

10

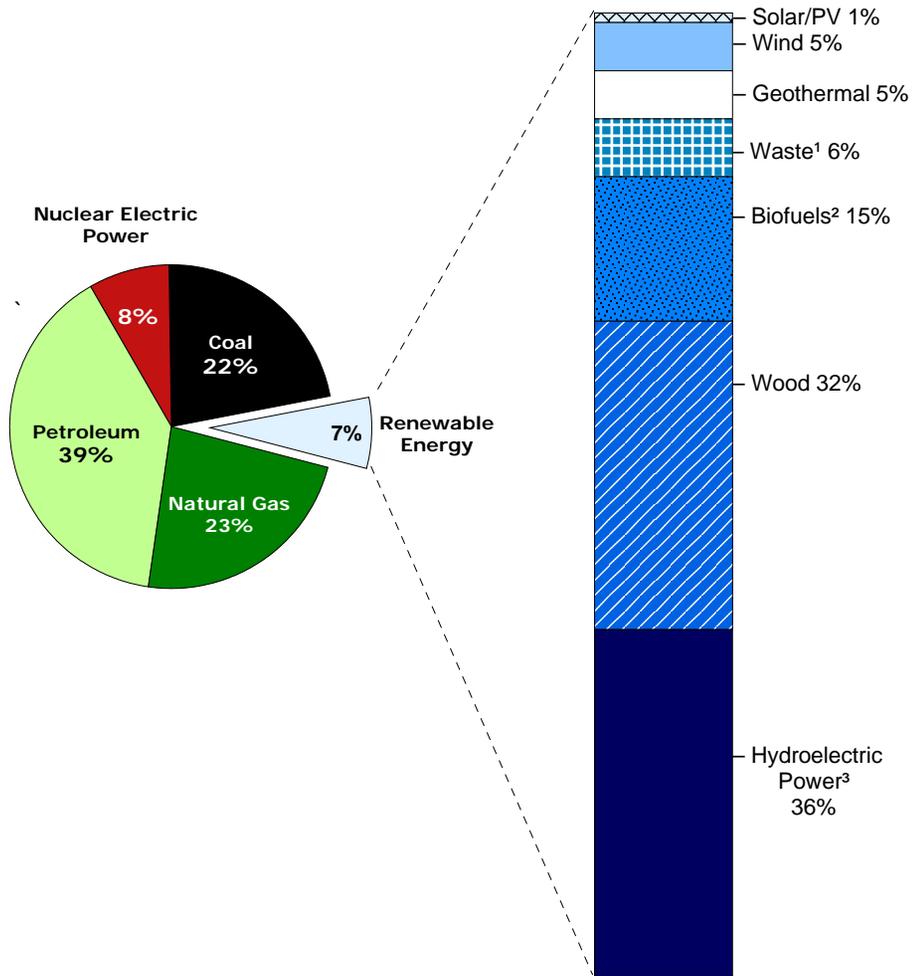
Renewable Energy



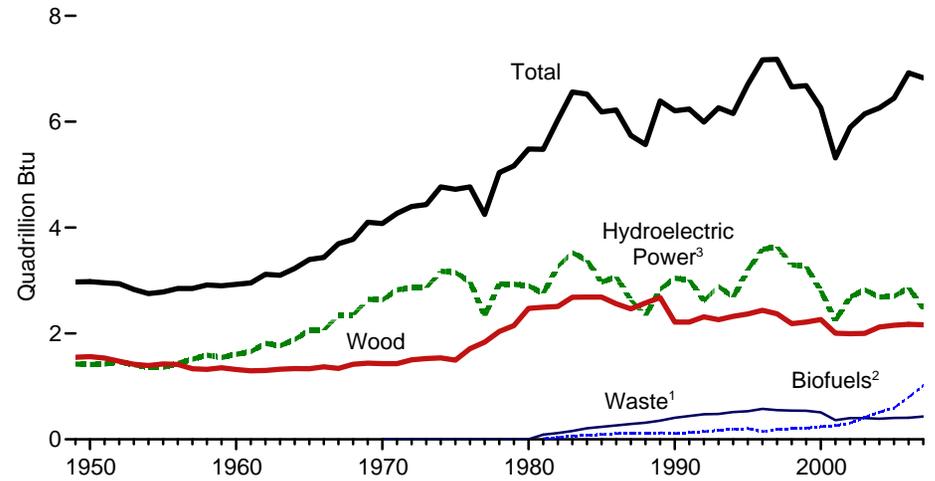
Grand Coulee Dam, Washington State. Source: U.S. Bureau of Reclamation.

Figure 10.1 Renewable Energy Consumption by Major Sources

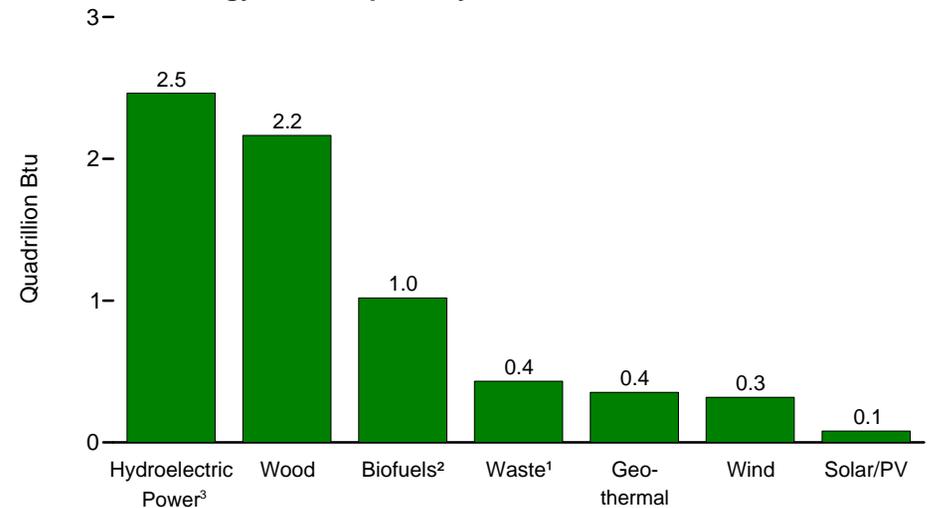
Renewable Energy as Share of Total Primary Energy Consumption, 2007



Renewable Energy Total Consumption and Major Sources, 1949-2007



Renewable Energy Consumption by Source, 2007



¹ 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).

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

³ Conventional hydroelectric power.

Note: Because vertical scales differ, graphs should not be compared. Sources: Tables 1.3 and 10.1.

Table 10.1 Renewable Energy Production and Consumption by Primary Energy Source, Selected Years, 1949-2007
(Trillion Btu)

| Year | Production ¹ | | | Consumption | | | | | | | | |
|-------------------|-------------------------|--------------------|-------------------------------------|----------------------------------|-------------------------|-----------------------|-------------------|-------------------|---------------------|------------------------|--------|------------------------|
| | Biomass | | Total Renewable Energy ⁴ | Hydroelectric Power ⁵ | Geothermal ⁶ | Solar/PV ⁷ | Wind ⁸ | Biomass | | | | Total Renewable Energy |
| | Biofuels ² | Total ³ | | | | | | Wood ⁹ | Waste ¹⁰ | Biofuels ¹¹ | Total | |
| 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 | 2,929 | 1,608 | 1 | NA | NA | 1,320 | NA | NA | 1,320 | 2,929 |
| 1965 | NA | 1,335 | 3,398 | 2,059 | 4 | NA | NA | 1,335 | NA | NA | 1,335 | 3,398 |
| 1970 | NA | 1,431 | 4,076 | 2,634 | 11 | NA | NA | 1,429 | 2 | NA | 1,431 | 4,076 |
| 1971 | NA | 1,432 | 4,268 | 2,824 | 12 | NA | NA | 1,430 | 2 | NA | 1,432 | 4,268 |
| 1972 | NA | 1,503 | 4,398 | 2,864 | 31 | NA | NA | 1,501 | 2 | NA | 1,503 | 4,398 |
| 1973 | NA | 1,529 | 4,433 | 2,861 | 43 | NA | NA | 1,527 | 2 | NA | 1,529 | 4,433 |
| 1974 | NA | 1,540 | 4,769 | 3,177 | 53 | NA | NA | 1,538 | 2 | NA | 1,540 | 4,769 |
| 1975 | NA | 1,499 | 4,723 | 3,155 | 70 | NA | NA | 1,497 | 2 | NA | 1,499 | 4,723 |
| 1976 | NA | 1,713 | 4,768 | 2,976 | 78 | NA | NA | 1,711 | 2 | NA | 1,713 | 4,768 |
| 1977 | NA | 1,838 | 4,249 | 2,333 | 77 | NA | NA | 1,837 | 2 | NA | 1,838 | 4,249 |
| 1978 | NA | 2,038 | 5,039 | 2,937 | 64 | NA | NA | 2,036 | 1 | NA | 2,038 | 5,039 |
| 1979 | NA | 2,152 | 5,166 | 2,931 | 84 | NA | NA | 2,150 | 2 | NA | 2,152 | 5,166 |
| 1980 | NA | 2,476 | 5,485 | 2,900 | 110 | NA | NA | 2,474 | 2 | NA | 2,476 | 5,485 |
| 1981 | 13 | 2,596 | 5,477 | 2,758 | 123 | NA | NA | 2,496 | 88 | 13 | 2,596 | 5,477 |
| 1982 | 35 | 2,664 | 6,034 | 3,266 | 105 | NA | NA | 2,510 | 119 | 35 | 2,664 | 6,034 |
| 1983 | 63 | 2,904 | 6,561 | 3,527 | 129 | NA | (s) | 2,684 | 157 | 63 | 2,904 | 6,561 |
| 1984 | 77 | 2,971 | 6,522 | 3,386 | 165 | (s) | (s) | 2,686 | 208 | 77 | 2,971 | 6,522 |
| 1985 | 93 | 3,016 | 6,185 | 2,970 | 198 | (s) | (s) | 2,687 | 236 | 93 | 3,016 | 6,185 |
| 1986 | 107 | 2,932 | 6,223 | 3,071 | 219 | (s) | (s) | 2,562 | 263 | 107 | 2,932 | 6,223 |
| 1987 | 123 | 2,875 | 5,739 | 2,635 | 229 | (s) | (s) | 2,463 | 289 | 123 | 2,875 | 5,739 |
| 1988 | 124 | 3,016 | 5,568 | 2,334 | 217 | (s) | (s) | 2,577 | 315 | 124 | 3,016 | 5,568 |
| 1989 | 126 | 3,160 | 6,391 | 2,837 | 317 | 55 | 22 | 2,680 | 354 | 126 | 3,160 | 6,391 |
| 1990 | 111 | 2,735 | 6,206 | 3,046 | 336 | 60 | 29 | 2,216 | 408 | 111 | 2,735 | 6,206 |
| 1991 | 129 | 2,782 | 6,238 | 3,016 | 346 | 63 | 31 | 2,214 | 440 | 129 | 2,782 | 6,238 |
| 1992 | 146 | 2,933 | 5,993 | 2,617 | 349 | 64 | 30 | 2,313 | 473 | 146 | 2,933 | 5,993 |
| 1993 | 171 | 2,910 | 6,263 | 2,892 | 364 | 66 | 31 | 2,260 | 479 | 171 | 2,910 | 6,262 |
| 1994 | 190 | 3,030 | 6,155 | 2,683 | 338 | 69 | 36 | 2,324 | 515 | 190 | 3,030 | 6,155 |
| 1995 | 200 | 3,102 | 6,703 | 3,205 | 294 | 70 | 33 | 2,370 | 531 | 202 | 3,104 | 6,705 |
| 1996 | 143 | 3,157 | 7,167 | 3,590 | 316 | 71 | 33 | 2,437 | 577 | 145 | 3,159 | 7,168 |
| 1997 | 190 | 3,111 | 7,180 | 3,640 | 325 | 70 | 34 | 2,371 | 551 | 187 | 3,108 | 7,178 |
| 1998 | 206 | 2,933 | 6,659 | 3,297 | 328 | 70 | 31 | 2,184 | 542 | 205 | 2,931 | 6,657 |
| 1999 | 215 | 2,969 | 6,683 | 3,268 | 331 | 69 | 46 | 2,214 | 540 | 213 | 2,967 | 6,681 |
| 2000 | 238 | 3,010 | 6,262 | 2,811 | 317 | 66 | 57 | 2,262 | 511 | 241 | 3,013 | 6,264 |
| 2001 | 260 | 2,629 | 5,318 | 2,242 | 311 | 65 | 70 | 2,006 | 364 | 258 | 2,627 | 5,316 |
| 2002 | R315 | 2,712 | 5,899 | 2,689 | 328 | 64 | 105 | 1,995 | 402 | 309 | 2,706 | 5,893 |
| 2003 | 412 | R2,815 | 6,149 | 2,825 | 331 | 64 | 115 | 2,002 | 401 | 414 | 2,817 | R6,150 |
| 2004 | 501 | 3,011 | 6,248 | 2,690 | 341 | 65 | 142 | 2,121 | 389 | 513 | 3,023 | 6,261 |
| 2005 | R582 | R3,141 | R6,431 | 2,703 | 343 | 66 | 178 | R2,156 | 403 | R595 | R3,154 | R6,444 |
| 2006 | R745 | R3,324 | R6,872 | R2,869 | R343 | R72 | R264 | R2,172 | R407 | R795 | R3,374 | R6,922 |
| 2007 ^P | 988 | 3,584 | 6,800 | 2,463 | 353 | 80 | 319 | 2,165 | 431 | 1,018 | 3,615 | 6,830 |

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, fuel ethanol, and biodiesel.

⁴ Hydroelectric power, geothermal, solar/PV, wind, and biomass.

⁵ Conventional hydroelectricity net generation (converted to Btu using the fossil-fueled plants heat rate).

⁶ Geothermal electricity net generation (converted to Btu using the geothermal energy plants heat rate), and geothermal heat pump and direct use energy.

⁷ Solar thermal and photovoltaic electricity net generation (converted to Btu using the fossil-fueled plants heat rate), and solar thermal direct use energy.

⁸ Wind electricity net generation (converted to Btu using the fossil-fueled plants heat rate).

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 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: • 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.

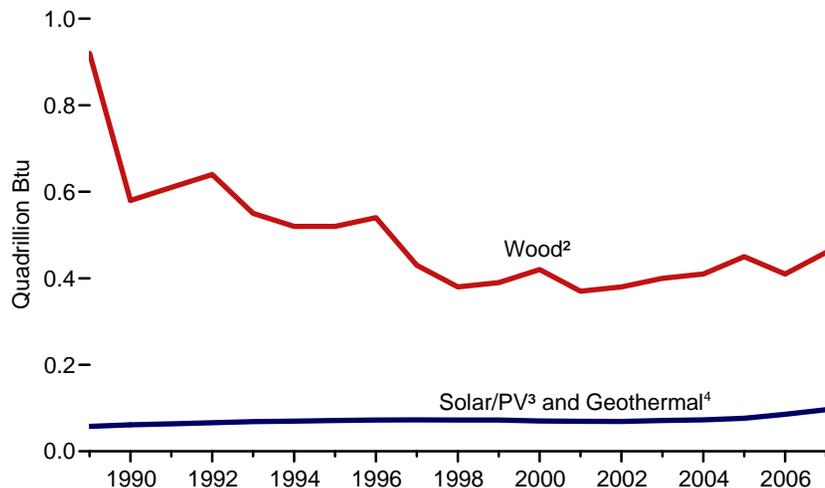
Web Pages: • For all data beginning in 1949, see <http://www.eia.doe.gov/emeu/aer/renew.html>.

• For related information, see <http://www.eia.doe.gov/fuelrenewable.html>.

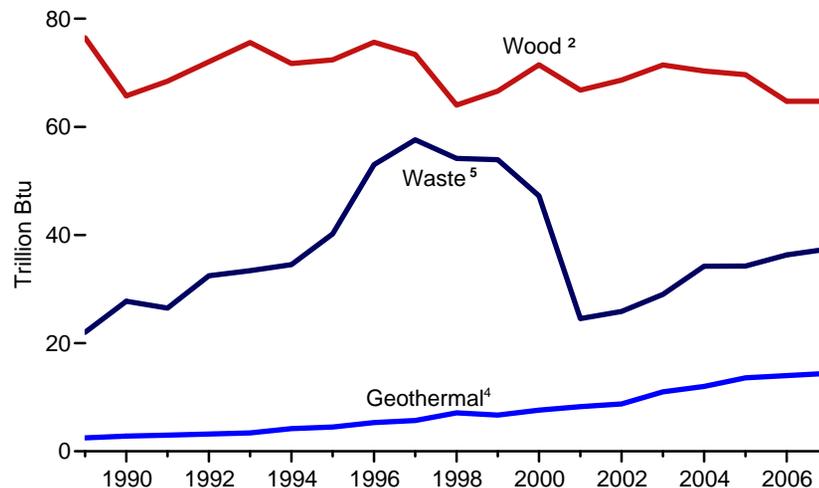
Sources: **Biofuels:** Table 10.3. **All Other Data:** Tables 10.2a-c.

Figure 10.2a Renewable Energy Consumption: End-Use Sectors, 1989-2007

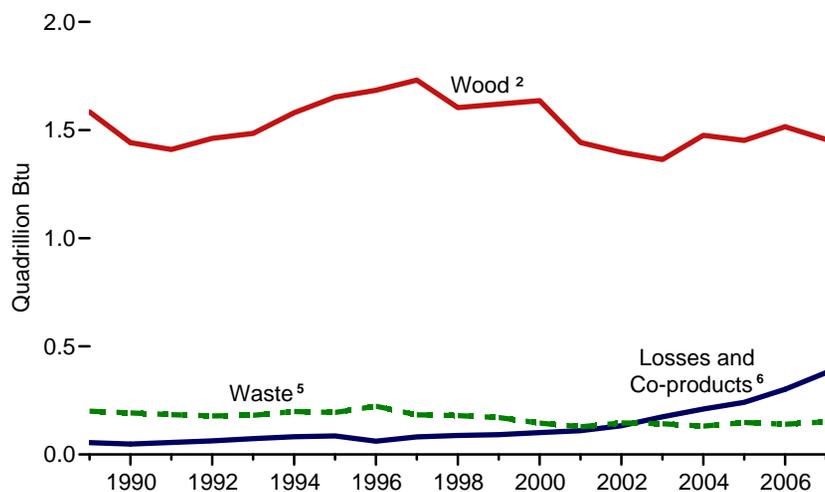
Residential Sector



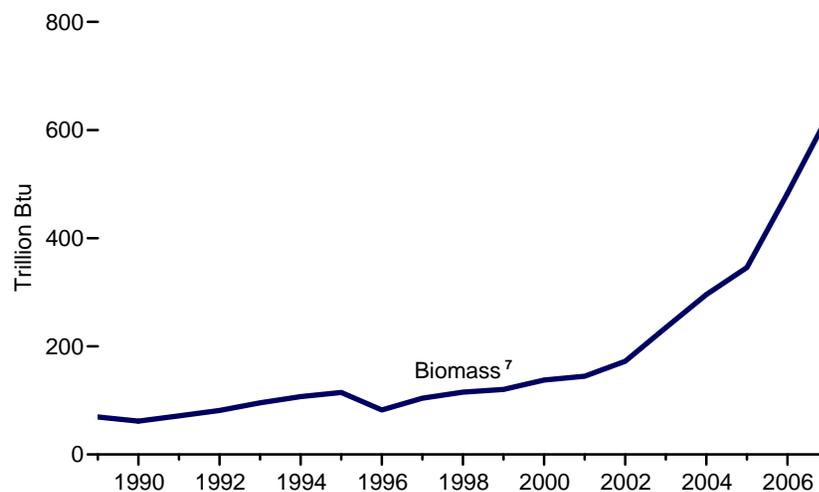
Commercial¹ Sector, Major Sources



Industrial¹ Sector



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 electricity generation. Includes small amounts of commercial sector use.

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.

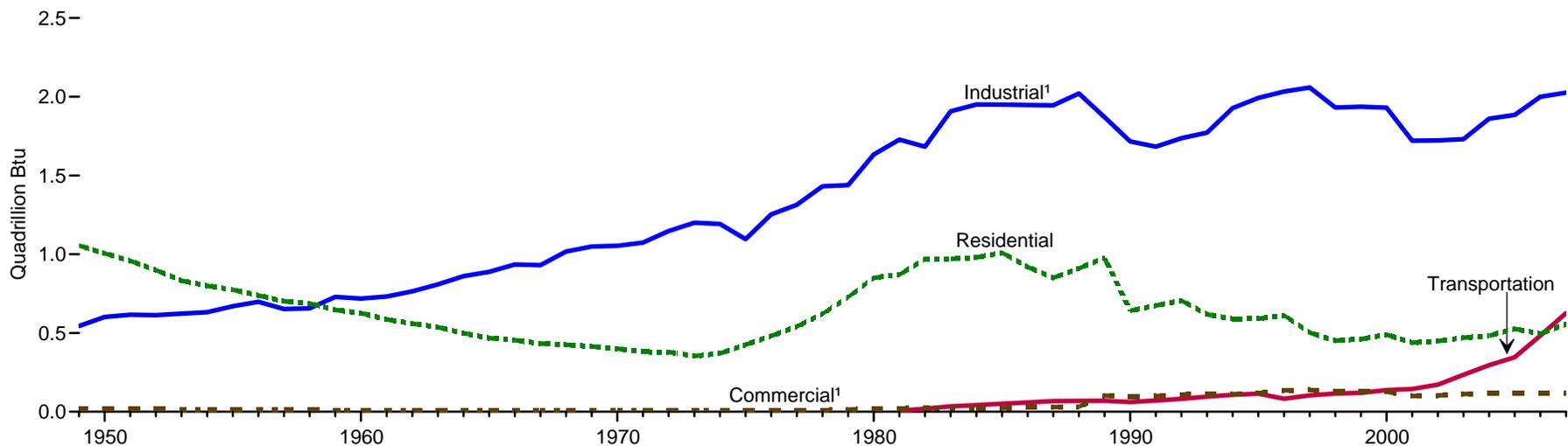
⁷ The ethanol portion of motor fuels (such as E10 and E85), and biofuels used as diesel fuel substitutes or additives.

Notes: • See related Figures 10.2b and 10.2c. • Because vertical scales differ, graphs should not be compared.

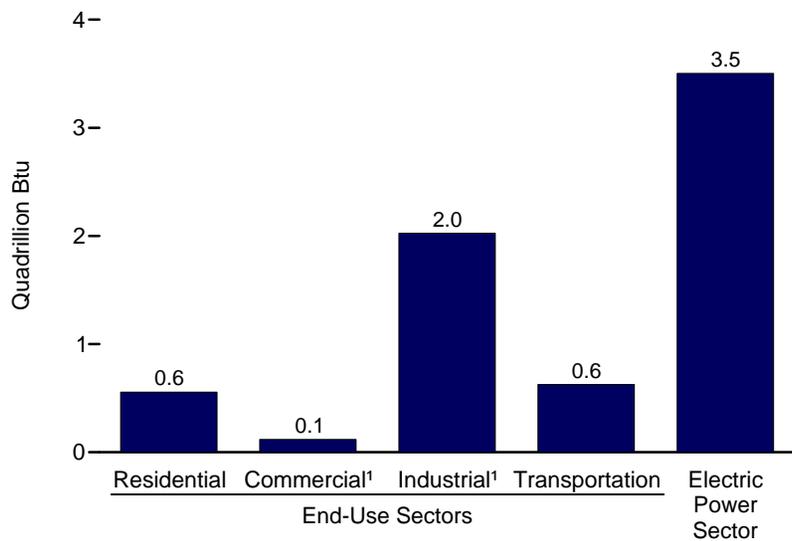
Sources: Tables 10.2a and 10.2b.

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

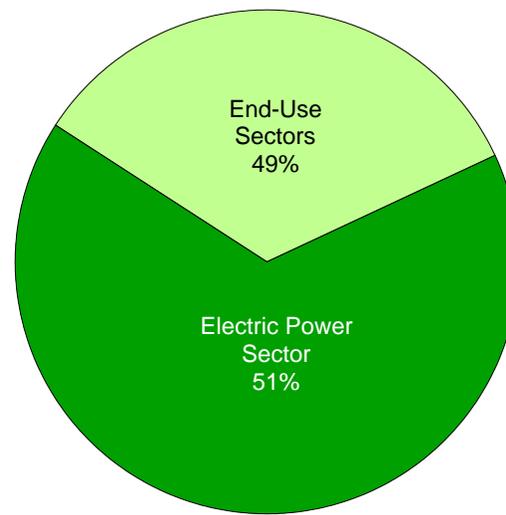
End-Use Sectors, 1949-2007



End-Use Sectors and Electric Power Sector, 2007



End-Use Sectors and Electric Power Sector Shares of Total Renewable Energy Consumption, 2007



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

Notes: • See related Figures 10.2a and 10.2c. • Because vertical scales differ, graphs should not be compared.
Sources: Tables 10.2a-10.2c.

Table 10.2a Renewable Energy Consumption: Residential and Commercial Sectors, Selected Years, 1949-2007
(Trillion Btu)

| Year | Residential Sector | | | | Commercial Sector ¹ | | | | | | |
|-------------------|--------------------------|-----------------------|-------------------|-------|-----------------------------------|--------------------------|-------------------|--------------------|---------------------------|-------|-------|
| | Geo-thermal ² | Solar/PV ³ | Biomass | Total | Hydro-electric Power ⁵ | Geo-thermal ² | Biomass | | | | Total |
| | | | Wood ⁴ | | | | Wood ⁴ | Waste ⁶ | Fuel Ethanol ⁷ | Total | |
| 1949 | NA | NA | 1,055 | 1,055 | NA | NA | 20 | NA | NA | 20 | 20 |
| 1950 | NA | NA | 1,006 | 1,006 | NA | NA | 19 | NA | NA | 19 | 19 |
| 1955 | NA | NA | 775 | 775 | NA | NA | 15 | NA | NA | 15 | 15 |
| 1960 | NA | NA | 627 | 627 | NA | NA | 12 | NA | NA | 12 | 12 |
| 1965 | NA | NA | 468 | 468 | NA | NA | 9 | NA | NA | 9 | 9 |
| 1970 | NA | NA | 401 | 401 | NA | NA | 8 | NA | NA | 8 | 8 |
| 1971 | NA | NA | 382 | 382 | NA | NA | 7 | NA | NA | 7 | 7 |
| 1972 | NA | NA | 380 | 380 | NA | NA | 7 | NA | NA | 7 | 7 |
| 1973 | NA | NA | 354 | 354 | NA | NA | 7 | NA | NA | 7 | 7 |
| 1974 | NA | NA | 371 | 371 | NA | NA | 7 | NA | NA | 7 | 7 |
| 1975 | NA | NA | 425 | 425 | NA | NA | 8 | NA | NA | 8 | 8 |
| 1976 | NA | NA | 482 | 482 | NA | NA | 9 | NA | NA | 9 | 9 |
| 1977 | NA | NA | 542 | 542 | NA | NA | 10 | NA | NA | 10 | 10 |
| 1978 | NA | NA | 622 | 622 | NA | NA | 12 | NA | NA | 12 | 12 |
| 1979 | NA | NA | 728 | 728 | NA | NA | 14 | NA | NA | 14 | 14 |
| 1980 | NA | NA | 850 | 850 | NA | NA | 21 | NA | NA | 21 | 21 |
| 1981 | NA | NA | 870 | 870 | NA | NA | 21 | NA | (s) | 21 | 21 |
| 1982 | NA | NA | 970 | 970 | NA | NA | 22 | NA | (s) | 22 | 22 |
| 1983 | NA | NA | 970 | 970 | NA | NA | 22 | NA | (s) | 22 | 22 |
| 1984 | NA | NA | 980 | 980 | NA | NA | 22 | NA | (s) | 22 | 22 |
| 1985 | NA | NA | 1,010 | 1,010 | NA | NA | 24 | NA | (s) | 24 | 24 |
| 1986 | NA | NA | 920 | 920 | NA | NA | 27 | NA | (s) | 27 | 27 |
| 1987 | NA | NA | 850 | 850 | NA | NA | 29 | NA | 1 | 30 | 30 |
| 1988 | NA | NA | 910 | 910 | NA | NA | 32 | NA | 1 | 33 | 33 |
| 1989 | 5 | 53 | 920 | 978 | 1 | 3 | 76 | 22 | 1 | 99 | 102 |
| 1990 | 6 | 56 | 580 | 641 | 1 | 3 | 66 | 28 | 1 | 94 | 98 |
| 1991 | 6 | 58 | 610 | 674 | 1 | 3 | 68 | 26 | (s) | 95 | 100 |
| 1992 | 6 | 60 | 640 | 706 | 1 | 3 | 72 | 32 | (s) | 105 | 109 |
| 1993 | 7 | 62 | 550 | 618 | 1 | 3 | 76 | 33 | (s) | 109 | 114 |
| 1994 | 6 | 64 | 520 | 590 | 1 | 4 | 72 | 35 | (s) | 106 | 112 |
| 1995 | 7 | 65 | 520 | 591 | 1 | 5 | 72 | 40 | (s) | 113 | 118 |
| 1996 | 7 | 65 | 540 | 612 | 1 | 5 | 76 | 53 | (s) | 129 | 135 |
| 1997 | 8 | 65 | 430 | 503 | 1 | 6 | 73 | 58 | (s) | 131 | 138 |
| 1998 | 8 | 65 | 380 | 452 | 1 | 7 | 64 | 54 | (s) | 118 | 127 |
| 1999 | 9 | 64 | 390 | 462 | 1 | 7 | 67 | 54 | (s) | 121 | 129 |
| 2000 | 9 | 61 | 420 | 490 | 1 | 8 | 71 | 47 | (s) | 119 | 128 |
| 2001 | 9 | 60 | 370 | 439 | 1 | 8 | 67 | 25 | (s) | 92 | 101 |
| 2002 | 10 | 59 | 380 | 449 | (s) | 9 | 69 | 26 | (s) | 95 | 104 |
| 2003 | 13 | 58 | 400 | 471 | 1 | 11 | 71 | 29 | 1 | 101 | 113 |
| 2004 | 14 | 59 | 410 | 483 | 1 | 12 | 70 | 34 | 1 | 105 | 118 |
| 2005 | 16 | 61 | R450 | R527 | 1 | 14 | 70 | 34 | 1 | 105 | 119 |
| 2006 | 18 | R67 | R410 | R495 | 1 | 14 | 65 | R36 | 1 | R102 | R119 |
| 2007 ^P | 22 | 74 | 460 | 556 | 1 | 14 | 65 | 37 | 2 | 104 | 119 |

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 electricity net generation (converted to Btu using the fossil-fueled plants heat rate). Includes a small amount of commercial sector use.

⁴ Wood and wood-derived fuels.

⁵ Conventional hydroelectricity net generation (converted to Btu using the fossil-fueled plants heat rate).

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 ethanol portion of motor fuels (such as E10) consumed by the commercial sector.

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

Notes: • All values are estimated, except for commercial sector hydroelectric power and waste.

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

Web Pages: • For all data beginning in 1949, see <http://www.eia.doe.gov/emeu/aer/renew.html>.

• For related information, see <http://www.eia.doe.gov/fuelrenewable.html>.

Sources: See end of section.

Table 10.2b Renewable Energy Consumption: Industrial and Transportation Sectors, Selected Years, 1949-2007
(Trillion Btu)

| Year | Industrial Sector ¹ | | | | | | | Transportation Sector | | | |
|-------------------|-----------------------------------|--------------------------|-------------------|--------------------|---------------------------|-------------------------------------|--------|---------------------------|------------------------|-------|------|
| | Hydro-electric Power ² | Geo-thermal ³ | Biomass | | | | Total | Biomass | | | |
| | | | Wood ⁴ | Waste ⁵ | Fuel Ethanol ⁶ | Losses and Co-products ⁷ | | Fuel Ethanol ⁸ | Biodiesel ⁹ | Total | |
| 1949 | 76 | NA | 468 | NA | NA | NA | 468 | 544 | NA | NA | NA |
| 1950 | 69 | NA | 532 | NA | NA | NA | 532 | 602 | NA | NA | NA |
| 1955 | 38 | NA | 631 | NA | NA | NA | 631 | 669 | NA | NA | NA |
| 1960 | 39 | NA | 680 | NA | NA | NA | 680 | 719 | NA | NA | NA |
| 1965 | 33 | NA | 855 | NA | NA | NA | 855 | 888 | NA | NA | NA |
| 1970 | 34 | NA | 1,019 | NA | NA | NA | 1,019 | 1,053 | NA | NA | NA |
| 1971 | 34 | NA | 1,040 | NA | NA | NA | 1,040 | 1,074 | NA | NA | NA |
| 1972 | 34 | NA | 1,113 | NA | NA | NA | 1,113 | 1,147 | NA | NA | NA |
| 1973 | 35 | NA | 1,165 | NA | NA | NA | 1,165 | 1,200 | NA | NA | NA |
| 1974 | 33 | NA | 1,159 | NA | NA | NA | 1,159 | 1,192 | NA | NA | NA |
| 1975 | 32 | NA | 1,063 | NA | NA | NA | 1,063 | 1,096 | NA | NA | NA |
| 1976 | 33 | NA | 1,220 | NA | NA | NA | 1,220 | 1,253 | NA | NA | NA |
| 1977 | 33 | NA | 1,281 | NA | NA | NA | 1,281 | 1,314 | NA | NA | NA |
| 1978 | 32 | NA | 1,400 | NA | NA | NA | 1,400 | 1,432 | NA | NA | NA |
| 1979 | 34 | NA | 1,405 | NA | NA | NA | 1,405 | 1,439 | NA | NA | NA |
| 1980 | 33 | NA | 1,600 | NA | NA | NA | 1,600 | 1,633 | NA | NA | NA |
| 1981 | 33 | NA | 1,602 | 87 | (s) | 6 | 1,695 | 1,728 | 7 | NA | 7 |
| 1982 | 33 | NA | 1,516 | 118 | (s) | 16 | 1,649 | 1,682 | 19 | NA | 19 |
| 1983 | 33 | NA | 1,690 | 155 | (s) | 28 | 1,874 | 1,907 | 34 | NA | 34 |
| 1984 | 33 | NA | 1,679 | 204 | 1 | 34 | 1,917 | 1,950 | 42 | NA | 42 |
| 1985 | 33 | NA | 1,645 | 230 | 1 | 41 | 1,917 | 1,950 | 51 | NA | 51 |
| 1986 | 33 | NA | 1,610 | 256 | 1 | 47 | 1,914 | 1,947 | 59 | NA | 59 |
| 1987 | 33 | NA | 1,576 | 282 | 1 | 54 | 1,912 | 1,945 | 67 | NA | 67 |
| 1988 | 33 | NA | 1,625 | 308 | 1 | 54 | 1,988 | 2,020 | 68 | NA | 68 |
| 1989 | 28 | 2 | 1,584 | 200 | 1 | 55 | 1,840 | 1,870 | 69 | NA | 69 |
| 1990 | 31 | 2 | 1,442 | 192 | 1 | 48 | 1,683 | 1,716 | 62 | NA | 62 |
| 1991 | 30 | 2 | 1,410 | 185 | 1 | 56 | 1,651 | 1,683 | 72 | NA | 72 |
| 1992 | 31 | 2 | 1,461 | 179 | 1 | 63 | 1,704 | 1,737 | 81 | NA | 81 |
| 1993 | 30 | 2 | 1,484 | 181 | 1 | 74 | 1,740 | 1,772 | 96 | NA | 96 |
| 1994 | 62 | 3 | 1,580 | 199 | 1 | 82 | 1,862 | 1,927 | 107 | NA | 107 |
| 1995 | 55 | 3 | 1,652 | 195 | 2 | 86 | 1,935 | 1,992 | 115 | NA | 115 |
| 1996 | 61 | 3 | 1,683 | 224 | 1 | 61 | 1,970 | 2,033 | 82 | NA | 82 |
| 1997 | 58 | 3 | 1,731 | 184 | 1 | 81 | 1,997 | 2,058 | 104 | NA | 104 |
| 1998 | 55 | 3 | 1,603 | 180 | 1 | 88 | 1,873 | 1,931 | 115 | NA | 115 |
| 1999 | 49 | 4 | 1,620 | 171 | 1 | 92 | 1,883 | 1,936 | 120 | NA | 120 |
| 2000 | 42 | 4 | 1,636 | 145 | 1 | 101 | 1,884 | 1,930 | 138 | NA | 138 |
| 2001 | 33 | 5 | 1,443 | 129 | 3 | 110 | 1,684 | 1,721 | 144 | 1 | 145 |
| 2002 | 39 | 5 | 1,396 | 146 | 3 | 133 | 1,679 | 1,723 | 171 | 1 | 172 |
| 2003 | 43 | 3 | 1,363 | 142 | R5 | 174 | 1,684 | 1,731 | 233 | 2 | 235 |
| 2004 | 33 | 4 | 1,476 | 132 | 6 | R210 | 1,824 | 1,861 | 292 | R4 | R296 |
| 2005 | 32 | 4 | 1,452 | 148 | 7 | 241 | R1,848 | R1,884 | 334 | R12 | R346 |
| 2006 | R29 | 4 | R1,515 | R140 | R9 | R301 | R1,966 | R1,999 | R451 | 32 | R483 |
| 2007 ^P | 23 | 5 | 1,457 | 151 | 12 | 379 | 1,998 | 2,025 | 564 | 63 | 626 |

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-fueled plants heat rate).

³ Geothermal heat pump and direct use energy.

⁴ Wood and wood-derived fuels.

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 The ethanol portion of motor fuels (such as E10) consumed by the industrial sector.

⁷ 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.

⁸ The ethanol portion of motor fuels (such as E10 and E85) consumed by the transportation sector.

⁹ "Biodiesel is any liquid biofuel suitable as a diesel fuel substitute, additive, or extender. See "Biodiesel" in Glossary.

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

Notes: • All values are estimated, except for industrial sector hydroelectric power in 1949-1978 and 1989 forward. • Totals may not equal sum of components due to independent rounding.

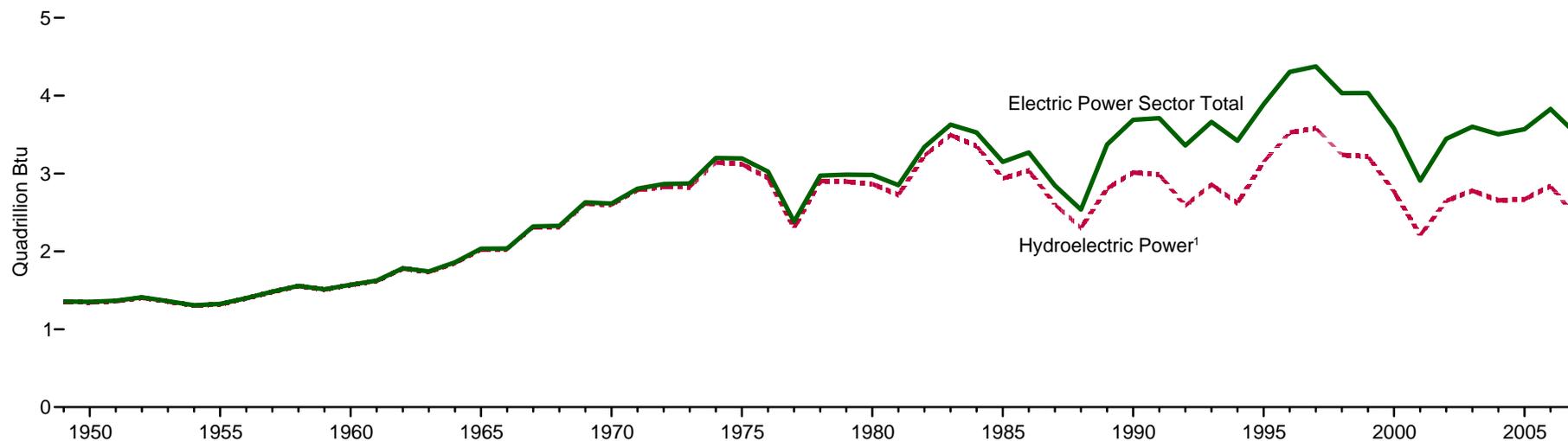
Web Pages: • For all data beginning in 1949, see <http://www.eia.doe.gov/emeu/aer/renew.html>.

• For related information, see <http://www.eia.doe.gov/fuelrenewable.html>.

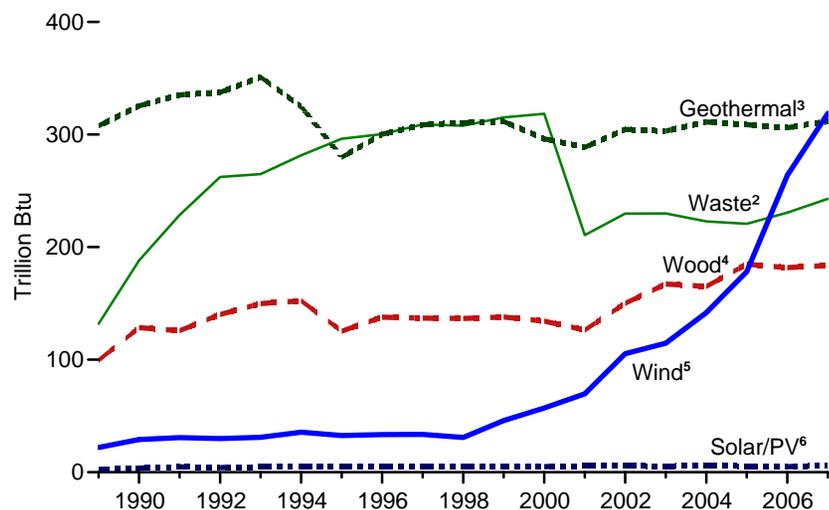
Sources: See end of section.

Figure 10.2c Renewable Energy Consumption: Electric Power Sector

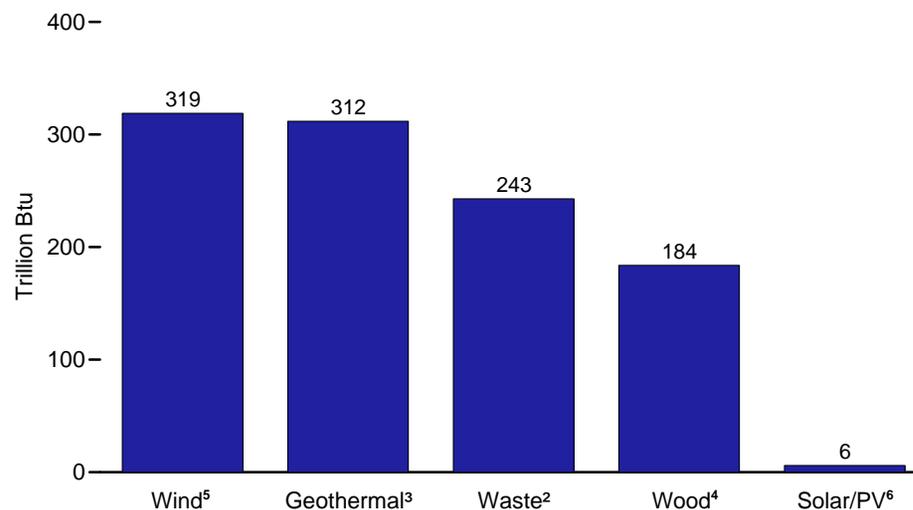
Electric Power Sector Total and Hydroelectric Power, 1949-2007



Non-Hydroelectric Power Sources, 1989-2007



Non-Hydroelectric Power Sources, 2007



¹Conventional hydroelectricity net generation.

² 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).

³Geothermal electricity net generation.

⁴Wood and wood-driven fuels.

⁵Wind electricity net generation.

⁶Solar thermal and photovoltaic electricity net generation.

Notes: • See related Figure 10.2a on the end-use sectors. • Because vertical scales differ, graphs should not be compared.

Source: Table 10.2c.

Table 10.2c Renewable Energy Consumption: Electric Power Sector, Selected Years, 1949-2007

(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 | 1 | NA | NA | 2 | NA | 2 | 1,571 |
| 1965 | 2,026 | 4 | NA | NA | 3 | NA | 3 | 2,033 |
| 1970 | 2,600 | 11 | NA | NA | 1 | 2 | 4 | 2,615 |
| 1971 | 2,790 | 12 | NA | NA | 1 | 2 | 3 | 2,806 |
| 1972 | 2,829 | 31 | NA | NA | 1 | 2 | 3 | 2,864 |
| 1973 | 2,827 | 43 | NA | NA | 1 | 2 | 3 | 2,873 |
| 1974 | 3,143 | 53 | NA | NA | 1 | 2 | 3 | 3,199 |
| 1975 | 3,122 | 70 | NA | NA | (s) | 2 | 2 | 3,194 |
| 1976 | 2,943 | 78 | NA | NA | 1 | 2 | 3 | 3,024 |
| 1977 | 2,301 | 77 | NA | NA | 3 | 2 | 5 | 2,383 |
| 1978 | 2,905 | 64 | NA | NA | 2 | 1 | 3 | 2,973 |
| 1979 | 2,897 | 84 | NA | NA | 3 | 2 | 5 | 2,986 |
| 1980 | 2,867 | 110 | NA | NA | 3 | 2 | 5 | 2,982 |
| 1981 | 2,725 | 123 | NA | NA | 3 | 1 | 4 | 2,852 |
| 1982 | 3,233 | 105 | NA | NA | 2 | 1 | 3 | 3,341 |
| 1983 | 3,494 | 129 | NA | (s) | 2 | 2 | 4 | 3,627 |
| 1984 | 3,353 | 165 | (s) | (s) | 5 | 4 | 9 | 3,527 |
| 1985 | 2,937 | 198 | (s) | (s) | 8 | 7 | 14 | 3,150 |
| 1986 | 3,038 | 219 | (s) | (s) | 5 | 7 | 12 | 3,270 |
| 1987 | 2,602 | 229 | (s) | (s) | 8 | 7 | 15 | 2,846 |
| 1988 | 2,302 | 217 | (s) | (s) | 10 | 8 | 17 | 2,536 |
| 1989 ⁷ | 2,808 | 308 | 3 | 22 | 100 | 132 | 232 | 3,372 |
| 1990 | 3,014 | 326 | 4 | 29 | 129 | 188 | 317 | 3,689 |
| 1991 | 2,985 | 335 | 5 | 31 | 126 | 229 | 354 | 3,710 |
| 1992 | 2,586 | 338 | 4 | 30 | 140 | 262 | 402 | 3,360 |
| 1993 | 2,861 | 351 | 5 | 31 | 150 | 265 | 415 | 3,662 |
| 1994 | 2,620 | 325 | 5 | 36 | 152 | 282 | 434 | 3,420 |
| 1995 | 3,149 | 280 | 5 | 33 | 125 | 296 | 422 | 3,889 |
| 1996 | 3,528 | 300 | 5 | 33 | 138 | 300 | 438 | 4,305 |
| 1997 | 3,581 | 309 | 5 | 34 | 137 | 309 | 446 | 4,375 |
| 1998 | 3,241 | 311 | 5 | 31 | 137 | 308 | 444 | 4,032 |
| 1999 | 3,218 | 312 | 5 | 46 | 138 | 315 | 453 | 4,034 |
| 2000 | 2,768 | 296 | 5 | 57 | 134 | 318 | 453 | 3,579 |
| 2001 | 2,209 | 289 | 6 | 70 | 126 | 211 | 337 | 2,910 |
| 2002 | 2,650 | 305 | 6 | 105 | 150 | 230 | 380 | 3,445 |
| 2003 | 2,781 | 303 | 5 | 115 | 167 | 230 | 397 | 3,601 |
| 2004 | 2,656 | 311 | 6 | 142 | 165 | 223 | 388 | 3,503 |
| 2005 | 2,670 | 309 | 6 | 178 | 185 | 221 | 406 | 3,568 |
| 2006 | ^R 2,839 | ^R 306 | 5 | ^R 264 | ^R 182 | ^R 231 | ^R 412 | ^R 3,827 |
| 2007 ^P | 2,440 | 312 | 6 | 319 | 184 | 243 | 427 | 3,503 |

¹ Conventional hydroelectricity net generation (converted to Btu using the fossil-fueled plants heat rate).

² Geothermal electricity net generation (converted to Btu using the geothermal energy plants heat rate).

³ Solar thermal and photovoltaic electricity net generation (converted to Btu using the fossil-fueled plants heat rate).

⁴ Wind electricity net generation (converted to Btu using the fossil-fueled plants heat rate).

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 Note 3, "Electricity Imports and Exports," at end of Section 8. • Totals may not equal sum of components due to independent rounding.

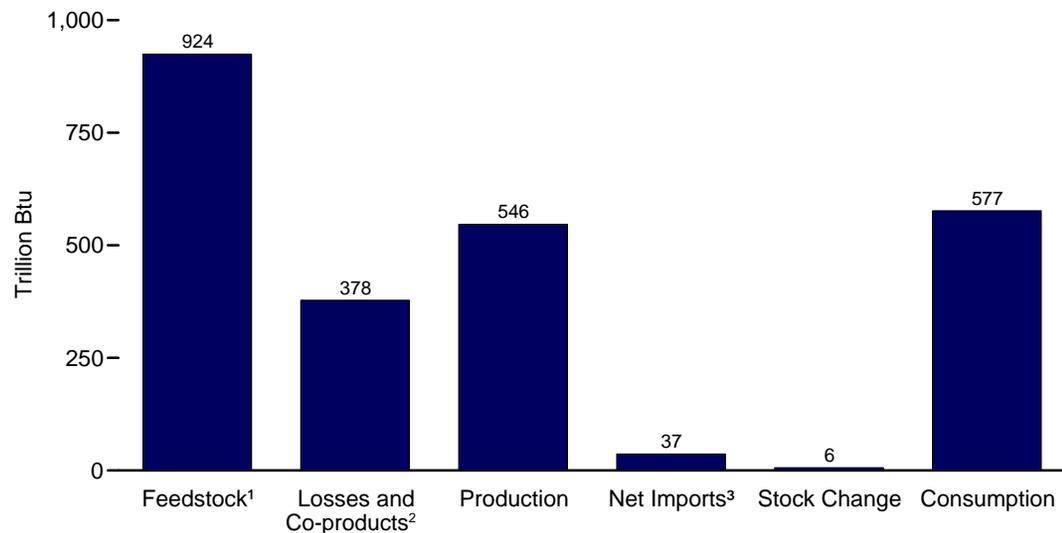
Web Pages: • For all data beginning in 1949, see <http://www.eia.doe.gov/emeu/aer/renew.html>.

• For related information, see <http://www.eia.doe.gov/fuelrenewable.html>.

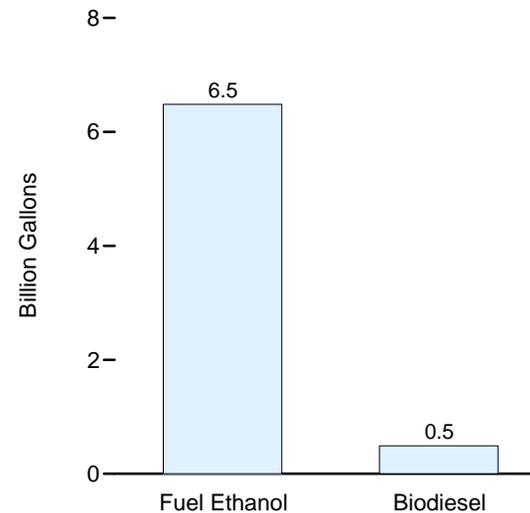
Sources: Tables 8.2b, 8.5b, 8.7b, and A6.

Figure 10.3 Fuel Ethanol and Biodiesel Overview

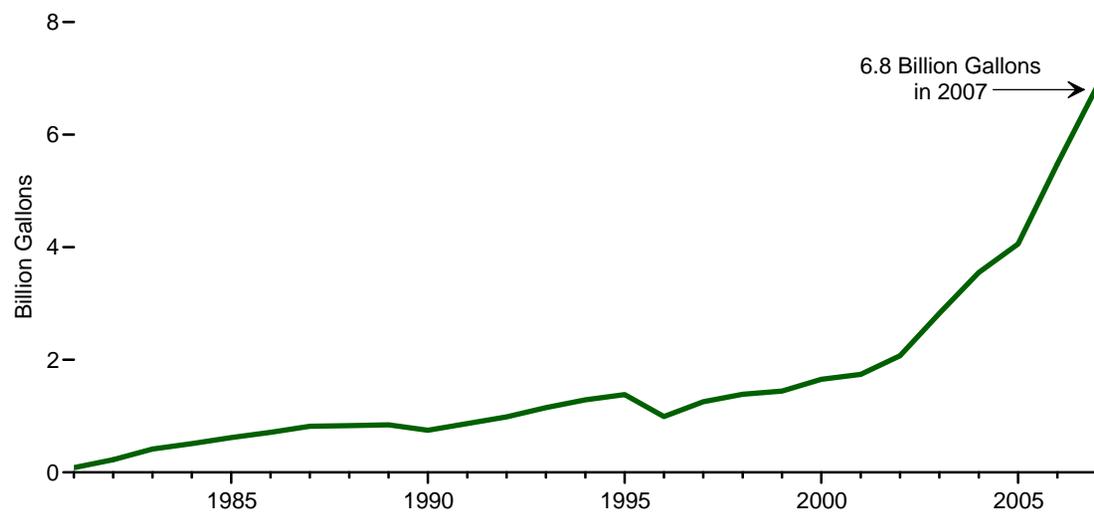
Fuel Ethanol Overview, 2007



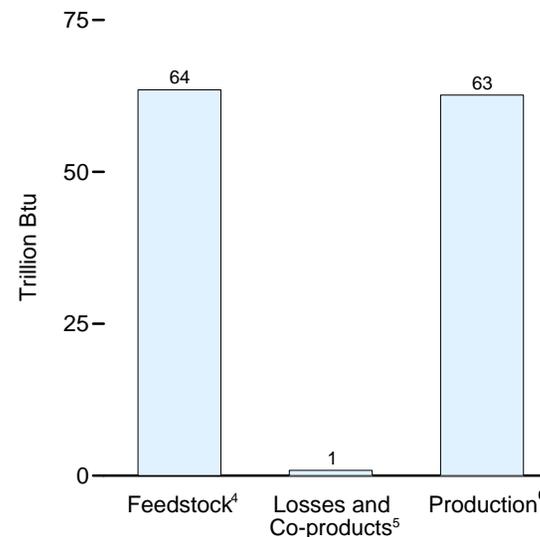
Production, 2007



Fuel Ethanol Consumption, 1981-2007



Biodiesel, 2007



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

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

³ Fuel ethanol imports only. Data for fuel ethanol exports are not available.

⁴ Total vegetable oil and other biomass inputs to the production of biodiesel.

⁵ Losses and co-products from the production of biodiesel.

⁶ Production of biodiesel for use as diesel fuel substitutes or additives.

Note: Because vertical scales differ, graphs should not be compared.

Source: Table 10.3.

Table 10.3 Fuel Ethanol and Biodiesel Overview, 1981-2007

| Year | Fuel Ethanol | | | | | | | | | | | Biodiesel | | | | | | |
|-------------------|-------------------------|-------------------------------------|------------|-------|------|--------------------------|------|---------------------|---------------------------|------|-------------|-----------|------|-------------------------|-------------------------------------|-------------------------|-------|------|
| | Feed-stock ¹ | Losses and Co-products ² | Production | | | Net Imports ³ | | Stocks ⁴ | Stock Change ⁵ | | Consumption | | | Feed-stock ⁶ | Losses and Co-products ⁷ | Production ⁸ | | |
| | TBtu | TBtu | Mbbl | MMgal | TBtu | Mbbl | TBtu | Mbbl | Mbbl | TBtu | Mbbl | MMgal | TBtu | TBtu | TBtu | Mbbl | MMgal | TBtu |
| 1981 | 13 | 6 | 1,978 | 83 | 7 | NA | NA | NA | NA | NA | 1,978 | 83 | 7 | NA | NA | NA | NA | NA |
| 1982 | 35 | 16 | 5,369 | 225 | 19 | NA | NA | NA | NA | NA | 5,369 | 225 | 19 | NA | NA | NA | NA | NA |
| 1983 | 63 | 28 | 9,890 | 415 | 35 | NA | NA | NA | NA | NA | 9,890 | 415 | 35 | NA | NA | NA | NA | NA |
| 1984 | 77 | 34 | 12,150 | 510 | 43 | NA | NA | NA | NA | NA | 12,150 | 510 | 43 | NA | NA | NA | NA | NA |
| 1985 | 93 | 41 | 14,693 | 617 | 52 | NA | NA | NA | NA | NA | 14,693 | 617 | 52 | NA | NA | NA | NA | NA |
| 1986 | 107 | 47 | 16,954 | 712 | 60 | NA | NA | NA | NA | NA | 16,954 | 712 | 60 | NA | NA | NA | NA | NA |
| 1987 | 123 | 54 | 19,497 | 819 | 69 | NA | NA | NA | NA | NA | 19,497 | 819 | 69 | NA | NA | NA | NA | NA |
| 1988 | 124 | 54 | 19,780 | 831 | 70 | NA | NA | NA | NA | NA | 19,780 | 831 | 70 | NA | NA | NA | NA | NA |
| 1989 | 126 | 55 | 20,062 | 843 | 71 | NA | NA | NA | NA | NA | 20,062 | 843 | 71 | NA | NA | NA | NA | NA |
| 1990 | 111 | 48 | 17,802 | 748 | 63 | NA | NA | NA | NA | NA | 17,802 | 748 | 63 | NA | NA | NA | NA | NA |
| 1991 | 129 | 56 | 20,627 | 866 | 73 | NA | NA | NA | NA | NA | 20,627 | 866 | 73 | NA | NA | NA | NA | NA |
| 1992 | 146 | 63 | 23,453 | 985 | 83 | NA | NA | 1,791 | NA | NA | 23,453 | 985 | 83 | NA | NA | NA | NA | NA |
| 1993 | 171 | 74 | 27,484 | 1,154 | 97 | 244 | 1 | 2,114 | 323 | 1 | 27,405 | 1,151 | 97 | NA | NA | NA | NA | NA |
| 1994 | 190 | 82 | 30,689 | 1,289 | 109 | 279 | 1 | 2,393 | 279 | 1 | 30,689 | 1,289 | 109 | NA | NA | NA | NA | NA |
| 1995 | 200 | 86 | 32,325 | 1,358 | 114 | 387 | 1 | 2,186 | -207 | -1 | 32,919 | 1,383 | 117 | NA | NA | NA | NA | NA |
| 1996 | 143 | 61 | 23,178 | 973 | 82 | 313 | 1 | 2,065 | -121 | (s) | 23,612 | 992 | 84 | NA | NA | NA | NA | NA |
| 1997 | 190 | 81 | 30,674 | 1,288 | 109 | 85 | (s) | 2,925 | 860 | 3 | 29,899 | 1,256 | 106 | NA | NA | NA | NA | NA |
| 1998 | 206 | 88 | 33,453 | 1,405 | 118 | 66 | (s) | 3,406 | 481 | 2 | 33,038 | 1,388 | 117 | NA | NA | NA | NA | NA |
| 1999 | 215 | 92 | 34,881 | 1,465 | 123 | 87 | (s) | 4,024 | 618 | 2 | 34,350 | 1,443 | 122 | NA | NA | NA | NA | NA |
| 2000 | 238 | 101 | 38,627 | 1,622 | 137 | 116 | (s) | 3,400 | -624 | -2 | 39,367 | 1,653 | 139 | NA | NA | NA | NA | NA |
| 2001 | 259 | 110 | 42,028 | 1,765 | 149 | 315 | 1 | 4,298 | 898 | 3 | 41,445 | 1,741 | 147 | 1 | (s) | 204 | 9 | 1 |
| 2002 | 313 | 133 | 50,956 | 2,140 | 180 | 306 | 1 | 6,200 | 1,902 | 7 | 49,360 | 2,073 | 175 | 1 | (s) | 250 | 10 | 1 |
| 2003 | 410 | 174 | 66,772 | 2,804 | 236 | 292 | 1 | 5,978 | -222 | -1 | 67,286 | 2,826 | 238 | 2 | (s) | R338 | 14 | 2 |
| 2004 | 497 | 210 | 81,058 | 3,404 | 287 | 3,542 | 13 | 6,002 | 24 | (s) | 84,576 | 3,552 | 299 | R4 | (s) | 666 | 28 | R4 |
| 2005 | 570 | 241 | 92,961 | 3,904 | 329 | 3,234 | 11 | 5,563 | -439 | -2 | 96,634 | 4,059 | 342 | R12 | (s) | 2,162 | 91 | R12 |
| 2006 | R712 | R301 | R116,294 | 4,884 | R412 | R17,408 | R62 | R8,760 | R3,197 | 11 | R130,505 | 5,481 | R462 | R32 | R(s) | R5,963 | 250 | R32 |
| 2007 ^P | 924 | 378 | 154,416 | 6,485 | 546 | 10,348 | 37 | 10,509 | 1,749 | 6 | 163,002 | 6,846 | 577 | 64 | 1 | 11,691 | 491 | 63 |

¹ Total corn and other biomass inputs to the production of 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 Fuel ethanol imports only. Data for fuel ethanol exports are not available.

⁴ Stocks are at end of year.

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

⁶ Total vegetable oil and other biomass inputs to the production of biodiesel.

⁷ 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.

⁸ Production of biofuels for use as diesel fuel substitutes or additives. Biodiesel consumption equals biodiesel production.

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

Notes: • Mbbl = thousand barrels. MMgal = million U.S. gallons. TBtu = trillion Btu. • Totals may not equal sum of components due to independent rounding.

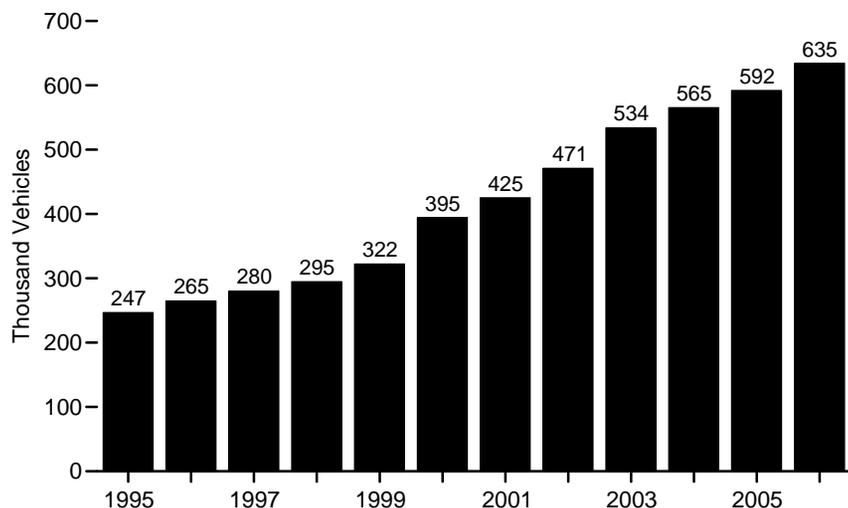
Web Pages: For related information, see http://www.eia.doe.gov/oil_gas/petroleum/data_publications/monthly_oxygenate_telephone_report/motr.html, http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html, and <http://www.census.gov/cir/www/311/m311k.html>.

Sources: (Note: For production, net imports, stocks, stock change, and consumption, data in thousand barrels are converted to million gallons by multiplying by 0.042; and are converted to trillion Btu by multiplying by the approximate heat content of fuel ethanol or biodiesel—see Table A3.) **Fuel Ethanol Feedstock:** Calculated as fuel ethanol production in thousand barrels multiplied by the approximate heat content of fuel ethanol feedstock—see Table A3. **Fuel Ethanol Losses and Co-products:** Calculated as fuel ethanol feedstock minus fuel ethanol production. **Fuel Ethanol Production:** • 1981-1992—Fuel ethanol production is equal to fuel ethanol consumption—see sources for "Fuel Ethanol Consumption." • 1993-2004—Calculated as fuel ethanol consumption plus fuel ethanol stock change minus fuel ethanol

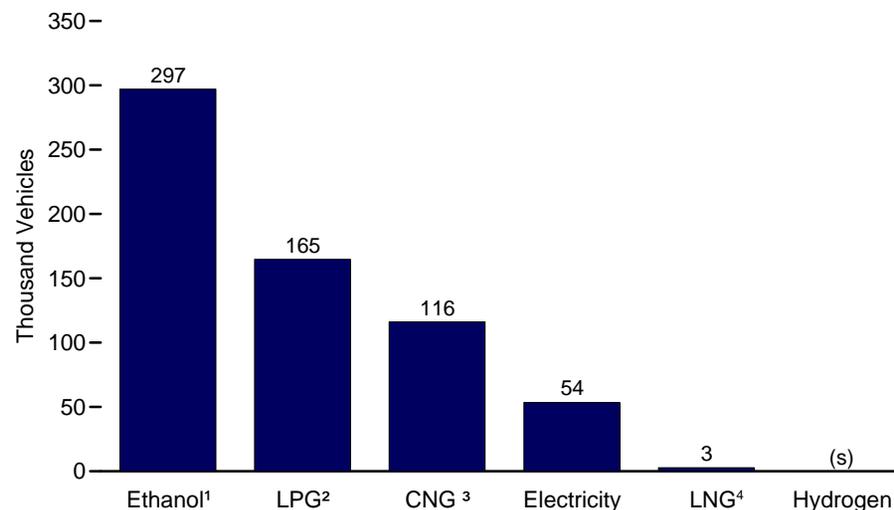
net imports. These data differ slightly from the original production data from Energy Information Administration (EIA), Form EIA-819, "Monthly Oxygenate Report," and predecessor form, which were not reconciled and updated to be consistent with the final balance. • 2005 forward—EIA, Form EIA-819, "Monthly Oxygenate Report." **Fuel Ethanol Net Imports, Stocks, and Stock Change:** • 1992-2006—EIA, *Petroleum Supply Annual (PSA)*, annual reports. • 2007—EIA, *Petroleum Supply Monthly (PSM)*, monthly reports. **Fuel Ethanol Consumption:** • 1981-1989—EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10; and EIA, Office of Coal, Nuclear, Electric and Alternate Fuels (CNEAF), estimates. • 1990-1992—EIA, *Estimates of U.S. Biomass Energy Consumption 1992*, Table D2; and EIA, CNEAF, estimates. • 1993-2004—EIA, *PSA*, annual reports, Tables 2 and 16. Calculated as ten percent of oxygenated finished motor gasoline field production (Table 2), plus fuel ethanol refinery input (Table 16). • 2005 and 2006—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). • 2007—EIA, *PSM*, monthly reports, Tables 1 and 27. 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 27). **Biodiesel Feedstock:** Calculated as biodiesel production in thousand barrels multiplied by the approximate heat content of biodiesel feedstock—see Table A3. **Biodiesel Losses and Co-products:** 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. • 2006—U.S. Department of Commerce, Bureau of the Census, "M311K - Fats and Oils: Production, Consumption, and Stocks," Table 3A, data for soybean oil consumed in methyl esters (biodiesel). In addition, EIA, Office of Integrated Analysis and Forecasting, estimates that 14.4 million gallons of yellow grease were consumed in methyl esters (biodiesel). EIA assumes that 7.65 pounds of vegetable oil are needed to make one gallon of biodiesel. • 2007—U.S. Department of Commerce, Bureau of the Census, "M311K - Fats and Oils: Production, Consumption, and Stocks," Table 3A, data for all fats and oils consumed in methyl esters (biodiesel). EIA assumes that 7.65 pounds of vegetable oil are needed to make one gallon of biodiesel.

Figure 10.4 Estimated Number of Alternative-Fueled Vehicles in Use and Alternative Fuel Consumption

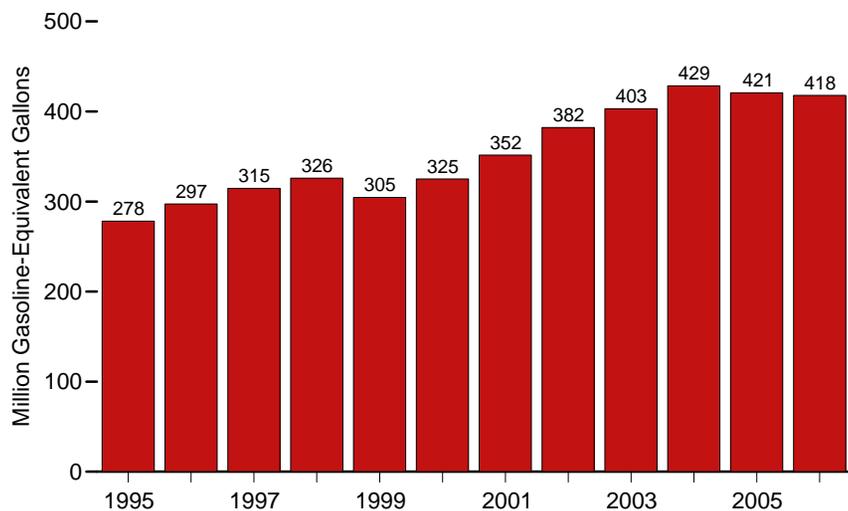
Vehicles in Use, 1995-2006



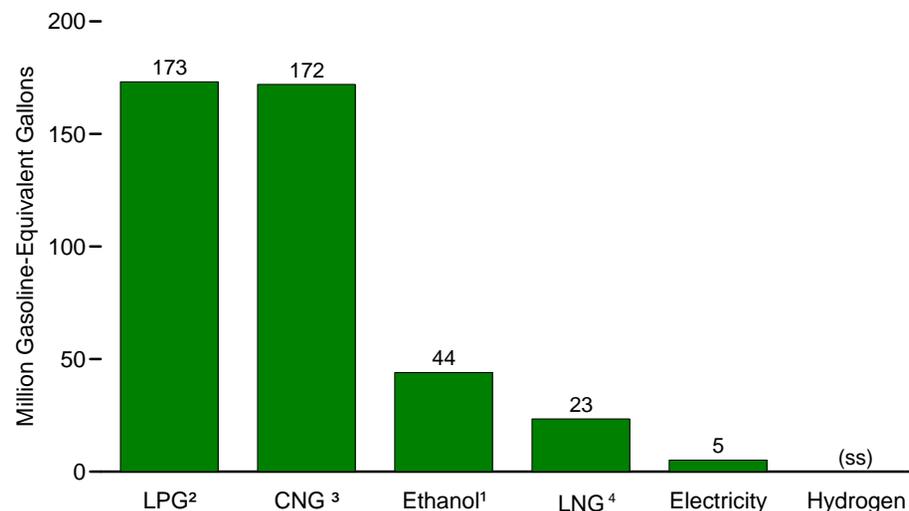
Vehicles in Use by Fuel Type, 2006



Fuel Consumption, 1995-2006



Fuel Consumption by Type, 2006



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.

Note: Because vertical scales differ, graphs should not be compared.

Source: Table 10.4.

Table 10.4 Estimated Number of Alternative-Fueled Vehicles in Use and Fuel Consumption, 1992-2006

| 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 | Electricity ⁶ | Hydrogen | Other Fuels ⁷ | Total | 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 |
| 1993 | NA | 32,714 | 299 | 10,263 | 414 | 441 | 27 | 1,690 | 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 |
| 1995 | 172,806 | 50,218 | 603 | 18,319 | 386 | 1,527 | 136 | 2,860 | 0 | 0 | 246,855 | 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 |
| 1997 | 175,679 | 68,571 | 813 | 21,040 | 172 | 9,130 | 347 | 4,453 | 0 | 0 | 280,205 | 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 |
| 1999 | 178,610 | 91,267 | 1,681 | 18,964 | 198 | 24,604 | 14 | 6,964 | 0 | 0 | 322,302 | 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 |
| 2001 | 185,053 | 111,851 | 2,576 | 7,827 | 0 | 100,303 | 0 | 17,847 | 0 | 0 | 425,457 | 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 |
| 2003 | 190,369 | 114,406 | 2,640 | 0 | 0 | 179,090 | 0 | 47,485 | 9 | 0 | 533,999 | 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 |
| 2005 | 173,795 | 117,699 | 2,748 | 0 | 0 | 246,363 | 0 | 51,398 | 119 | 3 | 592,125 | NA | NA | NA | NA | NA |
| 2006 ^P | 164,846 | 116,131 | 2,798 | 0 | 0 | 297,099 | 0 | 53,526 | 159 | 3 | 634,562 | 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 | 7,089 | 4,886,919 |
| 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 | 16,948 | 4,972,680 |
| 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 | R18,220 | R4,709,133 |
| 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 | R28,244 | R4,748,243 |
| 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 | R91,649 | R4,923,590 |
| 2006 ^P | 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 | 260,606 | 4,842,577 |

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 2006, the Energy Information Administration (EIA) estimates that the number of E85 vehicles that are capable of operating on E85, motor gasoline, or both, is about 6 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.

R=Revised. P=Preliminary. NA=Not available.

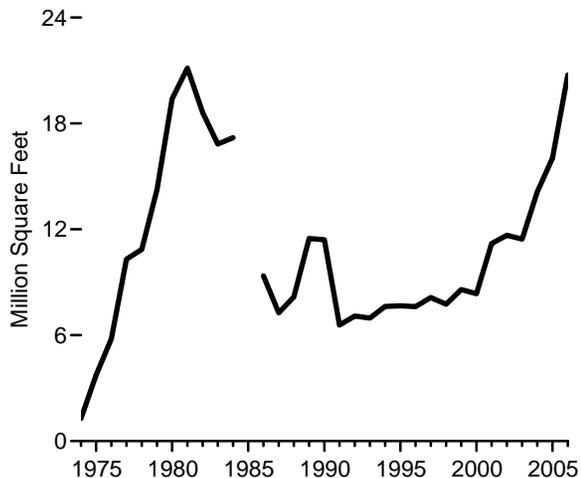
Note: Totals may not equal sum of components due to independent rounding.

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

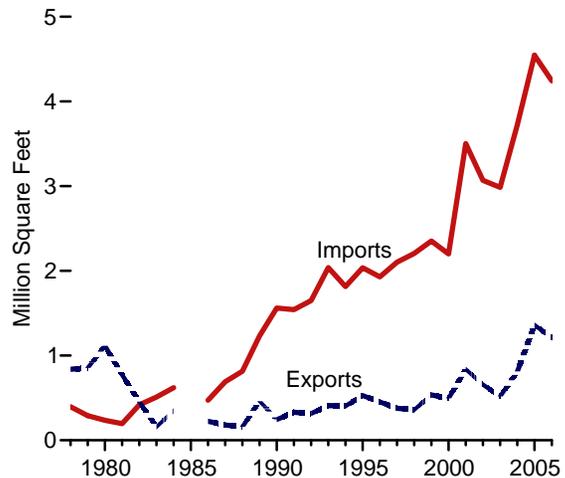
Sources: • 1992-1994—Science Applications International Corporation, "Alternative Transportation Fuels and Vehicles Data Development," unpublished final report prepared for the EIA, (McLean, VA, July 1996), and U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. Data were revised 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. Data were revised by using gross instead of net heat contents. • 2003 forward—EIA, "Alternatives to Traditional Transportation Fuels 2006" (May 2008), Tables V1 and C1.

Figure 10.5 Solar Thermal Collector Shipments by Type, Price, and Trade

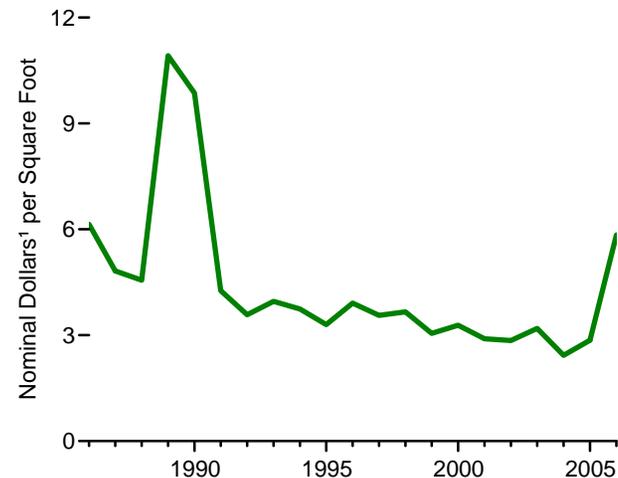
Total Shipments, 1974-1984 and 1986-2006



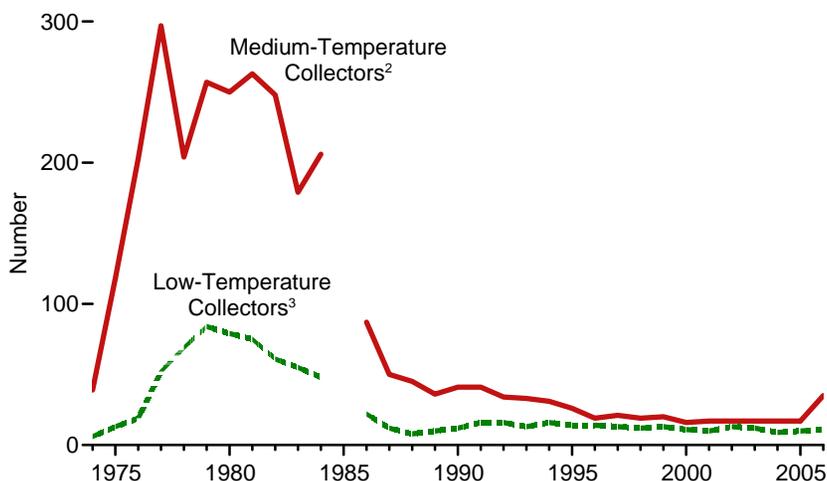
Trade, 1978-1984 and 1986-2006



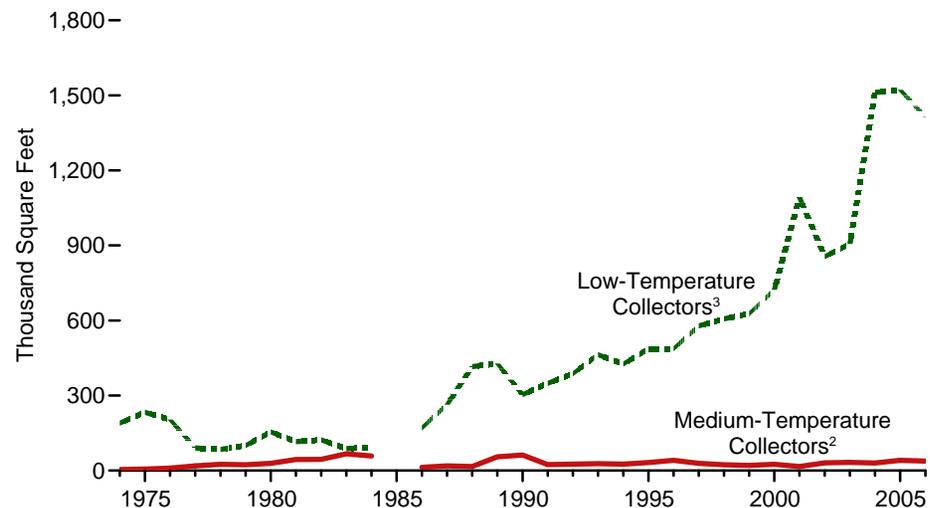
Price of Total Shipments, 1986-2006



Number of U.S. Manufacturers by Type of Collector, 1974-1984 and 1986-2006



Average Annual Shipments per Manufacturer, 1974-1984 and 1986-2006



¹ 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. • Because vertical scales differ, graphs should not be compared.

Source: Table 10.5.

Table 10.5 Solar Thermal Collector Shipments by Type, Price, and Trade, 1974-2006

(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 (nominal dollars ⁵ per square foot) | Number of U.S. Manufacturers | Quantity Shipped | Shipments per Manufacturer | Price ⁴ (nominal dollars ⁵ per square foot) | Quantity Shipped | Price ⁴ (nominal dollars ⁵ per square foot) | Quantity Shipped | Price ⁴ (nominal 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 | 0 | -- | 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 |

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.

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 See "Nominal Dollars" in Glossary.

⁶ No data are available for 1985.

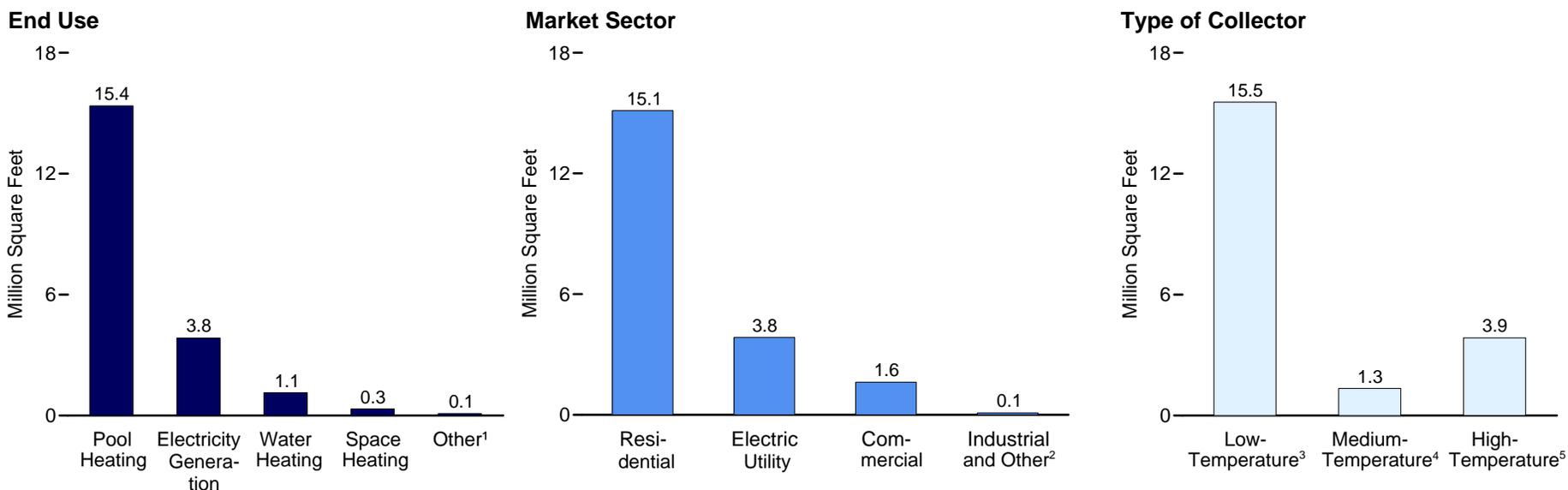
NA=Not available. -- = Not applicable. W=Value withheld to avoid disclosure of proprietary company data.

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.

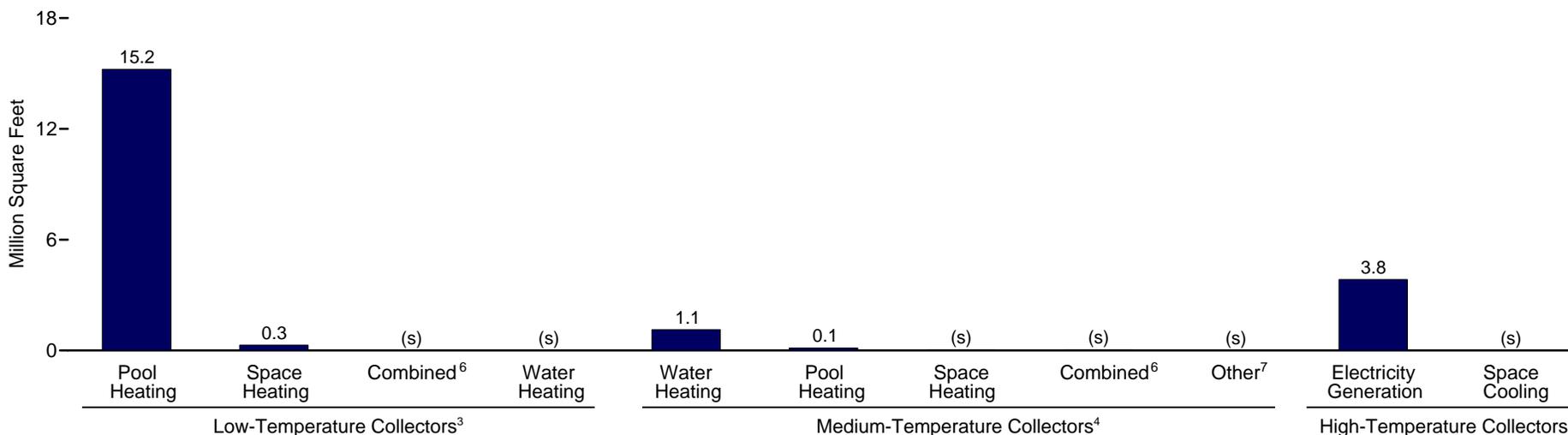
Web Page: For related information, see <http://www.eia.doe.gov/fuelrenewable.html>.

Sources: • 1974-1992—Energy Information Administration (EIA), *Solar Collector Manufacturing Activity*, annual reports, and Form CE-63A, "Annual Solar Thermal Collector Manufacturers Survey," and predecessor forms. • 1993-2001—EIA, *Renewable Energy Annual*, annual reports, and Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and predecessor form. • 2002 forward—EIA, *Solar Thermal and Photovoltaic Collector Manufacturing Activities*, annual reports, and Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Figure 10.6 Solar Thermal Collector Shipments by End Use, Market Sector, and Type, 2006



End Use by Type of Collector



¹Combined space and water heating, and space cooling.

²Other sectors, such as government, including the military but excluding space applications.

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

⁴Collectors 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.

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

⁶Combined space and water heating.

⁷Space cooling and electricity generation.

(s)=Less than 0.05 million square feet.

Notes: • Data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers.

Source: Table 10.6.

Table 10.6 Solar Thermal Collector Shipments by End Use, Market Sector, and Type, 2006
(Thousand Square Feet)

| End Use | Low-Temperature Collectors ¹ | Medium-Temperature Collectors ² | High-Temperature Collectors ³ | Total |
|----------------------------------------|-----------------------------------------|--------------------------------------------|------------------------------------------|---------------|
| End-Use Total | 15,546 | 1,346 | 3,852 | 20,744 |
| Pool Heating | 15,225 | 137 | 0 | 15,362 |
| Water Heating | 10 | 1,126 | 0 | 1,136 |
| Space Heating | 290 | 40 | 0 | 330 |
| Space Cooling | 0 | 3 | 0 | 3 |
| Combined Space and Water Heating | 21 | 38 | 7 | 66 |
| Process Heating | 0 | 0 | 0 | 0 |
| Electricity Generation | 0 | 2 | 3,845 | 3,847 |
| Other ⁴ | 0 | 0 | 0 | 0 |
| Market Sector Total | 15,546 | 1,346 | 3,852 | 20,744 |
| Residential | 13,906 | 1,217 | 0 | 15,123 |
| Commercial | 1,500 | 120 | 7 | 1,626 |
| Industrial ⁵ | 40 | 2 | 0 | 42 |
| Electric Utility | 0 | 0 | 3,845 | 3,845 |
| Other ⁶ | 100 | 7 | 0 | 107 |

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. These are parabolic dish/trough collectors used primarily by independent power producers to

generate electricity for the electric grid.

⁴ Cooking, water pumping, water purification, desalinization, distillation, and other uses.

⁵ Includes all independent power producers.

⁶ Other sectors, such as government, including the military but excluding space applications.

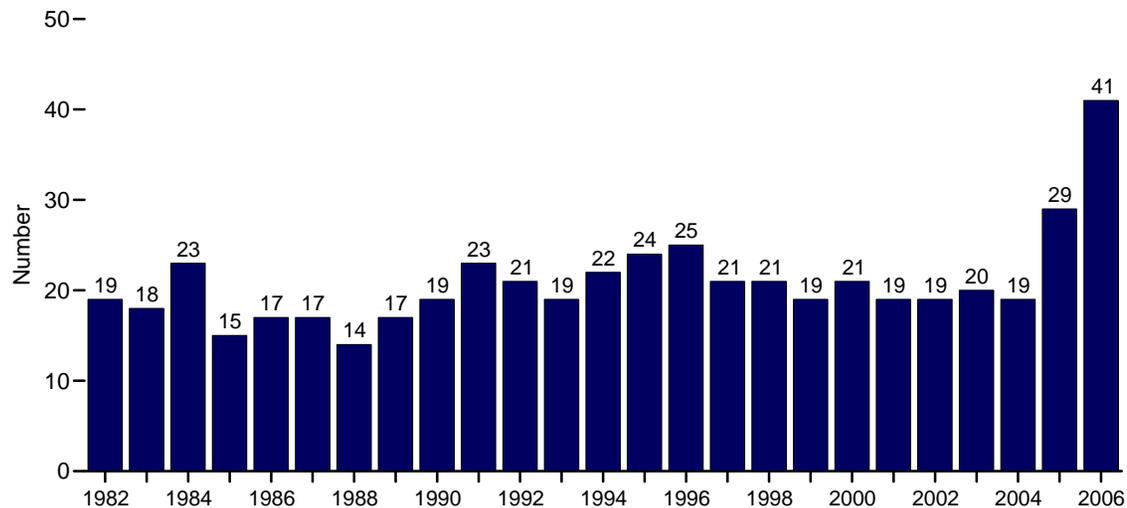
Notes: • Data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers. • Totals may not equal sum of components due to independent rounding.

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

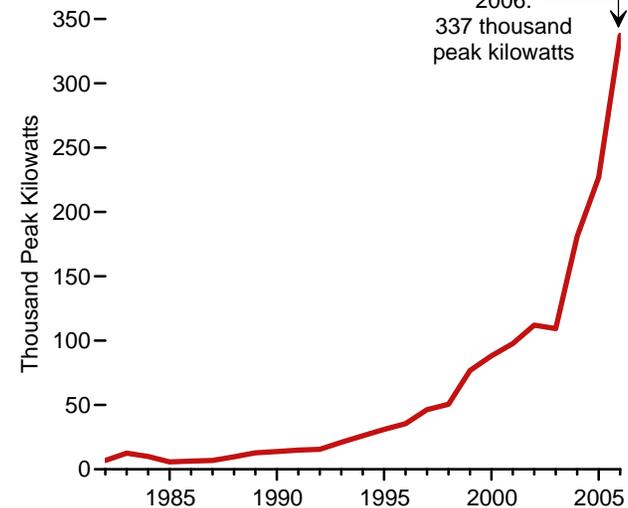
Source: Energy Information Administration, *Solar Thermal and Photovoltaic Collector Manufacturing Activities 2006* (October 2007), Table 2.10.

Figure 10.7 Photovoltaic Cell and Module Shipments, Trade, and Prices

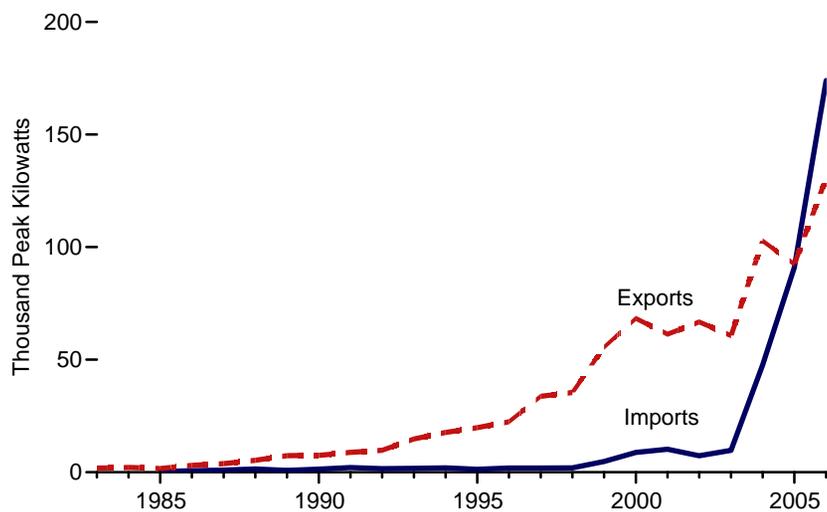
Number of U.S. Companies Reporting Shipments, 1982-2006



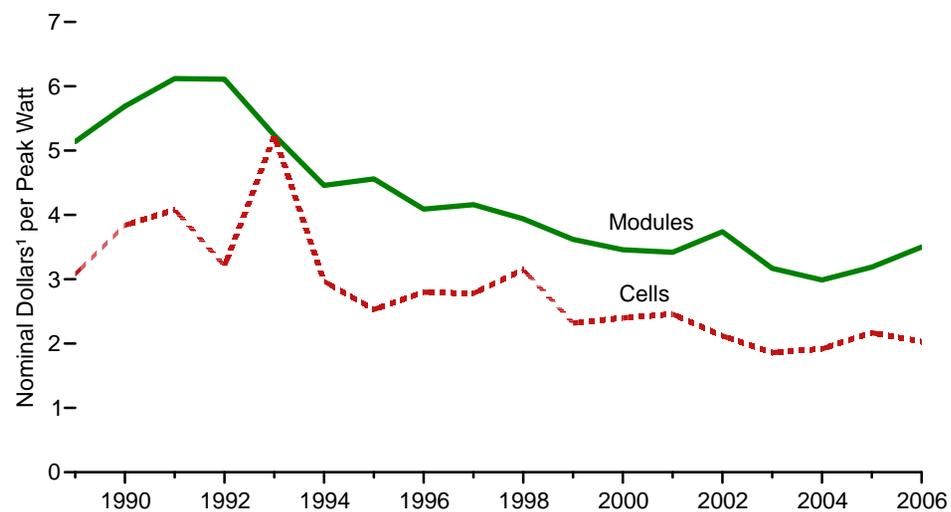
Total Shipments, 1982-2006



Trade, 1983-2006



Prices, 1989-2006



¹ See "Nominal Dollars" in Glossary.

Source: Table 10.7.

Notes: • Shipments are for domestic and export shipments, and may include imports that subsequently were shipped to domestic and foreign customers. • Because vertical scales differ, graphs should not be compared.

Table 10.7 Photovoltaic Cell and Module Shipments by Type, Trade, and Prices, 1982-2006

| 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 | | | | | Nominal 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 | 55,562 | 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 |

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 See "Nominal Dollars" in Glossary.

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

NA=Not available.

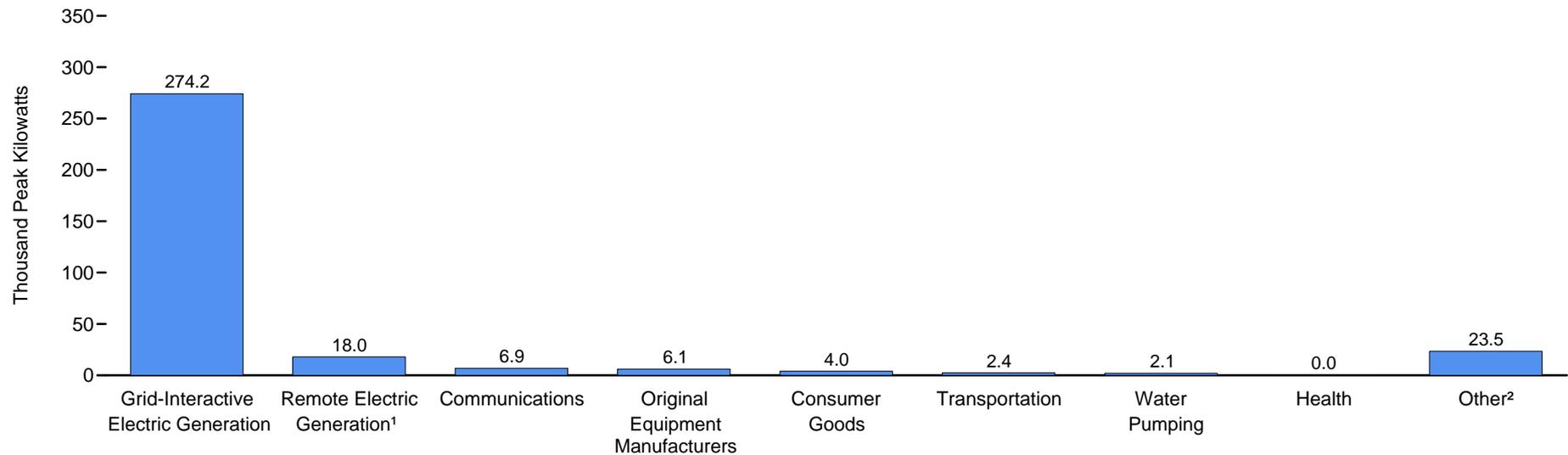
Note: Shipments data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers.

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

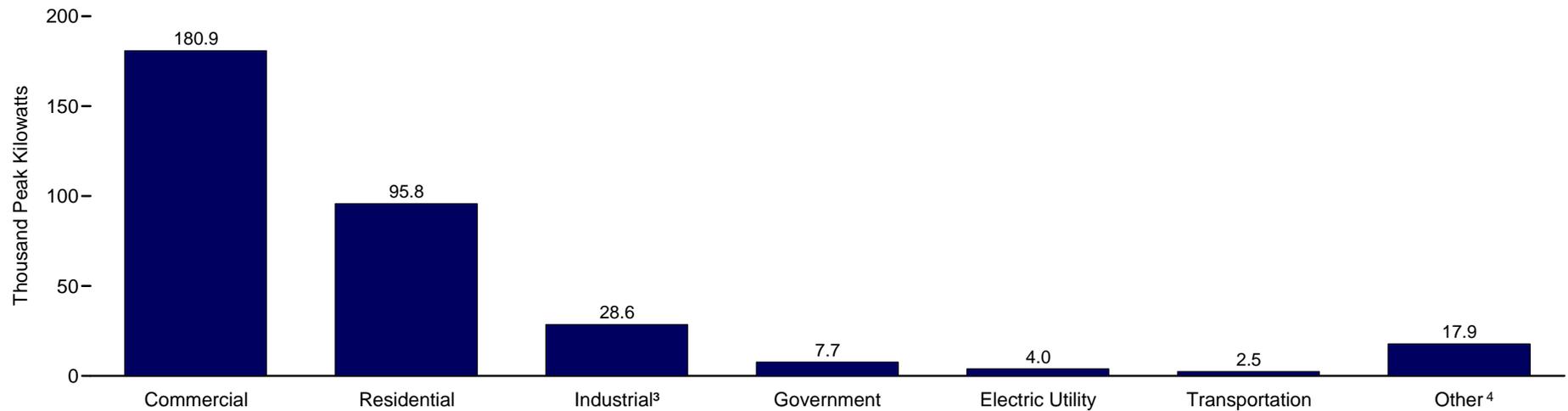
Sources: • 1982-1992—Energy Information Administration (EIA), *Solar Collector Manufacturing Activity*, annual reports. • 1993-2001—EIA, *Renewable Energy Annual*, annual reports. • 2002 forward—EIA, *Solar Thermal and Photovoltaic Collector Manufacturing Activities*, annual reports.

Figure 10.8 Photovoltaic Cell and Module Shipments by End Use and Market Sector, 2006

By End Use



By Market Sector



¹ Units designed for installations that do not interact with the electrical distribution system.

² Represents such applications as cooking food, desalination, and distilling.

³ Includes all independent power producers.

⁴ Shipments for specialty purposes such as research.

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

Source: Table 10.8.

Table 10.8 Photovoltaic Cell and Module Shipments by End Use and Market Sector, 1989-2006

| Year | End Use | | | | | | | | | Market Sector | | | | | | Total | |
|-----------------------------------------------------|---------------------|-------------------|----------------------------------|--------|--------|---------------------------------------------------------------|---------------------|------------------|--------------------|------------------|-----------------|-----------------|------------------------------|---------------------|---------------------|--------|--------------------|
| | Commu- nications | Consumer Goods | Electric Generation ¹ | | Health | Original Equip- ment Manu- facturers ² | Trans- portation | Water Pumping | Other ³ | Resi- dential | Com- mercial | Gov- ernment | Indus- trial ⁴ | Trans- portation | Electric Utility | | Other ⁵ |
| | | | Grid- Inter- active | Remote | | | | | | | | | | | | | |
| Amount Shipped (peak kilowatts ⁶) | | | | | | | | | | | | | | | | | |
| 1989 | 2,590 | 2,788 | 1,251 | 2,620 | 5 | 1,595 | 1,196 | 711 | 69 | 1,439 | 3,850 | 1,077 | 3,993 | 1,130 | 785 | 551 | 12,825 |
| 1990 | 4,340 | 2,484 | 469 | 3,097 | 5 | 1,119 | 1,069 | 1,014 | 240 | 1,701 | 6,086 | 1,002 | 2,817 | 974 | 826 | 432 | 13,837 |
| 1991 | 3,538 | 3,312 | 856 | 3,594 | 61 | 1,315 | 1,523 | 729 | 13 | 3,624 | 3,345 | 815 | 3,947 | 1,555 | 1,275 | 377 | 14,939 |
| 1992 | 3,717 | 2,566 | 1,227 | 4,238 | 67 | 828 | 1,602 | 809 | 530 | 4,154 | 2,386 | 1,063 | 4,279 | 1,673 | 1,553 | 477 | 15,583 |
| 1993 | 3,846 | 946 | 1,096 | 5,761 | 674 | 2,023 | 4,238 | 2,294 | 74 | 5,237 | 4,115 | 1,325 | 5,352 | 2,564 | 1,503 | 856 | 20,951 |
| 1994 | 5,570 | 3,239 | 2,296 | 9,253 | 79 | 1,849 | 2,128 | 1,410 | 254 | 6,632 | 5,429 | 2,114 | 6,855 | 2,174 | 2,364 | 510 | 26,077 |
| 1995 | 5,154 | 1,025 | 4,585 | 8,233 | 776 | 3,188 | 4,203 | 2,727 | 1,170 | 6,272 | 8,100 | 2,000 | 7,198 | 2,383 | 3,759 | 1,347 | 31,059 |
| 1996 | 6,041 | 1,063 | 4,844 | 10,884 | 977 | 2,410 | 5,196 | 3,261 | 789 | 8,475 | 5,176 | 3,126 | 8,300 | 3,995 | 4,753 | 1,639 | 35,464 |
| 1997 | 7,383 | 347 | 8,273 | 8,630 | 1,303 | 5,245 | 6,705 | 3,783 | 4,684 | 10,993 | 8,111 | 3,909 | 11,748 | 3,574 | 5,651 | 2,367 | 46,354 |
| 1998 | 8,280 | 1,198 | 14,193 | 8,634 | 1,061 | 5,044 | 6,356 | 4,306 | 1,491 | 15,936 | 8,460 | 2,808 | 13,232 | 3,440 | 3,965 | 2,720 | 50,562 |
| 1999 | 12,147 | 2,292 | 24,782 | 10,829 | 1,466 | 12,400 | 8,486 | 4,063 | 322 | 19,817 | 17,283 | 3,107 | 24,972 | 4,341 | 5,876 | 1,392 | 76,787 |
| 2000 | 12,269 | 2,870 | 21,713 | 14,997 | 2,742 | 12,153 | 12,804 | 5,644 | 3,028 | 24,814 | 13,692 | 4,417 | 28,808 | 5,502 | 6,298 | 4,690 | 88,221 |
| 2001 | 14,743 | 4,059 | 27,226 | 21,447 | 3,203 | 6,268 | 12,636 | 7,444 | 641 | 33,262 | 15,710 | 5,728 | 28,063 | 8,486 | 5,846 | 571 | 97,666 |
| 2002 | 17,290 | 3,400 | 33,983 | 21,693 | 4,202 | 7,869 | 16,028 | 7,532 | 93 | 29,315 | 20,578 | 8,565 | 32,218 | 12,932 | 7,640 | 841 | 112,090 |
| 2003 | 14,185 | 2,995 | 42,485 | 15,025 | 2,924 | 11,334 | 14,143 | 6,073 | 194 | 23,389 | 32,604 | 5,538 | 27,951 | 11,089 | 8,474 | 313 | 109,357 |
| 2004 | 11,348 | 6,444 | 129,265 | 18,371 | 341 | 6,452 | 1,380 | 1,322 | 6,193 | 53,928 | 74,509 | 3,257 | 30,493 | 1,380 | 3,233 | 14,316 | 181,116 |
| 2005 | 8,666 | 5,787 | 168,474 | 24,958 | 0 | 11,677 | 2,159 | 1,343 | 3,853 | 75,040 | 89,459 | 28,683 | 22,199 | 1,621 | 143 | 9,772 | 226,916 |
| 2006 | 6,888 | 4,030 | 274,197 | 18,003 | 0 | 6,132 | 2,438 | 2,093 | 23,487 | 95,815 | 180,852 | 7,688 | 28,618 | 2,458 | 3,981 | 17,857 | 337,268 |
| Percent of Total | | | | | | | | | | | | | | | | | |
| 1989 | 20.2 | 21.7 | 9.8 | 20.4 | (s) | 12.4 | 9.3 | 5.5 | 0.5 | 11.2 | 30.0 | 8.4 | 31.1 | 8.8 | 6.1 | 4.3 | 100.0 |
| 1990 | 31.4 | 18.0 | 3.4 | 22.4 | (s) | 8.1 | 7.7 | 7.3 | 1.7 | 12.3 | 44.0 | 7.2 | 20.4 | 7.0 | 6.0 | 3.1 | 100.0 |
| 1991 | 23.7 | 22.2 | 5.7 | 24.1 | .4 | 8.8 | 10.2 | 4.9 | .1 | 24.3 | 22.4 | 5.5 | 26.4 | 10.4 | 8.5 | 2.5 | 100.0 |
| 1992 | 23.9 | 16.5 | 7.9 | 27.2 | .4 | 5.3 | 10.3 | 5.2 | 3.4 | 26.7 | 15.3 | 6.8 | 27.5 | 10.7 | 10.0 | 3.1 | 100.0 |
| 1993 | 18.4 | 4.5 | 5.2 | 27.5 | 3.2 | 9.7 | 20.2 | 10.9 | .4 | 25.0 | 19.6 | 6.3 | 25.5 | 12.2 | 7.2 | 4.1 | 100.0 |
| 1994 | 21.4 | 12.4 | 8.8 | 35.5 | .3 | 7.1 | 8.2 | 5.4 | 1.0 | 25.4 | 20.8 | 8.1 | 26.3 | 8.3 | 9.1 | 2.0 | 100.0 |
| 1995 | 16.6 | 3.3 | 14.8 | 26.5 | 2.5 | 10.3 | 13.5 | 8.8 | 3.8 | 20.2 | 26.1 | 6.4 | 23.2 | 7.7 | 12.1 | 4.3 | 100.0 |
| 1996 | 17.0 | 3.0 | 13.7 | 30.7 | 2.8 | 6.8 | 14.7 | 9.2 | 2.2 | 23.9 | 14.6 | 8.8 | 23.4 | 11.3 | 13.4 | 4.6 | 100.0 |
| 1997 | 15.9 | .7 | 17.8 | 18.6 | 2.8 | 11.3 | 14.5 | 8.2 | 10.1 | 23.7 | 17.5 | 8.4 | 25.3 | 7.7 | 12.2 | 5.1 | 100.0 |
| 1998 | 16.4 | 2.4 | 28.1 | 17.1 | 2.1 | 10.0 | 12.6 | 8.5 | 2.9 | 31.5 | 16.7 | 5.6 | 26.2 | 6.8 | 7.8 | 5.4 | 100.0 |
| 1999 | 15.8 | 3.0 | 32.3 | 14.1 | 1.9 | 16.1 | 11.1 | 5.3 | .4 | 25.8 | 22.5 | 4.0 | 32.5 | 5.7 | 7.7 | 1.8 | 100.0 |
| 2000 | 13.9 | 3.3 | 24.6 | 17.0 | 3.1 | 13.8 | 14.5 | 6.4 | 3.4 | 28.1 | 15.5 | 5.0 | 32.7 | 6.2 | 7.1 | 5.3 | 100.0 |
| 2001 | 15.1 | 4.2 | 27.9 | 22.0 | 3.3 | 6.4 | 12.9 | 7.6 | .7 | 34.1 | 16.1 | 5.9 | 28.7 | 8.7 | 6.0 | .6 | 100.0 |
| 2002 | 15.4 | 3.0 | 30.3 | 19.4 | 3.7 | 7.0 | 14.3 | 6.7 | .1 | 26.2 | 18.4 | 7.6 | 28.7 | 11.5 | 6.8 | .8 | 100.0 |
| 2003 | 13.0 | 2.7 | 38.8 | 13.7 | 2.7 | 10.4 | 12.9 | 5.6 | .2 | 21.4 | 29.8 | 5.1 | 25.6 | 10.1 | 7.7 | .3 | 100.0 |
| 2004 | 6.3 | 3.6 | 71.4 | 10.1 | .2 | 3.6 | .8 | .7 | 3.4 | 29.8 | 41.1 | 1.8 | 16.8 | .8 | 1.8 | 7.9 | 100.0 |
| 2005 | 3.8 | 2.6 | 74.2 | 11.0 | .0 | 5.1 | 1.0 | .6 | 1.7 | 33.1 | 39.4 | 12.6 | 9.8 | .7 | .1 | 4.3 | 100.0 |
| 2006 | 2.0 | 1.2 | 81.3 | 5.3 | .0 | 1.8 | .7 | .6 | 7.0 | 28.4 | 53.6 | 2.3 | 8.5 | .7 | 1.2 | 5.3 | 100.0 |

¹ 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.

² "Original Equipment Manufacturers" are non-photovoltaic manufacturers that combine photovoltaic technology into existing or newly developed product lines.

³ Represents such applications as cooking food, desalinization, and distilling.

⁴ Includes all independent power producers.

⁵ Shipments for specialty purposes such as research.

⁶ See "Peak Kilowatt" in Glossary.

(s)=Less than 0.05 percent.

Notes: • Data are for domestic and export shipments, and may include imports that subsequently were shipped to domestic or foreign customers. • Totals may not equal sum of components due to independent rounding.

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

Sources: • 1989-1992—Energy Information Administration (EIA), *Solar Collector Manufacturing Activity*, annual reports. • 1993-2001—EIA, *Renewable Energy Annual*, annual reports. • 2002 forward—EIA, *Solar Thermal and Photovoltaic Collector Manufacturing Activities*, annual reports.

Renewable Energy

Note. Renewable Energy Production and Consumption. In Table 10.1, renewable energy consumption consists of: conventional hydroelectricity net generation (converted to Btu using the fossil-fueled plants heat rate); geothermal electricity net generation (converted to Btu using the geothermal plants heat rate), and geothermal heat pump and geothermal direct use energy; solar thermal and photovoltaic electricity net generation (converted to Btu using the fossil-fueled plants heat rate), and solar thermal direct use energy; wind electricity net generation (converted to Btu using the fossil-fueled plants heat rate); 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 and biodiesel consumption; and losses and co-products from the production of fuel ethanol and biodiesel. 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: Energy Information Administration (EIA), Office of Coal, Nuclear, Electric and Alternate Fuels (CNEAF), 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, CNEAF, estimates based on Form EIA-457 and regional heating degree-day data.

Commercial Sector, Hydroelectric Power: EIA, *Annual Energy Review (AER) 2007*, Tables 8.2d and A6.

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

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, CNEAF, estimate. • 1985–1988: Values interpolated. • 1989 forward: EIA, *AER 2007*, Table 8.7c; and EIA, CNEAF, estimates based on Form EIA-871, “Commercial Buildings Energy Consumption Survey.”

Commercial Sector, Biomass Waste: EIA, *AER 2007*, Table 8.7c.

Commercial Sector, Ethanol: EIA, *AER 2007*, 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 consumption (Table 10.3).

Table 10.2b Sources

Industrial Sector, Hydroelectric Power: • 1949–1988: EIA, *AER 2007*, Tables 8.1 and A6. • 1989 forward: EIA, *AER 2007*, Tables 8.2d and A6.

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

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 2007*, Table 8.7c; and EIA, CNEAF, 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 2007*, Table 10.2c). • 1982 and 1983: EIA, CNEAF, estimates for total waste consumption minus electric power sector waste consumption (see *AER 2007*, 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 2007*, 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 2007*, Table 10.2c). • 1988: Value interpolated. • 1989 forward: EIA, *AER 2007*, Table 8.7c; and EIA, CNEAF, 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, Ethanol: EIA, *AER 2007*, 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 consumption (Table 10.3).

Industrial Sector, Losses and Co-products: EIA, *AER 2007*, Table 10.3.

Transportation Sector, Ethanol: EIA, *AER 2007*, 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 consumption (Table 10.3).

Transportation Sector, Biodiesel: EIA, *AER 2007*, Table 10.3.