy/data/monthly/#environment.
Source: Table 11.1.

Table 11.1 Carbon Dioxide Emissions From Energy Consumption by Source

(Million Metric Tons of Carbon Dioxide[a])

			Petroleum											
	Coal[b]	Natural Gas[c]	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	Total[h,i]
1973 Total	**1,221**	**1,175**	**6**	**485**	**80**	**154**	**33**	**13**	**911**	**55**	**486**	**102**	**2,325**	**4,721**
1975 Total	**1,195**	**1,043**	**5**	**447**	**73**	**146**	**24**	**11**	**911**	**52**	**424**	**97**	**2,190**	**4,428**
1980 Total	**1,454**	**1,058**	**4**	**451**	**78**	**156**	**24**	**13**	**901**	**50**	**433**	**134**	**2,244**	**4,756**
1985 Total	**1,655**	**927**	**3**	**450**	**82**	**178**	**17**	**12**	**933**	**56**	**207**	**86**	**2,024**	**4,605**
1990 Total	**1,820**	**1,026**	**3**	**475**	**75**	**223**	**6**	**13**	**988**	**72**	**212**	**119**	**2,186**	**5,038**
1995 Total	**1,912**	**1,185**	**3**	**504**	**90**	**222**	**8**	**13**	**1,042**	**78**	**147**	**111**	**2,216**	**5,324**
2000 Total	**2,155**	**1,246**	**3**	**592**	**106**	**259**	**10**	**14**	**1,141**	**85**	**157**	**111**	**2,477**	**5,889**
2005 Total	**2,180**	**1,182**	**2**	**653**	**92**	**251**	**11**	**12**	**1,205**	**110**	**159**	**140**	**2,633**	**6,007**
2010 Total	**1,986**	**1,292**	**2**	**591**	**84**	**214**	**3**	**11**	**1,107**	**81**	**92**	**119**	**2,304**	**5,594**
2011 Total	**1,876**	**1,312**	**2**	**600**	**79**	**213**	**2**	**10**	**1,074**	**78**	**79**	**118**	**2,255**	**5,455**
2012 Total	**1,658**	**1,372**	**2**	**577**	**76**	**210**	**1**	**9**	**1,066**	**78**	**64**	**114**	**2,195**	**5,236**
2013 Total	**1,718**	**1,408**	**2**	**581**	**85**	**214**	**1**	**10**	**1,077**	**77**	**55**	**120**	**2,221**	**5,359**
2014 Total	**1,713**	**1,438**	**2**	**614**	**86**	**220**	**1**	**10**	**1,085**	**77**	**44**	**112**	**2,252**	**5,414**
2015 Total	**1,482**	**1,479**	**1**	**606**	**86**	**231**	**1**	**11**	**1,114**	**77**	**45**	**116**	**2,290**	**5,262**
2016 Total	**1,355**	**1,490**	**1**	**583**	**83**	**242**	**1**	**11**	**1,134**	**77**	**56**	**124**	**2,312**	**5,169**
2017 Total	**1,318**	**1,471**	**1**	**591**	**86**	**251**	**1**	**10**	**1,131**	**71**	**59**	**130**	**2,332**	**5,132**
2018 Total	**1,263**	**1,627**	**2**	**626**	**98**	**255**	**1**	**10**	**1,131**	**73**	**55**	**127**	**2,377**	**5,278**
2019 Total	**1,078**	**1,685**	**2**	**621**	**107**	**261**	**1**	**9**	**1,128**	**67**	**47**	**131**	**2,374**	**5,147**
2020 Total	**876**	**1,653**	**1**	**572**	**105**	**161**	**1**	**8**	**977**	**58**	**36**	**123**	**2,044**	**4,584**
2021 Total	**1,003**	**1,656**	**1**	**611**	**111**	**205**	**1**	**9**	**1,067**	**60**	**54**	**116**	**2,235**	**4,906**
2022 January	96	194	(s)	54	12	18	(s)	1	83	5	4	9	186	476
February	80	165	(s)	52	10	16	(s)	1	80	4	4	8	175	421
March	70	150	(s)	55	9	19	(s)	1	93	5	5	9	196	417
April	63	127	(s)	50	7	19	(s)	1	88	4	4	9	182	373
May	70	121	(s)	51	6	20	(s)	1	94	4	5	10	190	381
June	83	125	(s)	51	6	21	(s)	1	90	4	5	9	187	395
July	96	140	(s)	49	7	20	(s)	(s)	91	7	5	10	188	425
August	94	138	(s)	51	6	21	(s)	1	93	5	5	10	194	428
September	74	124	(s)	52	7	19	(s)	1	88	5	7	9	187	385
October	64	127	(s)	54	8	20	(s)	1	90	4	4	9	190	382
November	66	149	(s)	51	9	19	(s)	1	88	6	5	9	188	404
December	82	183	(s)	50	10	20	(s)	1	88	4	4	9	186	452
Total	**939**	**1,742**	**2**	**619**	**97**	**233**	**1**	**9**	**1,065**	**57**	**57**	**111**	**2,250**	**4,939**
2023 January	71	179	(s)	51	10	19	(s)	1	85	2	4	9	182	433
February	56	160	(s)	47	9	17	(s)	1	81	4	5	8	172	388
March	59	163	(s)	54	9	20	(s)	(s)	92	6	4	9	194	417
April	48	131	(s)	49	7	20	(s)	1	90	6	2	9	184	363
May	53	125	(s)	51	7	21	(s)	1	93	4	3	10	191	369
June	67	128	(s)	50	7	21	(s)	1	92	3	4	9	187	382
July	86	144	(s)	48	7	22	(s)	1	93	3	4	10	187	418
August	85	144	(s)	54	6	22	(s)	1	95	6	5	10	199	429
September	68	128	(s)	49	6	21	(s)	1	88	7	3	9	184	381
October	R60	132	(s)	53	8	21	(s)	1	93	5	4	9	194	R386
November	60	153	(s)	51	10	20	(s)	(s)	88	8	5	9	190	R403
December	64	171	(s)	47	10	21	(s)	(s)	91	3	5	9	187	423
Total	**R777**	**1,756**	**1**	**605**	**96**	**247**	**2**	**7**	**1,081**	**56**	**47**	**111**	**2,253**	**R4,793**
2024 January	83	200	(s)	51	12	20	(s)	1	85	4	4	9	184	468
February	54	161	(s)	48	9	19	(s)	(s)	83	2	4	8	173	388
March	47	151	(s)	48	9	21	(s)	1	91	2	5	9	186	384
3-Month Total	**184**	**512**	**(s)**	**147**	**30**	**59**	**(s)**	**2**	**259**	**9**	**12**	**26**	**543**	**1,240**
2023 3-Month Total	**186**	**501**	**(s)**	**152**	**28**	**57**	**1**	**2**	**258**	**12**	**13**	**26**	**548**	**1,237**
2022 3-Month Total	**245**	**509**	**(s)**	**160**	**31**	**54**	**(s)**	**3**	**256**	**13**	**14**	**26**	**557**	**1,313**

[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 and renewable diesel fuel.
[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 11.6.
[i] Excludes emissions from biomass energy consumption. See Table 11.7.

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

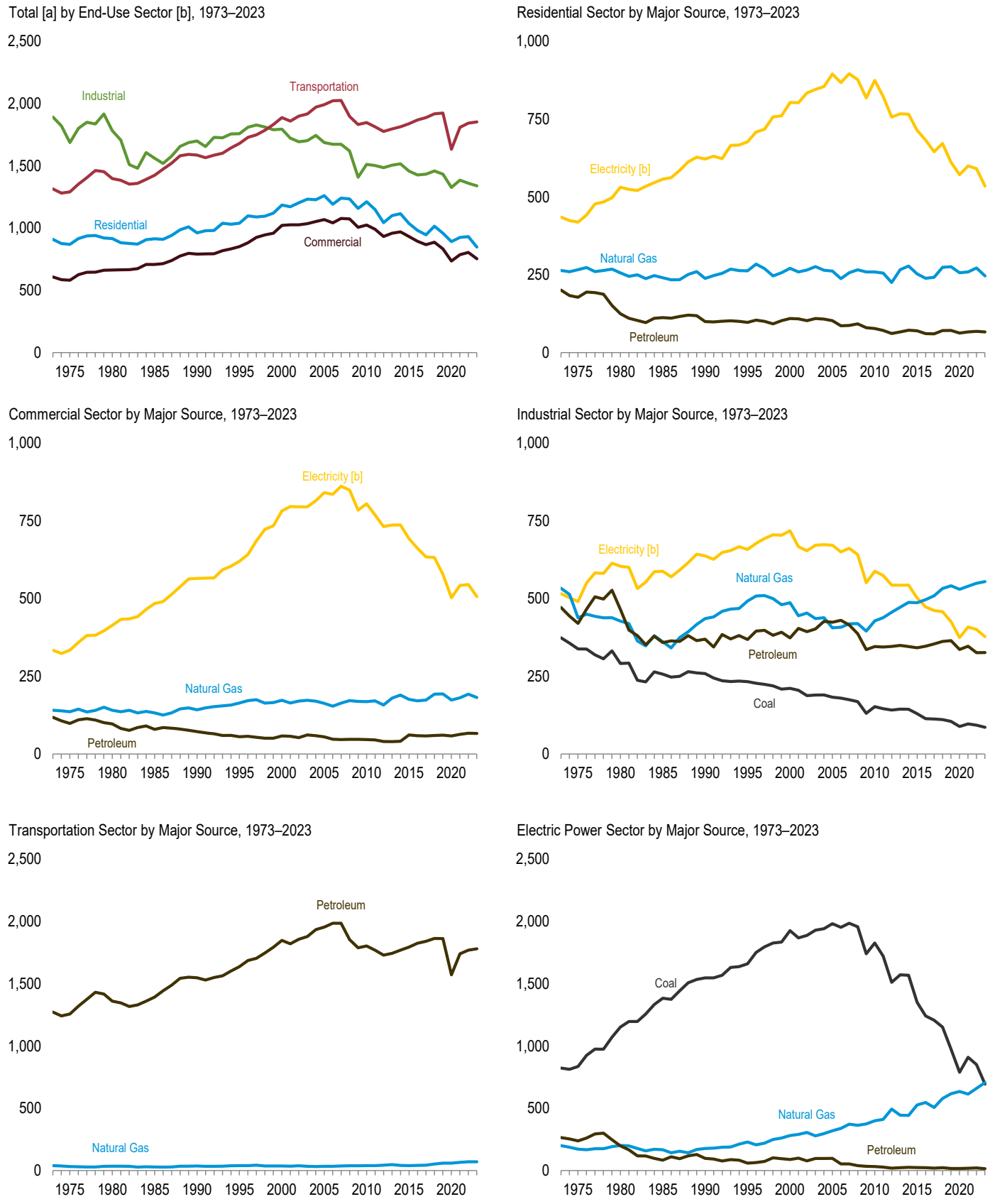
Notes: • Data are estimates for carbon dioxide emissions from energy consumption, plus the relatively small amount of emissions from the non-combustion use of fossil fuels. See "Section 11 Methodology and Sources" at end of section. • See "Carbon Dioxide" in Glossary. • See Note 1, "Emissions of Carbon Dioxide and Other Greenhouse Gases," at end of section. • Data exclude emissions from biomass energy consumption. See Table 11.7 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.

Figure 11.2 Carbon Dioxide Emissions From Energy Consumption by Sector

(Million Metric Tons of Carbon Dioxide)



[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 sales to ultimate customers.
Web Page: http://www.eia.gov/totalenergy/data/monthly/#environment.
Sources: Tables 11.2–11.6.

Table 11.2 Carbon Dioxide Emissions From Energy Consumption: Residential Sector

(Million Metric Tons of Carbon Dioxide[a])

	Coal	Natural Gas[b]	Petroleum				Electricity[e]	Total[f]
			Distillate Fuel Oil[c]	HGL[d]	Kerosene	Total		
1973 Total	**9**	**264**	**148**	**36**	**17**	**201**	**435**	**908**
1975 Total	**6**	**266**	**134**	**32**	**12**	**178**	**419**	**869**
1980 Total	**3**	**256**	**97**	**20**	**8**	**125**	**531**	**915**
1985 Total	**4**	**240**	**81**	**20**	**12**	**112**	**557**	**913**
1990 Total	**3**	**238**	**72**	**22**	**5**	**99**	**622**	**962**
1995 Total	**2**	**263**	**67**	**25**	**5**	**97**	**677**	**1,039**
2000 Total	**1**	**271**	**68**	**35**	**7**	**109**	**804**	**1,185**
2005 Total	**1**	**262**	**64**	**32**	**6**	**102**	**895**	**1,260**
2010 Total	**NA**	**259**	**42**	**33**	**2**	**77**	**874**	**1,210**
2011 Total	**NA**	**255**	**39**	**31**	**1**	**71**	**823**	**1,149**
2012 Total	**NA**	**225**	**36**	**25**	**1**	**61**	**757**	**1,043**
2013 Total	**NA**	**266**	**36**	**29**	**1**	**66**	**767**	**1,100**
2014 Total	**NA**	**278**	**40**	**31**	**1**	**71**	**766**	**1,115**
2015 Total	**NA**	**253**	**41**	**28**	**1**	**70**	**714**	**1,037**
2016 Total	**NA**	**238**	**32**	**27**	**1**	**60**	**683**	**981**
2017 Total	**NA**	**241**	**32**	**27**	**1**	**60**	**645**	**946**
2018 Total	**NA**	**274**	**38**	**32**	**1**	**70**	**672**	**1,016**
2019 Total	**NA**	**276**	**35**	**35**	**1**	**71**	**611**	**958**
2020 Total	**NA**	**256**	**30**	**31**	**1**	**62**	**571**	**890**
2021 Total	**NA**	**259**	**35**	**30**	**1**	**66**	**600**	**925**
2022 January	NA	53	5	5	(s)	11	59	123
February	NA	43	6	4	(s)	10	48	102
March	NA	32	4	3	(s)	8	39	79
April	NA	21	3	3	(s)	5	34	60
May	NA	11	2	2	(s)	4	41	56
June	NA	7	2	1	(s)	3	55	65
July	NA	6	1	1	(s)	2	71	79
August	NA	6	1	1	(s)	2	68	75
September	NA	6	2	1	(s)	3	50	59
October	NA	13	3	2	(s)	5	37	55
November	NA	28	3	3	(s)	6	39	73
December	NA	46	4	5	(s)	9	53	108
Total	**NA**	**272**	**36**	**32**	**1**	**68**	**591**	**931**
2023 January	NA	44	5	5	(s)	10	48	102
February	NA	37	5	4	(s)	10	38	85
March	NA	35	4	4	(s)	8	38	80
April	NA	18	3	2	(s)	5	31	54
May	NA	11	2	2	(s)	4	34	49
June	NA	7	2	1	(s)	3	47	57
July	NA	6	1	1	(s)	2	67	76
August	NA	6	1	1	(s)	2	66	74
September	NA	6	2	1	(s)	3	49	59
October	NA	12	3	2	(s)	5	37	54
November	NA	27	3	3	(s)	6	37	71
December	NA	36	4	4	(s)	8	44	88
Total	**NA**	**246**	**35**	**30**	**1**	**66**	**535**	**847**
2024 January	NA	50	5	5	(s)	10	59	119
February	NA	35	5	4	(s)	9	38	83
March	NA	28	4	3	(s)	7	32	67
3-Month Total	**NA**	**114**	**14**	**12**	**(s)**	**27**	**129**	**269**
2023 3-Month Total	**NA**	**116**	**14**	**12**	**1**	**27**	**124**	**267**
2022 3-Month Total	**NA**	**128**	**15**	**13**	**(s)**	**28**	**147**	**303**

[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 and renewable diesel fuel.
[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 sales to ultimate customers. See Tables 7.6 and 11.6.
[f] Excludes emissions from biomass energy consumption. See Table 11.7.
NA=Not available. (s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. See "Section 11 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 11.7 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 11.3 Carbon Dioxide Emissions From Energy Consumption: Commercial Sector

(Million Metric Tons of Carbon Dioxide[a])

	Coal	Natural Gas[b]	Petroleum							Electricity[f]	Total[g]
			Distillate Fuel Oil[c]	HGL[d]	Kerosene	Motor Gasoline[e]	Petroleum Coke	Residual Fuel Oil	Total		
1973 Total	**15**	**140**	**48**	**9**	**5**	**6**	**NA**	**50**	**118**	**334**	**607**
1975 Total	**14**	**136**	**43**	**8**	**4**	**6**	**NA**	**37**	**98**	**334**	**582**
1980 Total	**11**	**141**	**38**	**6**	**3**	**8**	**NA**	**42**	**97**	**414**	**662**
1985 Total	**13**	**132**	**47**	**6**	**2**	**7**	**NA**	**17**	**79**	**484**	**708**
1990 Total	**12**	**142**	**40**	**6**	**1**	**8**	**0**	**17**	**72**	**564**	**790**
1995 Total	**11**	**164**	**35**	**7**	**2**	**1**	**(s)**	**11**	**56**	**619**	**850**
2000 Total	**9**	**172**	**37**	**9**	**2**	**3**	**(s)**	**7**	**58**	**781**	**1,021**
2005 Total	**9**	**163**	**33**	**8**	**2**	**3**	**(s)**	**9**	**55**	**840**	**1,067**
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**	**958**
2014 Total	**4**	**189**	**26**	**10**	**(s)**	**4**	**(s)**	**1**	**41**	**736**	**970**
2015 Total	**3**	**175**	**27**	**9**	**(s)**	**25**	**(s)**	**(s)**	**61**	**692**	**932**
2016 Total	**2**	**171**	**24**	**9**	**(s)**	**25**	**(s)**	**(s)**	**59**	**661**	**893**
2017 Total	**2**	**173**	**24**	**10**	**(s)**	**24**	**(s)**	**(s)**	**58**	**633**	**866**
2018 Total	**2**	**193**	**24**	**11**	**(s)**	**24**	**(s)**	**(s)**	**59**	**632**	**886**
2019 Total	**2**	**193**	**24**	**11**	**(s)**	**24**	**(s)**	**(s)**	**60**	**578**	**832**
2020 Total	**1**	**173**	**20**	**13**	**(s)**	**24**	**(s)**	**(s)**	**58**	**502**	**735**
2021 Total	**1**	**180**	**24**	**14**	**(s)**	**25**	**(s)**	**(s)**	**63**	**542**	**787**
2022 January	(s)	30	3	2	(s)	2	(s)	(s)	8	48	86
February	(s)	25	4	1	(s)	2	(s)	(s)	8	40	73
March	(s)	21	3	1	(s)	3	(s)	(s)	7	38	66
April	(s)	15	2	1	(s)	2	(s)	(s)	5	36	56
May	(s)	10	2	1	(s)	3	(s)	(s)	5	42	57
June	(s)	8	1	1	(s)	2	(s)	(s)	4	49	61
July	(s)	8	1	1	(s)	2	(s)	(s)	4	58	70
August	(s)	8	1	1	(s)	3	0	(s)	4	57	69
September	(s)	8	1	1	(s)	2	(s)	(s)	4	48	60
October	(s)	12	2	1	(s)	2	0	(s)	5	42	59
November	(s)	19	2	1	(s)	2	(s)	(s)	6	40	65
December	(s)	27	3	2	(s)	2	(s)	(s)	7	46	80
Total	**1**	**192**	**25**	**13**	**(s)**	**29**	**(s)**	**(s)**	**67**	**545**	**805**
2023 January	(s)	26	3	2	(s)	2	(s)	(s)	7	41	74
February	(s)	23	4	1	(s)	2	(s)	(s)	7	34	65
March	(s)	22	3	1	(s)	3	(s)	(s)	7	37	67
April	(s)	14	2	1	(s)	2	0	(s)	5	33	52
May	(s)	10	2	1	(s)	3	0	(s)	5	38	53
June	(s)	8	1	1	(s)	2	0	(s)	4	45	58
July	(s)	8	1	1	(s)	3	0	(s)	4	56	68
August	(s)	8	1	1	(s)	3	0	(s)	4	55	67
September	(s)	8	1	1	(s)	2	0	(s)	4	46	58
October	(s)	12	2	1	(s)	3	0	(s)	5	41	59
November	(s)	19	2	1	(s)	2	0	(s)	6	39	64
December	(s)	23	3	1	(s)	2	(s)	(s)	7	40	70
Total	**1**	**181**	**24**	**12**	**(s)**	**29**	**(s)**	**(s)**	**66**	**506**	**754**
2024 January	(s)	29	3	2	(s)	2	(s)	(s)	7	47	84
February	(s)	23	4	1	(s)	2	(s)	(s)	7	34	65
March	(s)	19	3	1	(s)	2	0	(s)	6	33	59
3-Month Total	**(s)**	**71**	**10**	**4**	**(s)**	**7**	**(s)**	**(s)**	**21**	**115**	**208**
2023 3-Month Total	**(s)**	**72**	**10**	**4**	**(s)**	**7**	**(s)**	**(s)**	**21**	**112**	**205**
2022 3-Month Total	**(s)**	**77**	**10**	**5**	**(s)**	**7**	**(s)**	**(s)**	**22**	**126**	**225**

[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 and renewable diesel fuel.
[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 sales to ultimate customers. See Tables 7.6 and 11.6.
[g] Excludes emissions from biomass energy consumption. See Table 11.7.
NA=Not available. (s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. See "Section 11 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 11.7 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 11.4 Carbon Dioxide Emissions From Energy Consumption: Industrial Sector

(Million Metric Tons of Carbon Dioxide[a])

	Coal	Coal Coke Net Imports	Natural Gas[b]	Petroleum									Electricity[g]	Total[h]
				Distillate Fuel Oil[c]	HGL[d]	Kerosene	Lubricants	Motor Gasoline[e]	Petroleum Coke	Residual Fuel Oil	Other[f]	Total		
1973 Total	373	-1	533	107	31	11	7	18	54	139	102	471	515	1,891
1975 Total	338	2	437	98	30	9	6	16	52	113	97	420	490	1,687
1980 Total	291	-4	427	97	52	13	7	11	50	101	134	465	604	1,782
1985 Total	257	-2	361	82	54	3	6	16	55	56	86	358	587	1,561
1990 Total	258	1	435	85	45	1	7	13	69	31	119	369	636	1,699
1995 Total	232	7	492	83	57	1	7	14	69	25	111	368	658	1,757
2000 Total	211	7	486	89	61	1	7	11	75	18	111	373	717	1,795
2005 Total	182	5	405	94	49	3	6	25	86	21	140	423	671	1,687
2010 Total	152	-1	428	85	42	1	5	17	67	9	119	345	587	1,512
2011 Total	146	1	438	91	39	(s)	5	17	64	10	118	344	574	1,503
2012 Total	142	(s)	455	94	42	(s)	4	17	69	5	114	346	543	1,486
2013 Total	145	-2	472	94	46	(s)	5	17	64	4	120	349	542	1,505
2014 Total	144	-2	487	101	45	(s)	5	14	65	3	112	345	543	1,516
2015 Total	129	-2	486	87	48	(s)	5	17	66	2	116	342	502	1,457
2016 Total	113	-2	496	86	46	(s)	5	17	65	4	124	347	472	1,426
2017 Total	112	-3	509	89	48	(s)	5	17	61	4	130	354	461	1,432
2018 Total	111	-3	532	93	54	(s)	5	18	62	3	127	362	458	1,459
2019 Total	105	-2	540	89	60	(s)	4	18	60	3	131	364	425	1,432
2020 Total	88	-1	530	79	60	(s)	4	18	49	2	123	336	374	1,326
2021 Total	97	-6	539	88	67	(s)	4	17	51	3	116	347	408	1,385
2022 January	8	-1	52	9	5	(s)	(s)	1	4	(s)	9	28	36	123
February	8	(s)	46	8	4	(s)	(s)	1	3	(s)	8	25	30	108
March	8	-1	48	9	4	(s)	(s)	2	4	(s)	9	29	29	114
April	8	-1	45	7	4	(s)	(s)	1	4	(s)	9	26	28	107
May	8	-1	44	6	4	(s)	(s)	2	3	(s)	10	25	32	109
June	8	(s)	43	7	5	(s)	(s)	2	3	(s)	9	27	36	112
July	8	-1	44	5	5	(s)	(s)	2	6	(s)	10	28	39	118
August	8	(s)	44	7	5	(s)	(s)	2	5	(s)	10	28	39	119
September	7	-1	43	8	5	(s)	(s)	1	4	(s)	9	29	33	112
October	8	(s)	45	9	4	(s)	(s)	2	3	(s)	9	27	32	111
November	8	(s)	47	8	4	(s)	(s)	1	5	(s)	9	28	31	113
December	8	-1	49	5	4	(s)	(s)	2	3	(s)	9	23	33	112
Total	93	-6	549	89	52	(s)	4	18	48	3	111	325	400	1,360
2023 January	8	(s)	49	8	4	(s)	(s)	1	2	(s)	9	25	29	111
February	7	(s)	45	6	3	(s)	(s)	1	3	(s)	8	23	26	101
March	8	(s)	49	9	3	(s)	(s)	2	5	(s)	9	29	29	113
April	7	(s)	46	7	4	(s)	(s)	2	5	(s)	9	28	26	106
May	7	(s)	45	7	4	(s)	(s)	2	4	(s)	10	28	30	109
June	7	(s)	43	7	5	(s)	(s)	2	3	(s)	9	26	34	110
July	7	(s)	44	5	5	(s)	(s)	2	2	(s)	10	24	39	114
August	7	(s)	45	9	5	(s)	(s)	2	5	(s)	10	31	39	121
September	7	(s)	44	7	5	(s)	(s)	1	6	(s)	9	29	33	112
October	R 7	(s)	46	8	5	(s)	(s)	2	4	(s)	9	29	32	R 113
November	7	(s)	48	8	5	(s)	(s)	1	8	(s)	9	31	31	117
December	7	-1	51	5	5	(s)	(s)	2	3	(s)	9	23	30	111
Total	R 86	-4	554	87	53	(s)	3	18	51	3	111	326	377	R 1,339
2024 January	7	(s)	51	8	5	(s)	(s)	1	4	(s)	9	27	34	118
February	7	(s)	46	7	4	(s)	(s)	1	2	(s)	8	23	25	101
March	7	(s)	48	5	4	(s)	(s)	2	2	(s)	9	23	25	103
3-Month Total	21	-1	145	20	13	(s)	1	4	8	1	26	72	85	323
2023 3-Month Total	23	-1	143	23	11	(s)	1	4	11	1	26	77	83	325
2022 3-Month Total	24	-1	145	26	13	(s)	1	4	11	1	26	83	94	346

[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 and renewable diesel fuel.
[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 sales to ultimate customers. See Tables 7.6 and 11.6.
[h] Excludes emissions from biomass energy consumption. See Table 11.7.

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, plus the relatively small amount of emissions from the non-combustion use of fossil fuels. See "Section 11 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 11.7 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 11.5 Carbon Dioxide Emissions From Energy Consumption: Transportation Sector

(Million Metric Tons of Carbon Dioxide[a])

	Coal	Natural Gas[b]	Petroleum								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	164	3	152	6	887	55	1,272	2	1,314
1975 Total	(s)	32	5	157	3	144	6	889	53	1,257	2	1,291
1980 Total	([h])	34	4	207	1	155	6	882	105	1,361	2	1,397
1985 Total	([h])	28	3	234	2	178	6	910	59	1,393	3	1,423
1990 Total	([h])	36	3	271	1	223	7	967	76	1,548	3	1,587
1995 Total	([h])	38	3	310	1	222	6	1,026	68	1,637	3	1,679
2000 Total	([h])	36	3	386	1	259	7	1,128	67	1,848	4	1,888
2005 Total	([h])	33	2	453	2	251	6	1,177	63	1,954	5	1,992
2010 Total	([h])	38	2	429	(s)	214	6	1,086	67	1,804	5	1,847
2011 Total	([h])	39	2	436	(s)	213	5	1,054	58	1,769	4	1,813
2012 Total	([h])	41	2	417	(s)	210	5	1,047	50	1,730	4	1,776
2013 Total	([h])	47	2	421	(s)	214	5	1,057	44	1,744	4	1,795
2014 Total	([h])	40	2	441	(s)	220	6	1,067	34	1,769	4	1,814
2015 Total	([h])	39	1	447	1	231	6	1,073	35	1,794	4	1,837
2016 Total	([h])	40	1	437	1	242	6	1,092	47	1,825	4	1,869
2017 Total	([h])	42	1	442	1	251	5	1,090	50	1,841	4	1,887
2018 Total	([h])	51	2	466	1	255	5	1,090	45	1,864	4	1,918
2019 Total	([h])	59	2	468	1	261	5	1,086	40	1,862	3	1,924
2020 Total	([h])	59	1	439	1	161	4	935	29	1,572	3	1,633
2021 Total	([h])	65	1	459	1	205	4	1,025	46	1,741	3	1,809
2022 January	([h])	8	(s)	35	(s)	18	(s)	79	3	136	(s)	144
February	([h])	7	(s)	33	(s)	16	(s)	77	4	131	(s)	138
March	([h])	6	(s)	38	(s)	19	1	88	5	152	(s)	158
April	([h])	5	(s)	38	(s)	19	(s)	84	3	145	(s)	150
May	([h])	5	(s)	40	(s)	20	(s)	90	4	154	(s)	159
June	([h])	5	(s)	41	(s)	21	(s)	86	4	152	(s)	157
July	([h])	6	(s)	41	(s)	20	(s)	87	4	152	(s)	158
August	([h])	6	(s)	42	(s)	21	(s)	89	5	158	(s)	164
September	([h])	5	(s)	40	(s)	19	(s)	84	6	149	(s)	154
October	([h])	5	(s)	41	(s)	20	(s)	86	3	151	(s)	156
November	([h])	6	(s)	38	(s)	19	(s)	84	4	146	(s)	152
December	([h])	7	(s)	36	(s)	20	(s)	84	3	144	(s)	152
Total	([h])	70	2	464	1	233	5	1,018	47	1,770	3	1,843
2023 January	([h])	7	(s)	34	(s)	19	(s)	81	3	138	(s)	146
February	([h])	6	(s)	32	(s)	17	(s)	77	4	131	(s)	137
March	([h])	6	(s)	38	(s)	20	(s)	88	3	150	(s)	156
April	([h])	5	(s)	38	(s)	20	(s)	86	2	145	(s)	151
May	([h])	5	(s)	40	(s)	21	(s)	89	3	154	(s)	159
June	([h])	5	(s)	40	(s)	21	(s)	88	3	153	(s)	158
July	([h])	6	(s)	40	(s)	22	(s)	89	3	155	(s)	161
August	([h])	6	(s)	43	(s)	22	(s)	91	4	160	(s)	166
September	([h])	5	(s)	39	(s)	21	(s)	84	2	146	(s)	152
October	([h])	5	(s)	40	(s)	21	(s)	89	3	155	(s)	160
November	([h])	6	(s)	37	(s)	20	(s)	84	4	146	(s)	152
December	([h])	7	(s)	35	(s)	21	(s)	87	4	148	(s)	155
Total	([h])	70	1	455	1	247	4	1,033	39	1,781	3	1,853
2024 January	([h])	8	(s)	34	(s)	20	(s)	81	3	138	(s)	146
February	([h])	6	(s)	32	(s)	19	(s)	79	3	133	(s)	139
March	([h])	6	(s)	36	(s)	21	(s)	87	4	148	(s)	155
3-Month Total	([h])	20	(s)	102	(s)	59	1	247	10	419	1	440
2023 3-Month Total	([h])	20	(s)	104	(s)	57	1	247	10	419	1	440
2022 3-Month Total	([h])	21	(s)	107	(s)	54	1	244	11	419	1	440

[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 and renewable diesel fuel.

[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 sales to ultimate customers. See Tables 7.6 and 11.6.

[g] Excludes emissions from biomass energy consumption. See Table 11.7.

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

(s)=Less than 0.5 million metric tons.

Notes: • Data are estimates for carbon dioxide emissions from energy consumption, plus the relatively small amount of emissions from the non-combustion use of fossil fuels. See "Section 11 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 11.7 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 11.6 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	**823**	**199**	**20**	**2**	**242**	**264**	**NA**	**NA**	**1,286**
1975 Total	**836**	**172**	**17**	**(s)**	**221**	**237**	**NA**	**NA**	**1,245**
1980 Total	**1,153**	**200**	**12**	**1**	**185**	**198**	**NA**	**NA**	**1,551**
1985 Total	**1,383**	**166**	**6**	**1**	**75**	**82**	**NA**	**NA**	**1,631**
1990 Total	**1,547**	**175**	**7**	**3**	**87**	**98**	**(s)**	**6**	**1,826**
1995 Total	**1,660**	**228**	**8**	**8**	**43**	**59**	**(s)**	**10**	**1,957**
2000 Total	**1,926**	**281**	**13**	**10**	**65**	**89**	**(s)**	**10**	**2,306**
2005 Total	**1,983**	**319**	**9**	**24**	**66**	**98**	**(s)**	**11**	**2,411**
2010 Total	**1,828**	**400**	**6**	**14**	**12**	**31**	**(s)**	**11**	**2,270**
2011 Total	**1,723**	**409**	**5**	**14**	**7**	**26**	**(s)**	**11**	**2,170**
2012 Total	**1,512**	**493**	**4**	**9**	**6**	**18**	**(s)**	**11**	**2,035**
2013 Total	**1,571**	**444**	**4**	**13**	**6**	**22**	**(s)**	**11**	**2,049**
2014 Total	**1,568**	**443**	**6**	**12**	**7**	**25**	**(s)**	**11**	**2,048**
2015 Total	**1,351**	**525**	**5**	**11**	**7**	**24**	**(s)**	**11**	**1,912**
2016 Total	**1,242**	**545**	**4**	**12**	**5**	**21**	**(s)**	**11**	**1,820**
2017 Total	**1,207**	**506**	**4**	**10**	**5**	**19**	**(s)**	**11**	**1,743**
2018 Total	**1,153**	**578**	**6**	**10**	**6**	**22**	**(s)**	**11**	**1,765**
2019 Total	**974**	**617**	**4**	**8**	**4**	**16**	**(s)**	**11**	**1,618**
2020 Total	**788**	**635**	**3**	**9**	**4**	**16**	**(s)**	**11**	**1,450**
2021 Total	**910**	**613**	**4**	**9**	**4**	**18**	**(s)**	**12**	**1,552**
2022 January	88	52	1	1	1	3	(s)	1	143
February	72	44	(s)	1	(s)	2	(s)	1	118
March	62	42	(s)	1	(s)	1	(s)	1	106
April	56	40	(s)	1	(s)	1	(s)	1	98
May	63	50	(s)	1	(s)	1	(s)	1	116
June	75	62	(s)	1	(s)	1	(s)	1	140
July	89	77	(s)	1	(s)	1	(s)	1	168
August	87	75	(s)	1	(s)	1	(s)	1	165
September	67	61	(s)	1	(s)	2	(s)	1	131
October	57	52	(s)	1	(s)	2	(s)	1	110
November	58	49	(s)	1	(s)	1	(s)	1	110
December	75	54	2	1	1	3	(s)	1	133
Total	**851**	**659**	**6**	**9**	**6**	**21**	**(s)**	**7**	**1,538**
2023 January	64	53	(s)	(s)	(s)	1	(s)	1	118
February	48	47	(s)	(s)	1	1	(s)	1	98
March	51	51	(s)	(s)	(s)	1	(s)	1	104
April	41	47	(s)	(s)	(s)	1	(s)	1	90
May	46	54	(s)	(s)	(s)	1	(s)	1	102
June	60	64	(s)	(s)	(s)	1	(s)	1	126
July	80	80	(s)	1	(s)	1	(s)	1	162
August	79	80	(s)	1	(s)	1	(s)	1	161
September	61	65	(s)	1	(s)	1	(s)	1	128
October	53	55	(s)	(s)	(s)	1	(s)	1	110
November	53	53	(s)	(s)	(s)	1	(s)	1	107
December	57	55	(s)	(s)	(s)	1	(s)	1	114
Total	**694**	**705**	**4**	**5**	**5**	**14**	**(s)**	**7**	**1,420**
2024 January	76	62	1	(s)	1	2	(s)	1	140
February	46	50	(s)	(s)	(s)	1	(s)	1	98
March	40	50	(s)	(s)	(s)	1	(s)	1	91
3-Month Total	**162**	**162**	**1**	**1**	**1**	**3**	**(s)**	**2**	**329**
2023 3-Month Total	**163**	**151**	**1**	**1**	**1**	**3**	**(s)**	**2**	**320**
2022 3-Month Total	**222**	**138**	**2**	**2**	**2**	**6**	**(s)**	**2**	**368**

[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 and renewable diesel fuel.

[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 11.7.

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

Notes: • Data are estimates for carbon dioxide emissions from energy consumption. See "Section 11 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 11.7 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 11.7 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	Resi-dential	Com-mercial[e]	Indus-trial[f]	Trans-portation	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**
2000 Total	**212**	**27**	**9**	**NA**	**248**	**39**	**9**	**161**	**9**	**29**	**248**
2005 Total	**200**	**37**	**23**	**1**	**261**	**40**	**10**	**150**	**23**	**37**	**261**
2010 Total	**208**	**42**	**73**	**2**	**325**	**51**	**10**	**149**	**74**	**42**	**325**
2011 Total	**208**	**42**	**73**	**8**	**331**	**49**	**11**	**151**	**80**	**40**	**331**
2012 Total	**202**	**42**	**73**	**8**	**325**	**41**	**10**	**153**	**80**	**42**	**325**
2013 Total	**219**	**45**	**75**	**13**	**353**	**54**	**11**	**158**	**87**	**43**	**353**
2014 Total	**225**	**47**	**76**	**13**	**361**	**54**	**12**	**158**	**88**	**49**	**361**
2015 Total	**217**	**47**	**79**	**14**	**357**	**48**	**13**	**157**	**90**	**48**	**357**
2016 Total	**209**	**46**	**81**	**20**	**355**	**42**	**14**	**155**	**98**	**47**	**355**
2017 Total	**205**	**45**	**82**	**19**	**351**	**40**	**14**	**152**	**98**	**47**	**351**
2018 Total	**212**	**44**	**82**	**18**	**356**	**49**	**14**	**151**	**97**	**46**	**356**
2019 Total	**210**	**40**	**83**	**17**	**350**	**51**	**13**	**147**	**97**	**41**	**350**
2020 Total	**185**	**40**	**72**	**18**	**314**	**32**	**13**	**143**	**86**	**39**	**314**
2021 Total	**187**	**39**	**79**	**16**	**321**	**32**	**13**	**144**	**92**	**39**	**321**
2022 January	16	3	6	1	27	3	1	12	7	3	27
February	15	3	6	1	25	3	1	11	7	3	25
March	16	3	7	1	27	3	1	12	8	3	27
April	15	3	6	1	26	3	1	12	7	3	26
May	16	3	7	1	27	3	1	12	8	3	27
June	16	3	7	1	27	3	1	12	8	3	27
July	16	3	7	1	28	3	1	12	8	3	28
August	16	3	7	1	28	3	1	12	8	3	28
September	15	3	6	1	26	3	1	11	7	3	26
October	15	3	7	1	27	3	1	11	8	3	27
November	15	3	7	1	27	3	1	11	8	3	27
December	16	3	7	1	27	3	1	12	8	3	27
Total	**189**	**37**	**80**	**16**	**321**	**40**	**17**	**139**	**92**	**35**	**321**
2023 January	16	3	7	1	27	4	1	12	8	3	27
February	14	3	6	1	24	3	1	11	7	3	24
March	16	3	7	1	27	4	1	11	8	3	27
April	14	3	6	1	25	3	1	10	7	2	25
May	15	3	7	2	27	4	1	11	8	3	27
June	15	3	7	2	26	3	1	10	8	3	26
July	15	3	7	2	27	4	1	11	8	3	27
August	15	3	7	2	27	4	1	11	8	3	27
September	14	3	7	2	25	3	1	10	8	2	25
October	14	3	7	2	26	4	1	11	8	2	26
November	15	3	7	2	26	3	1	11	8	2	26
December	15	3	7	1	27	4	1	11	8	2	27
Total	**180**	**36**	**81**	**18**	**315**	**42**	**16**	**131**	**95**	**30**	**315**
2024 January	15	3	6	1	26	3	1	11	7	3	26
February	14	3	6	2	24	3	1	10	8	2	24
March	15	3	7	1	26	3	1	11	8	2	26
3-Month Total	**43**	**9**	**19**	**5**	**76**	**9**	**4**	**32**	**23**	**7**	**76**
2023 3-Month Total	**46**	**9**	**19**	**4**	**79**	**10**	**4**	**34**	**23**	**8**	**79**
2022 3-Month Total	**47**	**10**	**19**	**4**	**79**	**10**	**4**	**35**	**21**	**9**	**79**

[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.

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 11.1–11.6. See Note 2, "Accounting for Carbon Dioxide Emissions From Biomass Energy Combustion," at end of section. • Data are estimates. See "Section 11 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.

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.

The vast majority of U.S. CO2 emissions come from fossil fuel combustion, with smaller amounts from the non-combustion 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 11.1–11.6 are estimates for U.S. CO2 emissions from energy consumption, plus the non-combustion use of fossil fuels (excluded are estimates for CO2 emissions from biomass energy consumption, which appear in MER Table 11.7).

For annual U.S. estimates of CO2 emissions from all sources, as well as emissions for other greenhouse gases, see the U.S. Environmental Protection Agency's *Inventory of U.S. Greenhouse Gas Emissions and Sinks* reports at https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020.

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 11.1–11.6, but appear in MER Table 11.7. 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 11 Methodology and Sources

To estimate carbon dioxide emissions from energy consumption for the *Monthly Energy Review* (MER), Tables 11.1–11.7, 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 [through 2021]) 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 [through 2021], 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 and renewable diesel fuel, which are non-fossil renewable fuels.

2009–2011: To remove the biodiesel portion from distillate fuel oil, data for biodiesel consumption (calculated using data from EIA, EIA-22M, “Monthly Biodiesel Production Survey”) and biomass-based diesel fuel data (from EIA-810, “Monthly Refinery Report,” EIA-812, “Monthly Product Pipeline Report,” and EIA-815, “Monthly Bulk Terminal and Blender Report”) 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. To remove the renewable diesel fuel portion from distillate fuel oil, data for refinery and blender net inputs (from EIA-810, “Monthly Refinery Report,” and EIA-815, “Monthly Bulk Terminal and Blender Report”) are converted to trillion Btu by multiplying by the renewable diesel fuel heat content factor in MER Table A1, and then subtracted from the distillate fuel oil consumption values.

2012–2020: To remove the biodiesel portion from distillate fuel oil, data for biodiesel consumption (from MER Table 10.4) is subtracted from the distillate fuel oil consumption values. To remove the renewable diesel fuel portion from distillate fuel oil, data for refinery and blender net inputs (from EIA-810, “Monthly Refinery Report,” and EIA-815, “Monthly Bulk Terminal and Blender Report”) are converted to trillion Btu by multiplying by the renewable diesel fuel heat content factor in MER Table A1, and then subtracted from the distillate fuel oil consumption values.

2021 forward: To remove the biodiesel and renewable diesel fuel portions from distillate fuel oil, data for refinery and blender net inputs (from EIA-810, “Monthly Refinery Report,” and EIA-815, “Monthly Bulk Terminal and Blender Report”) are converted to trillion Btu by multiplying by the biodiesel and renewable diesel fuel heat content factors 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 11, 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 11, petroleum denaturant is left in motor gasoline.)

Step 3. Remove Carbon Sequestered by Non-Combustion Use

The following fuels have industrial non-combustion 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 non-combustion uses), naphthas, other oils, petroleum coke, residual fuel oil, special naphthas, still gas, waxes, and miscellaneous petroleum products. See Tables 1.12a and 1.12b for estimates of fossil fuel non-combustion uses.

In the non-combustion use of these fuels, some of the carbon is stored (sequestered) in the final product, and EIA subtracts this from the fuel consumption values in Steps 1 and 2. EIA calculates the amount of carbon sequestered as the product of the non-combustion use of fossil fuels shown in MER Table 1.12b and the following carbon sequestration factors. The factors range from 0.00 to 1.00. A factor of 0.00 indicates that the fuel does not sequester any carbon (all is emitted), while a factor of 1.00 indicates that the fuel sequesters all of the carbon (none is emitted). EIA uses the following carbon sequestration factors: coal—0.75; natural gas used to produce hydrogen—0.00; natural gas used for other manufacturing—0.44; asphalt and road oil—1.00; distillate fuel oil—0.50; hydrocarbon gas liquids—0.80; lubricants—0.50; naphthas used for petrochemical feedstock—0.75; other oils used for petrochemical feedstock—0.50; petroleum coke used for aluminum production—0.00; petroleum coke used for other manufacturing—0.50; residual fuel oil—0.50; special naphthas—0.00; still gas—0.80; waxes—1.00; and miscellaneous petroleum products—1.00.

Step 4. Determine Carbon Dioxide Emissions From Energy Consumption

EIA calculates carbon dioxide (CO2) emissions data in million metric tons as the product of the consumption values in trillion Btu from Steps 1 and 2 (minus the carbon sequestered by non-combustion use in Step 3) and the annual CO2 emissions factors at https://www.eia.gov/environment/emissions/xls/CO2_coeffs_detailed.xls.

Except for plant condensate and unfractionated stream (which are EIA estimates), the CO2 emissions factors for fossil fuels are from the U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, Tables A-22, A-34, and A-230. EIA converts metric tons of carbon to metric tons of CO2 using the approximate molar mass (44/12)—see https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021.

Coal—EIA calculates coal CO2 emissions 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—EIA calculates coal coke net imports CO2 emissions for the industrial sector.

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

Petroleum—EIA calculates CO2 emissions for each petroleum product and sector. 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). EIA estimates residential, commercial, and transportation sector HGL emissions as the product of the HGL consumption values in trillion Btu from MER Tables 3.8a and 3.8c and the propane emissions factor. EIA estimates industrial sector HGL emissions as total HGL emissions minus emissions by the other sectors.

Geothermal and Non-Biomass Waste—EIA estimates annual CO2 emissions data for geothermal and non-biomass waste on Form EIA-923, "Power Plant Operations Report" (and predecessor forms). EIA estimates monthly data 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—EIA calculates wood, biomass waste, and biofuel CO2 emissions for each sector. Total emissions for each biomass fuel are the sum of the sectoral emissions. EIA uses the following CO2 emissions factors, in million metric tons CO2 per quadrillion Btu: wood—93.80; biomass waste—90.70; fuel ethanol—68.44; and biodiesel—73.84. For 1973–1988, EIA estimates the biomass portion of waste in MER Tables 10.2a–10.2c as 67%; for 1989–2000, the annual biomass portion of waste ranges from 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 https://www.eia.gov/totalenergy/data/monthly/pdf/historical/msw.pdf.

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