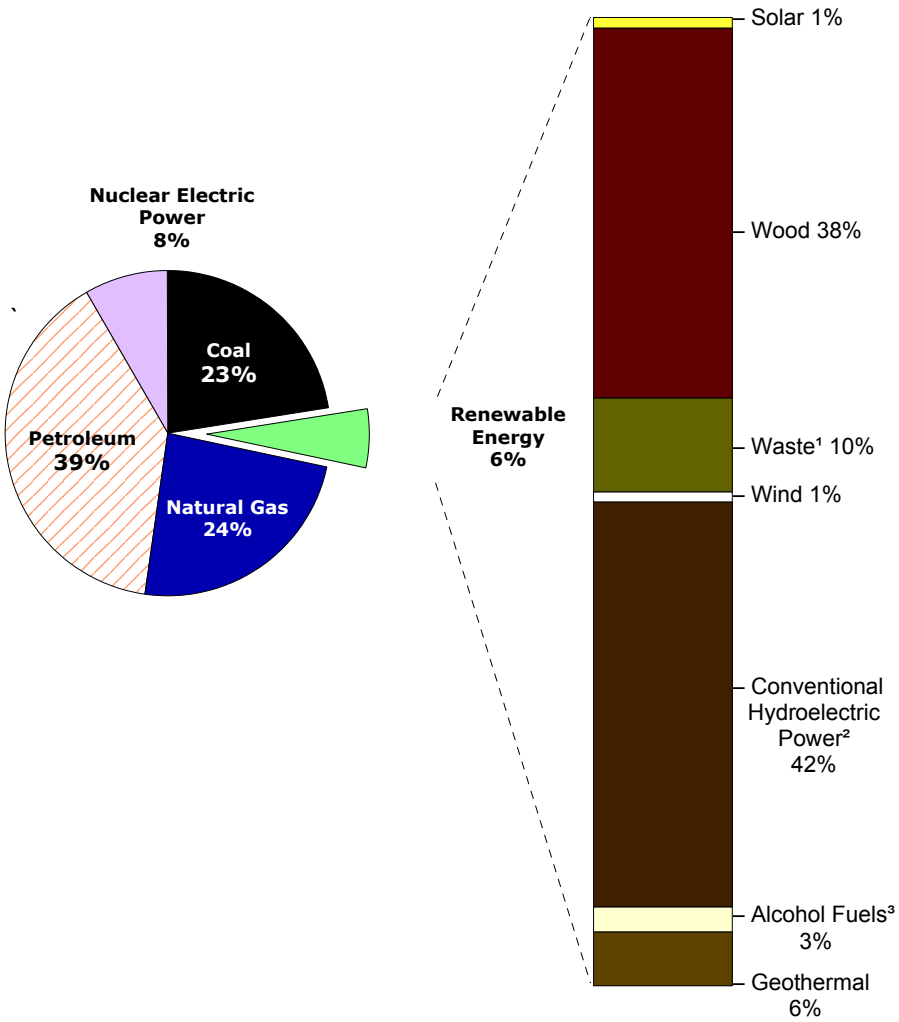
# 10 Renewable Energy

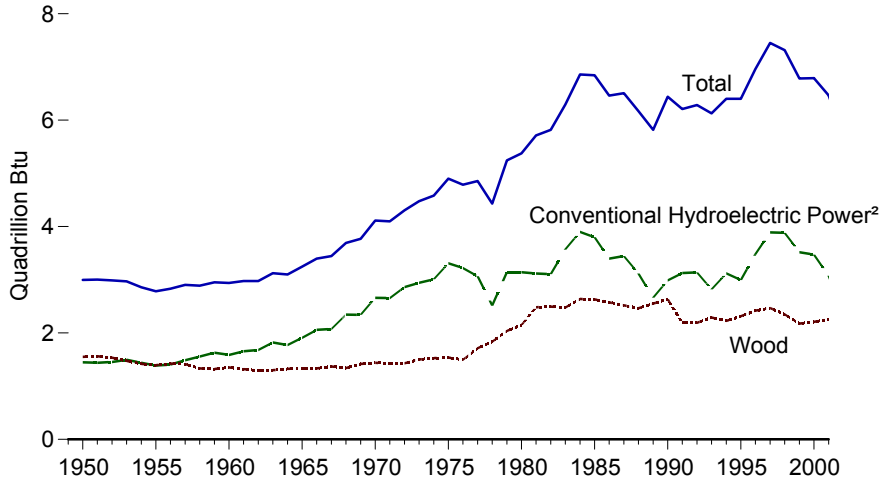
Grand Coulee Dam, Washington State. Source: U.S. Bureau of Reclamation.

# Figure 10.1 Renewable Energy Consumption by Source

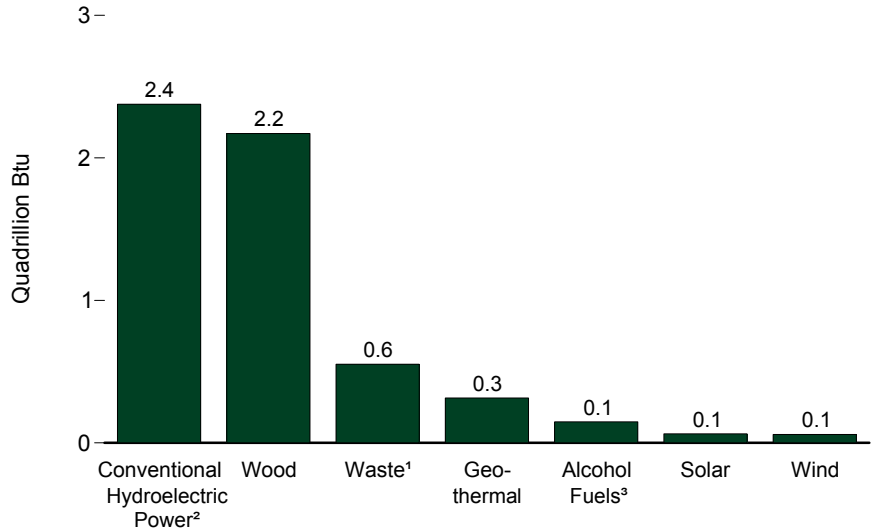
## Renewable Energy as Share of Total Energy, 2001




## Major Sources of Renewable Energy Consumption, 1949-2001




## Renewable Energy Consumption by Source, 2001




[1] Municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass.
[2] Through 1988, includes all electricity net imports. Beginning in 1989, includes only the portion of electricity net imports derived from hydroelectric power.
[3] Ethanol blended into motor gasoline.
Note: Because vertical scales differ, graphs should not be compared.
Sources: Tables 1.3 and 10.1.

# Table 10.1 Renewable Energy Consumption by Source, 1949-2001

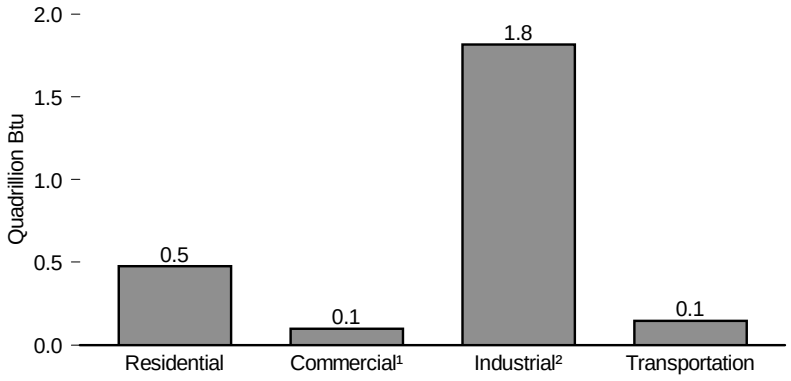
(Trillion Btu)

| Year | Conventional Hydroelectric Power [1,2] | Wood [3] | Waste [4] | Alcohol Fuels [5] | Geothermal [6] | Solar [7] | Wind [8] | Total |
|---|---|---|---|---|---|---|---|---|
| 1949 | 1,449 | 1,549 | NA | NA | NA | NA | NA | 2,998 |
| 1950 | 1,440 | 1,562 | NA | NA | NA | NA | NA | 3,003 |
| 1951 | 1,454 | 1,535 | NA | NA | NA | NA | NA | 2,988 |
| 1952 | 1,496 | 1,474 | NA | NA | NA | NA | NA | 2,970 |
| 1953 | 1,439 | 1,419 | NA | NA | NA | NA | NA | 2,857 |
| 1954 | 1,388 | 1,394 | NA | NA | NA | NA | NA | 2,783 |
| 1955 | 1,407 | 1,424 | NA | NA | NA | NA | NA | 2,832 |
| 1956 | 1,487 | 1,416 | NA | NA | NA | NA | NA | 2,903 |
| 1957 | 1,557 | 1,334 | NA | NA | NA | NA | NA | 2,890 |
| 1958 | 1,629 | 1,323 | NA | NA | NA | NA | NA | 2,952 |
| 1959 | 1,587 | 1,353 | NA | NA | NA | NA | NA | 2,940 |
| 1960 | 1,657 | 1,320 | NA | NA | 1 | NA | NA | 2,977 |
| 1961 | 1,680 | 1,295 | NA | NA | 2 | NA | NA | 2,977 |
| 1962 | 1,822 | 1,300 | NA | NA | 2 | NA | NA | 3,124 |
| 1963 | 1,772 | 1,323 | NA | NA | 4 | NA | NA | 3,099 |
| 1964 | 1,907 | 1,337 | NA | NA | 5 | NA | NA | 3,248 |
| 1965 | 2,058 | 1,335 | NA | NA | 4 | NA | NA | 3,397 |
| 1966 | 2,073 | 1,369 | NA | NA | 4 | NA | NA | 3,446 |
| 1967 | 2,344 | 1,340 | NA | NA | 7 | NA | NA | 3,691 |
| 1968 | 2,342 | 1,419 | NA | NA | 9 | NA | NA | 3,771 |
| 1969 | 2,659 | 1,440 | NA | NA | 13 | NA | NA | 4,113 |
| 1970 | 2,654 | 1,429 | 2 | NA | 11 | NA | NA | 4,096 |
| 1971 | 2,861 | 1,430 | 2 | NA | 12 | NA | NA | 4,305 |
| 1972 | 2,944 | 1,501 | 2 | NA | 31 | NA | NA | 4,478 |
| 1973 | 3,010 | 1,527 | 2 | NA | 43 | NA | NA | 4,581 |
| 1974 | 3,309 | 1,538 | 2 | NA | 53 | NA | NA | 4,902 |
| 1975 | 3,219 | 1,497 | 2 | NA | 70 | NA | NA | 4,788 |
| 1976 | 3,066 | 1,711 | 2 | NA | 78 | NA | NA | 4,857 |
| 1977 | 2,515 | 1,837 | 2 | NA | 77 | NA | NA | 4,431 |
| 1978 | 3,141 | 2,036 | 1 | NA | 64 | NA | NA | 5,243 |
| 1979 | 3,141 | 2,150 | 2 | NA | 84 | NA | NA | 5,377 |
| 1980 | 3,118 | 2,483 | 2 | NA | 110 | NA | NA | 5,712 |
| 1981 | 3,105 | 2,495 | 88 | 7 | 123 | NA | NA | 5,818 |
| 1982 | 3,572 | 2,477 | 119 | 19 | 105 | NA | NA | 6,292 |
| 1983 | 3,899 | 2,639 | 157 | 35 | 129 | NA | (s) | 6,860 |
| 1984 | 3,800 | 2,629 | 208 | 43 | 165 | (s) | (s) | 6,845 |
| 1985 | 3,398 | 2,576 | 236 | 52 | 198 | (s) | (s) | 6,460 |
| 1986 | 3,446 | 2,518 | 263 | 60 | 219 | (s) | (s) | 6,507 |
| 1987 | 3,117 | 2,465 | 289 | 69 | 229 | (s) | (s) | 6,170 |
| 1988 | 2,662 | 2,552 | 315 | 70 | 217 | (s) | (s) | 5,817 |
| 1989 | R2,987 | R2,637 | 354 | 71 | R317 | R55 | R19 | R6,441 |
| 1990 | R3,128 | R2,190 | 408 | 63 | R337 | R60 | R24 | R6,209 |
| 1991 | R3,139 | R2,190 | 440 | 73 | R351 | R63 | R27 | R6,283 |
| 1992 | 2,818 | R2,290 | 473 | 83 | R368 | R64 | 30 | R6,127 |
| 1993 | 3,119 | R2,228 | 479 | 97 | R382 | R66 | 31 | R6,403 |
| 1994 | 2,993 | R2,315 | 515 | 109 | R366 | R69 | 36 | R6,401 |
| 1995 | R3,480 | R2,420 | 531 | 117 | R312 | R70 | 33 | R6,962 |
| 1996 | R3,889 | R2,467 | 577 | 84 | R329 | R71 | R33 | R7,450 |
| 1997 | R3,881 | R2,349 | 551 | 106 | R325 | R70 | R34 | R7,316 |
| 1998 | R3,518 | R2,175 | R542 | 117 | R329 | R70 | 31 | R6,782 |
| 1999 | R3,472 | R2,210 | R540 | 122 | R332 | R69 | 46 | R6,790 |
| 2000 | R3,077 | R2,257 | R552 | 139 | R317 | R66 | R57 | R6,465 |
| 2001E | 2,376 | 2,170 | 551 | 147 | 315 | 64 | 59 | 5,683 |

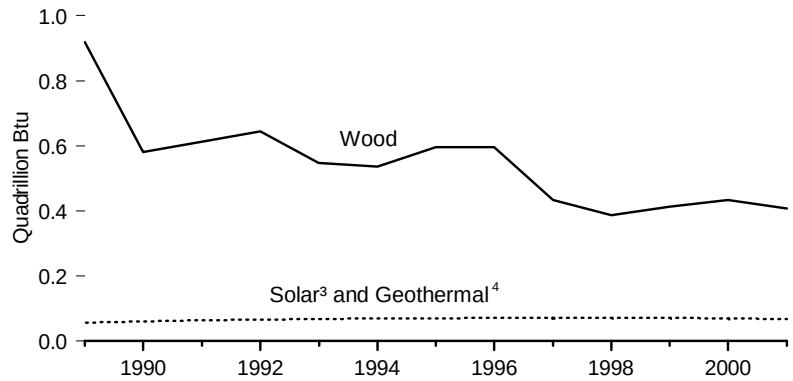
[1] Hydroelectricity generated by pumped storage is not included in renewable energy.
[2] Through 1988, includes all electricity net imports. Beginning in 1989, includes only the portion of electricity net imports derived from hydroelectric power.
[3] Wood, black liquor, and other wood waste.
[4] Municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass.
[5] Ethanol blended into motor gasoline.
[6] Geothermal electricity net generation, heat pump, and direct use energy. Beginning in 1989, also includes electricity net imports derived from geothermal energy.
[7] Solar thermal and photovoltaic electricity net generation, and solar thermal direct use energy.
[8] Wind electricity net generation.
R=Revised. E=Estimate. NA=Not available. (s)=Less than 0.5 trillion Btu.
Note: Totals may not equal sum of components due to independent rounding.
Web Page: http://www.eia.doe.gov/fuelrenewable.html.
Sources: Tables 10.2a and 10.2b.

## Figure 10.2a Renewable Energy Consumption: End-Use Sectors

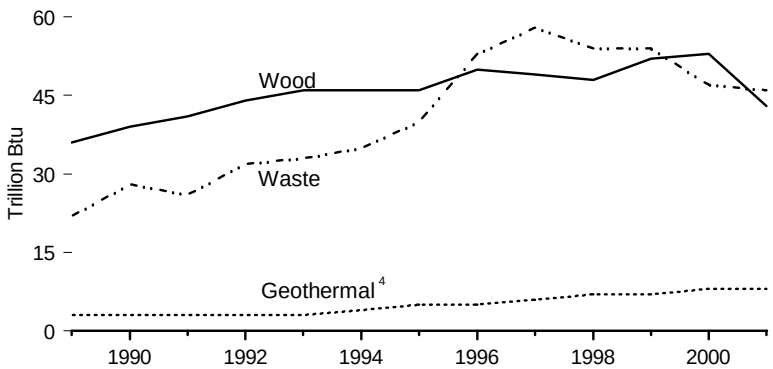
### End-Use Sectors, 2001



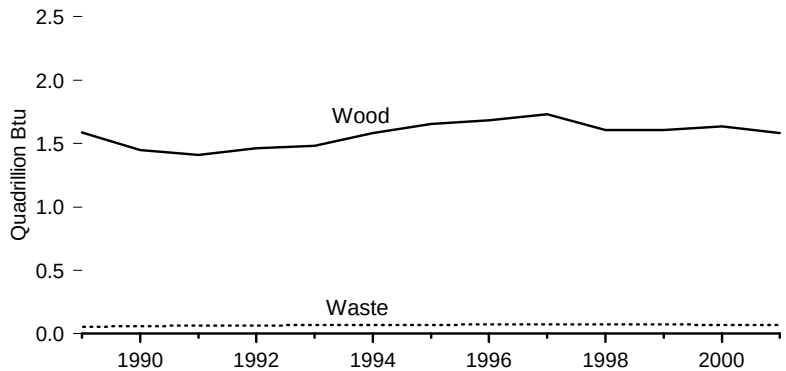

### Residential Sector, 1989-2001




### Commercial¹ Sector, Major Sources, 1989-2001




### Industrial² Sector, Major Sources, 1989-2001




[1] Includes fuel used at combined-heat-and-power plants and at commercial electricity-only plants.

[2] Includes fuel used at combined-heat-and-power plants and at industrial electricity-only plants.

[3] Solar thermal direct use energy and photovoltaic electricity generation. Includes small amounts of commercial sector use.

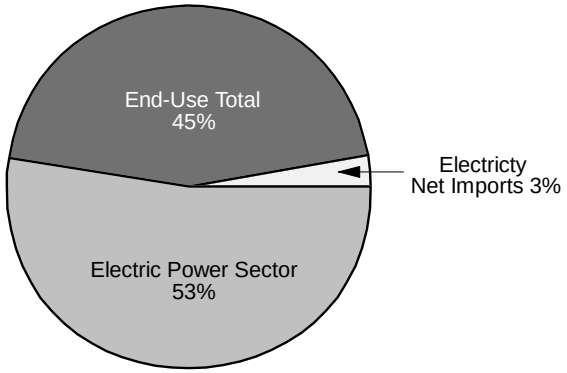
[4] Geothermal heat pump and direct use energy.

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

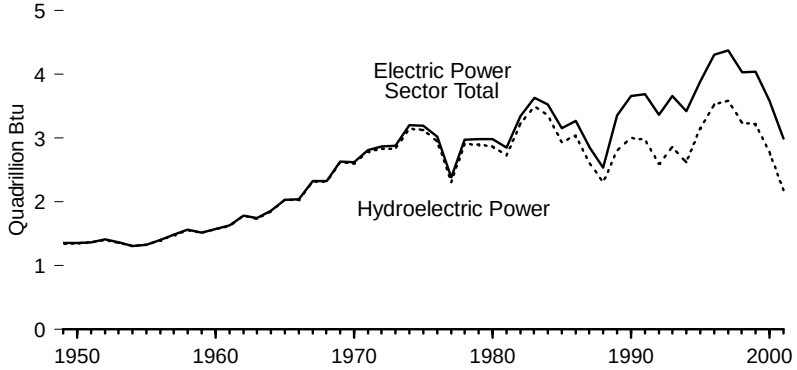
Source: Table 10.2a.

# Figure 10.2b Renewable Energy Consumption: Electric Power Sector

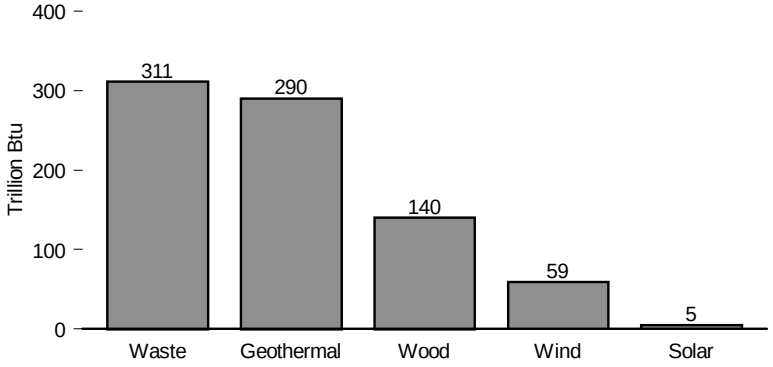
### Electric Power Share of Total Renewable Energy Consumption, 2001



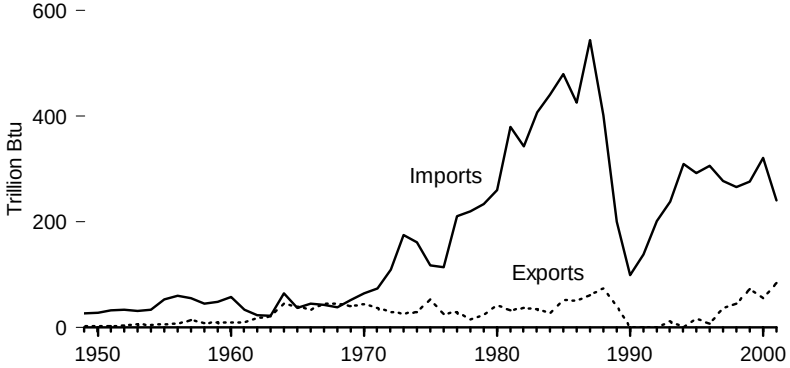

### Electric Power Sector Total and Hydroelectric Power, 1949-2001




### Non-Hydroelectric Power Sources, 2001




### Hydroelectricity Trade, 1949-2001




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

Sources: Tables 10.2a and 10.2b.

# Table 10.2a Renewable Energy Consumption: End-Use Sectors, 1949-2001

(Trillion Btu)

| | Residential | | | | Commercial [1] | | | | | Industrial [2] | | | | | Transportation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Wood [3] | Geo-thermal [4] | Solar [5] | Total | Hydro-power [6] | Wood [3] | Waste [7] | Geo-thermal [4] | Total | Hydro-power [6] | Wood [3] | Waste [7] | Geo-thermal [4] | Total | Alcohol Fuels [8] | End-Use Total |
| 1949 | 1,055 | NA | NA | 1,055 | NA | 20 | NA | NA | 20 | 76 | 468 | NA | NA | R544 | NA | R1,619 |
| 1950 | 1,006 | NA | NA | 1,006 | NA | 19 | NA | NA | 19 | 69 | 532 | NA | NA | R602 | NA | R1,626 |
| 1951 | 958 | NA | NA | 958 | NA | 18 | NA | NA | 18 | 63 | 553 | NA | NA | R616 | NA | R1,592 |
| 1952 | 899 | NA | NA | 899 | NA | 17 | NA | NA | 17 | 62 | 552 | NA | NA | R613 | NA | R1,529 |
| 1953 | 832 | NA | NA | 832 | NA | 16 | NA | NA | 16 | 57 | 566 | NA | NA | R622 | NA | R1,470 |
| 1954 | 800 | NA | NA | 800 | NA | 15 | NA | NA | 15 | 56 | 576 | NA | NA | R632 | NA | R1,447 |
| 1955 | 775 | NA | NA | 775 | NA | 15 | NA | NA | 15 | 38 | 631 | NA | NA | R669 | NA | R1,459 |
| 1956 | 739 | NA | NA | 739 | NA | 14 | NA | NA | 14 | 37 | 661 | NA | NA | R698 | NA | R1,451 |
| 1957 | 702 | NA | NA | 702 | NA | 13 | NA | NA | 13 | 36 | 616 | NA | NA | R652 | NA | R1,367 |
| 1958 | 688 | NA | NA | 688 | NA | 13 | NA | NA | 13 | 37 | 620 | NA | NA | R657 | NA | R1,358 |
| 1959 | 647 | NA | NA | 647 | NA | 12 | NA | NA | 12 | 37 | 692 | NA | NA | R729 | NA | R1,388 |
| 1960 | 627 | NA | NA | 627 | NA | 12 | NA | NA | 12 | 39 | 680 | NA | NA | R719 | NA | R1,357 |
| 1961 | 587 | NA | NA | 587 | NA | 11 | NA | NA | 11 | 36 | 695 | NA | NA | R731 | NA | R1,329 |
| 1962 | 560 | NA | NA | 560 | NA | 11 | NA | NA | 11 | 36 | 728 | NA | NA | R764 | NA | R1,335 |
| 1963 | 537 | NA | NA | 537 | NA | 10 | NA | NA | 10 | 34 | 775 | NA | NA | R809 | NA | R1,356 |
| 1964 | 499 | NA | NA | 499 | NA | 9 | NA | NA | 9 | 34 | 827 | NA | NA | R861 | NA | R1,369 |
| 1965 | 468 | NA | NA | 468 | NA | 9 | NA | NA | 9 | 33 | 855 | NA | NA | R888 | NA | R1,365 |
| 1966 | 455 | NA | NA | 455 | NA | 9 | NA | NA | 9 | 33 | 902 | NA | NA | R935 | NA | R1,399 |
| 1967 | 434 | NA | NA | 434 | NA | 8 | NA | NA | 8 | 36 | 895 | NA | NA | R930 | NA | R1,373 |
| 1968 | 426 | NA | NA | 426 | NA | 8 | NA | NA | 8 | 35 | 982 | NA | NA | R1,017 | NA | R1,451 |
| 1969 | 415 | NA | NA | 415 | NA | 8 | NA | NA | 8 | 34 | 1,014 | NA | NA | R1,048 | NA | R1,471 |
| 1970 | 401 | NA | NA | 401 | NA | 8 | NA | NA | 8 | 34 | 1,019 | NA | NA | R1,053 | NA | R1,461 |
| 1971 | 382 | NA | NA | 382 | NA | 7 | NA | NA | 7 | 34 | 1,040 | NA | NA | R1,074 | NA | R1,463 |
| 1972 | 380 | NA | NA | 380 | NA | 7 | NA | NA | 7 | 34 | 1,113 | NA | NA | R1,147 | NA | R1,534 |
| 1973 | 354 | NA | NA | 354 | NA | 7 | NA | NA | 7 | 35 | 1,165 | NA | NA | R1,200 | NA | R1,560 |
| 1974 | 371 | NA | NA | 371 | NA | 7 | NA | NA | 7 | 33 | 1,159 | NA | NA | R1,192 | NA | R1,570 |
| 1975 | 425 | NA | NA | 425 | NA | 8 | NA | NA | 8 | 32 | 1,063 | NA | NA | R1,096 | NA | R1,529 |
| 1976 | 482 | NA | NA | 482 | NA | 9 | NA | NA | 9 | 33 | 1,220 | NA | NA | R1,253 | NA | R1,744 |
| 1977 | 542 | NA | NA | 542 | NA | 10 | NA | NA | 10 | 33 | 1,281 | NA | NA | R1,314 | NA | R1,866 |
| 1978 | 622 | NA | NA | 622 | NA | 12 | NA | NA | 12 | 32 | 1,400 | NA | NA | R1,432 | NA | R2,066 |
| 1979 | 728 | NA | NA | 728 | NA | 14 | NA | NA | 14 | 34 | 1,405 | NA | NA | R1,439 | NA | R2,181 |
| 1980 | 859 | NA | NA | 859 | NA | 21 | NA | NA | 21 | 33 | 1,600 | NA | NA | R1,633 | NA | R2,513 |
| 1981 | 869 | NA | NA | 869 | NA | 21 | NA | NA | 21 | 33 | 1,602 | 87 | NA | R1,722 | 7 | R2,619 |
| 1982 | 937 | NA | NA | 937 | NA | 22 | NA | NA | 22 | 33 | 1,516 | 118 | NA | R1,667 | 19 | R2,645 |
| 1983 | 925 | NA | NA | 925 | NA | 22 | NA | NA | 22 | 33 | 1,690 | 155 | NA | R1,879 | 35 | R2,861 |
| 1984 | 923 | NA | NA | 923 | NA | 22 | NA | NA | 22 | 33 | 1,679 | 204 | NA | R1,916 | 43 | R2,904 |
| 1985 | 899 | NA | NA | 899 | NA | 24 | NA | NA | 24 | 33 | 1,645 | 230 | NA | R1,908 | 52 | R2,883 |
| 1986 | 876 | NA | NA | 876 | NA | 27 | NA | NA | 27 | 33 | 1,610 | 256 | NA | R1,899 | 60 | R2,862 |
| 1987 | 852 | NA | NA | 852 | NA | 29 | NA | NA | 29 | 33 | 1,576 | 282 | NA | R1,891 | 69 | R2,841 |
| 1988 | 885 | NA | NA | 885 | NA | 32 | NA | NA | 32 | 33 | 1,625 | 308 | NA | R1,965 | 70 | R2,952 |
| 1989 | 918 | 5 | 53 | 976 | P1 | R36 | 22 | 3 | R61 | RP26 | R1,584 | R200 | 2 | R1,812 | 71 | R2,919 |
| 1990 | 581 | 6 | 56 | 642 | P1 | R39 | 28 | 3 | R71 | RP28 | R1,447 | R194 | 2 | R1,671 | 63 | R2,447 |
| 1991 | 613 | 6 | 58 | 677 | P1 | R41 | 26 | 3 | R72 | RP28 | R1,410 | R185 | 2 | R1,625 | 73 | R2,446 |
| 1992 | 645 | 6 | 60 | 711 | P1 | R44 | 32 | 3 | R81 | RP31 | R1,461 | R179 | 2 | R1,672 | 83 | R2,548 |
| 1993 | 548 | 7 | 62 | 616 | P1 | R46 | 33 | 3 | R84 | RP30 | R1,484 | R181 | 2 | R1,697 | 97 | R2,495 |
| 1994 | 537 | 6 | 64 | 607 | P1 | R46 | 35 | 4 | R86 | RP62 | R1,580 | R199 | 3 | R1,844 | 109 | R2,645 |
| 1995 | 596 | 7 | 65 | 667 | P1 | R46 | 40 | 5 | R92 | RP55 | R1,652 | R195 | 3 | R1,905 | 117 | R2,781 |
| 1996 | 595 | 7 | R65 | R667 | P1 | R50 | 53 | 5 | R110 | RP61 | R1,683 | R224 | 3 | R1,971 | 84 | R2,832 |
| 1997 | 433 | R8 | 65 | 506 | P1 | R49 | 58 | 6 | R113 | RP58 | R1,731 | R184 | 3 | R1,976 | 106 | R2,701 |
| 1998 | 387 | 8 | 65 | 459 | P1 | R48 | 54 | 7 | R111 | RP55 | R1,603 | R180 | 3 | R1,841 | 117 | R2,528 |
| 1999 | 414 | R9 | 64 | 486 | P1 | R52 | 54 | 7 | R114 | RP49 | R1,606 | R171 | 4 | R1,830 | 122 | R2,551 |
| 2000 | 433 | 9 | R61 | 503 | P1 | R53 | 47 | 8 | R109 | RP42 | R1,636 | R186 | 4 | R1,869 | 139 | R2,620 |
| 2001E | 407 | 9 | 59 | 475 | 1 | 43 | 46 | 8 | 98 | 37 | 1,580 | 194 | 5 | 1,816 | 147 | 2,537 |

[1] Commercial sector fuel use, including that at commercial combined-heat-and-power (CHP) and commercial electricity-only plants. See Appendix G for commercial sector NAICS codes.
[2] Industrial sector fuel use, including that at industrial combined-heat-and-power (CHP) and industrial electricity-only plants. See Appendix G for industrial sector NAICS codes.
[3] Wood, black liquor, and other wood waste.
[4] Geothermal heat pump and direct use energy.
[5] Solar thermal direct use energy and photovoltaic electricity generation. Small amounts of commercial sector use are included in the residential sector.
[6] Conventional hydroelectric power.
[7] Municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass.
[8] Ethanol blended into motor gasoline.
R=Revised. P=Preliminary. E=Estimate. NA=Not available.
Note: Totals may not equal sum of components due to independent rounding.
Web Page: http://www.eia.doe.gov/fuelrenewable.html.
Sources: See end of section.

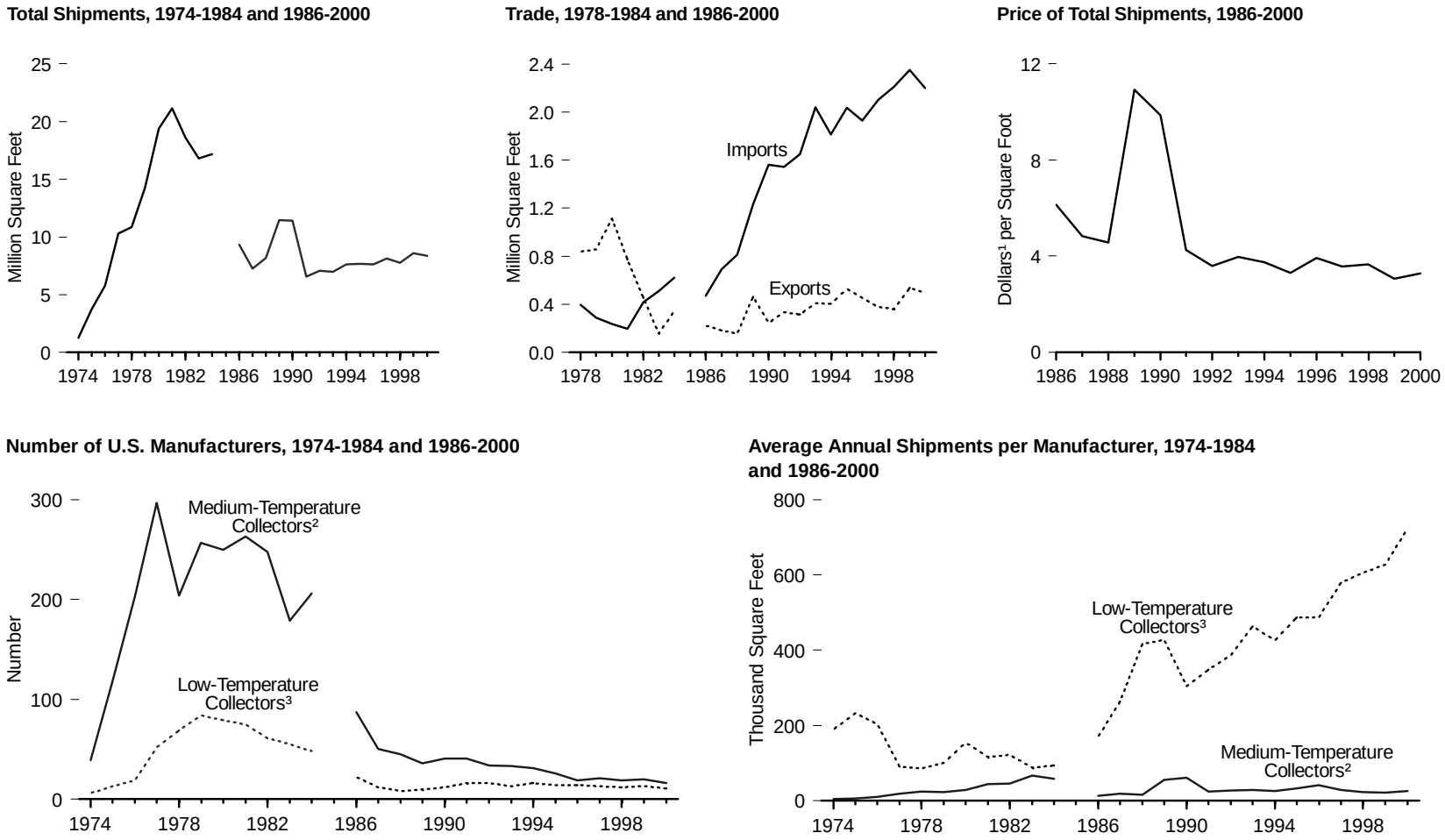
# Table 10.2b Renewable Energy Consumption: Electric Power Sector, Electricity Trade, and Total, 1949-2001

(Trillion Btu)

| Year | Electric Power Sector [1,2] | | | | | | | Electricity Trade [3] | | | | Renewable Energy Consumption Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydro-power [4] | Wood [5] | Waste [6] | Geo-thermal [7] | Solar [8] | Wind [9] | Total | Hydropower [4] Imports | Hydropower [4] Exports | Geo-thermal Imports | Total Net Imports | |
| 1949 | 1,349 | 6 | NA | NA | NA | NA | 1,355 | 27 | 3 | NA | 24 | 2,998 |
| 1950 | 1,346 | 5 | NA | NA | NA | NA | 1,351 | 27 | 2 | NA | 25 | 3,003 |
| 1951 | 1,361 | 5 | NA | NA | NA | NA | 1,366 | 33 | 3 | NA | 30 | 2,988 |
| 1952 | 1,404 | 6 | NA | NA | NA | NA | 1,411 | 33 | 3 | NA | 30 | 2,970 |
| 1953 | 1,356 | 5 | NA | NA | NA | NA | 1,361 | 31 | 6 | NA | 26 | 2,857 |
| 1954 | 1,304 | 3 | NA | NA | NA | NA | 1,307 | 33 | 4 | NA | 28 | 2,783 |
| 1955 | 1,322 | 3 | NA | NA | NA | NA | 1,325 | 53 | 6 | NA | 48 | 2,832 |
| 1956 | 1,398 | 2 | NA | NA | NA | NA | 1,400 | 59 | 7 | NA | 52 | 2,903 |
| 1957 | 1,480 | 2 | NA | NA | NA | NA | 1,482 | 55 | 14 | NA | 41 | 2,890 |
| 1958 | 1,555 | 2 | NA | NA | NA | NA | 1,557 | 45 | 8 | NA | 37 | 2,952 |
| 1959 | 1,511 | 2 | NA | NA | NA | NA | 1,513 | 48 | 9 | NA | 39 | 2,940 |
| 1960 | 1,569 | 2 | NA | 1 | NA | NA | 1,571 | 57 | 8 | NA | 49 | 2,977 |
| 1961 | 1,621 | 1 | NA | 2 | NA | NA | 1,624 | 34 | 10 | NA | 24 | 2,977 |
| 1962 | 1,780 | 1 | NA | 2 | NA | NA | 1,784 | 23 | 18 | NA | 6 | 3,124 |
| 1963 | 1,737 | 1 | NA | 4 | NA | NA | 1,743 | 22 | 21 | NA | 1 | 3,099 |
| 1964 | 1,853 | 2 | NA | 5 | NA | NA | 1,859 | 65 | 44 | NA | 20 | 3,248 |
| 1965 | 2,026 | 3 | NA | 4 | NA | NA | 2,033 | 37 | 39 | NA | -1 | 3,397 |
| 1966 | 2,028 | 3 | NA | 4 | NA | NA | 2,036 | 44 | 33 | NA | 11 | 3,446 |
| 1967 | 2,311 | 3 | NA | 7 | NA | NA | 2,321 | 42 | 45 | NA | -3 | 3,691 |
| 1968 | 2,313 | 4 | NA | 9 | NA | NA | 2,327 | 38 | 45 | NA | -7 | 3,771 |
| 1969 | 2,614 | 3 | NA | 13 | NA | NA | 2,630 | 51 | 40 | NA | 11 | 4,113 |
| 1970 | 2,600 | 1 | 2 | 11 | NA | NA | 2,615 | 65 | 44 | NA | 21 | 4,096 |
| 1971 | 2,790 | 1 | 2 | 12 | NA | NA | 2,806 | 74 | 37 | NA | 37 | 4,305 |
| 1972 | 2,829 | 1 | 2 | 31 | NA | NA | 2,864 | 109 | 29 | NA | 80 | 4,478 |
| 1973 | 2,827 | 1 | 2 | 43 | NA | NA | 2,873 | 175 | 27 | NA | 148 | 4,581 |
| 1974 | 3,143 | 1 | 2 | 53 | NA | NA | 3,199 | 161 | 28 | NA | 133 | 4,902 |
| 1975 | 3,122 | (s) | 2 | 70 | NA | NA | 3,194 | 117 | 53 | NA | 64 | 4,788 |
| 1976 | 2,943 | 1 | 2 | 78 | NA | NA | 3,024 | 114 | 25 | NA | 89 | 4,857 |
| 1977 | 2,301 | 3 | 2 | 77 | NA | NA | 2,383 | 210 | 29 | NA | 182 | 4,431 |
| 1978 | 2,905 | 2 | 1 | 64 | NA | NA | 2,973 | 220 | 15 | NA | 204 | 5,243 |
| 1979 | 2,897 | 3 | 2 | 84 | NA | NA | 2,986 | 233 | 23 | NA | 211 | 5,377 |
| 1980 | 2,867 | 3 | 2 | 110 | NA | NA | 2,982 | 260 | 43 | NA | 217 | 5,712 |
| 1981 | 2,725 | 3 | 1 | 123 | NA | NA | 2,852 | 379 | 32 | NA | 347 | 5,818 |
| 1982 | 3,233 | 2 | 1 | 105 | NA | NA | 3,341 | 343 | 37 | NA | 306 | 6,292 |
| 1983 | 3,494 | 2 | 2 | 129 | NA | (s) | 3,627 | 407 | 35 | NA | 372 | 6,860 |
| 1984 | 3,353 | 5 | 4 | 165 | (s) | (s) | 3,527 | 441 | 27 | NA | 414 | 6,845 |
| 1985 | 2,937 | 8 | 7 | 198 | (s) | (s) | 3,150 | 479 | 52 | NA | 428 | 6,460 |
| 1986 | 3,038 | 5 | 7 | 219 | (s) | (s) | 3,270 | 425 | 50 | NA | 375 | 6,507 |
| 1987 | 2,602 | 8 | 7 | 229 | (s) | (s) | 2,846 | 544 | 61 | NA | 483 | 6,170 |
| 1988 | 2,302 | 10 | 8 | 217 | (s) | (s) | 2,536 | 401 | 73 | NA | 328 | 5,817 |
| 1989 | [2,P]2,801 | [2,P]100 | [2,P]132 | [2,P]296 | [2,P]3 | [2,P]19 | [2,P]3,351 | 200 | 40 | 11 | 171 | [R]6,441 |
| 1990 | [P]3,000 | [P]124 | [P]187 | [P]315 | [P]4 | [P]24 | [P]3,653 | 99 | (s) | 11 | 110 | [R]6,209 |
| 1991 | [P]2,972 | [P]126 | [P]229 | [P]325 | [P]5 | [P]27 | [P]3,684 | 138 | (s) | 15 | 153 | [R]6,283 |
| 1992 | [P]2,586 | [P]140 | [P]262 | [P]338 | [P]4 | [P]30 | [P]3,360 | 201 | (s) | 19 | 219 | [R]6,127 |
| 1993 | [P]2,861 | [P]150 | [P]265 | [P]351 | [P]5 | [P]31 | [P]3,662 | 238 | 11 | 18 | 246 | [R]6,403 |
| 1994 | [P]2,620 | [P]152 | [P]282 | [P]325 | [P]5 | [P]36 | [P]3,420 | 309 | (s) | 27 | 337 | [R]6,401 |
| 1995 | [P]3,149 | [P]125 | [P]296 | [P]280 | [P]5 | [P]33 | [P]3,889 | 291 | 17 | 19 | 293 | [R]6,962 |
| 1996 | [P]3,528 | [P]138 | [P]300 | [P]300 | [P]5 | [P]33 | [P]4,305 | 306 | 7 | 14 | 313 | [R]7,450 |
| 1997 | [P]3,581 | [P]137 | [P]309 | [P]309 | [P]5 | [P]34 | [P]4,375 | [R]277 | [R]36 | (s) | [R]241 | [R]7,316 |
| 1998 | [P]3,241 | [P]137 | [P]308 | [P]311 | [P]5 | [P]31 | [P]4,032 | [R]265 | [R]45 | 1 | [R]221 | [R]6,782 |
| 1999 | [P]3,218 | [P]138 | [P]315 | [P]312 | [P]5 | [P]46 | [P]4,034 | [R]277 | [R]72 | 1 | [R]205 | [R]6,790 |
| 2000 | [P]2,768 | [P]134 | [P]318 | [P]296 | [P]5 | [P]57 | [P]3,579 | [R]321 | [R]55 | 0 | 266 | [R]6,465 |
| 2001 | [P]2,181 | [P]140 | [P]311 | [P]290 | [P]5 | [P]59 | [P]2,987 | [E]241 | [E]84 | [E]2 | [E]159 | [E]5,683 |

[1] The electric power sector (electric utilities and independent power producers) comprises electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public—i.e., NAICS 22 plants.
[2] Through 1988, data are for consumption at electric utilities only. Beginning in 1989, data also include consumption at independent power producers.
[3] Through 1988, all electricity imports and exports are included in "Hydropower." Beginning in 1989, includes only electricity imports and exports derived from hydroelectric power or geothermal energy.
[4] Conventional hydroelectric power.
[5] Wood, black liquor, and other wood waste.
[6] Municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass.
[7] Geothermal electricity net generation.
[8] Solar thermal and photovoltaic electricity net generation.
[9] Wind electricity net generation.
R=Revised. P=Preliminary. E=Estimate. NA=Not available. (s)=Less than 0.5 trillion Btu.
Note: Totals may not equal sum of components due to independent rounding.
Web Page: http://www.eia.doe.gov/fuelrenewable.html.
Sources: See end of section.

## Figure 10.3 Solar Thermal Collector Shipments by Type, Price, and Trade




[1] Nominal dollars.

[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.

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

Notes: • Data were not collected for 1985. • Medium-temperature collectors include special collectors. • Because vertical scales differ, graphs should not be compared.

Source: Table 10.3.

# Table 10.3 Solar Thermal Collector Shipments by Type, Price, and Trade, 1974-2000

(Thousand Square Feet, Except as Noted)

| Year | Low-Temperature Collectors [1] | | | | Medium-Temperature Collectors [2] | | | | High-Temperature Collectors [3] | | Total Shipments [4] | | Imports | Exports |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of U.S. Manu-facturers | Quantity Shipped | Shipments per Manu-facturer | Price [5] (dollars per square foot) | Number of U.S. Manu-facturers | Quantity Shipped | Shipments per Manu-facturer | Price [5] (dollars per square foot) | Quantity Shipped | Price [5] (dollars per square foot) | Quantity Shipped | Price [5] (dollars per square foot) | | |
| 1974 | 6 | 1,137 | 189.5 | NA | 39 | 137 | 3.5 | NA | NA | NA | 1,274 | NA | NA | NA |
| 1975 | 13 | 3,026 | 232.8 | NA | 118 | 717 | 6.1 | NA | NA | NA | 3,743 | NA | NA | NA |
| 1976 | 19 | 3,876 | 204.0 | NA | 203 | 1,925 | 9.5 | NA | NA | NA | 5,801 | NA | NA | NA |
| 1977 | 52 | 4,743 | 91.2 | NA | 297 | 5,569 | 18.8 | NA | NA | NA | 10,312 | NA | NA | NA |
| 1978 | 69 | 5,872 | 85.1 | NA | 204 | 4,988 | 24.5 | NA | NA | NA | 10,860 | NA | 396 | 840 |
| 1979 | 84 | 8,394 | 100.0 | NA | 257 | 5,856 | 22.8 | NA | NA | NA | 14,251 | NA | 290 | 855 |
| 1980 | 79 | 12,233 | 154.8 | NA | 250 | 7,165 | 28.7 | NA | NA | NA | 19,398 | NA | 235 | 1,115 |
| 1981 | 75 | 8,677 | 115.7 | NA | 263 | 11,456 | 43.6 | NA | NA | NA | 21,133 | NA | 196 | 771 |
| 1982 | 61 | 7,476 | 122.6 | NA | 248 | 11,145 | 44.9 | NA | NA | NA | 18,621 | NA | 418 | 455 |
| 1983 | 55 | 4,853 | 88.2 | NA | 179 | 11,975 | 66.9 | NA | NA | NA | 16,828 | NA | 511 | 159 |
| 1984 | 48 | 4,479 | 93.3 | NA | 206 | 11,939 | 58.0 | NA | 773 | NA | 17,191 | NA | 621 | 348 |
| 1985 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1986 | 22 | 3,751 | 170.5 | 2.30 | 87 | 1,111 | 12.8 | 18.30 | 4,498 | NA | 9,360 | 6.14 | 473 | 224 |
| 1987 | 12 | 3,157 | 263.1 | 2.18 | 50 | 957 | 19.1 | 13.50 | 3,155 | NA | 7,269 | 4.82 | 691 | 182 |
| 1988 | 8 | 3,326 | 415.8 | 2.24 | 45 | 732 | 16.2 | 14.88 | 4,116 | NA | 8,174 | 4.56 | 814 | 158 |
| 1989 | 10 | 4,283 | 428.3 | 2.60 | 36 | 1,989 | 55.3 | 11.74 | 5,209 | 17.76 | 11,482 | 10.92 | 1,233 | 461 |
| 1990 | 12 | 3,645 | 303.8 | 2.90 | 41 | 2,527 | 61.6 | 7.68 | 5,237 | 15.74 | 11,409 | 9.86 | 1,562 | 245 |
| 1991 | 16 | 5,585 | 349.0 | 2.90 | 41 | 989 | 24.1 | 11.94 | 1 | 31.94 | 6,574 | 4.26 | 1,543 | 332 |
| 1992 | 16 | 6,187 | 386.7 | 2.50 | 34 | 897 | 26.4 | 10.96 | 2 | 75.66 | 7,086 | 3.58 | 1,650 | 316 |
| 1993 | 13 | 6,025 | 463.5 | 2.80 | 33 | 931 | 28.2 | 11.74 | 12 | 22.12 | 6,968 | 3.96 | 2,039 | 411 |
| 1994 | 16 | 6,823 | 426.0 | 2.54 | 31 | 803 | 26.0 | 13.54 | 2 | 177.00 | 7,627 | 3.74 | 1,815 | 405 |
| 1995 | 14 | 6,813 | 487.0 | 2.32 | 26 | 840 | 32.0 | 10.48 | 13 | 53.26 | 7,666 | 3.30 | 2,037 | 530 |
| 1996 | 14 | 6,821 | 487.0 | 2.67 | 19 | 785 | 41.0 | 14.48 | 10 | 18.75 | 7,616 | 3.91 | 1,930 | 454 |
| 1997 | 13 | 7,524 | 579.0 | 2.60 | 21 | 606 | 29.0 | 15.17 | 7 | 25.00 | 8,138 | 3.56 | 2,102 | 379 |
| 1998 | 12 | 7,292 | 607.0 | 2.83 | 19 | 443 | 23.0 | 15.17 | 21 | 53.21 | 7,756 | 3.66 | 2,206 | 360 |
| 1999 | 13 | 8,152 | 627.0 | 2.08 | 20 | 427 | 21.0 | 19.12 | 4 | 286.49 | 8,583 | 3.05 | 2,352 | 537 |
| 2000 | 11 | 7,948 | 723.0 | 2.09 | 16 | 400 | 25.0 | 23.98 | 5 | 223.26 | 8,354 | 3.28 | 2,201 | 496 |

[1] Low-temperature collectors are solar thermal collectors that generally operate at temperatures below 110 degrees Fahrenheit.

[2] Medium-temperature collectors are solar thermal 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 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 degrees Fahrenheit.

[4] Total shipments as reported by respondents include all domestic and export shipments and may include imports that subsequently were shipped to domestic or to foreign customers.

[5] Prices, in nominal dollars, 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.

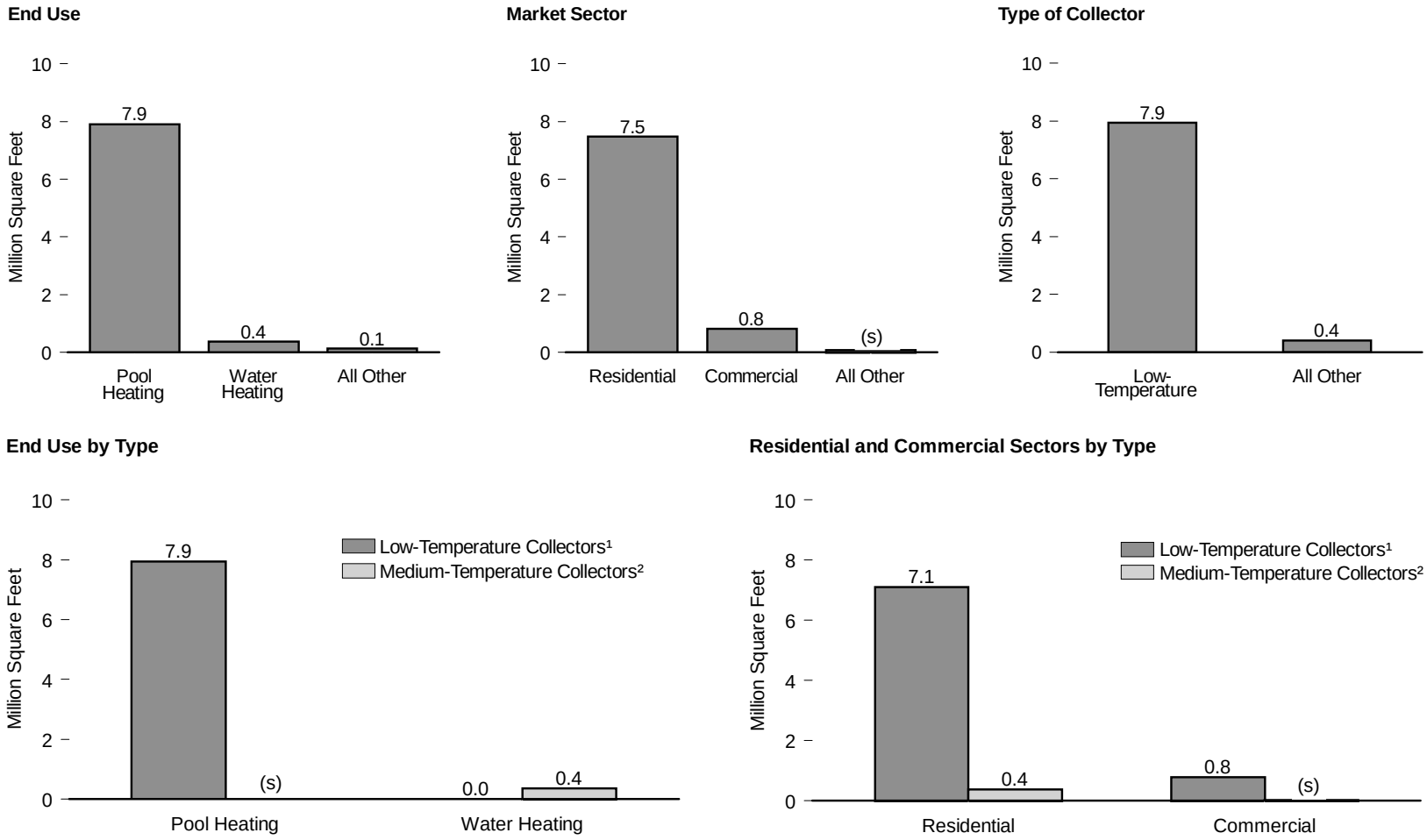
NA=Not available.

Notes: • Manufacturers producing more than one type of collector are accounted for in both groups. • No data are available for 1985. • High-temperature collector shipments were dominated by one manufacturer.

Web Page: http://www.eia.doe.gov/fuelrenewable.html.

Sources: • 1974-1992—Energy Information Administration (EIA), *Solar Collector Manufacturing Activity,* annual reports. • 1993 forward—EIA, *Renewable Energy Annual,* annual reports.

## Figure 10.4 Solar Thermal Collector Shipments by End Use, Market Sector, and Type, 2000




¹ Collectors that generally operate at temperatures below 110 degrees Fahrenheit.

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.

(s)=Less than 0.05 million square feet.

Source: Table 10.4.

# Table 10.4 Solar Thermal Collector Shipments by End Use, Market Sector, and Type, 2000

(Thousand Square Feet)

| End Use | Low-Temperature Collectors [1] | Medium-Temperature Collectors [2] | High-Temperature Collectors [3] | Total |
|---|---|---|---|---|
| **End-Use Total** | **7,949** | **400** | **5** | [4] **8,355** |
| Pool Heating | 7,836 | 26 | 0 | 7,863 |
| Water Heating | 0 | 365 | 2 | 367 |
| Space Heating | 92 | 7 | 0 | 99 |
| Space Cooling | 0 | 0 | 0 | 0 |
| Combined Space and Water Heating | 0 | 2 | (s) | 2 |
| Process Heating | 20 | 0 | 0 | 20 |
| Electricity Generation | 0 | 0 | 3 | [4] 3 |
| Other [5] | (s) | (s) | 0 | (s) |
| **Market Sector Total** | **7,949** | **400** | **5** | [4] **8,355** |
| Residential | 7,102 | 370 | 1 | 7,473 |
| Commercial | 786 | 23 | 1 | 810 |
| Industrial [6] | 52 | 5 | 0 | 57 |
| Electric Utility | 0 | (s) | 3 | [4] 5 |
| Other [7] | 9 | 1 | 0 | 10 |

[1] Low-temperature collectors are solar thermal collectors that generally operate at temperatures below 110 degrees Fahrenheit.

[2] Medium-temperature collectors are solar thermal 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 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 degrees Fahrenheit. These are Parabolic dish/trough collectors used primarily by independent power producers to generate electricity for the electric grid.

[4] Totals include other types of collectors not shown.

[5] "Other" includes shipments of solar thermal collectors for other uses, such as cooking foods, water pumping, water purification, desalinization, distilling, etc.

[6] Includes all independent power producers.

[7] "Other" includes shipments of solar thermal collectors to other sectors, such as government, including the military but excluding space applications.

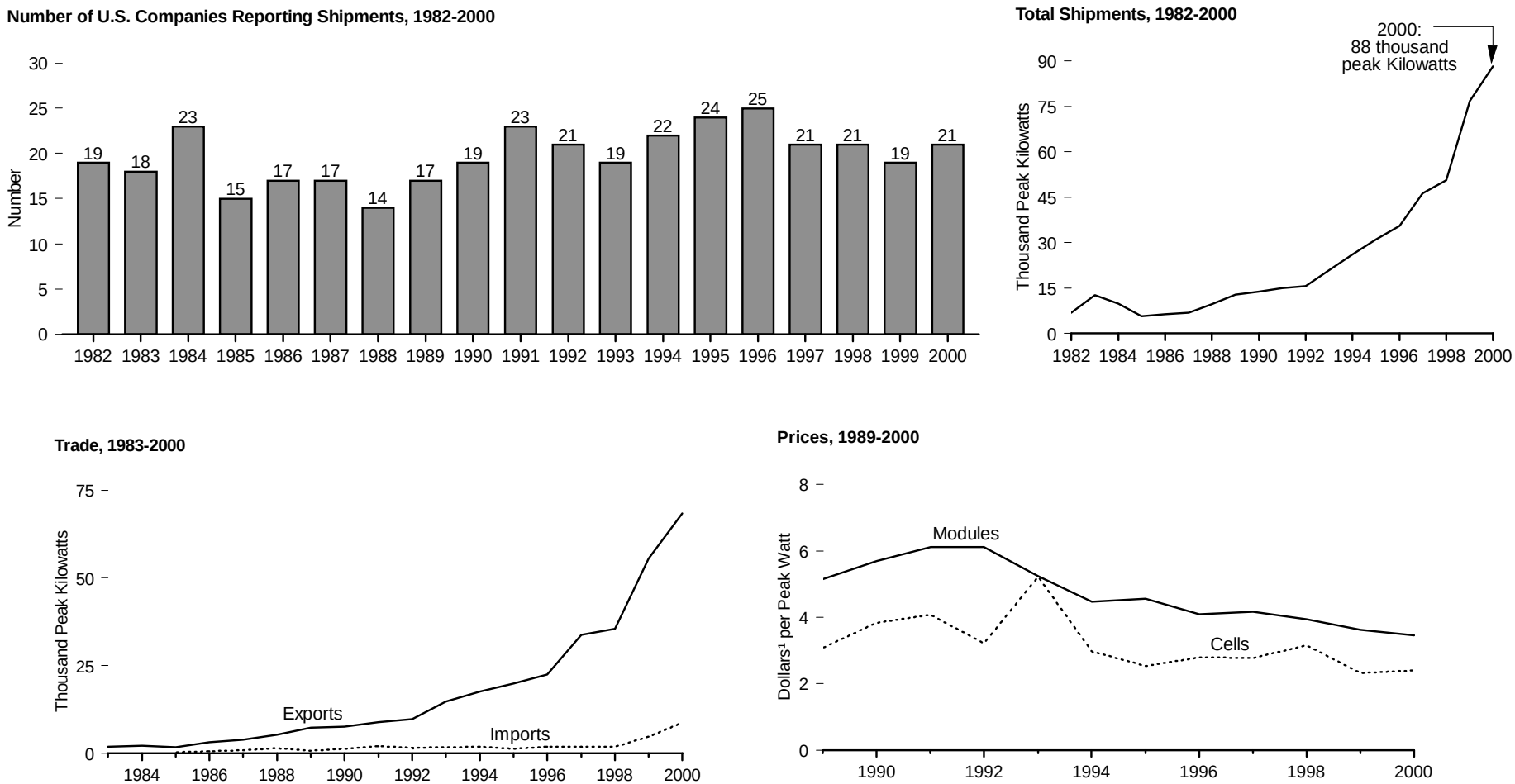
(s)=Less than 0.5 thousand square feet.

Notes: • Data represent shipments from U.S. manufacturers only. • Totals may not equal sum of components due to independent rounding.

Web Page: http://www.eia.doe.gov/fuelrenewable.html.

Source: Energy Information Administration, *Renewable Energy Annual 2001*.

## Figure 10.5 Photovoltaic Cell and Module Shipments, Trade, and Prices




[1] Nominal dollars.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 10.5.

# Table 10.5 Photovoltaic Cell and Module Shipments by Type, Trade, and Prices, 1982-2000

| Year | Number of U.S. Companies Reporting Shipments | Shipments | | | Imports | Exports | Prices [1] | |
|---|---|---|---|---|---|---|---|---|
| | | Crystalline Silicon | Thin-Film Silicon | Total [2] | | | Modules | Cells |
| | | Peak Kilowatts | | | | | Dollars per Peak Watt | |
| 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 | [3]19 | 12,492 | 1,321 | [3]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 |

[1] Prices, in nominal dollars, 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] Total shipments include all types of photovoltaic cells and modules (single-crystal silicon, cast silicon, ribbon silicon, thin-film silicon, and concentrator silicon) and internationally traded cells and modules. Shipments of cells and modules for space and satellite applications are not included.

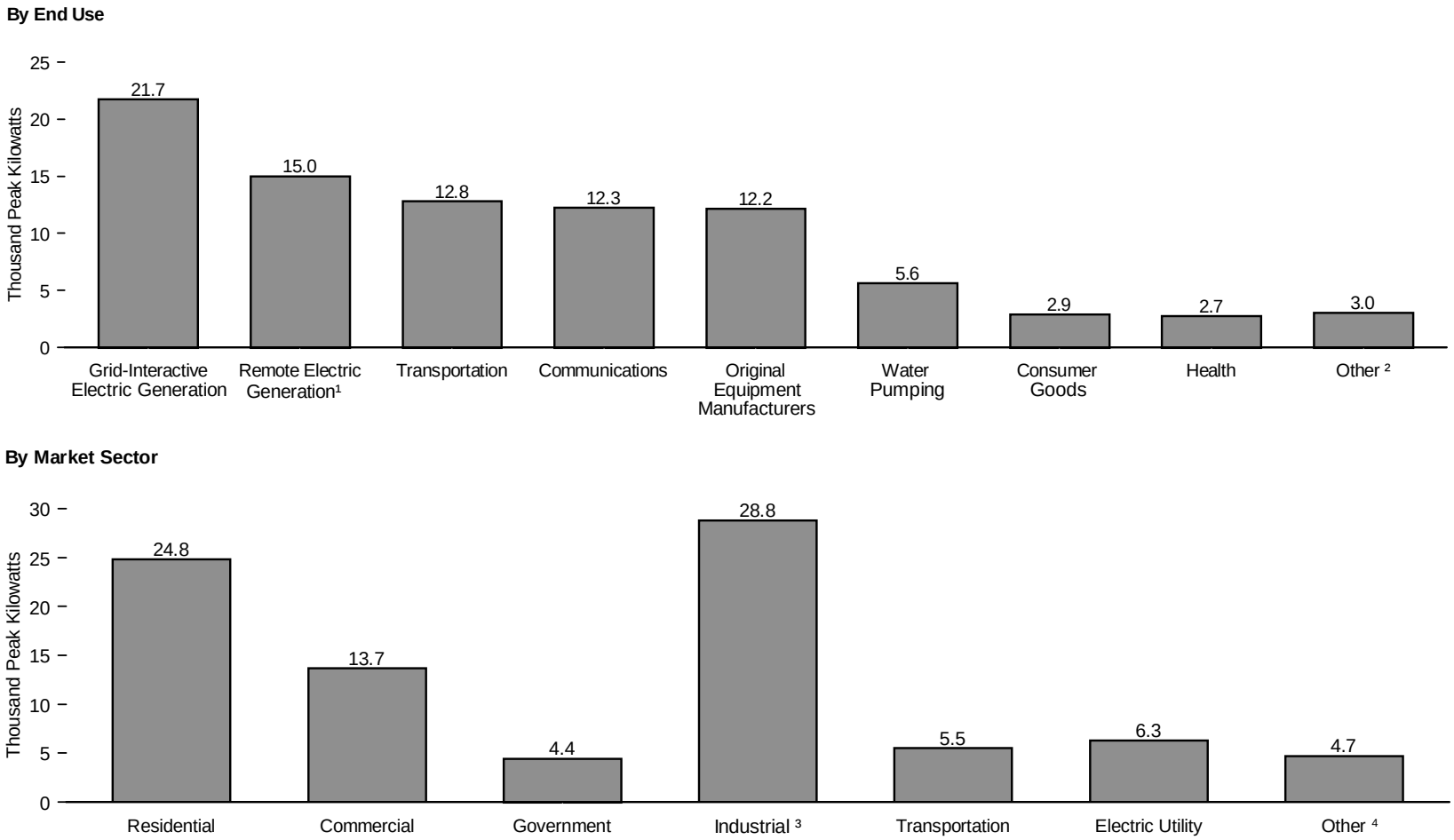
[3] Data were imputed for one nonrespondent who exited the industry during 1990.

NA=Not available.

Web Page: http://www.eia.doe.gov/fuelrenewable.html.

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

## Figure 10.6 Photovoltaic Cell and Module Shipments by End Use and Market Sector, 2000




[1] Units designed for installations that are not grid-interactive.
[2] Represents such applications as cooking food, desalinization, and distilling.
[3] Includes all independent power producers.
[4] Shipments to foreign governments and for specialty purposes.
Source: Table 10.6.

# Table 10.6 Photovoltaic Cell and Module Shipments by End Use and Market Sector, 1989-2000

| | End Use | | | | | | | | | Market Sector | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Electric Generation [1] | | | | | | | | | | | | | | |
| Year | Communications | Consumer Goods | Grid-Interactive | Remote | Health | Original Equipment Manufacturers [2] | Transportation | Water Pumping | Other [3] | Residential | Commercial | Government | Industrial [4] | Transportation | Electric Utility | Other [5] | Total |
| | Amount Shipped (peak kilowatts) | | | | | | | | | | | | | | | | |
| 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 |
| | 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 | 0.4 | 8.8 | 10.2 | 4.9 | 0.1 | 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 | 0.4 | 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 | 0.4 | 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 | 0.3 | 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 | 0.7 | 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 | 0.4 | 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 |

[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 to foreign governments and for specialty purposes.

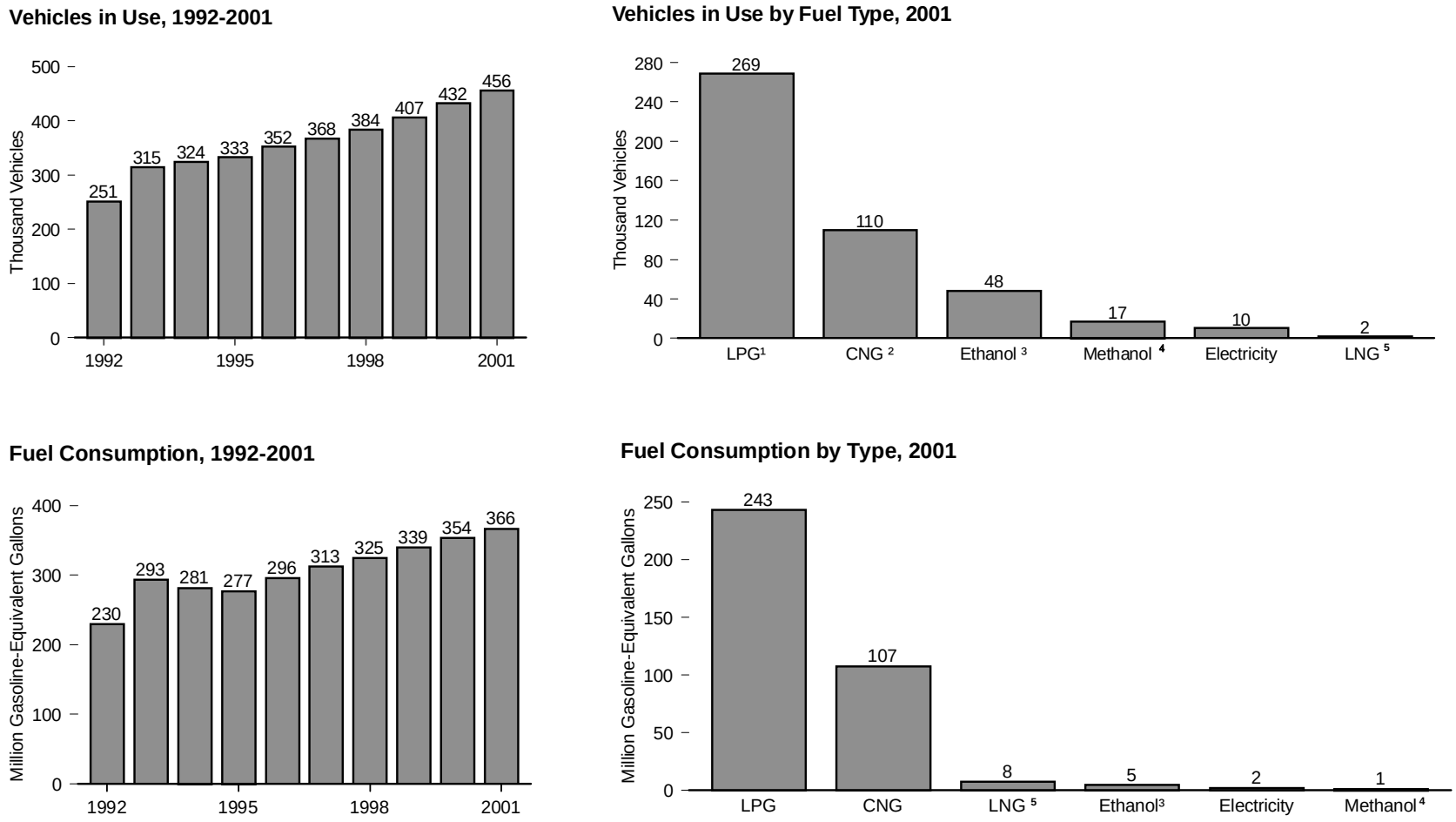
(s)=Less than 0.05 percent.

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

Web Page: http://www.eia.doe.gov/fuelrenewable.html.

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

## Figure 10.7 Estimated Alternative-Fueled Vehicles and Fuel Consumption by Type




[1] Liquefied petroleum gases.
[2] Compressed natural gas.
[3] Ethanol, 85 percent and ethanol, 95 percent.
[4] Methanol, 85 percent, and methanol, neat.
[5] Liquefied natural gas.
Note: Because vertical scales differ, graphs should not be compared.
Source: Table 10.7.

# Table 10.7 Estimated Alternative-Fueled Vehicles and Fuel Consumption by Type, 1992-2001

| Year | Liquefied Petroleum Gases [1] | Compressed Natural Gas | Liquefied Natural Gas | Methanol, 85 Percent [2] | Methanol, Neat | Ethanol, 85 Percent [2] | Ethanol, 95 Percent [2] | Electricity | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Number of Vehicles in Use | | | | | | | | |
| 1992 | 221,000 | 23,191 | 90 | 4,850 | 404 | 172 | 38 | 1,607 | 251,352 |
| 1993 | 269,000 | 32,714 | 299 | 10,263 | 414 | 441 | 27 | 1,690 | 314,848 |
| 1994 | 264,000 | 41,227 | 484 | 15,484 | 415 | 605 | 33 | 2,224 | 324,472 |
| 1995 | 259,000 | 50,218 | 603 | 18,319 | 386 | 1,527 | 136 | 2,860 | 333,049 |
| 1996 | 263,000 | 60,144 | 663 | 20,265 | 172 | 4,536 | 361 | 3,280 | 352,421 |
| 1997 | 263,000 | 68,571 | 813 | 21,040 | 172 | 9,130 | 347 | 4,453 | 367,526 |
| 1998 | 266,000 | 78,782 | 1,172 | 19,648 | 200 | 12,788 | 14 | 5,243 | 383,847 |
| 1999 | 267,000 | 89,556 | 1,681 | 18,964 | 198 | 22,464 | 14 | 6,964 | 406,841 |
| 2000 | 268,000 | 100,530 | 1,900 | 18,365 | 195 | 34,680 | 13 | 8,661 | 432,344 |
| 2001P | 269,000 | 109,730 | 2,039 | 16,918 | 184 | 48,022 | 13 | 10,400 | 456,306 |
| | Fuel Consumption (Thousand Gasoline-Equivalent Gallons) | | | | | | | | |
| 1992 | 208,142 | 16,823 | 585 | 1,069 | 2,547 | 21 | 85 | 359 | 229,631 |
| 1993 | 264,655 | 21,603 | 1,901 | 1,593 | 3,166 | 48 | 80 | 288 | 293,334 |
| 1994 | 248,467 | 24,160 | 2,345 | 2,340 | 3,190 | 80 | 140 | 430 | 281,152 |
| 1995 | 232,701 | 35,162 | 2,759 | 2,023 | 2,150 | 190 | 995 | 663 | 276,643 |
| 1996 | 239,158 | 46,923 | 3,247 | 1,775 | 347 | 694 | 2,699 | 773 | 295,616 |
| 1997 | 238,356 | 65,192 | 3,714 | 1,554 | 347 | 1,280 | 1,136 | 1,010 | 312,589 |
| 1998 | 241,583 | 73,251 | 5,343 | 1,212 | 449 | 1,727 | 59 | 1,202 | 324,826 |
| 1999 | 242,141 | 86,286 | 5,828 | 1,073 | 447 | 2,075 | 59 | 1,431 | 339,340 |
| 2000 | 242,695 | 97,568 | 6,847 | 996 | 437 | 3,344 | 54 | 1,819 | 353,760 |
| 2001P | 243,196 | 107,476 | 7,566 | 918 | 406 | 4,575 | 51 | 2,143 | 366,331 |

[1] Vehicles in use represent lower bound estimates, rounded to the nearest thousand.
[2] Remaining portion is motor gasoline.
P=Preliminary.
Note: Totals may not equal sum of components due to independent rounding.
Web Page: http://www.eia.doe.gov/fuelalternate.html.

Sources: • 1992-1995—Science Applications International Corporation, "Alternative Transportation Fuels and Vehicles Data Development," unpublished final report prepared for the Energy Information Administration (EIA) (McLean, VA, July 1996) and U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. • 1996-2001— EIA, Office of Coal, Nuclear, Electric, and Alternate Fuels.

## Renewable Energy

**Table 10.2a Sources**

**Wood, Residential:** • 1949-1979—Energy Information Administration (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. • 1989-2001—EIA, Office of Coal, Nuclear, Electric and Alternate Fuels (CNEAF) estimates based upon data from Form EIA-457A/G, "Residential Energy Consumption Survey." **Wood, Commercial:** • 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. • 1989-2001 CNEAF estimates combined with data from Table 8.3e. **Wood, Industrial:** • 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. • 1989-2001—EIA, CNEAF estimates based upon Form EIA-846 (A,B,C) "Manufacturing Energy Consumption Survey" and data from Table 8.3e. **Waste, Commercial:** • 1989-2001—Table 8.3e. **Waste, Industrial:** • 1981-1988—EIA, CNEAF estimates. • 1989- 2001—EIA, CNEAF estimates based upon data from Government Advisory Associates, *Resource Recovery Yearbook* and *Methane Recovery Yearbook*, and data from Table 8.3e. **Hydropower, Commercial:** 1989-2001—Tables 8.2c and A6. **Hydropower, Industrial:** • 1949-1978—Federal Power Commission (FPC), Form FPC-4, "Monthly Power Plant Report," for plants with generating capacity exceeding 10 megawatts, and FPC, Form FPC-12C, "Industrial Electric Generating Capacity," for all other plants, and Table A6. • 1979—FPC, Form FPC-4, "Monthly Power Plant Report," for plants with generating capacity exceeding 10 megawatts, and EIA estimates for all other plants; and Table A6. • 1980-1988—Estimated by EIA as the average generation over the 6-year period of 1974-1979; and Table A6. • 1989-2001— Tables 8.2c and A6. **Alcohol Fuels:** • 1981— EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10. • 1982 and 1983—EIA, CNEAF estimates. • 1984—EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10. • 1985 and 1986—Values interpolated. • 1987—EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10. • 1988—Value interpolated. • 1989—EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10. • 1990 and 1992—EIA, *Estimates of U.S. Biomass Energy Consumption 1992*, Table D1. • 1991—Value interpolated. • 1993-2000 EIA, *Petroleum Supply Monthly*, Tables 2 and 28, and Table A1. 2001—EIA, CNEAF estimates based upon EIA, Form-EIA-819M, "Monthly Oxygenate Telephone Report," and Form EIA-814, "Monthly Imports Report." **Geothermal:** • 1989-1999—John Lund, Oregon Institute of Technology Geoheat Center, unpublished data. **Solar:** • 1989-1991—EIA, CNEAF estimates. • 1992 and 1993—EIA, *Renewable Energy Annual 1997*, Table 2. • 1994-1998—EIA, *Renewable Energy Annual 1999*, Table 2. • 1999—EIA, *Renewable Energy Annual 2000*, Table 2. • 2000-2001—EIA, CNEAF estimates based upon Form EIA-63-A, "Annual Solar Thermal Collector Manufacturers Survey," and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

**Table 10.2b Sources**

Electric Power Sector: Tables 8.2b, 8.2c, and Table A6. **Electricity Trade:** • 1949-1988—Tables 8.1 and A6. • 1989-2001—Trade data from National Energy Board of Canada, the California Energy Commission, analysis by EIA, CNEAF, and Table A6.