

Renewable Energy Annual 2003

With Preliminary Data For 2003

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Contacts

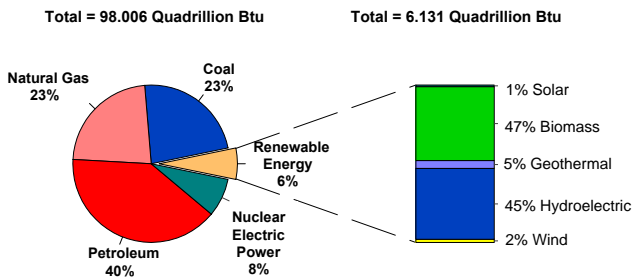
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Overview

Renewable energy consumption in 2003 grew 3 percent to 6.1 quadrillion Btu (Table 1). More than half of the increase came from a 4 percent gain in conventional hydropower, which contributed 104 trillion Btu more to consumption than it did in 2002. A 3 percent increase in biomass accounted for most of the remaining growth. Wind, geothermal, and solar energy consumption changed only modestly. Overall, renewable energy contributed 6 percent of the Nation's total energy supply (Figure 1).

At 6.1 quadrillion Btu, renewable energy consumption in 2003 was at essentially the same level it was in 1989, the year the Energy Information Administration (EIA) first began tracking "non-utility" electricity facilities (Table B1 and Figure 2). Renewable energy consumption peaked in the mid-1990s at 7.1 quadrillion Btu, or 7.5 percent of total US energy, owing largely to record hydropower output. After its peak in 1997, hydropower production declined for 5

Figure 1. The Role of Renewable Energy Consumption in the Nation's Energy Supply, 2003

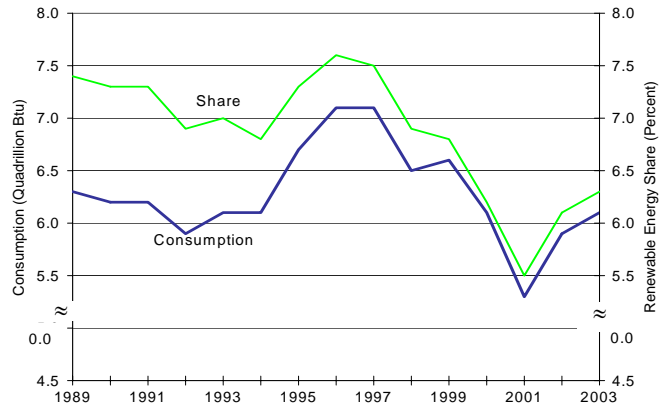


Source: Table 1 of this report

consecutive years and has been at normal or below-normal levels since 2000. Industrial and residential biomass consumption have declined slowly, while geothermal output has remained static. Wind and solar photovoltaics have expanded rapidly in recent years, but their share of the total is so small that this growth has not affected the renewable industry trend significantly.

Biomass energy consumption presented a complex picture in 2003. Although overall consumption rose 3 percent, there was great disparity among the components. Industrial and electric power sector biomass consumption declined 1 and 2 percent, respectively, compared to 2002 (Table 2). These two sectors account for over three-fourths of total biomass consumption. However, consumption during 2003 grew so fast in the smaller residential and transportation sectors, 15 and 41 percent, respectively, that their growth more than offset the major sector declines. Ethanol use increased from 133

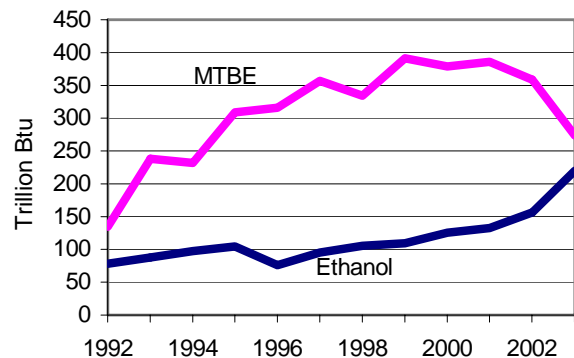
Figure 2. Historical Renewable Energy Consumption, 1989-2003



Source: Table B1 of this report

trillion Btu in 2001 to 156 trillion Btu in 2002 and surged to 220 trillion Btu in 2003 (Figure 2). Since ethanol's primary use is as an oxygenate in reformulated gasoline, its demand is tied to reformulated gasoline output and as a replacement for the other oxygenate additive, MTBE. Originally, MTBE was the overwhelming choice for oxygenating gasoline. Over the past few years, however, several states have passed bans on MTBE due to fears of groundwater contamination from leaky tanks.¹ As a result, MTBE consumption has declined since 2001, from 313 trillion Btu to 277 trillion Btu in 2002 and to 225 trillion Btu in 2003 (Figure 3).

Figure 3. Ethanol and MTBE Consumption in the Transportation Sector, 1992-2003



Sources: Ethanol: Table B1 of this report. MTBE: 1992-2001: Energy Information Administration, Alternatives to Traditional Transportation Fuels, 2003. Estimated Data (Washington, DC, February 2004), Table 10. (See: http://www.eia.doe.gov/cneaf/alternate/page/datatables/atf1-13_03.html). MTBE: 2002 and 2003: Energy Information Administration, Petroleum Supply Monthly February 2003, DOE/EIA-0109(2003/02) (Washington, DC, February 2003), Tables 34 and D3, and Office of Oil and Gas, unpublished data.

¹For a discussion of states which have banned MTBE, see <http://www.eia.doe.gov/oiaf/service/mtbeban/table1.html>.

Geothermal energy consumption has remained largely unchanged for 5 years, as very little new generating capacity has come on line. During 2000, nearly 600 net megawatts of geothermal capacity were retired, and little new capacity has come on line since (Table 5). Non-electric applications represent only a tiny fraction of total geothermal energy consumption.

Wind energy consumption grew 3 percent during 2003 to 108 trillion Btu, far below the double-digit growth experienced in the last few years. The EIA and industry sources document a major increase in capacity at the end of 2003 in anticipation of the expiration of the production tax credit. However, the full effect of these plants on generation levels will not be felt until 2004 when they are in full operation and are reporting to the EIA.

Solar energy maintained its contribution of about 63 trillion Btu in 2003, as solar thermal energy consumption declined while photovoltaic use expanded.

The electric power sector (excluding industrial and commercial combined heat and power (CHP) plants) consumed the most renewable energy in 2003 of any energy use sector, using nearly 60 percent, or 3.6 quadrillion Btu, of total renewable energy consumption. Three-fourths of electric power sector renewable consumption is water for hydropower. The industrial sector is heavily dominated (over 95 percent) by biomass; specifically, wood and wood waste. Residential renewable energy consumption is also heavily dominated by biomass. Residential wood consumption has generally been declining over the past 15 years. Despite a 15 percent increase to 359 trillion Btu, 2003 residential consumption equals just 62 percent of its 1990 value. Commercial sector consumption experienced a 15 percent rate of growth in 2003, bringing consumption near levels of the late 1990's and 2000. As mentioned previously, ethanol consumption in the transportation sector surged during 2003.

Electricity generation (including generation from CHPs) accounted for 4.1 quadrillion Btu, or two-thirds of total renewable energy consumption in 2003 (Table 3). Over 90 percent of this amount came from biomass and water for hydropower. Renewable energy was also consumed for space heating, process heat, and steam (Table 6).

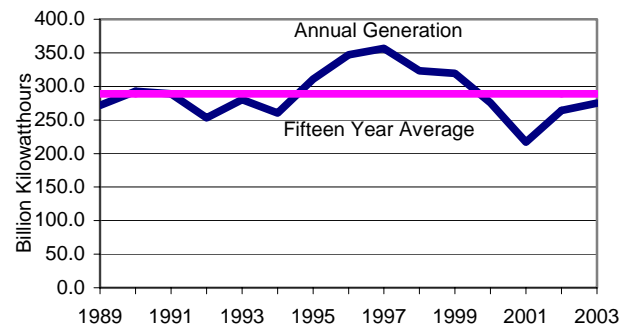
Renewable net electricity generation amounted to nearly 360 billion kilowatthours in 2003, up 2 percent from 2002 (Table 4). Ninety percent came from the electric power sector; its 322 billion kilowatthours was also up 2 percent from 2002. Industrial sector generation was essentially flat.

Geothermal generation dropped 9 percent between 2002 and 2003. The majority of geothermal generation comes from 21 plants at The Geysers field in California, one of the largest

geothermal fields in the world. Production at The Geysers fell sharply about 10 years ago because of a decline in underground pressure to produce steam. As a result, The Geysers, which have a total rated capacity of 1,650 megawatts, are currently achieving (according to industry measurements) an average annual net capacity of only 862 megawatts. The Santa Rosa Geysers Recharge Project, which became operative in December 2003, is designed to enhance steam production and produce 85 megawatts of additional generating capacity from this field by pumping about 11 million gallons of tertiary-treated wastewater daily into The Geysers geothermal reservoir.² The wastewater comes from the Santa Rosa regional sewage treatment plant and other cities through a 41-mile underground pipeline. The project also mitigates a major wastewater disposal problem. The project's final cost was just over \$200 million.

Hydroelectric generation, largely in the electric power sector, rose 4 percent and accounted for over three-fourths of renewable electricity generation in 2003. Despite increasing 27 percent since 2001, hydroelectric generation remains slightly below its average over the past 15 years (Figure 4). Generation from biomass in 2003 varied by detailed fuel category, with wood/wood waste-based generation declining 4 percent, but generation from "other biomass" jumping 17 percent.

Figure 4. Historical Hydroelectric Generation Compared to 15 Year Average for 1989-2003



Sources: 1989-1998: Energy Information Administration, Annual Energy Review 2002, DOE/EIA-0384(2002) (Washington, DC, October 2003), Table 8.2a. 1999-2003 Table 4 of this report.

There was a net addition of 560 megawatts of renewable electric generating capacity in 2003 (Table 5). Of this amount, 438 megawatts was additional wind capacity, and 110 megawatts was biomass. Industry sources indicate the increase for wind was closer to a total of 1,700 megawatts, but some new plants were not yet reporting to EIA.³ At nearly 97,000 megawatts of capacity, renewable energy provided 10 percent of the 2003 total net summer electric generating

²For information on this project, see http://www.energy.ca.gov/reports/2003-03-01_500-02-078V1.PDF and http://www.corporate-ir.net/ireve/ir_site.zhtml?ticker=CPN&script=411&layout=6&item_id=475360.

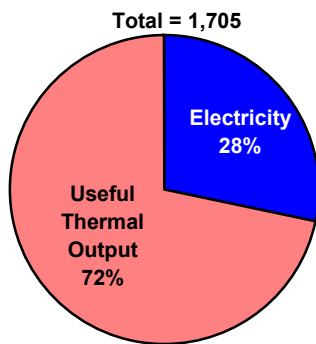
³See American Wind Energy Association News Release, "Boom: 2003 Close to Best Year Ever for New Wind Installations; Bust: Expiration of Key Incentive Lowers Hopes for 2004." January 22, 2004. See the website: <http://www.awea.org/news/news040122r03.html> (june 30, 2004).

capacity. Note that a considerable amount of renewable capacity typically operates at lower capacity factors than large baseload coal, gas, and nuclear plants.

Use of renewable energy for space heat, steam, and process heat grew 8 percent in 2003 to 2 quadrillion Btu (Table 6). Over 60 percent of this energy was consumed in the industrial sector. Over 95 percent of total non-electric renewable energy consumption, and nearly 97 percent of industrial sector non-electric consumption, is biomass. Most of the 1.1 quadrillion Btu of “Wood” consumed in the industrial sector for non-electric energy is a paper mill wood waste product, black liquor. Residential biomass use grew 15 percent in 2003, due mostly to a colder winter than in 2002. Commercial sector biomass use grew similarly. As mentioned previously, transportation sector non-electric consumption growth was rapid at 41 percent, due to increased ethanol usage as an oxygenate in gasoline.

A detailed examination of total biomass energy consumption reveals some interesting points. First, twice as much biomass was used for space, steam, and process heat (1.9 quads) as for electricity production in 2003. This contrasts with all other renewables, which are largely or entirely used to generate electricity. Since the industrial sector has by far the greatest demand for process heat and steam, the majority of total biomass (59 percent) was consumed there in 2003.

Figure 5. Industrial Biomass Energy Consumption by End Use, 2002 (Trillion Btu)



Source: Table 8 of this report.

Second, about 72 percent (1.2 quadrillion Btu) of industrial biomass was used for steam and process heat (also known as “useful thermal output”) in 2002 (Tables 8 and B3 and Figure 5). In addition to the Paper and Allied Products industry, the Lumber industry used a significant amount of biomass (248

trillion Btu) in 2002 to produce useful thermal output (Table 8). (Data for 2003 is not presently available for these detailed categories.) Third, after growing strongly between 2001 and

2002, waste and other biomass declined in 2003 by 3 and 7 percent, respectively (Table 7). Over half of biomass waste was consumed by independent power producers in 2002 (Table 9).

The Pacific “contiguous” (i.e., continental) Census Division generated nearly half, or 170 billion kilowatthours, of all renewable electricity in 2002 (Table B2). This included 144 billion kilowatthours of hydropower. Four other divisions (East South Central, Middle Atlantic, Mountain, and South Atlantic) generated roughly 30 billion kilowatthours each. The Pacific Contiguous division, which includes California and Washington, dominated generation from all renewable fuels except biomass. Black liquor- and wood/wood waste solids-based electricity were concentrated in the South Atlantic, South Central and Pacific Contiguous divisions (Table B4). New England also had substantial generation from black liquor.

Ninety-six electricity generating plants burned both biomass and coal in 2002 (Table B5). Plants for which biomass is only a small fraction of coal consumption are generally “co-firing” plants attempting to reduce emissions without making major retrofit investments. The remainder are genuine dual- or multi-fired plants consuming fuels based upon availability, demand, and price. For example, paper mills frequently require more energy than is available from the quantity of black liquor produced in the paper-making process.

State developments in renewable electricity generation complemented national trends in 2002. Washington, Oregon, California, and Montana (in descending order of importance) experienced major increases in hydroelectric generation as they recovered from the 2001 drought in the West (Tables C3 and C6). The net increase in renewable electric capacity was modest, less than 500 MW, led by expansion of wind in California, Iowa, and Texas and hydroelectric power in South Dakota and Tennessee (Tables C9 and C12). The western states and New York dominated hydroelectric capacity, while California was the leader in non-hydro electric capacity, with 30 percent of the national non-hydro total.

According to the Database of State Incentives for Renewable Energy (DSIRE), 18 states have renewable portfolio standards or state mandates with varying degrees of commitment to develop renewable energy in the future⁴ (Table C14). The list includes recently added Colorado, Florida and Maryland.

⁴ DSIRE is funded by the US Department of Energy and maintained by the North Carolina Solar Center.

Table 1. U.S. Energy Consumption by Energy Source, 1999-2003
(Quadrillion Btu)

Energy Source	1999	2000	2001	2002	^P 2003
Total	96.763	98.891	96.258	97.633	98.006
Fossil Fuels	82.650	84.965	83.121	84.297	84.388
Coal	21.623	22.580	21.897	<i>22.195</i>	22.773
Coal Coke Net Imports	0.058	0.065	<i>0.029</i>	<i>0.061</i>	0.051
Natural Gas ^a	23.010	<i>23.916</i>	<i>22.861</i>	<i>23.069</i>	22.490
Petroleum ^b	37.960	38.404	38.333	38.401	39.074
Electricity Net Imports	0.099	0.116	0.075	0.078	0.019
Nuclear Electric Power	7.610	7.862	8.028	8.145	7.795
Hydroelectric Pumped Storage ^c	-0.062	-0.057	-0.090	-0.088	-0.088
Renewable Energy	6.587	6.145	5.272	5.946	6.131
Conventional Hydroelectric.....	3.268	2.811	2.201	<i>2.675</i>	2.779
Geothermal Energy.....	0.331	0.317	0.311	<i>0.328</i>	0.314
Biomass	2.873	2.893	<i>2.626</i>	<i>2.773</i>	2.865
Solar Energy	0.069	0.066	0.065	<i>0.064</i>	0.063
Wind Energy	0.046	0.057	0.068	<i>0.105</i>	0.108

^a Includes supplemental gaseous fuels.

^b Petroleum products supplied, including natural gas plant liquids and crude oil burned as fuel.

^c Pumped storage facility production minus energy used for pumping.

P=Preliminary.

Note: Revised data are in italics. Totals may not equal sum of components due to independent rounding.

Sources: Non-renewable energy: Energy Information Administration (EIA), Monthly Energy Review April 2004, DOE/EIA-0035 (2004/04) (Washington, DC, April 2004.) Tables 1.3 and 1.4. Renewable Energy: Table 2 of this report.

Table 2. Renewable Energy Consumption by Energy Use Sector and Energy Source, 1999-2003
(Quadrillion Btu)

Sector and Source	1999	2000	2001	2002	^P 2003
Total	6.587	6.145	5.272	5.946	6.131
Residential	0.486	0.503	0.439	0.382	0.435
Biomass.....	0.414	0.433	<i>0.370</i>	<i>0.313</i>	0.359
Geothermal.....	0.009	0.009	0.009	0.010	0.018
Solar ^a	0.064	0.061	0.060	<i>0.059</i>	0.058
Commercial	0.114	0.109	0.089	0.093	0.107
Biomass.....	0.106	0.100	0.080	<i>0.084</i>	0.090
Wood/Wood Waste.....	0.052	0.053	<i>0.040</i>	<i>0.042</i>	0.042
MSW/Landfill Gas.....	0.049	0.041	0.035	<i>0.037</i>	0.042
Other Biomass ^b	0.005	0.006	0.004	0.005	0.007
Geothermal.....	0.007	0.008	0.008	0.009	0.015
Conventional Hydroelectric.....	0.001	0.001	0.001	*	0.001
Industrial	1.843	1.828	1.630	1.748	1.750
Biomass.....	1.791	1.781	1.593	<i>1.705</i>	1.689
Wood/Wood Waste.....	1.620	1.636	1.443	<i>1.531</i>	1.524
MSW/Landfill Gas.....	0.094	0.064	0.074	<i>0.087</i>	0.089
Other Biomass ^b	0.077	0.081	0.076	<i>0.087</i>	0.075
Geothermal.....	0.004	0.004	0.005	0.005	0.005
Conventional Hydroelectric.....	0.049	0.042	0.032	<i>0.039</i>	0.057
Transportation	0.110	0.126	0.133	0.156	0.220
Alcohol Fuels ^c	0.110	0.126	0.133	0.156	0.220
Electric Power ^d	4.034	3.579	2.982	3.567	3.619
Biomass.....	0.453	0.453	0.450	<i>0.516</i>	0.507
Wood/Wood Waste.....	0.138	0.134	0.126	<i>0.150</i>	0.161
MSW/Landfill Gas.....	0.292	0.295	0.310	<i>0.343</i>	0.322
Other Biomass ^b	0.023	0.023	0.014	<i>0.022</i>	0.024
Geothermal.....	0.312	0.296	0.289	<i>0.305</i>	0.276
Conventional Hydroelectric.....	3.218	2.768	2.169	<i>2.636</i>	2.722
Solar.....	0.005	0.005	0.006	<i>0.006</i>	0.005
Wind.....	0.046	0.057	0.068	<i>0.105</i>	0.108

^a Includes small amounts of distributed solar thermal and photovoltaic energy used in the commercial, industrial and electric power sectors.

^b Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

^c Ethanol primarily derived from corn.

^d Includes electric utilities and independent power producers.

* =Less than 500 billion Btu.

P=Preliminary.

Note: Revised data are in italics. Totals may not equal sum of components due to independent rounding.

Sources: Analysis conducted by Energy Information Administration, Office of Coal, Nuclear, Electric, and Alternate Fuels and specific sources described as follows. **Residential:** Energy Information Administration, Form EIA-457A/G, "Residential Energy Consumption Survey;" Oregon Institute of Technology, Geo-Heat Center; and Energy Information Administration, Form EIA-63-A, "Annual Solar Thermal Collector Manufacturers Survey" and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey." **Commercial:** Energy Information Administration, Form EIA-860B, "Annual Electric Generator Report - Nonutility," Form EIA-906, "Power Plant Report," and Oregon Institute of Technology, Geo-Heat Center. **Industrial:** Energy Information Administration, Form EIA-846 (A, B, C) "Manufacturing Energy Consumption Survey," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report;" Oregon Institute of Technology, Geo-Heat Center; and Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook. **Transportation:** Energy Information Administration, Form-EIA-819M, "Monthly Oxygenate Telephone Report," and Form EIA-814, "Monthly Imports Report." **Electric Power:** Energy Information Administration, Form EIA-759, "Monthly Power Plant Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report."

Table 3. Renewable Energy Consumption for Electricity Generation by Energy Use Sector and Energy Source, 1999-2003
(Quadrillion Btu)

Sector/Source	1999	2000	2001	2002	^P 2003
Total	4.452	3.995	3.396	4.094	4.127
Biomass	0.822	0.826	0.833	<i>1.004</i>	0.957
Wood/Wood Waste	0.490	0.496	0.486	<i>0.605</i>	0.576
MSW/Landfill Gas	0.301	0.297	0.323	<i>0.360</i>	0.344
Other Biomass ^a	0.031	0.033	0.023	<i>0.039</i>	0.037
Geothermal	0.312	0.296	0.289	<i>0.305</i>	0.276
Conventional Hydroelectric.....	3.268	2.811	2.201	<i>2.675</i>	2.779
Solar	0.005	0.005	0.006	0.006	0.005
Wind.....	0.046	0.057	0.068	<i>0.105</i>	0.108
Commercial	0.035	0.028	0.023	0.029	0.033
Biomass	0.033	0.026	0.023	<i>0.029</i>	0.032
Wood/Wood Waste.....	*	*	*	*	*
MSW/Landfill Gas	0.029	0.021	0.019	<i>0.024</i>	0.026
Other Biomass ^a	0.004	0.005	0.004	0.004	0.005
Conventional Hydroelectric.....	0.001	0.001	0.001	*	0.001
Industrial	0.422	0.421	0.411	0.520	0.494
Biomass	0.373	0.379	0.380	<i>0.482</i>	0.437
Wood/Wood Waste.....	0.364	0.369	0.370	<i>0.464</i>	0.424
MSW/Landfill Gas	*	*	0.003	<i>0.001</i>	0.002
Other Biomass ^a	0.008	0.009	0.007	<i>0.016</i>	0.011
Conventional Hydroelectric.....	0.049	0.042	0.032	<i>0.039</i>	0.057
Electric Power ^b	3.996	3.547	2.962	3.545	3.600
Biomass	0.416	0.421	0.430	<i>0.494</i>	0.488
Wood/Wood Waste.....	0.125	0.126	0.116	<i>0.141</i>	0.152
MSW/Landfill Gas	0.271	0.275	0.301	<i>0.334</i>	0.316
Other Biomass ^a	0.019	0.020	0.013	<i>0.019</i>	0.020
Geothermal	0.312	0.296	0.289	<i>0.305</i>	0.276
Conventional Hydroelectric.....	3.218	2.768	2.169	<i>2.636</i>	2.722
Solar	0.005	0.005	0.006	0.006	0.005
Wind.....	0.046	0.057	0.068	<i>0.105</i>	0.108

^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

^b Includes electric utilities and independent power producers.

* =Less than 500 billion Btu.

P=Preliminary.

Note: Revised data are in italics. Totals may not add due to independent rounding.

Sources: Analysis conducted by Energy Information Administration, Office of Coal, Nuclear, Electric, and Alternate Fuels and the following specific sources. Energy Information Administration, Form EIA-759, "Monthly Power Plant Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report."

Table 4. Electricity Net Generation From Renewable Energy by Energy Use Sector and Energy Source, 1999-2003
(Thousand Kilowatthours)

Sector/Source	1999	2000	2001	2002	^P 2003
Total	398,959,030	356,478,569	294,946,110	351,250,924	359,181,305
Biomass.....	59,612,909	60,726,180	56,964,468	<i>61,521,672</i>	59,761,936
Wood/Wood Waste.....	37,040,734	37,594,866	35,199,916	<i>38,665,040</i>	36,951,201
MSW/Landfill Gas.....	20,072,515	20,304,943	19,931,044	<i>20,184,615</i>	19,680,263
Other Biomass ^a	2,499,660	2,826,371	1,833,508	<i>2,672,017</i>	3,130,472
Geothermal.....	14,827,013	14,093,158	13,740,503	<i>14,491,310</i>	13,149,041
Conventional Hydroelectric.....	319,536,028	275,572,597	216,961,046	<i>264,328,832</i>	275,006,940
Solar.....	495,082	493,375	542,755	<i>554,831</i>	534,781
Wind.....	4,487,998	5,593,261	6,737,337	<i>10,354,279</i>	10,728,607
Commercial	2,527,117	2,111,620	1,548,109	1,597,470	1,994,634
Biomass.....	2,412,455	2,011,871	1,481,627	<i>1,584,673</i>	1,897,065
Wood/Wood Waste.....	19,671	26,958	17,626	<i>12,505</i>	9,187
MSW/Landfill Gas.....	2,041,933	1,601,152	1,181,827	<i>1,267,614</i>	1,451,182
Other Biomass ^a	350,851	383,761	282,174	<i>304,554</i>	436,696
Conventional Hydroelectric.....	114,663	99,749	66,482	<i>12,797</i>	97,569
Industrial	33,505,006	33,626,303	30,848,324	34,572,015	34,568,959
Biomass.....	28,746,698	29,491,148	27,703,056	<i>30,747,367</i>	28,948,096
Wood/Wood Waste.....	28,060,358	28,651,835	26,888,490	<i>29,643,207</i>	27,895,297
MSW/Landfill Gas.....	20,516	30,858	237,273	<i>202,209</i>	220,667
Other Biomass ^a	665,824	808,456	577,292	<i>901,951</i>	832,132
Conventional Hydroelectric.....	4,758,307	4,135,155	3,145,268	<i>3,824,648</i>	5,620,863
Electric Power ^b	362,926,907	320,740,647	262,549,676	315,081,439	322,617,712
Biomass.....	28,453,756	29,223,160	27,779,786	<i>29,189,632</i>	28,916,775
Wood/Wood Waste.....	8,960,705	8,916,073	8,293,800	<i>9,009,328</i>	9,046,717
MSW/Landfill Gas.....	18,010,065	18,672,933	18,511,944	<i>18,714,792</i>	18,008,414
Other Biomass ^a	1,482,985	1,634,155	974,042	<i>1,465,512</i>	1,861,644
Geothermal.....	14,827,013	14,093,158	13,740,503	<i>14,491,310</i>	13,149,041
Conventional Hydroelectric.....	314,663,058	271,337,693	213,749,295	<i>260,491,387</i>	269,288,508
Solar.....	495,082	493,375	542,755	<i>554,831</i>	534,781
Wind.....	4,487,998	5,593,261	6,737,337	<i>10,354,279</i>	10,728,607

^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

^b Includes electric utilities and independent power producers.

P=Preliminary.

Note: Revised data are in italics. Totals may not add due to independent rounding.

Sources: Energy Information Administration, Form EIA-759, "Monthly Power Plant Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report."

Table 5. U.S. Electric Net Summer Capacity, 1999-2003
(Megawatts)

Source	1999	2000	2001	2002	^P 2003
Total	785,927	811,719	848,254	905,301	953,206
Renewable Total	95,335	94,931	95,664	96,109	96,669
Biomass	10,454	<i>10,016</i>	9,709	<i>9,689</i>	9,799
Wood/Wood Waste	6,795	<i>6,147</i>	5,882	<i>5,844</i>	5,916
MSW/Landfill Gas	3,214	3,381	3,292	<i>3,330</i>	3,367
Other Biomass ^a	446	<i>488</i>	535	<i>515</i>	516
Geothermal	2,846	2,793	2,216	<i>2,252</i>	2,252
Conventional Hydroelectric	79,393	79,359	79,484	<i>79,354</i>	79,366
Solar	389	386	392	<i>397</i>	397
Wind	2,252	2,377	3,864	<i>4,417</i>	4,854
Nonrenewable Total	690,592	716,788	752,590	809,193	856,537

^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

P=Preliminary.

Note: Revised data are in italics. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report," Form EIA-860A, "Annual Electric Generator Report - Utility," and Form EIA-860B, "Annual Electric Generator Report - Nonutility."

Table 6. Renewable Energy Consumption for Nonelectric Use by Energy Use Sector and Energy Source, 1999-2003
(Quadrillion Btu)

Sector/Source	1999	2000	2001	2002	^P 2003
Total	2.134	2.149	1.875	1.852	2.004
Biomass	2.051	2.067	1.793	1.769	1.908
Wood	1.734	1.761	1.494	1.431	1.511
MSW/Landfill Gas	0.135	0.104	0.095	0.108	0.108
Other Biomass ^a	0.074	0.077	0.071	0.075	0.069
Alcohol Fuels ^b	0.110	0.126	0.133	0.156	0.220
Geothermal	0.019	0.021	0.022	0.024	0.038
Solar ^c	0.064	0.061	0.060	0.059	0.058
Residential	0.486	0.503	0.439	0.382	0.435
Biomass	0.414	0.433	0.370	0.313	0.359
Wood	0.414	0.433	0.370	0.313	0.359
Geothermal	0.009	0.009	0.009	0.010	0.018
Solar ^c	0.064	0.061	0.060	0.059	0.058
Commercial	0.079	0.082	0.065	0.064	0.074
Biomass	0.073	0.074	0.057	0.055	0.059
Wood	0.052	0.053	0.040	0.041	0.042
MSW/Landfill Gas	0.020	0.020	0.016	0.013	0.015
Other Biomass ^a	0.001	0.001	0.001	0.001	0.001
Geothermal	0.007	0.008	0.008	0.009	0.015
Industrial	1.422	1.407	1.218	1.228	1.256
Biomass	1.418	1.402	1.213	1.223	1.252
Wood	1.255	1.267	1.073	1.067	1.101
MSW/Landfill Gas	0.094	0.063	0.071	0.086	0.087
Other Biomass ^a	0.069	0.072	0.069	0.071	0.064
Geothermal	0.004	0.004	0.005	0.005	0.005
Transportation					
Alcohol Fuels ^b	0.110	0.126	0.133	0.156	0.220
Electric Power ^d	0.038	0.032	0.020	0.022	0.019
Biomass	0.038	0.032	0.020	0.022	0.019
Wood	0.013	0.008	0.010	0.010	0.009
MSW/Landfill Gas	0.021	0.020	0.008	0.009	0.006
Other Biomass ^a	0.004	0.004	0.001	0.003	0.004

^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

^b Ethanol primarily derived from corn.

^c Includes small amounts of distributed solar thermal and photovoltaic energy used in the commercial, industrial and electric power sectors.

^d Includes electric utilities and independent power producers.

P=Preliminary.

Note: Revised data are in italics. Totals may not equal sum of components due to independent rounding.

Sources: Analysis conducted by Energy Information Administration, Office of Coal, Nuclear, Electric, and Alternate Fuels and specific sources described as follows. Residential: Energy Information Administration, Form EIA-457A/G, "Residential Energy Consumption Survey;" Oregon Institute of Technology, Geo-Heat Center; and Energy Information Administration, Form EIA-63-A, "Annual Solar Thermal Collector Manufacturers Survey" and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey." Commercial: Energy Information Administration, Form EIA-860B, "Annual Electric Generator Report - Nonutility," Form EIA-906, "Power Plant Report," and Oregon Institute of Technology, Geo-Heat Center. Industrial: Energy Information Administration, Form EIA-846 (A,B,C) "Manufacturing Energy Consumption Survey," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report;" Oregon Institute of Technology, Geo-Heat Center; and Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook. Transportation: Energy Information Administration, Form-EIA-819M, "Monthly Oxygenate Telephone Report," and Form EIA-814, "Monthly Imports Report." Electric Power: Energy Information Administration, Form EIA-759, "Monthly Power Plant Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report."

Table 7. Biomass Energy Consumption by Energy Source and Energy Use Sector, 1999-2003
(Trillion Btu)

Source/Sector	1999	2000	2001	2002	^P 2003
Total	2,873	2,893	2,626	2,773	2,865
Wood Energy Total	2,224	2,257	1,980	2,036	2,087
Residential	414	433	370	313	359
Commercial	52	53	40	42	42
Industrial	1,620	1,636	1,443	1,531	1,524
Electric Power ^a	138	134	126	150	161
Waste Energy Total	540	511	514	581	559
MSW/Landfill Gas	435	400	419	467	453
Commercial	49	41	35	37	42
Industrial	94	64	74	87	89
Electric Power ^a	292	295	310	343	322
Other Biomass ^b	105	111	95	114	106
Commercial	5	6	4	5	7
Industrial	77	81	76	87	75
Electric Power ^a	23	23	14	22	24
Alcohol Fuels ^c					
Transportation	110	126	133	156	220

^a Includes electric utilities and independent power producers.

^b Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

^c Ethanol primarily derived from corn.

P=Preliminary.

Note: Revised data are in italics. Totals may not equal sum of components due to independent rounding.

Sources: Table 2 of this report.

Table 8. Industrial Biomass Energy Consumption and Electricity Net Generation by Primary Purpose of Business, 2002

Industry	Biomass Energy Consumption (Trillion Btus)			Net Generation (Million Kilowatthours)
	Total	For Electricity	For Useful Thermal Output	
Total	1,705	482	1,223	30,747
Agriculture, Forestry and Mining	11	3	8	205
Manufacturing	1,600	470	1,130	29,809
Food and Kindred Products	49	7	42	221
Lumber	248	17	231	1,389
Paper and Allied Products	1,249	444	805	28,057
Chemicals and Allied Products	23	1	22	36
Other ^a	31	1	30	106
Nonspecified ^b	93	8	85	733

^a Other includes Apparel; Petroleum Refining; Rubber and Misc. Plastic Products; Transportation Equipment; Stone, Clay, Glass, and Concrete Products; Furniture and Fixtures; and related industries.

^b Primary purpose of business is not specified.

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

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report;" Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook; and analysis conducted by the Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

Table 9. Waste Energy Consumption by Type and Energy Use Sector, 2002
(Trillion Btu)

Type	Sector				Total
	Commercial	Industrial	Electric Power		
			Electric Utilities	Independent Power Producers	
Total	42	174	38	327	581
MSW and Landfill Gas	37	87	37	306	467
MSW	36	8	33	248	325
Landfill Gas	2	79	3	59	142
Other Biomass ^a	5	87	2	21	114

^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

MSW = Municipal Solid Waste

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

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report," and Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook; and analysis conducted by the Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

Table B1. Historical Renewable Energy Consumption by Sector and Energy Source, 1989-2003
(Quadrillion Btu)

Sector and Energy Source	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total	6.294	6.152	6.150	5.902	6.148	6.053	6.657	7.129	7.065	6.549	6.587	6.145	5.272	5.946	6.131
Biomass	3.062	2.681	2.694	2.842	2.795	2.928	3.056	3.120	2.996	2.823	2.873	2.893	2.626	2.773	2.865
Wood	2.637	2.191	2.190	2.290	2.228	2.315	2.420	2.467	2.349	2.175	2.224	2.257	1.980	2.036	2.087
Waste ^a	0.354	0.408	0.440	0.473	0.479	0.515	0.531	0.577	0.551	0.542	0.540	0.511	0.514	0.581	0.559
Alcohol Fuels ^b	0.071	0.082	0.065	0.078	0.088	0.097	0.105	0.076	0.096	0.105	0.110	0.126	0.133	0.156	0.220
Geothermal	0.317	0.336	0.346	0.349	0.364	0.338	0.294	0.316	0.325	0.328	0.331	0.317	0.311	0.328	0.314
Hydroelectric	2.837	3.046	3.016	2.617	2.892	2.683	3.205	3.590	3.640	3.297	3.268	2.811	2.201	2.675	2.779
Solar ^c	0.055	0.060	0.063	0.064	0.066	0.069	0.070	0.071	0.070	0.070	0.069	0.066	0.065	0.064	0.063
Wind	0.022	0.029	0.031	0.030	0.031	0.036	0.033	0.033	0.034	0.031	0.046	0.057	0.068	0.105	0.108
Residential Sector	0.976	0.642	0.677	0.711	0.616	0.607	0.667	0.667	0.506	0.459	0.486	0.503	0.439	0.382	0.435
Biomass	0.918	0.581	0.613	0.645	0.548	0.537	0.596	0.595	0.433	0.387	0.414	0.433	0.370	0.313	0.359
Wood	0.918	0.581	0.613	0.645	0.548	0.537	0.596	0.595	0.433	0.387	0.414	0.433	0.370	0.313	0.359
Geothermal	0.005	0.006	0.006	0.006	0.007	0.006	0.007	0.007	0.008	0.008	0.009	0.009	0.009	0.010	0.018
Solar ^c	0.053	0.056	0.058	0.060	0.062	0.064	0.065	0.065	0.065	0.065	0.064	0.061	0.060	0.059	0.058
Commercial Sector	0.061	0.071	0.072	0.081	0.084	0.086	0.092	0.110	0.113	0.111	0.114	0.109	0.089	0.093	0.107
Biomass	0.058	0.067	0.068	0.076	0.079	0.081	0.086	0.103	0.107	0.102	0.106	0.100	0.080	0.084	0.090
Wood	0.036	0.039	0.041	0.044	0.046	0.046	0.046	0.050	0.049	0.048	0.052	0.053	0.040	0.042	0.042
Waste ^a	0.022	0.028	0.026	0.032	0.033	0.035	0.040	0.053	0.058	0.054	0.054	0.047	0.039	0.042	0.048
Geothermal	0.003	0.003	0.003	0.003	0.003	0.004	0.005	0.005	0.006	0.007	0.007	0.008	0.008	0.009	0.015
Hydroelectric	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	*	0.001
Industrial Sector	1.814	1.667	1.626	1.672	1.697	1.844	1.905	1.971	1.976	1.841	1.843	1.828	1.630	1.748	1.750
Biomass	1.784	1.634	1.595	1.640	1.666	1.779	1.847	1.907	1.915	1.784	1.791	1.781	1.593	1.705	1.689
Wood	1.584	1.442	1.410	1.461	1.484	1.580	1.652	1.683	1.731	1.603	1.620	1.636	1.443	1.531	1.524
Waste ^a	0.200	0.192	0.185	0.179	0.181	0.199	0.195	0.224	0.184	0.180	0.171	0.145	0.150	0.174	0.164
Geothermal	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.005	0.005	0.005
Hydroelectric	0.028	0.031	0.030	0.031	0.030	0.062	0.055	0.061	0.058	0.055	0.049	0.042	0.032	0.039	0.057
Transportation Sector	0.071	0.082	0.065	0.078	0.088	0.097	0.105	0.076	0.096	0.105	0.110	0.126	0.133	0.156	0.220
Alcohol Fuels ^b	0.071	0.082	0.065	0.078	0.088	0.097	0.105	0.076	0.096	0.105	0.110	0.126	0.133	0.156	0.220
Electric Power Sector	3.372	3.689	3.710	3.360	3.662	3.420	3.889	4.305	4.375	4.032	4.034	3.579	2.982	3.567	3.619
Electric Utilities	2.983	3.151	3.114	2.712	2.953	2.714	3.173	3.553	3.620	3.279	3.123	2.607	2.030	2.532	2.551
Biomass	0.020	0.022	0.021	0.022	0.021	0.021	0.017	0.020	0.020	0.021	0.020	0.021	0.019	0.049	0.043
Wood	0.010	0.008	0.008	0.008	0.009	0.008	0.007	0.008	0.008	0.007	0.007	0.007	0.006	0.011	0.012
Waste ^a	0.010	0.013	0.014	0.013	0.011	0.013	0.010	0.012	0.013	0.013	0.013	0.014	0.013	0.038	0.031
Geothermal	0.197	0.181	0.170	0.169	0.158	0.145	0.099	0.110	0.115	0.109	0.036	0.003	0.003	0.029	0.006
Hydroelectric	2.765	2.948	2.923	2.521	2.774	2.549	3.056	3.423	3.485	3.149	3.067	2.582	2.007	2.452	2.498
Solar	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wind	*	*	*	*	*	*	*	*	*	*	*	*	*	0.001	0.002

See footnotes at end of table.

Table B1. Historical Renewable Energy Consumption by Sector and Energy Source, 1989-2003 (Continued)
(Quadrillion Btu)

Sector and Energy Source	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Independent Power Producers	0.389	0.538	0.596	0.648	0.709	0.705	0.716	0.752	0.754	0.753	0.910	0.972	0.951	1.034	1.069
Biomass	0.211	0.295	0.333	0.381	0.394	0.413	0.405	0.418	0.426	0.424	0.433	0.432	0.432	<i>0.467</i>	0.464
Wood	0.089	0.120	0.118	0.132	0.141	0.144	0.119	0.130	0.129	0.129	0.131	0.127	0.121	<i>0.140</i>	0.149
Waste ^a	0.122	0.175	0.215	0.249	0.253	0.269	0.286	0.288	0.296	0.294	0.302	0.305	0.311	<i>0.327</i>	0.315
Geothermal	0.111	0.145	0.165	0.168	0.193	0.180	0.181	0.191	0.194	0.202	0.276	0.293	0.286	<i>0.275</i>	0.270
Hydroelectric.....	0.043	0.066	0.062	0.065	0.087	0.072	0.093	0.104	0.096	0.092	0.151	0.185	0.162	<i>0.184</i>	0.224
Solar	0.003	0.004	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	<i>0.006</i>	0.005
Wind.....	0.022	0.029	0.031	0.030	0.031	0.036	0.033	0.033	0.034	0.031	0.046	0.057	0.067	<i>0.103</i>	0.105

^a Municipal solid waste, landfill gases, agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

^b Ethanol primarily derived from corn.

^c Includes small amounts of distributed solar thermal and photovoltaic energy used in the commercial, industrial and electric power sectors.

*=Less than 500 billion Btu.

P=Preliminary.

Note: Revised data are in italics. Totals may not equal sum of components due to independent rounding.

Sources: Analysis conducted by Energy Information Administration, Office of Coal, Nuclear, Electric, and Alternate Fuels and specific sources described as follows. Residential: Energy Information Administration, Form EIA-457A/G, "Residential Energy Consumption Survey;" Oregon Institute of Technology, Geo-Heat Center and Energy Information Administration, Form EIA-63-A, "Annual Solar Thermal Collector Manufacturers Survey" and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey." Commercial: Energy Information Administration, Form EIA-867, "Annual Nonutility Power Producer Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," Form EIA-906, "Power Plant Report," and Oregon Institute of Technology, Geo-Heat Center. Industrial: Energy Information Administration, Form EIA-846 (A,B,C) "Manufacturing Energy Consumption Survey," Form EIA-867, "Annual Nonutility Power Producer Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report", Oregon Institute of Technology, Geo-Heat Center and Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook. Transportation: Bureau of Alcohol, Tobacco and Firearms, fuel ethanol production and import data, U.S. Bureau of Census, Schedule B, Commodity Number 2207.20.0000, "Ethyl Alcohol, Denatured of Any Strength," Energy Information Administration, Form-EIA-819M, "Monthly Oxygenate Telephone Report," and Form EIA-814, "Monthly Imports Report." Electric Power: Energy Information Administration, Form EIA-759, "Monthly Power Plant Report," Form EIA-867, "Annual Nonutility Power Producer Report," Form EIA-860B, "Annual Electric Generator Report - Nonutility," and Form EIA-906, "Power Plant Report."

Table B2. Renewable Electricity Net Generation by Energy Source and Census Division, 2002
(Thousand Kilowatthours)

Census Division	Geothermal	Conventional Hydroelectric	MSW/Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/Wood Waste	Total
Total	14,491,310	264,328,833	20,184,615	2,672,017	554,831	10,354,279	38,665,039	351,250,924
East North Central		5,212,690	2,079,968	418,754		46,509	2,245,566	10,003,487
East South Central		20,835,327	37,956	32,407		4,068	5,780,443	26,690,201
Middle Atlantic		27,270,488	5,368,372	24,746		139,394	1,178,507	33,981,507
Mountain	1,344,934	30,545,941	60,801	140,698	459	586,336	571,774	33,250,941
New England		6,225,430	4,086,402	512,390		10,372	4,885,812	15,720,405
Pacific Contiguous	13,073,615	143,720,459	2,170,131	454,550	554,372	4,595,385	5,707,819	170,276,331
Pacific Noncontiguous	72,761	1,534,419	301,177	149,971		1,614	1,031	2,060,973
South Atlantic		11,376,577	5,157,590	506,359		9,023	12,274,446	29,323,995
West North Central		10,168,897	868,882	103,062		2,305,474	377,626	13,823,941
West South Central		7,438,606	53,336	329,081		2,656,104	5,642,015	16,119,143

^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.

Note: Blank cell indicates the division has no data to report for that energy source. Totals may not add due to independent rounding.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table B3. Industrial Biomass Energy Consumption and Electricity Net Generation by Primary Purpose of Business and Energy Source, 2002

Industry	Energy Source	Code	Biomass Energy Consumption (Trillion Btus)			Net Generation (Million Kilowatthours)
			Total	For Electricity	For Useful Thermal Output	
Total			1,704.712	481.501	1,223.211	30,747
Agriculture, Forestry, and Mining Total			11.336	3.126	8.210	205
	Agricultural Byproducts/Crops	AB	11.23821	3.071883	8.166	200
	Other Biomass Gases	OBG	0.098	0.054	0.043	5
Manufacturing	Total		1,600.046	469.893	1,130.153	29,809
Food and Kindred Industry Products	Total					
	Agricultural Byproducts/Crops	AB	49.261	7.219	42.042	221
	Other Biomass Gases	OBG	42.669	4.200	38.469	25
	Other Biomass Liquids	OBL	0.529	0.154	0.375	20
	Other Biomass Solids	OBS	0.143	0.142	0.001	11
	Tires	TI	3.228	2.055	1.174	108
	Wood/Wood Waste Solids	WDS	0.303	0.090	0.213	8
			2.389	0.579	1.810	48
Lumber	Total		247.840	17.066	230.774	1,389
	Sludge Waste	SLW	*	*	*	**
	Wood/Wood Waste Liquids	WDL	0.151	0.151	-	7
	Wood/Wood Waste Solids	WDS	247.690	16.916	230.774	1,382
Paper and Allied Products	Total		1,248.900	444.004	804.896	28,057
	Black Liquor	BL	832.658	301.345	531.314	18,653
	Landfill Gas	LG	0.159	0.056	0.103	3
	Municipal Solid Waste	MW	2.484	0.613	1.870	122
	Other Biomass Liquids	OBL	0.223	0.091	0.132	8
	Other Biomass Solids	OBS	0.432	0.274	0.158	39
	Sludge Waste	SLW	9.459	3.965	5.494	269
	Tires	TI	7.257	1.863	5.394	192
	Wood/Wood Waste Liquids	WDL	18.711	5.829	12.882	412
	Wood/Wood Waste Solids	WDS	377.518	129.968	247.550	8,358
Chemicals and Allied Products ...	Total		22.676	0.720	21.956	36
	Municipal Solid Waste	MW	1.273	0.101	1.172	9
	Other Biomass Liquids	OBL	0.190	0.031	0.158	3
	Other Biomass Solids	OBS	*	*	*	**
	Sludge Waste	SLW	0.173	0.040	0.133	5
	Wood/Wood Waste Solids	WDS	21.040	0.547	20.493	19
Other ^a	Total		31.369	0.884	30.485	106
Nonspecified ^b	Total		93.330	8.482	84.848	733
	Black Liquor	BL	4.897	4.897	-	460
	Landfill Gas	LG	78.000	-	78.000	-
	Municipal Solid Waste	MW	4.650	-	4.650	-
	Wood/Wood Waste Liquids	WDL	1.456	0.490	0.965	53
	Wood/Wood Waste Solids	WDS	4.328	3.095	1.233	220

^a Other includes Apparel; Petroleum Refining; Rubber and Misc. Plastic Products; Transportation Equipment; Stone, Clay, Glass, and Concrete Products; Furniture and Fixtures; and related industries.

^b Primary purpose of business is not specified.

- = Not Applicable.

* = Less than 500 million Btu.

** = Less than 500 thousand kilowatthours.

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

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report," Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook; and analysis conducted by the Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

Table B4. Industrial Biomass Electricity Net Generation by Census Division and Energy Source, 2002
(Thousand Kilowatthours)

Census Region											
Energy Source	East North Central	East South Central	Middle Atlantic	Mountain	New England	Pacific Contiguous	Pacific Noncontiguous	South Atlantic	West North Central	West South Central	Total
Total	1,267,249	5,603,410	687,034	498,490	2,403,330	2,182,635	138,347	11,813,991	389,338	5,763,542	30,747,367
Agricultural Byproducts/Crops ...						42,000	18,769	146,559	410	17,119	224,857
Black Liquor.....	647,810	3,710,004	580,528	318,530	1,072,243	663,578		8,257,677	153,328	3,710,029	19,113,727
Landfill Gases.....	66,085					2,035		2,762			70,882
Municipal Solid Waste								131,327			131,327
Other Biomass Gases	7,450	5,276	11,029						8,557		32,312
Other Biomass Liquids			1,867		7,896	367	11,124	563			21,816
Other Biomass Solids.....		2			38,146		108,454	1,179	3		147,784
Sludge Waste	5,689	22,534	4,726		45,043	6,004		153,986	2,886	33,916	274,783
Tires.....	8,398	4,595	3,410		81,003			32,501		70,492	200,399
Wood/Wood Waste Liquids	31,541				52,668	80,458		101,985		204,779	471,431
Wood/Wood Waste Solids.....	500,277	1,860,999	85,474	179,960	1,106,331	1,388,194		2,985,452	224,154	1,727,207	10,058,048

Note: Blank cell indicates the division has no data to report for that energy source. Totals may not add due to independent rounding.

Source: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table B5. Net Generation and Fuel Consumption at Power Plants Consuming Coal and Biomass by State and Plant Name, 2002

State	Company Name	Plant I.D.	Plant Name	County	Net Electricity Generation (kilowatthours)	Energy Consumed (MMBTU)	Energy Consumed from Biomass (MMBTU)	Percent of Energy Consumed from		
								Biomass	Coal	Other
AK	U S Air Force-Eielson AFB	50392	Eielson AFB Central Heat & Pow	Fairbanks North Star	83,787,000	2,917,084	36,400	1.25	98.09	0.66
AL	Bowater Nwprt Coosa Pines Op	54216	U S Alliance Coosa Pines	Talladega	161,268,436	11,203,995	4,929,720	44.00	56.00	
AL	Georgia-Pacific Corp	10699	Georgia Pacific Naheola Mill	Choctaw	398,788,000	20,398,450	17,035,166	83.51	8.65	7.84
AL	Gulf States Paper Corp	54763	Gulf States Paper	Marengo	150,612,553	8,169,032	7,531,381	92.19	3.59	4.21
AL	International Paper Co	52140	International Paper Prattville	Autauga	467,368,475	17,381,492	12,500,933	71.92	10.07	18.01
AL	Mobile Energy Service Holdings	50407	Mobile Energy Services LLC	Mobile	427,709,000	6,365,342	3,102,894	48.75	51.25	
AL	Weyerhaeuser Co	54752	Weyerhaeuser Pine Hill Operati	Wilcox	489,890,275	13,497,702	10,679,962	79.12	3.84	17.04
AR	Domtar Industries Inc	54104	Ashdown	Little River	889,211,858	47,225,200	37,991,074	80.45	11.74	7.81
AZ	Tucson Electric Power Co	126	Irvington	Pima	1,403,955,000	14,970,685	170,095	1.14	48.13	50.74
CA	Air Products Energy Enterprise	10640	Stockton Cogen	San Joaquin	397,849,000	5,598,342	354,560	6.33	52.98	40.69
CA	FPL Energy Operating Servs Inc	54238	Port of Stockton District Ener	San Joaquin	324,544,000	3,941,778	1,260	0.03	93.52	6.44
CT	Covanta Mid-Connecticut Inc	54945	Covanta Mid-Connecticut Energy	Hartford	492,677,002	8,265,700	8,195,969	99.16	0.84	
FL	International Paper Co-Escambi	50250	International Paper Pensacola	Escambia	153,947,000	8,839,013	6,691,324	75.70	11.78	12.52
FL	JEA	667	Northside Generating Station	Duval	3,713,143,000	39,453,184	88,774	0.23	18.53	81.25
FL	Jefferson Smurfit Corp	10202	Jefferson Smurfit Fernandina B	Nassau	376,768,000	18,812,607	12,350,391	65.65	33.32	1.03
FL	Lakeland City of	676	C D McIntosh Jr	Polk	4,065,193,000	39,257,683	127,750	0.33	52.18	47.50
FL	Orlando Utilities Comm	564	Stanton Energy Center	Orange	6,070,495,000	60,455,660	821,352	1.36	98.53	0.11
FL	Stone Container Corp-Panama Ci	50807	Stone Container Panama City Mi	Bay	255,683,000	23,447,984	19,382,521	82.66	7.05	10.28
GA	Durango-Georgia Paper Co	54428	Durango Georgia Paper	Camden	45,112,634	3,327,617	2,346,672	70.52	18.57	10.91
GA	Fort James Operating Co	10361	Savannah River Mill	Effingham	651,660,706	10,647,223	41,982	0.39	9.84	89.76
GA	Georgia Pacific Corp	54101	Georgia Pacific Cedar Springs	Early	4,761,360,000	140,555,393	104,454,684	74.32	19.13	6.55
GA	Inland Paperboard & Pack'g Inc	10426	Inland Paperboard Packaging Ro	Floyd	397,827,000	19,401,922	12,905,646	66.52	27.03	6.45
GA	International Paper Co	50398	International Paper Savanna Mi	Chatham	835,384,572	23,407,619	13,329,707	56.95	35.76	7.30
GA	International Paper Co-Augusta	54358	International Paper Augusta Mi	Richmond	527,548,000	23,937,860	16,383,989	68.44	20.03	11.52
GA	Riverwood Intl USA Inc	54464	Riverwood International Macon	Bibb	268,227,621	10,461,065	7,901,127	75.53	11.46	13.01
GA	Southeast Paper Mfg Co Inc	54004	SP Newsprint	Laurens	347,987,000	9,860,585	6,289,253	63.78	18.63	17.59
HI	Hawaiian Com & Sugar Co Ltd	10604	Puueene Mill	Maui	158,533,516	4,393,136	3,228,212	73.48	18.58	7.93
HI	AES Hawaii Inc	10673	AES Hawaii	Oahu	1,479,427,000	15,118,533	118,978	0.79	98.41	0.80
IA	Ag Processing Inc	10223	AG Processing	Wright	39,977,580	1,550,923	3,019	0.19	99.81	
IA	Interstate Power and Light	1058	Sixth Street	Linn	202,333,000	4,249,641	200,288	4.71	72.20	23.09
IA	Interstate Power and Light	1073	Prairie Creek	Linn	861,343,000	8,950,115	137,604	1.54	95.43	3.04
IA	University of Iowa	54775	University of Iowa Main Power	Johnson	91,324,000	3,319,748	61,022	1.84	86.84	11.33
IL	Archer Daniels Midland Co	10865	Archer Daniels Midland Decatur	Macon	1,102,488,739	40,282,747	302,801	0.75	99.25	
IL	Dynegy Midwest Generation Inc	889	Baldwin Energy Complex	Randolph	12,444,339,000	128,738,542	1,212,657	0.94	98.95	0.10
LA	International Paper Co	54090	International Paper Louisiana	Morehouse	385,124,000	15,173,423	12,953,449	85.37	1.56	13.07
LA	IPC-Mansfield Mill	54091	Mansfield Mill	Desota	768,742,000	24,867,534	19,631,087	78.94	2.74	18.32
MD	MeadWestvaco Corp	50282	Luke Mill	Allegheny	520,663,000	5,421,878	1,813,714	33.45	66.55	
ME	Mead Paper Corp	10244	Mead Custom Paper	Ross	586,713,000	16,453,389	8,945,453	54.37	44.44	1.20
ME	Rumford Cogeneration Co	10495	Rumford Cogeneration	Oxford	767,374,169	17,326,665	11,662,354	67.31	32.69	
ME	S D Warren Co - Somerset	50447	S D Warren Somerset	Cumberland	345,874,000	6,542,661	4,351,878	66.52	28.49	5.00

See footnotes at end of table.

Table B5. Net Generation and Fuel Consumption at Power Plants Consuming Coal and Biomass by State and Plant Name, 2002 (Continued)

State	Company Name	Plant I.D.	Plant Name	County	Net Electricity Generation (kilowatthours)	Energy Consumed (MMBTU)	Energy Consumed from Biomass (MMBTU)	Percent of Energy Consumed from		
								Biomass	Coal	Other
ME	S D Warren Co - Somerset	50447	S D Warren Somerset	Cumberland	345,874,000	6,542,661	4,351,878	66.52	28.49	5.00
MI	International Paper Co-Quinnes	50251	International Paper Quinnesec	Dickinson	207,851,000	10,043,963	9,679,889	96.38	0.70	2.92
MI	Louisiana Pacific Co	10149	Louisiana Pacific	Alpena	51,822,000	164,726	56,042	34.02	33.76	32.22
MI	Mead Paper Corp	10208	Mead Paper	Delta	615,144,789	9,359,106	2,787,943	29.79	45.45	24.76
MI	S D Warren Co	50438	S D Warren Muskegon	Muskegon	260,453,000	8,009,730	2,774,032	34.63	58.03	7.34
MI	TES Filer City Station LP	50835	TES Filer City Station	Manistee	268,901,882	3,506,511	169,480	4.83	95.17	
MI	Wyandotte Municipal Serv Comm	1866	Wyandotte	Wayne	279,315,000	3,855,299	288,112	7.47	86.79	5.73
MN	Hibbing Public Utilities Comm	1979	Hibbing	St Louis	19,565,000	519,034	80	0.02	99.98	*
MN	Rapids Energy Center	10686	Rapids Energy Center	Itasca	132,108,000	4,322,121	2,508,968	58.05	15.00	26.95
MO	Anheuser-Busch Inc	10430	Anheuser Busch St Louis	St Louis City	108,738,509	4,345,554	342,352	7.88	83.85	8.28
MO	Empire District Electric Co	2076	Asbury	Jasper	1,213,990,000	12,766,118	78,428	0.61	99.30	0.08
MO	Hercules Inc	10207	Hercules Missouri Chemical Wor	Pike	77,510,000	2,810,003	204	0.01	99.80	0.20
MO	Marshall City of	2144	Marshall	Saline	43,511,000	720,712	4,838	0.67	92.32	7.01
MO	Union Electric Co	2107	Sioux	St Charles	6,296,711,000	62,614,668	476,441	0.76	92.36	6.88
MO	University of Missouri-Columba	50969	University of Missouri Columbi	Boone	139,431,000	3,276,270	61,747	1.88	86.12	12.00
NC	Blue Ridge Paper Products Inc	50244	Canton North Carolina	Haywood	317,470,968	20,165,872	9,323,611	46.23	53.12	0.64
NC	Cogentrix Eastern Carolina LLC	10382	Lumberton	Robeson	90,662,000	1,447,671	180,341	12.46	87.54	
NC	Corn Products Intl Inc	54618	Corn Products Winston Salem	Fosyth	52,974,000	2,622,632	2,385,772	90.97	8.97	0.06
NC	International Paper Co-Riegel	54656	International Paper Riegelwood	Columbus	475,375,070	26,096,174	19,298,184	73.95	2.37	23.68
NC	Weyerhaeuser Co	50189	Weyerhaeuser Plymouth NC	Martin	816,440,000	29,134,970	21,922,996	75.25	21.57	3.19
NY	AES Greenidge	2527	AES Greenidge LLC	Yates	1,035,604,000	11,544,550	163,432	1.42	98.39	0.19
PA	International Paper Co	54089	International Paper Lock Haven	Clinton	14,827,032	710,741	128,991	18.15	81.85	
PA	Kimberly-Clark Corp	50410	Chester Operations	Deleware	367,076,655	6,251,041	59,590	0.95	54.36	44.69
PA	Northampton Generating Co LP	50888	Northampton Generating LP	Northampton	852,156,000	9,737,811	1,449,737	14.89	50.66	34.45
PA	Northeastern Power Co	50039	Kline Township Cogen Facility	Schuylkill	408,666,000	6,257,830	6,568	0.10	99.61	0.29
PA	P H Glatfelter Co	50397	P H Glatfelter	York	644,742,277	16,258,640	8,077,601	49.68	49.83	0.48
PA	Willamette Industries-Johnsnbg	54638	Johnsonburg Mill	Elk	286,374,957	8,606,382	4,901,116	56.95	38.61	4.45
SC	International Paper Co-Eastovr	52151	International Paper Eastover F	Calhoun	522,873,000	21,668,622	16,851,091	77.77	15.48	6.76
SC	International Paper Co-GT Mill	54087	International Paper Georgetown	Georgetown	548,459,000	22,402,453	17,656,110	78.81	13.11	8.08
SC	Stone Container Corp	50806	Stone Container Florence Mill	Florence	597,329,000	19,561,312	12,711,596	64.98	23.81	11.21
TN	Bowater Newsprint Calhoun Ops	50956	Bowater Newsprint Calhoun Oper	MnMinn	509,947,587	34,329,683	24,031,860	70.00	28.54	1.46
TN	Eastman Chemical Co-TN Ops	50481	Tennessee Eastman Operations	Sullivan	1,255,653,778	41,562,683	173,155	0.42	97.89	1.70
TN	Packaging Corp of America	50296	Packaging Corp of America	Hardin	377,728,244	20,707,960	16,892,133	81.57	8.82	9.61
TN	Willamette Industries Inc	10252	Weyerhaeuser Kingsport Mill	Sullivan	124,671,000	4,491,819	3,405,726	75.82	24.18	
VA	Georgia Pacific Corp	50479	Georgia Pacific Big Island	Bedford	59,487,861	5,376,987	2,590,206	48.17	20.93	30.90
VA	International Paper	52152	International Paper Franklin M	Isle of Wight	808,602,000	32,656,724	5,733,283	17.56	33.50	48.94
VA	Smurfit-Stone Container Corp	10017	St Laurent Paper West Point	King William	569,944,773	19,384,150	13,977,065	72.11	19.29	8.60
VA	Stone Container Corp	50813	Stone Container Hopewell Mill		317,910,821	8,624,858	6,471,872	75.04	22.93	2.03

See footnotes at end of table.

Table B5. Net Generation and Fuel Consumption at Power Plants Consuming Coal and Biomass by State and Plant Name, 2002 (Continued)

State	Company Name	Plant I.D.	Plant Name	County	Net Electricity Generation (kilowatthours)	Energy Consumed (MMBTU)	Energy Consumed from Biomass (MMBTU)	Percent of Energy Consumed from		
								Biomass	Coal	Other
VA	Stone Container Corp	50813	Stone Container Hopewell Mill		317,910,821	8,624,858	6,471,872	75.04	22.93	2.03
VA	Westvaco Corp	50900	Covington Facility	Covington	610,852,000	6,557,790	4,051,561	61.78	38.22	
WA	Weyerhaeuser Co	50187	Weyerhaeuser Longview WA	Cowlitz	297,484,000	17,929,521	13,414,241	74.82	7.64	17.54
WI	Fraser Paper Co	50620	Fraser Paper	Price	37,761,620	1,724,828	1,263,992	73.28	26.72	0.00
WI	Georgia-Pacific Corp	50395	Georgia Pacific Nekoosa Mill	Wood	221,556,000	6,679,515	3,682,704	55.13	38.93	5.93
WI	International Paper Co-Thilmny	54098	International Paper Kaukauna M	Outagamie	207,308,000	8,060,466	2,150,678	26.68	39.67	33.65
WI	Madison Gas & Electric Co	3992	Blount Street	Dane	472,206,000	6,360,563	100,812	1.58	83.51	14.90
WI	Mosinee Paper Corp	50614	Wausau Mosinee Paper Pulp	Marathon	123,712,000	4,016,632	2,413,430	60.09	33.86	6.05
WI	Northern States Power Co	3982	Bay Front	Ashland	260,223,000	4,062,065	2,243,840	55.24	40.31	4.45
WI	Packaging Corp of America	50476	Packaging of America Tomahawk	Lincoln	129,474,000	8,593,082	4,747,354	55.25	37.17	7.59
WI	State of Wisconsin	54407	Waupun Correctional Central He	Dodge	4,093,630	271,121	23,753	8.76	91.24	
WI	State of Wisconsin	54408	Univ of Wisc Madison Charter S	Dane	52,917,583	5,182,065	397,714	7.67	67.68	24.65
WI	Stora Enso North America	10234	Biron Mill	Wood	236,028,000	4,778,350	328,258	6.87	88.17	4.96
WI	Stora Enso North America	10476	Whiting Mill	Portage	25,800,000	1,503,959	221,531	14.73	77.20	8.07
WI	Stora Enso North America	10477	Wisconsin Rapids Pulp Mill	Wood	361,733,000	12,080,955	8,018,488	66.37	26.73	6.90
WI	Stora Enso North America	54857	Niagara Mill	Marinette	123,609,000	2,968,751	348,265	11.73	66.74	21.53
WI	Wisconsin Power & Light Co	4050	Edgewater	Sheboygan	4,786,914,000	48,050,722	306,048	0.64	99.20	0.16
WV	Monongahela Power Co	3942	Albright	Preston	1,374,335,000	15,541,824	705	*	99.73	0.27
WV	Monongahela Power Co	3946	Willow Island	Pleasants	1,151,588,000	12,601,777	185,299	1.47	98.26	0.27
WV	Union Carbide C&P-Charleston	50151	Union Carbide South Charleston	Kanawha	28,724,000	3,340,049	65,451	1.96	57.52	40.52
Total					79,188,600,172	1,550,408,567	621,851,818			

* = Less than .005 percent.

MMBtu = One million British thermal units.

Note: State abbreviations are documented on the United States Postal Service website: http://www.usps.com/ncsc/lookups/usps_abbreviations.htm. Blank cell indicates the plant had no consumption or other energy to report.

Source: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report," and Form EIA-906, "Power Plant Report."

Table B6. Average Heat Content of Selected Biomass Fuels

Fuel Type	Heat Content	Units
Agricultural Byproducts	8.248	Million Btu/Short Ton
Black Liquor	11.758	Million Btu/Short Ton
Digester Gas	0.619	Million Btu/Thousand Cubic Feet
Landfill Gas	0.490	Million Btu/Thousand Cubic Feet
Methane	0.841	Million Btu/Thousand Cubic Feet
Municipal Solid Waste.....	9.945	Million Btu/Short Ton
Paper Pellets.....	13.029	Million Btu/Short Ton
Peat.....	8.000	Million Btu/Short Ton
Railroad Ties.....	12.618	Million Btu/Short Ton
Sludge Waste.....	7.512	Million Btu/Short Ton
Sludge Wood	10.071	Million Btu/Short Ton
Solid Byproducts	25.830	Million Btu/Short Ton
Spent Sulfite Liquor.....	12.720	Million Btu/Short Ton
Tires	26.865	Million Btu/Short Ton
Utility Poles	12.500	Million Btu/Short Ton
Waste Alcohol	3.800	Million Btu/Barrel
Wood/Wood Waste	9.961	Million Btu/Short Ton

Source: Energy Information Administration, Form EIA-860B (1999),
"Annual Electric Generator Report - Nonutility 1999."

Table C1. Renewable Electric Power Sector Net Generation by Source by State, 2001
(Thousand Kilowatthours)

	Geothermal	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		8,356,382					217,434	8,573,816
Alaska.....		1,345,665				950		1,346,615
Arizona.....		7,623,565	33,601		489			7,657,655
Arkansas.....		2,548,251						2,548,251
California.....	12,181,295	25,541,782	1,761,134	257,735	542,271	3,499,738	2,103,213	45,887,167
Colorado.....		1,494,704		32,103		48,640		1,575,447
Connecticut.....		286,373	1,566,661	211,403				2,064,436
Delaware.....								
District of Columbia.....								
Florida.....		147,718	2,984,991	55,474			217,388	3,405,571
Georgia.....		2,567,158	19,407					2,586,565
Hawaii.....	206,592	50,282	282,481			2,125		541,480
Idaho.....		7,223,127					38,147	7,261,274
Illinois.....		141,017	572,158	69,108				782,283
Indiana.....		570,692	89,188					659,880
Iowa.....		845,153	96,733			487,864		1,429,750
Kansas.....		25,561				39,832		65,393
Kentucky.....		3,855,508						3,855,508
Louisiana.....		732,217		60,053				792,270
Maine.....		1,710,244	227,986	55,565			1,702,579	3,696,373
Maryland.....		1,183,518	590,841					1,774,359
Massachusetts.....		694,267	1,929,386	202			129,768	2,753,623
Michigan.....		1,535,575	733,956	43,887		280	1,102,876	3,416,574
Minnesota.....		645,392	761,617			897,017		2,304,026
Mississippi.....								
Missouri.....		1,104,135		51,592				1,155,727
Montana.....		6,613,472						6,613,472
Nebraska.....		1,124,122		8,347		2,630		1,135,099
Nevada.....	1,199,874	2,513,722						3,713,596
New Hampshire.....		897,883	225,933				754,196	1,878,012
New Jersey.....		18,001	1,290,277					1,308,278
New Mexico.....		237,320		18,652				255,972
New York.....		23,014,433	1,856,366			20,540	322,903	25,214,242
North Carolina.....		1,861,019	99,503				359,711	2,320,233
North Dakota.....		1,332,076						1,332,076
Ohio.....		510,785	27,888				38,971	577,644
Oklahoma.....		2,344,690						2,344,690
Oregon.....		28,644,556	87,408			88,587	327,243	29,147,794
Pennsylvania.....		1,650,004	1,821,467	2,047		11,174	198,000	3,682,692
Rhode Island.....		3,143	103,616					106,759
South Carolina.....		1,224,923						1,224,923
South Dakota.....		3,431,865				871		3,432,736
Tennessee.....		6,542,616	33,824				167	6,576,607
Texas.....		1,200,331	51,151		-5	1,187,510		2,438,987
Utah.....	152,742	508,407	9,642					670,791
Vermont.....		868,281				12,133	351,073	1,231,487
Virginia.....		1,012,892	671,611				5,018	1,689,521
Washington.....		54,674,085	174,845	30,272			400,841	55,280,043
West Virginia.....		513,309	25,139				1,198	539,646
Wisconsin.....		1,899,964	383,134	77,602		72,284	23,073	2,456,057
Wyoming.....		879,111				365,162		1,244,273
Total.....	13,740,503	213,749,295	18,511,944	974,042	542,755	6,737,337	8,293,800	262,549,676

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding. Electric power sector includes electric utilities and independent power producers.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C2. Renewable Commercial and Industrial Sector Net Generation by State, 2001
(Thousand Kilowatthours)

	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Wood/ Wood Waste	Total
Alabama.....		3,353	21,094	3,954,822	3,979,269
Alaska.....					
Arizona.....			5,347		5,347
Arkansas.....			7,375	1,504,696	1,512,071
California.....		99,454	151,822	1,220,565	1,471,841
Colorado.....			32,101		32,101
Connecticut.....					
Delaware.....					
District of Columbia.....					
Florida.....		4,727	169,851	1,610,851	1,785,429
Georgia.....	29,267	9,352	6,213	2,974,339	3,019,170
Hawaii.....	50,468	119,045	55,657		225,170
Idaho.....				495,186	495,186
Illinois.....	3,012	68,519	18,281		89,812
Indiana.....		37,064	4,264		41,328
Iowa.....			15,465		15,465
Kansas.....					
Kentucky.....				9,552	9,552
Louisiana.....			46,839	2,640,656	2,687,495
Maine.....	934,879	171,912	102,812	1,827,564	3,037,167
Maryland.....		17,908	29	11,939	29,876
Massachusetts.....	8,237		23,982		32,219
Michigan.....	26,343	8,824	20,335	597,385	652,887
Minnesota.....	186,230	18,394	7,041	574,709	786,374
Mississippi.....			146	1,432,117	1,432,264
Missouri.....			10,835		10,835
Montana.....				65,425	65,425
Nebraska.....			8,374		8,374
Nevada.....					
New Hampshire.....	92,698			104,573	197,271
New Jersey.....			12,745		12,745
New Mexico.....					
New York.....	69,510	230,778		179,783	480,071
North Carolina.....	734,689	29,888	8,889	1,282,619	2,056,084
North Dakota.....			7,665		7,665
Ohio.....				364,101	364,101
Oklahoma.....				230,696	230,696
Oregon.....				373,877	373,877
Pennsylvania.....		198,005	32,365	398,736	629,106
Rhode Island.....					
South Carolina.....	520	49,202	537	866,107	916,366
South Dakota.....					
Tennessee.....	403,914	15,395		779,259	1,198,568
Texas.....			58,815	897,605	956,420
Utah.....					
Vermont.....	15,930			19,335	35,265
Virginia.....	1,330	319,266	4,896	1,143,088	1,468,581
Washington.....	59,807		17,172	664,252	741,231
West Virginia.....	438,635				438,635
Wisconsin.....	156,281	18,013	8,519	682,281	865,095
Wyoming.....					
Total.....	3,211,750	1,419,100	859,466	26,906,116	32,396,433

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C3. Total Renewable Net Generation by State, 2001
(Thousand Kilowatthours)

	Geothermal	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		8,356,382	3,353	21,094			4,172,256	12,553,086
Alaska.....		1,345,665				950		1,346,615
Arizona.....		7,623,565	33,601	5,347	489			7,663,002
Arkansas.....		2,548,251		7,375			1,504,696	4,060,322
California.....	12,181,295	25,541,782	1,860,588	409,557	542,271	3,499,738	3,323,777	47,359,008
Colorado.....		1,494,704		64,204		48,640		1,607,548
Connecticut.....		286,373	1,566,661	211,403				2,064,436
Delaware.....								
District of Columbia.....								
Florida.....		147,718	2,989,718	225,325			1,828,239	5,191,000
Georgia.....		2,596,425	28,759	6,213			2,974,339	5,605,735
Hawaii.....	206,592	100,750	401,526	55,657		2,125		766,650
Idaho.....		7,223,127					533,333	7,756,460
Illinois.....		144,029	640,677	87,389				872,095
Indiana.....		570,692	126,252	4,264				701,208
Iowa.....		845,153	96,733	15,465		487,864		1,445,215
Kansas.....		25,561				39,832		65,393
Kentucky.....		3,855,508					9,552	3,865,060
Louisiana.....		732,217		106,892			2,640,656	3,479,765
Maine.....		2,645,123	399,898	158,376			3,530,143	6,733,541
Maryland.....		1,183,518	608,749	29			11,939	1,804,235
Massachusetts.....		702,504	1,929,386	24,184			129,768	2,785,842
Michigan.....		1,561,918	742,780	64,222		280	1,700,261	4,069,461
Minnesota.....		831,622	780,011	7,041		897,017	574,709	3,090,400
Mississippi.....				146			1,432,117	1,432,264
Missouri.....		1,104,135		62,427				1,166,562
Montana.....		6,613,472					65,425	6,678,897
Nebraska.....		1,124,122		16,721		2,630		1,143,473
Nevada.....	1,199,874	2,513,722						3,713,596
New Hampshire.....		990,581	225,933				858,769	2,075,283
New Jersey.....		18,001	1,290,277	12,745				1,321,023
New Mexico.....		237,320		18,652				255,972
New York.....		23,083,943	2,087,144			20,540	502,686	25,694,313
North Carolina.....		2,595,708	129,391	8,889			1,642,330	4,376,317
North Dakota.....		1,332,076		7,665				1,339,741
Ohio.....		510,785	27,888				403,072	941,745
Oklahoma.....		2,344,690					230,696	2,575,386
Oregon.....		28,644,556	87,408			88,587	701,120	29,521,671
Pennsylvania.....		1,650,004	2,019,472	34,412		11,174	596,736	4,311,798
Rhode Island.....		3,143	103,616					106,759
South Carolina.....		1,225,443	49,202	537			866,107	2,141,289
South Dakota.....		3,431,865				871		3,432,736
Tennessee.....		6,946,530	49,219				779,426	7,775,175
Texas.....		1,200,331	51,151	58,815	-5	1,187,510	897,605	3,395,407
Utah.....	152,742	508,407	9,642					670,791
Vermont.....		884,211				12,133	370,408	1,266,752
Virginia.....		1,014,222	990,877	4,896			1,148,106	3,158,102
Washington.....		54,733,892	174,845	47,444			1,065,093	56,021,274
West Virginia.....		951,944	25,139				1,198	978,281
Wisconsin.....		2,056,245	401,147	86,121		72,284	705,354	3,321,152
Wyoming.....		879,111				365,162		1,244,273
Total.....	13,740,503	216,961,046	19,931,044	1,833,508	542,755	6,737,337	35,199,916	294,946,109

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C4. Renewable Electric Power Sector Net Generation by State, 2002
(Thousand Kilowatthours)

	Geothermal	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		8,824,787					209,290	9,034,077
Alaska.....		1,439,351					1,031	1,440,382
Arizona.....		7,427,180	49,604	87,714	459			7,564,957
Arkansas.....		3,435,829						3,435,829
California.....	13,073,615	31,140,628	1,770,944	205,044	554,372	3,802,645	2,841,739	53,388,987
Colorado.....		1,209,007		29,834		139,006		1,377,847
Connecticut.....		335,088	1,437,402	188,266				1,960,756
Delaware.....								
District of Columbia.....								
Florida.....		184,114	3,305,749	95,047			286,187	3,871,097
Georgia.....		2,686,692	18,754					2,705,446
Hawaii.....	72,761	34,840	301,177	11,624		1,614		422,016
Idaho.....		8,769,321					73,284	8,842,605
Illinois.....		128,589	525,731	240,334				894,654
Indiana.....		411,270	88,589					499,859
Iowa.....		946,383	77,904	9,607		918,835		1,952,729
Kansas.....		12,746				466,679		479,425
Kentucky.....		4,024,749						4,024,749
Louisiana.....		891,441		59,087				950,528
Maine.....		1,831,118	235,692	125,533			1,534,241	3,726,584
Maryland.....		1,660,989	593,416					2,254,405
Massachusetts.....		853,159	1,917,587	851			106,687	2,878,284
Michigan.....		1,640,403	717,965	81,298		329	992,199	3,432,194
Minnesota.....		763,851	772,666			905,839	1	2,442,357
Mississippi.....		12,129						12,129
Missouri.....		1,356,928		55,055			143	1,412,126
Montana.....		9,566,909						9,566,909
Nebraska.....		1,097,486		6,455		8,078		1,112,019
Nevada.....	1,127,283	2,267,586						3,394,869
New Hampshire.....		1,087,979	225,290				659,358	1,972,627
New Jersey.....		12,030	1,314,587					1,326,617
New Mexico.....		264,591		19,408				283,999
New York.....		24,980,784	1,899,258			81,626	228,209	27,189,877
North Carolina.....		2,421,157	105,609	14,365			354,151	2,895,282
North Dakota.....		1,592,616						1,592,616
Ohio.....		488,329	23,041				42,679	554,049
Oklahoma.....		1,987,844						1,987,844
Oregon.....		34,413,167	86,675			376,159	230,997	35,106,998
Pennsylvania.....		2,210,563	1,709,033	781		57,768	284,296	4,262,441
Rhode Island.....		3,685	97,752					101,437
South Carolina.....		1,389,429	15,522					1,404,951
South Dakota.....		4,353,653				6,043		4,359,696
Tennessee.....		7,317,487	33,190			4,068	150	7,354,895
Texas.....		1,123,492	52,513	132,223		2,656,104		3,964,332
Utah.....	217,651	457,732	11,197					686,580
Vermont.....		1,098,925				10,372	352,053	1,461,350
Virginia.....		866,686	720,646				280,210	1,867,542
Washington.....		77,988,869	225,117	14,538		416,581	502,854	79,147,959
West Virginia.....		598,963		21,737		9,023	51	629,774
Wisconsin.....		2,297,218	382,183	66,711		46,180	29,518	2,821,810
Wyoming.....		583,615				447,330		1,030,945
Total.....	14,491,310	260,491,387	18,714,793	1,465,512	554,831	10,354,279	9,009,328	315,081,440

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding. Electric power sector includes electric utilities and independent power producers.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C5. Renewable Commercial and Industrial Sector Net Generation by State, 2002
(Thousand Kilowatthours)

	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Wood/ Wood Waste	Total
Alabama.....			22,857	3,518,203	3,541,060
Alaska.....			11,124		11,124
Arizona.....			3,742		3,742
Arkansas.....			4,658	1,580,608	1,585,266
California.....		87,395	228,964	1,115,850	1,432,209
Colorado.....					
Connecticut.....					
Delaware.....					
District of Columbia.....					
Florida.....		2,762	186,952	1,266,704	1,456,418
Georgia.....	29,030	9,319	168,036	6,218,978	6,425,363
Hawaii.....	60,228		127,223		187,451
Idaho.....				435,019	435,019
Illinois.....	233	66,085	13,211		79,529
Indiana.....		35,549	7,450		42,999
Iowa.....			10,965	91	11,056
Kansas.....					
Kentucky.....				365,465	365,465
Louisiana.....			54,804	2,748,900	2,803,704
Maine.....	936,729	172,680	172,088	2,189,518	3,471,015
Maryland.....		316	29	182,904	183,249
Massachusetts.....	9,788		25,652		35,440
Michigan.....	28,849	227,247	13	482,353	738,462
Minnesota.....	45,233	18,312	2,886	377,391	443,822
Mississippi.....			2	936,593	936,595
Missouri.....			11,147		11,147
Montana.....				63,470	63,470
Nebraska.....			6,538		6,538
Nevada.....					
New Hampshire.....	52,961			40,409	93,370
New Jersey.....			15,829		15,829
New Mexico.....					
New York.....	67,111	230,009		184,009	481,129
North Carolina.....	1,070,891		15,501	1,328,653	2,415,045
North Dakota.....			410		410
Ohio.....			2,203	83,388	85,591
Oklahoma.....				239,045	239,045
Oregon.....				393,089	393,089
Pennsylvania.....		215,485	8,136	481,993	705,614
Rhode Island.....					
South Carolina.....	322			1,228,895	1,229,217
South Dakota.....					
Tennessee.....	656,175	4,766	9,548	750,742	1,421,231
Texas.....		823	78,310	1,073,462	1,152,595
Utah.....					
Vermont.....	15,997			3,546	19,543
Virginia.....	1,530	385,498	4,129	1,127,712	1,518,869
Washington.....	177,795		6,004	623,291	807,090
West Virginia.....	466,773		563		467,336
Wisconsin.....	217,799	13,578	7,534	615,429	854,340
Wyoming.....					
Total.....	3,837,444	1,469,824	1,206,508	29,655,710	36,169,486

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C6. Total Renewable Net Generation by State, 2002
(Thousand Kilowatthours)

	Geothermal	Hydroelectric Conventional	MSW /Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		8,824,787		22,857			3,727,493	12,575,137
Alaska.....		1,439,351		11,124			1,031	1,451,506
Arizona.....		7,427,180	49,604	91,456	459			7,568,699
Arkansas.....		3,435,829		4,658			1,580,608	5,021,095
California.....	13,073,615	31,140,628	1,858,339	434,008	554,372	3,802,645	3,957,589	54,821,196
Colorado.....		1,209,007		29,834		139,006		1,377,847
Connecticut.....		335,088	1,437,402	188,266				1,960,756
Delaware.....								
District of Columbia.....								
Florida.....		184,114	3,308,511	281,999			1,552,891	5,327,515
Georgia.....		2,715,722	28,073	168,036			6,218,978	9,130,809
Hawaii.....	72,761	95,068	301,177	138,847		1,614		609,467
Idaho.....		8,769,321					508,303	9,277,624
Illinois.....		128,822	591,816	253,545				974,183
Indiana.....		411,270	124,138	7,450				542,858
Iowa.....		946,383	77,904	20,572		918,835	91	1,963,785
Kansas.....		12,746				466,679		479,425
Kentucky.....		4,024,749					365,465	4,390,214
Louisiana.....		891,441		113,891			2,748,900	3,754,232
Maine.....		2,767,847	408,372	297,621			3,723,759	7,197,599
Maryland.....		1,660,989	593,732	29			182,904	2,437,654
Massachusetts.....		862,947	1,917,587	26,503			106,687	2,913,724
Michigan.....		1,669,252	945,212	81,311		329	1,474,552	4,170,656
Minnesota.....		809,084	790,978	2,886		905,839	377,392	2,886,179
Mississippi.....		12,129		2			936,593	948,724
Missouri.....		1,356,928		66,202			143	1,423,273
Montana.....		9,566,909					63,470	9,630,379
Nebraska.....		1,097,486		12,993		8,078		1,118,557
Nevada.....	1,127,283	2,267,586						3,394,869
New Hampshire.....		1,140,940	225,290				699,767	2,065,997
New Jersey.....		12,030	1,314,587	15,829				1,342,446
New Mexico.....		264,591		19,408				283,999
New York.....		25,047,895	2,129,267			81,626	412,218	27,671,006
North Carolina.....		3,492,048	105,609	29,866			1,682,804	5,310,327
North Dakota.....		1,592,616		410				1,593,026
Ohio.....		488,329	23,041	2,203			126,067	639,640
Oklahoma.....		1,987,844					239,045	2,226,889
Oregon.....		34,413,167	86,675			376,159	624,086	35,500,087
Pennsylvania.....		2,210,563	1,924,518	8,917		57,768	766,289	4,968,055
Rhode Island.....		3,685	97,752					101,437
South Carolina.....		1,389,751	15,522				1,228,895	2,634,168
South Dakota.....		4,353,653				6,043		4,359,696
Tennessee.....		7,973,662	37,956	9,548		4,068	750,892	8,776,126
Texas.....		1,123,492	53,336	210,533		2,656,104	1,073,462	5,116,927
Utah.....	217,651	457,732	11,197					686,580
Vermont.....		1,114,922				10,372	355,599	1,480,893
Virginia.....		868,216	1,106,144	4,129			1,407,922	3,386,411
Washington.....		78,166,664	225,117	20,542		416,581	1,126,145	79,955,049
West Virginia.....		1,065,736		22,300		9,023	51	1,097,110
Wisconsin.....		2,515,017	395,761	74,245		46,180	644,947	3,676,150
Wyoming.....		583,615				447,330		1,030,945
Total.....	14,491,310	264,328,831	20,184,617	2,672,020	554,831	10,354,279	38,665,038	351,250,926

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C7. Renewable Electric Power Sector Net Summer Capacity by State, 2001
(Megawatts)

	Geothermal	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		3,014						3,014
Alaska.....		399						399
Arizona.....		2,705	4		1			2,710
Arkansas.....		1,392						1,392
California.....	2,003	10,326	241	58	390	1,558	424	14,998
Colorado.....		642		10		46		698
Connecticut.....		138	234	26				398
Delaware.....								
District of Columbia...								
Florida.....		47	437	140			67	691
Georgia.....		2,334	2					2,336
Hawaii.....	33	19	62	62		11		187
Idaho.....		2,637					12	2,648
Illinois.....		34	110	40				184
Indiana.....		58	11					70
Iowa.....		131	109			318		559
Kansas.....		2				112		114
Kentucky.....		821						821
Louisiana.....		192		12				204
Maine.....		458	30				279	766
Maryland.....		530	118					648
Massachusetts.....		809	273				26	1,108
Michigan.....		253	100			1	160	513
Minnesota.....		145	114			303	92	654
Mississippi.....								
Missouri.....		543						543
Montana.....		2,680						2,680
Nebraska.....		264		2		4		269
Nevada.....	148	1,052						1,199
New Hampshire.....		398	31				92	521
New Jersey.....		12	181					194
New Mexico.....		82		2				84
New York.....		4,098	276			18	37	4,429
North Carolina.....		1,501	14	2			45	1,561
North Dakota.....		497						497
Ohio.....		163	94				7	264
Oklahoma.....		793						793
Oregon.....		9,118	14	3		158	36	9,329
Pennsylvania.....		687	310			34	28	1,059
Rhode Island.....		4	15					19
South Carolina.....		1,294						1,294
South Dakota.....		1,576				3		1,579
Tennessee.....		2,239	5			2	7	2,253
Texas.....		697	9		1	925		1,632
Utah.....	33	254	1					288
Vermont.....		272				0	72	345
Virginia.....		754	93				84	930
Washington.....		21,422	38	4		180	136	21,781
West Virginia.....		190						190
Wisconsin.....		451	59	1		45	29	586
Wyoming.....		297				146		443
Total	2,216	78,424	2,985	362	392	3,864	1,631	89,874

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

* =Less than 500 kilowatts.

Note: Revised data are in italics. Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding. Electric power sector includes electric utilities and independent power producers.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Table C8. Renewable Commercial and Industrial Sector Net Summer Capacity by State, 2001
(Megawatts)

	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Wood/ Wood Waste	Total
Alabama.....				432	432
Alaska.....					
Arizona.....					
Arkansas.....			2	269	270
California.....	5	12	36	207	260
Colorado.....			1		1
Connecticut.....					
Delaware.....					
District of Columbia.....					
Florida.....			73	245	318
Georgia.....	7	5		403	415
Hawaii.....	7		20		27
Idaho.....				70	70
Illinois.....	1	12	4		16
Indiana.....		10			10
Iowa.....			3		3
Kansas.....					
Kentucky.....				51	51
Louisiana.....			2	239	241
Maine.....	224	23		388	635
Maryland.....		3		62	65
Massachusetts.....	5		16		21
Michigan.....	4	67		128	198
Minnesota.....	29	3		77	108
Mississippi.....				255	255
Missouri.....					
Montana.....				11	11
Nebraska.....			3		3
Nevada.....					
New Hampshire.....	31			9	40
New Jersey.....			1		1
New Mexico.....					
New York.....	15	33			49
North Carolina.....	366			194	560
North Dakota.....			10		10
Ohio.....				7	7
Oklahoma.....		16		60	75
Oregon.....				123	123
Pennsylvania.....		28		56	84
Rhode Island.....					
South Carolina.....	1	10		222	233
South Dakota.....					
Tennessee.....	165	7		56	227
Texas.....			1	100	101
Utah.....					
Vermont.....	5			4	8
Virginia.....	4	76		318	397
Washington.....	31			158	189
West Virginia.....	101				101
Wisconsin.....	62	4		109	174
Wyoming.....					
Total.....	1,060	307	173	4,250	5,790

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Revised data are in italics. Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Table C9. Total Renewable Net Summer Capacity by State, 2001
(Megawatts)

	Geothermal	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		3,014					432	3,446
Alaska.....		399						399
Arizona.....		2,705	4		1			2,710
Arkansas.....		1,392		2			269	1,662
California.....	2,003	10,331	253	94	390	1,558	631	15,259
Colorado.....		642		11		46		699
Connecticut.....		138	234	26				398
Delaware.....								
District of Columbia.....								
Florida.....		47	437	213			312	1,009
Georgia.....		2,341	7				403	2,751
Hawaii.....	33	25	62	82		11		214
Idaho.....		2,637					81	2,718
Illinois.....		35	122	44				200
Indiana.....		58	21					79
Iowa.....		131	109	3		318		562
Kansas.....		2				112		114
Kentucky.....		821					51	872
Louisiana.....		192		15			239	445
Maine.....		681	53				667	1,401
Maryland.....		530	121				62	713
Massachusetts.....		814	273	16			26	1,129
Michigan.....		256	166			1	288	711
Minnesota.....		173	117			303	169	762
Mississippi.....							255	255
Missouri.....		543						543
Montana.....		2,680					11	2,691
Nebraska.....		264		5		4		272
Nevada.....	148	1,052						1,199
New Hampshire.....		429	31				101	561
New Jersey.....		12	181	1				195
New Mexico.....		82		2				84
New York.....		4,113	309			18	37	4,477
North Carolina.....		1,867	14	2			239	2,122
North Dakota.....		497		10				507
Ohio.....		163	94				14	271
Oklahoma.....		793	16				60	868
Oregon.....		9,118	14	3		158	160	9,453
Pennsylvania.....		687	338			34	83	1,143
Rhode Island.....		4	15					19
South Carolina.....		1,295	10				222	1,526
South Dakota.....		1,576				3		1,579
Tennessee.....		2,404	12			2	62	2,480
Texas.....		697	9	1	1	925	100	1,732
Utah.....	33	254	1					288
Vermont.....		277				*	76	353
Virginia.....		758	168				402	1,328
Washington.....		21,453	38	4		180	294	21,970
West Virginia.....		292						292
Wisconsin.....		513	63	1		45	138	760
Wyoming.....		297				146		443
Total.....	2,216	79,484	3,292	535	392	3,864	5,882	95,664

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

* =Less than 500 kilowatts.

Note: Revised data are in italics. Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Table C10. Renewable Electric Power Sector Net Summer Capacity Source by State, 2002
(Megawatts)

	Geothermal	Hydroelectric Conventional	MSW/ Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		3,002						3,002
Alaska.....		396						396
Arizona.....		2,703	4		1			2,707
Arkansas.....		1,388		4				1,392
California.....	2,018	10,358	245	55	390	1,701	422	15,190
Colorado.....		643		10		37		690
Connecticut.....		146	228	26				400
Delaware.....								
District of Columbia.....								
Florida.....		50	439	140			67	696
Georgia.....		2,318	2					2,321
Hawaii.....	33	17	60	46		11		167
Idaho.....		2,665					12	2,677
Illinois.....		20	122	19				161
Indiana.....		59	11					70
Iowa.....		131	109			416		657
Kansas.....		2				112		114
Kentucky.....		821						821
Louisiana.....		192		12				204
Maine.....		494	30				270	793
Maryland.....		530	118					648
Massachusetts.....		246	258				26	530
Michigan.....		253	109			1	160	523
Minnesota.....		147	140			312	81	679
Mississippi.....								
Missouri.....		543						543
Montana.....		2,717						2,717
Nebraska.....		167	3	2		3		174
Nevada.....	168	1,052						1,220
New Hampshire.....		482	31				90	604
New Jersey.....		13	180					194
New Mexico.....		82		6				88
New York.....		4,094	271			48	37	4,451
North Carolina.....		1,548	19	2			45	1,614
North Dakota.....		497						497
Ohio.....		164	94				7	265
Oklahoma.....		796						796
Oregon.....		9,089	14	3		182	36	9,324
Pennsylvania.....		751	317			34	28	1,129
Rhode Island.....		4	15					19
South Carolina.....		1,383						1,383
South Dakota.....		1,678				3		1,681
Tennessee.....		2,348	5			2	7	2,361
Texas.....		697	9		6	1,085		1,797
Utah.....	33	254	1					288
Vermont.....		300				1	72	373
Virginia.....		754	93				80	926
Washington.....		21,442	38	4		225	86	21,795
West Virginia.....		134				66		200
Wisconsin.....		432	64	1		36	29	563
Wyoming.....		300				141		441
Total.....	2,252	78,302	3,029	331	397	4,417	1,554	90,280

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding. Electric power sector includes electric utilities and independent power producers.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Table C11. Renewable Commercial and Industrial Sector Net Summer Capacity by State, 2002
(Megawatts)

	Hydroelectric Conventional	MSW /Landfill Gas	Other Biomass ^a	Wood/ Wood Waste	Total
Alabama.....				543	543
Alaska.....					
Arizona.....					
Arkansas.....			2	295	297
California.....	6	13	50	207	276
Colorado.....					
Connecticut.....					
Delaware.....					
District of Columbia.....					
Florida.....			73	249	322
Georgia.....	7	5		395	407
Hawaii.....	7				7
Idaho.....				70	70
Illinois.....	1	12	1		14
Indiana.....		10			10
Iowa.....			3		3
Kansas.....					
Kentucky.....				51	51
Louisiana.....			5	153	158
Maine.....	224	23		375	622
Maryland.....		3		62	65
Massachusetts.....	5		21		26
Michigan.....	4	67		51	121
Minnesota.....	29	3		43	75
Mississippi.....				279	279
Missouri.....					
Montana.....				11	11
Nebraska.....			3		3
Nevada.....					
New Hampshire.....	31			9	40
New Jersey.....			1		1
New Mexico.....					
New York.....	15	33			48
North Carolina.....	366			202	568
North Dakota.....			10		10
Ohio.....				7	7
Oklahoma.....		16		60	76
Oregon.....				122	122
Pennsylvania.....		28		71	99
Rhode Island.....					
South Carolina.....	1	10		222	233
South Dakota.....					
Tennessee.....	165			101	266
Texas.....			9	100	108
Utah.....					
Vermont.....	5			4	8
Virginia.....	4	76		336	415
Washington.....	22			166	188
West Virginia.....	101				101
Wisconsin.....	62	4	7	109	181
Wyoming.....					
Total.....	1,052	301	184	4,290	5,828

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Table C12. Total Renewable Net Summer Capacity by State, 2002
(Megawatts)

	Geothermal	Hydroelectric Conventional	MSW /Landfill Gas	Other Biomass ^a	Solar	Wind	Wood/ Wood Waste	Total
Alabama.....		3,002					543	3,544
Alaska.....		396						396
Arizona.....		2,703	4		1			2,707
Arkansas.....		1,388		6			295	1,689
California.....	2,018	10,364	258	105	390	1,701	629	15,466
Colorado.....		643		10		37		690
Connecticut.....		146	228	26				400
Delaware.....								
District of Columbia.....								
Florida.....		50	439	213			316	1,017
Georgia.....		2,325	7				395	2,727
Hawaii.....	33	23	60	46		11		174
Idaho.....		2,665					81	2,747
Illinois.....		21	134	20				175
Indiana.....		59	21					79
Iowa.....		131	109	3		416		660
Kansas.....		2				112		114
Kentucky.....		821					51	872
Louisiana.....		192		17			153	362
Maine.....		718	53				645	1,416
Maryland.....		530	121				62	713
Massachusetts.....		251	258	21			26	556
Michigan.....		257	176			1	211	644
Minnesota.....		176	142			312	124	754
Mississippi.....							279	279
Missouri.....		543						543
Montana.....		2,717					11	2,728
Nebraska.....		167	3	5		3		177
Nevada.....	168	1,052						1,220
New Hampshire.....		514	31				99	644
New Jersey.....		13	180	1				195
New Mexico.....		82		6				88
New York.....		4,109	305			48	37	4,499
North Carolina.....		1,914	19	2			247	2,182
North Dakota.....		497		10				507
Ohio.....		164	94				14	271
Oklahoma.....		796	16				60	872
Oregon.....		9,089	14	3		182	158	9,446
Pennsylvania.....		751	345			34	98	1,228
Rhode Island.....		4	15					19
South Carolina.....		1,384	10				222	1,615
South Dakota.....		1,678				3		1,681
Tennessee.....		2,513	5			2	107	2,627
Texas.....		697	9	9	6	1,085	100	1,905
Utah.....	33	254	1					288
Vermont.....		305				1	76	381
Virginia.....		757	168				415	1,341
Washington.....		21,464	38	4		225	252	21,983
West Virginia.....		235				66		301
Wisconsin.....		494	68	8		36	138	744
Wyoming.....		300				141		441
Total.....	2,252	79,354	3,330	515	397	4,417	5,844	96,109

^a Agriculture byproducts/crops, sludge waste, tires and other biomass solids, liquids and gases.

Note: Blank cell indicates the state has no data to report for that energy source. Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Table C13. Renewable Market Share of Net Generation by State, 2001 and 2002
(Thousand Kilowatthours)

	2001			2002		
	Total State Generation	Percent Renewable	Percent Nonhydro Renewable	Total State Generation	Percent Renewable	Percent Nonhydro Renewable
Alabama.....	125,345,122	10.0	3.3	132,920,670	9.5	2.8
Alaska.....	6,743,770	20.0	*	6,767,326	21.4	0.2
Arizona.....	89,911,270	8.5	*	94,131,666	8.0	0.2
Arkansas.....	47,192,036	8.6	3.2	47,611,645	10.5	3.3
California.....	198,596,086	23.8	11.0	184,210,031	29.8	12.9
Colorado.....	46,876,013	3.4	0.2	45,600,388	3.0	0.4
Connecticut.....	30,490,640	6.8	5.8	31,311,220	6.3	5.2
Delaware.....	6,807,686	-	-	6,002,489	-	-
District of Columbia.....	123,239	-	-	261,980	-	-
Florida.....	190,945,341	2.7	2.6	203,352,774	2.6	2.5
Georgia.....	118,316,772	4.7	2.5	126,512,215	7.2	5.1
Hawaii.....	10,633,095	7.2	6.3	11,663,070	5.2	4.4
Idaho.....	9,346,940	83.0	5.7	9,786,933	94.8	5.2
Illinois.....	179,249,272	0.5	0.4	188,054,449	0.5	0.4
Indiana.....	122,569,679	0.6	0.1	125,608,139	0.4	0.1
Iowa.....	40,658,513	3.6	1.5	42,528,385	4.6	2.4
Kansas.....	44,748,522	0.1	0.1	47,188,446	1.0	1.0
Kentucky.....	95,417,624	4.1	*	92,106,668	4.8	0.4
Louisiana.....	87,894,382	4.0	3.1	94,970,963	4.0	3.0
Maine.....	19,564,815	34.4	20.9	22,535,034	31.9	19.7
Maryland.....	49,062,340	3.7	1.3	48,279,088	5.0	1.6
Massachusetts.....	38,478,433	7.2	5.4	42,015,688	6.9	4.9
Michigan.....	111,845,612	3.6	2.2	117,889,087	3.5	2.1
Minnesota.....	48,523,228	6.4	4.7	52,777,967	5.5	3.9
Mississippi.....	53,446,452	2.7	2.7	42,900,941	2.2	2.2
Missouri.....	79,544,875	1.5	0.1	81,162,197	1.8	0.1
Montana.....	24,232,483	27.6	0.3	25,473,705	37.8	0.2
Nebraska.....	30,485,214	3.8	0.1	31,618,494	3.5	0.1
Nevada.....	33,875,970	11.0	3.5	32,088,935	10.6	3.5
New Hampshire.....	15,074,629	13.8	7.2	15,953,078	13.0	5.8
New Jersey.....	59,421,254	2.2	2.2	61,569,386	2.2	2.2
New Mexico.....	33,611,642	0.8	0.1	30,661,707	0.9	0.1
New York.....	143,914,537	17.9	1.8	139,591,689	19.8	1.9
North Carolina.....	117,495,853	3.7	1.5	124,468,029	4.3	1.5
North Dakota.....	30,332,072	4.4	*	31,306,312	5.1	*
Ohio.....	142,261,810	0.7	0.3	147,068,849	0.4	0.1
Oklahoma.....	55,249,448	4.7	0.4	59,183,419	3.8	0.4
Oregon.....	45,051,910	65.5	1.9	47,099,368	75.4	2.3
Pennsylvania.....	196,576,594	2.2	1.4	204,322,878	2.4	1.3
Rhode Island.....	7,501,894	1.4	1.4	7,056,765	1.4	1.4
South Carolina.....	89,158,988	2.4	1.0	96,563,498	2.7	1.3
South Dakota.....	7,400,743	46.4	*	7,721,958	56.5	0.1
Tennessee.....	96,221,985	8.1	0.9	96,114,262	9.1	0.8
Texas.....	372,580,008	0.9	0.6	385,628,541	1.3	1.0
Utah.....	35,853,751	1.9	0.5	36,608,003	1.9	0.6
Vermont.....	5,480,612	23.1	7.0	5,456,190	27.1	6.7
Virginia.....	74,104,744	4.3	2.9	75,005,652	4.5	3.4
Washington.....	83,048,665	67.5	1.6	102,765,047	77.8	1.7
West Virginia.....	81,836,725	1.2	*	94,761,753	1.2	*
Wisconsin.....	58,763,433	5.7	2.2	58,431,438	6.3	2.0
Wyoming.....	44,776,941	2.8	0.8	43,783,839	2.4	1.0
Total	3,736,643,659	7.9	2.1	3,858,452,254	9.1	2.3

* = Less than .05 percent.

- = Not applicable.

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

Source: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C14. Renewable Portfolio Standards and State Mandates by State, 2004

	RPS or Mandate
Alabama.....	
Alaska.....	
Arizona.....	X
Arkansas.....	
California.....	X
Colorado ^a	X
Connecticut.....	X
Delaware.....	
District of Columbia.....	
Florida ^a	X
Georgia.....	
Hawaii.....	X
Idaho.....	
Illinois.....	X
Indiana.....	
Iowa.....	X
Kansas.....	
Kentucky.....	
Louisiana.....	
Maine.....	X
Maryland.....	X
Massachusetts.....	X
Michigan.....	
Minnesota.....	X
Mississippi.....	
Missouri.....	
Montana.....	
Nebraska.....	
Nevada.....	X
New Hampshire.....	
New Jersey.....	X
New Mexico.....	X
New York.....	
North Carolina.....	
North Dakota.....	
Ohio.....	
Oklahoma.....	
Oregon.....	
Pennsylvania.....	X
Rhode Island.....	
South Carolina.....	
South Dakota.....	
Tennessee.....	
Texas.....	X
Utah.....	
Vermont.....	
Virginia.....	
Washington.....	
West Virginia.....	
Wisconsin.....	X
Wyoming.....	

^a In Colorado and Florida the RPS is not statewide.

Note: In a few states, such as Hawaii and Illinois, the renewable portfolio standard (RPS) is voluntary. Blank cell indicates there is no RPS or state mandate for that state.

Source: North Carolina Solar Center, Database of State Incentives for Renewable Energy (DSIRE) website: <http://www.dsireusa.org> (June 30, 2004).

Table D1. Geothermal Direct Use of Energy and Heat Pumps, 1990-2003
(Quadrillion Btu)

	Direct Use	Heat Pumps	Total
1990.....	0.0048	0.0054	0.0102
1991.....	0.0050	0.0060	0.0110
1992.....	0.0051	0.0067	0.0118
1993.....	0.0053	0.0072	0.0125
1994.....	0.0056	0.0076	0.0132
1995.....	0.0058	0.0083	0.0141
1996.....	0.0059	0.0093	0.0152
1997.....	0.0061	0.0101	0.0162
1998.....	0.0063	0.0115	0.0178
1999.....	0.0079	0.0114	0.0193
2000.....	0.0084	0.0122	0.0206
2001.....	0.0090	0.0135	0.0225
2002.....	0.0090	0.0147	0.0237
2003.....	0.0090	0.0289	0.0379

Source: John Lund, Oregon Institute of Technology, Geo-Heat Center (Klamath Falls, Oregon, March 2004), unpublished data.

Overview

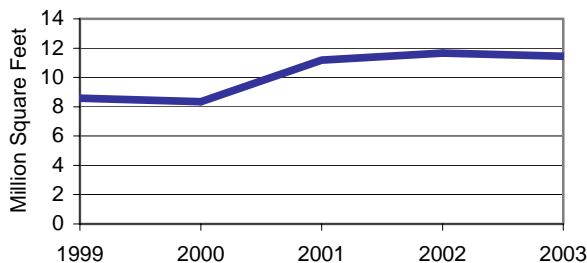
Summary

While the U.S. solar collector market was ho-hum in 2003, the photovoltaic cell and module business was anything but dull. The second-largest manufacturer of photovoltaic (PV) cells and modules, AstroPower, went bankrupt. Other major manufacturers significantly changed their relative outputs of cells and modules, as well as entering and leaving major end-use markets. The result was the first decline in total peak kilowatt production of photovoltaic cells and modules since EIA resumed collecting such data in 1986.

Solar Thermal Collectors

The solar collector market was lackluster in 2003. Total and domestic shipments of solar collectors remained close to 2002 and 2001 levels (Tables 10 and 11 and Figure 1). Total sales were 11.4 million square feet, down 2 percent from 2002. Domestic shipments of 10.9 million square feet declined a similar amount from 2002 levels. The number of companies shipping solar collectors has remained steady since 2000.

Figure 1. Total Solar Thermal Collector Shipments, 1999-2003



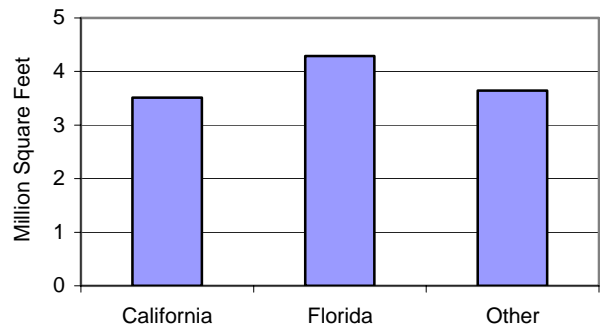
Source: Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Low-temperature collectors continued to dominate the market in 2003, with a 95 percent share (Table 12). Nearly three-fourths of all collectors were produced in five domestic locales: California, New Jersey, Florida, Puerto Rico, and Tennessee (Table 13a), with two-thirds shipped from California and New Jersey alone. As in the past few years, around 80 to 85 percent of solar collectors were sent to the top 5 destinations (Table 13b). For 2003, these states were: Florida, California, New Jersey, Arizona, and Hawaii.

All but New Jersey have relatively high incidences of heated swimming pools. Over two-thirds were shipped to just Florida and California (Figure 2).

The small (0.5 million square feet) solar collector export market was dominated by sales to Canada, Mexico, and

Figure 2. Solar Thermal Collector Shipments Top Destinations, 2003

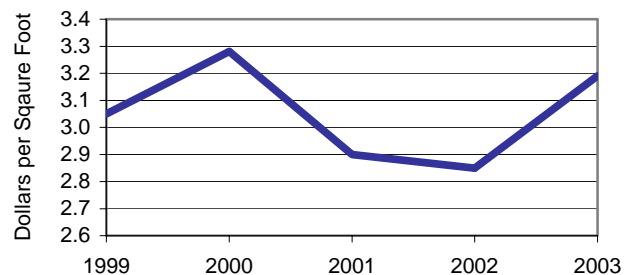


Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Austria (Table 15). Collectors were shipped to various kinds of business in similar proportions for both 2002 and 2003 (Table 16).

Steady sales produced steady prices for the dominant low-temperature collector in 2003. The average price per square foot rose slightly to \$2.08 from \$1.97 in 2002 (Table 17). Medium- and high-temperature collectors went for a somewhat higher average price, resulting in the overall average price per square foot of all solar collectors rising to \$3.19 in 2003 from \$2.85 in 2002 (Figure 3).

Figure 3. Solar Thermal Collector Average Prices, 1999-2003



Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Shipments by market sector, end use, and type were also similar in 2003 to 2002 (Table 18). The only shift of any size was between the residential and commercial sectors.

One of the few notable differences between 2002 and 2003 solar collector shipments was in complete shipments. The number of complete systems rose 15 percent to 7,266 systems in 2003 (Table 19). Moreover the value of complete shipments increased even more— 31 percent. This difference is likely due to the average size of a complete collector decreasing from 143 square feet to 119 square

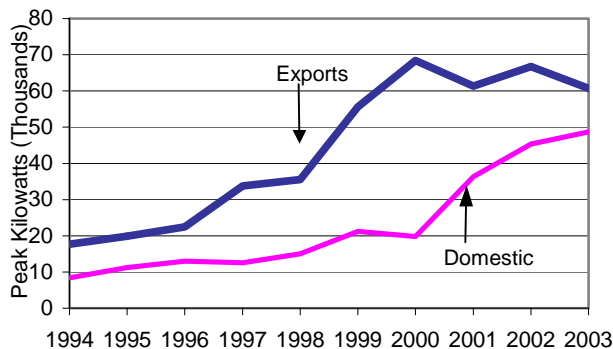
feet, requiring fixed per system costs to be spread over a smaller collector area.

Sales concentration remained constant during 2003, with 92 percent of sales made by the 5 largest firms (Table 21). This concentration has stayed between 90 and 96 percent over the past 5 years. New product introduction continues to be anticipated by only a few companies (Table 20); employment is near the 5-year industry average (Table 22); and except for non-collector system component manufacture, solar collector companies are remaining in the same lines of work (Table 23) as in recent years. Companies which produce solar products continue to do so as the predominant portion of their business (Table 24).

Photovoltaic Cells and Modules

After uninterrupted increases for nearly two decades, shipments of photovoltaic (PV) cells and modules declined 2.5 percent in 2003 to 109,357 peak kilowatts (Table 26). Exports dropped sharply—9 percent—while domestic shipments rose 7 percent (Table 10 and Figure 4).

Figure 4. Photovoltaic Exports and Domestic Shipments, 1994-2003



Sources: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

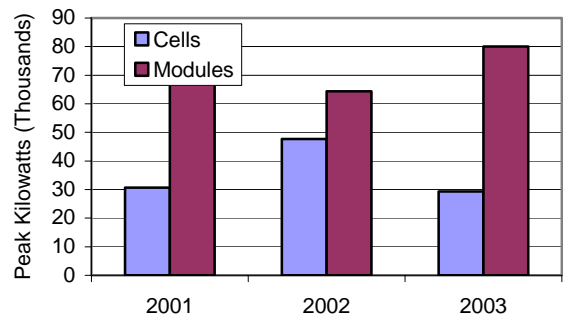
Module shipments increased 24 percent to 80,062 peak kilowatts, but cell shipments decreased to 29,295 peak kilowatts from 47,677 peak kilowatts in 2002 (Table 25 and Figure 5).

Two major events occurred in the PV industry during 2003 that affected cell and module shipments:

- The second-largest producer of PV cells and modules, AstroPower, went bankrupt. Its assets were purchased by General Electric's solar division. The bankruptcy had a major impact on the amount and distribution of cell and module shipments, as will be described later.
- Shell Solar repurchased substantial quantities of cells during 2003 for module manufacture.

Both of these events affected shipments to business categories. Shipments to module manufacturers decreased nearly two-thirds, owing largely to Shell Solar cell

Figure 5. Photovoltaic Cell and Module Shipments, 2001-2003



Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

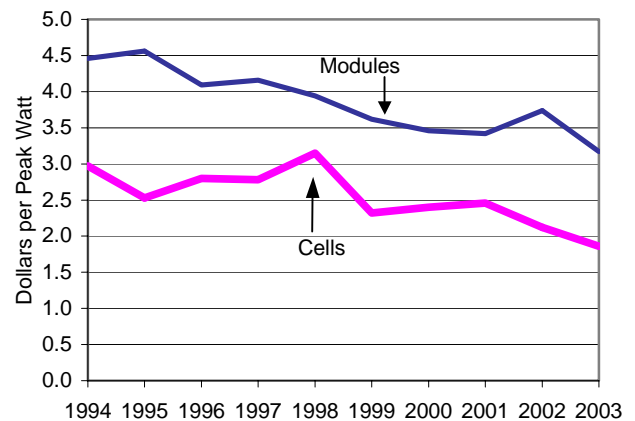
repurchases, which are treated as negative shipments (Table 27). In contrast, shipments to exporters and end-users rose substantially.

Single crystal cell and module shipments suffered the worst drop in 2003 of all PV technologies, falling 15,000 peak kilowatts (Table 28). This was due in large measure to the fact that AstroPower produced only single crystal cells. The sharp increase in cast and ribbon cell and module shipments was largely due to one company, RWE, expanding its module capacity substantially during 2003. Other companies also expanded module capacity.

Softer shipments also adversely affected prices in 2003. The average cell price per peak watt for the most prevalent technology, single-crystal silicon, dropped to \$1.88 from \$2.14 in 2002 (Table 29). Single-crystal module prices also dropped, despite increased shipments, from \$3.64 in 2002 to \$3.38 in 2003.

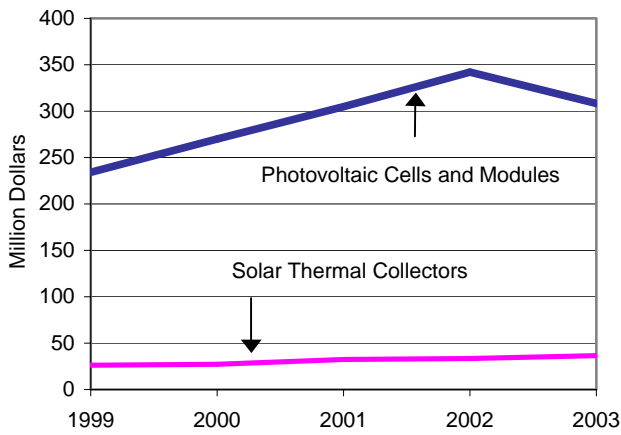
The average price per peak watt of all PV cells displayed a similar pattern (\$2.12 to \$1.86), while the average price of

Figure 6. Photovoltaic Cell and Module Average Prices, 1994-2003



Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Manufacturers Survey."

Figure 7. Solar Equipment Manufacturers' Value of Shipments, 1999-2003



Sources: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

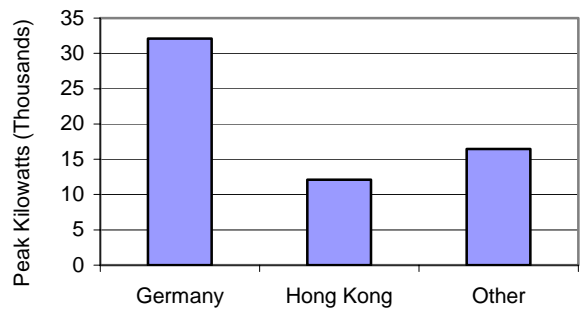
modules declined more (\$3.74 to \$3.17) than did the price of single-crystal modules (Figure 6).

The decline in average price combined with the drop in shipments to reduce the total value of PV shipments to \$308 million in 2003, a 9 percent decline from 2002 (Figure 7). The value of PV shipments still outweighs the value of solar thermal collectors by an 8:1 margin.

Market sector and end-use distributions of PV shipments in 2003 changed considerably from 2002. Shipments in 2003 to the industrial and residential markets declined sharply, 13 and 20 percent, respectively (Table 30). Commercial shipments, in contrast, rose nearly 60 percent from about 21,000 peak kilowatts in 2002 to nearly 33,000 peak kilowatts in 2003. Much of the commercial market increase was due to Shell Solar, which discontinued its recreational vehicle kits and began providing rooftop applications in 2003. This made the commercial market the largest market for PV shipments in 2003, supplanting the industrial market. The distribution of former Astropower markets also affected 2003 market sector shipments substantially.

Shell Solar's product switch also affected the distribution of shipments to end-use categories. Shipments to the transportation sector declined in 2003 by nearly 2,000 peak kilowatts, or 12 percent. Also, grid-interactive electricity generation shipments, which are how rooftop applications

Figure 8. Photovoltaic Export Shipment Top Destinations, 2003



Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

are generally used, rose almost 9,000 peak kilowatts to over 42,000 peak kilowatts in 2003. With nearly a 40 percent share in 2003, the grid-interactive application increased its position as the predominant use of PV cell and module shipments, up from 30 percent in 2002.

PV exports were split nearly 50:50 between cells and modules during 2003 (Table 31). This was fairly similar to the 2002 pattern, when cells held a slight edge. Over half of 2003 PV exports were to Germany, which imported 2.5 times more U.S. cells and modules than the next-largest importer, Hong Kong (Table 32 and Figure 8).

Shipments of complete PV systems dropped 21 percent in 2003, yet the total peak kilowatts and value of shipped systems actually rose substantially (Table 33). These characteristics are heavily influenced by Shell Solar's change in product mix to larger rooftop installations. These developments affected prices. While the price per system increased more than 40 percent in 2003, the price per peak kilowatt dropped only slightly (\$5.28 in 2003 versus \$5.51 in 2002).

Employment in the PV manufacturing industry dropped slightly in 2003 but remained at approximately 2001-2002 levels (Table 34). Employment rose fairly steadily from 1994 through 1998, then remained stable through 2000. Despite only a 10 percent market share, 5 companies plan to introduce new thin-film products (Table 35). More companies (7) are planning for new products using crystalline silicon technology. No new flat plate or concentrator products are planned. The number and type of companies involved in PV-related businesses remained essentially unchanged in 2003 (Table 36).

Table 10. Annual Photovoltaic and Solar Thermal Domestic Shipments, 1994-2003

Year	Photovoltaic Cells and Modules ^a (Peak Kilowatts)	Solar Thermal Collectors ^a
		(Thousand Square Feet)
1994.....	8,363	7,222
1995.....	11,188	7,136
1996.....	13,016	7,162
1997.....	12,561	7,759
1998.....	15,069	7,396
1999.....	21,225	8,046
2000.....	19,839	7,857
2001.....	36,310	10,349
2002.....	45,313	11,004
2003 ^P	48,664	10,926
Total.....	231,548	84,859

^a Total shipments minus export shipments.

P = Preliminary

Notes: Totals may not equal sum of components due to independent rounding. Total shipments include those made to U.S. Territories.

Sources: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 11. Annual Shipments of Solar Thermal Collectors, 1994-2003

Year	Number of Companies	Collector Shipments ^a (Thousand Square Feet)		
		Total ^b	Imports	Exports
1994	41	7,627	1,815	405
1995	36	7,666	2,037	530
1996	28	7,616	1,930	454
1997	29	8,138	2,102	379
1998	28	7,756	2,206	360
1999	29	8,583	2,352	537
2000	26	8,354	2,201	496
2001	26	11,189	3,502	840
2002	27	11,663	3,068	659
2003 ^P	26	11,444	2,986	518

^a Includes imputation of shipment data to account for nonrespondents.

^b Includes shipments of solar thermal collectors to the government, including some military, but excluding space applications.

P = Preliminary.

Note: Total shipments as reported by respondents include all domestic and export shipments and may include imported collectors that subsequently were shipped to domestic or foreign customers.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 12. Annual Shipments of Solar Thermal Collectors by Type, 1994-2003
(Thousand Square Feet)

Year	Low-Temperature		Medium-Temperature		High-Temperature Total Shipments ^{a, c}
	Total Shipments ^{a, b}	Average per Manufacturer	Total Shipments ^a	Average per Manufacturer	
1994.....	6,823	426	803	26	2
1995.....	6,813	487	840	32	13
1996.....	6,821	487	785	41	10
1997.....	7,524	579	606	29	7
1998.....	7,292	607	443	23	21
1999.....	8,152	627	427	21	4
2000.....	7,948	723	400	25	5
2001.....	10,919	1,092	268	16	2
2002.....	R11,126	R856	R535	R31	2
2003 ^P	10,877	906	560	33	7

^a Includes imputation of shipment data to account for nonrespondents.

^b Includes shipments of solar thermal collectors to the government, including some military, but excluding space applications.

^c For high-temperature collectors, average annual shipments per manufacturer are not disclosed.

P = Preliminary.

R = Revised.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 13a. Domestic Shipments of Solar Collectors Ranked by Origin and Destination, 2003

Origin/Destination	2003 Shipments ^P	
	Thousand Square Feet	Percent of U.S. Total
Origin		
Top Five States	8,351	73
California.....	3,990	35
New Jersey.....	3,536	31
Florida.....	623	5
Puerto Rico.....	113	1
Tennessee.....	89	1
Other.....	106	1
Imported.....	2,986	26
U.S. Total	11,444	100.0
Destination		
Top Five States.....	9,641	84
Florida.....	4,290	37
California.....	3,514	31
New Jersey.....	804	7
Arizona.....	731	6
Hawaii.....	302	3
Other.....	1,285	11
Exported	518	5
U.S. Total	11,444	100.0

W = Data withheld to avoid disclosure of proprietary company data.

P = Preliminary.

Notes: Totals may not equal sum of components due to independent rounding. U.S. total includes territories.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 13b. Domestic Shipments of Solar Collectors Ranked by Origin and Destination, 2002

Origin/Destination	2002 Shipments	
	Thousand Square Feet	Percent of U.S. Total
Origin		
Top Five States.....	8,517	73
California.....	4,344	37
New Jersey.....	3,482	30
Florida.....	502	4
Puerto Rico.....	111	1
New York.....	80	1
Other.....	77	1
Imported.....	3,068	26
U.S. Total	11,663	100
Destination		
Top Five States.....	9,322	80
Florida.....	4,368	37
California.....	3,213	28
New Jersey.....	937	8
Arizona.....	530	5
Hawaii.....	274	2
Other.....	1,683	14
Exported.....	659	6
U.S. Total	11,663	100

W = Data withheld to avoid disclosure of proprietary company data.

Notes: Totals may not equal sum of components due to independent rounding. U.S. total includes territories.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 14. Shipments of Solar Thermal Collectors by Destination, 2003 (Square Feet)

Destination	Shipments ^P
Alabama	458
Arizona	731,211
Arkansas	766
California	3,514,290
Colorado.....	17,859
Connecticut.....	131,521
Delaware.....	123
Florida	4,289,945
Georgia	45,726
Hawaii	302,072
Idaho	2,181
Illinois	211,794
Indiana	477
Iowa.....	238
Louisiana.....	34,138
Maine	1,860
Maryland	5,805
Massachusetts	35,826
Michigan.....	34,194
Minnesota.....	35,418
Mississippi.....	114
Missouri.....	279
Nebraska.....	1,525
Nevada.....	47,981
New Hampshire.....	258
New Jersey	803,579
New Mexico.....	50,140
New York.....	92,995
North Carolina.....	4,466
Ohio.....	34,364
Oklahoma.....	715
Oregon	118,269
Pennsylvania.....	37,011
Puerto Rico	114,700
South Carolina	295
Tennessee	477
Texas	86,796
Utah.....	12,960
Vermont.....	10,099
Virgin Islands.....	604
Virginia	73,978
Washington	477
Wisconsin.....	38,091
Shipments to United States/Territories.....	10,926,073
Exports	517,664
Total Shipments	11,443,737

P = Preliminary

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 15. Distribution of U.S. Solar Thermal Collector Exports by Country, 2003

Country	Percent of U.S. Exports ^P
Asia and the Middle East	
China	2.03
Guam	0.41
India	0.13
Japan	2.70
Taiwan	0.53
Total	5.8
Europe	
Austria	11.41
Belgium & Luxembourg	4.59
Czech Republic	2.85
France	5.01
Spain	1.15
Sweden	4.50
Switzerland	0.95
Total	30.5
North America	
Bahamas	0.47
Barbados	0.06
Bermuda	*
Canada	35.09
Costa Rica	3.81
French West Indies	0.17
Guatemala	1.94
Mexico	19.75
Panama	*
Total	61.3
South America	
Bolivia	1.43
Ecuador	0.09
Peru	0.40
Total	1.9
Other, nonspecified	0.5
Total	100.0

P = Preliminary.

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

Source: EIA Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 16. Distribution of Solar Thermal Collector Shipments, 2002 and 2003

Recipient	Shipments (Thousand Square Feet)	
	2002	2003 ^P
Wholesale Distribution	6,411	6,316
Retail Distributors	4,509	4,283
Exporters	177	262
Installers	403	413
End Users and Other ^a	162	170
Total	11,663	11,444

^aOther includes minimal shipments not explained on form EIA-63A.

P = Preliminary.

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

Source: Energy Information Administration. Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 17. Solar Thermal Collector Shipments by Type, Quantity, Value, and Average Price 2002 and 2003

Type	2002			2003 ^P		
	Quantity (Thousand Square Feet)	Value (Thousand Dollars)	Average Price (Dollars per Square Foot)	Quantity (Thousand Square Feet)	Value (Thousand Dollars)	Average Price (Dollars per Square Foot)
Low-Temperature						
Liquid and Air	R 11,126	R 21,942	1.97	10,877	22,674	2.08
Medium/High Temperature	537	11,344	21.11	567	13,784	24.31
Medium:						
Air	R4	W	W	6	W	W
Liquid						
ICS/Themosiphon	110	5,229	47.74	111	5,803	52.09
Flat Plate	419	5,771	13.77	440	7,378	16.78
Evacuated Tube	2	W	W	2	W	W
Concentrator	*	W	W	*	W	W
High:						
Parabolic Dish and Trough	2	W	W	7	W	W
Total	11,663	33,286^a	2.85	11,444	36,458	3.19

^aTotal includes institutional research project.

ICS = Integral collector storage.

W = Data withheld to avoid disclosure of proprietary company data

R = Revised.

P = Preliminary

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

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 18. Shipments of Solar Collectors by Market Sector, End Use, and Type, 2002 and 2003 (Thousand Square Feet)

Type	Low-Temperature	Medium-Temperature					High-Temperature	2003 ^P Total	2002 Total
	Liquid/Air Metallic and Nonmetallic	Air	Liquid				Parabolic Dish/Trough		
			ICS/Ther- mosiphon	Flat-Plate (Pumped)	Evacuated Tube	Concen- trator			
Market Sector									
Residential	9,993	6	106	400	1	*	0	10,506	11,000
Commercial	813	0	3	40	1	0	7	864	595
Industrial	71	0	0	0	0	0	0	71	62
Utility	0	0	0	0	0	0	0	0	4
Other ^a	0	0	2	0	0	0	0	2	1
Total	10,877	6	111	440	2	*	7	11,444	11,663
End use									
Pool Heating	10,778	0	0	22	0	0	0	10,800	11,073
Hot Water	0	0	111	397	2	*	0	511	423
Space Heating	65	6	0	4	*	0	0	76	146
Space Cooling	0	0	0	0	*	0	0	*	*
Combined Space and Water Heating	0	0	0	16	0	0	7	23	17
Process Heating	34	0	0	0	0	0	0	34	4
Electricity									
Generation	0	0	0	0	0	0	0	0	0
Other ^b	0	0	0	0	0	0	0	0	0
Total	10,877	6	111	440	2	*	7	11,444	11,663

^aOther market sector include shipments of solar thermal collectors to sectors such as government, including the Military but excluding space applications.

^bOther end use includes shipments of solar thermal collectors for other uses such as cooking, water pumping, water purification, desalination, distillation, etc.

*=Less than 500 square feet.

ICS= Integral Collector Storage.

P = Preliminary.

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

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 19. Shipments of Complete Solar Thermal Collector Systems, 2002 and 2003

Shipment Information	2002	2003 ^P
Complete Collector Systems		
Shipped.....	6,333	7266
Thousand Square Feet.....	904	864
Percent of Total Shipments.....	8	8
Number of Companies.....	27	26
Value of Systems (Thousand Dollars).....	10,363	13,586

P = Preliminary.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 20. Number of Companies Expecting To Introduce New Solar Thermal Collector Products in 2004

New Product Type	Number of Companies
Low-Temperature Collectors	4
Medium-Temperature Collectors	7
High-Temperature Collectors.....	1
Noncollector Components	3

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 21. Percent of Solar Collector Shipments by 10 Largest Companies, 1994-2003

Year	Company Rank	Shipments (Thousand Square Feet)	Percent of Total Shipments
1994.....	1-5	6,401	84
	6-10	861	11
1995.....	1-5	6,525	85
	6-10	806	11
1996.....	1-5	6,452	85
	6-10	910	12
1997.....	1-5	7,183	88
	6-10	731	9
1998.....	1-5	6,938	89
	6-10	613	8
1999.....	1-5	7,813	91
	6-10	563	7
2000.....	1-5	7,521	90
	6-10	567	7
2001.....	1-5	10,732	96
	6-10	325	3
2002.....	1-5	10,755	92
	6-10	670	6
2003 ^P	1-5	10,485	92
	6-10	700	6

P = Preliminary.

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

Source: Energy Information Administration: Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 22. Employment in the Solar Thermal Collector Industry, 1994-2003

Year	Person Years
1994.....	402
1995.....	386
1996.....	239
1997.....	184
1998.....	207
1999.....	289
2000.....	284
2001.....	256
2002.....	356
2003 ^P	287

P = Preliminary.

Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 23. Companies Involved in Solar Thermal Activities by Type, 2002 and 2003

Type of Activity	2002	2003 ^P
Collector or System Design.....	20	20
Prototype Collector Development.....	13	12
Prototype System Development.....	9	11
Wholesale Distribution	21	21
Retail Distribution	13	12
Installation	10	10
Noncollector System Component Manufacture	12	9

P = Preliminary.
Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 24. Solar-Related Sales as a Percentage of Total Company Sales, 2002 and 2003

Percent of Total Sales	Number of Companies	
	2002	2003 ^P
90-100	19	18
50-89	4	5
10-49	1	1
Less than 10.....	3	2
Total.....	27	26

P = Preliminary.
Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Table 25. Annual Shipments of Photovoltaic Cells and Modules, 2001-2003 (Peak Kilowatts)

Item	2001	2002	2003 ^P
Cells.....	30,633	47,677	29,295
Modules	67,033	64,413	80,062
Total	97,666	112,090	109,357

P = Preliminary.
Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 26. Annual Shipments of Photovoltaic Cells and Modules, 1994-2003

Year	Number of Companies	Photovoltaic Cell and Module Shipments ^a (Peak Kilowatts)		
		Total	Imports	Exports
1994.....	22	26,077	1,960	17,714
1995.....	24	31,059	1,337	19,871
1996.....	25	35,464	1,864	22,448
1997.....	21	46,354	1,853	33,793
1998.....	21	50,562	1,931	35,493
1999.....	19	76,787	4,784	55,562
2000.....	21	88,221	8,821	68,382
2001.....	19	97,666	10,204	61,356
2002.....	19	112,090	7,297	66,778
2003 ^P	20	109,357	9,731	60,693

^a Does not include shipments of cells and modules for space/satellite applications.

P = Preliminary.

Note: Total shipments as reported by respondents include all domestic and export shipments and may include imported collectors that subsequently were shipped to domestic or foreign customers.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 27. Distribution of Photovoltaic Cells and Modules, 2001-2003

Recipient	Shipments (Peak Kilowatts)		
	2001	2002	2003 ^P
Wholesale Distributors.....	59,799	62,651	65,477
Retail Distributors	5,302	8,270	6,624
Exporters	4,441	449	7,600
Installers	10,810	11,538	11,733
End-Users.....	1,482	4,012	8,286
Module manufacturers	14,045	23,784	8,738
Other ^a	1,787	1,386	899
Total	97,666	112,090	109,357

^a Other includes categories not identified by reporting companies.

P = Preliminary.

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

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 28. Photovoltaic Cell and Module Shipments by Type, 2001-2003

Type	Shipments (Peak Kilowatts)			Percent of Total		
	2001	2002	2003 ^P	2001	2002	2003 ^P
Crystalline Silicon						
Single Crystal.....	54,736	74,717	59,379	56	67	54
Cast and Ribbon	29,915	29,406	38,561	31	26	35
Subtotal.....	84,651	104,123	97,939	87	93	90
Thin-Film Silicon	12,541	7,396	10,966	13	7	10
Concentrator Silicon	474	571	452	*	*	*
Other ^a	0	0	0	0	0	0
Total	97,666	112,090	109,357	100	100	100

^a Includes categories not identified by reporting companies.

* = Less than 0.5 percent.

P = Preliminary.

Notes: Data do not include shipments of cells and modules for space/satellite applications. Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 29. Photovoltaic Cell and Module Shipment Values by Type, 2002 and 2003

Type	2002			2003 ^P		
	Value (Thousand Dollars)	Average Price (Dollars per Peak Watt)		Value (Thousand Dollars)	Average Price (Dollars per Peak Watt)	
		Modules	Cells		Modules	Cells
Crystalline Silicon						
Single-Crystal	201,488	3.64	2.14	158,480	3.38	1.88
Cast and Ribbon	115,625	3.98	1.38	113,511	2.97	1.23
Subtotal.....	317,113	3.81	2.13	271,991	3.16	1.87
Thin-Film Silicon	W	W	W	W	W	W
Concentrator Silicon	W	W	W	W	W	W
Other ^a	0	---	---	0	---	---
Total	341,975	3.74	2.12	308,192	3.17	1.86

^a Includes categories not identified by reporting companies.

W = Data withheld to avoid disclosure of proprietary company data.

-- = Does not apply.

P = Preliminary.

Notes: Data do not include shipments of cells and modules for space/satellite applications. Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 30. Shipments of Photovoltaic Cells and Modules by Market Sector, End Use, and Type, 2002 and 2003 (Peak Kilowatts)

Sector and End Use	Crystalline Silicon ^a	Thin-Film Silicon	Concentrator Silicon	Other	2003 ^P Total	2002 Total
Market						
Industrial	26,793	1,158	0	0	27,951	32,218
Residential	22,493	896	0	0	23,389	29,315
Commercial.....	24,649	7,955	0	0	32,604	20,578
Transportation.....	10,928	162	0	0	11,089	12,932
Utility	7,446	737	291	0	8,474	7,640
Government ^b	5,318	59	161	0	5,538	8,565
Other ^c	313	0	0	0	313	841
Total	97,939	10,966	452	0	109,357	112,090
End Use						
Electricity Generation						
Grid Interactive	34,902	7,583	0	0	42,485	33,983
Remote	13,974	792	260	0	15,025	21,693
Communications.....	13,920	265	0	0	14,185	17,290
Consumer Goods.....	2,926	69	0	0	2,995	3,400
Transportation.....	13,807	336	0	0	14,143	16,028
Water Pumping.....	5,864	209	0	0	6,073	7,532
Cells/Modules To OEM ^d	9,658	1,675	0	0	11,334	7,869
Health	2,887	37	0	0	2,924	4,202
Other ^e	2	0	192	0	194	93
Total	97,939	10,966	452	0	109,357	112,090

^a Includes single-crystal and cast and ribbon types.

^b Includes Federal, State, local governments, excluding military.

^c Other includes shipments that are manufactured for private contractors for research.

^d Original equipment manufacturer.

^e Other uses include shipments of photovoltaic and modules for other uses, such as cooking food, desalinization, distillation, etc.

P = Preliminary.

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

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 31. Export Shipments of Photovoltaic Cells and Modules by Type, 2002 and 2003 (Peak Kilowatts)

Item	Type							
	Crystalline		Thin-Film Silicon		Concentrator Silicon		Total	
	2002	2003 ^P	2002	2003 ^P	2002	2003 ^P	2002	2003 ^P
Cells.....	33,952	30,337	0	0	267	127	34,219	30,464
Modules	29,987	25,190	2,572	5,039	0	0	32,559	30,229
Total	63,939	55,527	2,572	5,039	267	127	66,778	60,693

P = Preliminary.

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

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 32. Destination of U.S. Photovoltaic Cell and Module Export Shipments by Country, 2003

Country	Peak Kilowatts ^P	Percent of U.S. Exports ^P
Africa		
Egypt.....	63.2	0.1
Kenya.....	157.8	0.3
Nigeria	0.2	*
Other Africa.....	1,013.9	1.7
South Africa, Rep of.....	1,144.8	1.9
Zambia.....	18.1	*
Total	2,398.1	4.0
Asia and the Middle East		
Bangladesh.....	250.2	0.4
China	63.3	0.1
Hong Kong.....	12,127.4	20.0
Japan	2,557.9	4.2
Malaysia.....	0.1	*
Nepal	223.5	0.4
North Korea	94.9	0.2
Singapore	948.7	1.6
South Korea.....	205.4	0.3
Taiwan	257.1	0.4
Thailand.....	158.1	0.3
Total	16,886.5	27.8
Australia		
Australia.....	1,455.2	2.4
French Pacific Island	0.6	*
Total	1,455.8	2.4
Europe		
Belgium & Luxembourg	369.3	0.6
France.....	0.2	*
Germany	32,088.4	52.9
Greece	75.0	0.1
Italy	65.8	0.1
Spain.....	3,537.3	5.8
United Kingdom	291.1	0.5
Total	36,427.1	60.0
North America		
Canada	2,034.9	3.4
Mexico	791.5	1.3
Netherlands Antilles.....	0.2	*
Total	2,826.6	4.7
South America		
Argentina	126.5	0.2
Brazil.....	316.7	0.5
Chile.....	3.4	*
Colombia.....	63.2	0.1
Ecuador	1.3	*
Guyana	4.6	*
Other Latin America.....	21.7	*
Peru	94.9	0.2
Puerto Rico.....	3.1	*
Uruguay	63.2	0.1
Total	698.6	1.3
Other	0.1	*
Total U.S. Exports.....	60,692.8	100.0

P = Preliminary.

Note: "Other" represents shipments to countries not disaggregated by companies on Form EIA63B. Totals may not equal sum of components due to independent rounding.

* = Value Less Than 0.05 Percent

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 33. Shipments of Complete Photovoltaic Module Systems, 2001-2003

Shipment Information	2001	2002	2003 ^P
Complete Photovoltaic Module Systems Shipped	6,759	R7,008	5,525
Peak Kilowatts	10,075	R8,160	9,545
Percent of Total Module Shipments	15	13	12
Value of Systems (Thousand Dollars)	50,467	R44,984	50,412

P = Preliminary.

R = Revised

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 34. Employment in the Photovoltaic Manufacturing Industry, 1994-2003

Year	Number of Companies	Number of Person-Years
1994.....	22	1,312
1995.....	24	1,578
1996.....	25	1,280
1997.....	21	1,736
1998.....	21	1,988
1999.....	19	2,013
2000.....	21	1,913
2001.....	19	2,666
2002.....	19	2,696
2003 ^P	20	2,590

P = Preliminary.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 35. Companies Expecting to Introduce New Photovoltaic Products in 2004

New Product Type	Number of Companies
Crystalline Silicon	
Single-Crystal Silicon Modules.....	4
Cast Silicon Modules.....	2
Ribbon Silicon Modules.....	1
Thin-Film	
Amorphous Silicon Modules.....	2
Other (Thin-Film).....	3
Other (Flat Plate).....	0
Concentrators	0
Nonmodule System Components	0

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Table 36. Number of Companies Involved in Photovoltaic-Related Activities, 2002 and 2003

Type of Activity	Number of Companies	
	2002	2003 ^P
Cell Manufacturing	11	12
Module or System Design.....	16	17
Prototype Module Development.....	12	13
Prototype Systems Development.....	11	11
Wholesale Distribution	12	13
Retail Distribution	8	7
Installation.....	8	8
Noncollector System		
Component Manufacturing.....	3	5

P = Preliminary.

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Survey of Geothermal Heat Pump Shipments 2003

This report provides information on geothermal heat pump shipments, based on the Energy Information Administration, Form EIA-902, "Annual Geothermal Heat Pump Manufacturers Survey." The survey shows that manufacturers shipped 36,439 geothermal heat pumps in 2003, a 2 percent decrease over the 2002 total of 37,139. Of those shipped in 2003, 10,306 were ARI-320 rated,¹ and 25, 211 were ARI-325 or ARI-330. ARI-rated shipments increased to 35,517 units in 2003, while the number of non-ARI-rated units shipped decreased to 922 (Table 37).

The total rated capacity of heat pumps shipped in 2003 was 124,438 tons, compared to 125,297 tons in 2002 (Table 38).

The proportion of geothermal heat pumps shipped to each Census Region in 2003 was as follows: the South (34 percent), the Midwest (33 percent), the Northeast (16 percent), and the West (9 percent) (Table 39). The proportion of geothermal heat pumps exported was 8 percent. Forty-four percent of geothermal heat pumps were shipped to wholesale distributors, while 30 percent went to installers. The remaining 26 percent were sold to exporters, retail distributors, end-users, or other domestic customers. (Table 40).

Table 37. Geothermal Heat Pump Shipments by Model Type, 1997-2003

(Number of Units)

Model	1997	1998	1999	2000	2001	2002	2003
ARI-320	7,772	10,510	7,910	7,808	NA	6,445	10,306
ARI-325/330	28,335	26,042	31,631	26,219	NA	26,802	25,211
Other Non-ARI Rated	1,327	1,714	2,138	1,554	NA	3,892	922
Totals	37,434	38,266	41,679	35,581	NA	37,139	36,439

NA=Not Available. No survey was conducted for 2001.

Source: Energy Information Administration, Form EIA-902 "Annual Geothermal Heat Pump Manufacturers Survey."

Table 38. Capacity of Geothermal Heat Pump Shipments by Model Type, 1997-2003

(Total Rated Capacity Tons)

Model	1997	1998	1999	2000	2001	2002	2003
ARI-320	24,708	35,776	27,970	26,469	NA	16,756	29,238
ARI-325/330	110,186	98,912	153,947	130,132	NA	96,541	89,731
Other Non-ARI Rated	6,662	6,758	9,735	7,590	NA	12,000	5,469
Totals	141,556	141,446	191,651	164,191	NA	125,297	124,438

NA=Not Available. No survey was conducted for 2001.

Note: One ton of capacity is equal to 12,000 Btus per hour. Source: Energy Information Administration, Form EIA-902 "Annual Geothermal Heat Pump Manufacturers Survey."

Table 39. Geothermal Heat Pump Shipments by Export, Census Region, and Model Type, 2003
(Number of Units)

Export and Census Region	ARI-320	ARI-325/330	Other Non-ARI Rated GHPs	Total
Export	260	2,455	49	2,764
Midwest	1,877	9,864	301	12,042
Northeast	2,797	3,031	96	5,924
South	3,983	8,126	434	12,543
West	1,389	1,735	42	3,166
Total	10,306	25,211	922	36,439

Note: The **Midwest Census Region** consists of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. The **Northeast Census Region** consists of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. The **South Census Region** consists of Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. The **West Census Region** consists of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. "Export" in Table 39 and "Exporter" in Table 40 are different. "Export" refers to shipments outside of the country, while "Exporter" is the type of customer.

Source: Energy Information Administration, Form EIA-902 "Annual Geothermal Heat Pump Manufacturers Survey."

Table 40. Geothermal Heat Pump Shipments by Customer Type and Model Type, 2003
(Number of Units)

Customer Type	ARI-320	ARI-325/330	Other Non-ARI Rated GHPs	Total
Exporter	0	945	0	945
Wholesale Distributor	4,271	11,864	32	16,167
Retail Distributor	0	975	170	1,145
Installer	5	10,372	407	10,784
End-User	0	1,002	101	1,103
Others	6,030	53	212	6,295
Total	10,306	25,211	922	36,439

Note: "Export" in Table 39 and "Exporter" in Table 40 are different. "Export" refers to shipments outside of the country, while "Exporter" is the type of customer.

Source: Energy Information Administration, Form EIA-902 "Annual Geothermal Heat Pump Manufacturers Survey."

¹For a detailed explanation of the Air-Conditioning & Refrigeration Institute (ARI) system of rating geothermal heat pumps see: http://www.eia.doe.gov/cneaf/solar.renewables/rea_issues/geo_hp_art.pdf, June 7, 2004

Green Pricing and Net Metering Programs 2003

Green pricing/marketing programs allow electricity customers to pay the additional costs for renewable energy through direct payments on their monthly bills. The Energy Information Administration (EIA) first collected information on green pricing on the Form EIA-861, "Annual Electric Power Industry Report," which is a survey of electric industry participants including: electric utilities, wholesale power marketers, energy service providers, and electric power producers. All respondents, except independent power producers and qualifying facilities, were asked to report the number of their customers in green pricing programs by state and customer class.

Net metering provisions vary by state and utility, but usually apply only to very small generators that typically use solar or wind energy. This system usually permits a customer operating a small generator to purchase extra electricity when needed. Also, any excess power at the end of the month can be sold back to the utility. Pricing schemes vary by individual utility and customer circumstances. This system facilitates the ease of operating intermittent generators such as those using solar and wind energy and improves their economics. The EIA first collected information on net metering on the Form EIA-861 in much the same manner as it did green pricing.

In 2003, the number of electric industry participants reporting customers in green pricing programs was 308, up 45 percent from 2002 (Table 1). The number of customers

Table 1. Estimated U.S. Green Pricing Customers by Customer Class, 2002-2003

Year	Electric Industry Participants	Participating Customers		
		Customer Class		Total
		Residential	Non-residential	
2002 ^R	212	688,069	23,481	711,550
2003 ^P	308	819,579	57,547	877,126

P=Preliminary
R=Revised

Note: Electric industry participants include the following respondent types: federal, state, municipal, investor-owned, and cooperative utilities; municipal marketing authorities; and power marketers (or energy service providers). Non-residential may include some customers for which no customer class is specified. Totals may not equal the sum of the components due to independent rounding.

Source: Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report."

in green pricing programs dwarfed those in net metering and increased 23 percent from 711,550 nationwide in 2002 to 877,126 in 2003. Residential customers accounted for about 93 percent of the total in 2003. However, this was down from residential's 97 percent share in 2002.

Electric industry participants reported having green pricing customers in forty states, including six states that were reported for the first time in 2003 (Table 3). Ohio led the United States in total number of green pricing customers with 428,849 customers and accounted for nearly 44 percent of the annual increase. Pennsylvania, Texas, California and Colorado followed next in order of importance.

In 2003, the number of electric industry participants reporting customers in net metering programs was up to 127 from just 96 one year earlier (Table 2). The number of customers in net metering during 2003 was 6,813 and represented a 52 percent increase from 2002. Residential customers accounted for 86 percent of the customers in the program. Electric industry participants reported having net metering customers in thirty-nine states, including four states that were reported for the first time (Table 4). California dominated with 77 percent of the national total.

Table 2. Estimated U.S. Net Metering Customers by Customer Class, 2002-2003

Year	Electric Industry Participants	Participating Customers		
		Customer Class		Total
		Residential	Non-residential	
2002 ^R	96	3,559	913	4,472
2003 ^P	127	5,870	943	6,813

P=Preliminary
R=Revised

Note: Electric industry participants include the following respondent types: federal, state, municipal, investor-owned, and cooperative utilities; municipal marketing authorities; and power marketers (or energy service providers). Non-residential may include some customers for which no customer class is specified. Totals may not equal the sum of the components due to independent rounding.

Source: Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report."

Additional information concerning green pricing and net metering is available on U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy websites. For green pricing and net metering, see <http://www.eere.energy.gov/greenpower/index.shtml> (October 20, 2004).

Table 3. Estimated U.S. Green Pricing Customers by State and Customer Class, 2002 and 2003

State	Electric Industry Participants 2003 ^P	Participating Customers			
		2003 ^P			2002
		Residential	Non-residential	Total	Total
Alabama.....					
Alaska.....					
Arizona.....	2	5,838	96	5,934	4,039
Arkansas.....					
California.....	8	60,626	1,653	62,279	55,631
Colorado.....	18	43,418	776	44,194	39,191
Connecticut.....					1,056
Delaware.....					8
District of Columbia.....	2	4,612	212	4,824	1,686
Florida.....	1	206	12	218	146
Georgia.....	11	3,881	14	3,895	418
Hawaii.....	3	3,551	28	3,579	3,040
Idaho.....	4	2,437	71	2,508	2,090
Illinois.....	1	8		8	8
Indiana.....	9	1,075	16	1,091	708
Iowa.....	30	5,756	29	5,785	4,403
Kansas.....					
Kentucky.....	5	115	3	118	6
Louisiana.....					
Maine.....	1		5	5	47
Maryland.....	2	14,205	151	14,356	2,553
Massachusetts.....	1		1	1	
Michigan.....	6	1,285	61	1,346	1,189
Minnesota.....	76	19,805	450	20,255	7,922
Mississippi.....	1	7		7	
Missouri.....	4	261		261	136
Montana.....	4	48	1	49	241
Nebraska.....	4	4,086	85	4,171	4,809
Nevada.....	1	284	1	285	241
New Hampshire.....					
New Jersey.....	1	1,731	85	1,816	2,226
New Mexico.....	5	5,610	164	5,774	629
New York.....	2	133	1	134	
North Carolina.....	9	3,747	166	3,913	
North Dakota.....	9	1,771	21	1,792	670
Ohio.....	1	387,938	40,911	428,849	356,309
Oklahoma.....	1	6,712	46	6,758	
Oregon.....	12	37,173	4,966	42,139	35,674
Pennsylvania.....	3	74,583	93	74,676	92,722
Rhode Island.....					
South Carolina.....	4	1,506	219	1,725	1,152
South Dakota.....	12	613	11	624	^R 513
Tennessee.....	1		1	1	
Texas.....	4	65,618	2,993	68,611	47,638
Utah.....	1	12,264	3,216	15,480	8,924
Vermont.....					
Virginia.....	2	4,624	15	4,639	2,394
Washington.....	18	16,406	452	16,858	11,003
West Virginia.....					
Wisconsin.....	50	26,158	437	26,595	20,913
Wyoming.....	5	1,488	85	1,573	1,215
Total.....	308	819,579	57,547	877,126	^R 711,550

P=Preliminary

R=Revised

Note: Electric industry participants include the following respondent types: federal, state, municipal, investor-owned, and cooperative utilities; municipal marketing authorities; and power marketers (or energy service providers). Non-residential may include some customers for which no customer class is specified. Blank cells indicate no data was reported for the state or the number of customers in a class was zero. Totals may not equal the sum of the components due to independent rounding.

Source: Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report."

Table 4. Estimated Net Metering Customers by State and Customer Class, 2002 and 2003

State	Electric Industry Participants 2003 ^P	Participating Customers			
		2003 ^P			2002
		Residential	Non-residential	Total	Total
Alabama.....					
Alaska.....	2	1	1	2	
Arizona.....	2	29	301	330	320
Arkansas.....					
California.....	14	4,869	373	5,242	3,016
Colorado.....	9	128	35	163	149
Connecticut.....	2	20	8	28	25
Delaware.....	1	7	3	10	11
District of Columbia.....					
Florida.....	2	7	3	10	9
Georgia.....	1	1		1	
Hawaii.....	3	28	3	31	14
Idaho.....	3	15	3	18	11
Illinois.....	1		1	1	12
Indiana.....	1	3		3	3
Iowa.....	1	2		2	2
Kansas.....	2	2	3	5	4
Kentucky.....	2		14	14	1
Louisiana.....					
Maine.....					
Maryland.....	2	5		5	6
Massachusetts.....	3	90	1	91	85
Michigan.....	1	2	1	3	4
Minnesota.....	17	129	11	140	97
Mississippi.....					
Missouri.....	2	1	1	2	2
Montana.....	2	3		3	3
Nebraska.....					11
Nevada.....	2	54	2	56	39
New Hampshire.....	3	48	25	73	69
New Jersey.....					
New Mexico.....	3	9	1	10	8
New York.....	1	43	3	46	22
North Carolina.....					
North Dakota.....	2	1	1	2	5
Ohio.....	4	5	6	11	5
Oklahoma.....	2	1	35	36	36
Oregon.....	6	23	14	37	22
Pennsylvania.....	2	42	18	60	35
Rhode Island.....	2	12	4	16	5
South Carolina.....					^R 0
South Dakota.....					^R 0
Tennessee.....					
Texas.....	4	7	6	13	197
Utah.....	1		1	1	
Vermont.....	2	46	6	52	43
Virginia.....	6	12	0	12	5
Washington.....	10	44	4	48	34
West Virginia.....	2	1	1	2	
Wisconsin.....	6	178	54	232	161
Wyoming.....	2	2		2	1
Total.....	127	5,870	943	6,813	^R 4,472

P=Preliminary

R=Revised

Note: Electric industry participants include the following respondent types: federal, state, municipal, investor-owned, and cooperative utilities; municipal marketing authorities; and power marketers (or energy service providers). Non-residential may include some customers for which no customer class is specified. Blank cells indicate no data was reported for the state or the number of customers in a class was zero. Totals may not equal the sum of the components due to independent rounding.

Source: Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report."