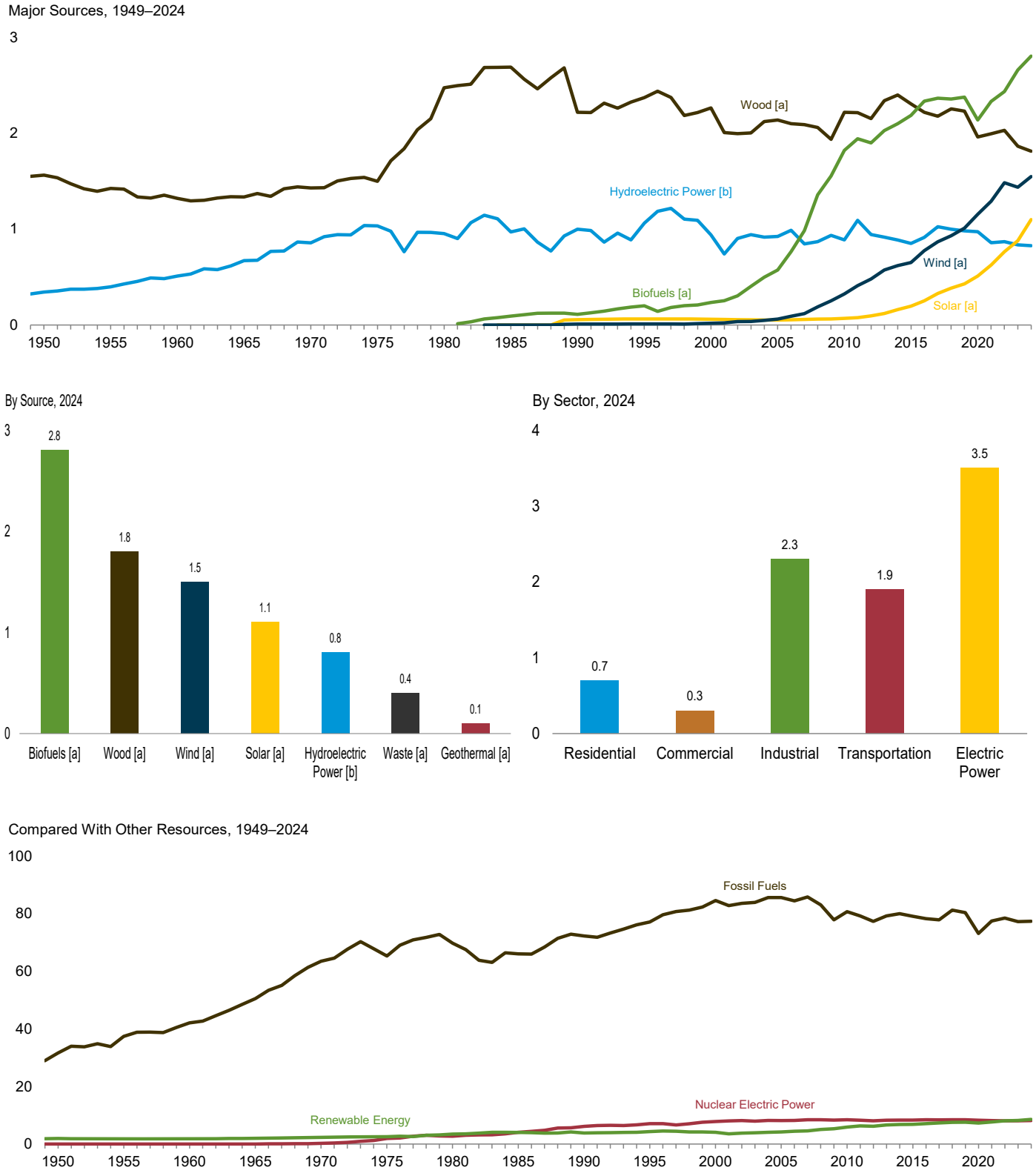
10. Renewable Energy

Figure 10.1 Renewable Energy Consumption

(Quadrillion Btu)



[a] See Table 10.1 for definition.
[b] Conventional hydroelectric power.

Web Page: http://www.eia.gov/totalenergy/data/monthly/#renewable.
Sources: Tables 1.3 and 10.1–10.2c.

Table 10.1 Renewable Energy Production and Consumption by Source

(Trillion Btu)

	Production[a]				Consumption								
	Biomass			Total Renewable Energy	Hydroelectric Power[f]	Geothermal[g]	Solar[h]	Wind[i]	Biomass				Total Renewable Energy
	Wood[b]	Biofuels[c]	Total[d]						Wood[j]	Waste[k]	Biofuels[l]	Total	
1950 Total	**1,562**	**NA**	**1,562**	**1,907**	**344**	**NA**	**NA**	**NA**	**1,562**	**NA**	**NA**	**1,562**	**1,907**
1955 Total	**1,424**	**NA**	**1,424**	**1,821**	**397**	**NA**	**NA**	**NA**	**1,424**	**NA**	**NA**	**1,424**	**1,821**
1960 Total	**1,320**	**NA**	**1,320**	**1,830**	**510**	**(s)**	**NA**	**NA**	**1,320**	**NA**	**NA**	**1,320**	**1,830**
1965 Total	**1,335**	**NA**	**1,335**	**2,008**	**672**	**1**	**NA**	**NA**	**1,335**	**NA**	**NA**	**1,335**	**2,008**
1970 Total	**1,429**	**NA**	**1,431**	**2,289**	**856**	**2**	**NA**	**NA**	**1,429**	**2**	**NA**	**1,431**	**2,289**
1975 Total	**1,497**	**NA**	**1,499**	**2,544**	**1,034**	**11**	**NA**	**NA**	**1,497**	**2**	**NA**	**1,499**	**2,544**
1980 Total	**2,474**	**NA**	**2,475**	**3,445**	**953**	**17**	**NA**	**NA**	**2,474**	**2**	**NA**	**2,475**	**3,445**
1985 Total	**2,687**	**93**	**3,016**	**4,018**	**970**	**32**	**(s)**	**(s)**	**2,687**	**236**	**93**	**3,016**	**4,018**
1990 Total	**2,216**	**111**	**2,735**	**3,863**	**999**	**63**	**56**	**10**	**2,216**	**408**	**111**	**2,735**	**3,863**
1995 Total	**2,370**	**198**	**3,099**	**4,295**	**1,061**	**60**	**64**	**11**	**2,370**	**531**	**200**	**3,101**	**4,297**
2000 Total	**2,262**	**233**	**3,006**	**4,093**	**940**	**69**	**59**	**19**	**2,262**	**511**	**236**	**3,008**	**4,096**
2005 Total	**2,137**	**561**	**3,101**	**4,220**	**922**	**84**	**52**	**61**	**2,137**	**403**	**574**	**3,114**	**4,233**
2010 Total	**2,217**	**1,868**	**4,553**	**5,943**	**888**	**111**	**68**	**323**	**2,217**	**468**	**1,821**	**4,506**	**5,896**
2011 Total	**2,213**	**2,037**	**4,712**	**6,404**	**1,090**	**116**	**76**	**410**	**2,213**	**462**	**1,941**	**4,616**	**6,308**
2012 Total	**2,151**	**1,936**	**4,554**	**6,187**	**943**	**117**	**94**	**480**	**2,151**	**467**	**1,899**	**4,517**	**6,150**
2013 Total	**2,338**	**2,000**	**4,835**	**6,561**	**916**	**117**	**120**	**573**	**2,338**	**496**	**2,026**	**4,861**	**6,587**
2014 Total	**2,398**	**2,135**	**5,049**	**6,833**	**885**	**118**	**161**	**620**	**2,398**	**516**	**2,099**	**5,013**	**6,796**
2015 Total	**2,305**	**2,201**	**5,025**	**6,840**	**850**	**118**	**196**	**651**	**2,305**	**518**	**2,185**	**5,008**	**6,823**
2016 Total	**2,290**	**2,329**	**5,122**	**7,179**	**914**	**117**	**251**	**774**	**2,217**	**503**	**2,333**	**5,053**	**7,110**
2017 Total	**2,254**	**2,407**	**5,156**	**7,495**	**1,025**	**118**	**329**	**868**	**2,176**	**495**	**2,364**	**5,035**	**7,374**
2018 Total	**2,348**	**2,471**	**5,306**	**7,736**	**998**	**118**	**384**	**930**	**2,254**	**487**	**2,355**	**5,096**	**7,526**
2019 Total	**2,333**	**2,432**	**5,207**	**7,745**	**982**	**116**	**430**	**1,010**	**2,229**	**442**	**2,376**	**5,048**	**7,586**
2020 Total	**2,066**	**2,194**	**4,700**	**7,454**	**973**	**118**	**511**	**1,153**	**1,960**	**440**	**2,136**	**4,535**	**7,290**
2021 Total	**2,112**	**2,374**	**4,916**	**7,808**	**858**	**118**	**625**	**1,290**	**1,992**	**430**	**2,331**	**4,753**	**7,645**
2022 Total	**2,167**	**2,511**	**5,090**	**8,324**	**869**	**118**	**764**	**1,482**	**2,029**	**412**	**2,433**	**4,874**	**8,107**
2023 January	174	219	428	690	78	10	44	131	166	35	208	409	671
February	155	198	384	654	68	9	51	141	147	31	189	368	637
March	176	221	430	729	73	10	67	149	161	34	220	415	714
April	156	212	399	703	68	10	80	146	148	32	207	386	690
May	168	228	429	735	94	10	91	110	157	34	234	425	730
June	162	229	423	692	74	10	92	94	150	32	231	412	682
July	167	232	432	710	75	10	97	96	157	33	224	414	692
August	173	230	436	707	73	10	93	97	159	33	235	427	699
September	165	226	421	667	58	10	81	97	152	31	222	404	650
October	162	232	427	688	53	10	74	123	151	33	234	418	679
November	164	230	427	676	58	10	57	124	155	33	219	407	656
December	176	248	460	715	65	10	50	130	160	36	235	431	687
Total	**1,998**	**2,705**	**5,097**	**8,367**	**836**	**119**	**878**	**1,437**	**1,863**	**394**	**2,659**	**4,916**	**8,186**
2024 January	165	225	424	681	75	10	53	119	157	34	212	403	660
February	153	227	411	696	69	10	65	142	142	31	221	394	679
March	166	241	440	769	80	10	84	156	153	33	233	418	747
April	159	222	412	748	66	10	98	162	148	31	219	398	734
May	165	232	429	760	77	10	112	132	153	33	240	425	756
June	157	237	425	756	72	10	119	130	146	30	233	409	740
July	163	252	446	743	72	10	119	95	151	32	251	434	731
August	169	250	451	749	73	10	117	98	156	31	244	432	730
September	163	235	427	693	57	10	101	99	151	30	231	411	677
October	158	247	437	732	54	9	95	137	146	32	246	424	719
November	163	251	445	726	62	10	70	140	151	31	239	421	703
December	168	253	452	734	70	10	65	138	156	32	235	423	705
Total	**1,949**	**2,871**	**5,199**	**8,788**	**826**	**117**	**1,098**	**1,547**	**1,811**	**379**	**2,802**	**4,992**	**8,581**
2025 January	[R]168	235	435	740	72	10	74	149	155	32	210	398	704
February	151	214	394	684	66	9	80	135	139	30	201	369	658
March	165	234	431	801	75	10	111	173	153	32	216	401	771
3-Month Total	**483**	**683**	**1,260**	**2,225**	**213**	**30**	**265**	**456**	**447**	**94**	**627**	**1,168**	**2,133**
2024 3-Month Total	**484**	**693**	**1,275**	**2,146**	**223**	**30**	**202**	**417**	**451**	**98**	**666**	**1,215**	**2,087**
2023 3-Month Total	**504**	**638**	**1,242**	**2,074**	**219**	**30**	**162**	**421**	**474**	**100**	**618**	**1,191**	**2,023**

[a] For hydroelectric power, geothermal, solar, wind, and biomass waste, production equals consumption.

[b] Wood and wood-derived fuels. Through 2015, wood production equals consumption. Beginning in 2016, wood production equals consumption plus densified biomass exports.

[c] Total biomass inputs to the production of fuel ethanol and biodiesel. Beginning in 2011, also includes production of renewable diesel fuel. Beginning in 2014, also includes production of other biofuels.

[d] Includes biomass waste.

[e] Hydroelectric power, geothermal, solar, wind, and biomass.

[f] Conventional hydroelectricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[g] Geothermal electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6), and geothermal heat pump and direct use energy.

[h] Solar photovoltaic (PV) and solar thermal electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6), and solar thermal direct use energy.

[i] Wind electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[j] Wood and wood-derived fuels.

[k] Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass. Through 2000, also includes non-renewable waste (municipal solid waste from non-biogenic sources, and tire-derived fuels).

[l] Fuel ethanol (minus denaturant), biodiesel, renewable diesel fuel, and other biofuels consumption; plus losses and co-products from the production of fuel ethanol and biodiesel.

R=Revised. NA=Not available. (s)=Less than 0.5 trillion Btu.

Notes: • Production data are estimates. Consumption data are estimates, except for hydroelectric power in 1949–1978 and 1989 forward, and wind. • See Note, "Renewable Energy Production and Consumption," 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/#renewable (Excel and CSV files) for all available annual data beginning in 1949 and monthly data beginning in 1973.

Sources: • **Production:** Tables 10.2a–10.4c and U.S. Energy Information Administration, Form EIA-63C, "Densified Biomass Fuel Report." • **Consumption:** Tables 10.2a–10.2c.

Table 10.2a Renewable Energy Consumption: Residential and Commercial Sectors

(Trillion Btu)

	Residential Sector				Commercial Sector[a]								
			Biomass						Biomass				
	Geo-thermal[b]	Solar[c]	Wood[d]	Total	Hydro-electric Power[e]	Geo-thermal[f]	Solar[g]	Wind[h]	Wood[d]	Waste[i]	Fuel Ethanol[j,k]	Total	Total
1950 Total	**NA**	**NA**	**1,006**	**1,006**	**NA**	**NA**	**NA**	**NA**	**19**	**NA**	**NA**	**19**	**19**
1955 Total	**NA**	**NA**	**775**	**775**	**NA**	**NA**	**NA**	**NA**	**15**	**NA**	**NA**	**15**	**15**
1960 Total	**NA**	**NA**	**627**	**627**	**NA**	**NA**	**NA**	**NA**	**12**	**NA**	**NA**	**12**	**12**
1965 Total	**NA**	**NA**	**468**	**468**	**NA**	**NA**	**NA**	**NA**	**9**	**NA**	**NA**	**9**	**9**
1970 Total	**NA**	**NA**	**401**	**401**	**NA**	**NA**	**NA**	**NA**	**8**	**NA**	**NA**	**8**	**8**
1975 Total	**NA**	**NA**	**425**	**425**	**NA**	**NA**	**NA**	**NA**	**8**	**NA**	**NA**	**8**	**8**
1980 Total	**NA**	**NA**	**850**	**850**	**NA**	**NA**	**NA**	**NA**	**21**	**NA**	**NA**	**21**	**21**
1985 Total	**NA**	**NA**	**1,010**	**1,010**	**NA**	**NA**	**NA**	**NA**	**24**	**NA**	**(s)**	**24**	**24**
1990 Total	**6**	**55**	**580**	**640**	**(s)**	**3**	**(s)**	**–**	**66**	**28**	**(s)**	**94**	**97**
1995 Total	**7**	**63**	**520**	**589**	**(s)**	**5**	**(s)**	**–**	**72**	**40**	**(s)**	**113**	**118**
2000 Total	**9**	**57**	**420**	**486**	**(s)**	**8**	**(s)**	**–**	**71**	**47**	**(s)**	**119**	**127**
2005 Total	**16**	**49**	**430**	**495**	**(s)**	**14**	**1**	**–**	**70**	**34**	**1**	**105**	**120**
2010 Total	**37**	**59**	**541**	**636**	**(s)**	**19**	**4**	**(s)**	**72**	**36**	**3**	**111**	**134**
2011 Total	**40**	**62**	**524**	**626**	**(s)**	**20**	**7**	**(s)**	**69**	**43**	**3**	**115**	**141**
2012 Total	**40**	**66**	**438**	**544**	**(s)**	**20**	**11**	**(s)**	**61**	**45**	**3**	**108**	**139**
2013 Total	**40**	**72**	**572**	**683**	**(s)**	**20**	**15**	**(s)**	**70**	**47**	**3**	**120**	**155**
2014 Total	**40**	**79**	**579**	**697**	**(s)**	**20**	**19**	**(s)**	**73**	**47**	**4**	**124**	**163**
2015 Total	**40**	**87**	**513**	**639**	**(s)**	**20**	**21**	**(s)**	**73**	**47**	**[k] 26**	**146**	**187**
2016 Total	**40**	**100**	**445**	**585**	**1**	**20**	**23**	**(s)**	**74**	**48**	**26**	**148**	**191**
2017 Total	**40**	**113**	**430**	**582**	**1**	**20**	**28**	**(s)**	**74**	**48**	**25**	**146**	**195**
2018 Total	**40**	**123**	**526**	**689**	**1**	**20**	**35**	**1**	**74**	**47**	**25**	**146**	**203**
2019 Total	**40**	**136**	**547**	**723**	**1**	**21**	**40**	**1**	**74**	**39**	**26**	**139**	**201**
2020 Total	**40**	**150**	**345**	**535**	**1**	**21**	**46**	**1**	**73**	**38**	**26**	**137**	**205**
2021 Total	**40**	**167**	**357**	**564**	**1**	**21**	**54**	**1**	**73**	**39**	**27**	**139**	**215**
2022 Total	**40**	**199**	**450**	**688**	**1**	**20**	**63**	**1**	**73**	**75**	**32**	**180**	**263**
2023 January	3	12	32	48	(s)	2	4	(s)	6	6	2	14	20
February	3	14	29	46	(s)	2	4	(s)	5	5	2	13	19
March	3	19	32	54	(s)	2	6	(s)	6	6	2	14	22
April	3	21	31	56	(s)	2	7	(s)	6	6	2	14	22
May	3	24	32	60	(s)	2	7	(s)	6	6	2	14	23
June	3	23	31	58	(s)	2	7	(s)	6	6	2	14	23
July	3	24	32	60	(s)	2	7	(s)	6	6	2	15	24
August	3	24	32	60	(s)	2	7	(s)	6	6	2	15	24
September	3	21	31	55	(s)	2	6	(s)	6	6	2	14	22
October	3	19	32	55	(s)	2	5	(s)	6	6	2	15	22
November	3	16	31	51	(s)	2	4	(s)	6	6	2	14	20
December	3	14	32	50	(s)	2	4	(s)	6	7	2	15	21
Total	**40**	**231**	**382**	**653**	**1**	**20**	**69**	**(s)**	**72**	**72**	**28**	**172**	**263**
2024 January	3	15	30	49	(s)	2	4	(s)	6	6	2	15	21
February	3	17	28	48	NM	2	5	(s)	6	6	2	13	20
March	3	22	30	56	(s)	2	7	(s)	6	6	2	14	22
April	3	24	29	57	(s)	2	7	(s)	6	6	2	13	22
May	3	26	30	60	NM	2	8	(s)	6	6	3	14	24
June	3	27	29	59	(s)	2	8	(s)	6	6	2	14	24
July	3	27	30	61	NM	2	8	(s)	6	6	2	15	25
August	3	26	30	60	(s)	2	8	(s)	6	6	2	14	24
September	3	23	29	56	(s)	2	7	(s)	6	5	2	13	22
October	3	21	30	55	NM	2	6	(s)	6	6	3	14	22
November	3	17	29	50	(s)	2	5	(s)	6	6	2	14	21
December	3	15	30	49	(s)	2	4	(s)	6	6	2	14	21
Total	**40**	**260**	**358**	**658**	**1**	**20**	**79**	**1**	**72**	**69**	**28**	**169**	**269**
2025 January	3	16	31	51	(s)	2	5	(s)	6	6	2	14	21
February	3	18	28	49	(s)	2	5	(s)	6	5	2	13	20
March	3	24	31	58	NM	2	7	(s)	6	6	2	14	23
3-Month Total	**10**	**58**	**90**	**158**	**(s)**	**5**	**18**	**(s)**	**18**	**17**	**7**	**41**	**64**
2024 3-Month Total	**10**	**53**	**89**	**152**	**(s)**	**5**	**16**	**(s)**	**18**	**18**	**7**	**42**	**63**
2023 3-Month Total	**10**	**45**	**94**	**149**	**(s)**	**5**	**14**	**(s)**	**18**	**17**	**7**	**42**	**61**

[a] Commercial sector, including commercial combined-heat-and-power (CHP) and commercial electricity-only plants. See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 7.

[b] Geothermal heat pump and direct use energy.

[c] Small-scale solar photovoltaic (PV) electricity generation in the residential sector (converted to Btu by multiplying by the heat content of electricity in Table A6) and small-scale solar thermal energy in the residential, commercial, and industrial sectors. See Table 10.5.

[d] Wood and wood-derived fuels.

[e] Conventional hydroelectricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[f] Geothermal heat pump and direct use energy. Beginning in December 2018, also includes geothermal electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[g] Solar photovoltaic (PV) electricity net generation in the commercial sector (converted to Btu by multiplying by the heat content of electricity in Table A6), both utility-scale and small-scale. See Table 10.5.

[h] Wind electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[i] Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass. Through 2000, also includes non-renewable waste (municipal solid waste from non-biogenic sources, and tire-derived fuels).

[j] The fuel ethanol (minus denaturant) portion of motor fuels, such as E10, consumed by the commercial sector.

[k] There is a discontinuity in this time series between 2014 and 2015 due to a change in the method for allocating motor gasoline consumption to the end-use sectors. Beginning in 2015, the commercial and industrial sector shares of fuel ethanol consumption are larger than in 2014, while the transportation sector share is smaller.

NA=Not available. NM=Not meaningful. – =No data reported. (s)=Less than 0.5 trillion Btu.

Notes: • Residential sector data are estimates. Commercial sector data are estimates, except for hydroelectric power, wind, and biomass waste. • 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/#renewable (Excel and CSV files) for all available annual data beginning in 1949 and monthly data beginning in 1973.

Sources: See end of section.

Table 10.2b Renewable Energy Consumption: Industrial Sector

(Trillion Btu)

	Industrial Sector[a]									
					Biomass					
	Hydro-electric Power[b]	Geo-thermal[c]	Solar[d]	Wind[e]	Wood[f]	Waste[g]	Fuel Ethanol[h,i]	Losses and Co-products[j]	Total	Total
1950 Total	17	NA	NA	NA	532	NA	NA	NA	532	549
1955 Total	11	NA	NA	NA	631	NA	NA	NA	631	642
1960 Total	12	NA	NA	NA	680	NA	NA	NA	680	692
1965 Total	11	NA	NA	NA	855	NA	NA	NA	855	866
1970 Total	11	NA	NA	NA	1,019	NA	NA	NA	1,019	1,030
1975 Total	11	NA	NA	NA	1,063	NA	NA	NA	1,063	1,074
1980 Total	11	NA	NA	NA	1,600	NA	NA	NA	1,600	1,611
1985 Total	11	NA	NA	NA	1,645	230	1	42	1,918	1,928
1990 Total	10	2	(s)	–	1,442	192	1	49	1,684	1,696
1995 Total	18	3	(s)	–	1,652	195	2	86	1,934	1,955
2000 Total	14	4	(s)	–	1,636	145	1	99	1,881	1,900
2005 Total	11	4	(s)	–	1,452	148	7	227	1,834	1,849
2010 Total	6	4	1	–	1,409	168	17	727	2,320	2,331
2011 Total	6	4	1	(s)	1,438	165	17	756	2,375	2,387
2012 Total	8	4	2	(s)	1,462	159	17	711	2,349	2,363
2013 Total	12	4	3	(s)	1,489	187	18	714	2,407	2,427
2014 Total	4	4	4	(s)	1,495	190	14	766	2,466	2,478
2015 Total	5	4	5	(s)	1,476	190	[i] 18	791	2,474	2,489
2016 Total	4	4	7	(s)	1,474	174	18	821	2,487	2,503
2017 Total	5	4	8	(s)	1,442	168	18	847	2,475	2,493
2018 Total	4	4	9	(s)	1,432	165	19	855	2,471	2,489
2019 Total	4	4	11	(s)	1,407	156	19	835	2,416	2,435
2020 Total	3	4	12	(s)	1,356	160	19	735	2,270	2,290
2021 Total	3	4	14	(s)	1,366	161	19	789	2,336	2,357
2022 Total	3	4	15	(s)	1,309	161	20	808	2,297	2,320
2023 January	(s)	(s)	1	(s)	110	14	2	69	194	196
February	(s)	(s)	1	(s)	97	12	1	62	173	175
March	(s)	(s)	1	(s)	107	14	2	68	189	192
April	(s)	(s)	2	(s)	98	13	2	64	177	179
May	(s)	(s)	2	(s)	104	13	2	68	188	190
June	(s)	(s)	2	(s)	97	12	2	69	180	182
July	(s)	(s)	2	(s)	103	12	2	71	187	189
August	(s)	(s)	2	(s)	105	12	2	69	187	189
September	(s)	(s)	1	(s)	101	12	2	67	181	183
October	(s)	(s)	1	(s)	100	13	2	70	186	187
November	(s)	(s)	1	(s)	104	13	2	70	189	190
December	(s)	(s)	1	(s)	107	14	2	74	197	198
Total	3	4	16	(s)	1,235	153	20	819	2,227	2,251
2024 January	(s)	(s)	1	(s)	105	14	2	68	187	189
February	(s)	(s)	1	(s)	95	13	2	69	178	180
March	(s)	(s)	2	(s)	104	13	2	73	192	194
April	(s)	(s)	2	(s)	102	13	2	65	181	184
May	(s)	(s)	2	(s)	103	14	2	70	188	191
June	(s)	(s)	2	(s)	97	12	2	69	179	181
July	(s)	(s)	2	(s)	101	12	2	75	189	192
August	(s)	(s)	2	(s)	105	12	2	74	193	195
September	(s)	(s)	2	(s)	102	12	2	69	184	187
October	(s)	(s)	1	(s)	98	13	2	73	186	188
November	(s)	(s)	1	(s)	103	13	2	74	192	194
December	(s)	(s)	1	(s)	105	13	2	76	196	198
Total	3	4	18	(s)	1,219	153	20	854	2,246	2,271
2025 January	(s)	(s)	1	(s)	103	13	2	74	192	194
February	(s)	(s)	1	(s)	92	12	1	67	173	175
March	(s)	(s)	2	(s)	102	13	2	72	190	192
3-Month Total	1	1	4	(s)	298	39	5	213	555	561
2024 3-Month Total	1	1	4	(s)	304	40	5	209	557	563
2023 3-Month Total	1	1	3	(s)	315	40	5	198	557	562

[a] Industrial sector, including industrial combined-heat-and-power (CHP) and industrial electricity-only plants. See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 7.

[b] Conventional hydroelectricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[c] Geothermal heat pump and direct use energy.

[d] Solar photovoltaic (PV) electricity net generation in the industrial sector (converted to Btu by multiplying by the heat content of electricity in Table A6), both utility-scale and small-scale. See Table 10.5.

[e] Wind electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[f] Wood and wood-derived fuels.

[g] Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass. Through 2000, also includes non-renewable waste (municipal solid waste from non-biogenic sources, and tire-derived fuels).

[h] The fuel ethanol (minus denaturant) portion of motor fuels, such as E10, consumed by the industrial sector.

[i] There is a discontinuity in this time series between 2014 and 2015 due to a change in the method for allocating motor gasoline consumption to the end-use sectors. Beginning in 2015, the commercial and industrial sector shares of fuel ethanol consumption are larger than in 2014, while the transportation sector share is smaller.

[j] Losses and co-products from the production of fuel ethanol and biodiesel. Does not include natural gas, electricity, and other non-biomass energy used in the production of fuel ethanol and biodiesel—these are included in the industrial sector consumption statistics for the appropriate energy source.

NA=Not available. – =No data reported. (s)=Less than 0.5 trillion Btu.

Notes: • Industrial sector data are estimates, except for hydroelectric power in 1949–1978 and 1989 forward, and wind. • 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/#renewable (Excel and CSV files) for all available annual data beginning in 1949 and monthly data beginning in 1973.

Sources: See end of section.

Table 10.2c Renewable Energy Consumption: Transportation and Electric Power Sectors

(Trillion Btu)

	Transportation Sector					Electric Power Sector[a]							
	Biomass									Biomass			
	Fuel Ethanol[b,c]	Bio-diesel[d]	Renewable Diesel Fuel[e]	Other Biofuels[f]	Total	Hydro-electric Power[g]	Geo-thermal[h]	Solar[i]	Wind[j]	Wood[k]	Waste[l]	Total	Total
1950 Total	NA	NA	NA	NA	NA	327	NA	NA	NA	5	NA	5	333
1955 Total	NA	NA	NA	NA	NA	385	NA	NA	NA	3	NA	3	389
1960 Total	NA	NA	NA	NA	NA	498	(s)	NA	NA	2	NA	2	499
1965 Total	NA	NA	NA	NA	NA	661	1	NA	NA	3	NA	3	665
1970 Total	NA	NA	NA	NA	NA	845	2	NA	NA	1	2	4	851
1975 Total	NA	NA	NA	NA	NA	1,024	11	NA	NA	(s)	2	2	1,037
1980 Total	NA	NA	NA	NA	NA	942	17	NA	NA	3	2	4	964
1985 Total	50	NA	NA	NA	50	959	32	(s)	(s)	8	7	14	1,006
1990 Total	60	NA	NA	NA	60	989	53	1	10	129	188	317	1,369
1995 Total	112	NA	NA	NA	112	1,042	46	2	11	125	296	422	1,522
2000 Total	135	NA	NA	NA	135	926	48	2	19	134	318	453	1,447
2005 Total	327	12	NA	NA	339	911	50	2	61	185	221	406	1,430
2010 Total	1,041	33	NA	NA	1,075	882	52	4	323	196	264	459	1,720
2011 Total	1,045	113	8	NA	1,166	1,083	52	6	410	182	255	437	1,988
2012 Total	1,045	115	10	NA	1,169	934	53	14	480	190	262	453	1,935
2013 Total	1,072	182	39	NA	1,292	904	54	30	572	207	262	470	2,030
2014 Total	1,093	181	38	2	1,314	880	54	59	619	251	279	530	2,143
2015 Total	[c] 1,110	191	48	2	1,351	845	54	83	650	244	281	525	2,158
2016 Total	1,143	266	57	2	1,469	909	54	121	774	224	281	505	2,363
2017 Total	1,156	253	62	3	1,474	1,019	54	180	867	229	280	510	2,630
2018 Total	1,152	243	57	3	1,456	993	54	216	929	221	275	496	2,689
2019 Total	1,162	231	99	4	1,497	978	51	243	1,009	201	248	448	2,729
2020 Total	1,004	239	107	4	1,355	969	53	302	1,152	185	242	428	2,904
2021 Total	1,110	218	158	10	1,496	854	53	391	1,289	197	229	426	3,014
2022 Total	1,111	212	225	25	1,573	865	55	487	1,481	198	176	374	3,263
2023 January	91	17	24	3	136	77	5	26	131	17	15	32	271
February	81	17	24	2	124	68	4	32	141	15	14	28	274
March	97	20	28	3	149	72	5	41	149	16	14	30	297
April	91	17	28	3	139	67	5	51	146	12	13	25	294
May	98	23	38	3	162	94	5	59	110	14	14	28	295
June	98	23	35	3	158	73	4	61	94	15	14	29	261
July	96	21	29	3	149	75	4	64	96	16	14	30	269
August	101	22	37	2	162	72	4	60	97	16	14	30	264
September	91	23	34	3	152	57	4	53	97	13	13	26	238
October	100	22	33	4	159	53	5	48	123	12	14	26	255
November	94	21	27	3	146	58	5	35	124	13	14	27	249
December	94	20	39	4	157	65	5	31	130	15	15	30	260
Total	1,132	246	376	38	1,792	832	56	562	1,436	174	168	342	3,228
2024 January	86	20	31	3	141	74	5	33	119	16	14	30	261
February	88	21	37	3	149	68	4	42	142	12	13	25	282
March	94	20	39	3	156	79	4	54	156	13	13	26	319
April	87	22	37	4	150	66	5	65	162	12	12	24	320
May	103	21	38	2	165	77	4	75	132	14	13	27	316
June	93	22	43	3	161	72	4	82	130	14	13	27	316
July	100	20	49	3	172	72	5	82	95	14	13	28	282
August	99	19	44	3	165	73	4	82	98	15	14	29	285
September	94	19	42	4	158	57	4	69	99	13	13	26	255
October	103	20	42	4	169	54	4	66	137	11	13	24	285
November	94	19	42	5	160	62	4	47	140	13	13	25	279
December	95	20	37	3	155	69	5	44	138	14	13	27	283
Total	1,136	245	480	41	1,901	822	53	741	1,546	162	156	319	3,482
2025 January	92	12	25	4	133	72	5	52	149	15	13	28	306
February	85	11	28	6	130	66	4	56	134	13	12	25	285
March	93	13	29	5	140	75	5	78	173	13	13	26	357
3-Month Total	270	36	81	15	402	212	14	186	456	42	38	80	948
2024 3-Month Total	269	61	106	10	446	222	14	129	416	41	40	81	863
2023 3-Month Total	270	54	76	9	409	217	14	100	421	47	43	90	842

[a] 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. Through 1988, data are for electric utilities only; beginning in 1989, data are for electric utilities and independent power producers.

[b] The fuel ethanol (minus denaturant) portion of motor fuels, such as E10 and E85, consumed by the transportation sector.

[c] There is a discontinuity in this time series between 2014 and 2015 due to a change in the method for allocating motor gasoline consumption to the end-use sectors. Beginning in 2015, the commercial and industrial sector shares of fuel ethanol consumption are larger than in 2014, while the transportation sector share is smaller.

[d] "Biodiesel" is primarily fatty acid methyl esters (FAME). See "Biodiesel" in Glossary. Although there is use of biodiesel in other sectors, all consumption is assigned to the transportation sector.

[e] "Renewable diesel fuel," which is commonly called "non-ester renewable diesel" and "green diesel," is chemically similar to petroleum diesel fuel. Although there is use of renewable diesel fuel in other sectors, all consumption is assigned to the transportation sector.

[f] Renewable heating oil, renewable jet fuel (sustainable aviation fuel), renewable naphtha and gasoline, biobutanol, and other biofuels and biointermediates. Although there is use of these biofuels in other sectors, all consumption is assigned to the transportation sector.

[g] Conventional hydroelectricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[h] Geothermal electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[i] Solar photovoltaic (PV) and solar thermal electricity net generation in the electric power sector (converted to Btu by multiplying by the heat content of electricity in Table A6). See Table 10.5.

[j] Wind electricity net generation (converted to Btu by multiplying by the heat content of electricity in Table A6).

[k] Wood and wood-derived fuels.

[l] Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass. Through 2000, also includes non-renewable waste (municipal solid waste from non-biogenic sources, and tire-derived fuels).

NA=Not available. (s)=Less than 0.5 trillion Btu.

Notes: • Transportation sector data are estimates, except for biodiesel beginning in 2012, and renewable diesel fuel and other biofuels beginning in 2021. • 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/#renewable (Excel and CSV files) for all available annual data beginning in 1949 and monthly data beginning in 1973.

Sources: See end of section.

Table 10.3 Fuel Ethanol Overview

	Feedstock[b]	Losses and Co-products[c]	Denaturant[d]	Production[a]			Trade[a] Net Imports[e]	Stocks[a,f]	Stock Change[a,g]	Consumption[a]			*Consumption Minus Denaturant*[h]
	TBtu	TBtu	Mbbl	Mbbl	MMgal	TBtu	Mbbl	Mbbl	Mbbl	Mbbl	MMgal	TBtu	*TBtu*
1981 Total	**13**	**6**	**40**	**1,978**	**83**	**7**	**NA**	**NA**	**NA**	**1,978**	**83**	**7**	***7***
1985 Total	**93**	**42**	**294**	**14,693**	**617**	**52**	**NA**	**NA**	**NA**	**14,693**	**617**	**52**	***51***
1990 Total	**111**	**49**	**356**	**17,802**	**748**	**63**	**NA**	**NA**	**NA**	**17,802**	**748**	**63**	***62***
1995 Total	**198**	**86**	**647**	**32,325**	**1,358**	**115**	**387**	**2,186**	**-207**	**32,919**	**1,383**	**117**	***114***
2000 Total	**233**	**99**	**773**	**38,627**	**1,622**	**138**	**116**	**3,400**	**-624**	**39,367**	**1,653**	**140**	***137***
2005 Total	**550**	**227**	**1,859**	**92,961**	**3,904**	**331**	**3,234**	**5,563**	**-439**	**96,634**	**4,059**	**344**	***335***
2010 Total	**1,823**	**726**	**6,506**	**316,617**	**13,298**	**1,128**	**-9,115**	**17,941**	**1,347**	**306,155**	**12,858**	**1,091**	***1,061***
2011 Total	**1,904**	**754**	**6,649**	**331,646**	**13,929**	**1,181**	**-24,365**	**18,238**	**297**	**306,984**	**12,893**	**1,093**	***1,065***
2012 Total	**1,801**	**709**	**6,264**	**314,714**	**13,218**	**1,120**	**-5,891**	**20,350**	**2,112**	**306,711**	**12,882**	**1,092**	***1,064***
2013 Total	**1,809**	**711**	**6,181**	**316,493**	**13,293**	**1,127**	**-5,761**	**16,424**	**-3,926**	**314,658**	**13,216**	**1,120**	***1,092***
2014 Total	**1,947**	**764**	**6,476**	**340,781**	**14,313**	**1,213**	**-18,371**	**18,739**	**2,315**	**320,095**	**13,444**	**1,139**	***1,111***
2015 Total	**2,013**	**788**	**6,636**	**352,553**	**14,807**	**1,254**	**-17,632**	**21,596**	**2,857**	**332,064**	**13,947**	**1,181**	***1,153***
2016 Total	**2,092**	**818**	**6,920**	**366,981**	**15,413**	**1,306**	**-27,002**	**19,758**	**-1,838**	**341,817**	**14,356**	**1,216**	***1,187***
2017 Total	**2,164**	**844**	**6,657**	**379,435**	**15,936**	**1,349**	**-31,268**	**23,043**	**3,285**	**344,882**	**14,485**	**1,226**	***1,199***
2018 Total	**2,187**	**852**	**5,819**	**383,127**	**16,091**	**1,361**	**-39,410**	**23,418**	**375**	**343,342**	**14,420**	**1,220**	***1,197***
2019 Total	**2,140**	**832**	**6,089**	**375,678**	**15,778**	**1,336**	**-30,276**	**22,352**	**-1,066**	**346,468**	**14,552**	**1,232**	***1,206***
2020 Total	**1,886**	**732**	**5,892**	**331,928**	**13,941**	**1,181**	**-27,692**	**24,663**	**2,311**	**301,925**	**12,681**	**1,074**	***1,050***
2021 Total	**2,030**	**786**	**6,094**	**357,517**	**15,016**	**1,271**	**-28,135**	**22,036**	**-2,627**	**332,010**	**13,944**	**1,180**	***1,155***
2022 Total	**2,079**	**805**	**5,869**	**365,731**	**15,361**	**1,299**	**-29,631**	**24,245**	**2,209**	**333,891**	**14,023**	**1,186**	***1,163***
2023 January	176	68	537	31,064	1,305	110	-2,790	25,240	995	27,280	1,146	97	*95*
February	159	62	473	27,980	1,175	99	-2,551	26,284	1,045	24,384	1,024	87	*85*
March	174	67	505	30,602	1,285	109	-2,817	24,966	-1,318	29,104	1,222	103	*101*
April	166	64	495	29,162	1,225	104	-2,853	24,165	-801	27,111	1,139	96	*94*
May	175	68	515	30,820	1,294	110	-2,676	23,108	-1,057	29,201	1,226	104	*102*
June	177	68	519	31,089	1,306	110	-2,656	22,314	-794	29,228	1,228	104	*102*
July	182	70	528	32,014	1,345	114	-2,678	23,057	742	28,594	1,201	102	*100*
August	177	68	531	31,132	1,308	111	-2,146	21,800	-1,257	30,243	1,270	107	*105*
September	171	66	492	30,104	1,264	107	-2,499	22,159	360	27,245	1,144	97	*95*
October	181	70	538	31,858	1,338	113	-2,777	21,203	-957	30,037	1,262	107	*105*
November	179	70	532	31,603	1,327	112	-2,746	21,791	589	28,268	1,187	100	*98*
December	191	74	547	33,530	1,408	119	-3,707	23,498	1,707	28,116	1,181	100	*98*
Total	**2,107**	**816**	**6,211**	**370,957**	**15,580**	**1,318**	**-32,895**	**23,498**	**-747**	**338,808**	**14,230**	**1,204**	***1,179***
2024 January	174	68	503	30,672	1,288	109	-3,580	24,806	[i] 1,216	25,876	1,087	92	*90*
February	176	68	524	31,047	1,304	110	-3,317	26,233	1,428	26,302	1,105	93	*92*
March	188	73	500	32,959	1,384	117	-3,807	27,189	956	28,196	1,184	100	*98*
April	167	65	435	29,365	1,233	104	-5,108	25,516	-1,674	25,931	1,089	92	*90*
May	180	70	469	31,693	1,331	113	-3,685	22,679	-2,837	30,845	1,295	110	*108*
June	177	69	496	31,133	1,308	111	-3,481	22,612	-67	27,719	1,164	98	*97*
July	192	74	541	33,823	1,421	120	-3,247	23,349	737	29,839	1,253	106	*104*
August	191	74	522	33,548	1,409	119	-3,374	23,797	448	29,725	1,248	106	*104*
September	177	69	476	31,181	1,310	111	-3,543	23,474	-323	27,961	1,174	99	*97*
October	187	72	521	32,900	1,382	117	-3,553	22,156	-1,318	30,665	1,288	109	*107*
November	191	74	519	33,554	1,409	119	-4,472	23,062	906	28,176	1,183	100	*98*
December	195	76	543	34,302	1,441	122	-4,635	24,358	1,296	28,372	1,192	101	*99*
Total	**2,196**	**851**	**6,049**	**386,176**	**16,219**	**1,372**	**-45,802**	**24,358**	[i] **768**	**339,606**	**14,263**	**1,207**	***1,183***
2025 January	191	74	576	33,596	1,411	119	-4,724	25,774	1,416	27,455	1,153	98	*95*
February	173	67	479	30,354	1,275	108	-3,313	27,339	1,565	25,476	1,070	91	*89*
March	186	72	525	32,683	1,373	116	-4,671	27,378	39	27,973	1,175	99	*97*
3-Month Total	**549**	**213**	**1,579**	**96,632**	**4,059**	**343**	**-12,707**	**27,378**	**3,021**	**80,904**	**3,398**	**287**	***282***
2024 3-Month Total	**538**	**208**	**1,527**	**94,678**	**3,976**	**336**	**-10,704**	**27,189**	**3,600**	**80,373**	**3,376**	**286**	***280***
2023 3-Month Total	**509**	**197**	**1,515**	**89,646**	**3,765**	**319**	**-8,158**	**24,966**	**721**	**80,767**	**3,392**	**287**	***281***

[a] Includes denaturant.
[b] Total corn and other biomass inputs to the production of undenatured ethanol used for fuel ethanol.
[c] Losses and co-products from the production of fuel ethanol. Does not include natural gas, electricity, and other non-biomass energy used in the production of fuel ethanol—these are included in the industrial sector consumption statistics for the appropriate energy source.
[d] The amount of denaturant in fuel ethanol produced.
[e] Through 2009, data are for fuel ethanol imports only; data for fuel ethanol exports are not available. Beginning in 2010, data are for fuel ethanol imports minus fuel ethanol (including industrial alcohol) exports.
[f] Stocks are at end of period.
[g] A negative value indicates a decrease in stocks and a positive value indicates an increase.
[h] Consumption of fuel ethanol minus denaturant. Data for fuel ethanol minus denaturant are used to develop data for "Renewable Energy/Biomass" in Tables 10.1–10.2b, as well as in Sections 1 and 2.
[i] Derived from the preliminary 2023 stocks value (23,589 thousand barrels), not the final 2023 value (23,498 thousand barrels) that is shown under "Stocks."

NA=Not available.

Notes: • Mbbl = thousand barrels. MMgal = million U.S. gallons. TBtu = trillion Btu. • Fuel ethanol data in thousand barrels are converted to million gallons by multiplying by 0.042, and are converted to Btu by multiplying by the approximate heat content of fuel ethanol—see Table A3. • Through 1980, data are not available. For 1981–1992, data are estimates. For 1993–2008, only data for feedstock, losses and co-products, and denaturant are estimates. Beginning in 2009, only data for feedstock, and losses and co-products, are estimates. • See "Denaturant," "Ethanol," "Fuel Ethanol," and "Fuel Ethanol Minus Denaturant" in Glossary. • 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/#renewable (Excel and CSV files) for all available annual and monthly data beginning in 1981.

Sources: See end of section.

Table 10.4a Biodiesel Overview

	Feedstock[b]	Losses and Co-products[c]	Production[a]			Trade[a]			Stocks[a,e]	Stock Change[a,f]	Consumption[a,g]		
						Imports	Exports	Net Imports[d]					
	TBtu	TBtu	Mbbl	MMgal	TBtu	Mbbl	Mbbl	Mbbl	Mbbl	Mbbl	Mbbl	MMgal	TBtu
2001 Total	**1**	**(s)**	**204**	**9**	**1**	**81**	**41**	**40**	**NA**	**NA**	**244**	**10**	**1**
2005 Total	**12**	**(s)**	**2,162**	**91**	**12**	**214**	**213**	**1**	**NA**	**NA**	**2,163**	**91**	**12**
2010 Total	**44**	**1**	**8,177**	**343**	**44**	**564**	**2,588**	**-2,024**	**672**	**-39**	**6,192**	**260**	**33**
2011 Total	**125**	**2**	**23,035**	**967**	**123**	**890**	**1,799**	**-908**	**2,005**	**[h] 1,028**	**21,099**	**886**	**113**
2012 Total	**128**	**2**	**23,588**	**991**	**126**	**853**	**3,056**	**-2,203**	**1,984**	**-20**	**21,406**	**899**	**115**
2013 Total	**176**	**2**	**32,368**	**1,359**	**173**	**8,152**	**4,675**	**3,477**	**3,810**	**1,825**	**34,020**	**1,429**	**182**
2014 Total	**165**	**2**	**30,452**	**1,279**	**163**	**4,578**	**1,974**	**2,604**	**3,131**	**-679**	**33,735**	**1,417**	**181**
2015 Total	**163**	**2**	**30,080**	**1,263**	**161**	**8,399**	**2,091**	**6,308**	**3,943**	**813**	**35,575**	**1,494**	**191**
2016 Total	**203**	**3**	**37,327**	**1,568**	**200**	**16,879**	**2,098**	**14,781**	**6,398**	**2,454**	**49,653**	**2,085**	**266**
2017 Total	**206**	**3**	**37,993**	**1,596**	**204**	**9,374**	**2,228**	**7,146**	**4,268**	**-2,130**	**47,269**	**1,985**	**253**
2018 Total	**240**	**3**	**44,222**	**1,857**	**237**	**3,969**	**2,470**	**1,499**	**4,662**	**394**	**45,326**	**1,904**	**243**
2019 Total	**223**	**3**	**41,060**	**1,725**	**220**	**4,078**	**2,730**	**1,348**	**3,907**	**-756**	**43,163**	**1,813**	**231**
2020 Total	**235**	**3**	**43,207**	**1,815**	**232**	**4,684**	**3,458**	**1,226**	**3,665**	**-241**	**44,675**	**1,876**	**239**
2021 Total	**221**	**3**	**40,686**	**1,709**	**218**	**5,005**	**4,452**	**553**	**4,187**	**522**	**40,717**	**1,710**	**218**
2022 Total	**210**	**3**	**38,620**	**1,622**	**207**	**5,950**	**5,671**	**279**	**3,608**	**-580**	**39,478**	**1,658**	**212**
2023 January	18	(s)	3,275	138	18	930	164	766	4,402	794	3,247	136	17
February	15	(s)	2,841	119	15	952	150	802	4,886	485	3,158	133	17
March	18	(s)	3,316	139	18	916	261	655	5,133	246	3,725	156	20
April	17	(s)	3,176	133	17	1,000	1,141	-141	4,957	-175	3,210	135	17
May	20	(s)	3,685	155	20	832	758	74	4,487	-470	4,229	178	23
June	19	(s)	3,588	151	19	1,016	839	177	3,998	-490	4,255	179	23
July	20	(s)	3,623	152	19	725	691	34	3,753	-245	3,901	164	21
August	19	(s)	3,449	145	18	991	553	438	3,622	-130	4,018	169	22
September	19	(s)	3,438	144	18	1,280	410	870	3,629	6	4,302	181	23
October	19	(s)	3,495	147	19	1,017	451	566	3,505	-124	4,185	176	22
November	18	(s)	3,231	136	17	1,239	361	878	3,655	149	3,959	166	21
December	18	(s)	3,286	138	18	1,031	391	640	3,813	159	3,767	158	20
Total	**219**	**3**	**40,401**	**1,697**	**217**	**11,929**	**6,169**	**5,760**	**3,813**	**206**	**45,955**	**1,930**	**246**
2024 January	16	(s)	3,028	127	16	1,179	122	1,057	4,205	[i] 378	3,707	156	20
February	16	(s)	2,989	126	16	1,572	213	1,359	4,564	359	3,989	168	21
March	18	(s)	3,230	136	17	658	326	332	4,401	-163	3,725	156	20
April	17	(s)	3,180	134	17	1,452	428	1,024	4,413	12	4,191	176	22
May	19	(s)	3,406	143	18	878	504	374	4,185	-228	4,008	168	21
June	18	(s)	3,370	142	18	721	480	241	3,728	-458	4,069	171	22
July	19	(s)	3,478	146	19	599	627	-28	3,373	-355	3,804	160	20
August	19	(s)	3,482	146	19	551	581	-30	3,200	-174	3,625	152	19
September	18	(s)	3,361	141	18	604	482	122	3,165	-35	3,518	148	19
October	19	(s)	3,449	145	18	505	379	126	3,007	-158	3,733	157	20
November	19	(s)	3,446	145	18	505	120	385	3,309	302	3,530	148	19
December	18	(s)	3,381	142	18	768	137	631	3,552	244	3,769	158	20
Total	**216**	**3**	**39,798**	**1,672**	**213**	**9,992**	**4,399**	**5,593**	**3,552**	**[i] -275**	**45,667**	**1,918**	**245**
2025 January	10	(s)	1,862	78	10	78	195	-117	3,058	-495	2,240	94	12
February	11	(s)	1,936	81	10	165	56	109	3,014	-44	2,089	88	11
March	13	(s)	2,355	99	13	111	107	4	3,028	14	2,346	99	13
3-Month Total	**33**	**(s)**	**6,153**	**258**	**33**	**354**	**357**	**-3**	**3,028**	**-525**	**6,675**	**280**	**36**
2024 3-Month Total	**50**	**1**	**9,246**	**388**	**50**	**3,409**	**662**	**2,747**	**4,401**	**573**	**11,420**	**480**	**61**
2023 3-Month Total	**51**	**1**	**9,431**	**396**	**51**	**2,798**	**575**	**2,223**	**5,133**	**1,525**	**10,130**	**425**	**54**

[a] Data are for "biodiesel," which is primarily fatty acid methyl esters (FAME). See "Biodiesel" in Glossary.

[b] Total vegetable oil and other biomass inputs to the production of biodiesel. See "Biodiesel Feedstock" entry in the "Thermal Conversion Factor Source Documentation" at the end of Appendix A.

[c] Losses and co-products from the production of biodiesel. Does not include natural gas, electricity, and other non-biomass energy used in the production of biodiesel—these are included in the industrial sector consumption statistics for the appropriate energy source.

[d] Net imports equal imports minus exports.

[e] Stocks are at end of period. Includes biodiesel stocks at (or in) refineries, pipelines, and bulk terminals. Beginning in 2011, also includes stocks at biodiesel production plants.

[f] A negative value indicates a decrease in stocks and a positive value indicates an increase.

[g] In 2009, because of incomplete data coverage and differing data sources, a "Balancing Item" amount of 733 thousand barrels (653 thousand barrels in January 2009; 80 thousand barrels in February 2009) is used to balance biodiesel supply and disposition.

[h] Derived from the final 2010 stocks value for bulk terminals and biodiesel production plants (977 thousand barrels), not the final 2010 value for bulk terminals only (672 thousand barrels) that is shown under "Stocks."

[i] Derived from the preliminary 2023 stocks value (3,827 thousand barrels), not the final 2023 value (3,813 thousand barrels) that is shown under "Stocks."

NA=Not available. (s)=Less than 0.5 trillion Btu.

Notes: • Mbbl = thousand barrels. MMgal = million U.S. gallons. TBtu = trillion Btu. • Biodiesel data in thousand barrels are converted to million gallons by multiplying by 0.042, and are converted to Btu by multiplying by 5.359 million Btu per barrel (the approximate heat content of biodiesel—see Table A1). • Through 2000, data are not available. Beginning in 2001, data not from EIA surveys are estimates. • 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/#renewable (Excel and CSV files) for all available annual and monthly data beginning in 2001.

Sources: See end of section.

Table 10.4b Renewable Diesel Fuel Overview

	Feedstock[b]	Losses and Co-products[c]	Production[a,d]			Trade[a]			Stocks[a,f]	Stock Change[a,g]	Consumption[a,h]		
						Imports	Exports	Net Imports[e]					
	TBtu	TBtu	Mbbl	MMgal	TBtu	Mbbl	Mbbl	Mbbl	Mbbl	Mbbl	Mbbl	MMgal	TBtu
2011 Total	**NA**	**NA**	**1,477**	**62**	**8**	**–**	**NA**	**0**	**7**	**7**	**1,470**	**62**	**8**
2012 Total	**NA**	**NA**	**1,248**	**52**	**7**	**605**	**NA**	**605**	**94**	**87**	**1,766**	**74**	**10**
2013 Total	**NA**	**NA**	**2,697**	**113**	**15**	**4,921**	**NA**	**4,921**	**691**	**597**	**7,021**	**295**	**39**
2014 Total	**NA**	**NA**	**3,789**	**159**	**21**	**2,873**	**NA**	**2,873**	**350**	**-341**	**7,003**	**294**	**38**
2015 Total	**NA**	**NA**	**4,211**	**177**	**23**	**4,874**	**NA**	**4,874**	**634**	**284**	**8,801**	**370**	**48**
2016 Total	**NA**	**NA**	**5,750**	**241**	**32**	**5,304**	**NA**	**5,304**	**1,315**	**681**	**10,373**	**436**	**57**
2017 Total	**NA**	**NA**	**6,151**	**258**	**34**	**4,509**	**NA**	**4,509**	**753**	**-562**	**11,222**	**471**	**62**
2018 Total	**NA**	**NA**	**7,273**	**305**	**40**	**4,124**	**NA**	**4,124**	**1,727**	**974**	**10,423**	**438**	**57**
2019 Total	**NA**	**NA**	**11,715**	**492**	**64**	**6,143**	**NA**	**6,143**	**1,491**	**-236**	**18,094**	**760**	**99**
2020 Total	**NA**	**NA**	**12,702**	**533**	**70**	**6,658**	**NA**	**6,658**	**1,287**	**-204**	**19,564**	**822**	**107**
2021 Total	**NA**	**NA**	**[d] 20,503**	**[d] 861**	**[d] 113**	**9,340**	**NA**	**9,340**	**2,353**	**1,066**	**28,777**	**1,209**	**158**
2022 Total	**NA**	**NA**	**35,692**	**1,499**	**196**	**6,254**	**NA**	**6,254**	**3,405**	**1,053**	**40,893**	**1,718**	**225**
2023 January	NA	NA	3,999	168	22	633	NA	633	3,685	280	4,352	183	24
February	NA	NA	3,760	158	21	546	NA	546	3,679	-7	4,312	181	24
March	NA	NA	4,718	198	26	786	NA	786	4,035	357	5,147	216	28
April	NA	NA	4,820	202	26	420	NA	420	4,143	107	5,133	216	28
May	NA	NA	5,355	225	29	1,149	NA	1,149	3,714	-429	6,933	291	38
June	NA	NA	5,488	231	30	681	NA	681	3,565	-149	6,318	265	35
July	NA	NA	5,086	214	28	783	NA	783	4,071	506	5,363	225	29
August	NA	NA	5,733	241	31	1,003	NA	1,003	4,074	3	6,733	283	37
September	NA	NA	5,962	250	33	405	NA	405	4,244	170	6,196	260	34
October	NA	NA	5,094	214	28	351	NA	351	3,668	-576	6,021	253	33
November	NA	NA	5,388	226	30	813	NA	813	4,993	1,325	4,876	205	27
December	NA	NA	6,493	273	36	1,052	NA	1,052	5,478	485	7,060	297	39
Total	**NA**	**NA**	**61,895**	**2,600**	**340**	**8,622**	**NA**	**8,622**	**5,478**	**2,072**	**68,445**	**2,875**	**376**
2024 January	NA	NA	5,649	237	31	855	NA	855	6,379	902	5,603	235	31
February	NA	NA	5,624	236	31	999	NA	999	6,290	-89	6,712	282	37
March	NA	NA	5,984	251	33	1,048	NA	1,048	6,292	1	7,031	295	39
April	NA	NA	6,222	261	34	1,025	NA	1,025	6,720	428	6,819	286	37
May	NA	NA	5,468	230	30	620	NA	620	5,887	-833	6,921	291	38
June	NA	NA	7,020	295	39	1,455	NA	1,455	6,557	669	7,806	328	43
July	NA	NA	6,835	287	38	1,595	NA	1,595	6,151	-406	8,836	371	49
August	NA	NA	6,648	279	37	1,354	NA	1,354	6,205	54	7,948	334	44
September	NA	NA	6,385	268	35	1,010	NA	1,010	5,997	-208	7,603	319	42
October	NA	NA	6,769	284	37	701	NA	701	5,818	-179	7,649	321	42
November	NA	NA	6,775	285	37	682	NA	682	5,631	-188	7,645	321	42
December	NA	NA	6,530	274	36	961	NA	961	6,399	768	6,722	282	37
Total	**NA**	**NA**	**75,910**	**3,188**	**417**	**12,305**	**NA**	**12,305**	**6,399**	**921**	**87,294**	**3,666**	**480**
2025 January	NA	NA	5,189	218	29	1	163	-162	6,903	504	[h] 4,523	[h] 190	[h] 25
February	NA	NA	4,416	185	24	442	543	-101	6,113	-789	5,104	214	28
March	NA	NA	5,413	227	30	177	641	-464	5,860	-253	5,202	218	29
3-Month Total	**NA**	**NA**	**15,018**	**631**	**83**	**620**	**1,347**	**-727**	**5,860**	**-539**	**14,829**	**623**	**81**
2024 3-Month Total	**NA**	**NA**	**17,258**	**725**	**95**	**2,902**	**NA**	**2,902**	**6,292**	**814**	**19,346**	**813**	**106**
2023 3-Month Total	**NA**	**NA**	**12,476**	**524**	**69**	**1,965**	**NA**	**1,965**	**4,035**	**630**	**13,811**	**580**	**76**

[a] Data are for "renewable diesel fuel," which is commonly called "non-ester renewable diesel" and "green diesel," and which is chemically similar to petroleum diesel fuel. Beginning in 2025, exports data also include renewable jet fuel (sustainable aviation fuel).

[b] Total vegetable oil and other biomass inputs to the production of renewable diesel fuel.

[c] Losses and co-products from the production of renewable diesel fuel. Does not include natural gas, electricity, and other non-biomass energy used in the production of renewable diesel fuel—these are included in the industrial sector consumption statistics for the appropriate energy source.

[d] Through 2020, production data are from U.S. Environmental Protection Agency. Beginning in 2021, production data are from EIA. See sources at end of section.

[e] Net imports equal imports minus exports.

[f] Stocks are at end of period. Includes renewable diesel fuel stocks at refineries and bulk terminals. Beginning in 2021, also includes renewable diesel fuel stocks at renewable fuel production plants.

[g] A negative value indicates a decrease in stocks and a positive value indicates an increase.

[h] Through 2024, consumption, which is calculated as production plus imports minus stock change, also includes amounts of exports that cannot be differentiated from consumption. Beginning in 2025, consumption is calculated as production plus net imports minus stock change.

NA=Not available. – =No data reported.

Notes: • Mbbl = thousand barrels. MMgal = million U.S. gallons. TBtu = trillion Btu. • Renewable diesel fuel data in thousand barrels are converted to million gallons by multiplying by 0.042, and are converted to Btu by multiplying by 5.494 million Btu per barrel (the approximate heat content of renewable diesel fuel–see Table A1). • Through 2010, data are not available, or there is incomplete data coverage. Beginning in 2011, data not from EIA surveys are estimates. • 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/#renewable (Excel and CSV files) for all available annual and monthly data beginning in 2011.

Sources: See end of section.

Table 10.4c Other Biofuels Overview

	Feed-stock[b]	Losses and Co-prod-ucts[c]	Production[a,d]			Trade[a]			Stocks[a,f]	Stock Change[a,g]	Consumption[a,h]		
						Imports	Exports	Net Imports[e]					
	TBtu	TBtu	Mbbl	MMgal	TBtu	Mbbl	Mbbl	Mbbl	Mbbl	Mbbl	Mbbl	MMgal	TBtu
2014 Total	**NA**	**NA**	**290**	**12**	**2**	**–**	**NA**	**–**	**7**	**2**	**288**	**12**	**2**
2015 Total	**NA**	**NA**	**393**	**17**	**2**	**–**	**NA**	**–**	**4**	**-3**	**396**	**17**	**2**
2016 Total	**NA**	**NA**	**503**	**21**	**3**	**–**	**NA**	**–**	**43**	**39**	**464**	**20**	**2**
2017 Total	**NA**	**NA**	**570**	**24**	**3**	**–**	**NA**	**–**	**28**	**-15**	**585**	**25**	**3**
2018 Total	**NA**	**NA**	**611**	**26**	**3**	**–**	**NA**	**–**	**54**	**26**	**585**	**25**	**3**
2019 Total	**NA**	**NA**	**791**	**33**	**4**	**–**	**NA**	**–**	**50**	**-4**	**795**	**33**	**4**
2020 Total	**NA**	**NA**	**761**	**32**	**4**	**–**	**NA**	**–**	**27**	**-23**	**784**	**33**	**4**
2021 Total[i]	**NA**	**NA**	**[d] 1,914**	**[d] 80**	**[d] 10**	**27**	**NA**	**27**	**83**	**56**	**1,885**	**79**	**10**
2022 Total	**NA**	**NA**	**4,841**	**203**	**26**	**114**	**NA**	**114**	**282**	**200**	**4,756**	**200**	**25**
2023 January	NA	NA	579	24	3	–	NA	–	239	-43	622	26	3
February	NA	NA	539	23	3	–	NA	–	355	116	423	18	2
March	NA	NA	594	25	3	–	NA	–	340	-15	610	26	3
April	NA	NA	475	20	3	–	NA	–	311	-29	504	21	3
May	NA	NA	592	25	3	–	NA	–	265	-46	638	27	3
June	NA	NA	604	25	3	–	NA	–	301	36	568	24	3
July	NA	NA	480	20	3	52	NA	52	204	-96	628	26	3
August	NA	NA	521	22	3	–	NA	–	313	108	413	17	2
September	NA	NA	603	25	3	–	NA	–	274	-39	642	27	3
October	NA	NA	723	30	4	–	NA	–	332	59	664	28	4
November	NA	NA	599	25	3	–	NA	–	309	-24	623	26	3
December	NA	NA	749	31	4	48	NA	48	314	6	791	33	4
Total	**NA**	**NA**	**7,058**	**296**	**38**	**100**	**NA**	**100**	**314**	**32**	**7,126**	**299**	**38**
2024 January	NA	NA	597	25	3	–	NA	–	259	[i] -45	642	27	3
February	NA	NA	620	26	3	–	NA	–	295	36	584	25	3
March	NA	NA	640	27	3	–	NA	–	343	48	592	25	3
April	NA	NA	651	27	3	–	NA	–	338	-5	657	28	4
May	NA	NA	512	21	3	–	NA	–	407	69	442	19	2
June	NA	NA	651	27	3	–	NA	–	466	59	593	25	3
July	NA	NA	580	24	3	–	NA	–	407	-59	640	27	3
August	NA	NA	700	29	4	–	NA	–	556	149	551	23	3
September	NA	NA	778	33	4	–	NA	–	644	89	690	29	4
October	NA	NA	740	31	4	–	NA	–	629	-15	755	32	4
November	NA	NA	715	30	4	–	NA	–	361	-268	983	41	5
December	NA	NA	631	27	3	–	NA	–	456	95	536	23	3
Total	**NA**	**NA**	**7,815**	**328**	**42**	**–**	**NA**	**–**	**456**	**[i] 151**	**7,664**	**322**	**41**
2025 January	NA	NA	1,032	43	6	–	(s)	(s)	725	269	[h] 764	[h] 32	[h] 4
February	NA	NA	1,238	52	7	–	45	-45	884	159	1,033	43	6
March	NA	NA	1,013	43	5	–	1	-1	938	54	958	40	5
3-Month Total	**NA**	**NA**	**3,283**	**138**	**18**	**–**	**47**	**-47**	**938**	**482**	**2,754**	**116**	**15**
2024 3-Month Total	**NA**	**NA**	**1,856**	**78**	**10**	**–**	**NA**	**–**	**343**	**39**	**1,818**	**76**	**10**
2023 3-Month Total	**NA**	**NA**	**1,713**	**72**	**9**	**–**	**NA**	**–**	**340**	**57**	**1,655**	**70**	**9**

[a] Data are for renewable heating oil, renewable jet fuel (sustainable aviation fuel), renewable naphtha and gasoline, biobutanol, and other biofuels and biointermediates. Beginning in 2025, exports data for renewable jet fuel (sustainable aviation fuel) are included with renewable diesel fuel exports on Table 10.4b.

[b] Total vegetable oil and other biomass inputs to the production of other biofuels.

[c] Losses and co-products from the production of other biofuels. Does not include natural gas, electricity, and other non-biomass energy used in the production of other biofuels—these are included in the industrial sector consumption statistics for the appropriate energy source.

[d] Through 2020, production data are from U.S. Environmental Protection Agency. Beginning in 2021, production data are from EIA. See sources at end of section.

[e] Net imports equal imports minus exports.

[f] Stocks are at end of period. Includes other biofuels stocks at refineries and bulk terminals. Beginning in 2021, also includes other biofuels stocks at renewable fuel production plants.

[g] A negative value indicates a decrease in stocks and a positive value indicates an increase.

[h] Through 2024, consumption, which is calculated as production plus imports minus stock change, also includes amounts of exports that cannot be differentiated from consumption. Beginning in 2025, consumption is calculated as production plus net imports minus stock change.

[i] There is a discontinuity in the time series between 2020 and 2021. Beginning in 2021, there is expanded coverage of other biofuels due to the incorporation of data from EIA, Form EIA-819, "Monthly Report of Biofuels, Fuels from Non-Biogenic Wastes, Fuel Oxygenates, Isooctane, and Isooctene."

[j] Derived from the preliminary 2023 stocks value (305 thousand barrels), not the final 2023 value (314 thousand barrels) that is shown under "Stocks."

NA=Not available. – =No data reported. (s)=Less than 500 barrels and greater than -500 barrels.

Notes: • Mbbl = thousand barrels. MMgal = million U.S. gallons. TBtu = trillion Btu. • Other biofuels data in thousand barrels are converted to million gallons by multiplying by 0.042, and are converted to Btu by multiplying by 5.359 million Btu per barrel (the approximate heat content of other biofuels–see Table A1). • Through 2013, data are not available, or there is incomplete data coverage. Beginning in 2014, data not from EIA surveys are estimates. • 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/#renewable (Excel and CSV files) for all available annual and monthly data beginning in 2014.

Sources: See end of section.

Table 10.5 Solar Energy Consumption

(Trillion Btu)

	Small-Scale[a] Solar Energy[b]						Utility-Scale[c] Solar Energy[b]				
		Electricity[d]					Electricity[e]				
	Heat[f]	Residential Sector	Commercial Sector	Industrial Sector	Total	Total[g]	Commercial Sector[h]	Industrial Sector[i]	Electric Power Sector[j]	Total	Total[k]
1985 Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**(s)**	**(s)**	**(s)**
1990 Total	**55**	**(s)**	**(s)**	**(s)**	**(s)**	**55**	**–**	**–**	**1**	**1**	**56**
1995 Total	**63**	**(s)**	**(s)**	**(s)**	**(s)**	**63**	**–**	**–**	**2**	**2**	**64**
2000 Total	**57**	**(s)**	**(s)**	**(s)**	**(s)**	**58**	**–**	**–**	**2**	**2**	**59**
2005 Total	**49**	**(s)**	**1**	**(s)**	**1**	**50**	**–**	**–**	**2**	**2**	**52**
2010 Total	**56**	**3**	**4**	**1**	**8**	**64**	**(s)**	**(s)**	**4**	**4**	**68**
2011 Total	**58**	**5**	**6**	**1**	**12**	**70**	**(s)**	**(s)**	**6**	**6**	**76**
2012 Total	**59**	**7**	**10**	**2**	**20**	**79**	**1**	**(s)**	**14**	**15**	**94**
2013 Total	**61**	**11**	**14**	**3**	**28**	**89**	**1**	**(s)**	**30**	**31**	**120**
2014 Total	**62**	**17**	**18**	**4**	**38**	**101**	**1**	**(s)**	**59**	**60**	**161**
2015 Total	**63**	**24**	**19**	**5**	**48**	**111**	**1**	**(s)**	**83**	**85**	**196**
2016 Total	**64**	**36**	**21**	**7**	**64**	**128**	**2**	**(s)**	**121**	**123**	**251**
2017 Total	**65**	**48**	**26**	**8**	**82**	**147**	**2**	**(s)**	**180**	**182**	**329**
2018 Total	**65**	**58**	**33**	**9**	**101**	**166**	**2**	**(s)**	**216**	**218**	**384**
2019 Total	**65**	**71**	**38**	**10**	**119**	**184**	**2**	**(s)**	**243**	**245**	**430**
2020 Total	**65**	**86**	**44**	**12**	**142**	**206**	**2**	**(s)**	**302**	**304**	**511**
2021 Total	**64**	**103**	**52**	**13**	**168**	**232**	**2**	**(s)**	**391**	**393**	**625**
2022 Total	**64**	**135**	**60**	**14**	**209**	**273**	**2**	**1**	**487**	**491**	**764**
2023 January	3	9	4	1	14	17	(s)	(s)	26	27	44
February	4	10	4	1	15	19	(s)	(s)	32	32	51
March	5	13	6	1	20	26	(s)	(s)	41	42	67
April	6	15	6	1	23	29	(s)	(s)	51	51	80
May	6	17	7	2	26	32	(s)	(s)	59	59	91
June	6	17	7	2	25	32	(s)	(s)	61	61	92
July	7	18	7	2	26	33	(s)	(s)	64	64	97
August	6	17	7	2	26	32	(s)	(s)	60	61	93
September	6	15	6	1	23	28	(s)	(s)	53	53	81
October	5	14	5	1	21	26	(s)	(s)	48	48	74
November	4	12	4	1	17	21	(s)	(s)	35	36	57
December	4	11	4	1	15	19	(s)	(s)	31	31	50
Total	**63**	**168**	**67**	**15**	**250**	**314**	**2**	**1**	**562**	**565**	**878**
2024 January	4	11	4	1	16	20	(s)	(s)	33	33	53
February	4	13	5	1	19	23	(s)	(s)	42	43	65
March	5	17	6	1	24	30	(s)	(s)	54	54	84
April	6	18	7	1	27	33	(s)	(s)	65	65	98
May	6	20	8	2	29	36	(s)	(s)	75	76	112
June	7	20	8	2	29	36	(s)	(s)	82	83	119
July	7	20	8	2	30	37	(s)	(s)	82	83	119
August	6	20	8	2	29	35	(s)	(s)	82	82	117
September	6	17	7	1	26	32	(s)	(s)	69	69	101
October	5	16	6	1	23	28	(s)	(s)	66	67	95
November	4	13	5	1	19	23	(s)	(s)	47	47	70
December	4	12	4	1	17	21	(s)	(s)	44	44	65
Total	**64**	**197**	**76**	**16**	**289**	**353**	**2**	**2**	**741**	**746**	**1,098**
2025 January	3	13	5	1	18	22	(s)	(s)	52	52	74
February	4	14	5	1	20	24	(s)	(s)	56	56	80
March	5	19	7	2	28	33	(s)	(s)	78	79	111
3-Month Total	**13**	**45**	**17**	**4**	**66**	**78**	**(s)**	**(s)**	**186**	**187**	**265**
2024 3-Month Total	**13**	**40**	**16**	**3**	**59**	**72**	**(s)**	**(s)**	**129**	**130**	**202**
2023 3-Month Total	**12**	**32**	**14**	**3**	**49**	**61**	**(s)**	**(s)**	**100**	**100**	**162**

[a] Data are estimates for small-scale facilities (combined generator nameplate capacity less than 1 megawatt).

[b] See "Photovoltaic Energy" and "Solar Thermal Energy" in Glossary.

[c] Data are for utility-scale facilities (combined generator nameplate capacity of 1 megawatt or more).

[d] Solar photovoltaic (PV) electricity generation at small-scale facilities connected to the electric power grid (converted to Btu by multiplying by the heat content of electricity in Table A6).

[e] Solar photovoltaic (PV) and solar thermal electricity net generation at utility-scale facilities (converted to Btu by multiplying by the heat content of electricity in Table A6).

[f] Solar thermal direct use energy in the residential, commercial, and industrial sectors for all end uses, such as pool heating, hot water heating, and space heating.

[g] Data are the sum of "Small-Scale Solar Energy Heat" and "Small-Scale Solar Energy Electricity."

[h] Commercial combined-heat-and-power (CHP) and commercial electricity-only plants. See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 7.

[i] Industrial combined-heat-and-power (CHP) and industrial electricity-only plants. See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 7.

[j] 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. Through 1988, data are for electric utilities only; beginning in 1989, data are for electric utilities and independent power producers.

[k] Data are the sum of "Small-Scale Solar Energy Total" and "Utility-Scale Solar Energy Total."

NA=Not available. – =No data reported. (s)=Less than 0.5 trillion Btu.

Notes: • Small-scale solar energy data for all years, and utility-scale solar energy data for the current two years, are estimates. • 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/#renewable (Excel and CSV files) for all available annual and monthly data beginning in 1984.

Sources: See end of section.

Table 10.6 Solar Electricity Net Generation

(Million Kilowatthours)

	Small-Scale[a] Solar Generation[b]				Utility-Scale[c] Solar Generation[b]				
	Residential Sector	Commercial Sector	Industrial Sector	Total	Commercial Sector[d]	Industrial Sector[e]	Electric Power Sector[f]	Total	Total
1985 Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**11**	**11**	**11**
1990 Total	**12**	**16**	**4**	**32**	**–**	**–**	**367**	**367**	**399**
1995 Total	**20**	**28**	**6**	**54**	**–**	**–**	**497**	**497**	**551**
2000 Total	**39**	**53**	**12**	**104**	**–**	**–**	**493**	**493**	**598**
2005 Total	**121**	**166**	**37**	**324**	**–**	**–**	**550**	**550**	**875**
2010 Total	**899**	**1,130**	**250**	**2,280**	**5**	**2**	**1,206**	**1,212**	**3,492**
2011 Total	**1,358**	**1,845**	**409**	**3,612**	**84**	**7**	**1,727**	**1,818**	**5,429**
2012 Total	**2,058**	**3,061**	**678**	**5,797**	**148**	**14**	**4,164**	**4,327**	**10,123**
2013 Total	**3,217**	**4,106**	**909**	**8,232**	**294**	**17**	**8,724**	**9,036**	**17,268**
2014 Total	**4,947**	**5,146**	**1,139**	**11,233**	**371**	**16**	**17,304**	**17,691**	**28,924**
2015 Total	**6,999**	**5,689**	**1,451**	**14,139**	**416**	**21**	**24,456**	**24,893**	**39,032**
2016 Total	**10,595**	**6,158**	**2,060**	**18,812**	**529**	**27**	**35,497**	**36,054**	**54,866**
2017 Total	**13,942**	**7,685**	**2,364**	**23,990**	**521**	**42**	**52,724**	**53,287**	**77,277**
2018 Total	**17,105**	**9,798**	**2,636**	**29,539**	**525**	**47**	**63,253**	**63,825**	**93,365**
2019 Total	**20,914**	**11,002**	**3,041**	**34,957**	**587**	**85**	**71,265**	**71,937**	**106,894**
2020 Total	**25,179**	**12,859**	**3,484**	**41,522**	**586**	**101**	**88,511**	**89,199**	**130,721**
2021 Total	**30,182**	**15,124**	**3,858**	**49,164**	**598**	**137**	**114,523**	**115,258**	**164,422**
2022 Total	**39,510**	**17,724**	**4,048**	**61,282**	**669**	**276**	**142,847**	**143,792**	**205,074**
2023 January	2,625	1,119	244	3,989	28	16	7,763	7,806	11,795
February	2,894	1,234	259	4,387	38	18	9,379	9,435	13,822
March	3,954	1,680	370	6,005	51	24	12,138	12,213	18,218
April	4,478	1,855	408	6,742	67	34	14,961	15,062	21,803
May	5,073	2,023	447	7,543	71	35	17,175	17,281	24,824
June	4,948	2,011	446	7,405	66	35	17,733	17,834	25,239
July	5,173	2,087	461	7,720	70	37	18,788	18,894	26,614
August	5,049	2,010	444	7,504	62	34	17,648	17,744	25,248
September	4,409	1,796	400	6,604	53	30	15,500	15,583	22,187
October	4,155	1,558	363	6,076	46	26	14,049	14,121	20,196
November	3,428	1,225	286	4,938	37	21	10,388	10,446	15,384
December	3,087	1,153	254	4,494	25	17	9,070	9,113	13,606
Total	**49,273**	**19,751**	**4,382**	**73,406**	**615**	**326**	**164,590**	**165,530**	**238,937**
2024 January	3,281	1,256	267	4,804	33	25	9,681	9,740	14,543
February	3,696	1,433	295	5,425	46	33	12,410	12,489	17,914
March	4,854	1,881	405	7,139	58	41	15,741	15,840	22,979
April	5,385	2,070	438	7,894	67	48	18,986	19,101	26,995
May	5,847	2,284	476	8,606	75	55	22,079	22,209	30,815
June	5,864	2,282	475	8,621	79	59	24,156	24,294	32,915
July	5,993	2,370	488	8,851	74	59	24,067	24,200	33,052
August	5,743	2,273	472	8,488	74	58	23,923	24,055	32,543
September	5,114	2,037	433	7,584	62	48	20,154	20,264	27,848
October	4,643	1,764	389	6,797	60	45	19,420	19,525	26,322
November	3,758	1,376	303	5,437	39	31	13,808	13,878	19,315
December	3,433	1,281	270	4,984	35	28	12,879	12,942	17,926
Total	**57,611**	**22,307**	**4,711**	**84,630**	**702**	**531**	**217,305**	**218,538**	**303,167**
2025 January	3,693	1,398	290	5,380	39	31	15,285	15,355	20,735
February	3,989	1,550	314	5,853	39	35	16,300	16,374	22,227
March	5,503	2,118	448	8,069	57	50	22,960	23,067	31,137
3-Month Total	**13,185**	**5,067**	**1,051**	**19,302**	**136**	**116**	**54,545**	**54,797**	**74,099**
2024 3-Month Total	**11,831**	**4,569**	**966**	**17,367**	**137**	**99**	**37,833**	**38,069**	**55,436**
2023 3-Month Total	**9,473**	**4,034**	**873**	**14,380**	**116**	**58**	**29,279**	**29,453**	**43,834**

[a] Data are estimates for solar photovoltaic (PV) electricity generation at small-scale facilities (combined generator nameplate capacity less than 1 megawatt) connected to the electric power grid.

[b] See "Photovoltaic Energy" and "Solar Thermal Energy" in Glossary.

[c] Solar photovoltaic (PV) and solar thermal electricity net generation at utility-scale facilities (combined generator nameplate capacity of 1 megawatt or more).

[d] Commercial combined-heat-and-power (CHP) and commercial electricity-only plants. See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 7.

[e] Industrial combined-heat-and-power (CHP) and industrial electricity-only plants. See Note 2, "Classification of Power Plants Into Energy-Use Sectors," at end of Section 7.

[f] 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. Through 1988, data are for electric utilities only; beginning in 1989, data are for electric utilities and independent power producers.

NA=Not available. – =No data reported.

Notes: • Small-scale solar generation data for all years, and utility-scale solar energy data for the current two years, are estimates. • 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/#renewable (Excel and CSV files) for all available annual and monthly data beginning in 1984.

Sources: • **Small-Scale Solar Generation: 1989–2013**—Calculated as small-scale solar energy consumption (see Table 10.5) divided by the heat content of electricity (see Table A6). **2014 forward**—U.S. Energy Information Administration (EIA), *Electric Power Monthly,* monthly reports, Tables 1.1, 1.2.C, 1.2.D, and 1.2.E. • **Utility-Scale Solar Generation: 1984–1988**—EIA, Form EIA-759, "Monthly Power Plant Report." **1989–1997:** EIA, Form EIA-759, "Monthly Power Plant Report," and Form EIA-867, "Annual Nonutility Power Producer Report." **1998–2000:** EIA, Form EIA-759, "Monthly Power Plant Report," and Form EIA-860B, "Annual Electric Generator Report—Nonutility." **2001–2003:** EIA, Form EIA-906, "Power Plant Report." **2004–2007:** EIA, Form EIA-906, "Power Plant Report," and Form EIA-920, "Combined Heat and Power Plant Report." **2008 forward:** EIA, Form EIA-923, "Power Plant Operations Report." • **Total:** Calculated as small-scale solar generation plus utility-scale solar generation.

Note. Renewable Energy Production and Consumption. In Tables 1.1, 1.3, and 10.1, renewable energy consumption consists of: conventional hydroelectricity net generation (converted to Btu by multiplying by the electricity heat content factor in Table A6); geothermal electricity net generation (converted to Btu by multiplying by the electricity heat content factor in Table A6), and geothermal heat pump and geothermal direct use energy; solar thermal and photovoltaic electricity net generation (converted to Btu by multiplying by the electricity heat content factor in Table A6), and solar thermal direct use energy; wind electricity net generation (converted to Btu by multiplying by the electricity heat content factor in Table A6); wood and wood-derived fuels consumption; biomass waste (municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass) consumption; fuel ethanol (minus denaturant), biodiesel, renewable diesel fuel, and other biofuels consumption; and losses and co-products from the production of fuel ethanol and biodiesel. In Tables 1.1, 1.2, and 10.1, renewable energy production is assumed to equal consumption for all renewable energy sources except wood and biofuels; plus wood production (which is the sum of wood consumption and densified biomass exports); plus biofuels production (which comprises fuel ethanol feedstock, biodiesel feedstock, renewable diesel fuel production, and other biofuels production).

Table 10.2a Sources

Residential Sector, Geothermal

1989–2011: Annual estimates by the U.S. Energy Information Administration (EIA) based on data from Oregon Institute of Technology, Geo-Heat Center.

2012 forward: Annual estimates assumed by EIA to be equal to that of 2011.

(For 1989 forward, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

Residential Sector, Solar

1989 forward: Residential sector solar consumption is the sum of the values for "Small-Scale Solar Energy Consumption: Heat" (which includes solar thermal direct use energy in the residential, commercial, and industrial sectors) from Table 10.5 and "Small-Scale Solar Energy Consumption: Electricity, Residential Sector" from Table 10.5.

Residential Sector, Wood

1949–1979: Annual estimates are from EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A2.

1980–2008: Annual estimates are based on EIA, Form EIA-457, "Residential Energy Consumption Survey"; and National Oceanic and Atmospheric Administration regional heating degree-day data.

2009 forward: Annual estimates based on EIA, Form EIA-457, “Residential Energy Consumption Survey”; and residential wood consumption growth rates from EIA's *Annual Energy Outlook* data system.

(For 1973 forward, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

Residential Sector, Total Renewable Energy

1949–1988: Residential sector total renewable energy consumption is equal to residential sector wood consumption.

1989 forward: Residential sector total renewable energy consumption is the sum of the residential sector consumption values for geothermal, solar, and wood.

Commercial Sector, Hydroelectric Power

1989 forward: Commercial sector conventional hydroelectricity net generation data from EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Commercial Sector, Geothermal Heat Pump and Direct Use Energy
1989–2011: Annual estimates by EIA based on data from Oregon Institute of Technology, Geo-Heat Center.

2012 forward: Annual estimates assumed by EIA to be equal to that of 2011.

(For 1989 forward, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

Commercial Sector, Geothermal Electricity Net Generation
December 2018 forward: Commercial sector geothermal electricity net generation data from EIA, Form EIA-923, "Power Plant Operations Report," are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Commercial Sector, Geothermal Total
1989–November 2018: Commercial sector geothermal total consumption is equal to commercial sector heat pump and direct use energy.

December 2018 forward: Commercial sector geothermal total consumption is the sum of the commercial sector values for geothermal heat pump and direct use energy, and geothermal electricity net generation.

Commercial Sector, Solar
1989 forward: Commercial sector solar consumption is the sum of the values for "Small-Scale Solar Energy Consumption: Electricity, Commercial Sector" from Table 10.5 and "Utility-Scale Solar Energy Consumption: Electricity, Commercial Sector" from Table 10.5.

Commercial Sector, Wind
2009 forward: Commercial sector wind electricity net generation data from EIA, Form EIA-923, "Power Plant Operations Report," are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Commercial Sector, Wood
1949–1979: Annual estimates are from EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A2.

1980–1983: Annual estimates are from EIA, *Estimates of U.S. Wood Energy Consumption 1980 –1983*, Table ES1.

1984: Annual estimate assumed by EIA to be equal to that of 1983.

1985–1988: Annual estimates interpolated by EIA.

(For 1973–1988, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

1989 forward: Monthly/annual commercial sector combined-heat-and-power (CHP) wood consumption data are from EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms. For 1989–2013, annual estimates for commercial sector non-CHP wood consumption are based on EIA, Form EIA-871, "Commercial Buildings Energy Consumption Survey"; U.S. heating degree days (see MER Table 1.11); and estimates of growth in commercial floor space. For 2014 forward, annual estimates for commercial sector non-CHP wood consumption are assumed by EIA to be equal to that of 2013. For 1989 forward, monthly estimates for commercial sector non-CHP wood consumption are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month. Commercial sector total wood consumption is the sum of commercial sector CHP and non-CHP wood consumption.

Commercial Sector, Biomass Waste
1989 forward: Table 7.4c.

Commercial Sector, Fuel Ethanol (Minus Denaturant)
1981 forward: The commercial sector share of motor gasoline consumption is equal to commercial sector motor gasoline consumption from Table 3.7a divided by motor gasoline product supplied from Table 3.5. Commercial sector fuel ethanol (minus denaturant) consumption is equal to fuel ethanol (minus denaturant) consumption from Table 10.3

multiplied by the commercial sector share of motor gasoline consumption. Note that there is a discontinuity in this time series between 2014 and 2015 due to a change in the method for allocating motor gasoline consumption to the end-use sectors; beginning in 2015, the commercial and industrial sector shares of fuel ethanol consumption are larger than in 2014, while the transportation sector share is smaller.

Commercial Sector, Total Biomass

1949–1980: Commercial sector total biomass consumption is equal to commercial sector wood consumption.

1981–1988: Commercial sector total biomass consumption is the sum of the commercial sector consumption values for wood and fuel ethanol (minus denaturant).

1989 forward: Commercial sector total biomass consumption is the sum of the commercial sector consumption values for wood, waste, and fuel ethanol (minus denaturant).

Commercial Sector, Total Renewable Energy

1949–1988: Commercial sector total renewable energy consumption is equal to commercial sector total biomass consumption.

1989–2007: Commercial sector total renewable energy consumption is the sum of the commercial sector consumption values for conventional hydroelectric power, geothermal, and total biomass.

2008: Commercial sector total renewable energy consumption is the sum of the commercial sector consumption values for conventional hydroelectric power, geothermal, solar, and total biomass.

2009 forward: Commercial sector total renewable energy is the sum of the commercial sector consumption values for conventional hydroelectric power, geothermal, solar, wind, and total biomass.

Table 10.2b Sources

Industrial Sector, Hydroelectric Power

1949 forward: Industrial sector conventional hydroelectricity net generation data from Table 7.2c are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Industrial Sector, Geothermal

1989–2009: Annual estimates by the U.S. Energy Information Administration (EIA) based on data from Oregon Institute of Technology, Geo-Heat Center.

2010 forward: Annual estimates assumed by EIA to be equal to that of 2009.

(For 1989 forward, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

Industrial Sector, Solar

1989 forward: Industrial sector solar consumption is the sum of the values for "Small-Scale Solar Energy Consumption: Electricity, Industrial Sector" from Table 10.5 and "Utility-Scale Solar Energy Consumption: Electricity, Industrial Sector" from Table 10.6.

Industrial Sector, Wind

2011 forward: Industrial sector wind electricity net generation data from EIA, Form EIA-923, "Power Plant Operations Report," are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Industrial Sector, Wood

1949–1979: Annual estimates are from EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981,* Table A2.

1980–1983: Annual estimates are from EIA, *Estimates of U.S. Wood Energy Consumption 1980–1983,* Table ES1.

1984: Annual estimate is from EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 1.

1985 and 1986: Annual estimates interpolated by EIA.

1987: Annual estimate is from EIA, *Estimates of Biofuels Consumption in the United States During 1987*, Table 2.

1988: Annual estimate interpolated by EIA.

(For 1973–1988, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

1989 forward: Monthly/annual industrial sector combined-heat-and-power (CHP) wood consumption data are from EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms. Annual estimates for industrial sector non-CHP wood consumption are based on EIA, Form EIA-846, "Manufacturing Energy Consumption Survey" (for 2019 forward, the annual estimates are assumed by EIA to be equal to that of 2018). For 1989 forward, monthly estimates for industrial sector non-CHP wood consumption are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month. Industrial sector total wood consumption is the sum of industrial sector CHP and non-CHP wood consumption.

Industrial Sector, Biomass Waste

1981: Annual estimate is calculated as total waste consumption (from EIA, *Estimates of U.S. Biofuels Consumption 199*0, Table 8) minus electric power sector waste consumption (from MER Table 10.2c).

1982 and 1983: Annual estimates are calculated as total waste consumption (based on *Estimates of U.S. Biofuels Consumption 1990*, Table 8) minus electric power sector waste consumption (from MER, Table 10.2c).

1984: Annual estimate is calculated as total waste consumption (from EIA*, Estimates of U.S. Biofuels Consumption 1990*, Table 8) minus electric power sector waste consumption (from MER, Table 10.2c).

1985 and 1986: Annual estimates interpolated by EIA.

1987: Annual estimate is calculated as total waste consumption (from EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 8) minus electric power sector waste consumption (from MER, Table 10.2c).

1988: Annual estimate interpolated by EIA.

(For 1973–1988, monthly estimates are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month.)

1989 forward: Monthly/annual industrial sector combined-heat-and-power (CHP) consumption data are from Table 7.4c. Annual estimates for industrial sector non-CHP waste consumption are based on information presented in Government Advisory Associates, *Resource Recovery Yearbook* and *Methane Recovery Yearbook,* and information provided by the U.S. Environmental Protection Agency, Landfill Methane Outreach Program (for 2014 forward, the annual estimates are assumed by EIA to be equal to that of 2013). For 1989 forward, monthly estimates for industrial sector non-CHP waste consumption are created by dividing the annual estimates by the number of days in the year and then multiplying by the number of days in the month. Industrial sector total waste consumption is the sum of industrial sector CHP and non-CHP waste consumption.

Industrial Sector, Fuel Ethanol (Minus Denaturant)

1981 forward: The industrial sector share of motor gasoline consumption is equal to industrial sector motor gasoline consumption from Table 3.7b divided by motor gasoline product supplied from Table 3.5. Industrial sector fuel ethanol (minus denaturant) consumption is equal to fuel ethanol (minus denaturant) consumption from Table 10.3 multiplied by the industrial sector share of motor gasoline consumption. Note that there is a discontinuity in this time series between 2014 and 2015 due to a change in the method for allocating motor gasoline consumption to the end-use sectors; beginning in 2015, the commercial and industrial sector shares of fuel ethanol consumption are larger than in 2014, while the transportation sector share is smaller.

Industrial Sector, Biomass Losses and Co-products
1981 forward: Calculated as fuel ethanol losses and co-products from Table 10.3 plus biodiesel losses and co-products from Table 10.4a.

Industrial Sector, Total Biomass
1949–1980: Industrial sector total biomass consumption is equal to industrial sector wood consumption.

1981 forward: Industrial sector total biomass consumption is the sum of the industrial sector consumption values for wood, waste, fuel ethanol (minus denaturant), and biomass losses and co-products.

Industrial Sector, Total Renewable Energy
1949–1988: Industrial sector total renewable energy consumption is the sum of the industrial sector consumption values for conventional hydroelectric power and total biomass.

1989–2009: Industrial sector total renewable energy consumption is the sum of the industrial sector consumption values for conventional hydroelectric power, geothermal, and total biomass.

2010: Industrial sector total renewable energy consumption is the sum of the industrial sector consumption values for conventional hydroelectric power, geothermal, solar, and total biomass.

2011 forward: Industrial sector total renewable energy consumption is the sum of the industrial sector consumption values for conventional hydroelectric power, geothermal, solar, wind, and total biomass.

Table 10.2c Sources

Transportation Sector, Fuel Ethanol (Minus Denaturant)
1981 forward: The transportation sector share of motor gasoline consumption is equal to transportation sector motor gasoline consumption from Table 3.7c divided by motor gasoline product supplied from Table 3.5. Transportation sector fuel ethanol (minus denaturant) consumption is equal to fuel ethanol (minus denaturant) consumption from Table 10.3 multiplied by the transportation sector share of motor gasoline consumption. Note that there is a discontinuity in this time series between 2014 and 2015 due to a change in the method for allocating motor gasoline consumption to the end-use sectors; beginning in 2015, the commercial and industrial sector shares of fuel ethanol consumption are larger than in 2014, while the transportation sector share is smaller.

Transportation Sector, Biodiesel
2001 forward: Transportation sector biodiesel consumption is assumed to equal total biodiesel consumption from Table 10.4a.

Transportation Sector, Renewable Diesel Fuel
2011 forward: Transportation sector renewable diesel fuel consumption is assumed to equal total renewable diesel fuel consumption from Table 10.4b.

Transportation Sector, Other Biofuels
2014 forward: Transportation sector other biofuels consumption is assumed to equal total other biofuels consumption from Table 10.4c.

Transportation Sector, Total Renewable Energy
1981–2000: Transportation sector total renewable energy consumption is equal to transportation sector fuel ethanol (minus denaturant) consumption.

2001–2010: Transportation sector total renewable energy consumption is the sum of the transportation sector consumption values for fuel ethanol (minus denaturant) and biodiesel.

2011–2013: Transportation sector total renewable energy consumption is the sum of the transportation sector consumption values for fuel ethanol (minus denaturant), biodiesel, and renewable diesel fuel.

2014 forward: Transportation sector total renewable energy consumption is the sum of the transportation sector consumption values for fuel ethanol (minus denaturant), biodiesel, renewable diesel fuel, and other biofuels.

Electric Power Sector, Hydroelectric Power
1949 forward: Electric power sector conventional hydroelectricity net generation data from Table 7.2b are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Electric Power Sector, Geothermal
1960 forward: Electric power sector geothermal electricity net generation data from Table 7.2b are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Electric Power Sector, Solar
1984 forward: Electric power sector solar electricity net generation data from Table 7.2b are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Electric Power Sector, Wind
1983 forward: Electric power sector wind electricity net generation data from Table 7.2b are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Electric Power Sector, Wood
1949 forward: Table 7.4b.

Electric Power Sector, Biomass Waste
1970 forward: Table 7.4b.

Electric Power Sector, Total Biomass
1949–1969: Electric power sector total biomass consumption is equal to electric power sector wood consumption.

1970 forward: Electric power sector total biomass consumption is the sum of the electric power sector consumption values for wood and biomass waste.

Electric Power Sector, Total Renewable Energy
1949–1959: Electric power sector total renewable energy consumption is the sum of the electric power sector consumption values for hydroelectric power and total biomass.

1960–1982: Electric power sector total renewable energy consumption is the sum of the electric power sector consumption values for hydroelectric power, geothermal, and total biomass.

1983: Electric power sector total renewable energy consumption is the sum of the electric power sector consumption values for hydroelectric power, geothermal, wind, and total biomass.

1984 forward: Electric power sector total renewable energy consumption is the sum of the electric power sector consumption values for hydroelectric power, geothermal, solar, wind, and total biomass.

Table 10.3 Sources

Feedstock
1981 forward: Calculated as fuel ethanol production (in thousand barrels) minus denaturant, and then multiplied by the fuel ethanol feedstock factor—see Table A3.

Losses and Co-products
1981 forward: Calculated as fuel ethanol feedstock plus denaturant minus fuel ethanol production.

Denaturant
1981–2008: Data in thousand barrels for petroleum denaturant in fuel ethanol produced are estimated as 2% of fuel ethanol production; these data are converted to Btu by multiplying by 4.661 million Btu per barrel (the estimated quantity-weighted factor of natural gasoline and conventional motor gasoline used as denaturant).

2009–2020: U.S. Energy Information Administration (EIA), *Petroleum Supply Annual* (PSA), annual reports, Table 1. Data in thousand barrels for net production of natural gasoline at "renewable fuels and oxygenate plants" are multiplied by -1; these data are converted to Btu by multiplying by 4.638 million Btu per barrel (the approximate heat content of natural gasoline). Data in thousand barrels for net production of conventional motor gasoline and motor gasoline blending components at "renewable fuels and oxygenate plants" are multiplied by -1; these data are converted to Btu by multiplying by 5.222 million Btu per barrel (the approximate heat content of motor gasoline blending components). Total denaturant is the sum of the values for natural gasoline, conventional motor gasoline, and motor gasoline blending components.

2021–2023: EIA, PSA, annual reports, Table 1. Data in thousand barrels for net production of natural gasoline at biofuels plants are multiplied by -1; these data are converted to Btu by multiplying by 4.638 million Btu per barrel (the approximate heat content of natural gasoline). Data in thousand barrels for net production of conventional motor gasoline and motor gasoline blending components at biofuels plants are multiplied by -1; these data are converted to Btu by multiplying by 5.222 million Btu per barrel (the approximate heat content of motor gasoline blending components). Total denaturant is the sum of the values for natural gasoline, conventional motor gasoline, and motor gasoline blending components.

2024 and 2025: EIA, *Petroleum Supply Monthly* (PSM), monthly reports, Table 1. Data in thousand barrels for net production of natural gasoline at biofuels plants are multiplied by -1; these data are converted to Btu by multiplying by 4.638 million Btu per barrel (the approximate heat content of natural gasoline). Data in thousand barrels for net production of conventional motor gasoline and motor gasoline blending components at biofuels plants are multiplied by -1; these data are converted to Btu by multiplying by 5.222 million Btu per barrel (the approximate heat content of motor gasoline blending components). Total denaturant is the sum of the values for natural gasoline, conventional motor gasoline, and motor gasoline blending components.

Production

1981–1992: Fuel ethanol production is assumed to equal fuel ethanol consumption—see sources for "Consumption."

1993–2004: Calculated as fuel ethanol consumption plus fuel ethanol stock change minus fuel ethanol net imports. These data differ slightly from the original production data from EIA, Form EIA-819, "Monthly Oxygenate Report," and predecessor form, which were not reconciled and updated to be consistent with the final balance.

2005–2008: EIA, Form EIA-819, "Monthly Oxygenate Report."

2009–2020: EIA, PSA, annual reports, Table 1, data for net production of fuel ethanol at "renewable fuels and oxygenate plants."

2021–2023: EIA, PSA, annual reports, Table 1, data for net production of fuel ethanol at biofuels plants.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for net production of fuel ethanol at biofuels plants.

Trade, Stocks, and Stock Change

1992–2023: EIA, PSA, annual reports, Table 1.

2024 and 2025: EIA, PSM, monthly reports, Table 1.

Consumption

1981–1989: EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10; and interpolated values for 1982, 1983, 1985, 1986, and 1988.

1990–1992: EIA, *Estimates of U.S. Biomass Energy Consumption 1992*, Table D2; and interpolated value for 1991.

1993–2004: EIA, PSA, annual reports, Tables 2 and 16. Calculated as 10% of oxygenated finished motor gasoline field production (Table 2), plus fuel ethanol refinery input (Table 16).

2005–2008: EIA, PSA, annual reports, Tables 1 and 15. Calculated as motor gasoline blending components adjustments (Table 1), plus finished motor gasoline adjustments (Table 1), plus fuel ethanol refinery and blender net inputs (Table 15).

2009–2023: EIA, PSA, annual reports, Table 1. Calculated as fuel ethanol refinery and blender net inputs minus fuel ethanol adjustments.

2024 and 2025: EIA, PSM, monthly reports, Table 1. Calculated as fuel ethanol refinery and blender net inputs minus fuel ethanol adjustments.

Consumption Minus Denaturant

1981 forward: Calculated as fuel ethanol consumption minus the amount of denaturant in fuel ethanol consumed. Denaturant in fuel ethanol consumed is estimated by multiplying denaturant in fuel ethanol produced by the fuel ethanol consumption-to-production ratio.

Table 10.4a Sources

Biodiesel Feedstock

2001 forward: Calculated as biodiesel production in thousand barrels multiplied by 5.433 million Btu per barrel (the biodiesel feedstock factor—see "Biodiesel Feedstock" entry in the "Thermal Conversion Factor Source Documentation" at the end of Appendix A).

Biodiesel Losses and Co-products

2001 forward: Calculated as biodiesel feedstock minus biodiesel production.

Biodiesel Production

2001–2005: U.S. Department of Agriculture, Commodity Credit Corporation, Bioenergy Program records. Annual data are derived from quarterly data. Monthly data are estimated by dividing the annual data by the number of days in the year and then multiplying by the number of days in the month.

2006: U.S. Department of Commerce, U.S. Census Bureau, "M311K—Fats and Oils: Production, Consumption, and Stocks," data for soybean oil consumed in methyl esters (biodiesel). In addition, the U.S. Energy Information Administration (EIA) estimates that 14.4 million gallons of yellow grease were consumed in methyl esters (biodiesel).

2007: U.S. Department of Commerce, U.S. Census Bureau, "M311K—Fats and Oils: Production, Consumption, and Stocks," data for all fats and oils consumed in methyl esters (biodiesel).

2008: EIA, *Monthly Biodiesel Production Report*, December 2009 (release date October 2010), Table 11. Monthly data for 2008 are estimated based on U.S. Department of Commerce, U.S. Census Bureau, M311K data, multiplied by the EIA 2008 annual value's share of the M311K 2008 annual value.

2009 and 2010: EIA, *Monthly Biodiesel Production Report*, monthly reports, Table 1.

2011–2020: EIA, *Petroleum Supply Annual* (PSA), annual reports, Table 1, data for “renewable fuels except fuel ethanol.”

2021–2023: EIA, PSA, annual reports, Table 1, data for biodiesel.

2024 and 2025: EIA, *Petroleum Supply Monthly* (PSM), monthly reports, Table 1, data for biodiesel.

Biodiesel Trade

2001–2011: For imports, U.S. Department of Agriculture, data for the following Harmonized Tariff Schedule codes: 3824.90.40.20, "Fatty Esters Animal/Vegetable Mixture" (data through June 2010); and 3824.90.40.30, "Biodiesel/Mixes" (data for July 2010–2011). For exports, U.S. Department of Agriculture, data for the following Schedule B codes: 3824.90.40.00, "Fatty Substances Animal/Vegetable/Mixture" (data through 2010); and 3824.90.40.30, "Biodiesel <70%" (data for 2011). (The data above are converted from pounds to gallons by dividing by 7.4.) Although these categories include products other than biodiesel (such as biodiesel coprocessed with petroleum

feedstocks; and products destined for soaps, cosmetics, and other items), biodiesel is the largest component. In the absence of other reliable data for biodiesel trade, EIA sees these data as good substitutes.

2012–2018: EIA, PSA, annual reports, Tables 25 and 31, data for "biomass-based diesel fuel."

2019–2020: EIA, PSA, annual reports, Tables 25 and 31, data for biodiesel.

2021–2023: EIA, PSA, annual reports, Table 1, data for biodiesel.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for biodiesel.

Biodiesel Stocks and Stock Change

2009–2018: EIA, Form EIA-22M, "Monthly Biodiesel Production Survey," data for biodiesel; and Form EIA-810, "Monthly Refinery Report," Form EIA-812, "Monthly Product Pipeline Report," and Form EIA-815, "Monthly Bulk Terminal and Blender Report," data for "biomass-based diesel fuel."

2019–September 2020: EIA, Form EIA-22M, "Monthly Biodiesel Production Survey," Form EIA-810, "Monthly Refinery Report," and Form EIA-815, "Monthly Bulk Terminal and Blender Report," data for biodiesel.

October 2020–December 2020: EIA, Form EIA-810, "Monthly Refinery Report," Form EIA-815, "Monthly Bulk Terminal and Blender Report," and Form EIA-819, "Monthly Report of Biofuels, Fuels from Non-Biogenic Wastes, Fuel Oxygenates, Isooctane, and Isooctene," data for biodiesel.

2021–2023: EIA, PSA, annual reports, Table 1, data for biodiesel.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for biodiesel.

Biodiesel Consumption

2001–2008: Calculated as biodiesel production plus biodiesel net imports.

January and February 2009: EIA, PSA, Table 1, data for refinery and blender net inputs of "renewable fuels except fuel ethanol."

March 2009 forward: Calculated as biodiesel production plus biodiesel net imports minus biodiesel stock change.

Table 10.4b Sources

Renewable Diesel Fuel Production

2011–2020: U.S. Environmental Protection Agency, "RINs Generated Transactions—Generation Summary Report," updated on September 10, 2021. Data are for volumes (in gallons); for "domestic" producer type; for fuel "non-ester renewable diesel."

2021–2023: EIA, PSA, annual reports, Table 1, data for renewable diesel fuel.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for renewable diesel fuel.

Renewable Diesel Fuel Trade

2012–2020: EIA, PSA, annual reports, Table 25, data for "other renewable diesel fuel."

2021–2023: EIA, PSA, annual reports, Table 1, data for renewable diesel fuel.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for renewable diesel fuel.

Renewable Diesel Fuel Stocks and Stock Change

2011–2020: EIA, Form EIA-810, "Monthly Refinery Report," and Form EIA-815, "Monthly Bulk Terminal and Blender Report," data for "other renewable diesel fuel."

2021–2023: EIA, PSA, annual reports, Table 1, data for renewable diesel fuel.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for renewable diesel fuel.

Renewable Diesel Fuel Consumption

2011–2024: Calculated as renewable diesel fuel production plus renewable diesel fuel imports minus renewable diesel fuel stock change.

2025: Calculated as renewable diesel fuel production plus renewable diesel fuel net imports minus renewable diesel fuel stock change.

Table 10.4c Sources

Other Biofuels Production

2014–2020: U.S. Environmental Protection Agency, "RINs Generated Transactions—Generation Summary Report," updated on September 10, 2021. Data are for volumes (in gallons); for "domestic" producer type; for fuels "renewable heating oil," "renewable jet fuel," "naphtha," "LPG," "butanol," "cellulosic diesel," and "cellulosic renewable gasoline blendstock."

2021–2023: EIA, PSA, annual reports, Table 1, data for other biofuels.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for other biofuels.

Other Biofuels Trade

2014–2020: EIA, PSA, annual reports, Table 25, data for "other renewable fuels."

2021–2023: EIA, PSA, annual reports, Table 1, data for other biofuels.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for other biofuels.

Other Biofuels Stocks and Stock Change

2014–2020: EIA, Form EIA-810, "Monthly Refinery Report," and Form EIA-815, "Monthly Bulk Terminal and Blender Report," data for "other renewable fuels."

2021–2023: EIA, PSA, annual reports, Table 1, data for other biofuels.

2024 and 2025: EIA, PSM, monthly reports, Table 1, data for other biofuels.

Other Biofuels Consumption

2014–2024: Calculated as other biofuels production plus other biofuels imports minus other biofuels stock change.

2025: Calculated as other biofuels production plus other biofuels net imports minus other biofuels stock change.

Table 10.5 Sources

Small-Scale Solar Energy Consumption: Heat

Annual Data

1989–2009: Annual estimates by the U.S. Energy Information Administration (EIA) based on EIA, Form EIA-63A, "Annual Solar Thermal Collector/Reflector Shipments Report." Solar energy consumption by solar thermal non-electric applications (mainly in the residential sector, but with some in the commercial and industrial sectors) is based on assumptions about the stock of equipment in place and other factors.

2010 forward: Annual estimates based on commercial sector solar thermal growth rates from EIA's *Annual Energy Outlook* (AEO) data system.

Monthly Data

1989–2013: Monthly estimates for each year are obtained by allocating a given year's annual value to the months in that year. Each month's allocator is the average of that month's "Small-Scale Solar Energy Consumption: Electricity, Total" values in 2014 and 2015. The allocators, when rounded, are as follows: January—5%; February—6%; March—8%; April—9%; May—10%; June—10%; July—10%; August—10%; September—9%; October—9%; November—7%; and December—7%.

2014 forward: Once all 12 months of "Small-Scale Solar Energy Consumption: Electricity, Total" data are available for a given year, they are used as allocators and applied to the annual estimate in order to derive monthly estimates for that year. Initial monthly estimates for the current year use the previous year's allocators.

Small-Scale Solar Energy Consumption: Electricity, Residential Sector

Beginning in 2014, monthly and annual data for residential sector small-scale solar photovoltaic generation are from EIA, *Electric Power Monthly*, Table 1.2.E. Those data are converted to consumption data in Btu by multiplying by the electricity heat content factor in MER Table A6.

Backcasts for earlier periods are developed as follows:

Annual Data

1989–2003: Annual growth rates are calculated based on small-scale solar electricity consumption in all sectors. Consumption is estimated using information on shipments of solar panels from EIA, Form EIA-63B, "Annual Photovoltaic Cell/Module Shipments Report," and assumptions about the stock of equipment in place and other factors. The growth rates are applied to more recent data to create historical annual estimates.

2004–2008: Annual growth rates based on commercial sector solar photovoltaic growth rates from EIA's *Annual Energy Outlook* (AEO) data system are applied to more recent data to create historical annual estimates.

2009–2013: Annual growth rates based on residential sector solar photovoltaic growth rates from EIA's *Annual Energy Outlook* (AEO) data system are applied to more recent data to create historical annual estimates.

Monthly Data

1989–2013: See "Small-Scale Solar Energy Consumption: Heat, Monthly Data."

Small-Scale Solar Energy Consumption: Electricity, Commercial Sector

Beginning in 2014, monthly and annual data for commercial sector small-scale solar photovoltaic generation are from EIA, *Electric Power Monthly*, Table 1.2.C. Those data are converted to consumption data in Btu by multiplying by the electricity heat content factor in MER Table A6.

Backcasts for earlier periods are developed as follows:

Annual Data

1989–2003: Annual growth rates based on EIA, Form EIA-63B, "Annual Photovoltaic Cell/Module Shipments Report," are applied to more recent data to create historical annual estimates. (See "Small-Scale Solar Energy Consumption: Electricity, Residential Sector" sources above for details.)

2004–2013: Annual growth rates based on commercial sector solar photovoltaic growth rates from EIA's *Annual Energy Outlook* (AEO) data system are applied to more recent data to create historical annual estimates.

Monthly Data

1989–2013: See "Small-Scale Solar Energy Consumption: Heat, Monthly Data."

Small-Scale Solar Energy Consumption: Electricity, Industrial Sector

Beginning in 2014, monthly and annual data for industrial sector small-scale solar photovoltaic generation are from EIA, *Electric Power Monthly*, Table 1.2.D. Those data are converted to consumption data in Btu by multiplying by the electricity heat content factor in MER Table A6.

Backcasts for earlier periods are developed as follows:

Annual Data

1989–2003: Annual growth rates based on EIA, Form EIA-63B, "Annual Photovoltaic Cell/Module Shipments Report," are applied to more recent data to create historical annual estimates. (See "Small-Scale Solar Energy Consumption: Electricity, Residential Sector" sources above for details.)

2004–2013: Annual growth rates based on commercial sector solar photovoltaic growth rates from EIA's *Annual Energy Outlook* (AEO) data system are applied to more recent data to create historical annual estimates.

Monthly Data

1989–2013: See "Small-Scale Solar Energy Consumption: Heat, Monthly Data."

Small-Scale Solar Energy Consumption: Electricity, Total

1989 forward: Small-scale solar energy consumption for total electricity is the sum of the small-scale solar energy consumption (for electricity) values for the residential, commercial, and industrial sectors.

Small-Scale Solar Energy Consumption: Total

1989 forward: Small-scale solar energy consumption total is the sum of small-scale solar energy consumption values for heat and total electricity.

Utility-Scale Solar Energy Consumption: Electricity, Commercial Sector

2008 forward: Commercial sector solar photovoltaic and solar thermal electricity net generation data from EIA, Form EIA-923, "Power Plant Operations Report," are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Utility-Scale Solar Energy Consumption: Electricity, Industrial Sector

2010 forward: Industrial sector solar photovoltaic and solar thermal electricity net generation data from EIA, Form EIA-923, "Power Plant Operations Report," are converted to Btu by multiplying by the electricity heat content factor in Table A6.

Utility-Scale Solar Energy Consumption: Electricity, Electric Power Sector

1984 forward: Electric power sector solar photovoltaic and solar thermal electricity net generation data from Table 7.2b are converted to Btu by multiplying the electricity heat content factor in Table A6.

Utility-Scale Solar Energy Consumption: Electricity, Total

1984 forward: Utility-scale solar energy consumption for total electricity is the sum of the utility-scale solar energy consumption (for electricity) values for the commercial, industrial, and electric power sectors.

Solar Energy Consumption: Total

1984 forward: Total solar energy consumption is the sum of the values for total small-scale solar energy consumption and total utility-scale solar energy consumption.