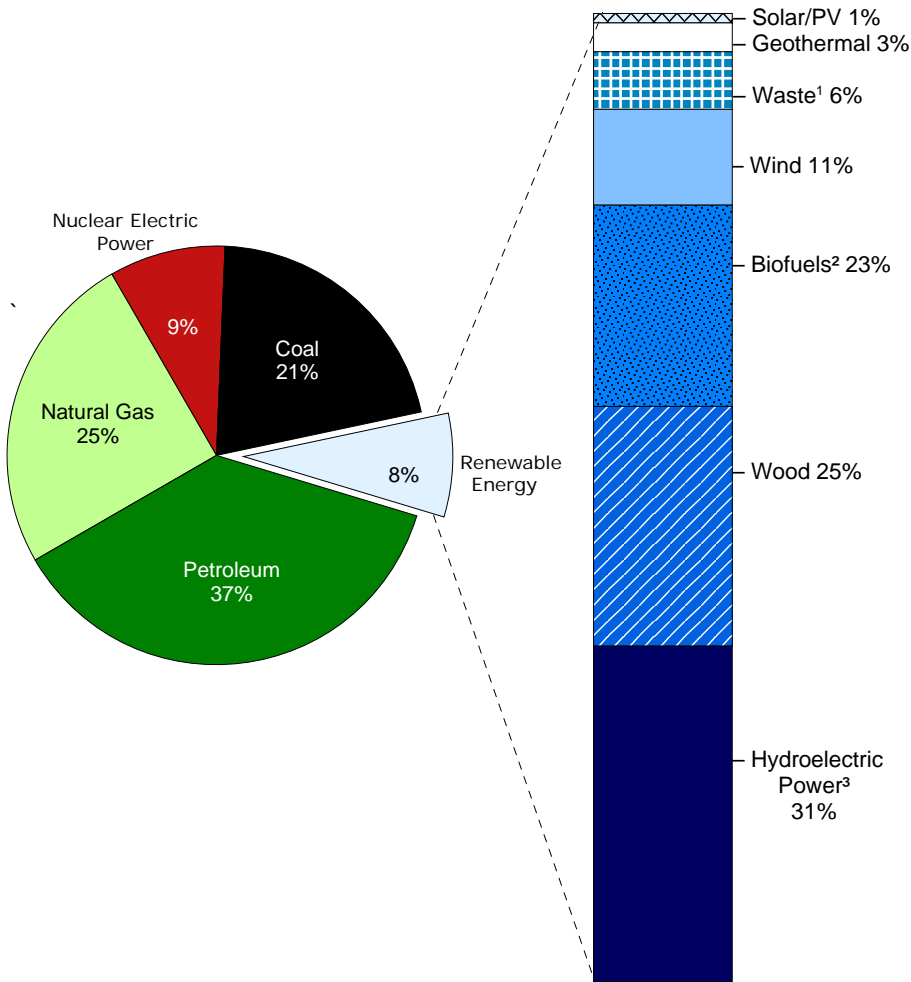


10. Renewable Energy

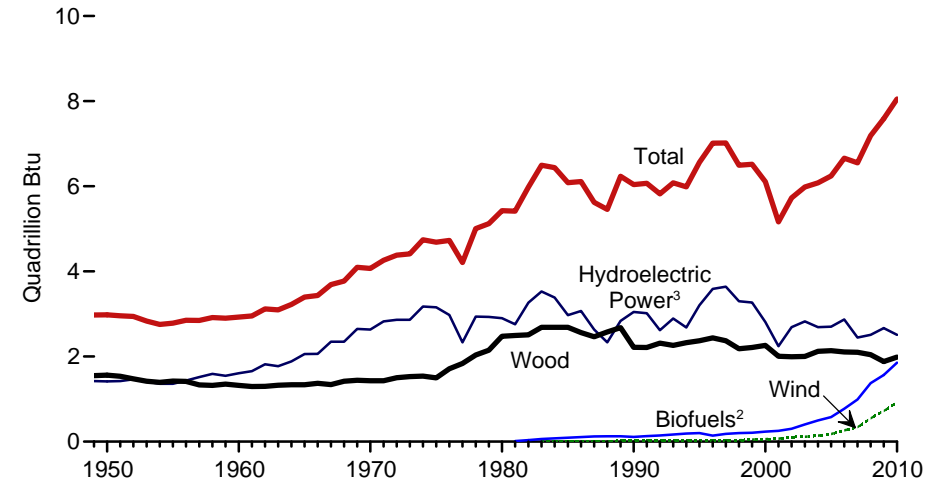


Figure 10.1 Renewable Energy Consumption by Major Source

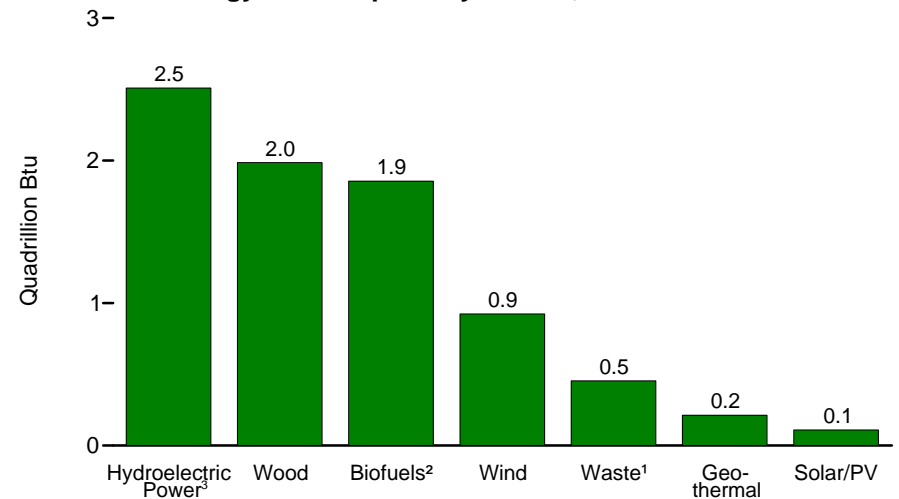
Renewable Energy as Share of Total Primary Energy Consumption, 2010



Renewable Energy Total Consumption and Major Sources, 1949-2010



Renewable Energy Consumption by Source, 2010



¹ Municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, and other biomass.

² Fuel ethanol (minus denaturant) and biodiesel consumption, plus losses and co-products from the production of fuel ethanol and biodiesel.

³ Conventional hydroelectric power. Sources: Tables 1.3 and 10.1.

Table 10.1 Renewable Energy Production and Consumption by Primary Energy Source, Selected Years, 1949-2010
(Trillion Btu)

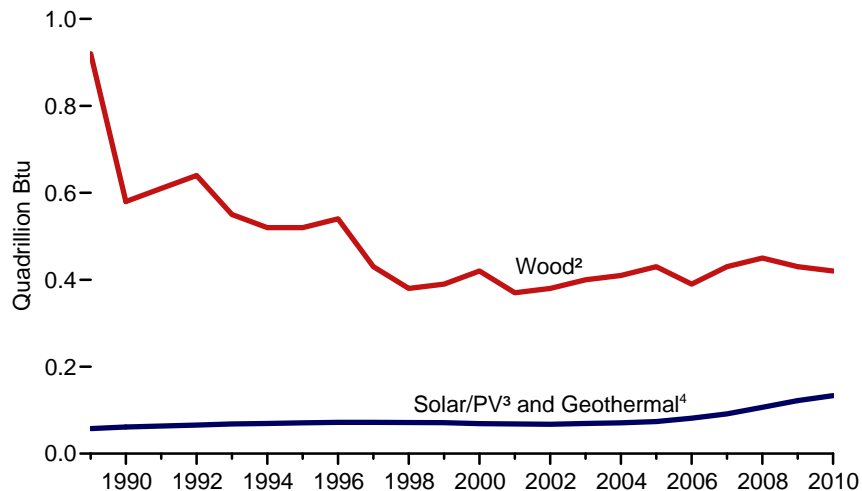
Year	Production ¹			Consumption								Total Renewable Energy
	Biomass		Total Renewable Energy ⁴	Hydro-electric Power ⁵	Geo-thermal ⁶	Solar/PV ⁷	Wind ⁸	Biomass			Total	
	Biofuels ²	Total ³						Wood ⁹	Waste ¹⁰	Biofuels ¹¹		
1949	NA	1,549	2,974	1,425	NA	NA	NA	1,549	NA	NA	1,549	2,974
1950	NA	1,562	2,978	1,415	NA	NA	NA	1,562	NA	NA	1,562	2,978
1955	NA	1,424	2,784	1,360	NA	NA	NA	1,424	NA	NA	1,424	2,784
1960	NA	1,320	R ² 2,928	1,608	R ^(s) NA	NA	NA	1,320	NA	NA	1,320	R ² 2,928
1965	NA	1,335	R ³ 3,396	2,059	R ² NA	NA	NA	1,335	NA	NA	1,335	R ³ 3,396
1970	NA	1,431	R ⁴ 4,070	2,634	R ⁶ NA	NA	NA	1,429	2	NA	1,431	R ⁴ 4,070
1975	NA	1,499	R ⁴ 4,687	3,155	R ³⁴ NA	NA	NA	1,497	2	NA	1,499	R ⁴ 4,687
1976	NA	1,713	R ⁴ 4,727	2,976	R ³⁸ NA	NA	NA	1,711	2	NA	1,713	R ⁴ 4,727
1977	NA	1,838	R ⁴ 4,209	2,333	R ³⁷ NA	NA	NA	1,837	2	NA	1,838	R ⁴ 4,209
1978	NA	2,038	R ⁵ 5,005	2,937	R ³¹ NA	NA	NA	2,036	1	NA	2,038	R ⁵ 5,005
1979	NA	2,152	R ⁵ 5,123	2,931	R ⁴⁰ NA	NA	NA	2,150	2	NA	2,152	R ⁵ 5,123
1980	NA	2,476	R ⁵ 5,428	2,900	R ⁵³ NA	NA	NA	2,474	2	NA	2,476	R ⁵ 5,428
1981	13	2,596	R ⁵ 5,414	2,758	R ⁵⁹ NA	NA	NA	2,496	88	13	2,596	R ⁵ 5,414
1982	34	2,663	R ⁵ 5,980	3,266	R ⁵¹ NA	NA	NA	2,510	119	34	2,663	R ⁵ 5,980
1983	63	2,904	R ⁶ 6,496	3,527	R ⁶⁴ NA	(s)	(s)	2,684	157	63	2,904	R ⁶ 6,496
1984	77	2,971	R ⁶ 6,438	3,386	R ⁸¹ (s)	(s)	(s)	2,686	208	77	2,971	R ⁶ 6,438
1985	93	3,016	R ⁶ 6,084	2,970	R ⁹⁷ (s)	(s)	(s)	2,687	236	93	3,016	R ⁶ 6,084
1986	107	2,932	R ⁶ 6,111	3,071	R ¹⁰⁸ (s)	(s)	(s)	2,562	263	107	2,932	R ⁶ 6,111
1987	123	2,875	R ⁵ 6,222	2,635	R ¹¹² (s)	(s)	(s)	2,463	289	123	2,875	R ⁵ 6,222
1988	124	3,016	R ⁵ 5,457	2,334	R ¹⁰⁶ (s)	(s)	(s)	2,577	315	124	3,016	R ⁵ 5,457
1989	125	3,159	R ⁶ 6,235	2,837	R ¹⁶² 55	22	22	2,680	354	125	3,159	R ⁶ 6,235
1990	111	2,735	R ⁶ 6,041	3,046	R ¹⁷¹ 59	29	29	2,216	408	111	2,735	R ⁶ 6,041
1991	128	2,782	R ⁶ 6,069	3,016	R ¹⁷⁸ 62	31	31	2,214	440	128	2,782	R ⁶ 6,069
1992	145	2,932	R ⁵ 5,821	2,617	R ¹⁷⁹ 64	30	30	2,313	473	145	2,932	R ⁵ 5,821
1993	169	2,908	R ⁶ 6,083	2,892	R ¹⁸⁶ 66	31	31	2,260	479	169	2,908	R ⁶ 6,083
1994	188	3,028	R ⁵ 5,988	2,683	R ¹⁷³ 68	36	36	2,324	515	188	3,028	R ⁵ 5,988
1995	198	3,099	R ⁶ 6,558	3,205	R ¹⁵² 69	33	33	2,370	531	200	3,101	R ⁶ 6,560
1996	141	3,155	R ⁷ 7,012	3,590	R ¹⁶³ 70	33	33	2,437	577	143	3,157	R ⁷ 7,014
1997	186	3,108	R ⁷ 7,018	3,640	R ¹⁶⁷ 70	34	34	2,371	551	184	3,105	R ⁷ 7,016
1998	202	2,929	R ⁶ 6,494	3,297	R ¹⁶⁸ 69	31	31	2,184	542	201	R ² 2,927	R ⁶ 6,493
1999	211	2,965	R ⁶ 6,517	3,268	R ¹⁷¹ 68	46	46	2,214	540	209	2,963	R ⁶ 6,516
2000	233	3,006	R ⁶ 6,104	2,811	R ¹⁶⁴ 65	57	57	2,262	511	236	3,008	R ⁶ 6,106
2001	254	2,624	R ⁵ 5,164	2,242	R ¹⁶⁴ 64	70	70	2,006	364	253	2,622	R ⁵ 5,163
2002	308	2,705	R ⁵ 5,734	2,689	R ¹⁷¹ 63	105	105	1,995	402	303	2,701	R ⁵ 5,729
2003	402	2,805	R ⁵ 5,982	2,825	R ¹⁷⁵ 62	115	115	2,002	401	404	2,807	R ⁵ 5,983
2004	487	2,998	R ⁶ 6,070	2,690	R ¹⁷⁸ 63	142	142	2,121	389	R ⁴⁹⁹ 499	3,010	R ⁶ 6,082
2005	564	3,104	R ⁶ 6,229	2,703	R ¹⁸¹ 63	178	178	2,136	403	577	R ³ 3,116	R ⁶ 6,242
2006	720	3,226	R ⁶ 6,608	2,869	R ¹⁸¹ 68	264	264	2,109	397	771	R ³ 3,276	R ⁶ 6,659
2007	978	3,489	R ⁶ 6,537	2,446	R ¹⁸⁶ 76	341	341	2,098	413	991	R ³ 3,502	R ⁶ 6,551
2008	1,387	3,867	R ⁷ 7,205	2,511	R ¹⁹² 89	546	546	2,044	436	1,372	3,852	R ⁷ 7,190
2009	R ¹ 1,583	R ³ 3,915	R ⁷ 7,603	R ² 2,669	R ²⁰⁰ 98	R ⁷²¹ 98	R ⁷²¹ 98	R ¹ 1,881	R ⁴⁵² 452	R ¹ 1,567	R ³ 3,899	R ⁷ 7,587
2010 ^P	1,870	4,310	8,064	2,509	212	109	924	1,986	454	1,855	4,295	8,049

¹ Production equals consumption for all renewable energy sources except biofuels.
² Total biomass inputs to the production of fuel ethanol and biodiesel.
³ Wood and wood-derived fuels, biomass waste, and total biomass inputs to the production of fuel ethanol and biodiesel.
⁴ Hydroelectric power, geothermal, solar thermal/photovoltaic, wind, and biomass.
⁵ Conventional hydroelectricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).
⁶ Geothermal electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6), and geothermal heat pump and direct use energy.
⁷ Solar thermal and photovoltaic (PV) electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6), and solar thermal direct use energy.
⁸ Wind electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).
⁹ Wood and wood-derived fuels.
¹⁰ 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

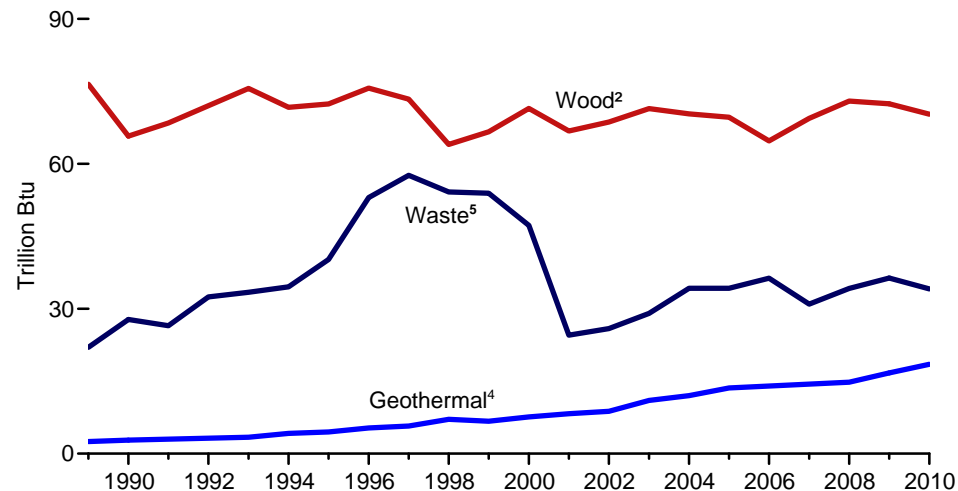
non-biogenic sources, and tire-derived fuels).
¹¹ Fuel ethanol (minus denaturant) and biodiesel consumption, plus losses and co-products from the production of fuel ethanol and biodiesel.
R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 trillion Btu.
Notes: • Most data for the residential, commercial, industrial, and transportation sectors are estimates. See notes and sources for Tables 10.2a and 10.2b. • See Tables 8.2a-8.2d and 8.3a-8.3c for electricity net generation and useful thermal output from renewable energy sources; Tables 8.4a-8.4c, 8.5a-8.5d, 8.6a-8.6c, and 8.7a-8.7c for renewable energy consumption for electricity generation and useful thermal output; and Tables 8.11a-8.11d for renewable energy electric net summer capacity. • See Note, "Renewable Energy Production and Consumption," at end of section. • See Table E1 for estimated renewable energy consumption for 1635-1945. • Totals may not equal sum of components due to independent rounding.
Web Pages: • See <http://www.eia.gov/totalenergy/data/annual/#renewable> for all data beginning in 1949. • For related information, see <http://www.eia.gov/renewable/>.
Sources: **Biofuels:** Tables 10.3 and 10.4. **All Other Data:** Tables 10.2a-10.2c.

Figure 10.2a Renewable Energy Consumption: End-Use Sectors, 1989-2010

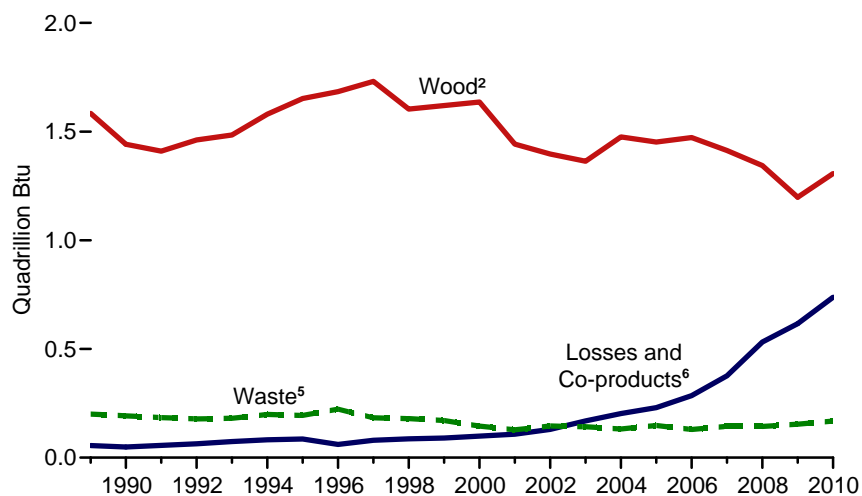
Residential Sector



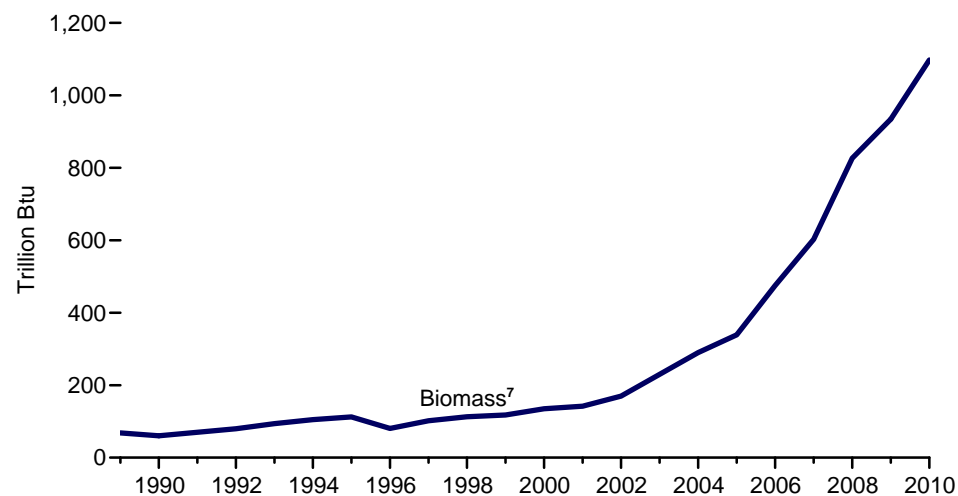
Commercial¹ Sector, Major Sources



Industrial¹ Sector, Major Sources



Transportation Sector



¹ Includes fuel used at combined-heat-and-power (CHP) plants and a small number of electricity-only plants.

² Wood and wood-derived fuels.

³ Solar thermal direct use energy, and photovoltaic (PV) electricity net generation. Includes small amounts of distributed solar thermal and PV energy used in the commercial, industrial, and electric power sectors.

⁴ Geothermal heat pump and direct use energy.

⁵ 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).

⁶ From the production of fuel ethanol and biodiesel.

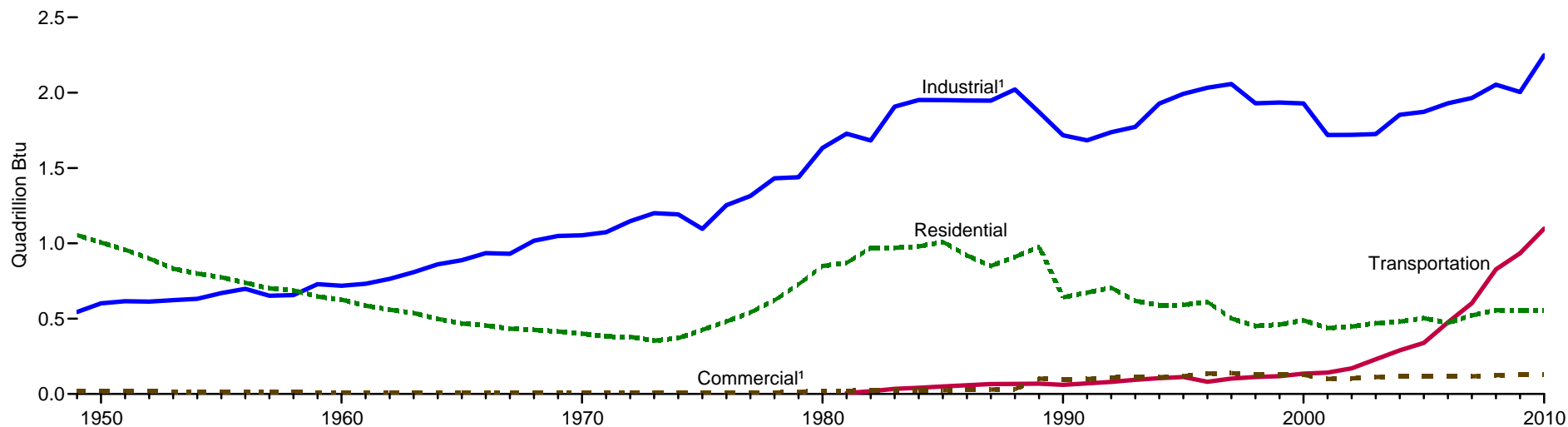
⁷ The fuel ethanol (minus denaturant) portion of motor fuels (such as E10 and E85), and biofuels used as diesel fuel substitutes, additives or extenders.

Note: See related Figures 10.2b and 10.2c.

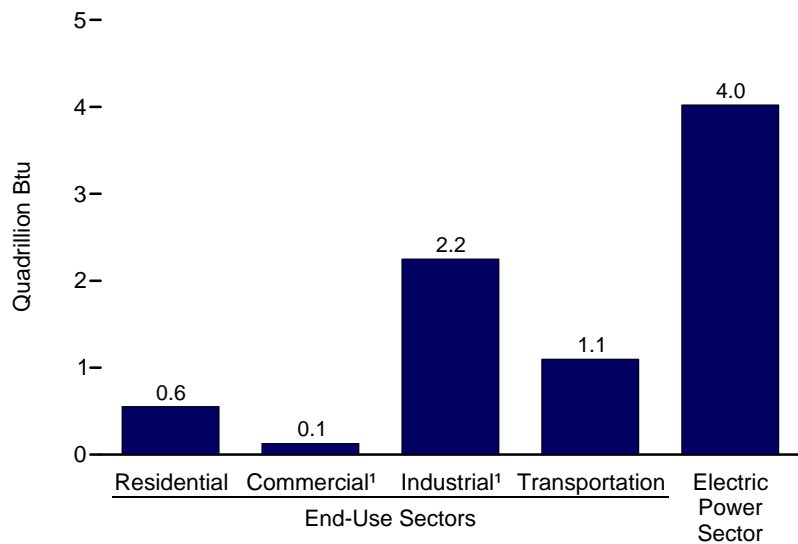
Sources: Tables 10.2a and 10.2b.

Figure 10.2b Renewable Energy Consumption: End-Use Sectors and Electric Power Sector

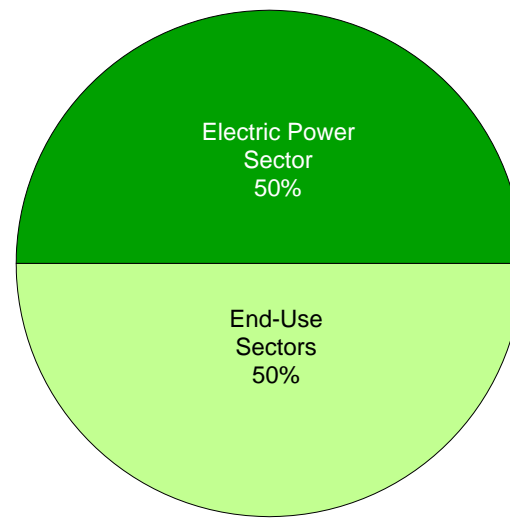
End-Use Sectors, 1949-2010



End-Use Sectors and Electric Power Sector, 2010



End-Use Sectors and Electric Power Sector Shares of Total Renewable Energy Consumption, 2010



¹ Includes fuel use at combined-heat-and-power (CHP) plants and a small number of electricity-only plants.

Note: See related Figures 10.2a and 10.2c.
Sources: Tables 10.2a-10.2c.

Table 10.2a Renewable Energy Consumption: Residential and Commercial Sectors, Selected Years, 1949-2010
(Trillion Btu)

Year	Residential Sector				Commercial Sector ¹									Total
	Geo-thermal ²	Solar/PV ³	Biomass	Total	Hydro-electric Power ⁵	Geo-thermal ²	Solar/PV ⁶	Wind ⁷	Biomass					
			Wood ⁴						Wood ⁴	Waste ⁸	Fuel Ethanol ⁹	Total		
1949	NA	NA	1,055	1,055	NA	NA	NA	NA	20	NA	NA	NA	20	20
1950	NA	NA	1,006	1,006	NA	NA	NA	NA	19	NA	NA	NA	19	19
1955	NA	NA	775	775	NA	NA	NA	NA	15	NA	NA	NA	15	15
1960	NA	NA	627	627	NA	NA	NA	NA	12	NA	NA	NA	12	12
1965	NA	NA	468	468	NA	NA	NA	NA	9	NA	NA	NA	9	9
1970	NA	NA	401	401	NA	NA	NA	NA	8	NA	NA	NA	8	8
1975	NA	NA	425	425	NA	NA	NA	NA	8	NA	NA	NA	8	8
1976	NA	NA	482	482	NA	NA	NA	NA	9	NA	NA	NA	9	9
1977	NA	NA	542	542	NA	NA	NA	NA	10	NA	NA	NA	10	10
1978	NA	NA	622	622	NA	NA	NA	NA	12	NA	NA	NA	12	12
1979	NA	NA	728	728	NA	NA	NA	NA	14	NA	NA	NA	14	14
1980	NA	NA	850	850	NA	NA	NA	NA	21	NA	NA	NA	21	21
1981	NA	NA	870	870	NA	NA	NA	NA	21	NA	(s)	NA	21	21
1982	NA	NA	970	970	NA	NA	NA	NA	22	NA	(s)	NA	22	22
1983	NA	NA	970	970	NA	NA	NA	NA	22	NA	(s)	NA	22	22
1984	NA	NA	980	980	NA	NA	NA	NA	22	NA	(s)	NA	22	22
1985	NA	NA	1,010	1,010	NA	NA	NA	NA	24	NA	(s)	NA	24	24
1986	NA	NA	920	920	NA	NA	NA	NA	27	NA	(s)	NA	27	27
1987	NA	NA	850	850	NA	NA	NA	NA	29	NA	1	NA	30	30
1988	NA	NA	910	910	NA	NA	NA	NA	32	NA	1	NA	33	33
1989	5	R52	920	R977	1	3	-	-	76	22	1	NA	99	102
1990	6	R56	580	641	1	3	-	-	66	28	(s)	NA	94	98
1991	6	R57	610	R673	1	3	-	-	68	26	(s)	NA	95	100
1992	6	R59	640	706	1	3	-	-	72	32	(s)	NA	105	109
1993	7	R61	550	618	1	3	-	-	76	33	(s)	NA	109	114
1994	6	R63	520	R589	1	4	-	-	72	35	(s)	NA	106	112
1995	7	R64	520	591	1	5	-	-	72	40	(s)	NA	113	118
1996	7	R65	540	612	1	5	-	-	76	53	(s)	NA	129	135
1997	8	R64	430	R502	1	6	-	-	73	58	(s)	NA	131	138
1998	8	R64	380	452	1	7	-	-	64	54	(s)	NA	118	127
1999	9	R63	390	R461	1	7	-	-	67	54	(s)	NA	121	129
2000	9	R60	420	R489	1	8	-	-	71	47	(s)	NA	119	128
2001	9	R59	370	R438	1	8	-	-	67	25	(s)	NA	92	101
2002	10	R57	380	R448	(s)	9	-	-	69	26	(s)	NA	95	104
2003	13	R57	400	R470	1	11	-	-	71	29	1	NA	101	113
2004	14	R57	410	R481	1	12	-	-	70	34	1	NA	105	118
2005	16	R58	430	R504	1	14	-	-	70	34	1	NA	105	119
2006	18	R63	390	R472	1	14	-	-	65	36	1	NA	102	117
2007	22	R70	430	R522	1	14	-	-	69	31	2	NA	102	118
2008	26	R80	450	R556	1	15	(s)	-	73	34	2	NA	109	125
2009	33	R89	430	R552	1	17	(s)	(s)	72	R36	R3	NA	R112	R129
2010 ^P	37	97	420	554	1	19	(s)	(s)	70	34	3	NA	108	127

¹ 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 8.

² Geothermal heat pump and direct use energy.

³ Solar thermal direct use energy, and photovoltaic (PV) electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6). Includes small amounts of distributed solar thermal and PV energy used in the commercial, industrial, and electric power sectors.

⁴ Wood and wood-derived fuels.

⁵ Conventional hydroelectricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

⁶ Photovoltaic (PV) electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6) at commercial plants with capacity of 1 megawatt or greater.

⁷ Wind electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

⁸ 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).

⁹ The fuel ethanol (minus denaturant) portion of motor fuels, such as E10, consumed by the commercial sector.

R=Revised. P=Preliminary. NA=Not available. - =No data reported. (s)=Less than 0.5 trillion Btu.

Notes: • Data are estimates, except for commercial sector solar/PV, hydroelectric power, wind, and waste. • See Tables 8.2a-8.2d and 8.3a-8.3c for electricity net generation and useful thermal output from renewable energy sources; Tables 8.4a-8.4c, 8.5a-8.5d, 8.6a-8.6c, and 8.7a-8.7c for renewable energy consumption for electricity generation and useful thermal output; and Tables 8.11a-8.11d for renewable energy electric net summer capacity. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/annual/#renewable> for all data beginning in 1949. • For related information, see <http://www.eia.gov/renewable/>.

Sources: See end of section.

Table 10.2b Renewable Energy Consumption: Industrial and Transportation Sectors, Selected Years, 1949-2010
(Trillion Btu)

Year	Industrial Sector ¹								Transportation Sector			
	Hydro-electric Power ²	Geo-thermal ³	Solar/PV ⁴	Biomass				Total	Biomass			
				Wood ⁵	Waste ⁶	Fuel Ethanol ⁷	Losses and Co-products ⁸		Fuel Ethanol ⁹	Biodiesel	Total	
1949	76	NA	NA	468	NA	NA	NA	468	544	NA	NA	NA
1950	69	NA	NA	532	NA	NA	NA	532	602	NA	NA	NA
1955	38	NA	NA	631	NA	NA	NA	631	669	NA	NA	NA
1960	39	NA	NA	680	NA	NA	NA	680	719	NA	NA	NA
1965	33	NA	NA	855	NA	NA	NA	855	888	NA	NA	NA
1970	34	NA	NA	1,019	NA	NA	NA	1,019	1,053	NA	NA	NA
1975	32	NA	NA	1,063	NA	NA	NA	1,063	1,096	NA	NA	NA
1976	33	NA	NA	1,220	NA	NA	NA	1,220	1,253	NA	NA	NA
1977	33	NA	NA	1,281	NA	NA	NA	1,281	1,314	NA	NA	NA
1978	32	NA	NA	1,400	NA	NA	NA	1,400	1,432	NA	NA	NA
1979	34	NA	NA	1,405	NA	NA	NA	1,405	1,439	NA	NA	NA
1980	33	NA	NA	1,600	NA	NA	NA	1,600	1,633	NA	NA	NA
1981	33	NA	NA	1,602	87	(s)	6	1,695	1,728	7	NA	7
1982	33	NA	NA	1,516	118	(s)	16	1,650	1,683	18	NA	18
1983	33	NA	NA	1,690	155	(s)	29	1,874	1,908	34	NA	34
1984	33	NA	NA	1,679	204	1	35	1,918	1,951	41	NA	41
1985	33	NA	NA	1,645	230	1	42	1,918	1,951	50	NA	50
1986	33	NA	NA	1,610	256	1	48	1,915	1,948	57	NA	57
1987	33	NA	NA	1,576	282	1	55	1,914	1,947	66	NA	66
1988	33	NA	NA	1,625	308	1	55	1,989	2,022	67	NA	67
1989	28	2	-	1,584	200	1	56	1,841	1,871	68	NA	68
1990	31	2	-	1,442	192	1	49	1,684	1,717	60	NA	60
1991	30	2	-	1,410	185	1	56	1,652	1,684	70	NA	70
1992	31	2	-	1,461	179	1	64	1,705	1,737	80	NA	80
1993	30	2	-	1,484	181	1	74	1,741	1,773	94	NA	94
1994	62	3	-	1,580	199	1	82	1,862	1,927	105	NA	105
1995	55	3	-	1,652	195	2	86	1,934	1,992	^R 112	NA	^R 112
1996	61	3	-	1,683	224	1	61	1,969	2,033	81	NA	81
1997	58	3	-	1,731	184	1	80	1,996	2,057	102	NA	102
1998	55	3	-	1,603	180	1	86	1,872	1,929	113	NA	113
1999	49	4	-	1,620	171	1	90	1,882	1,934	118	NA	118
2000	42	4	-	1,636	145	1	99	1,881	1,928	135	NA	135
2001	33	5	-	1,443	129	3	108	1,681	1,719	141	1	142
2002	39	5	-	1,396	146	3	130	1,676	1,720	168	2	170
2003	43	3	-	1,363	142	4	169	1,679	1,726	228	2	230
2004	33	4	-	1,476	132	6	203	1,817	1,853	286	3	290
2005	32	4	-	1,452	148	7	230	1,837	1,873	^R 327	12	339
2006	29	4	-	1,472	130	10	285	1,897	1,930	442	33	475
2007	16	5	-	1,413	144	10	377	1,944	1,964	557	46	^R 602
2008	17	5	-	1,344	144	12	532	2,031	2,053	786	40	^R 826
2009	18	4	-	^R 1,198	^R 154	13	^R 617	^R 1,982	^R 2,005	^R 894	^R 40	^R 934
2010 ^P	16	4	(s)	1,307	168	16	738	2,229	2,249	1,070	28	1,098

¹ 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 8.

² Conventional hydroelectricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

³ Geothermal heat pump and direct use energy.

⁴ Photovoltaic (PV) electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6) at industrial plants with capacity of 1 megawatt or greater.

⁵ Wood and wood-derived fuels.

⁶ 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).

⁷ The fuel ethanol (minus denaturant) portion of motor fuels, such as E10, consumed by the industrial sector.

⁸ 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.

⁹ The fuel ethanol (minus denaturant) portion of motor fuels, such as E10 and E85, consumed by the transportation sector.

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

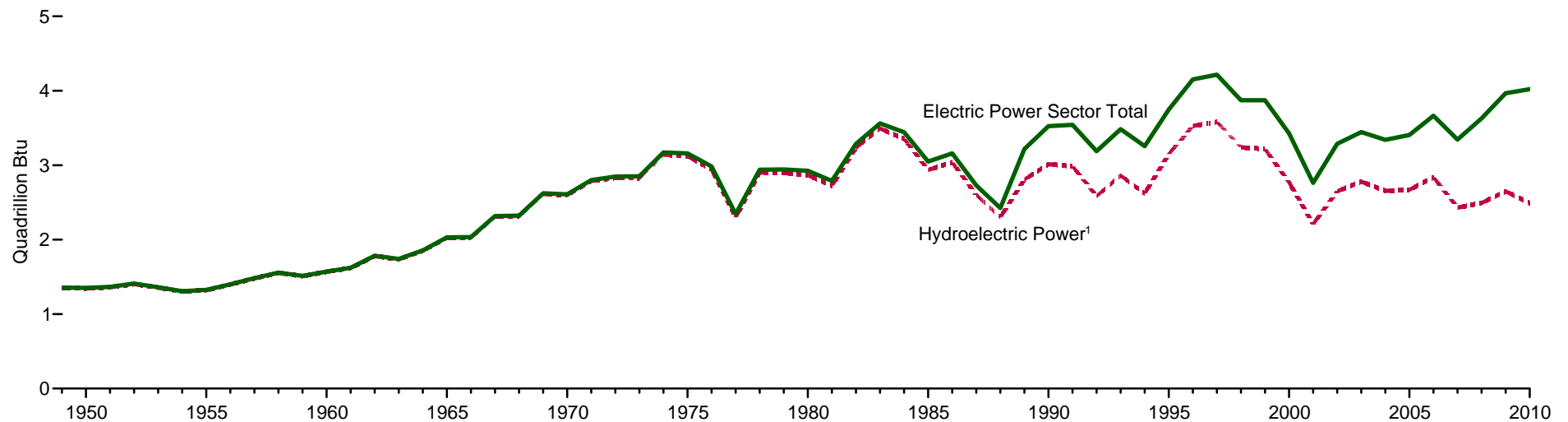
Notes: • Data are estimates, except for industrial sector hydroelectric power in 1949-1978 and 1989 forward, and solar/PV. • See Tables 8.2a-8.2d and 8.3a-8.3c for electricity net generation and useful thermal output from renewable energy sources; Tables 8.4a-8.4c, 8.5a-8.5d, 8.6a-8.6c, and 8.7a-8.7c for renewable energy consumption for electricity generation and useful thermal output; and Tables 8.11a-8.11d for renewable energy electric net summer capacity. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/annual/#renewable> for all data beginning in 1949. • For related information, see <http://www.eia.gov/renewable/>.

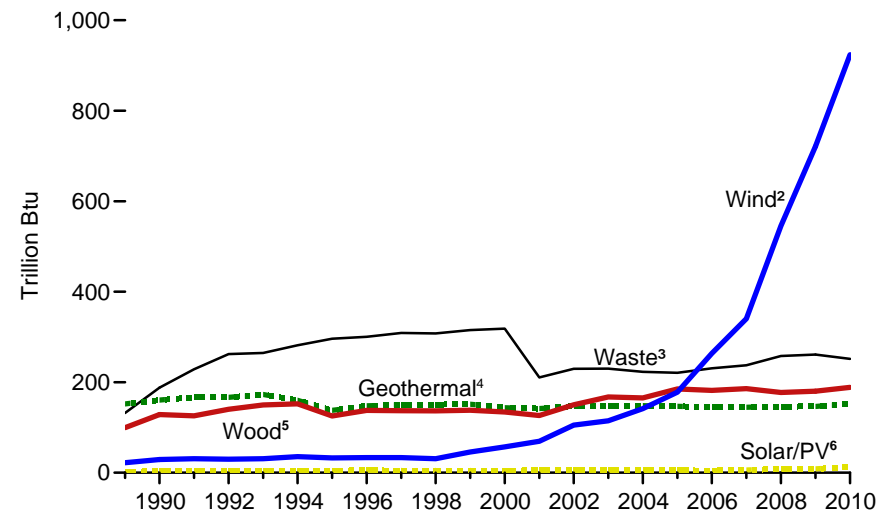
Sources: See end of section.

Figure 10.2c Renewable Energy Consumption: Electric Power Sector

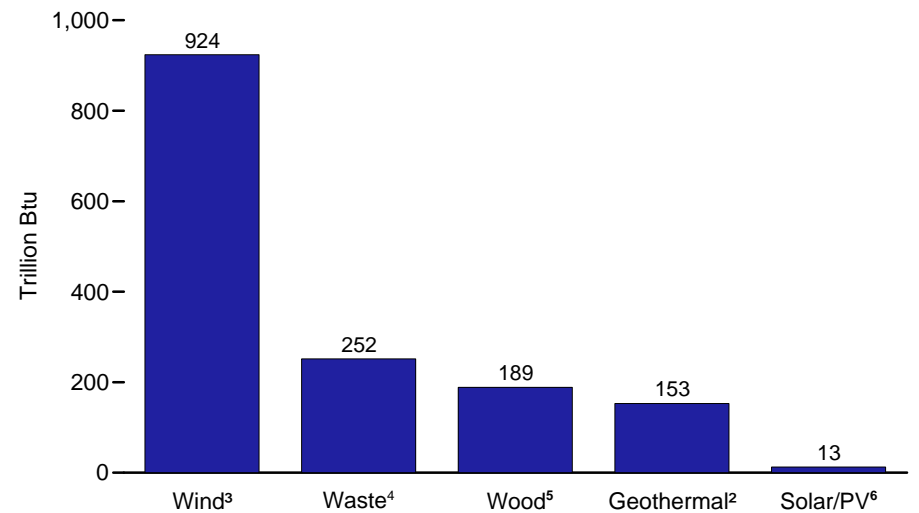
Electric Power Sector Total and Hydroelectric Power, 1949-2010



Non-Hydroelectric Power Sources, 1989-2010



Non-Hydroelectric Power Sources, 2010



¹ Conventional hydroelectricity net generation.

² Wind electricity net generation.

³ 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).

⁴ Geothermal electricity net generation.

⁵ Wood and wood-derived fuels.

⁶ Solar thermal and photovoltaic (PV) electricity net generation.

Note: See related Figures 10.2a and 10.2b on the end-use sectors.

Source: Table 10.2c.

Table 10.2c Renewable Energy Consumption: Electric Power Sector, Selected Years, 1949-2010

(Trillion Btu)

Year	Hydroelectric Power ¹	Geothermal ²	Solar/PV ³	Wind ⁴	Biomass			Total
					Wood ⁵	Waste ⁶	Total	
1949	1,349	NA	NA	NA	6	NA	6	1,355
1950	1,346	NA	NA	NA	5	NA	5	1,351
1955	1,322	NA	NA	NA	3	NA	3	1,325
1960	1,569	R(s)	NA	NA	2	NA	2	1,571
1965	2,026	R2	NA	NA	3	NA	3	R2,031
1970	2,600	R6	NA	NA	1	2	4	R2,609
1975	3,122	R34	NA	NA	(s)	2	2	R3,158
1976	2,943	R38	NA	NA	1	2	3	R2,983
1977	2,301	R37	NA	NA	3	2	5	R2,343
1978	2,905	R31	NA	NA	2	1	3	R2,940
1979	2,897	R40	NA	NA	3	2	5	R2,942
1980	2,867	R53	NA	NA	3	2	5	R2,925
1981	2,725	R59	NA	NA	3	1	4	R2,788
1982	3,233	R51	NA	NA	2	1	3	R3,286
1983	3,494	R64	NA	(s)	2	2	4	R3,562
1984	3,353	R81	(s)	(s)	5	4	9	R3,443
1985	2,937	R97	(s)	(s)	8	7	14	R3,049
1986	3,038	R108	(s)	(s)	5	7	12	R3,158
1987	2,602	R112	(s)	(s)	8	7	15	R2,729
1988	2,302	R106	(s)	(s)	10	8	17	R2,425
1989 ⁷	2,808	R152	3	22	100	132	232	R3,217
1990	3,014	R161	4	29	129	188	317	R3,524
1991	2,985	R167	5	31	126	229	354	R3,542
1992	2,586	R167	4	30	140	262	402	R3,189
1993	2,861	R173	5	31	150	265	415	R3,484
1994	2,620	R160	5	36	152	282	434	R3,255
1995	3,149	R138	5	33	125	296	422	R3,747
1996	3,528	R148	5	33	138	300	438	R4,153
1997	3,581	R150	5	34	137	309	446	R4,216
1998	3,241	R151	5	31	137	308	444	R3,872
1999	3,218	R152	5	46	138	315	453	R3,874
2000	2,768	R144	5	57	134	318	453	R3,427
2001	2,209	R142	6	70	126	211	337	R2,763
2002	2,650	R147	6	105	150	230	380	R3,288
2003	2,781	R148	5	115	167	230	397	R3,445
2004	2,656	R148	6	142	165	223	388	R3,340
2005	2,670	R147	6	178	185	221	406	R3,406
2006	2,839	R145	5	264	182	231	412	R3,665
2007	2,430	R145	6	341	186	237	423	R3,345
2008	2,494	R146	9	546	177	258	435	R3,630
2009	R2,650	R146	R9	R721	R180	R261	R441	R3,967
2010 ^P	2,492	153	13	924	189	252	440	4,022

¹ Conventional hydroelectricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

² Geothermal electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

³ Solar thermal and photovoltaic (PV) electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

⁴ Wind electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6).

⁵ Wood and wood-derived fuels.

⁶ 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).

⁷ Through 1988, data are for electric utilities only. Beginning in 1989, data are for electric utilities and independent power producers.

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

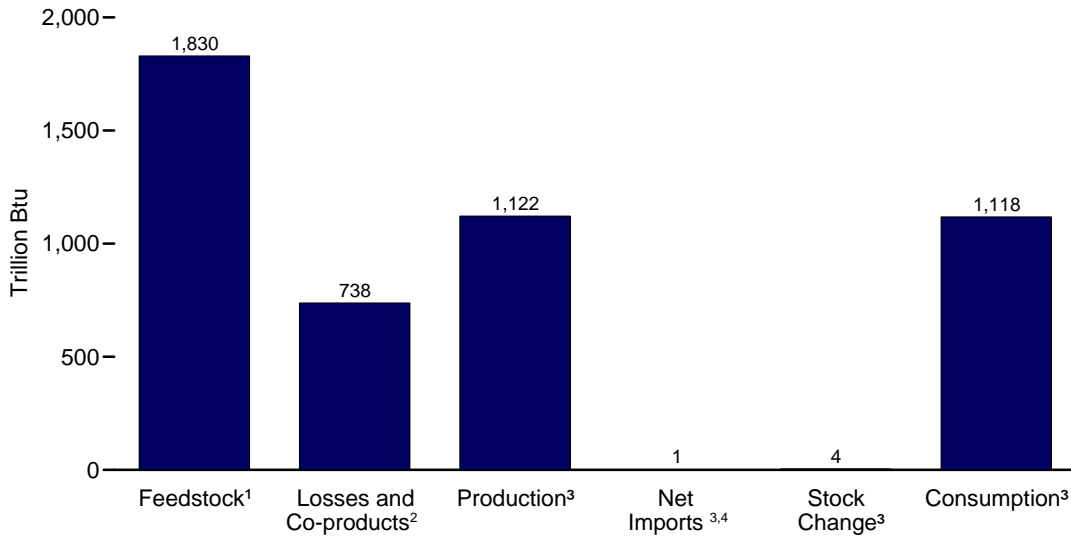
Notes: • The electric power sector comprises electricity-only and combined-heat-and-power (CHP) plants within the NAICS 22 category whose primary business is to sell electricity, or electricity and heat, to the public. • See Tables 8.2a-8.2d and 8.3a-8.3c for electricity net generation and useful thermal output from renewable energy sources; Tables 8.4a-8.4c, 8.5a-8.5d, 8.6a-8.6c, and 8.7a-8.7c for renewable energy consumption for electricity generation and useful thermal output; and Tables 8.11a-8.11d for renewable energy electric net summer capacity. • See Note 3, "Electricity Imports and Exports," at end of Section 8. • Totals may not equal sum of components due to independent rounding.

Web Pages: • See <http://www.eia.gov/totalenergy/data/annual/#renewable> for all data beginning in 1949. • For related information, see <http://www.eia.gov/renewable/>.

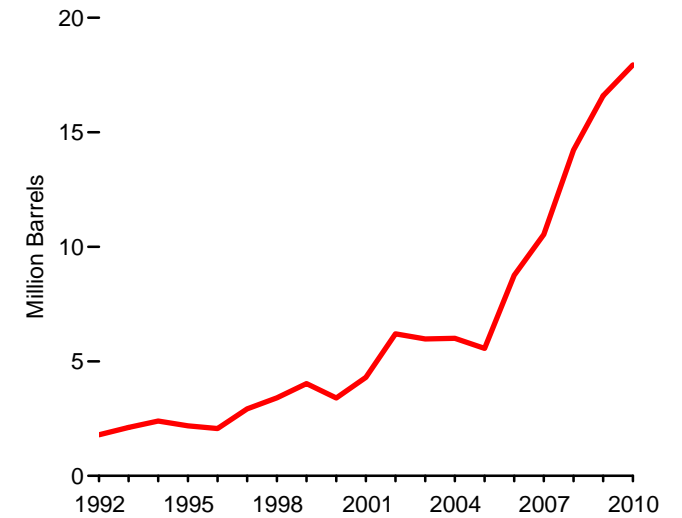
Sources: Tables 8.2b, 8.5b, 8.7b, and A6.

Figure 10.3 Fuel Ethanol Overview

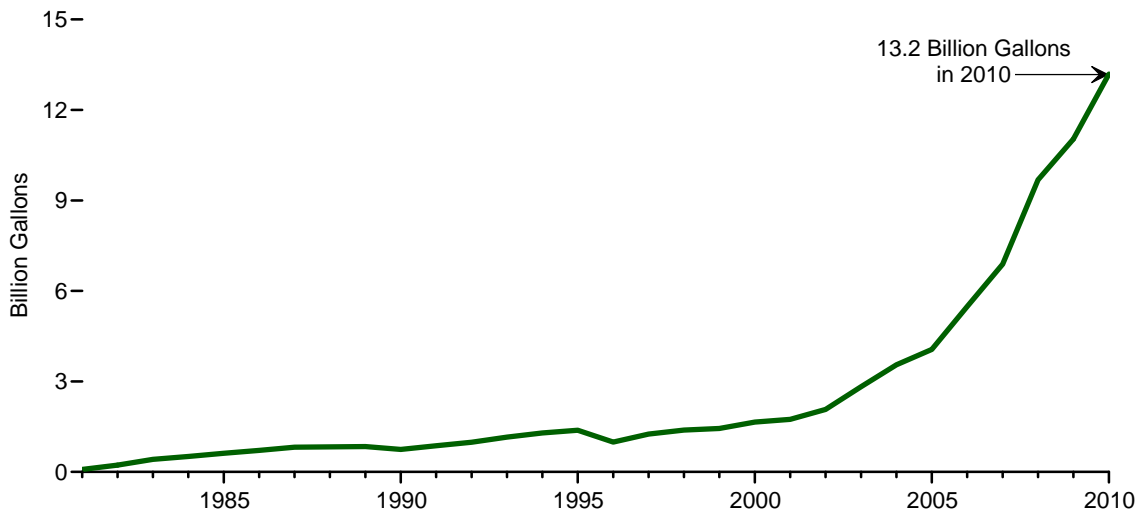
Overview, 2010



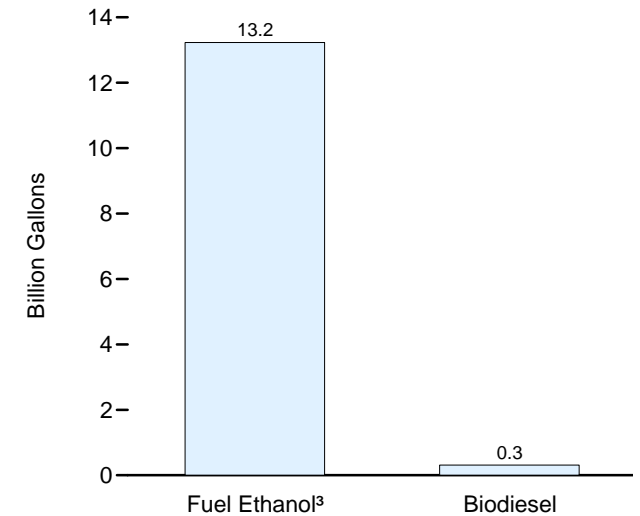
Stocks,³ 1992-2010



Consumption,³ 1981-2010



Fuel Ethanol and Biodiesel Production, 2010



¹ Total corn and other biomass inputs to the production of undenatured ethanol used for fuel ethanol.

² Losses and co-products from the production of fuel ethanol.

³ Includes denaturant.

⁴ Fuel ethanol imports only. Data for fuel ethanol exports are not available.

Sources: Tables 10.3, 10.4, and A3.

Table 10.3 Fuel Ethanol Overview, 1981-2010

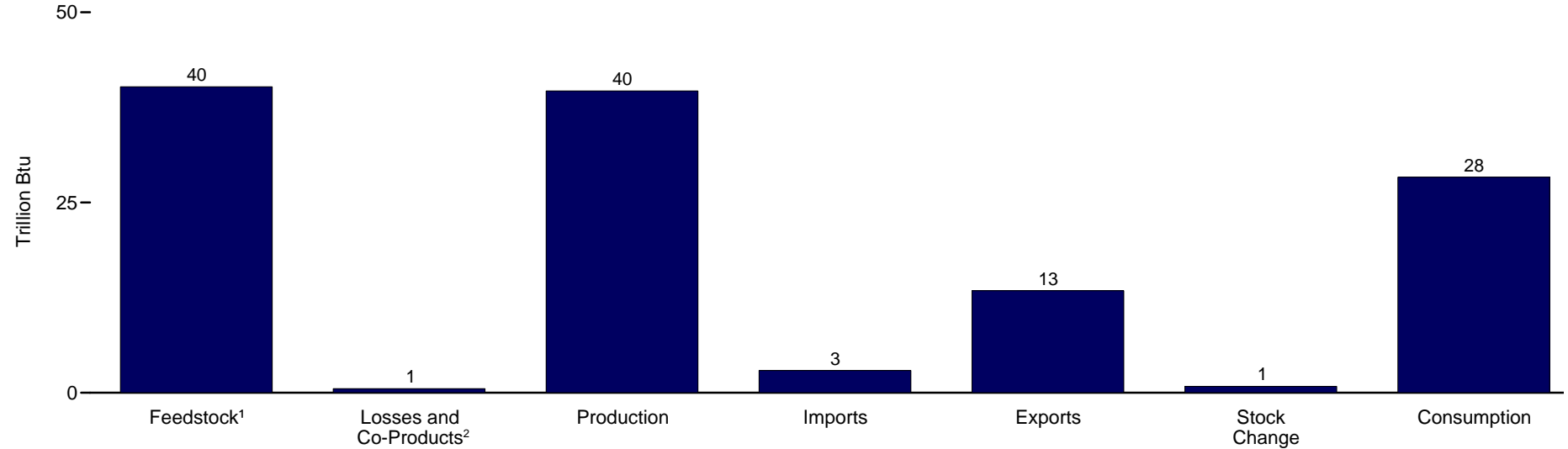
Year	Feed-stock ¹ Trillion Btu	Losses and Co-products ² Trillion Btu	Denaturant ³ Thousand Barrels	Production ⁴			Trade ⁴			Stocks ^{4,6} Thousand Barrels	Stock Change ^{4,7} Thousand Barrels	Consumption ⁴			Consumption Minus Denaturant ⁸ Trillion Btu
				Thousand Barrels	Million Gallons	Trillion Btu	Imports Thousand Barrels	Exports Thousand Barrels	Net Imports ⁵ Thousand Barrels			Thousand Barrels	Million Gallons	Trillion Btu	
1981	13	6	40	1,978	83	7	NA	NA	NA	NA	NA	1,978	83	7	7
1982	34	16	107	5,369	225	19	NA	NA	NA	NA	NA	5,369	225	19	19
1983	63	29	198	9,890	415	35	NA	NA	NA	NA	NA	9,890	415	35	34
1984	77	35	243	12,150	510	43	NA	NA	NA	NA	NA	12,150	510	43	42
1985	93	42	294	14,693	617	52	NA	NA	NA	NA	NA	14,693	617	52	51
1986	107	48	339	16,954	712	60	NA	NA	NA	NA	NA	16,954	712	60	59
1987	123	55	390	19,497	819	69	NA	NA	NA	NA	NA	19,497	819	69	68
1988	124	55	396	19,780	831	70	NA	NA	NA	NA	NA	19,780	831	70	69
1989	125	56	401	20,062	843	71	NA	NA	NA	NA	NA	20,062	843	71	70
1990	111	49	356	17,802	748	63	NA	NA	NA	NA	NA	17,802	748	63	62
1991	128	56	413	20,627	866	73	NA	NA	NA	NA	NA	20,627	866	73	72
1992	145	64	469	23,453	985	84	NA	NA	NA	1,791	NA	23,453	985	84	81
1993	169	74	550	27,484	1,154	98	244	NA	244	2,114	323	27,405	1,151	98	95
1994	188	82	614	30,689	1,289	109	279	NA	279	2,393	279	30,689	1,289	109	106
1995	198	86	647	32,325	1,358	115	387	NA	387	2,186	-207	32,919	1,383	117	114
1996	141	61	464	23,178	973	83	313	NA	313	2,065	-121	23,612	992	84	82
1997	186	80	613	30,674	1,288	109	85	NA	85	2,925	860	29,899	1,256	107	104
1998	202	86	669	33,453	1,405	119	66	NA	66	3,406	481	33,038	1,388	118	115
1999	211	90	698	34,881	1,465	124	87	NA	87	4,024	618	34,350	1,443	122	119
2000	233	99	773	38,627	1,622	138	116	NA	116	3,400	-624	39,367	1,653	140	137
2001	253	108	841	42,028	1,765	150	315	NA	315	4,298	898	41,445	1,741	148	144
2002	307	130	1,019	50,956	2,140	182	306	NA	306	6,200	1,902	49,360	2,073	176	171
2003	400	169	1,335	66,772	2,804	238	292	NA	292	5,978	-222	67,286	2,826	240	233
2004	484	203	1,621	81,058	3,404	289	3,542	NA	3,542	6,002	24	84,576	3,552	301	293
2005	552	230	1,859	92,961	3,904	331	3,234	NA	3,234	5,563	-439	96,634	4,059	344	335
2006	688	285	2,326	116,294	4,884	414	17,408	NA	17,408	8,760	3,197	130,505	5,481	465	453
2007	914	376	3,105	155,263	6,521	553	10,457	NA	10,457	10,535	1,775	163,945	6,886	584	569
2008	1,300	531	4,433	221,637	9,309	790	12,610	NA	12,610	14,226	3,691	230,556	9,683	821	800
2009	R1,517	R616	R5,688	R260,424	R10,938	R928	R4,720	-	R4,720	R16,594	R2,368	R262,776	R11,037	R936	R910
2010 ^P	1,830	738	6,464	315,018	13,231	1,122	243	-	243	17,940	91,229	314,032	13,189	1,118	1,089

¹ Total corn and other biomass inputs to the production of undenatured ethanol used for fuel ethanol.
² 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.
³ The amount of denaturant in fuel ethanol produced.
⁴ Includes denaturant.
⁵ Net imports equal imports minus exports.
⁶ Stocks are at end of year.
⁷ A negative value indicates a decrease in stocks and a positive value indicates an increase.
⁸ 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.
⁹ Derived from the preliminary 2009 stocks value (16,711 thousand barrels), not the final 2009 value (16,594 thousand barrels) that is shown under "Stocks."
R=Revised. P=Preliminary. NA=Not available. --=No data reported.
Notes: • 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.
Web Page: http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html.
Sources: **Feedstock:** 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:** 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 percent of fuel ethanol production; these data are converted to Btu by multiplying by 4.645 million Btu per barrel (the estimated quantity-weighted factor of pentanes plus and conventional motor gasoline used as denaturant).
• 2009 and 2010—U.S. Energy Information Administration (EIA), *Petroleum Supply Annual (PSA)*, annual

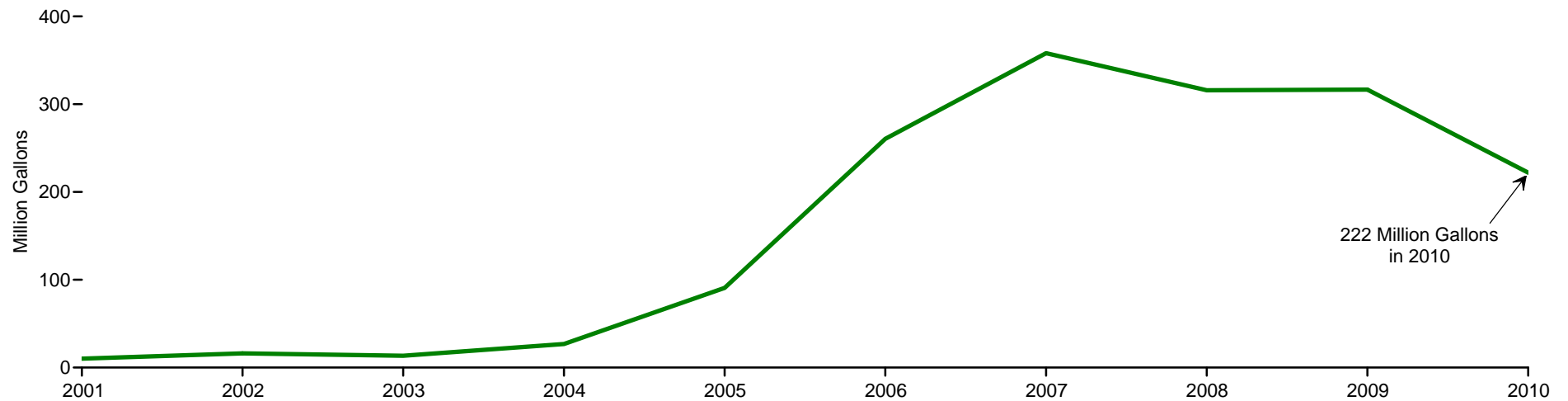
report, Table 1, and *Petroleum Supply Monthly (PSM)*, monthly reports, Table 1. Data in thousand barrels for net production of pentanes plus at renewable fuels and oxygenate plants are multiplied by -1; these data are converted to Btu by multiplying by 4.620 million Btu per barrel (the approximate heat content of pentanes plus). 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 5.253 million Btu per barrel (the approximate heat content of conventional motor gasoline). Total denaturant is the sum of the values for pentanes plus, 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—EIA, PSA, Table 1, data for net production of fuel ethanol at renewable fuels and oxygenate plants. • 2010—EIA, PSM (February 2011), Table 1, data for net production of fuel ethanol at renewable fuels and oxygenate plants. **Trade, Stocks, and Stock Change:** • 1992-2009—EIA, PSA, annual reports, Table 1.
• 2010—EIA, PSM (February 2011), 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 percent 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—EIA, PSA, Table 1. Calculated as fuel ethanol refinery and blender net inputs minus fuel ethanol adjustments. • 2010—EIA, PSM (February 2011), Table 1. Calculated as fuel ethanol refinery and blender net inputs minus fuel ethanol adjustments. **Consumption Minus Denaturant:** 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.

Figure 10.4 Biodiesel Overview

Overview, 2010



Consumption, 2001-2010



¹ Total vegetable oil and other biomass inputs to the production of biodiesel.

² Losses and co-products from the production of biodiesel.

Sources: Tables 10.4 and A3.

Table 10.4 Biodiesel Overview, 2001-2010

Year	Feedstock ¹	Losses and Co-products ²	Production			Trade			Stocks ⁴	Stock Change ⁵	Balancing Item ⁶	Consumption		
						Imports	Exports	Net Imports ³						
			Trillion Btu	Trillion Btu	Thousand Barrels	Million Gallons	Trillion Btu	Thousand Barrels				Thousand Barrels	Thousand Barrels	Thousand Barrels
2001	1	(s)	204	9	1	78	39	39	NA	NA	NA	243	10	1
2002	1	(s)	250	10	1	191	56	135	NA	NA	NA	385	16	2
2003	2	(s)	338	14	2	94	110	-16	NA	NA	NA	322	14	2
2004	4	(s)	666	28	4	97	124	-26	NA	NA	NA	640	27	3
2005	12	(s)	2,162	91	12	207	206	1	NA	NA	NA	2,163	91	12
2006	32	(s)	5,963	250	32	1,069	828	242	NA	NA	NA	6,204	261	33
2007	63	1	11,662	490	62	3,342	6,477	-3,135	NA	NA	NA	8,528	358	46
2008	88	1	16,145	678	87	7,502	16,128	-8,626	NA	NA	NA	7,519	316	40
2009	^R 65	1	^R 12,054	^R 506	^R 65	1,844	6,332	-4,489	^R 711	^R 711	^R 682	^R 7,537	^R 317	^R 40
2010 ^P	40	1	7,401	311	40	546	2,503	-1,958	662	7156	0	5,288	222	28

¹ Total vegetable oil and other biomass inputs to the production of biodiesel.

² 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.

³ Net imports equal imports minus exports.

⁴ Stocks are at end of year.

⁵ A negative value indicates a decrease in stocks and a positive value indicates an increase.

⁶ Beginning in 2009, because of incomplete data coverage and different data sources, "Balancing Item" is used to balance biodiesel supply and disposition.

⁷ Derived from the preliminary 2009 stocks value (506 thousand barrels), not the final 2009 value (711 thousand barrels) that is shown under "Stocks."

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

Notes: • 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 A3). • Through 2000, data are not available. Beginning in 2001, data not from U.S. Energy Information Administration (EIA) surveys are estimates. • Totals may not equal sum of components due to independent rounding.

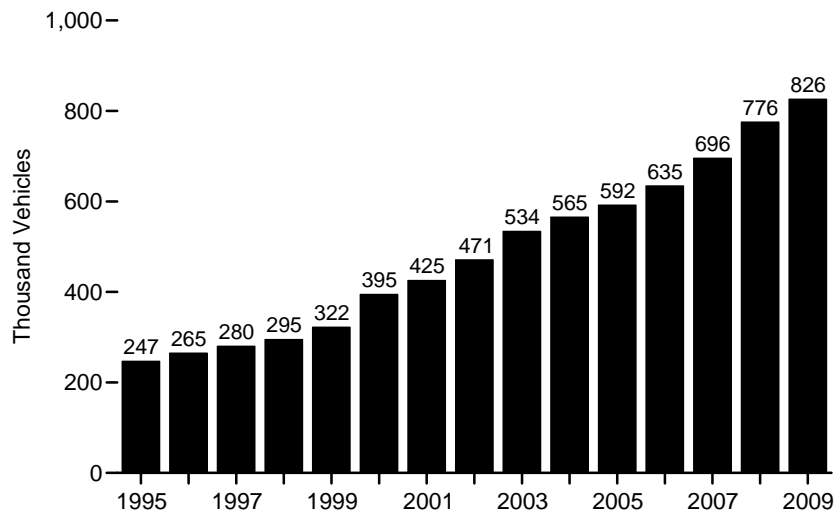
Web Page: See <http://www.eia.doe.gov/cneaf/solar.renewables/page/biodiesel/biodiesel.pdf> for related information.

Sources: **Feedstock:** Calculated as biodiesel production in thousand barrels multiplied by 5.433 million Btu per barrel (the biodiesel feedstock factor—see Table A3). **Losses and Co-products:** Calculated as biodiesel feedstock minus biodiesel production. **Production:** • 2001-2005—U.S. Department of Agriculture, Commodity Credit Corporation, Bioenergy Program records. Annual data are derived from quarterly data. • 2006—U.S. Department of Commerce, Bureau of the Census, "M311K - Fats and Oils:

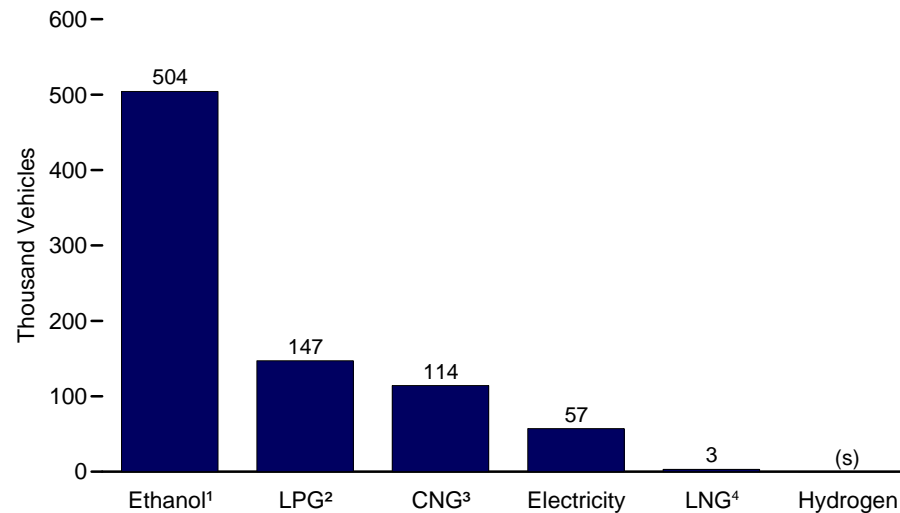
Production, Consumption, and Stocks," data for soybean oil consumed in methyl esters (biodiesel). In addition, EIA estimates that 14.4 million gallons of yellow grease were consumed in methyl esters (biodiesel). • 2007—U.S. Department of Commerce, Bureau of the Census, "M311K - Fats and Oils: Production, Consumption, and Stocks," data for all fats and oils consumed in methyl esters (biodiesel). • 2008 and 2009—EIA, *Monthly Biodiesel Production Report, December 2009* (release date October 2010), Table 11. • 2010—U.S. Department of Commerce, Bureau of the Census, "M311K - Fats and Oils: Production, Consumption, and Stocks," data for all fats and oils consumed in methyl esters (biodiesel). **Trade:** U.S. Department of Agriculture, imports data for Harmonized Tariff Schedule codes 3824.90.40.20, "Fatty Esters Animal/Vegetable/Mixture" (for data through June 2010), and 3824.90.40.30, "Biodiesel/Mixes" (for data beginning in July 2010); and exports data for Schedule B code 3824.90.40.00, "Fatty Substances Animal/Vegetable/Mixture." Although these categories include products other than biodiesel (such as those 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 estimates. **Stocks and Stock Change:** • 2009—EIA, *Petroleum Supply Annual*, annual reports, Table 1, data for renewable fuels except fuel ethanol. • 2010—EIA, *Petroleum Supply Monthly (PSM)*, monthly reports, Table 1, data for renewable fuels except fuel ethanol. **Balancing Item:** • 2009 and 2010—Calculated as biodiesel consumption and biodiesel stock change minus biodiesel production and biodiesel net imports. **Consumption:** • 2001-2008—Calculated as biodiesel production plus biodiesel net imports. • 2009—Calculated as the sum of the monthly consumption data. Data for January and February 2009 are from EIA, PSM, monthly reports, Table 1, refinery and blender net inputs of renewable fuels except fuel ethanol. Data for March-December 2009 are calculated as biodiesel production plus biodiesel net imports minus biodiesel stock change. • 2010—Calculated as biodiesel production plus biodiesel net imports minus biodiesel stock change.

Figure 10.5 Estimated Number of Alternative-Fueled Vehicles in Use and Alternative Fuel Consumption

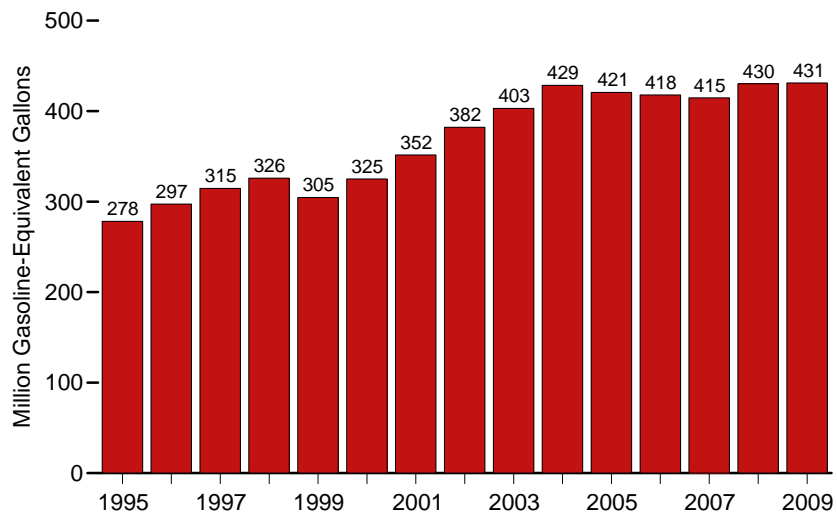
Vehicles in Use, 1995-2009



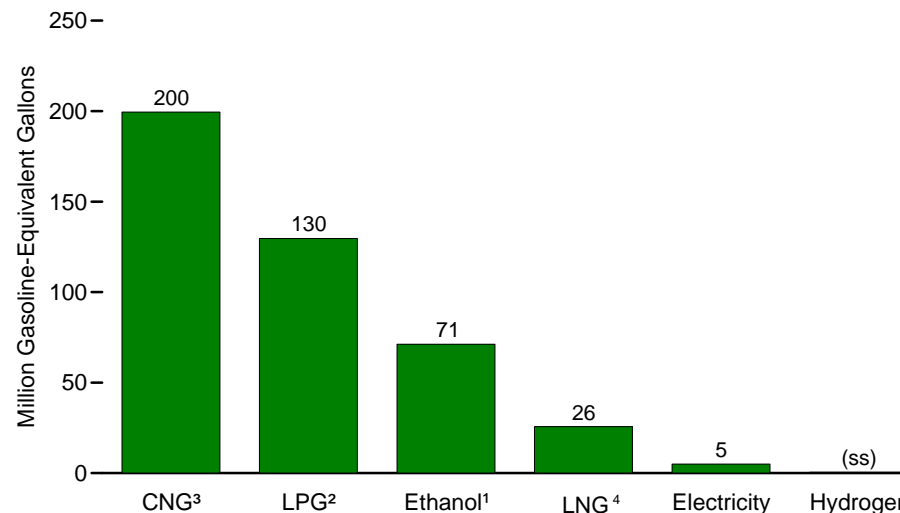
Vehicles in Use by Fuel Type, 2009



Fuel Consumption, 1995-2009



Fuel Consumption by Type, 2009



¹ Ethanol, 85 percent (E85). Includes only those E85 vehicles believed to be used as alternative-fueled vehicles, primarily fleet-operated vehicles; excludes other vehicles with E85-fueling capability.

² Liquefied petroleum gases.

³ Compressed natural gas.

⁴ Liquefied natural gas.

(s)=Fewer than 0.5 thousand vehicles.

(ss)=Less than 0.5 million gasoline-equivalent gallons.

Source: Table 10.5.

Table 10.5 Estimated Number of Alternative-Fueled Vehicles in Use and Fuel Consumption, 1992-2009

Year	Alternative and Replacement Fuels ¹												Oxygenates ²			Bio-diesel ¹⁰	Total
	Liquefied Petroleum Gases	Compressed Natural Gas	Liquefied Natural Gas	Methanol, 85 Percent (M85) ³	Methanol, Neat (M100) ⁴	Ethanol, 85 Percent (E85) ^{3,5}	Ethanol, 95 Percent (E95) ³	Elec-tricity ⁶	Hydro-gen	Other Fuels ⁷	Subtotal	Methyl Tertiary Butyl Ether ⁸	Ethanol in Gasohol ⁹	Total			
	Alternative-Fueled Vehicles in Use ¹¹ (number)																
1992	NA	23,191	90	4,850	404	172	38	1,607	NA	NA	NA	NA	NA	NA	NA	NA	NA
1993	NA	32,714	299	10,263	414	441	27	1,690	NA	NA	NA	NA	NA	NA	NA	NA	NA
1994	NA	41,227	484	15,484	415	605	33	2,224	NA	NA	NA	NA	NA	NA	NA	NA	NA
1995	172,806	50,218	603	18,319	386	1,527	136	2,860	0	0	246,855	NA	NA	NA	NA	NA	NA
1996	175,585	60,144	663	20,265	172	4,536	361	3,280	0	0	265,006	NA	NA	NA	NA	NA	NA
1997	175,679	68,571	813	21,040	172	9,130	347	4,453	0	0	280,205	NA	NA	NA	NA	NA	NA
1998	177,183	78,782	1,172	19,648	200	12,788	14	5,243	0	0	295,030	NA	NA	NA	NA	NA	NA
1999	178,610	91,267	1,681	18,964	198	24,604	14	6,964	0	0	322,302	NA	NA	NA	NA	NA	NA
2000	181,994	100,750	2,090	10,426	0	87,570	4	11,830	0	0	394,664	NA	NA	NA	NA	NA	NA
2001	185,053	111,851	2,576	7,827	0	100,303	0	17,847	0	0	425,457	NA	NA	NA	NA	NA	NA
2002	187,680	120,839	2,708	5,873	0	120,951	0	33,047	0	0	471,098	NA	NA	NA	NA	NA	NA
2003	190,369	114,406	2,640	0	0	179,090	0	47,485	9	0	533,999	NA	NA	NA	NA	NA	NA
2004	182,864	118,532	2,717	0	0	211,800	0	49,536	43	0	565,492	NA	NA	NA	NA	NA	NA
2005	173,795	117,699	2,748	0	0	246,363	0	51,398	119	3	592,125	NA	NA	NA	NA	NA	NA
2006	164,846	116,131	2,798	0	0	297,099	0	53,526	159	3	634,562	NA	NA	NA	NA	NA	NA
2007	158,254	114,391	2,781	0	0	364,384	0	55,730	223	3	695,766	NA	NA	NA	NA	NA	NA
2008	151,049	113,973	3,101	0	0	450,327	0	56,901	313	3	775,667	NA	NA	NA	NA	NA	NA
2009 ^P	147,030	114,270	3,176	0	0	504,297	0	57,185	357	3	826,318	NA	NA	NA	NA	NA	NA
Fuel Consumption ¹² (thousand gasoline-equivalent gallons)																	
1992	NA	17,159	598	1,121	2,672	22	87	359	NA	NA	NA	1,175,964	719,408	1,895,372	NA	NA	NA
1993	NA	22,035	1,944	1,671	3,321	49	82	288	NA	NA	NA	2,070,897	779,958	2,850,854	NA	NA	NA
1994	NA	24,643	2,398	2,455	3,347	82	144	430	NA	NA	NA	2,020,455	868,113	2,888,569	NA	NA	NA
1995	233,178	35,865	2,821	2,122	2,255	195	1,021	663	0	0	278,121	2,693,407	934,615	3,628,022	NA	3,906,142	NA
1996	239,648	47,861	3,320	1,862	364	712	2,770	773	0	0	297,310	2,751,955	677,537	3,429,492	NA	3,726,802	NA
1997	238,845	66,495	3,798	1,630	364	1,314	1,166	1,010	0	0	314,621	3,106,745	852,514	3,959,260	NA	4,273,880	NA
1998	241,881	73,859	5,463	1,271	471	1,772	61	1,202	0	0	325,980	2,905,781	912,858	3,818,639	NA	4,144,620	NA
1999	210,247	81,211	5,959	1,126	469	4,019	64	1,524	0	0	304,618	3,405,390	975,255	4,380,645	NA	4,685,263	NA
2000	213,012	88,478	7,423	614	0	12,388	13	3,058	0	0	324,986	3,298,803	1,114,313	4,413,116	6,828	4,744,930	NA
2001	216,319	106,584	9,122	461	0	15,007	0	4,066	0	0	351,558	3,354,949	1,173,323	4,528,272	10,627	4,890,457	NA
2002	223,600	123,081	9,593	354	0	18,250	0	7,274	0	0	382,152	3,122,859	1,450,721	4,573,580	16,824	4,972,556	NA
2003	224,697	133,222	13,503	0	0	26,376	0	5,141	2	0	402,941	2,368,400	1,919,572	4,287,972	14,082	4,704,995	NA
2004	211,883	158,903	20,888	0	0	31,581	0	5,269	8	0	428,532	1,877,300	2,414,167	4,291,467	27,616	4,747,615	NA
2005	188,171	166,878	22,409	0	0	38,074	0	5,219	25	2	420,778	1,654,500	2,756,663	4,411,163	93,281	4,925,222	NA
2006	173,130	172,011	23,474	0	0	44,041	0	5,104	41	2	417,803	435,000	3,729,168	4,164,168	267,623	4,849,594	NA
2007	152,360	178,565	24,594	0	0	54,091	0	5,037	66	2	414,715	0	4,694,304	4,694,304	367,764	5,476,783	NA
2008	147,784	189,358	25,554	0	0	62,464	0	5,050	117	2	430,329	0	6,442,781	6,442,781	324,329	7,197,439	NA
2009 ^P	129,631	199,513	25,652	0	0	71,213	0	4,956	140	2	431,107	0	7,343,133	7,343,133	325,102	8,099,342	NA

¹ See "Alternative Fuel" and "Replacement Fuel" in Glossary.

² See "Oxygenates" in Glossary.

³ Remaining portion is motor gasoline. Consumption data include the motor gasoline portion of the fuel.

⁴ One hundred percent methanol.

⁵ Includes only those E85 vehicles believed to be used as alternative-fuels vehicles (AFVs), primarily fleet-operated vehicles; excludes other vehicles with E85-fueling capability. In 1997, some vehicle manufacturers began including E85-fueling capability in certain model lines of vehicles. For 2009, the U.S. Energy Information Administration (EIA) estimates that the number of E85 vehicles that are capable of operating on E85, motor gasoline, or both, is about 10 million. Many of these AFVs are sold and used as traditional gasoline-powered vehicles.

⁶ Excludes gasoline-electric hybrids.

⁷ May include P-Series fuel or any other fuel designated by the Secretary of Energy as an alternative fuel in accordance with the Energy Policy Act of 1995.

⁸ In addition to methyl tertiary butyl ether (MTBE), includes a very small amount of other ethers, primarily tertiary amyl methyl ether (TAME) and ethyl tertiary butyl ether (ETBE).

⁹ Data do not include the motor gasoline portion of the fuel.

¹⁰ "Biodiesel" may be used as a diesel fuel substitute or diesel fuel additive or extender. See "Biodiesel" in Glossary.

¹¹ "Vehicles in Use" data represent accumulated acquisitions, less retirements, as of the end of each

calendar year; data do not include concept and demonstration vehicles that are not ready for delivery to end users. See "Alternative-Fueled Vehicle" in Glossary.

¹² Fuel consumption quantities are expressed in a common base unit of gasoline-equivalent gallons to allow comparisons of different fuel types. Gasoline-equivalent gallons do not represent gasoline displacement. Gasoline equivalent is computed by dividing the gross heat content of the replacement fuel by the gross heat content of gasoline (using an approximate heat content of 122,619 Btu per gallon) and multiplying the result by the replacement fuel consumption value. See "Heat Content" in Glossary.

P=Preliminary. NA=Not available.

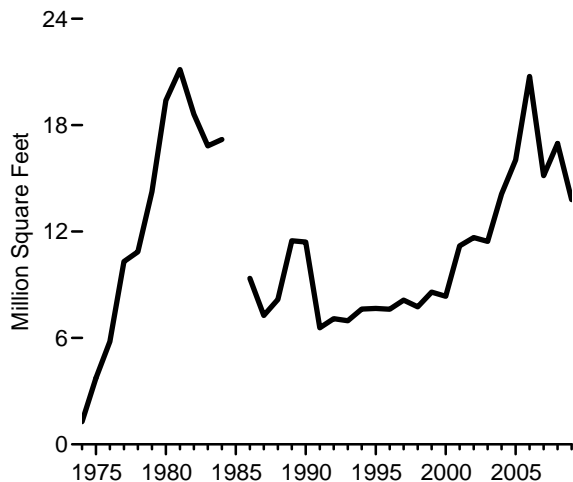
Note: Totals may not equal sum of components due to independent rounding.

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

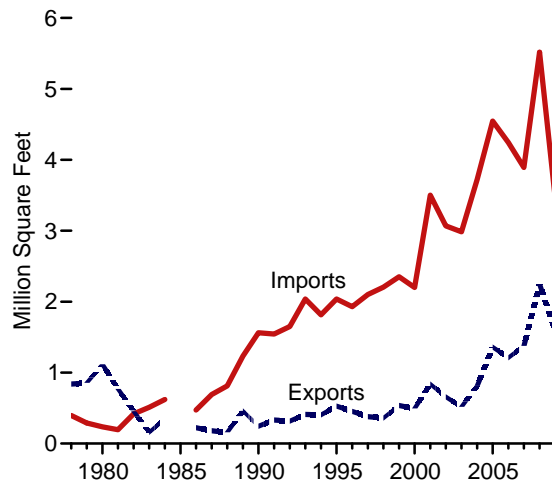
Sources: • 1992-1994—Science Applications International Corporation, "Alternative Transportation Fuels and Vehicles Data Development," unpublished final report prepared for the EIA, (McLean, VA, July 1996), and U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. Data were revised by using gross instead of net heat contents. For a table of gross and net heat contents, see EIA, *Alternatives to Traditional Transportation Fuels: An Overview* (June 1994), Table 22. • 1995-2002—EIA, "Alternatives to Traditional Transportation Fuels 2003 Estimated Data" (February 2004), Tables 1 and 10, and unpublished revisions. Data were revised by using gross instead of net heat contents. • 2003 forward—EIA, "Alternatives to Traditional Transportation Fuels," annual reports, Tables V1 and C1, and unpublished revisions.

Figure 10.6 Solar Thermal Collector Shipments by Type, Price, and Trade

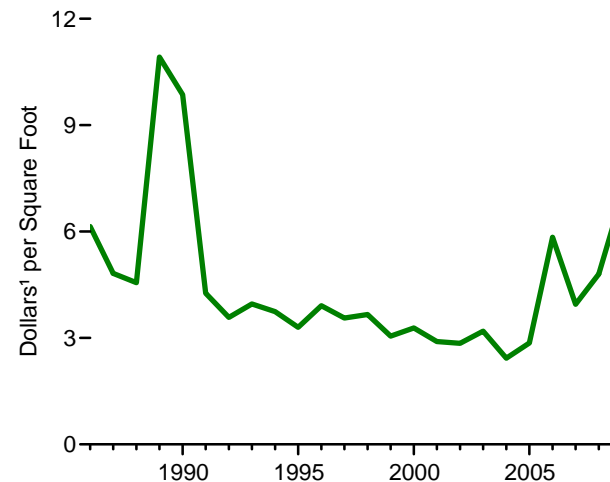
Total Shipments, 1974-1984 and 1986-2009



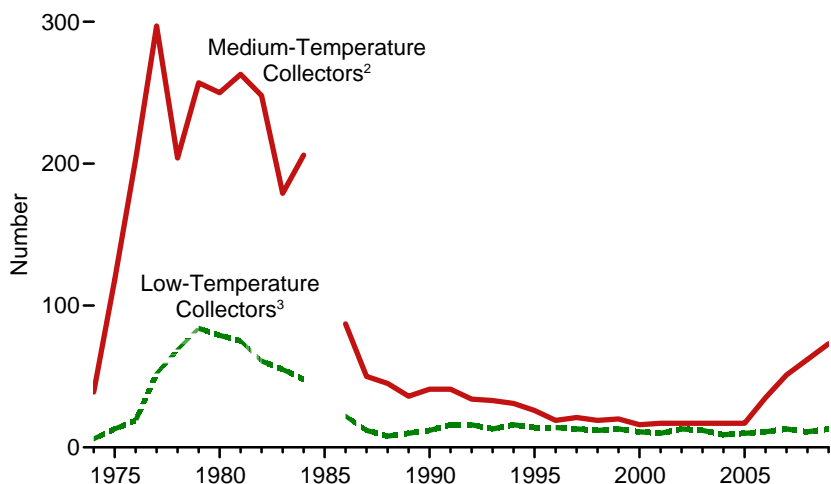
Trade, 1978-1984 and 1986-2009



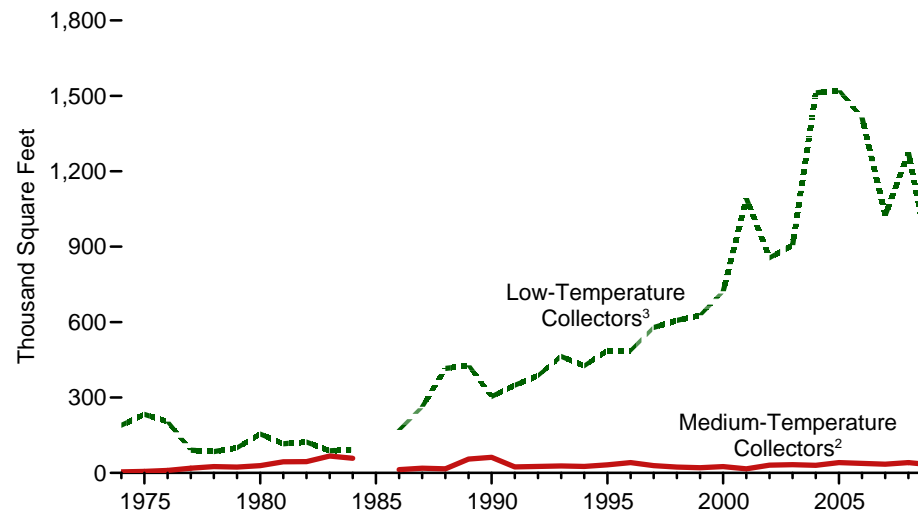
Price of Total Shipments, 1986-2009



Number of U.S. Manufacturers by Type of Collector, 1974-1984 and 1986-2009



Average Annual Shipments per Manufacturer, 1974-1984 and 1986-2009



¹ Prices are not adjusted for inflation. See "Nominal Dollars" in Glossary.

² Collectors that generally operate in the temperature range of 140 degrees Fahrenheit to 180 degrees Fahrenheit but can also operate at temperatures as low as 110 degrees Fahrenheit. Special collectors—evacuated tube collectors or concentrating (focusing) collectors—are included in the medium-temperature category.

³ Collectors that generally operate at temperatures below 110 degrees Fahrenheit.

Notes: • Shipments are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers. • Data were not collected for 1985.

Source: Table 10.6.

Table 10.6 Solar Thermal Collector Shipments by Type, Price, and Trade, 1974-2009

(Thousand Square Feet, Except as Noted)

Year	Low-Temperature Collectors ¹				Medium-Temperature Collectors ²				High-Temperature Collectors ³		Total Shipments		Trade	
	Number of U.S. Manufacturers	Quantity Shipped	Shipments per Manufacturer	Price ⁴ (dollars ⁵ per square foot)	Number of U.S. Manufacturers	Quantity Shipped	Shipments per Manufacturer	Price ⁴ (dollars ⁵ per square foot)	Quantity Shipped	Price ⁴ (dollars ⁵ per square foot)	Quantity Shipped	Price ⁴ (dollars ⁵ per square foot)	Imports	Exports
1974	6	1,137	190	NA	39	137	4	NA	NA	NA	1,274	NA	NA	NA
1975	13	3,026	233	NA	118	717	6	NA	NA	NA	3,743	NA	NA	NA
1976	19	3,876	204	NA	203	1,925	10	NA	NA	NA	5,801	NA	NA	NA
1977	52	4,743	91	NA	297	5,569	19	NA	NA	NA	10,312	NA	NA	NA
1978	69	5,872	85	NA	204	4,988	25	NA	NA	NA	10,860	NA	396	840
1979	84	8,394	100	NA	257	5,856	23	NA	NA	NA	14,251	NA	290	855
1980	79	12,233	155	NA	250	7,165	29	NA	NA	NA	19,398	NA	235	1,115
1981	75	8,677	116	NA	263	11,456	44	NA	NA	NA	21,133	NA	196	771
1982	61	7,476	123	NA	248	11,145	45	NA	NA	NA	18,621	NA	418	455
1983	55	4,853	88	NA	179	11,975	67	NA	NA	NA	16,828	NA	511	159
1984	48	4,479	93	NA	206	11,939	58	NA	773	NA	17,191	NA	621	348
1985 ⁶	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1986	22	3,751	171	2.30	87	1,111	13	18.30	4,498	NA	9,360	6.14	473	224
1987	12	3,157	263	2.18	50	957	19	13.50	3,155	NA	7,269	4.82	691	182
1988	8	3,326	416	2.24	45	732	16	14.88	4,116	NA	8,174	4.56	814	158
1989	10	4,283	428	2.60	36	1,989	55	11.74	5,209	17.76	11,482	10.92	1,233	461
1990	12	3,645	304	2.90	41	2,527	62	7.68	5,237	15.74	11,409	9.86	1,562	245
1991	16	5,585	349	2.90	41	989	24	11.94	1	31.94	6,574	4.26	1,543	332
1992	16	6,187	387	2.50	34	897	26	10.96	2	75.66	7,086	3.58	1,650	316
1993	13	6,025	464	2.80	33	931	28	11.74	12	22.12	6,968	3.96	2,039	411
1994	16	6,823	426	2.54	31	803	26	13.54	2	177.00	7,627	3.74	1,815	405
1995	14	6,813	487	2.32	26	840	32	10.48	13	53.26	7,666	3.30	2,037	530
1996	14	6,821	487	2.67	19	785	41	14.48	10	18.75	7,616	3.91	1,930	454
1997	13	7,524	579	2.60	21	606	29	15.17	7	25.00	8,138	3.56	2,102	379
1998	12	7,292	607	2.83	19	443	23	15.17	21	53.21	7,756	3.66	2,206	360
1999	13	8,152	627	2.08	20	427	21	19.12	4	286.49	8,583	3.05	2,352	537
2000	11	7,948	723	2.09	16	400	25	W	5	W	8,354	3.28	2,201	496
2001	10	10,919	1,092	2.15	17	268	16	W	2	W	11,189	2.90	3,502	840
2002	13	11,126	856	1.97	17	535	31	W	2	W	11,663	2.85	3,068	659
2003	12	10,877	906	2.08	17	560	33	W	7	W	11,444	3.19	2,986	518
2004	9	13,608	1,512	1.80	17	506	30	19.30	—	—	14,114	2.43	3,723	813
2005	10	15,224	1,522	2.00	17	702	41	W	115	W	16,041	2.86	4,546	1,361
2006	11	15,546	1,413	1.95	35	1,346	38	W	3,852	W	20,744	5.84	4,244	1,211
2007	13	13,323	1,025	1.97	51	1,797	35	W	33	W	15,153	3.95	3,891	1,376
2008	11	14,015	1,274	1.89	62	2,560	41	R19.57	388	11.96	16,963	4.80	5,517	2,247
2009	13	10,511	809	1.94	73	2,307	32	27.32	980	25.32	13,798	7.01	3,456	1,577

¹ Low-temperature collectors are solar thermal collectors that generally operate at temperatures below 110° F.

² Medium-temperature collectors are solar thermal collectors that generally operate in the temperature range of 140° F to 180° F but can also operate at temperatures as low as 110° F. Special collectors are included in this category. Special collectors are evacuated tube collectors or concentrating (focusing) collectors. They operate in the temperature range from just above ambient temperature (low concentration for pool heating) to several hundred degrees Fahrenheit (high concentration for air conditioning and specialized industrial processes).

³ High-temperature collectors are solar thermal collectors that generally operate at temperatures above 180° F. High-temperature collector shipments are dominated by one manufacturer, and the collectors are used by the electric power sector to build new central station solar thermal power plants and generate electricity. Year-to-year fluctuations depend on how much new capacity is brought online.

⁴ Prices equal shipment value divided by quantity shipped. Value includes charges for advertising and warranties. Excluded are excise taxes and the cost of freight or transportation for the shipments.

⁵ Prices are not adjusted for inflation. See "Nominal Dollars" in Glossary.

⁶ No data are available for 1985.

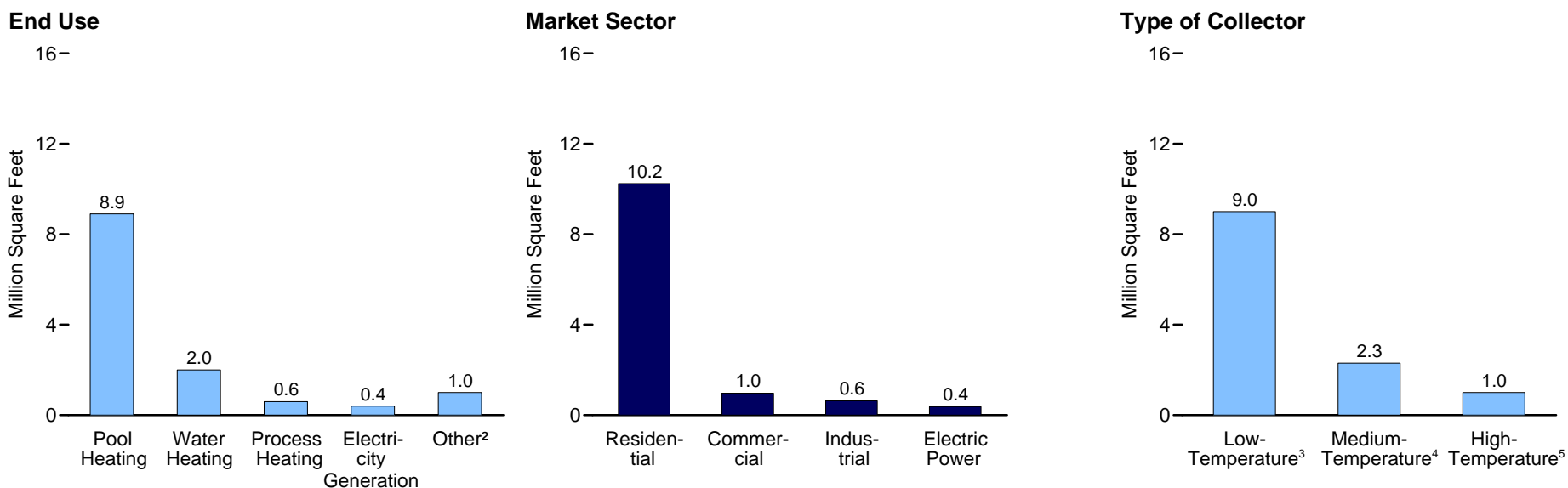
R=Revised. NA=Not available. —=No data reported. --=Not applicable. W=Value withheld to avoid disclosure of proprietary company data.

Notes: • Shipments data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers. • Manufacturers producing more than one type of collector are accounted for in both groups.

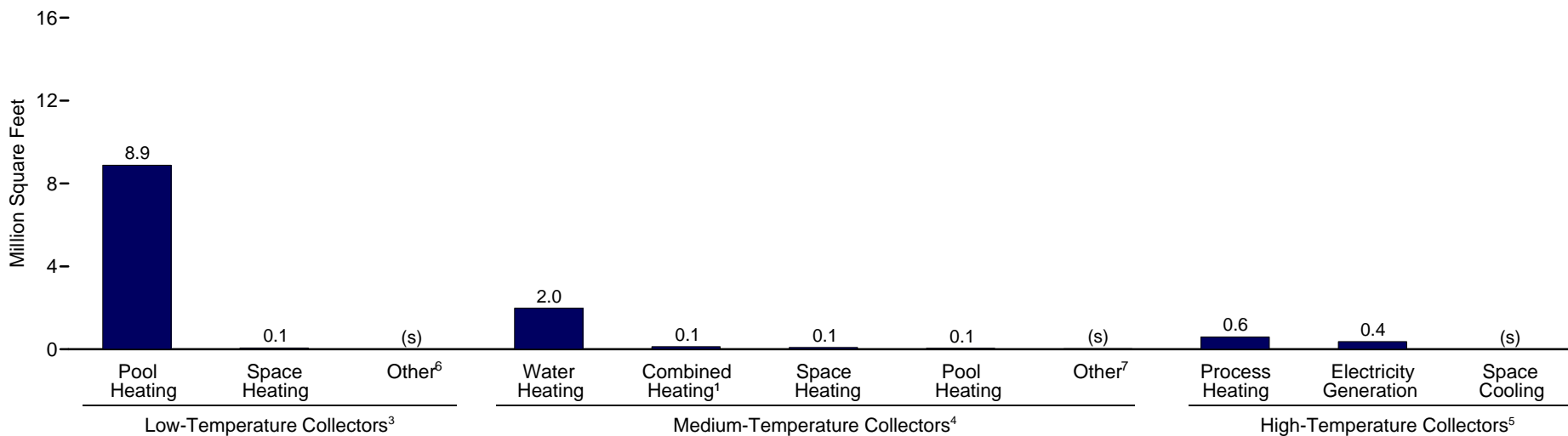
Web Page: For related information, see <http://www.eia.gov/renewable/>.

Sources: • 1974-1992—U.S. Energy Information Administration (EIA), *Solar Collector Manufacturing Activity*, annual reports, and Form CE-63A, "Annual Solar Thermal Collector Manufacturers Survey," and predecessor forms. • 1993-2002—EIA, *Renewable Energy Annual*, annual reports, and Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and predecessor form. • 2003 forward—EIA, *Solar Thermal Collector Manufacturing Activities* (and predecessor reports), annual reports, and Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Figure 10.7 Solar Thermal Collector Domestic Shipments by Market Sector, End-Use, and Type, 2009



End Use by Type of Collector



¹ Combined space and water heating.

² Space heating, combined heating, and space cooling.

³ Collectors that generally operate at temperatures below 110 degrees Fahrenheit.

⁴ Collectors that generally operate in the temperature range of 140 degrees Fahrenheit to 180 degrees Fahrenheit but can also operate at temperatures as low as 110 degrees Fahrenheit.

⁵ Collectors that generally operate at temperatures above 180 degrees Fahrenheit.

⁶ Water heating and combined heating.

⁷ Space cooling, process heating, and electricity generation.

(s)=Less than 0.05 million square feet.

Source: Table 10.7.

Table 10.7 Solar Thermal Collector Shipments by Market Sector, End Use, and Type, 2001-2009
(Thousand Square Feet)

Year and Type	By Market Sector					By End Use							Total
	Residential	Commercial ¹	Industrial ²	Electric Power ³	Other ⁴	Pool Heating	Water Heating	Space Heating	Space Cooling	Combined Heating ⁵	Process Heating	Electricity Generation	
Total Shipments⁶													
2001 Total	10,125	1,012	17	1	35	10,797	274	70	0	12	34	2	11,189
Low ⁷	9,885	987	12	0	34	10,782	42	61	0	0	34	0	10,919
Medium ⁸	240	24	5	0	1	16	232	9	0	12	0	0	268
High ⁹	0	1	0	1	0	0	0	0	0	0	0	2	2
2002 Total	11,000	595	62	4	1	11,073	423	146	(s)	17	4	0	11,663
Low ⁷	10,519	524	2	0	0	11,045	1	0	0	0	0	0	11,046
Medium ⁸	481	69	60	4	1	28	422	146	(s)	15	4	0	615
High ⁹	0	2	0	0	0	0	0	0	0	2	0	0	2
2003 Total	10,506	864	71	0	2	10,800	511	76	(s)	23	34	0	11,444
Low ⁷	9,993	813	71	0	0	10,778	0	65	0	0	34	0	10,877
Medium ⁸	513	44	0	0	2	22	511	11	(s)	16	0	0	560
High ⁹	0	7	0	0	0	0	0	0	0	7	0	0	7
2004 Total	12,864	1,178	70	0	3	13,634	452	13	0	16	0	0	14,115
Low ⁷	12,386	1,178	44	0	0	13,600	0	8	0	0	0	0	13,608
Medium ⁸	478	0	26	0	3	33	452	5	0	16	0	0	506
High ⁹	0	0	0	0	0	0	0	0	0	0	0	0	0
2005 Total	14,681	1,160	31	114	56	15,041	640	228	2	16	0	114	16,041
Low ⁷	14,045	1,099	30	0	50	15,022	12	190	0	0	0	0	15,224
Medium ⁸	636	58	1	0	6	20	628	38	0	16	0	0	702
High ⁹	0	2	0	114	0	0	0	0	2	0	0	114	115
2006 Total	15,123	1,626	42	3,845	107	15,362	1,136	330	3	66	0	3,847	20,744
Low ⁷	13,906	1,500	40	0	100	15,225	10	290	0	21	0	0	15,546
Medium ⁸	1,217	120	2	0	7	137	1,126	40	3	38	0	2	1,346
High ⁹	0	7	0	3,845	0	0	0	0	0	7	0	3,845	3,852
Domestic Shipments⁶													
2007 Total	12,799	931	46	1	-	12,076	1,393	189	13	73	27	6	13,777
Low ⁷	11,352	633	-	1	-	11,917	4	63	-	-	-	1	11,986
Medium ⁸	1,447	298	18	-	-	158	1,389	126	13	73	-	5	1,764
High ⁹	-	(s)	27	-	-	-	(s)	-	-	-	27	-	27
2008 Total	13,000	1,294	128	294	-	11,973	1,978	186	18	148	50	361	14,716
Low ⁷	10,983	918	-	-	-	11,880	8	10	-	2	-	-	11,900
Medium ⁸	2,017	376	33	6	-	93	1,971	176	18	141	21	12	2,432
High ⁹	-	-	95	289	-	-	-	-	-	5	29	349	383
2009 Total	10,239	974	634	374	-	8,934	1,992	150	10	137	608	389	12,221
Low ⁷	8,423	526	11	-	-	8,882	7	61	-	9	-	-	8,959
Medium ⁸	1,816	439	29	-	-	52	1,985	89	(s)	128	14	15	2,284
High ⁹	-	10	594	374	-	-	-	-	10	-	594	374	978

¹ Through 2006, data are for the commercial sector, excluding government, which is included in "Other." Beginning in 2007, data are for the commercial sector, including government.

² Through 2006, data are for the industrial sector and independent power producers. Beginning in 2007, data are for the industrial sector only; independent power producers are included in "Electric Power."

³ Through 2006, data are for electric utilities only; independent power producers are included in "Industrial." Beginning in 2007, data are for electric utilities and independent power producers.

⁴ Through 2006, data are for other sectors such as government, including the military, but excluding space applications. Beginning in 2007, data are for the transportation sector.

⁵ Combined space and water heating.

⁶ Through 2006, data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers. Beginning in 2007, data are for domestic shipments only.

⁷ Low-temperature collectors are solar thermal collectors that generally operate at temperatures below 110° F.

⁸ Medium-temperature collectors are solar thermal collectors that generally operate in the temperature

range of 140° F to 180° F, but can also operate at temperatures as low as 110° F. Special collectors are included in this category. Special collectors are evacuated tube collectors or concentrating (focusing) collectors. They operate in the temperature range from just above ambient temperature (low concentration for pool heating) to several hundred degrees Fahrenheit (high concentration for air conditioning and specialized industrial processes).

⁹ High-temperature collectors are solar thermal collectors that generally operate at temperatures above 180° F. These are parabolic dish/trough collectors used primarily by the electric power sector to generate electricity for the electric grid.

- =No data reported. (s)=Less than 0.5 thousand square feet.

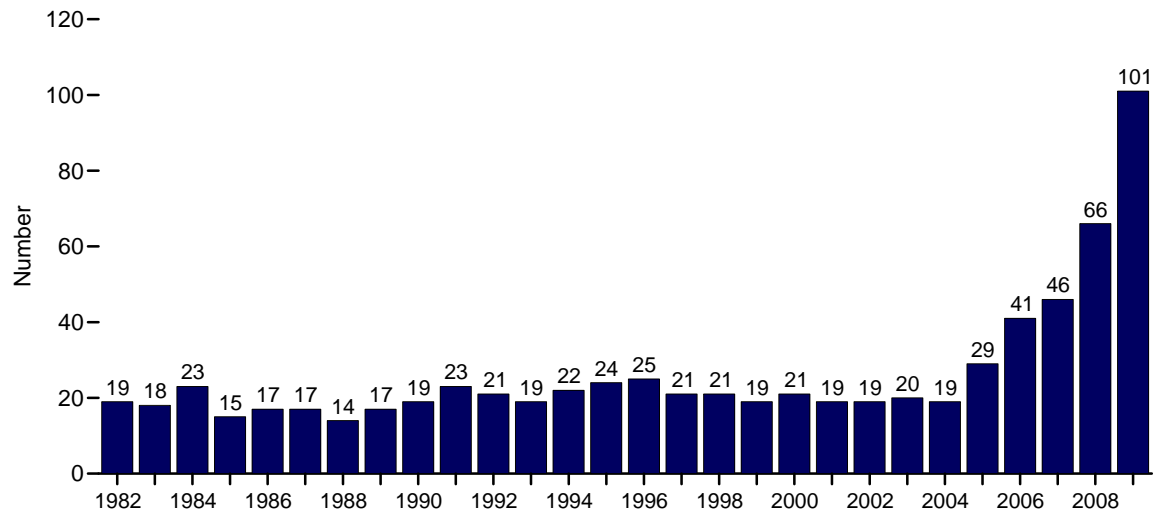
Note: Totals may not equal sum of components due to independent rounding.

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

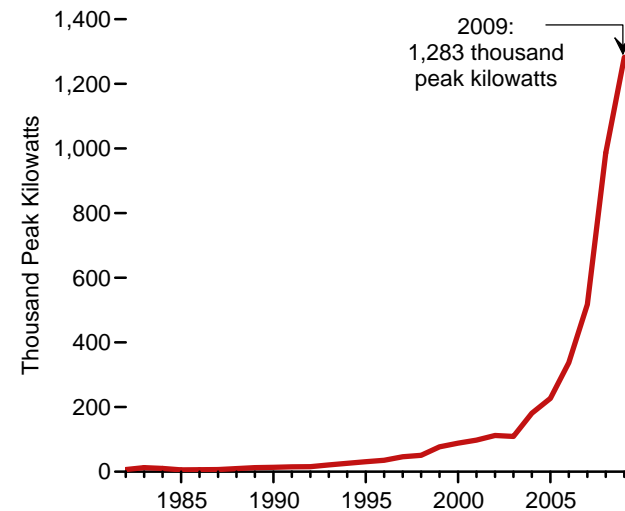
Sources: • 2000-2002—U.S. Energy Information Administration (EIA), *Renewable Energy Annual*, annual reports, and Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey." • 2003 forward—EIA, *Solar Thermal Collector Manufacturing Activities* (and predecessor reports), annual reports, and Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Figure 10.8 Photovoltaic Cell and Module Shipments, Trade, and Prices

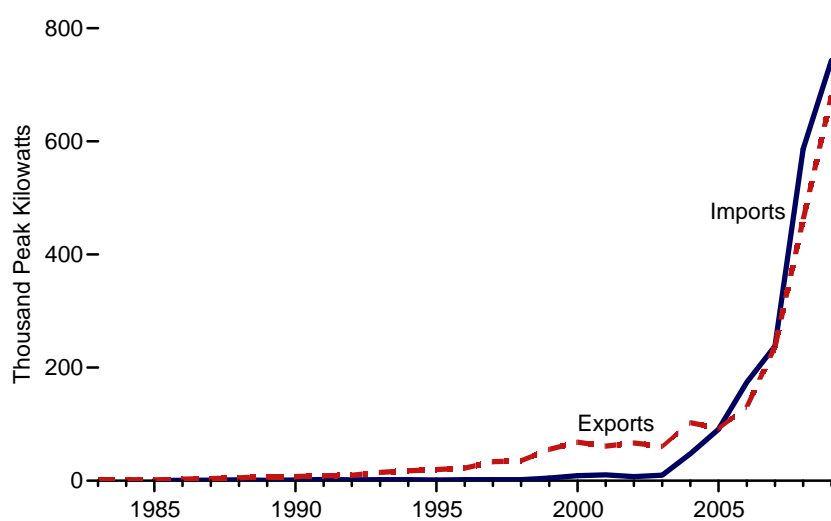
Number of U.S. Companies Reporting Shipments, 1982-2009



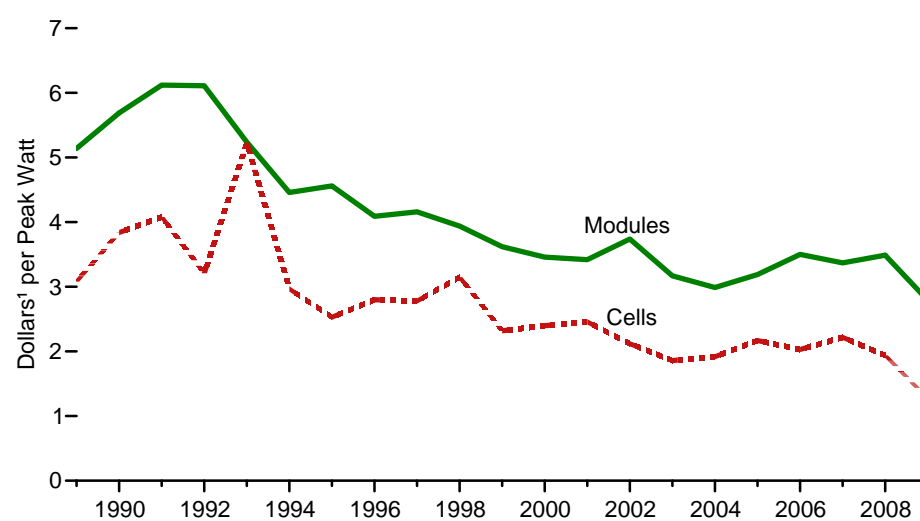
Total Shipments, 1982-2009



Trade, 1983-2009



Prices, 1989-2009



¹ Prices are not adjusted for inflation. See "Nominal Dollars" in Glossary.
 Note: Shipments are for domestic and export shipments, and may include imports that subsequently were shipped to domestic and foreign customers.

Source: Table 10.8.

Table 10.8 Photovoltaic Cell and Module Shipments by Type, Trade, and Prices, 1982-2009

Year	U.S. Companies Reporting Shipments	Shipments			Trade		Prices ¹	
		Crystalline Silicon	Thin-Film Silicon	Total ²	Imports	Exports	Modules	Cells
	Number	Peak Kilowatts ³					Dollars ⁴ per Peak Watt ³	
1982	19	NA	NA	6,897	NA	NA	NA	NA
1983	18	NA	NA	12,620	NA	1,903	NA	NA
1984	23	NA	NA	9,912	NA	2,153	NA	NA
1985	15	5,461	303	5,769	285	1,670	NA	NA
1986	17	5,806	516	6,333	678	3,109	NA	NA
1987	17	5,613	1,230	6,850	921	3,821	NA	NA
1988	14	7,364	1,895	9,676	1,453	5,358	NA	NA
1989	17	10,747	1,628	12,825	826	7,363	5.14	3.08
1990	⁵ 19	12,492	1,321	⁵ 13,837	1,398	7,544	5.69	3.84
1991	23	14,205	723	14,939	2,059	8,905	6.12	4.08
1992	21	14,457	1,075	15,583	1,602	9,823	6.11	3.21
1993	19	20,146	782	20,951	1,767	14,814	5.24	5.23
1994	22	24,785	1,061	26,077	1,960	17,714	4.46	2.97
1995	24	29,740	1,266	31,059	1,337	19,871	4.56	2.53
1996	25	33,996	1,445	35,464	1,864	22,448	4.09	2.80
1997	21	44,314	1,886	46,354	1,853	33,793	4.16	2.78
1998	21	47,186	3,318	50,562	1,931	35,493	3.94	3.15
1999	19	73,461	3,269	76,787	4,784	55,585	3.62	2.32
2000	21	85,155	2,736	88,221	8,821	68,382	3.46	2.40
2001	19	84,651	12,541	97,666	10,204	61,356	3.42	2.46
2002	19	104,123	7,396	112,090	7,297	66,778	3.74	2.12
2003	20	97,940	10,966	109,357	9,731	60,693	3.17	1.86
2004	19	159,138	21,978	181,116	47,703	102,770	2.99	1.92
2005	29	172,965	53,826	226,916	90,981	92,451	3.19	2.17
2006	41	233,518	101,766	337,268	173,977	130,757	3.50	2.03
2007	46	310,330	202,519	517,684	238,018	237,209	3.37	2.22
2008	66	665,795	293,182	986,504	586,558	462,252	3.49	1.94
2009	101	984,161	266,547	1,282,560	743,414	681,427	2.79	1.27

¹ Prices equal shipment value divided by quantity shipped. Value includes charges for advertising and warranties. Excluded are excise taxes and the cost of freight or transportation for the shipments.

² Includes all types of photovoltaic cells and modules (single-crystal silicon, cast silicon, ribbon silicon, thin-film silicon, and concentrator silicon). Excludes cells and modules for space and satellite applications.

³ See "Peak Kilowatt" and "Peak Watt" in Glossary.

⁴ Prices are not adjusted for inflation. See "Nominal Dollars" in Glossary.

⁵ Data were imputed for one nonrespondent who exited the industry during 1990.

NA=Not available.

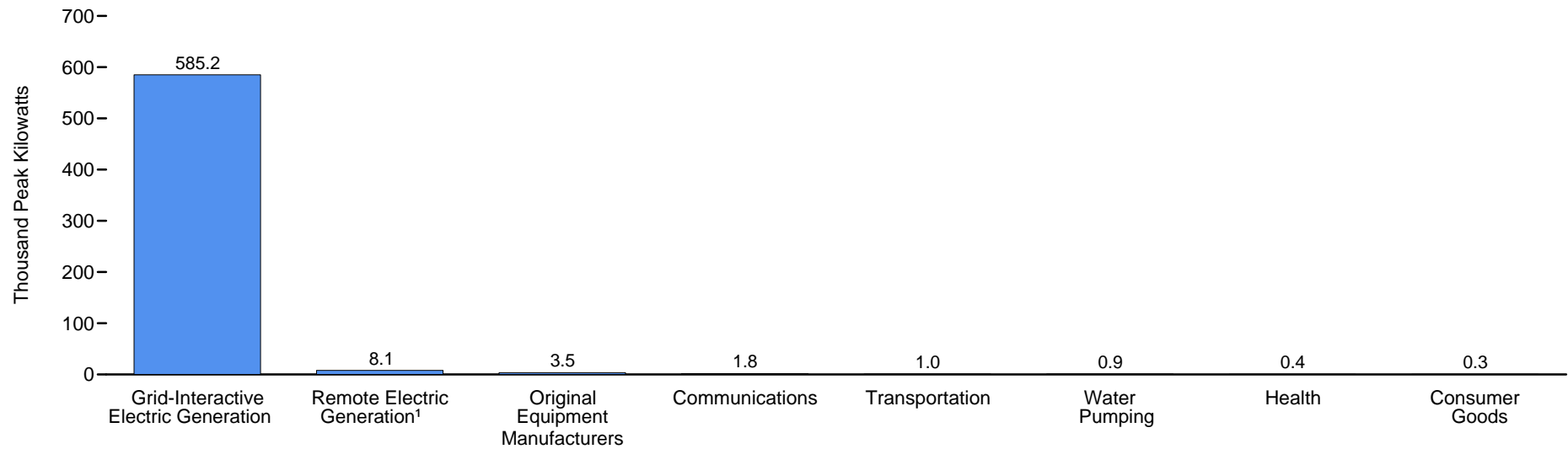
Note: Shipments data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers.

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

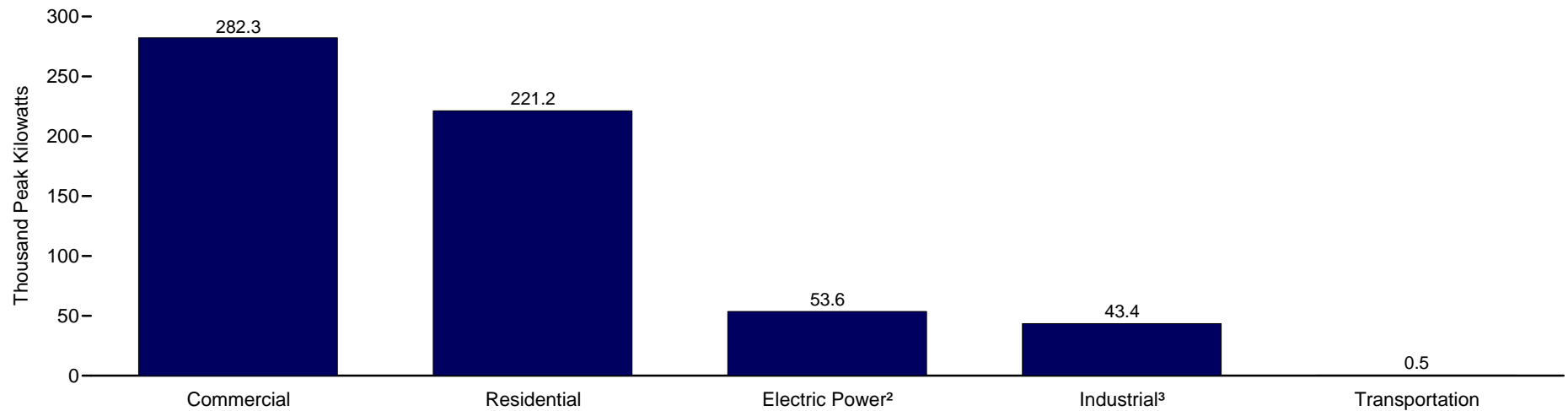
Sources: • 1982-1992—U.S. Energy Information Administration (EIA), *Solar Collector Manufacturing Activity*, annual reports. • 1993-2002—EIA, *Renewable Energy Annual*, annual reports. • 2003 forward—EIA, *Solar Photovoltaic Cell/Module Manufacturing Activities* (and predecessor reports), annual reports.

Figure 10.9 Photovoltaic Cell and Module Domestic Shipments by Market Sector and End Use, 2009

By End Use



By Market Sector



¹ Electricity for general use that does not interact with the electrical distribution system.

² Electric utilities and independent power producers.

³ Industrial sector only; independent power producers are included in "Electric Power."

Source: Table 10.9.

Table 10.9 Photovoltaic Cell and Module Shipments by Market Sector and End Use, 1989-2009
(Peak Kilowatts ¹)

Year	By Market Sector							By End Use								Total	
	Residential	Commercial ³	Government	Industrial ⁴	Transportation	Electric Power ⁵	Other ⁶	Communications	Consumer Goods	Electricity Generation ²		Health	Original Equipment Manufacturers ⁷	Transportation	Water Pumping		Other ⁸
										Grid-Interactive	Remote						
Total Shipments ⁹																	
1989	1,439	3,850	1,077	3,993	1,130	785	551	2,590	2,788	1,251	2,620	5	1,595	1,196	711	69	12,825
1990	1,701	6,086	1,002	2,817	974	826	432	4,340	2,484	469	3,097	5	1,119	1,069	1,014	240	13,837
1991	3,624	3,345	815	3,947	1,555	1,275	377	3,538	3,312	856	3,594	61	1,315	1,523	729	13	14,939
1992	4,154	2,386	1,063	4,279	1,673	1,553	477	3,717	2,566	1,227	4,238	67	828	1,602	809	530	15,583
1993	5,237	4,115	1,325	5,352	2,564	1,503	856	3,846	946	1,096	5,761	674	2,023	4,238	2,294	74	20,951
1994	6,632	5,429	2,114	6,855	2,174	2,364	510	5,570	3,239	2,296	9,253	79	1,849	2,128	1,410	254	26,077
1995	6,272	8,100	2,000	7,198	2,383	3,759	1,347	5,154	1,025	4,585	8,233	776	3,188	4,203	2,727	1,170	31,059
1996	8,475	5,176	3,126	8,300	3,995	4,753	1,639	6,041	1,063	4,844	10,884	977	2,410	5,196	3,261	789	35,464
1997	10,993	8,111	3,909	11,748	3,574	5,651	2,367	7,383	347	8,273	8,630	1,303	5,245	6,705	3,783	4,684	46,354
1998	15,936	8,460	2,808	13,232	3,440	3,965	2,720	8,280	1,198	14,193	8,634	1,061	5,044	6,356	4,306	1,491	50,562
1999	19,817	17,283	3,107	24,972	4,341	5,876	1,392	12,147	2,292	24,782	10,829	1,466	12,400	8,486	4,063	322	76,787
2000	24,814	13,692	4,417	28,808	5,502	6,298	4,690	12,269	2,870	21,713	14,997	2,742	12,153	12,804	5,644	3,028	88,221
2001	33,262	15,710	5,728	28,063	8,486	5,846	571	14,743	4,059	27,226	21,447	3,203	6,268	12,636	7,444	641	97,666
2002	29,315	20,578	8,565	32,218	12,932	7,640	841	17,290	3,400	33,983	21,693	4,202	7,869	16,028	7,532	93	112,090
2003	23,389	32,604	5,538	27,951	11,089	8,474	313	14,185	2,995	42,485	15,025	2,924	11,334	14,143	6,073	194	109,357
2004	53,928	74,509	3,257	30,493	1,380	3,233	14,316	11,348	6,444	129,265	18,371	341	6,452	1,380	1,322	6,193	181,116
2005	75,040	89,459	28,683	22,199	1,621	143	9,772	8,666	5,787	168,474	24,958	0	11,677	2,159	1,343	3,853	226,916
2006	95,815	180,852	7,688	28,618	2,458	3,981	17,857	6,888	4,030	274,197	18,003	0	6,132	2,438	2,093	23,487	337,268
Domestic Shipments ⁹																	
2007	68,417	¹⁰ 140,434	(¹⁰)	32,702	3,627	35,294	--	2,836	589	253,101	10,867	410	4,802	4,018	3,852	--	280,475
2008	173,989	¹⁰ 253,852	(¹⁰)	51,493	9,100	35,819	--	2,622	312	500,854	15,527	217	2,659	916	1,145	--	524,252
2009	221,245	¹⁰ 282,273	(¹⁰)	43,445	534	53,636	--	1,817	290	585,189	8,119	381	3,455	961	923	--	601,133

¹ See "Peak Killowatt" in Glossary.

² Grid-interactive means connection to the electrical distribution system; remote means electricity for general use that does not interact with the electrical distribution system, such as at an isolated residential site or mobile home. The other end uses in this table also include electricity generation, but only for the specific use cited.

³ Through 2006, data are for the commercial sector, excluding government, which is included in "Government." Beginning in 2007, data are for the commercial sector, including government.

⁴ Through 2006, data are for the industrial sector and independent power producers. Beginning in 2007, data are for the industrial sector only; independent power producers are included in "Electric Power."

⁵ Through 2006, data are for electric utilities only; independent power producers are included in "Industrial." Beginning in 2007, data are for electric utilities and independent power producers.

⁶ Through 2006, data are for shipments for specialty purposes such as research.

⁷ "Original Equipment Manufacturers" are non-photovoltaic manufacturers that combine photovoltaic

technology into existing or newly developed product lines.

⁸ Through 2006, includes applications such as cooking food, desalination, and distilling.

⁹ Through 2006, data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers. Beginning in 2007, data are for domestic shipments only.

¹⁰ Beginning in 2007, the government sector is included in "Commercial."

-- =Not applicable.

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

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

Sources: • 1989-1992—U.S. Energy Information Administration (EIA), *Solar Collector Manufacturing Activity*, annual reports. • 1993-2002—EIA, *Renewable Energy Annual*, annual reports. • 2003 forward—EIA, *Solar Photovoltaic Cell/Module Manufacturing Activities* (and predecessor reports), annual reports.

Renewable Energy

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 using the fossil-fuels heat rate—see Table A6); geothermal electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6), and geothermal heat pump and geothermal direct use energy; solar thermal and photovoltaic electricity net generation (converted to Btu using the fossil-fuels heat rate—see Table A6), and solar thermal direct use energy; wind electricity net generation (converted to Btu using the fossil-fuels heat rate—see 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) and biodiesel 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 biofuels (biofuels production comprises biomass inputs to the production of fuel ethanol and biodiesel).

Table 10.2a Sources

Residential Sector, Geothermal: Oregon Institute of Technology, Geo-Heat Center.

Residential Sector, Solar/PV: U.S. Energy Information Administration (EIA) estimates based on Form EIA-63A, “Annual Solar Thermal Collector Manufacturers Survey,” and Form EIA-63B, “Annual Photovoltaic Module/Cell Manufacturers Survey.”

Residential Sector, Wood: • 1949–1979: EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A2. • 1980 forward: EIA, Form EIA-457, “Residential Energy Consumption Survey”; and EIA estimates based on Form EIA-457 and regional heating degree-day data.

Commercial Sector, Hydroelectric Power: EIA, *Annual Energy Review (AER)*, Tables 8.2d and A6.

Commercial Sector, Geothermal: Oregon Institute of Technology, Geo-Heat Center.

Commercial Sector, Solar/PV: EIA, AER, Tables 8.2d and A6.

Commercial Sector, Wind: 2009 and 2010: EIA, AER, Tables 8.2d and A6.

Commercial Sector, Wood: • 1949–1979: EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A2. • 1980–1983: EIA, *Estimates of U.S. Wood Energy Consumption 1980-1983*, Table ES1. • 1984: EIA estimate based on the 1983 value. • 1985–1988: Values interpolated. • 1989 forward: EIA, AER, Table 8.7c; and EIA estimates based on Form EIA-871, “Commercial Buildings Energy Consumption Survey.”

Commercial Sector, Biomass Waste: EIA, AER, Table 8.7c.

Commercial Sector, Fuel Ethanol (Minus Denaturant): EIA, AER, Tables 5.11, 5.13a, and 10.3. Calculated as commercial sector motor gasoline consumption (Table 5.13a) divided by total motor gasoline product supplied (Table 5.11), and then multiplied by fuel ethanol (minus denaturant) consumption (Table 10.3).

Table 10.2b Sources

Industrial Sector, Hydroelectric Power: • 1949–1988: U.S. Energy Information Administration (EIA), *Annual Energy Review (AER)*, Tables 8.1 and A6. • 1989 forward: EIA, AER, Tables 8.2d and A6.

Industrial Sector, Geothermal: Oregon Institute of Technology, Geo-Heat Center.

Industrial Sector, Solar/PV: 2010: EIA, AER, Tables 8.2d and A6.

Industrial Sector, Wood: • 1949–1979: EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A2. • 1980–1983: EIA, *Estimates of U.S. Wood Energy Consumption 1980-1983*, Table ES1. • 1984: EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 1. • 1985 and 1986: Values interpolated. • 1987: EIA, *Estimates of Biofuels Consumption in the United States During 1987*, Table 2. • 1988: Value interpolated. • 1989 forward: EIA, AER, Table 8.7c; and EIA estimates based on Form EIA-846, “Manufacturing Energy Consumption Survey.”

Industrial Sector, Biomass Waste: • 1981: EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 8, total waste consumption minus electric power sector waste consumption (see AER, Table 10.2c). • 1982 and 1983: EIA estimates for total waste consumption based on *Estimates of U.S. Biofuels Consumption 1990* Table 8, minus electric power waste consumption (see AER, Table 10.2c). • 1984: EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 8, total waste consumption minus electric power sector waste consumption (see AER, Table 10.2c). • 1985 and 1986: Values interpolated. • 1987: EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 8, total waste consumption minus electric power sector waste consumption (see AER, Table 10.2c). • 1988: Value interpolated. • 1989 forward: EIA, AER, Table 8.7c; and EIA estimates 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.

Industrial Sector, Fuel Ethanol (Minus Denaturant): EIA, AER, Tables 5.11, 5.13b, and 10.3. Calculated as industrial sector motor gasoline consumption (Table 5.13b) divided by total motor gasoline product supplied (Table 5.11), and then multiplied by fuel ethanol (minus denaturant) consumption (Table 10.3).

Industrial Sector, Losses and Co-products: EIA, AER, Table 10.3 and 10.4. Calculated as fuel ethanol losses and co-products (Table 10.3) plus biodiesel losses and co-products (Table 10.4).

Transportation Sector, Fuel Ethanol (Minus Denaturant): EIA, AER, Tables 5.11, 5.13c, and 10.3. Calculated as transportation sector motor gasoline consumption (Table 5.13c) divided by total motor gasoline product supplied (Table 5.11), and then multiplied by fuel ethanol (minus denaturant) consumption (Table 10.3).

Transportation Sector, Biodiesel: EIA, AER, Table 10.4.