

Renewable Energy Annual 2004

With Preliminary Data For 2004

June 2006

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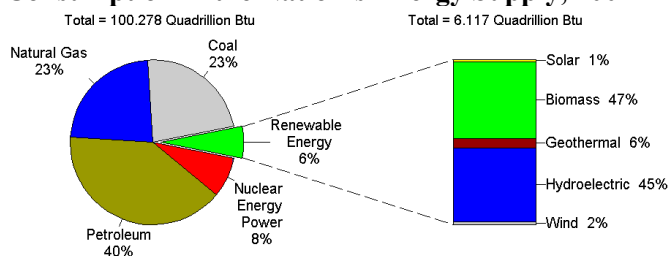
Renewable Energy Trends 2004 Highlights

Renewable Energy Consumption

Renewable energy consumption increased slightly less than 1 percent between 2003 and 2004 (Table 1).¹ At 6.1 quadrillion Btu, it provided a 6 percent market share of total U.S. energy consumption (Figure H1). Total energy consumption grew faster than did renewables, rising nearly 2 percent in 2004 to 100.3 quadrillion Btu.² Petroleum and natural gas supplied most of the increase.

The electric power and industrial sectors continued to dominate renewable energy in 2004, although the transportation sector had the greatest year-to-year increase, 24 percent (Table 2). This was due to the expanding use of fuel ethanol to replace MTBE as this oxygenate is phased out in many states (Figure H2).

Figure H1. The Role of Renewable Energy Consumption in the Nation's Energy Supply, 2004



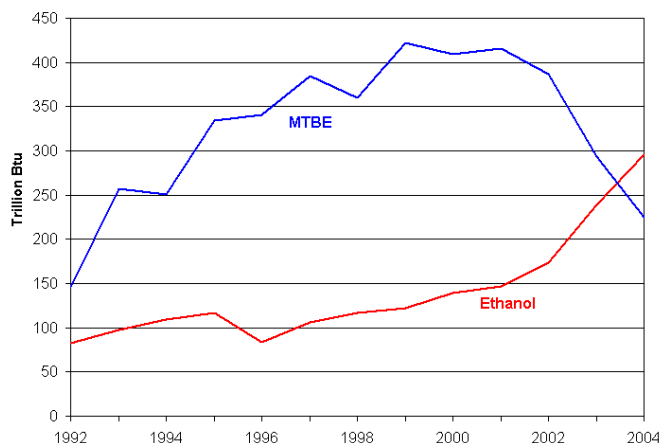
Source: Table 1 of this report.

Total renewable energy consumption for electricity generation increased by 3 percent to 4.3 quadrillion Btu in 2004, despite a decline in conventional hydroelectric power (Table 3). Renewable energy consumption for nonelectric use (which includes useful thermal output at combined heat and power plants, space heating, and motor fuel) decreased by 4 percent to 1.8 quadrillion Btu (Table 4). Most of the decrease was in

biomass energy for the residential and industrial sectors. Because of the importance of hydroelectric power, 70 percent of renewable energy was consumed for electricity generation, compared to 30 percent for nonelectric purposes.

Biomass consumption increased by 4 percent, or 105 trillion Btu in 2004 (Table 6). Wood energy in the industrial sector and alcohol fuels in the transportation sector led the growth. Wood energy consumption in the residential sector declined due to a milder heating season. Biomass energy consumption was primarily from wood (70 percent) followed by waste (20 percent) and alcohol fuels (10 percent). Independent power producers were the biggest consumers of waste, using 240 trillion Btu of municipal solid waste and 59 trillion Btu of landfill gas in 2003 (Table 7). The role of electric utilities as consumers of waste energy was relatively minor; they used only 20 trillion Btu in 2003, down from 38 trillion Btu in 2002.

Figure H2. Ethanol and MTBE Consumption in the Transportation Sector 1992-2004



Source: Ethanol: Table 5 of this report. MTBE: 1992-2004: Energy Information Administration, Petroleum Supply Monthly DOE/EIA-0109 (Washington, D.C. Various Issues). Appendix D and Table 34, and Office of Coal, Nuclear, Electric and Alternate Fuels analysis.

¹ Note: Data in this report are shown for the most recent year available. For aggregate categories, this is preliminary 2004 data. For detailed categories, this is 2003 data and includes any revisions that were necessary.

² Energy Information Administration, *Monthly Energy Review April 2005*, DOE/EIA-0035(2005/01) (Washington, DC, April 2005), Table 2.4, p. 31.

Biomass Energy Consumption Revisions

Industrial Sector

Every four years, the EIA conducts a survey of manufacturers, Form EIA-846 (A,B,C) "Manufacturing Energy Consumption Survey (MECS)." Between surveys, EIA estimates industrial biomass energy consumption based on the most recent MECS survey, industrial production indices, and other factors.

Because data from the most recent MECS survey, for 2002, did not become available until late 2004, EIA initially estimated 2002 and 2003 industrial biomass energy consumption as described above. When EIA rebased its estimates for those years to the 2002 MECS survey, the revised estimates of consumption were notably lower. The new estimates for 2002 are presented in Table H1 along with estimates for 2003.

Table H1. Industrial Biomass Energy Consumption by Industry, 2002 and 2003 (Trillion Btu)

Industry	2002 (Old Basis)	2002 (New Basis)	2003
Total	1,705	1,565	1,533
Agriculture, Forestry And Mining	11	11	9
Manufacturing	1,600	1,460	1,444
Food and Kindred Products	49	43	41
Lumber	248	209	216
Paper and Allied Products	1,249	1,181	1,151
Chemicals and Allied Products	23	3	4
Other (a)	31	24	32
Nonspecified (b)	93	93	80

(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. 2002 Old Basis refers to estimates extrapolated from MECS 1998 and the EIA-906. 2002 New Basis refers to estimates extrapolated from MECS 2002 and the EIA-906.

Sources: Energy Information Administration, Form EIA-906, "Power Plant Report" and Form EIA-846(A,B,C), "Manufacturing Energy Consumption Survey (MECS);" 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.

Some of the downward trend in 2002 compared to the last MECS in 1998 is due to the fact that wood production was down because the United States economy was in recession. Also, the paper and pulp industry is slowly replacing older equipment with newer, more efficient equipment. It is also worth noting that MECS is a sample. It is therefore possible that sampling error accounted for part of the downward revision. Table H3 presents detailed industrial biomass energy consumption by industry and fuel type for 2002 revised comparable to Table 8 for 2003.

Transportation Sector

EIA has revised the methodology used to estimate consumption of energy for alcohol fuels, principally fuel ethanol, so that the methodology across EIA is uniform. Previously, the *Renewable Energy Annual* and *Renewable Energy Trends* reports diverged from the *Annual Energy Review (AER)* and *Monthly Energy Review (MER)* and used the lower heating value of fuels which excludes the latent heat of evaporation. The revised estimates presented in this report assume the higher heating value, used in the AER and MER. Although energy from latent heat of evaporation is not normally used by engines in today's vehicles, it is the full amount of energy available should a technology be developed in the future to harness it. In 2004, this revision resulted in a difference of 31 trillion Btu or an increase of about 11 percent (Table H2).

Table H2. Comparison of Transportation Sector Energy Consumption Assuming Lower and Higher Heating Value, 2000-2004 (Trillion Btu)

Assumption	2000	2001	2002	2003	2004
Lower Heating Value	126	133	156	217	265
Higher Heating Value	139	147	174	239	296

Sources: Energy Information Administration, Form-EIA-819M, "Monthly Oxygenate Telephone Report," and Form EIA-814, "Monthly Imports Report."

Table H3. Industrial Biomass Energy Consumption and Electricity Net Generation by Industry and Energy Sources for MECS Benchmark, 2002

Industry	Energy Source	Biomass Energy Consumption (Trillion Btus)			Net Generation (Million Kilowatthours)	
		Total	For Electricity	For Useful Thermal Output		
Total		1,564.557	481.501	1,083.056	30,747	
Agriculture, Forestry and Mining	Total	11.336	3.126	8.210	205	
	Agricultural Byproducts/Crops	11.238	3.072	8.166	200	
	Other Biomass Gases	0.098	0.054	0.043	5	
Manufacturing	Total	1,459.892	469.893	989.998	29,809	
	Food and Kindred Products	Total	42.592	7.219	35.373	221
		Agricultural Byproducts/Crops	36.000	4.200	31.800	25
Other Biomass Gases		0.529	0.154	0.375	20	
	Other Biomass Liquids	0.143	0.142	0.001	11	
	Other Biomass Solids	3.228	2.055	1.174	108	
	Tires	0.303	0.090	0.213	8	
	Wood/Wood Waste Solids	2.389	0.579	1.810	48	
Lumber	Total	209.151	17.066	192.084	1,389	
	Sludge Waste	*	*	*	**	
	Wood/Wood Waste Liquids	0.151	0.151	-	7	
	Wood/Wood Waste Solids	209.000	16.916	192.084	1,382	
Paper and Allied Products	Total	1,180.634	444.004	736.630	28,057	
	Agricultural Byproducts/Crops	1.000	-	1.000	-	
	Black Liquor	820.000	301.345	518.655	18,653	
	Landfill Gas	0.159	0.056	0.103	3	
	Municipal Solid Waste	2.484	0.613	1.870	122	
	Other Biomass Liquids	0.223	0.091	0.132	8	
	Other Biomass Solids	0.432	0.274	0.158	39	
	Sludge Waste	9.459	3.965	5.494	269	
	Tires	7.167	1.863	5.303	192	
	Wood/Wood Waste Liquids	18.711	5.829	12.882	412	
	Wood/Wood Waste Solids	321.000	129.968	191.032	8,358	
	Chemicals and Allied Products	Total	3.449	0.720	2.729	36
		Municipal Solid Waste	1.273	0.101	1.172	9
Other Biomass Liquids		0.190	0.031	0.158	3	
Other Biomass Solids		*	*	*	**	
Sludge Waste		0.173	0.040	0.133	5	
Wood/Wood Waste Solids		1.813	0.547	1.266	19	
Other a	Total	24.066	0.884	23.182	106	
Nonspecified b	Total	93.330	8.482	84.848	733	
	Black Liquor	4.897	4.897	-	460	
	Landfill Gas	78.000	-	78.000	-	
	Municipal Solid Waste	4.650	-	4.650	-	
	Wood/Wood Waste Liquids	1.456	0.490	0.965	53	
	Wood/Wood Waste Solids	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-846(A,B,C), "Manufacturing Energy Consumption Survey (MECS);" 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.

While total U.S. industrial sector energy consumption grew 2 percent between 2003 and 2004 to 33,447 trillion Btu, industrial biomass energy consumption rose 6 percent to 1,620 trillion Btu.³ Most industrial biomass energy consumption was black liquor and wood waste used by the lumber and paper and pulp industries for the production of “useful thermal output” (e.g. process heat and steam) to support their processes (Tables H3 and 8). Industrial biomass also includes (in lesser quantities) agricultural byproducts/crops, sludge waste, tires and others. Detailed information by industry and type of biomass energy consumed is provided in Table H3 for 2002 and Table 8 for 2003; there was little change between the years, except for the end-use. Energy for useful thermal output increased by 71 trillion Btu in 2003, while energy for electricity generation decreased by 103 trillion Btu.

One hundred six electricity generating plants burned both biomass and coal in 2003 (Table 9). Plants for which biomass is only a small fraction of total energy consumption compared to coal are generally “co-fired” plants attempting to reduce emissions without making major retrofit investments. The remaining plants are dual- or multi-fired plants consuming fuels based on availability, demand and price.

Electricity

Total U.S. electricity generation increased by 2 percent in 2004 to 3,953 billion kilowatthours.⁴ In contrast, renewable electricity generation decreased 1 percent to 359 billion kilowatthours due to reductions in hydropower and biomass energy (Table 11). Wind power increased rapidly by 27 percent, but it still accounted for only 0.36 percent of the U.S. total. Electric power sector generation, including electric utilities and independent power producers, dominated production.

Preliminary estimates of renewable electric capacity indicate there was a slight increase in capacity in 2004, though the change could be higher when EIA releases its final data (Table 12). The growth would probably have been greater but for the expiration of the Production Tax Credit (PTC) in December 2003. During much of 2004, the fate of the PTC was uncertain. The credit was finally renewed retrospectively in October 2004 as part of Public Law 108-311, “The Working Families Tax Relief Act of

2004,” but not in time for construction that year.⁵ Early projections for 2005 were for rapid growth in wind to resume again until the next tax credit expiration date (December 31, 2005).

The largest concentration (48 percent) of renewable electricity generation was in the Pacific Contiguous Census Division (Table 13). This division had the highest concentrations of hydroelectric, geothermal, wind, other biomass and solar power in the nation. Black liquor and wood/wood waste solids were the main energy sources for industrial sector biomass electricity generation and accounted for 63 percent and 32 percent of the sector’s total, respectively (Table 14). Twenty-three percent of the industrial sector biomass generation was from black liquor in the South Atlantic Division.

State Electricity

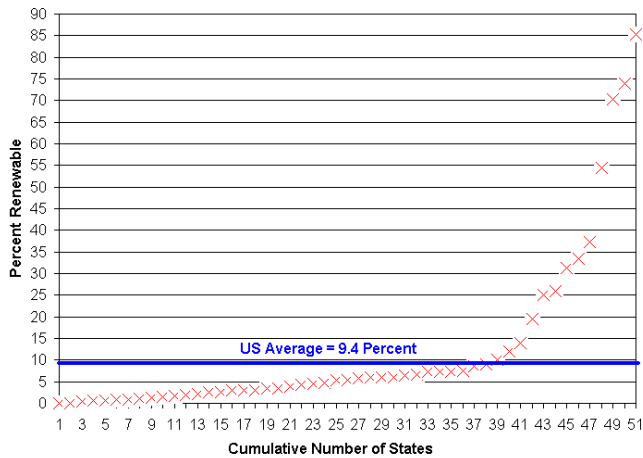
Growth in hydropower in California and the southeastern states led the increase in renewable generation in 2003, followed by other biomass in Florida and New Jersey and wind power in New Mexico, Washington, and West Virginia (Tables 17 and 20). Utility scale wind farms appeared for the first time in 2003 in Illinois, New Mexico, North Dakota, Ohio and Oklahoma (Tables 23 and 26). The major components of change in capacity were a nearly 1,600 MW expansion of wind, partially offset by a 660 MW decrease in hydroelectric capacity.

³ Energy Information Administration, *Monthly Energy Review April 2005*, DOE/EIA-0035(2005/01) (Washington, DC, April 2005), Table 2.4, p. 31.

⁴ Energy Information Administration, *Monthly Energy Review April 2005*, DOE/EIA-0035(2005/01) (Washington, DC, April 2005), Table 7.2a, p. 99.

⁵ American Wind Energy Association, Press Release for September 27, 2004. See website: <http://www.awea.org/news/news040924wti.html> .

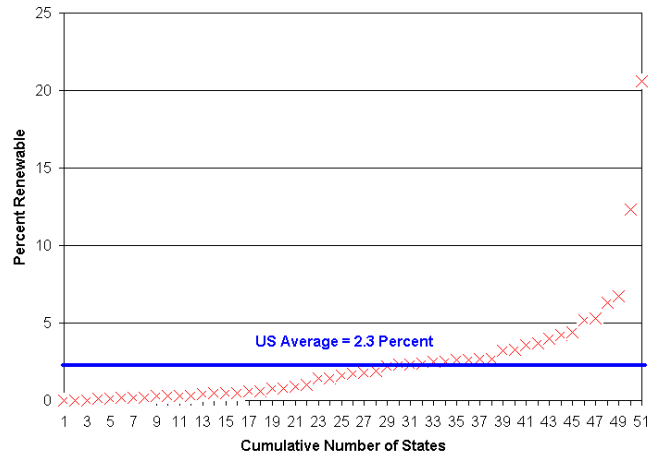
Figure H3. Renewable Electricity Generation Market Share by State, 2003



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

Overall, renewable electricity was 9 percent of total U.S. net generation; excluding hydropower, the share was only 2 percent (Table 27). Three northwestern states (Idaho, Oregon, and Washington) had more than 70 percent of their electricity provided by renewable energy, while 35 states had at least 3 percent (Table 27 and Figure H3). Excluding conventional hydropower, the number dropped to 13 states, led by Maine with 21 percent and California with 12 percent (Table 27 and Figure H4).

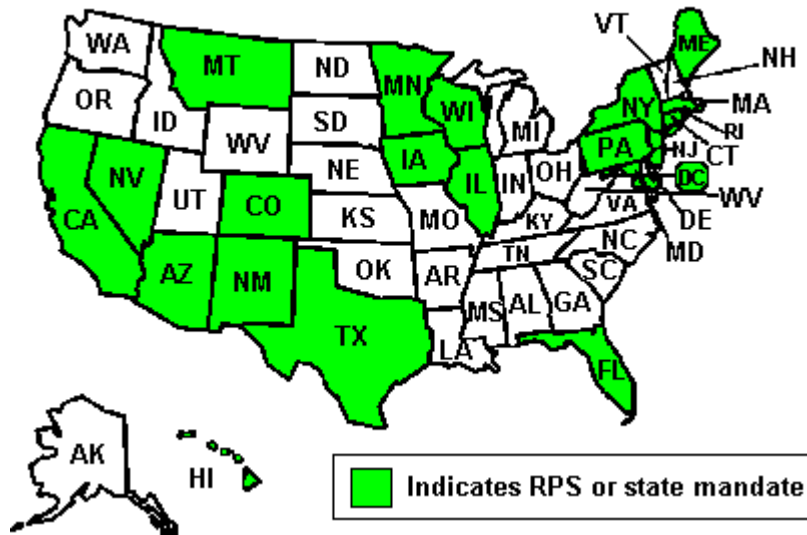
Figure H4. Renewable Nonhydro Electricity Generation Market Share by State, 2003



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

By mid-2005, 22 states had renewable portfolio standards or state mandates (Table 28 and Figure H5). Maryland, Pennsylvania, Rhode Island, Washington, DC and Montana adopted renewable portfolio standards during 2004 and the first half of 2005. In addition, Hawaii’s voluntary standard established in 2001 was changed to an enforceable standard in 2004.

Figure H5. Renewable Portfolio Standards and State Mandates by State, 2005



(a) In Colorado and Florida the RPS is not statewide.
 Note: In some states, such as Illinois, the renewable portfolio standard (RPS) is voluntary.
 States shaded in green have an RPS or state mandate.

Sources: All states except Montana: North Carolina Solar Center, Database of State Incentive for Renewable Energy (DSIRE) website: <http://www.dsireusa.org> (May 5, 2005). Montana: U.S. Department of Energy, EERE Network News, “Montana Laws Set the Requirements for Renewable Energy and Ethanol,” May 11, 2005.

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**Table 1. U.S. Energy Consumption by Energy Source, 2000-2004
(Quadrillion Btu)**

Energy Source	2000	2001	2002	2003	2004 ^P
Total ^a	98.961	96.464	97.952	98.714	100.278
Fossil Fuels	84.965	83.176	84.070	84.889	86.186
Coal	22.580	21.952	21.980	22.723	22.918
Coal Coke Net Imports	0.065	0.029	0.061	0.051	0.138
Natural Gas ^b	23.916	22.861	23.628	23.069	23.000
Petroleum ^c	38.404	38.333	38.401	39.047	40.130
Electricity Net Imports	0.115	0.075	0.078	0.022	0.039
Nuclear Electric Power	7.862	8.033	8.143	7.959	8.232
Renewable Energy	6.158	5.328	5.835	6.082	6.117
Conventional Hydroelectric	2.811	2.242	2.689	2.825	2.725
Geothermal Energy	0.317	0.311	0.328	0.339	0.340
Biomass ^d	2.907	2.640	2.648	2.740	2.845
Solar Energy	0.066	0.065	0.064	0.064	0.063
Wind Energy	0.057	0.070	0.105	0.115	0.143

^a Ethanol blended into motor gasoline is included in both "Petroleum" and "Biomass," but is counted only once in total consumption.

^b Includes supplemental gaseous fuels.

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

^d Biomass includes: black liquor, wood/wood waste liquids, wood/wood waste solids, municipal solid waste (MSW), landfill gas, agriculture byproducts/crops, sludge waste, tires, alcohol fuels (primarily ethanol derived from corn and blended into motor gasoline) and other biomass solids, liquids and gases.

P=Preliminary.

Note: Data revisions are discussed in Highlights section. Totals may not equal sum of components due to independent rounding.

Sources: Non-renewable energy: Energy Information Administration (EIA), Monthly Energy Review (MER) March 2005, DOE/EIA-0035 (2005/03)

(Washington, DC, March 2005,) Tables 1.3 and 1.4. Renewable Energy: Table 2 of this report. As a result totals in this table do not match the March MER.

**Table 2. Renewable Energy Consumption by Energy Use Sector and Energy Source, 2000-2004
(Quadrillion Btu)**

Sector and Source	2000	2001	2002	2003	2004 ^P
Total	6.158	5.328	5.835	6.082	6.117
Residential	0.503	0.439	0.382	0.434	0.408
Biomass	0.433	0.370	0.313	0.359	0.332
Geothermal	0.009	0.009	0.010	0.017	0.018
Solar ^a	0.061	0.060	0.059	0.058	0.057
Commercial	0.109	0.089	0.090	0.102	0.106
Biomass	0.100	0.080	0.081	0.087	0.089
Wood/Wood Waste	0.053	0.040	0.039	0.040	0.041
MSW/Landfill Gas ^b	0.041	0.035	0.037	0.042	0.043
Other Biomass	0.006	0.004	0.005	0.006	0.005
Geothermal	0.008	0.008	0.009	0.014	0.015
Conventional Hydroelectric	0.001	0.001	*	0.001	0.001
Industrial	1.828	1.630	1.608	1.581	1.676
Biomass	1.781	1.593	1.565	1.533	1.620
Wood/Wood Waste	1.636	1.443	1.396	1.363	1.448
MSW/Landfill Gas	0.064	0.074	0.087	0.085	0.088
Other Biomass ^b	0.081	0.076	0.081	0.085	0.084
Geothermal	0.004	0.005	0.005	0.005	0.005
Conventional Hydroelectric	0.042	0.033	0.039	0.043	0.051
Transportation	0.139	0.147	0.174	0.239	0.296
Alcohol Fuels ^c	0.139	0.147	0.174	0.239	0.296
Electric Power ^d	3.579	3.023	3.581	3.725	3.632
Biomass	0.453	0.450	0.516	0.522	0.508
Wood/Wood Waste	0.134	0.126	0.150	0.167	0.168
MSW/Landfill Gas	0.295	0.310	0.343	0.314	0.312
Other Biomass ^b	0.023	0.014	0.022	0.041	0.028
Geothermal	0.296	0.289	0.305	0.303	0.302
Conventional Hydroelectric	2.768	2.209	2.650	2.781	2.673
Solar	0.005	0.006	0.006	0.005	0.006
Wind	0.057	0.070	0.105	0.115	0.143

^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 The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public.

*=Less than 500 billion Btu.

P=Preliminary.

Note: Data revisions are discussed in the Highlights section. 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," Form EIA-920, "Combined Heat and 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," Form EIA-906, "Power Plant Report," and Form EIA-920, "Combined Heat and 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," Form EIA-906, "Power Plant Report" and Form EIA-920, "Combined Heat and Power Plant Report."

Table 3. Renewable Energy Consumption for Electricity Generation by Energy Use Sector and Energy Source, 2000-2004
(Quadrillion Btu)

Sector/Source	2000	2001	2002	2003	2004 ^P
Total	3.995	3.439	4.109	4.150	4.269
Biomass	0.826	0.833	1.004	0.902	1.092
Wood/Wood Waste	0.496	0.486	0.605	0.519	0.710
MSW/Landfill Gas	0.297	0.323	0.360	0.335	0.339
Other Biomass ^a	0.033	0.023	0.039	0.048	0.044
Geothermal	0.296	0.289	0.305	0.303	0.302
Conventional Hydroelectric	2.811	2.242	2.689	2.825	2.725
Solar	0.005	0.006	0.006	0.005	0.006
Wind	0.057	0.070	0.105	0.115	0.143
Commercial	0.028	0.023	0.029	0.031	0.033
Biomass	0.026	0.023	0.029	0.031	0.032
Wood/Wood Waste	*	*	*	*	0.001
MSW/Landfill Gas	0.021	0.019	0.024	0.026	0.028
Other Biomass ^a	0.005	0.004	0.004	0.005	0.004
Conventional Hydroelectric	0.001	0.001	*	0.001	0.001
Industrial	0.421	0.412	0.520	0.422	0.619
Biomass	0.379	0.380	0.481	0.379	0.568
Wood/Wood Waste	0.369	0.370	0.464	0.362	0.551
MSW/Landfill Gas	*	0.003	0.001	0.002	0.003
Other Biomass ^a	0.009	0.007	0.016	0.015	0.013
Conventional Hydroelectric	0.042	0.033	0.039	0.043	0.051
Electric Power ^b	3.547	3.003	3.560	3.697	3.617
Biomass	0.421	0.430	0.494	0.493	0.492
Wood/Wood Waste	0.126	0.116	0.141	0.156	0.158
MSW/Landfill Gas	0.275	0.301	0.334	0.308	0.308
Other Biomass ^a	0.020	0.013	0.019	0.029	0.027
Geothermal	0.296	0.289	0.305	0.303	0.302
Conventional Hydroelectric	2.768	2.209	2.650	2.781	2.673
Solar	0.005	0.006	0.006	0.005	0.006
Wind	0.057	0.070	0.105	0.115	0.143

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

^b The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public.

* =Less than 500 billion Btu.

P=Preliminary.

Note: Data revisions are discussed in the Highlights section. 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 " and Form EIA-920, "Combined Heat and Power Plant Report."

Table 4. Renewable Energy Consumption for Nonelectric Use by Energy Use Sector and Energy Source, 2000-2004 (Quadrillion Btu)

Sector/Source	2000	2001	2002	2003	2004 ^P
Total	2.163	1.890	1.727	1.932	1.848
Biomass	2.081	1.808	1.644	1.837	1.753
Wood	1.761	1.493	1.294	1.410	1.279
MSW/Landfill Gas	0.104	0.095	0.108	0.105	0.104
Other Biomass ^a	0.077	0.071	0.069	0.083	0.073
Alcohol Fuels ^b	0.139	0.147	0.174	0.239	0.296
Geothermal	0.021	0.022	0.024	0.036	0.038
Solar ^c	0.061	0.060	0.059	0.058	0.057
Residential	0.503	0.439	0.382	0.434	0.408
Biomass	0.433	0.370	0.313	0.359	0.332
Wood	0.433	0.370	0.313	0.359	0.332
Geothermal	0.009	0.009	0.010	0.017	0.018
Solar ^e	0.061	0.060	0.059	0.058	0.057
Commercial	0.082	0.065	0.061	0.071	0.072
Biomass	0.074	0.057	0.053	0.057	0.057
Wood	0.053	0.040	0.039	0.039	0.041
MSW/Landfill Gas	0.020	0.016	0.013	0.016	0.015
Other Biomass ^a	0.001	0.001	0.001	0.001	0.001
Geothermal	0.008	0.008	0.009	0.014	0.015
Industrial	1.407	1.218	1.088	1.159	1.057
Biomass	1.402	1.213	1.083	1.154	1.052
Wood	1.267	1.073	0.932	1.001	0.897
MSW/Landfill Gas	0.063	0.071	0.086	0.083	0.084
Other Biomass ^a	0.072	0.069	0.065	0.070	0.071
Geothermal	0.004	0.005	0.005	0.005	0.005
Transportation					
Alcohol Fuels ^b	0.139	0.147	0.174	0.239	0.296
Electric Power ^d	0.032	0.020	0.022	0.028	0.016
Biomass	0.032	0.020	0.022	0.028	0.016
Wood	0.008	0.010	0.010	0.011	0.010
MSW/Landfill Gas	0.020	0.008	0.009	0.006	0.005
Other Biomass ^a	0.004	0.001	0.003	0.012	0.001

^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 The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public.

^P Preliminary.

Note: Data revisions are discussed in the Highlights section. 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," Form EIA-920, "Combined Heat and 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 " and Form EIA-920, "Combined Heat and 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 " and Form EIA-920, "Combined Heat and Power Plant Report."

**Table 5a. Historical Renewable Energy Consumption by Energy Use Sector and Energy Source, 1989-1999
(Quadrillion Btu)**

Sector and Energy Source	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total	6.294	6.133	6.158	5.907	6.157	6.065	6.669	7.137	7.075	6.561	6.599
Biomass	3.062	2.662	2.702	2.847	2.804	2.939	3.068	3.127	3.006	2.835	2.885
Wood	2.637	2.191	2.190	2.290	2.228	2.315	2.420	2.467	2.350	2.175	2.224
Waste ^a	0.354	0.408	0.440	0.473	0.479	0.515	0.531	0.577	0.551	0.542	0.540
Alcohol Fuels ^b	0.071	0.063	0.073	0.083	0.097	0.109	0.117	0.084	0.106	0.117	0.122
Geothermal	0.317	0.336	0.346	0.349	0.364	0.338	0.294	0.316	0.325	0.328	0.331
Conventional Hydroelectric	2.837	3.046	3.016	2.617	2.892	2.683	3.205	3.590	3.640	3.297	3.268
Solar ^c	0.055	0.060	0.063	0.064	0.066	0.069	0.070	0.071	0.070	0.070	0.069
Wind	0.022	0.029	0.031	0.030	0.031	0.036	0.033	0.033	0.034	0.031	0.046
Residential	0.976	0.642	0.677	0.711	0.616	0.607	0.667	0.667	0.506	0.459	0.486
Biomass	0.918	0.581	0.613	0.645	0.548	0.537	0.596	0.595	0.433	0.387	0.414
Wood	0.918	0.581	0.613	0.645	0.548	0.537	0.596	0.595	0.433	0.387	0.414
Geothermal	0.005	0.006	0.006	0.006	0.007	0.006	0.007	0.007	0.008	0.008	0.009
Solar ^c	0.053	0.056	0.058	0.060	0.062	0.064	0.065	0.065	0.065	0.065	0.064
Commercial	0.061	0.071	0.072	0.081	0.084	0.086	0.092	0.110	0.113	0.111	0.114
Biomass	0.058	0.067	0.068	0.076	0.079	0.081	0.086	0.103	0.107	0.102	0.106
Wood	0.036	0.039	0.041	0.044	0.046	0.046	0.046	0.050	0.049	0.048	0.052
Waste ^a	0.022	0.028	0.026	0.032	0.033	0.035	0.040	0.053	0.058	0.054	0.054
Geothermal	0.003	0.003	0.003	0.003	0.003	0.004	0.005	0.005	0.006	0.007	0.007
Conventional Hydroelectric	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Industrial	1.814	1.667	1.626	1.672	1.697	1.844	1.905	1.971	1.976	1.841	1.843
Biomass	1.784	1.634	1.595	1.640	1.666	1.779	1.847	1.907	1.915	1.784	1.791
Wood	1.584	1.442	1.410	1.461	1.484	1.580	1.652	1.683	1.731	1.603	1.620
Waste ^a	0.200	0.192	0.185	0.179	0.181	0.199	0.195	0.224	0.184	0.180	0.171
Geothermal	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004
Conventional Hydroelectric	0.028	0.031	0.030	0.031	0.030	0.062	0.055	0.061	0.058	0.055	0.049
Solar											
Wind											
Transportation	0.071	0.063	0.073	0.083	0.097	0.109	0.117	0.084	0.106	0.117	0.122
Alcohol Fuels ^b	0.071	0.063	0.073	0.083	0.097	0.109	0.117	0.084	0.106	0.117	0.122
Electric Power Sector ^d	3.372	3.689	3.710	3.360	3.662	3.420	3.889	4.305	4.375	4.032	4.034
Electric Utilities	2.983	3.151	3.114	2.712	2.953	2.714	3.173	3.553	3.620	3.279	3.123
Biomass	0.020	0.022	0.021	0.022	0.021	0.021	0.017	0.020	0.020	0.021	0.020
Wood	0.010	0.008	0.008	0.008	0.009	0.008	0.007	0.008	0.008	0.007	0.007
Waste ^a	0.010	0.013	0.014	0.013	0.011	0.013	0.010	0.012	0.013	0.013	0.013
Geothermal	0.197	0.181	0.170	0.169	0.158	0.145	0.099	0.110	0.115	0.109	0.036
Conventional Hydroelectric	2.765	2.948	2.923	2.521	2.774	2.549	3.056	3.423	3.485	3.149	3.067
Solar	*	*	*	*	*	*	*	*	*	*	*
Wind	*	*	*	*	*	*	*	*	*	*	*
Independent Power Producer	0.389	0.538	0.596	0.648	0.709	0.705	0.716	0.752	0.754	0.753	0.910
Biomass	0.211	0.295	0.333	0.381	0.394	0.413	0.405	0.418	0.426	0.424	0.433
Wood	0.089	0.120	0.118	0.132	0.141	0.144	0.119	0.130	0.129	0.129	0.131
Waste	0.122	0.175	0.215	0.249	0.253	0.269	0.286	0.288	0.296	0.294	0.302
Geothermal	0.111	0.145	0.165	0.168	0.193	0.180	0.181	0.191	0.194	0.202	0.276
Conventional Hydroelectric	0.043	0.066	0.062	0.065	0.087	0.072	0.093	0.104	0.096	0.092	0.151
Solar	0.003	0.004	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005	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

See footnotes at end of table.

Table 5b. Historical Renewable Energy Consumption by Energy Use Sector and Energy Source, 2000-2004 (Continued)
(Quadrillion Btu)

Sector and Energy Source	2000	2001	2002	2003	2004 ^P
Total	6.158	5.328	5.835	6.082	6.117
Biomass	2.907	2.640	2.648	2.740	2.845
Wood	2.257	1.980	1.899	1.929	1.989
Waste ^a	0.511	0.514	0.576	0.571	0.560
Alcohol Fuels ^b	0.139	0.147	0.174	0.239	0.296
Geothermal	0.317	0.311	0.328	0.339	0.340
Conventional Hydroelectric	2.811	2.242	2.689	2.825	2.725
Solar ^c	0.066	0.065	0.064	0.064	0.063
Wind	0.057	0.070	0.105	0.115	0.143
Residential	0.503	0.439	0.382	0.434	0.408
Biomass	0.433	0.370	0.313	0.359	0.332
Wood	0.433	0.370	0.313	0.359	0.332
Geothermal	0.009	0.009	0.010	0.017	0.018
Solar	0.061	0.060	0.059	0.058	0.057
Commercial	0.109	0.089	0.090	0.102	0.106
Biomass	0.100	0.080	0.081	0.087	0.089
Wood	0.053	0.040	0.039	0.040	0.041
Waste ^a	0.047	0.039	0.042	0.047	0.048
Geothermal	0.008	0.008	0.009	0.014	0.015
Conventional Hydroelectric	0.001	0.001	0.000	0.001	0.001
Industrial	1.828	1.630	1.608	1.581	1.676
Biomass	1.781	1.593	1.565	1.533	1.620
Wood	1.636	1.443	1.396	1.363	1.448
Waste ^a	0.145	0.150	0.168	0.170	0.172
Geothermal	0.004	0.005	0.005	0.005	0.005
Conventional Hydroelectric	0.042	0.033	0.039	0.043	0.051
Solar					
Wind					
Transportation	0.139	0.147	0.174	0.239	0.296
Alcohol Fuels ^b	0.139	0.147	0.174	0.239	0.296
Electric Power Sector ^d	3.579	3.023	3.581	3.725	3.632
Electric Utilities	2.607	2.067	2.545	2.622	2.505
Biomass	0.021	0.019	0.049	0.036	0.029
Wood	0.007	0.006	0.011	0.017	0.012
Waste ^a	0.014	0.013	0.038	0.020	0.016
Geothermal	0.003	0.003	0.029	0.026	0.026
Conventional Hydroelectric	2.582	2.044	2.465	2.556	2.447
Solar	*	*	*	*	*
Wind	*	0.001	0.002	0.004	0.003
Independent Power Producer	0.972	0.956	1.036	1.103	1.127
Biomass	0.432	0.432	0.467	0.485	0.479
Wood	0.127	0.121	0.140	0.151	0.155
Waste	0.305	0.311	0.327	0.335	0.324
Geothermal	0.293	0.286	0.275	0.277	0.275
Conventional Hydroelectric	0.185	0.165	0.185	0.224	0.227
Solar	0.005	0.006	0.006	0.005	0.006
Wind	0.057	0.068	0.103	0.111	0.140

See footnotes at end of table.

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Table 5a and 5b. Historical Renewable Energy Consumption by Energy Use Sector and Energy Source, 2000-2004 (Continued)

Notes and Sources

^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.

^d The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public.

*=Less than 500 billion Btu.

P=Preliminary.

Note: Data revisions are discussed in the Highlights section. Blank cell indicates the sector has no data to report for that energy source. 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-63A, "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, Form EIA-920, "Combined Heat and 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," Form EIA-920, "Combined Heat and 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," Form EIA-906, "Monthly Power Plant Report," and Form EIA-920, "Combined Heat and Power Plant Report."

**Table 6. Biomass Energy Consumption by Energy Source and Energy Use Sector, 2000-2004
(Trillion Btu)**

Sector/Source	2000	2001	2002	2003	2004 ^P
Total	2,907	2,640	2,648	2,740	2,845
Wood Energy Total	2,257	1,980	1,899	1,929	1,989
Residential	433	370	313	359	332
Commercial	53	40	39	40	41
Industrial	1,636	1,443	1,396	1,363	1,448
Electric Power ^a	134	126	150	167	168
Waste Energy Total	511	514	576	571	560
MSW/Landfill Gas	400	419	467	440	443
Commercial	41	35	37	42	43
Industrial	64	74	87	85	88
Electric Power ^a	295	310	343	314	312
Other Biomass ^b	111	95	108	131	117
Commercial	6	4	5	6	5
Industrial	81	76	81	85	84
Electric Power ^a	23	14	22	41	28
Alcohol Fuels Total ^c	139	147	174	239	296
Transportation	139	147	174	239	296

^a The electric power sector comprises electricity-only and combined-heat-power (CHP) within the North American Industry Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public.

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

^c Ethanol primarily derived from corn.

P=Preliminary.

Note: Data revisions are discussed in the Highlights section. Totals may not equal sum. of components due to independent rounding.

Sources: Table 2 of this report.

**Table 7. Waste Energy Consumption by Type of Waste and Energy Use Sector, 2003
(Trillion Btu)**

Type	Commercial	Industrial	Electric Utilities	Independent Power Producers	Total
Total	47	170	20	335	571
MSW and Landfill Gas	42	85	14	299	440
MSW	40	9	4	240	293
Landfill Gas	1	76	10	59	147
Other Biomass ^a	6	85	5	35	131

^aAgriculture 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," Form EIA-920, "Combined Heat and 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 8. Industrial Biomass Energy Consumption and Electricity Net Generation by Industry and Energy Sources, 2003

Industry	Energy Source	Biomass Energy Consumption (Trillion Btus)			Net Generation (Million Kilowatthours)
		Total	For Electricity	For Useful Thermal Output	
Total	Total	1,532.947	378.706	1,154.242	29,001
Agriculture, Forestry, and Mining	Total	9.010	2.720	6.290	167
	Agricultural Byproducts/Crops	9.010	2.720	6.290	167
Manufacturing	Total	1,444.208	375.986	1,068.222	28,834
Food and Kindred Industry Products	Total	41.318	5.176	36.142	104
	Agricultural Byproducts/Crops	37.153	4.073	33.079	28
	Other Biomass Gases	0.278	0.217	0.062	8
	Other Biomass Liquids	0.067	0.067	-	5
	Tires	0.379	0.179	0.201	14
	Wood/Wood Waste Solids	3.441	0.641	2.801	49
Lumber	Total	216.442	16.364	200.078	1,499
	Sludge Waste	0.058	0.019	0.039	3
	Wood/Wood Waste Liquids	0.248	0.080	0.168	12
	Wood/Wood Waste Solids	216.137	16.265	199.872	1,483
Paper and Allied Products	Total	1,150.781	352.138	798.643	27,039
	Agricultural Byproducts/Crops	1.131	0.092	1.040	7
	Black Liquor	814.120	239.340	574.780	18,311
	Landfill Gas	0.310	0.063	0.247	7
	Municipal Solid Waste	2.274	0.427	1.848	53
	Other Biomass Liquids	0.071	0.034	0.037	2
	Other Biomass Solids	0.741	0.586	0.155	59
	Sludge Waste	10.136	3.536	6.600	251
	Tires	7.540	2.627	4.913	253
	Wood/Wood Waste Liquids	21.019	4.697	16.322	416
	Wood/Wood Waste Solids	293.439	100.738	192.701	7,679
	Chemicals and Allied Products	Total	3.870	0.745	3.125
Landfill Gas		0.214	0.041	0.173	4
Municipal Solid Waste		1.398	0.122	1.276	12
Other Biomass Liquids		0.073	0.014	0.059	0
Other Biomass Solids		0.004	0.001	0.003	0
Sludge Waste		0.300	0.072	0.228	9
Wood/Wood Waste Solids		1.881	0.496	1.385	18
Other ^a	Total	31.797	1.564	30.233	149
Nonspecified ^b	Total	79.730	-	79.730	-
	Landfill Gas	74.730	-	74.730	-
	Municipal Solid Waste	5.000	-	5.000	-

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

^bPrimary purpose of business is not specified.

- = Not Applicable.

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. Net Generation and Fuel Consumption at Power Plants Consuming Coal and Biomass by States and Plant Name, 2003

State	Company Name	Plant I.D.	Plant Name	County	Net Electricity Generation (Thousand Kilowatthours)	Total Energy Consumed (MMBTU)	Energy Consumed from Biomass (MMBTU)	Percent of Energy Consumed from		
								Biomass	Coal	Other
AL	Bowater Nwprt Coosa Pines Op	54216	U S Alliance Coosa Pines	Talladega	173,254	13,134,273	5,911,501	45.01	54.99	
AL	Georgia-Pacific Corp	10699	Georgia Pacific Naheola Mill	Choctaw	428,406	17,123,967	12,892,753	75.29	14.18	10.53
AL	Gulf States Paper Corp	54763	Gulf States Paper	Marengo	144,742	10,488,058	8,689,654	82.85	7.30	9.85
AL	International Paper Co	52140	International Paper Prattville	Autauga	496,108	20,716,033	16,225,436	78.32	8.78	12.89
AL	Mobile Energy Service Holdings	50407	Mobile Energy Services LLC	Mobile	416,485	6,961,111	3,033,258	43.57	52.68	3.75
AL	Weyerhaeuser Co	54752	Weyerhaeuser Pine Hill Operati	Wilcox	477,473	6,352,999	3,621,355	57.00	10.01	32.99
AK	U S Air Force-Eielson AFB	50392	Eielson AFB Central Heat & Pow	Fairbanks North Star	82,455	2,919,023	26,599	0.91	97.77	1.32
AZ	Tucson Electric Power Co	126	Irvington	Pima	1,048,187	11,086,805	154,014	1.39	56.56	42.05
AR	Domtar Industries Inc	54104	Ashdown	Little River	849,495	41,001,419	36,029,685	87.87	8.03	4.10
CA	Air Products Energy Enterprise	10640	Stockton Cogen	San Joaquin	452,689	5,741,432	528,273	9.20	54.29	36.50
CA	Mt Poso Cogeneration Co	54626	Mt Poso Cogeneration	Kern	450,228	5,125,472	12,237	0.24	69.44	30.32
CT	Covanta Mid-Connecticut Inc	54945	Covanta Mid-Connecticut Energy	Hartford	450,215	8,664,367	8,512,216	98.24	1.76	
FL	Gulf Power Co	641	Crist	Escambia	6,413,151	66,408,961	2,080	0.00	99.79	0.21
FL	International Paper Co-Pensacola	50250	International Paper Pensacola	Escambia	463,167	19,758,653	14,615,865	73.97	13.54	12.48
FL	JEA	667	Northside Generating Station	Duval	4,724,993	48,641,433	76,943	0.16	15.18	84.67
FL	Jefferson Smurfit Corp	10202	Jefferson Smurfit Fernandina B	Nassau	593,529	18,167,538	11,360,666	62.53	30.73	6.74
FL	Lakeland City of	676	C D McIntosh Jr	Polk	4,271,266	39,831,464	62,406	0.16	59.17	40.67
FL	Orlando Utilities Comm	564	Stanton Energy Center	Orange	6,054,342	59,081,269	1,007,967	1.71	98.14	0.16
FL	Stone Container Corp-Panama Ci	50807	Stone Container Panama City Mi	Bay	236,641	20,068,826	17,409,869	86.75	7.52	5.73
FL	US Operating Services Co.- Cedar Bay	10672	Cedar Bay Generating LP	Duval	1,833,539	23,812,502	60,039	0.25	99.54	0.21
GA	Georgia Pacific Corp	54101	Georgia Pacific Cedar Springs	Early	701,709	37,200,341	28,956,649	77.84	18.10	4.06
GA	Georgia-Pacific Corp	10361	Savannah River Mill	Effingham	616,517	9,999,695	55,381	0.55	9.12	90.33
GA	Inland Paperboard & Package Inc	10426	Inland Paperboard Packaging Ro	Floyd	437,595	21,075,416	12,717,543	60.34	27.61	12.05
GA	International Paper Co	50398	International Paper Savanna Mi	Chatham	819,569	22,625,484	13,597,613	60.10	30.75	9.15
GA	International Paper Co-Augusta	54358	International Paper Augusta Mi	Richmond	499,834	23,164,308	15,929,560	68.77	22.49	8.74
GA	Riverwood Intl USA Inc	54464	Riverwood International Macon	Bibb	272,388	12,444,817	9,829,168	78.98	9.98	11.04
GA	SP Newsprint Company	54004	SP Newsprint	Laurens	257,674	8,242,895	5,876,174	71.29	19.73	8.98
HI	AES Hawaii Inc	10673	AES Hawaii	Oahu	1,558,310	15,768,698	197,811	1.25	98.03	0.72
HI	Hawaiian Com & Sugar Co Ltd	10604	Hawaiian Comm and Sugar Puunen	Maui	196,437	6,327,592	5,073,883	80.19	18.02	1.80
IL	Archer Daniels Midland Co	10865	Archer Daniels Midland Decatur	Macon	1,285,911	35,123,776	379,235	1.08	98.92	
IL	Dynegy Midwest Generation Inc	889	Baldwin Energy Complex	Randolph	13,090,406	133,957,397	1,082,779	0.81	99.10	0.09
IA	Ames City of	1122	Ames Electric Services Power P	Story	417,670	5,042,727	351,818	6.98	92.46	0.56
IA	Interstate Power and Light Co	1073	Prairie Creek	Linn	988,852	10,404,803	126,754	1.22	97.23	1.55
IA	Interstate Power and Light Co	1058	Sixth Street	Linn	147,644	3,280,837	20,616	0.63	77.34	22.03
IA	University of Iowa	54775	University of Iowa Main Power	Johnson	96,154	3,493,728	303,494	8.69	80.71	10.60
KY	Owensboro City of	1374	Elmer Smith	Daviess	2,576,356	26,232,220	315,669	1.20	97.60	1.20
LA	IPC-Mansfield Mill	54091	Mansfield Mill	De Soto	823,390	25,267,624	20,284,572	80.28	5.28	14.44
LA	International Paper Co	54090	International Paper Louisiana	Morehouse	573,028	20,240,021	17,793,018	87.91	1.44	10.65
ME	Rumford Cogeneration Co	10495	Rumford Cogeneration	Oxford	761,994	14,988,922	10,674,204	71.21	28.79	
ME	S D Warren Co.- Westbrook	50447	S D Warren Somerset	Cumberland	405,698	6,776,035	3,981,923	58.76	37.70	3.54
MD	MeadWestvaco Corp	50282	Luke Mill	Allegany	479,094	17,525,830	7,452,148	42.52	57.48	
MI	International Paper Co-Quinnes	50251	International Paper Quinnesec	Dickinson	220,975	10,079,834	9,772,982	96.96	0.18	2.86
MI	Louisiana Pacific Co	10149	Louisiana Pacific	Alpena	44,646	739,198	57,597	7.79	60.85	31.36
MI	MeadWestvaco Corp.	10208	Mead Paper	Delta	684,599	18,935,467	12,154,663	64.19	22.06	13.75

Footnotes at end of table.

Table 9. Net Generation of and Fuel Consumption at Power Plants Consuming Coal and Biomass by States and Plant Name, 2003 (Continued)

State	Company Name	Plant I.D.	Plant Name	County	Net Electricity Generation (Thousand Kilowatthours)	Total Energy Consumed (MMBTU)	Energy Consumed from Biomass (MMBTU)	Percent of Energy Consumed from		
								Biomass	Coal	Other
MI	S D Warren Co	50438	S D Warren Muskegon	Muskegon	250,591	7,668,122	2,867,940	37.40	58.72	3.87
MI	TES Filer City Station LP	50835	TES Filer City Station	Manistee	458,857	6,101,760	501,018	8.21	91.79	
MI	Wyandotte Municipal Serv Comm	1866	Wyandotte	Wayne	270,603	3,951,663	305,851	7.74	91.39	0.87
MN	Hiing Public Utilities Comm	1979	Hiing	St Louis	45,670	1,531,495	78	0.01	99.99	0.00
MN	Minnesota Power Inc	10686	Rapids Energy Center	Itasca	130,699	3,608,215	2,769,301	76.75	16.16	7.09
MS	Weyerhaeuser Co	50184	Weyerhaeuser Columbus MS	Lowndes	613,650	20,090,225	18,705,609	93.11	3.83	3.06
MO	Anheuser-Busch Inc	10430	Anheuser Busch St Louis	St Louis City	120,498	4,094,333	278,326	6.80	88.85	4.35
MO	Aquila, Inc.	2094	Sibley	Jackson	3,170,801	32,841,421	314,186	0.96	99.01	0.04
MO	Empire District Electric Co	2076	Asbury	Jasper	1,301,578	14,793,004	298,172	2.02	97.72	0.27
MO	Hercules Incorporated	10207	Hercules Missouri Chemical Wor	Pike	84,970	2,864,296	3,573	0.12	98.92	0.95
MO	Marshall City of	2144	Marshall	Saline	35,538	571,009	4,734	0.83	94.14	5.03
MO	Union Electric Co	2107	Sioux	St Charles	6,332,833	60,585,566	631,649	1.04	98.15	0.81
MO	University of Missouri-Columba	50969	University of Missouri Columbi	Boone	127,509	3,444,927	76,558	2.22	91.00	6.78
NY	AES Greenidge	2527	AES Greenidge LLC	Yates	1,040,354	11,705,155	99,328	0.85	98.90	0.25
NY	Black River Power LLC	10464	Black River Power LLC	Jefferson	355,861	4,539,007	9,635	0.21	74.06	25.73
NY	WPS Power Development	50202	WPS Power Niagara	Niagara	251,890	3,353,781	28,760	0.86	98.21	0.94
NC	Blue Ridge Paper Products Inc	50244	Canton North Carolina	Haywood	344,245	20,265,972	9,641,230	47.57	52.12	0.30
NC	Corn Products Intl Inc	54618	Corn Products Winston Salem	Forsyth	56,591	3,948,209	3,441,379	87.16	11.73	1.11
NC	International Paper Co-Buckspt	50254	International Paper Roanoke Ra	Halifax	174,563	12,732,892	8,624,055	67.73	23.23	9.04
NC	International Paper Co-Riegel	54656	International Paper Riegelwood	Columbus	503,301	25,783,234	18,114,256	70.26	5.22	24.52
NC	North Carolina Power Holdings, LLC	10380	Elizabethtown Power LLC	Bladen	117,590	1,659,872	383,987	23.13	76.87	
NC	North Carolina Power Holdings, LLC	10382	Lumberton	Robeson	83,280	1,075,248	201,011	18.69	81.31	
NC	Weyerhaeuser Co	50189	Weyerhaeuser Plymouth NC	Martin	806,280	39,957,341	32,330,211	80.91	17.27	1.81
OH	Columbus Southern Power Co	2843	Picway	Pickaway	402,519	4,674,846	29,550	0.63	98.86	0.51
OH	MeadWestvaco Corp	10244	Mead Custom Paper	Ross	532,453	15,151,763	8,077,827	53.31	45.29	1.40
PA	Kimberly-Clark Corp	50410	Chester Operations	Delaware	389,779	6,591,803	23,657	0.36	54.54	45.10
PA	Northampton Generating Co LP	50888	Northampton Generating LP	Northampton	820,274	8,762,273	205,553	2.35	56.42	41.24
PA	Northeastern Power Co	50039	Kline Township Cogen Facility	Schuylkill	393,564	5,978,255	423,384	7.08	92.01	0.91
PA	P H Glatfelter Co	50397	P H Glatfelter	York	680,328	17,422,344	8,766,181	50.32	48.75	0.94
PA	Weyerhaeuser	54638	Johnsonburg Mill	Elk	279,550	8,572,138	4,801,100	56.01	38.92	5.07
SC	International Paper Co-Eastovr	52151	International Paper Eastover F	Richland	529,454	21,208,564	16,189,319	76.33	16.94	6.72
SC	International Paper Co-GT Mill	54087	International Paper Georgetown	Georgetown	527,894	21,735,489	17,702,311	81.44	10.33	8.23
SC	Stone Container Corp	50806	Stone Container Florence Mill	Florence	710,340	20,402,914	12,541,662	61.47	27.28	11.25
TN	Bowater Newsprint Calhoun Ops	50956	Bowater Newsprint Calhoun Oper	McMinn	525,280	21,325,300	15,574,553	73.03	25.16	1.81
TN	Eastman Chemical Co-TN Ops	50481	Tennessee Eastman Operations	Sullivan	1,239,569	40,812,321	300,054	0.74	98.39	0.88
TN	Packaging Corp of America	50296	Packaging Corp of America	Hardin	373,340	22,112,700	18,034,060	81.56	9.63	8.82
TN	Willamette Industries Inc	10252	Weyerhaeuser Kingsport Mill	Sullivan	101,154	6,722,666	5,825,213	86.65	13.35	
VA	Georgia Pacific Corp - Big Island Mill	50479	Georgia Pacific Big Island	Bedford	52,032	3,357,369	1,720,872	51.26	46.83	1.91
VA	International Paper	52152	International Paper Franklin M	Isle of Wight	776,727	25,587,752	14,481,554	56.60	22.09	21.32
VA	Smurfit-Stone Container Corp	10017	St Laurent Paper West Point	King William	525,859	17,126,189	12,851,000	75.04	17.05	7.92
VA	Southeastern Public Serv Auth	54998	SPSA Waste To Energy Power Pla	Portsmouth City	173,116	5,415,699	5,388,534	99.50	0.00	0.50
VA	Stone Container Corp	50813	Stone Container Hopewell Mill	Hopewell City	319,104	8,636,244	6,255,293	72.43	25.30	2.27

Footnotes at end of table.
Released: August 2005

Table 9. Net Generation and Fuel Consumption at Power Plants Consuming Coal and Biomass by States and Plant Name, 2003 (Continued)

State	Company Name	Plant I.D.	Plant Name	County	Net Electricity Generation (Thousand Kilowatthours)	Total Energy Consumed (MMBTU)	Energy Consumed from Biomass (MMBTU)	Percent of Energy Consumed from		
								Biomass	Coal	Other
VA	Westvaco Corp	50900	Covington Facility	Covington	671,771	29,004,636	13,064,973	45.04	42.23	12.72
WA	Weyerhaeuser Co	50187	Weyerhaeuser Longview WA	Cowlitz	327,661	18,235,976	14,422,210	79.09	7.72	13.19
WV	Monongahela Power Co	3942	Albright	Preston	1,669,380	18,709,260	1,806	0.01	99.79	0.20
WV	Monongahela Power Co	3946	Willow Island	Pleasants	1,095,678	12,279,409	196,900	1.60	98.02	0.37
WV	Union Carbide C&P-Charleston	50151	Union Carbide South Charleston	Kanawha	21,488	3,309,914	73,163	2.21	64.49	33.30
WI	Domtar Industries Inc	50395	Georgia Pacific Nekoosa Mill	Wood	203,635	5,584,402	3,224,101	57.73	36.09	6.17
WI	Fraser Paper Co	50620	Fraser Paper	Price	36,422	334,360	113,361	33.90	66.10	
WI	International Paper Co-Thilmny	54098	International Paper Kaukauna M	Outagamie	211,943	7,634,467	3,344,608	43.81	39.06	17.13
WI	Madison Gas & Electric Co	3992	Blount Street	Dane	451,308	6,299,195	180,864	2.87	80.63	16.50
WI	Manitowoc Public Utilities	4125	Manitowoc	Manitowoc	315,087	4,761,246	23,264	0.49	66.17	33.34
WI	Northern States Power Co	3982	Bay Front	Ashland	296,711	4,529,448	1,795,854	39.65	58.60	1.75
WI	Packaging Corp of America	50476	Packaging of America Tomahawk	Lincoln	133,041	10,575,641	7,959,582	75.26	23.01	1.72
WI	State of Wisconsin	54408	Univ of Wisc Madison Charter S	Dane	42,282	3,947,769	323,026	8.18	82.18	9.64
WI	State of Wisconsin	54407	Waupun Correctional Central He	Dodge	4,130	288,951	20,665	7.15	88.90	3.95
WI	Stora Enso North America	10234	Biron Mill	Wood	246,244	4,614,572	326,216	7.07	91.64	1.29
WI	Stora Enso North America	54857	Niagara Mill	Marinette	114,749	3,000,275	196,181	6.54	71.80	21.66
WI	Stora Enso North America	10476	Whiting Mill	Portage	25,362	1,572,137	208,755	13.28	78.43	8.29
WI	Stora Enso North America	10477	Wisconsin Rapids Pulp Mill	Wood	374,930	12,125,962	8,338,658	68.77	26.14	5.10
WI	Wausau Mosinee Paper Corporation	50614	Wausau Mosinee Paper Pulp	Marathon	122,059	12,335,121	10,406,885	84.37	13.37	2.26
WI	Wisconsin Power & Light Co	4050	Edgewater	Sheboygan	4,893,820	47,746,013	665,280	1.39	98.48	0.12
Total					95,304,634	1,709,675,399	630,926,946	36.90	53.78	9.32

* = 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 10. 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 11. Electricity Net Generation From Renewable Energy by Energy Use Sector and Energy Source, 2000-2004
(Thousand Kilowatthours)

Sector/Source	2000	2001	2002	2003	2004 ^P
Total	356,478,576	294,946,110	351,250,926	363,216,799	358,766,924
Biomass	60,726,183	56,964,468	61,521,675	61,264,772	60,042,172
Wood/ Wood Waste	37,594,867	35,199,916	38,665,038	37,529,099	37,294,927
MSW/Landfill Gas	20,304,947	19,931,044	20,184,617	20,179,386	19,592,596
Other Biomass ^a	2,826,369	1,833,508	2,672,020	3,556,287	3,154,649
Geothermal	14,093,158	13,740,503	14,491,310	14,424,231	14,355,859
Conventional Hydroelectric	275,572,599	216,961,046	264,328,831	275,806,329	269,636,745
Solar	493,375	542,755	554,831	534,001	579,048
Wind	5,593,261	6,737,337	10,354,279	11,187,466	14,153,100
Commercial	2,111,621	1,548,109	1,597,472	1,966,052	1,882,280
Biomass	2,011,871	1,481,627	1,584,675	1,893,807	1,778,755
Wood/ Wood Waste	26,958	17,626	12,505	13,049	12,751
MSW/Landfill Gas	1,601,153	1,181,827	1,267,615	1,455,294	1,454,433
Other Biomass ^a	383,760	282,174	304,555	425,464	311,571
Conventional Hydroelectric	99,750	66,482	12,797	72,245	103,525
Industrial	33,626,302	30,848,324	34,572,014	33,223,295	33,951,800
Biomass	29,491,148	27,703,056	30,747,367	29,000,871	28,915,566
Wood/ Wood Waste	28,651,835	26,888,490	29,643,205	27,988,372	27,793,219
MSW/Landfill Gas	30,858	237,273	202,209	161,467	145,448
Other Biomass ^a	808,455	577,292	901,953	851,032	976,899
Conventional Hydroelectric	4,135,154	3,145,268	3,824,647	4,222,424	5,036,234
Electric Power ^b	320,740,653	262,549,676	315,081,440	328,027,452	322,932,844
Biomass	29,223,164	27,779,786	29,189,633	30,370,094	29,347,851
Wood/ Wood Waste	8,916,074	18,293,800	9,009,328	19,527,678	9,488,957
MSW/Landfill Gas	18,672,936	18,511,944	18,714,793	18,562,625	17,992,715
Other Biomass ^a	1,634,154	974,042	1,465,512	2,279,791	1,866,179
Geothermal	14,093,158	13,740,503	14,491,310	14,424,231	14,355,859
Conventional Hydroelectric	271,337,695	213,749,295	260,491,387	271,511,660	264,496,986
Solar	493,375	542,755	554,831	534,001	579,048
Wind	5,593,261	6,737,337	10,354,279	11,187,466	14,153,100

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

^b The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public.

P=Preliminary.

Note: Data revisions are discussed in Highlights section. 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," Form EIA-906, "Power Plant Report," and Form EIA-920, "Combined Heat and Power Plant Report."

Table 12. U.S. Electric Net Summer Capacity, 2000-2004 (Megawatts)

Source	2000	2001	2002	2003	2004 ^P
Total	811,719	848,254	905,301	948,446	967,895
Renewable Total	94,931	95,664	96,109	96,893	96,952
Biomass	10,016	9,709	9,689	9,674	9,709
Wood/Wood Waste	6,147	5,882	5,844	5,871	5,891
MSW/Landfill Gas	3,381	3,292	3,330	3,304	3,319
Other Biomass ^a	488	535	515	499	499
Geothermal	2,793	2,216	2,252	2,133	2,133
Conventional Hydroelectric	79,359	79,484	79,354	78,694	78,703
Solar	386	392	397	397	397
Wind	2,377	3,864	4,417	5,995	6,010
Nonrenewable Total	716,788	752,590	809,193	851,553	870,943

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

P=Preliminary.

Note: Data revisions are discussed in Highlights section. 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 13. Renewable Electricity Net Generation by Energy Source and Census Division, 2003
(Thousand Kilowattthours)

Census Division	Geothermal	Conventional Hydroelectric	MSW / Landfill Gas	Other Biomass ^a	Solar	Wind	Wood / Wood Waste	Total
Total	14,424,231	275,806,329	20,179,386	3,556,287	534,001	11,187,466	37,529,099	363,216,799
New England		7,303,549	4,035,361	404,483		10,829	4,439,122	16,193,344
Middle Atlantic		27,653,818	5,350,132	136,371		152,722	1,147,005	34,440,048
East North Central		4,302,407	2,132,417	539,277		118,264	2,932,581	10,024,946
West North Central		9,248,395	897,324	192,249		2,467,017	656,734	13,461,719
South Atlantic		21,053,891	5,093,823	735,601		169,762	10,168,615	37,221,692
East South Central		28,616,565	31,762	108,632		3,933	5,729,437	34,490,329
West South Central		6,241,560	199,119	416,498		2,624,323	6,066,042	15,547,542
Mountain	1,264,176	28,335,285	50,272	35,313	395	696,322	612,121	30,993,884
Pacific Contiguous	12,981,763	141,377,818	2,055,355	799,763	533,606	4,942,722	5,776,684	168,467,711
Pacific Noncontiguous	178,292	1,673,041	333,821	188,100		1,572	758	2,375,584

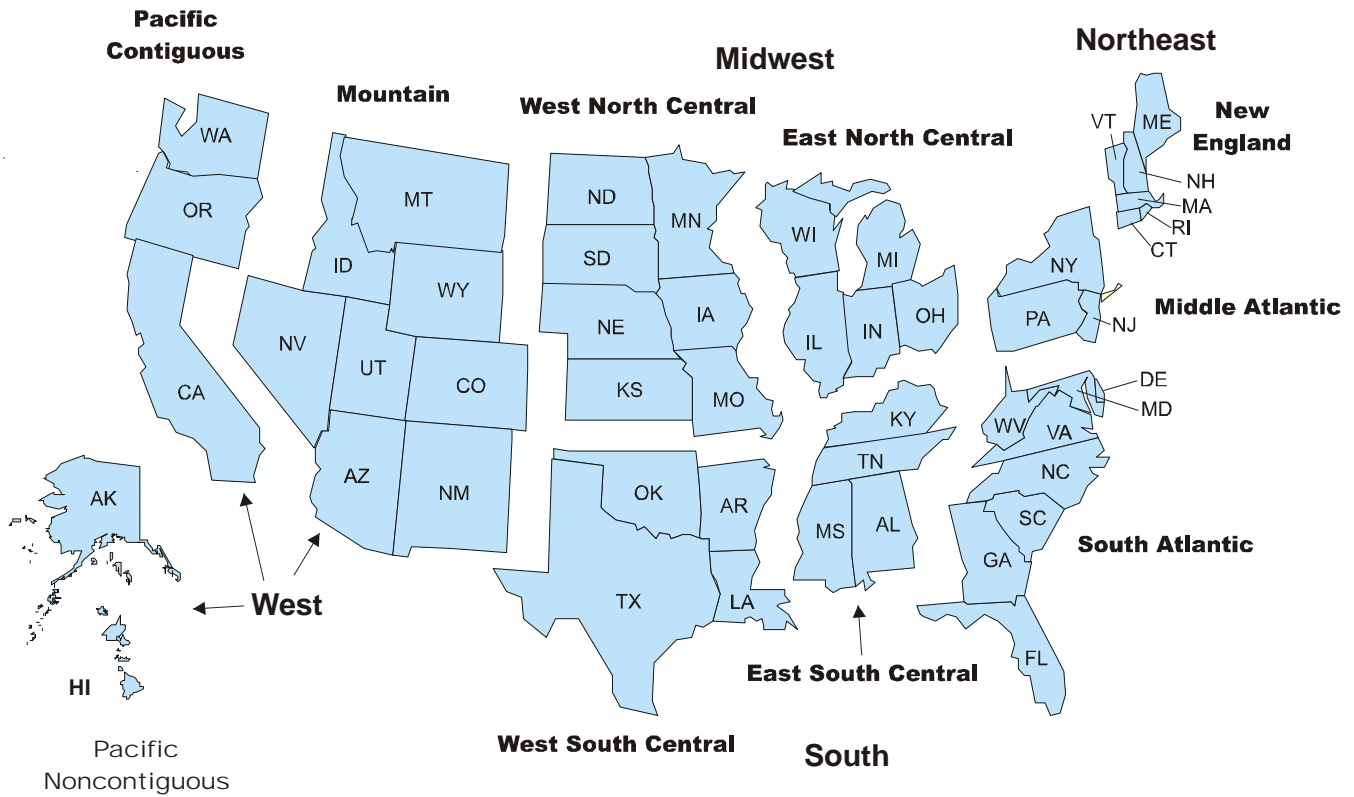
^a Agriculture byproducts/crops, sludge waste, tires, and other biomass solids, liquids and gases.
Note: Blank cell indicates the division has no data to report for that energy source. Totals may not add due to independent rounding.
Sources: Energy Information Administration, Form EIA-906, "Power Plant Report."

Table 14. Industrial Biomass Electricity Net Generation by Census Division and Energy Sources, 2003
(Thousand Kilowatthours)

Energy Source	Census Division										
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific Contiguous	Pacific Noncontiguous	Total
Total	1,920,417	677,817	1,951,482	568,753	9,362,935	5,638,326	6,184,807	525,362	2,157,324	13,645	29,000,869
Agricultural Byproducts/Crops				602	145,698	7,079	18,308		20,914	8,626	201,227
Black Liquor	860,516	554,466	1,226,776	208,463	6,705,338	3,707,167	4,112,394	324,279	612,026		18,311,425
Landfill Gases			82,254		7,270	3,674			2,820		96,018
Municipal Solid Waste					65,449						65,449
Other Biomass Gases			7,520	8,191							15,711
Other Biomass Liquids	1,954				480					5,019	7,453
Other Biomass Solids	55,000		36,251	106	4,430						95,787
Sludge Waste	16,528	6,915	10,092	3,915	154,855	51,897	3,996		15,055		263,252
Tires	76,722		14,163		52,271	27,984	96,461				267,601
Wood/Wood Waste Liquids		37,527	20,704		58,364	3,031	207,180		100,887		427,693
Wood/Wood Waste Solids	909,698	78,909	553,722	347,477	2,168,780	1,837,494	1,746,468	201,083	1,405,623		9,249,253

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."

Figure E1. U.S. Census Regions and Divisions



Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

Table 15. Renewable Electric Power Sector Net Generation by Energy Source and State, 2002
(Thousand Kilowatthours)

State	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: The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public. 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 16. Renewable Commercial and Industrial Sector Net Generation by Energy Source and State, 2002
(Thousand Kilowatthours)**

State	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 17. Total Renewable Net Generation by Energy Source and State, 2002
(Thousand Kilowattthours)**

State	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	54,821,195
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	9,130,810
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		2,767,848	408,371	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	639,639
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	210,532		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	264,328,833	20,184,615	2,672,017	554,831	10,354,279	38,665,040	351,250,925

^aAgriculture 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 18. Renewable Electric Power Sector Net Generation by Energy Source and State, 2003
(Thousand Kilowatthours)

State	Geothermal	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Solar	Wind	Wood / Wood Waste	Total
Alabama		12,664,867					181,745	12,846,612
Alaska		1,582,536						1,582,536
Arizona		7,074,984	41,031		395			7,116,410
Arkansas		2,654,618		89,960				2,744,578
California	12,981,763	36,369,789	1,637,983	410,358	533,606	3,895,431	2,767,418	58,596,348
Colorado		1,262,197		31,470		147,109		1,440,776
Connecticut		564,416	1,400,718	165,224				2,130,358
Delaware								
District of Columbia								
Florida		262,667	3,127,877	301,213			486,417	4,178,174
Georgia		4,112,790	16,798					4,129,588
Hawaii	178,292	40,464	333,821	174,455		1,572		728,604
Idaho		8,354,034					86,759	8,440,793
Illinois		138,497	595,850	272,343		18,024		1,024,714
Indiana		423,953	85,278					509,231
Iowa		788,593	97,548	1,149		981,970		1,869,260
Kansas		12,435				365,939		378,374
Kentucky		3,948,052		21,672				3,969,724
Louisiana		891,991		60,663				952,654
Maine		2,150,143	230,078	63,093			1,519,788	3,963,102
Maryland		2,646,984	629,254					3,276,238
Massachusetts		1,064,426	1,905,588	1,361			119,534	3,090,909
Michigan		1,310,430	658,861	124,751		2,660	1,018,495	3,115,197
Minnesota		721,287	755,142			977,760	100,615	2,554,804
Mississippi								
Missouri		652,477		121,112			179	773,768
Montana		8,701,772						8,701,772
Nebraska		980,110	27,090	18,906		38,221		1,064,327
Nevada	1,065,711	1,756,705						2,822,416
New Hampshire		1,169,528	218,880				635,187	2,023,595
New Jersey		38,891	1,272,953	125,485				1,437,329
New Mexico		170,699				182,735		353,434
New York		24,188,523	1,890,342	2,967		41,201	235,338	26,358,371
North Carolina		6,328,684	104,797	42,772			367,733	6,843,986
North Dakota		1,723,904				58,878		1,782,782
Ohio		510,835	27,184				50,561	588,580
Oklahoma		1,798,412				54,470		1,852,882
Oregon		33,250,332	109,045	16,590		443,617	294,763	34,114,347
Pennsylvania		3,346,267	1,747,127	910		111,521	240,765	5,446,590
Rhode Island		6,021	101,768					107,789
South Carolina		3,664,637	22,091					3,686,728
South Dakota		4,276,303				44,249		4,320,552
Tennessee		11,087,048	28,088			3,933		11,119,069
Texas		896,539	177,196	126,752		2,569,853		3,770,340
Utah	198,465	421,339	9,241					629,045
Vermont		1,147,962				10,829	394,307	1,553,098
Virginia		1,775,702	715,173				370,861	2,861,736
Washington		71,701,843	208,517	14,333		603,674	595,968	73,124,335
West Virginia		630,353		20,623		169,762	157	820,895
Wisconsin		1,653,066	387,306	71,629		97,580	61,088	2,270,669
Wyoming		593,555				366,478		960,033
Total	14,424,231	271,511,660	18,562,625	2,279,791	534,001	11,187,466	9,527,678	328,027,452

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

Note: The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public. 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 19. Renewable Commercial and Industrial Sector Net Generation by Energy Source and State, 2003
(Thousand Kilowattthours)**

State	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Wood / Wood Waste	Total
Alabama		3,674	45,844	3,467,138	3,516,656
Alaska			5,019	758	5,777
Arizona			3,843		3,843
Arkansas			4,812	1,749,117	1,753,929
California	914	99,810	343,427	1,112,619	1,556,770
Colorado					
Connecticut					
Delaware					
District of Columbia					
Florida		7,270	158,937	1,723,978	1,890,185
Georgia	27,480	11,974	138,345	3,039,353	3,217,152
Hawaii	50,041		8,626		58,667
Idaho				454,194	454,194
Illinois	3	74,115	14,163		88,281
Indiana		41,232	7,520		48,752
Iowa			25,098		25,098
Kansas					
Kentucky			764	298,476	299,240
Louisiana			100,459	3,013,642	3,114,101
Maine	1,022,480	178,329	150,204	1,768,117	3,119,130
Maryland		19,760	20	225,240	245,020
Massachusetts	10,756		24,601		35,357
Michigan	75,394	249,335	3,479	749,226	1,077,434
Minnesota	93,286	17,544	3,915	555,940	670,685
Mississippi			7,235	1,015,096	1,022,331
Missouri			11,021		11,021
Montana				71,168	71,168
Nebraska			10,446		10,446
Nevada					
New Hampshire	161,741			2,189	163,930
New Jersey			94		94
New Mexico					
New York	80,137	232,156		176,238	488,531
North Carolina	872,260	665	21,525	1,493,930	2,388,380
North Dakota			602		602
Ohio			6,116	356,856	362,972
Oklahoma				267,123	267,123
Oregon				259,151	259,151
Pennsylvania		207,554	6,915	494,664	709,133
Rhode Island					
South Carolina	789	53,810	24,463	1,244,262	1,323,324
South Dakota					
Tennessee	916,598		33,117	766,982	1,716,697
Texas		21,923	33,852	1,036,160	1,091,935
Utah					
Vermont	6,076				6,076
Virginia	5,867	384,354	27,223	1,216,684	1,634,128
Washington	54,940		15,055	746,765	816,760
West Virginia	725,678		480		726,158
Wisconsin	190,229	13,256	39,276	696,355	939,116
Wyoming					
Total	4,294,669	1,616,761	1,276,496	28,001,421	35,189,347

^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 20. Total Renewable Net Generation by Energy Source and State, 2003
(Thousand Kilowatthours)

State	Geothermal	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Solar	Wind	Wood / Wood Waste	Total
Alabama		12,664,867	3,674	45,844			3,648,883	16,363,268
Alaska		1,582,536		5,019			758	1,588,313
Arizona		7,074,984	41,031	3,843	395			7,120,253
Arkansas		2,654,618		94,772			1,749,117	4,498,507
California	12,981,763	36,370,703	1,737,793	753,785	533,606	3,895,431	3,880,037	60,153,118
Colorado		1,262,197		31,470		147,109		1,440,776
Connecticut		564,416	1,400,718	165,224				2,130,358
Delaware								
District of Columbia								
Florida		262,667	3,135,147	460,150			2,210,395	6,068,359
Georgia		4,140,270	28,772	138,345			3,039,353	7,346,740
Hawaii	178,292	90,505	333,821	183,081		1,572		787,271
Idaho		8,354,034					540,953	8,894,987
Illinois		138,500	669,965	286,506		18,024		1,112,995
Indiana		423,953	126,510	7,520				557,983
Iowa		788,593	97,548	26,247		981,970		1,894,358
Kansas		12,435				365,939		378,374
Kentucky		3,948,052		22,436			298,476	4,268,964
Louisiana		891,991		161,122			3,013,642	4,066,755
Maine		3,172,623	408,407	213,297			3,287,905	7,082,232
Maryland		2,646,984	649,014	20			225,240	3,521,258
Massachusetts		1,075,182	1,905,588	25,962			119,534	3,126,266
Michigan		1,385,824	908,196	128,230		2,660	1,767,721	4,192,631
Minnesota		814,573	772,686	3,915		977,760	656,555	3,225,489
Mississippi				7,235			1,015,096	1,022,331
Missouri		652,477		132,133			179	784,789
Montana		8,701,772					71,168	8,772,940
Nebraska		980,110	27,090	29,352		38,221		1,074,773
Nevada	1,065,711	1,756,705						2,822,416
New Hampshire		1,331,269	218,880				637,376	2,187,525
New Jersey		38,891	1,272,953	125,579				1,437,423
New Mexico		170,699				182,735		353,434
New York		24,268,660	2,122,498	2,967		41,201	411,576	26,846,902
North Carolina		7,200,944	105,462	64,297			1,861,663	9,232,366
North Dakota		1,723,904		602		58,878		1,783,384
Ohio		510,835	27,184	6,116			407,417	951,552
Oklahoma		1,798,412				54,470	267,123	2,120,005
Oregon		33,250,332	109,045	16,590		443,617	553,914	34,373,498
Pennsylvania		3,346,267	1,954,681	7,825		111,521	735,429	6,155,723
Rhode Island		6,021	101,768					107,789
South Carolina		3,665,426	75,901	24,463			1,244,262	5,010,052
South Dakota		4,276,303				44,249		4,320,552
Tennessee		12,003,646	28,088	33,117		3,933	766,982	12,835,766
Texas		896,539	199,119	160,604		2,569,853	1,036,160	4,862,275
Utah	198,465	421,339	9,241					629,045
Vermont		1,154,038				10,829	394,307	1,559,174
Virginia		1,781,569	1,099,527	27,223			1,587,545	4,495,864
Washington		71,756,783	208,517	29,388		603,674	1,342,733	73,941,095
West Virginia		1,356,031		21,103		169,762	157	1,547,053
Wisconsin		1,843,295	400,562	110,905		97,580	757,443	3,209,785
Wyoming		593,555				366,478		960,033
Total	14,424,231	275,806,329	20,179,386	3,556,287	534,001	11,187,466	37,529,099	363,216,799

^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 21. Renewable Electric Power Sector Net Summer Capacity by Energy Source and State, 2002 (Megawatts)

State	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		542						542
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	6	2,361
Texas		697	8		6	1,085		1,797
Utah	33	254	1					288
Vermont		300				1	72	374
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	90,281

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

* =Less than 500 kilowatts.

Note: The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public. 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 22. Renewable Commercial and Industrial Sector Net Summer Capacity by Energy Source and State, 2002 (Megawatts)

State	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Wood / Wood Waste	Total
Alabama				543	543
Alaska					
Arizona					
Arkansas			2	295	296
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				6	6
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	6	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 23. Total Renewable Net Summer Capacity by Energy Source and State, 2002 (Megawatts)

State	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		542						542
Montana		2,717					11	2,728
Nebraska		167	3	4		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	8	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.

* =Less than 500 kilowatts.

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 24. Renewable Electric Power Sector Net Capacity by Energy Source and State, 2003 (Megawatts)

State	Geothermal	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Solar	Wind	Wood / Wood Waste	Total
Alabama		3,234						3,234
Alaska		396				1		396
Arizona		2,706	4		7			2,718
Arkansas		1,388		4				1,392
California	1,896	9,942	243	55	390	1,910	414	14,850
Colorado		639		10		199		848
Connecticut		146	228	26				400
Delaware								
District of Columbia								
Florida		50	441	75			67	633
Georgia		2,101	2					2,104
Hawaii	33	17	60	46		11		167
Idaho		2,414					12	2,426
Illinois		32	103	45		50		230
Indiana		59	10					69
Iowa		138	109			460		708
Kansas		3				114		116
Kentucky		818						818
Louisiana		192		12				204
Maine		492	30				266	788
Maryland		566	118					684
Massachusetts		254	258				26	538
Michigan		241	91			1	158	491
Minnesota		147	131			434	80	792
Mississippi								
Missouri		556						556
Montana		2,712						2,712
Nebraska		268	3	2		13		286
Nevada	172	1,051						1,223
New Hampshire		482	31				91	604
New Jersey		14	180	19				213
New Mexico		82		6		204		292
New York		4,145	254			48	37	4,485
North Carolina		1,784	14				45	1,843
North Dakota		371				64		435
Ohio		162	94			4	7	266
Oklahoma		800				176		976
Oregon		9,112	15	3		223	66	9,420
Pennsylvania		751	310			132	28	1,220
Rhode Island		4	15					19
South Carolina		1,383	3					1,386
South Dakota		1,549				43		1,592
Tennessee		2,389	5			2	6	2,403
Texas		699	40			1,286		2,025
Utah	33	254	1					288
Vermont		298				5	72	376
Virginia		776	93				83	952
Washington		21,453	40	4		228	136	21,861
West Virginia		77				66		143
Wisconsin		434	67	1		36		539
Wyoming		300				285		585
Total	2,133	77,886	2,995	308	397	5,995	1,593	91,308

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

Note: The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American Classification System (NAICS) 22 category whose primary business is to sell electricity, or electricity and heat, to the public. 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 25. Renewable Commercial and Industrial Sector Net Summer Capacity by Energy Source and State, 2003 (Megawatts)

State	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Wood / Wood Waste	Total
Alabama				544	544
Alaska					
Arizona					
Arkansas			2	298	299
California	6	18	53	199	275
Colorado					
Connecticut					
Delaware					
District of Columbia					
Florida			73	247	320
Georgia	7	5		392	404
Hawaii	5		2		8
Idaho				58	58
Illinois	1	12	2		15
Indiana		9			9
Iowa			3		3
Kansas					
Kentucky				51	51
Louisiana			5	159	163
Maine	228	23		375	626
Maryland		7		2	9
Massachusetts	7		21		28
Michigan	4	67		52	122
Minnesota	29	3		61	92
Mississippi				279	279
Missouri					
Montana				11	11
Nebraska			3		3
Nevada					
New Hampshire	29			9	38
New Jersey			1		1
New Mexico					
New York	15	33			48
North Carolina	155			205	360
North Dakota			10		10
Ohio				6	6
Oklahoma		16		63	78
Oregon				119	119
Pennsylvania		28		78	106
Rhode Island					
South Carolina	1	10		222	233
South Dakota					
Tennessee	165			100	265
Texas			9	100	108
Utah					
Vermont	5			4	8
Virginia	4	76		325	404
Washington	4			194	198
West Virginia	101				101
Wisconsin	43	4	6	126	180
Wyoming					
Total	808	309	191	4,277	5,585

^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 26. Total Renewable Net Summer Capacity by Energy Source and State, 2003 (Megawatts)

State	Geothermal	Hydroelectric Conventional	MSW / Landfill Gas	Other Biomass ^a	Solar	Wind	Wood / Wood Waste	Total
Alabama		3,234					544	3,778
Alaska		396				1		396
Arizona		2,706	4		7			2,718
Arkansas		1,388		6			298	1,692
California	1,896	9,947	260	108	390	1,910	613	15,125
Colorado		639		10		199		848
Connecticut		146	228	26				400
Delaware								
District of Columbia								
Florida		50	441	148			314	953
Georgia		2,109	7				392	2,508
Hawaii	33	22	60	49		11		175
Idaho		2,414					70	2,484
Illinois		33	115	48		50		246
Indiana		59	19					78
Iowa		138	109	3		460		711
Kansas		3				114		116
Kentucky		818					51	869
Louisiana		192		17			159	367
Maine		721	53				641	1,414
Maryland		566	125				2	693
Massachusetts		261	258	21			26	566
Michigan		245	158			1	210	613
Minnesota		176	134			434	140	884
Mississippi							279	279
Missouri		556						556
Montana		2,712					11	2,723
Nebraska		268	3	4		13		289
Nevada	172	1,051						1,223
New Hampshire		511	31				99	642
New Jersey		14	180	20				214
New Mexico		82		6		204		292
New York		4,160	288			48	37	4,533
North Carolina		1,939	14				250	2,203
North Dakota		371		10		64		445
Ohio		162	94			4	14	273
Oklahoma		800	16			176	63	1,055
Oregon		9,112	15	3		223	186	9,539
Pennsylvania		751	338			132	105	1,326
Rhode Island		4	15					19
South Carolina		1,384	13				222	1,619
South Dakota		1,549				43		1,592
Tennessee		2,554	5			2	107	2,668
Texas		699	40	9		1,286	100	2,133
Utah	33	254	1					288
Vermont		303				5	76	384
Virginia		780	168				408	1,356
Washington		21,457	40	4		228	330	22,059
West Virginia		179				66		245
Wisconsin		478	71	8		36	126	719
Wyoming		300				285		585
Total	2,133	78,694	3,304	499	397	5,995	5,870	96,893

^aAgriculture 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 27. Renewable Market Share of Net Generation by State, 2002 and 2003 (Megawatts)

	2002			2003		
	Total State Generation	Percent Renewable	Percent NonHydro Renewable	Total State Generation	Percent Renewable	Percent NonHydro Renewable
Alabama	132,920,670	9.4	2.8	137,487,222	11.9	2.7
Alaska	6,767,325	21.4	0.2	6,338,732	25.1	0.1
Arizona	94,131,666	8.0	0.2	94,396,218	7.5	0.1
Arkansas	47,611,644	10.5	3.3	50,401,101	8.9	3.7
California	184,210,030	29.7	12.9	192,788,542	31.2	12.3
Colorado	45,600,388	3.0	0.4	46,616,787	3.1	0.4
Connecticut	31,311,218	6.2	5.2	29,545,050	7.2	5.3
Delaware	6,002,490	-	-	7,392,287	-	-
District of Columbia	261,980	-	-	74,144	-	-
Florida	203,352,775	2.6	2.5	212,610,011	2.9	2.7
Georgia	126,512,216	7.2	5.1	124,076,834	5.9	2.6
Hawaii	11,663,069	5.2	4.4	10,976,371	7.2	6.4
Idaho	9,786,933	94.8	5.2	10,422,935	85.3	5.2
Illinois	188,054,449	0.5	0.5	189,055,260	0.6	0.5
Indiana	125,608,139	0.4	0.1	124,888,217	0.5	0.1
Iowa	42,528,385	4.6	2.4	42,116,192	4.5	2.6
Kansas	47,188,446	1.0	1.0	46,567,560	0.8	0.8
Kentucky	92,106,668	4.7	0.4	91,718,820	4.7	0.4
Louisiana	94,970,963	3.9	3.0	94,885,040	4.3	3.4
Maine	22,535,033	31.9	19.7	18,971,635	37.3	20.6
Maryland	48,279,088	5.0	1.6	52,244,237	6.7	1.7
Massachusetts	42,015,689	6.9	4.9	48,385,024	6.5	4.2
Michigan	117,889,087	3.5	2.1	111,347,060	3.8	2.5
Minnesota	52,777,966	5.4	3.9	55,050,995	5.9	4.4
Mississippi	42,900,941	2.2	2.2	40,148,278	2.6	2.6
Missouri	81,162,198	1.7	0.1	87,225,087	0.9	0.2
Montana	25,473,706	37.8	0.3	26,268,726	33.4	0.3
Nebraska	31,618,493	3.5	0.1	30,455,984	3.5	0.3
Nevada	32,088,935	10.5	3.5	33,194,888	8.5	3.2
New Hampshire	15,953,078	12.9	5.8	21,597,107	10.1	4.0
New Jersey	61,569,387	2.1	2.2	57,399,351	2.5	2.4
New Mexico	30,661,707	0.9	0.1	32,735,653	1.1	0.6
New York	139,591,687	19.8	1.9	137,643,316	19.5	1.9
North Carolina	124,468,030	4.2	1.5	127,582,319	7.2	1.6
North Dakota	31,306,312	5.0	*	31,322,129	5.7	0.2
Ohio	147,068,850	0.4	0.1	146,638,128	0.7	0.3
Oklahoma	59,183,419	3.7	0.4	60,626,856	3.5	0.5
Oregon	47,099,368	75.3	2.3	48,966,139	70.2	2.3
Pennsylvania	204,322,878	2.4	1.4	206,349,513	3.0	1.4
Rhode Island	7,056,765	1.4	1.4	5,621,145	1.9	1.8
South Carolina	96,563,498	2.7	1.3	93,772,677	5.3	1.4
South Dakota	7,721,958	56.4	0.1	7,943,837	54.4	0.6
Tennessee	96,114,261	9.1	0.8	92,221,791	13.9	0.9
Texas	385,628,543	1.3	1.0	379,199,685	1.3	1.1
Utah	36,608,003	1.8	0.6	38,023,666	1.7	0.6
Vermont	5,456,190	27.1	6.7	6,027,962	25.9	6.7
Virginia	75,005,651	4.5	3.4	75,309,420	6.0	3.6
Washington	102,765,048	77.8	1.7	100,094,691	73.9	2.2
West Virginia	94,761,752	1.1	*	94,711,554	1.6	0.2
Wisconsin	58,431,438	6.2	2.0	60,122,425	5.3	2.3
Wyoming	43,783,839	2.3	1.0	43,626,602	2.2	0.8
Total	3,858,452,252	9.1	2.3	3,883,185,205	9.4	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 28. Renewable Portfolio Standards and State Mandates by State, 2005

State	RPS or Mandate
Alabama	
Alaska	
Arizona	X
Arkansas	
California	X
Colorado ^a	X
Connecticut	X
Delaware	
District of Columbia	X
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	X
Nebraska	
Nevada	X
New Hampshire	
New Jersey	X
New Mexico	X
New York	X
North Carolina	
North Dakota	
Ohio	
Oklahoma	
Oregon	
Pennsylvania	X
Rhode Island	X
South Carolina	
South Dakota	
Tennessee	
Texas	X
Utah	
Vermont	
Virginia	
Washington	
West Virginia	
Wisconsin	X
Wyoming	

^aIn Colorado and Florida the RPS is not statewide.

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

Source: All states except Montana: North Carolina Solar Center, Database of State Incentives for Renewable Energy (DSIRE) website; <http://www.dsireusa.org> (May 5, 2005). Montana: U.S. Department of Energy, EERE Network News, "Montana Laws Set Requirements for Renewable Energy and Ethanol," May 11, 2005.

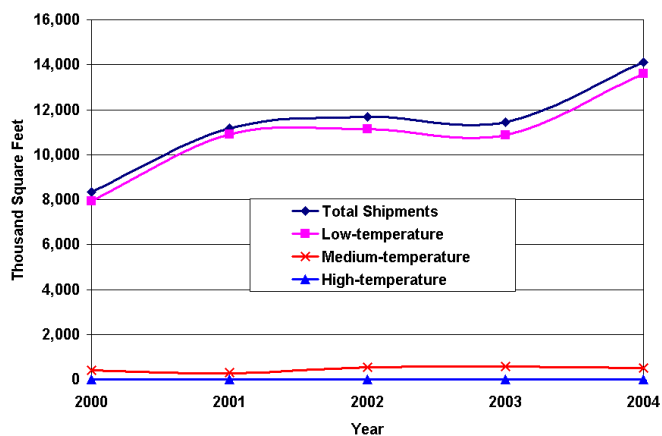
Solar Thermal and Photovoltaic Collector Manufacturing Activities 2004 Highlights

Solar Thermal Collectors

Solar collector shipments surged 23 percent in 2004 to 14.1 million square feet, despite a decline in the number of companies shipping solar thermal collectors (Figure H1). Domestic shipments rose to 13.3 million square feet, a 22 percent increase over 2003 (Table 29). Exports gained 57 percent, while imports increased 25 percent (Table 30). The number of companies shipping solar collectors dropped from 26 to 24 between 2003 and 2004.

Low-temperature collectors continued to dominate the market in 2004, with a 96 percent share (Table 31 and Figure H1). Nearly three-fourths of all collectors were produced in the United States, including U.S. territories, with New Jersey, California, Florida, Puerto Rico, and Hawaii accounting for around 75 percent of collectors shipped (Table 32). Thirty-seven percent were manufactured in New Jersey, followed by California with 32 percent. About 26 percent of collectors shipped were imported, mostly from Israel (Figure H2).

Figure H1. Solar Thermal Collector Shipments, 2000-2004

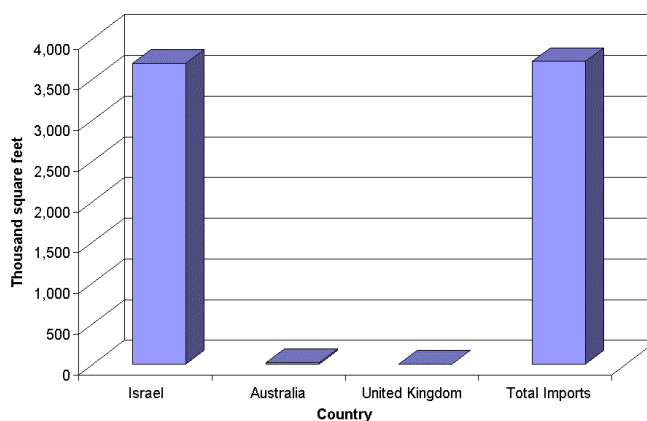


Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

During 2004, 13.3 million square feet of domestic solar thermal shipments were sent to 45 states and 2 U.S. territories or possessions (Table 34). Nearly 80 percent of solar collectors were shipped to the following states: Florida, California, Arizona, New Jersey, and Illinois (Table 32), with Florida and California accounting for almost two-thirds of the total.

After two years of decline, the solar collector export market rebounded to near 2001 record levels. Approximately 6 percent of total shipments (0.8 million square feet) were exported, principally to Canada, Brazil, and Mexico (Table 35). Collectors were shipped to various kinds of businesses in similar proportions for both 2003 and 2004, with wholesale distribution growing fastest at 31 percent (Table 36).

Figure H2. Solar Thermal Collector Imports, 2004

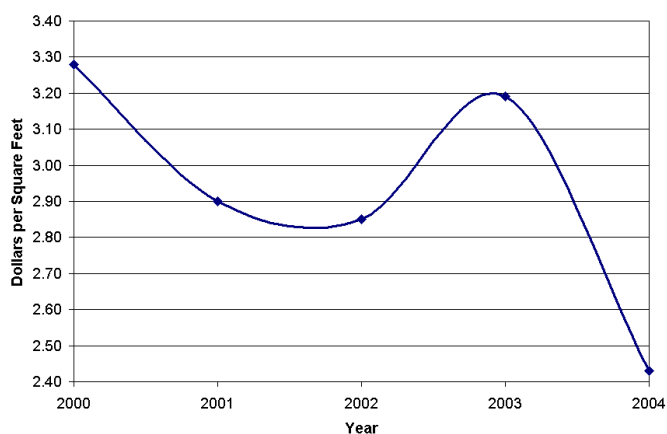


Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."

Advanced technology and production economies of scale have led to significant cost reductions. While the volume of total shipments increased, the value of total shipments actually declined to \$34.3 million [6 percent from 2003] (Table 37). As a result, the average price for total shipments dropped a substantial 24 percent, from \$3.19 per square foot in 2003 to \$2.43 per square foot in 2004 (Figure H3). On the other hand, the value of low-temperature collectors, 96 percent of total shipments, increased from \$22.7 million in 2003 to \$24.5 million in 2004, an increase of 9 percent (Table 37). However, the average price of low-temperature collectors decreased from \$2.08 in 2003 to \$1.80 in 2004. In contrast, the value of medium-temperature collectors decreased from \$13.8 million to \$9.8 million, a 29 percent decrease. The average value of medium-temperature collectors fell somewhat less, 21 percent, to \$19.30 per square foot.

There were no high-temperature collector shipments such as parabolic dish or trough collectors reported in 2004. However, recent activities have focused on high-temperature technology, which will be one of the favored options to meet the growing demand for electricity throughout the United States. On August 9, 2005, Southern California Edison and Stirling Energy Systems, Inc. announced an agreement for development of a 500-megawatt (MW) solar project using innovative Stirling dish technology. When completed, the proposed power station would be the world's largest solar-only facility, capable of producing more electricity than all other U.S. solar projects combined.

Figure H3. Solar Thermal Collector Average Price, 2000-2004



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

Patterns of shipments by market sector, end use, and type were similar in 2003 and 2004 (Table 38). The residential sector continued to be the prime market for solar collectors, totaling 12.9 million square feet, or 91 percent of total shipments (Table 38). The largest end use for solar collectors shipped in 2004 was for heating swimming pools, consuming 13.6 million square feet (97 percent) of total shipments.

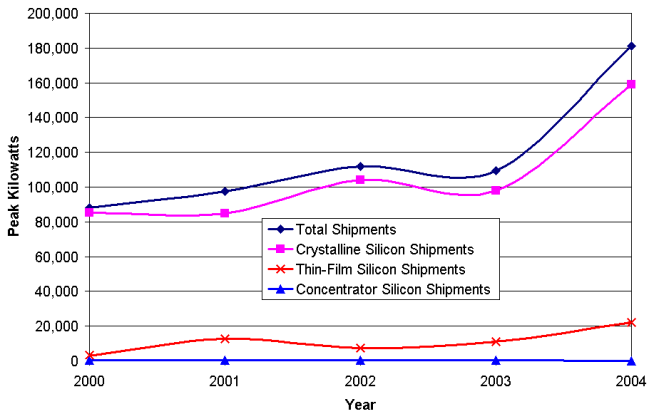
The value of shipments of complete systems increased to \$18.3 million in 2004 from \$13.6 million in 2003 (Table 39). The number of complete systems rose dramatically from 7,266 systems in 2003 to 29,769 systems in 2004 (Table 39). This increase was due to the change of reporting methodology by one of the manufacturers. Hence, the average size of a complete collector increased from 119 square feet to 187 square feet.

In 2004, the industry remained highly concentrated, with the 5 largest companies accounting for 94 percent of total shipments (Table 41). 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 40). Although employment increased more than 10 percent in 2004, it was still only 82 percent of peak employment during the past decade, which occurred in 1995 (Table 42). A total of 19 companies were involved in the design of collectors or systems, 10 were involved in prototype collector development, and 8 were active in prototype system development (Table 43). Companies which produce solar products continue to do so as the predominant portion of their business (Table 44).

Photovoltaic Cells and Modules

2004 was a big year for photovoltaic (PV) cells and modules, returning to the pattern of strong growth seen between 2000 and 2002. Domestic shipments jumped from 48,664 peak kilowatts to a record 78,346 peak kilowatts, a 61 percent increase (Table 45). Total shipments of PV cells and modules reached a record high of 181,116 peak kilowatts, a 66 percent increase from 109,357 peak kilowatts in 2003. Module shipments increased 79 percent to 143,274 peak kilowatts in 2004, while cell shipments increased to 37,842 peak kilowatts from 29,295 peak kilowatts (Table 46 and Figure H4). From 2003 to 2004, imports surged from 9,731 to 47,703 peak kilowatts, as did exports, rising from 60,693 to 102,770 peak kilowatts (Table 47 and Figure H5).

Figure H4. Photovoltaic Shipments, 2000-2004



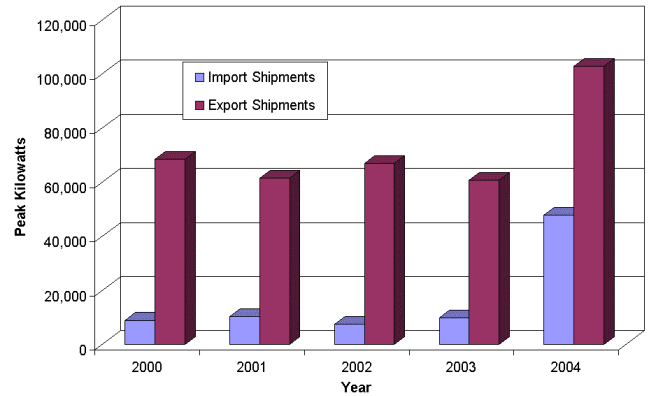
Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

The renewed vigor of the PV market was due to advanced development of innovative technologies, expansion of existing manufacturing facilities, and the opening of the Sharp PV manufacturing facility in Memphis, TN. All in all, there were 19 companies involved in manufacturing photovoltaic products, or one less than in 2003. Three of the largest PV manufacturers, including BP Solar International LLC, Sharp Manufacturing Company of America, and Shell Solar Industries LP, were the main contributors to the increase. These companies were also primarily responsible for noticeable changes in PV shipments to business categories, average price of cells/modules, market sector and end-use distributions, imports and exports, and the employment in the PV manufacturing industry.

Trends in sales to different groups of recipients varied. Sales to wholesale distributors, the largest recipient category, rose 62 percent to 106,400 peak kilowatts in 2004. Sales to the second-largest category, installers, nearly tripled to 34,779 peak kilowatts in 2004. In contrast, the end-users and exporter categories decreased by 88 and 69 percent, respectively (Table 48).

Crystalline silicon cells and modules shipments continued to dominate all PV technologies, increasing to 159,138 peak kilowatts in 2004 (Table 49 and Figure H4). However, its market share declined slightly to 88 percent from 90 percent of total shipments in 2003. Within this category, single-crystal shipments in 2004 jumped to 94,899 peak kilowatts, a 60 percent increase. Cast and ribbon silicon shipments rose even more sharply during 2004—67 percent—to 64,239 peak kilowatts.

Figure H5. Photovoltaic Import and Export Shipments, 2000-2004

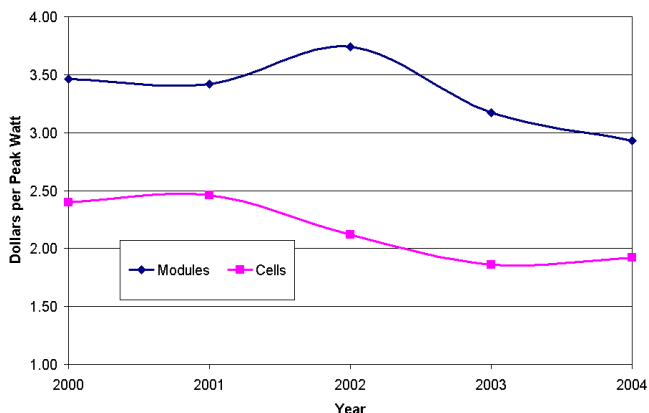


Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

Thin-film shipments doubled to 21,978 peak kilowatts in 2004 over 2003. The increase was mainly due to the activities of two companies. The market share of thin-film shipments has steadily increased, from 6 percent in 2002 to 10 percent in 2003 to 12 percent of total shipments in 2004 (Table 49).

The total value of photovoltaic cell and module shipments grew around 60 percent to \$493 million in 2004 (Table 50). The average price for modules (dollars per peak watt) decreased 8 percent, from \$3.17 in 2003 to \$2.93 in 2004. Principally due to the effect of one manufacturer, the average price of the cells increased 3 percent or 6 cents, from \$1.86 in 2003 to \$1.92 in 2004 (Figure H6).

Figure H6. Photovoltaic Cell and Module Average Prices, 2000-2004



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

A major change in shipments to end-use markets occurred during 2004. Grid-interactive electricity generation became the dominant end-use of PV cells and modules shipped, with a market share of 71 percent (129,265 peak kilowatts) in 2004 (Table 51). This compares to just 39 percent (42,485 peak kilowatts) in 2003. Further, with remote applications included, electricity generation accounted for 82 percent of the 2004 market share. In contrast, shipments for communications decreased from 14,185 to 11,348 peak kilowatts, and transportation declined sharply from 14,143 to 1,380 peak kilowatts in 2004. Shipments to the consumer goods sector continued to hold a small market share while increasing from 2,995 peak kilowatts in 2003 to 6,444 peak kilowatts in 2004.

Despite the huge increase in domestic shipments, PV exports still increased their market share by 1 percent between 2003 and 2004. PV cell and module export shipments rose 69 percent to 102,770 peak kilowatts in 2004 (Table 52). Germany maintained its position as the predominant importer of U.S. PV cells and modules, taking 41 percent of U.S. export shipments (42,128 peak kilowatts) in 2004 (Table 53). This represented a 31-percent increase from 32,088 peak kilowatts in 2003. The Netherlands replaced Hong Kong as the second-largest recipient of U.S. PV exports, with a 28-percent export market share in 2004 (28,744 peak kilowatts). Hong Kong, the third-largest importer of U.S. PV cells and modules, accounted for approximately 12 percent of U.S. exports with 11,793 peak kilowatts. U.S. imports were dominated by shipments from Japan and Hong Kong.

Complete PV systems shipments tripled from 5,525 systems in 2003 to 16,990 systems in 2004 (Table 54). The increase was mainly due to the introduction of a lightweight, portable, and rugged system by one of the largest vertically-integrated producers in the U.S. solar energy industry. However, the total peak kilowatts and value of shipped systems actually decreased, from 9,545 peak kilowatts in 2003 to 8,110 peak kilowatts in 2004 and from \$50 million in 2003 to \$39 million in 2004. As a result, the value per system decreased more than 74 percent in 2004, and the value per peak kilowatt dropped from \$5.28 in 2003 to \$4.86 in 2004.

The strong growth of the PV manufacturing industry in 2004 restored the pre-2003 upward trend in employment, rising more than 12 percent, from 2,590 person-years in 2003 to 2,916 person-years in 2004 (Table 55). The U.S. photovoltaic industry has made significant technical advances in crystalline silicon and thin film technology. Further, at least 8 companies reported that for 2005 they plan to introduce crystalline silicon products, and at least 3 companies plan to introduce thin-film products. However, no new flat plate or concentrator products have been planned (Table 56). In 2004, overall company involvement in PV-related activities included 12 in cell manufacturing and 18 in module or system design; 13 in prototype module development and 9 in prototype systems development; 16 in wholesale distribution; 10 in retail distribution; and 6 in installation (Table 57).

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Table 29. Annual Solar Thermal Collector Domestic Shipments, 1995-2004

Year	Solar Thermal Collectors^a (Thousand Square Feet)
1995	7,136
1996	7,162
1997	7,759
1998	7,396
1999	8,046
2000	7,857
2001	10,349
2002	11,004
2003 ^p	10,926
2004 ^p	13,301
Total	90,938

^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 in or shipped to U.S. Territories.

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

Table 30. Annual Shipments of Solar Thermal Collectors, 1995-2004

Year	Number of Companies	Collector Shipments ^a (Thousand Square Feet)		
		Total ^b	Imports	Export
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
2004 ^p	24	14,114	3,723	813

^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 31. Annual Shipments of Solar Thermal Collectors by Type , 1995-2004
(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	
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	11,126	856	535	31	2
2003 ^p	10,877	906	560	33	7
2004 ^p	13,608	1,512	506	30	0

^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.

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

Table 32. Shipments of Solar Thermal Collectors Ranked by Origin and Destination, 2004

Origin/Destination	2004 Shipments ^P	
	Thousand Square Feet	Percent of U.S. Total
Origin		
Top Five States	10,375	74
New Jersey	5,200	37
California	4,480	32
Florida	544	4
Puerto Rico	93	1
Hawaii	58	*
Other Domestic	16	*
Imported	3,723	26
U.S. Total	14,114	100
Destination		
Top Five States	10,960	78
Florida	4,955	35
California	4,306	31
Arizona	702	5
New Jersey	600	4
Illinois	396	3
Other Domestic	2,342	17
Exported	813	6
U.S. Total	14,114	100

* = Less than 0.5 percent.

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 33. Shipments of Solar Thermal Collectors Ranked by Origin and Destination, 2003

Origin/Destination	2003 Shipments	
	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 Domestic	106	1
Imported	2,986	26
U.S. Total	11,444	100
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 Domestic	1,285	11
Exported	518	5
U.S. Total	11,444	100

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 34. Shipments of Solar Thermal Collectors by Destination, 2004
(Square Feet)**

Destination	Shipments ^P
Alaska	40
Arizona	702,498
Arkansas	22,425
California	4,305,861
Colorado	13,539
Connecticut	172,495
Delaware	59
Florida	4,955,350
Georgia	22,191
Hawaii	278,289
Idaho	684
Illinois	396,245
Indiana	84,324
Iowa	54
Kansas	873
Kentucky	81,599
Louisiana	34,717
Maine	40,677
Maryland	90,686
Massachusetts	124,870
Michigan	146,397
Minnesota	12,813
Mississippi	48
Missouri	1,945
Montana	320
Nevada	41,673
New Hampshire	40,629
New Jersey	599,565
New Mexico	31,632
New York	325,619
North Carolina	62,117
Ohio	56,546
Oklahoma	1,462
Oregon	79,236
Pennsylvania	251,104
Puerto Rico	102,460
Rhode Island	49
Tennessee	1,057
Texas	49,762
Utah	3,120
Vermont	9,406
Virgin Islands of the U.S.	253
Virginia	93,239
Washington	6,239
West Virginia	44,000
Wisconsin	12,926
Wyoming	278
Shipments to United States/Territories	13,301,371
Exports	813,001
Total Shipments	14,114,372

P = Preliminary.

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

Table 35. Distribution of U.S. Solar Thermal Collector Exports by Country, 2004

Country	U.S. Export Shipments (Square Feet) ^P	Percent of U.S. Exports
Africa		
Morocco	17,712	2.18
Total	17,712	2.18
Asia		
Japan	120	0.01
Taiwan	2,935	0.36
Total	3,055	0.38
Europe		
Czech Republic	14,520	1.79
France	8,299	1.02
Italy	13,366	1.64
Romania	1,400	0.17
Spain	254	0.03
Sweden	48,000	5.90
Total	85,839	10.56
North & Central America		
Antigua and Barbuda	1,424	0.18
Bahamas	674	0.08
Barbados	37	*
Bermuda	415	0.05
Canada	279,290	34.35
Cayman Islands	368	0.05
Costa Rica	1,600	0.20
Guatemala	2,379	0.29
Mexico	122,080	15.02
Netherlands Antilles	128	0.02
Turks and Caicos Islands	232	0.03
Total	408,627	50.26
Oceania & Australia		
Australia	29,880	3.68
Total	29,880	3.68
South America		
Bolivia	17,980	2.21
Brazil	233,920	28.77
Chile	2,225	0.27
Ecuador	1,213	0.15
Peru	12,550	1.54
Total	267,888	32.95
Total	813,001	100.00

P = Preliminary.

*** = Less than 0.01 percent.**

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 36. Distribution of Solar Thermal Collector Shipments, 2003 and 2004

Recipient	Shipments (Thousand Square Feet)	
	2003	2004 ^P
Wholesale Distribution	6,316	8,248
Retail Distributors	4,283	5,092
Exporters	262	253
Installers	413	398
End Users and Other ^a	170	124
Total	11,444	14,114

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

P = Preliminary.

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

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

Table 37. Solar Thermal Collector Shipments by Type, Quantity, Value, and Average Price, 2003 and 2004

Type	2003			2004 ^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	10,877	22,674	2.08	13,608	24,545	1.80
Medium/High Temperature	567	13,784	24.31	506	9,769	19.30
Medium						
Air	6	W	W	4	W	W
Liquid						
ICS/Thermosiphon	111	5,803	52.09	118	2,772	23.57
Flat Plate	440	7,378	16.78	383	6,802	17.75
Evacuated Tube	2	W	W	2	W	W
Concentrator	*	W	W	0	0	0
High						
Parabolic Dish and Trough	7	W	W	0	0	0
Total	11,444	36,458	3.19	14,114	34,311	2.43

ICS = Integral collector storage.

W = Data withheld to avoid disclosure of proprietary company data

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 38. Shipments of Solar Thermal Collectors by Market Sector, End Use, and Type, 2003 and 2004
(Thousand Square Feet)

Type	Low-Temperature	Medium-Temperature					High-Temperature	2004 ^P Total	2003 Total
	Liquid/Air	Air	Liquid				Parabolic Dish/Trough		
	Metallic and Nonmetallic		ICS/Thermo- siphon	Flat-Plate (Pumped)	Evacuated Tube	Concentrator			
Market Sector									
Residential	12,386	4	115	358	1	0	0	12,864	10,506
Commercial	1,178	0	0	0	0	0	0	1,178	864
Industrial	44	0	3	23	*	0	0	70	71
Utility	0	0	0	0	0	0	0	0	0
Other ^a	0	0	*	3	0	0	0	3	2
Total	13,608	4	118	383	2	0	0	14,114	11,444
End use									
Pool Heating	13,600	0	0	33	0	0	0	13,634	10,800
Hot Water	0	0	118	332	2	0	0	452	511
Space Heating	8	4	0	2	0	0	0	13	76
Space Cooling	0	0	0	0	0	0	0	0	*
Combined Space and Water Heating	0	0	0	16	0	0	0	16	23
Process Heating	0	0	0	0	0	0	0	0	34
Electricity Generation	0	0	0	0	0	0	0	0	0
Other ^b	0	0	0	0	0	0	0	0	0
Total	13,608	4	118	383	2	0	0	14,114	11,444

^a Other market sector includes shipments of solar thermal collectors to sectors such as government, including the military but excluding space applications.

^b Other end use includes shipments of solar thermal collectors for other uses such as cooking, water pumping, water purification, desalinization, 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 39. Shipments of Complete Solar Thermal Collector Systems, 2003 and 2004

Shipment Information	2003	2004^P
Complete Collector Systems		
Shipped	7,266	29,769
Thousand Square Feet	864	5,560
Percent of Total Shipments	8	39
Number of Companies	19	18
Value of Systems (Thousand Dollars)	13,586	18,293

P = Preliminary.

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

Table 40. Number of Companies Expecting to Introduce New Solar Thermal Collector Products in 2005

New Product Type	Number of Companies
Low-Temperature Collectors	5
Medium-Temperature Collectors	6
High-Temperature Collectors	0
Noncollector Components	4

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

Table 41. Percent of Solar Thermal Collectors Shipments by 10 Largest Companies, 1995-2004

Year	Company Rank	Shipments (Thousand Square Feet)	Percent of Total Shipments
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	1-5	10,485	92
	6-10	700	6
2004 ^P	1-5	13,291	94
	6-10	664	5

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 42. Employment in the Solar Thermal Collector Industry, 1995-2004

Year	Person Years
1995	386
1996	239
1997	184
1998	207
1999	289
2000	284
2001	256
2002	356
2003 ^p	287
2004 ^p	317

P = Preliminary.

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

Table 43. Companies Involved in Solar Thermal Collector Activities by Type, 2003 and 2004

Type of Activity	2003	2004 ^P
Collector or System Design	20	19
Prototype Collector Development	12	10
Prototype System Development	11	8
Wholesale Distribution	21	22
Retail Distribution	12	11
Installation	10	8
Noncollector System Component Manufacture	9	11

P = Preliminary.

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

Table 44. Solar-Related Sales as a Percentage of Total Company Sales, 2003 and 2004

Percent of Total Sales	Number of Companies	
	2003	2004 ^P
90-100	18	15
50-89	5	6
10-49	1	0
Less than 10	2	3
Total	26	24

P = Preliminary.

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

Table 45. Annual Photovoltaic Domestic Shipments, 1995-2004

Year	Photovoltaic Cells and Modules^a (Peak Kilowatts)
1995	11,188
1996	13,016
1997	12,561
1998	15,069
1999	21,225
2000	19,838
2001	36,310
2002	45,313
2003	48,664
2004 ^p	78,346
Total	301,530

^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 in or shipped to U.S. Territories.

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

**Table 46. Annual Shipments of Photovoltaic Cells and Modules, 2002-2004
(Peak Kilowatts)**

Item	2002	2003	2004^P
Cells	47,677	29,295	37,842
Modules	64,413	80,062	143,274
Total	112,090	109,357	181,116

P = Preliminary.

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

Table 47. Annual Shipments of Photovoltaic Cells and Modules, 1995-2004

Year	Number of Companies	Photovoltaic Cell and Modules Shipments ^a (Peak Kilowatts)		
		Total	Imports	Exports
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	20	109,357	9,731	60,693
2004 ^p	19	181,116	47,703	102,770

^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 cells and modules that subsequently were shipped to domestic or foreign customers.

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

Table 48. Distribution of Photovoltaic Cells and Modules, 2002-2004

Recipient	Shipments (Peak Kilowatts)		
	2002	2003	2004 ^P
Wholesale Distributers	62,651	65,477	106,400
Retail Distributers	8,270	6,624	5,140
Exporters	449	7,600	2,354
Installers	11,538	11,733	34,779
End-Users	4,012	8,286	1,029
Module Manufacturers	23,784	8,738	11,868
Other ^a	1,386	899	19,546
Total	112,090	109,357	181,116

^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 49. Photovoltaic Cell and Module Shipments by Type, 2002-2004

Type	Shipments (Peak kilowatts)			Percent of Total		
	2002	2003	2004 ^P	2002	2003	2004 ^P
Crystalline Silicon						
Single-Crystal	74,717	59,379	94,899	67	54	52
Cast and Ribbon	29,406	38,561	64,239	26	35	35
Subtotal	104,123	97,940	159,138	93	90	88
Thin-Film	7,396	10,966	21,978	7	10	12
Concentrator	571	452	0	1	*	0
Other ^a	0	0	0	0	0	0
Total	112,090	109,357	181,116	100	100	100

^a Includes categories not identified by reporting companies.

* = Less than 0.5 percent.

P = Preliminary.

Note: 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 50. Photovoltaic Cell and Module Shipment Values by Type, 2003 and 2004

Type	2003			2004 ^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	158,480	3.38	1.88	253,558	3.09	1.94
Cast and Ribbon	113,511	2.97	1.23	188,371	3.00	1.76
Subtotal	271,991	3.16	1.87	441,930	3.04	1.92
Thin-Film Silicon	W	W	W	W	W	W
Concentrator Silicon	W	W	W	W	W	W
Other ^a	0	---	---	0	---	---
Total	308,192	3.17	1.86	492,718	2.93	1.92

^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 51. Shipments of Photovoltaic Cells and Modules by Market Sector, End Use, and Type, 2003 and 2004 (Peak Kilowatts)

Sector and End Use	Crystalline Silicon ^a	Thin-Film Silicon	Concentrator Silicon	Other	2004 Total ^p	2003 Total
Market						
Industrial	29,935	558	0	0	30,493	27,951
Residential	53,538	391	0	0	53,900	23,389
Commercial	53,755	13,996	0	0	67,751	32,604
Transportation	1,376	4	0	0	1,380	11,089
Utility	3,233	6,758	0	0	9,991	8,474
Government ^b	3,140	117	0	0	3,257	5,538
Other ^c	14,162	154	0	0	14,316	313
Total	159,138	21,978	0	0	181,116	109,357
End Use						
Electricity Generation						
Grid Interactive	114,400	14,865	0	0	129,265	42,485
Remote	17,838	534	0	0	18,371	15,025
Communication	11,235	113	0	0	11,348	14,185
Consumer Goods	6,442	1	0	0	6,444	2,995
Transportation	1,376	4	0	0	1,380	14,143
Water Pumping	1,028	295	0	0	1,322	6,073
Cells/Modules to OEM ^d	441	6,011	0	0	6,452	11,334
Health	341	0	0	0	341	2,924
Other ^e	6,037	156	0	0	6,193	194
Total	159,138	21,978	0	0	181,116	109,357

^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 includes shipments of photovoltaic cells 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 52. Export Shipments of Photovoltaic Cells and Modules by Type, 2003 and 2004 (Peak Kilowatts)

Item	Type							
	Crystalline		Thin-Film Silicon		Concentrator Silicon		Total	
	2003	2004 ^P	2003	2004 ^P	2003	2004 ^P	2003	2004 ^P
Cells	30,337	36,492	0	0	127	0	30,464	36,492
Modules	25,190	52,938	5,039	13,341	0	0	30,229	66,278
Totals	55,527	89,430	5,039	13,341	127	0	60,693	102,770

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 53. Destination of U.S. Photovoltaic Cell and Module Export Shipments by Country, 2004

Country	Peak Kilowatts	Percent of U.S. Exports ^p
Africa		
Angola	0.3	*
Egypt	90.0	0.1
Ethiopia	18.8	*
Kenya	133.0	0.1
Mali	1.1	*
Nigeria	3.0	*
South Africa	488.2	0.5
Total	734.4	0.7
Asia		
Bangladesh	52.8	0.1
Cambodia	216.0	0.2
China	1,047.4	1.0
Hong Kong	11,793.1	11.5
India	128.9	0.1
Japan	1,974.7	1.9
Jordan	56.6	0.1
Kuwait	12.8	*
Malaysia	1.0	*
Nepal	67.0	0.1
North Korea	138.0	0.1
Oman	57.6	0.1
Philippines	144.8	0.1
Saudi Arabia	0.3	*
Singapore	1,317.1	1.3
South Korea	258.6	0.3
SriLanka	83.0	0.1
Taiwan	109.3	0.1
Thailand	11.3	*
United Arab Emirates	200.0	0.2
Vietnam	1.3	*
Total	17,671.0	17.2
Europe		
Austria	42.0	*
Belgium	2.1	*
Cyprus	19.0	*
Denmark	59.8	0.1
Federal Republic of Germany	42,128.0	41.0
Finland	23.0	*
France	213.1	0.2
Greece	34.0	*
Italy	189.4	0.2
Luxembourg	380.0	0.4
Netherlands	28,744.3	28.0
Norway	10.1	*
Slovakia	50.0	*
Spain	3,661.6	3.6
Sweden	110.1	0.1
Switzerland	345.0	0.3
Turkey	93.6	0.1
United Kingdom	224.1	0.2
Uzbekistan	2.0	*
Total	76,331.2	74.3
North & Central America		
Antigua and Barbuda	0.3	*
Belize	0.5	*
Bermuda	0.3	*
Canada	2,451.7	2.4
Costa Rica	44.3	*
Dominica	2.0	*
Dominican Republic	43.7	*
El Salvador	1.0	*
Guadeloupe	217.7	0.2
Guatemala	6.8	*

Table 53. Destination of U.S. Photovoltaic Cell and Module Export Shipments by Country, 2004 (Continued)

Country	Peak Kilowatts	Percent of U.S. Exports ^p
Haiti	39.5	*
Honduras	27.0	*
Mexico	1,629.1	1.6
Netherlands Antilles	27.5	*
Nicaragua	10.0	*
Panama	11.6	*
Trinidad and Tobago	0.3	*
Total	4,513.3	4.4
Oceania & Australia		
Australia	1,706.4	1.7
French Polynesia	19.7	*
New Zealand	29.0	*
Total	1,755.1	1.7
South America		
Argentina	691.0	0.7
Bolivia	52.7	0.1
Brazil	225.2	0.2
Chile	58.7	0.1
Colombia	322.4	0.3
Ecuador	22.7	*
Guyana	6.2	*
Peru	371.9	0.4
Uruguay	6.9	*
Venezuela	7.5	*
Total	1,765.2	1.7
Total U.S. Export	102,770.2	100.0

P = Preliminary.

*** = Value less than 0.05 percent.**

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 54. Shipments of Complete Photovoltaic Systems, 2002-2004

Shipment Information	2002	2003	2004^P
Complete Photovoltaic Module System Shipped	7,008	5,525	16,990
Peak Kilowatts	8,160	9,545	8,110
Percentage of Total Module Shipments	13	12	6
Value of Systems (Thousand Dollars)	44,984	50,412	39,459

P = Preliminary.

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

Table 55. Employment in the Photovoltaic Manufacturing Industry, 1995-2004

Year	Number of Companies	Number of Person-Years
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
2004 ^p	19	2,916

P = Preliminary.

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

Table 56. Companies Expecting to Introduce New Photovoltaic Products in 2005

New Product Type	Number of Companies
Crystalline Silicon	
Single-Crystal Silicon Modules	8
Cast Silicon Modules	6
Ribbon Silicon Modules	2
Thin-Film	
Amorphous Silicon Modules	3
Other (Thin Film)	3
Other (Flat Plate)	0
Concentrators	0
Nonmodule System Components	1

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

Table 57. Number of Companies Involved in Photovoltaic-Related Activities, 2003 and 2004

Type of Activity	Number of Companies	
	2003	2004 ^P
Cell Manufacturing	12	12
Module or Systems Design	17	18
Prototype Module Development	13	13
Prototype Systems Development	11	9
Wholesale Distribution	13	16
Retail Distribution	7	10
Installation	8	6
Noncollector System		
Component Manufacturing	5	3

P = Preliminary.

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

List of Respondents for the Solar Thermal Collector Manufacturers Surveys	Address
AAA Solar Supply	2021 Zearing NW, Albuquerque, NM 87104
Alternative Energy Tech LLC	1057 N Ellis Rd Unit 4, Jacksonville, FL 32236
Aquatherm Industries, Inc.	1940 Rutgers University Blvd, Lakewood, NJ 08701
Conserval Systems Inc	4242 Ridge Lea Road #28, Buffalo, NY 14226
Fafco Inc	435 Otterson Dr, Chico, CA 95928
Haleakala Solar Inc	2000 Mokulele Hwy, Puunene, HI 96784
Harter Industries	PO Box 502, Holmdel, NJ 07733
Heliocol USA, Inc.	927 Fern Steet, Suite 1500, Altamonte Springs, FL 32701
Heliodyne Inc	4910 Seaport Avenue, Richmond, CA 94804
Puerto Rico Solar Products	PO Box 702, Moca, PR 00676
R & R Services	922 Austin Ln Bldg D, Honolulu, HI 96817
Radco Products, Inc.	2877 Industrial Parkway, Santa Maria, CA 93455
Rheem Manufacturing Company	101 Bell Rd, Montgomery, AL 36117
Sealed Air Corporation	3433 Arden Road, Hayward, CA 94545
Solar Living, Inc	PO Box 12, Netcong, NJ 07857
SolarRoofs.com	5480 Gibbons Drive, Suite G, Carmichael, CA 95608
Sun Quest	1555 Rankin Avenue, Newton, NC 28658
SunEarth Inc	8425 Almera Ave, Fontana, CA 92335
Sunsiaray Solar Mfg Inc	4414 N Washburn Road, Davison, MI 48423
Techno-solis Inc	12929 44th St N, Clearwater, FL 33762
Thermo Technologies	5560 Sterrett Pl, Suite 115, Columbia, MD 21044
Universal Solar Products	P O Box 364027, San Juan, PR 00936

List of Respondents for the Photovoltaic Collector Manufacturers Surveys	Address
Atlantis Energy System Inc	7 Industry Street, Poughkeepsie, NY 12603
B P Solar Int'l LLC	630 Solarex Court, Frederick, MD 21701
Energy Photovoltaics Inc	276 Bakers Basin Road, Lawrenceville, NJ 08648
Evergreen Solar Inc	138 Bartlett Street, Marlborough, MA 01752
First Solar Llc	28101 Cedar Park Blvd, Perrysburg, OH 43551
GE Energy (USA) LLC	231 Lake Drive, Newark, DE 19702
Kyocera Solar Inc	7812 East Acoma Dr, Scottsdale, AZ 85260
Matrix Solar Technologies	540 A Silver Creek NW, Albuquerque, NM 87121
RWE Schott Solar Inc	4 Suburban Park Drive, Billerica, MA 01821
Sanyo Semoconductor Corporation	80 Commerce Drive, Allendale, NJ 07401
Sharp Manufacturing Company of America	4120 Mendenhall Road, Memphis, TN 38115
Shell Solar Industries LP	4650 Adohr Lane, Camarillo, CA 93012
Solar Electric Inc	5555 Santa Fe St #d, San Diego, CA 92109
Solar Power Industries, Inc.	13 Airport Road Belle, Vernon, PA 15012
Spire Corporation	One Patriots Park, Bedford, MA 01730
Sunwatt Corporation	17 Rockwell Rd SE, Jonesport, ME 04649
United Solar Ovonic LLC	3800 Lapeer Road, Auburn Hills, MI 48326

Survey of Geothermal Heat Pump Shipments, 2004

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 43,806 geothermal heat pumps in 2004, a 20 percent increase over the 2003 total of 36,439. Most of the increase was for ARI-325/330 rated units. Of those shipped in 2004, 9,130 were ARI-320 rated,¹ and 31,855 were ARI-325 or ARI-330. ARI rated shipments increased to 40,985 units in 2004, while the number of non-ARI-rated units increased to 2,821 (Table 58).

The total rated capacity of heat pumps shipped in 2004 was 144,301 tons, compared to 124,438 tons in 2003 (Table 59). The average unit size shipped in 2004 was 3.29 tons, compared to an average unit size of 3.41 tons in 2003.

The proportion of geothermal heat pumps shipped to each Census Region in 2004 was as follows: the South (33 percent), the Midwest (33 percent), the Northeast (18 percent), and the West (8 percent) (Table 60). The proportion of geothermal heat pumps exported was 7 percent. Fifty-four percent of geothermal heat pumps were shipped to wholesale distributors, while 31 percent went to installers. The remaining 15 percent were sold to exporters, retail distributors, end-users, or other domestic customers (Table 61).

Analysis conducted by the Oregon Institute of Technology, Geo-Heat Center, indicates that geothermal heat pumps consumed almost 29 trillion Btu of geothermal energy in 2004 and direct uses, such as crop drying, consumed 9 trillion Btu of geothermal energy (Table 62). The recently enacted Energy Policy Act of 2005 includes incentives for the use of geothermal heat pumps in the future. Section 1333 gives a tax credit of up to \$300 per geothermal heat pump installed in a residence in the years 2006 through 2007. Also of interest is Section 206, which offers a 25 percent rebate (up to \$3,000) for renewable energy systems installed in residences or small businesses, including systems that transmit or use energy from "geothermal deposits," such as geothermal heat pumps. However funds have not yet been appropriated for rebates under this section.

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¹ For 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.

**Table 58. Geothermal Heat Pump Shipments by Model Type, 1998-2004
(Number of Units)**

Model	1998	1999	2000	2001	2002	2003	2004
ARI-320	10,510	7,910	7,808	NA	6,445	10,306	9,130
ARI-325/330	26,042	31,631	26,219	NA	26,802	25,211	31,855
Other Non-ARI Rated	1,714	2,138	1,554	NA	3,892	922	2,821
Totals	38,266	41,679	35,581	NA	37,139	36,439	43,806

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

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

**Table 59. Capacity of Geothermal Heat Pump Shipments by Model Type, 1998-2004
(Total Rated Capacity Tons)**

Model	1998	1999	2000	2001	2002	2003	2004
ARI-320	35,776	27,970	26,469	NA	16,756	29,238	23,764
ARI-325/330	98,912	153,947	130,132	NA	96,541	89,731	100,317
Other Non-ARI Rated	6,758	9,735	7,590	NA	12,000	5,469	20,220
Totals	141,446	191,651	164,191	NA	125,297	124,438	144,301

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 60. Geothermal Heat Pump Shipments by Export, Census Region and Model Type, 2004
(Number of Units)**

Export and Census Region	ARI-320	ARI-325/330	Other Non-ARI Rated GHPs	Total
Export	127	2,251	606	2,984
Midwest	1,612	12,256	782	14,650
Northeast	2,144	5,655	261	8,060
South	3,880	10,237	557	14,674
West	1,367	1,456	615	3,438
Total	9,130	31,855	2,821	43,806

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 60 and "Exporter" in Table 61 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 61. Geothermal Heat Pump Shipments by Customer Type and Model Type, 2004
(Number of Units)**

Customer	ARI-320	ARI-325/330	Other Non-ARI Rated GHPs	Total
Exporter	2	514	576	1,092
Wholesale Distributor	4,779	18,444	424	23,647
Retail Distributor	0	228	127	355
Installer	3,419	9,190	953	13,562
End-User	0	110	287	397
Others	930	3,369	454	4,753
Total	9,130	31,855	2,821	43,806

Note: "Export" in Table 60 and "Exporter" in Table 61 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 62. Geothermal Direct Use of Energy and Heat Pumps, 1990 -2004
(Quadrillion Btu)**

Year	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	0.0086	0.0274	0.0360
2004	0.0090	0.0289	0.0379

Note: 2003: Data is revised. Direct use includes applications such as: district heating, aquaculture pond and raceway heating, greenhouse heating and agricultural drying.

Source: John Lund, Oregon Institute of Technology, Geo-Heat Center (Klamath Falls, Oregon, March 2005).

List of Respondents for the Geothermal Heat Pump Manufacturers Survey	Address
Advanced Geothermal Technology	P.O. Box 6469 Redding, PA 19610
Aqua CalC	2737 24th Street North St. Petersburg, FL 33713
Bard Manufacturing Company	1914 Randolph Drive Bryan, OH 43506
Climate Master, Incorporated	7300 SW 44th Street Oklahoma City, OK 73179
Econar Energy Systems Corporation	19230 Evans Street Elks River, MN 55330
ECR Technologies, Incorporated	3536 DMG Drive Lakeland, FL 33811
Fedders Addison Company	7050 Overland Road Orlando, FL 32810
FHP Manufacturing Company	601 NW 65th Court Ft. Lauderdale, FL 33309
Geothermal Heat Pump, Incorporated dba American Geothermal	1037 Old Salem Road Murfreesboro, TN 37129
Heat Controller	1900 Wellworth Avenue Jackson, MI 49204
Hydro-Temp Corporation	P.O. Box 566 Pocahontas, AR 72455
Mammoth, Inc.	101 West 82nd Street Chaska, MN 55318
Sunteq	2610 Clyde Avenue State College, PA 16801
WaterFurnace International, Inc.	9000 Conservation Way Fort Wayne, IN 46809

Green Pricing and Net Metering Programs 2004

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) collects information on green pricing on the Form EIA-861, "Annual Electric Power Industry Report," which is a survey of electric industry participants. 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 circumstance. This system facilitates the ease of operating intermittent generators such as those using solar and wind energy and improves their economics. The EIA collects information on net metering on the Form EIA-861 in much the same manner as it does green pricing.

In 2004, the number of electric industry participants reporting customers in green pricing programs was 403, up 31 percent from 2003 (Table H1). The number of customers in green pricing programs dwarfed those in net metering and increased 6 percent from 877,126 nationwide in 2003 to 928,333 in 2004, despite a significant decrease in Pennsylvania. Residential customers accounted for 93 percent of the total green pricing customers in 2004.

Electric industry participants reported having green pricing customers in forty-four states and the District of Columbia, including four states that were reported for the first time in 2004 (Table 63). Ohio led the United States in total number of green pricing customers with 454,509 customers and accounted for 50 percent of the annual increase. Texas, California, Oregon and Colorado followed next in terms of number of green pricing customers.

In 2004, the number of electric industry participants reporting customers in net metering programs was up to 166 from 127 just one year earlier (Table H2). The number of customers in net metering during 2004 was 15,826 and represented a 132 percent increase from 2003. Residential customers accounted for 89 percent of the customers in the program. Electric industry participants reported having net metering customers in 44 states, including six states that were reported for the first time as having net metering programs (Table 64). California dominated with 85 percent of the national total.

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Table H1. Estimated U.S. Green Pricing Customers by Customer Class, 2002-2004

Year	Electric Industry Participants	Participating Customers		
		Customer Class		Total
		Residential	Non-residential	
2002	212	688,069	23,481	711,550
2003	308	819,579	57,547	877,126
2004 ^P	403	864,794	63,539	928,333

^P = Preliminary

Note: Non-residential may include some customers for whom 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."

Table H2. Estimated U.S. Net Metering Customers by Customer Class, 2002-2004

Year	Electric Industry Participants	Participating Customers		
		Customer Class		Total
		Residential	Non-residential	
2002	96	3,559	913	4,472
2003	127	5,870	943	6,813
2004 ^P	166	14,114	1,712	15,826

^P = Preliminary

Note: Non-residential may include some customers for whom 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."

Table 63. Estimated U.S. Green Pricing Customers by State and Customer Class, 2003 and 2004

State	Electric Industry Participants 2004 ^a	Participating Customers			
		2004 ^p			2003
		Residential	Non-residential	Total	Total
Alabama	2	735	20	755	
Alaska					
Arizona	3	5,701	91	5,792	5,934
Arkansas					
California	12	59,158	2,932	62,090	62,279
Colorado	23	39,389	777	40,166	44,194
Connecticut					
Delaware	2	8	7	15	
District of Columbia	2	4,994	228	5,222	4,824
Florida	3	11,053	23	11,076	218
Georgia	14	3,223	18	3,241	3,895
Hawaii	3	3,965	40	4,005	3,579
Idaho	6	4,173	110	4,283	2,508
Illinois	3	31		31	8
Indiana	8	1,313	26	1,339	1,091
Iowa	50	7,239	74	7,313	5,785
Kansas					
Kentucky	11	502	11	513	118
Maine	1		8	8	5
Maryland	2	14,985	193	15,178	14,356
Massachusetts	3	2,741	125	2,866	1
Michigan	7	1,319	57	1,376	1,346
Minnesota	90	22,803	255	23,058	20,255
Mississippi	2	79	2	81	7
Missouri	7	392	6	398	261
Montana	6	398	9	407	49
Nebraska	5	4,017	54	4,071	4,171
Nevada	2	493	5	498	285
New Hampshire					
New Jersey	3	1,575	336	1,911	1,816
New Mexico	7	8,031	430	8,461	5,774
New York	3	1,272	213	1,485	134
North Carolina	15	6,024	242	6,266	3,913
North Dakota	11	4,666	21	4,687	1,792
Ohio	3	407,051	47,458	454,509	428,849
Oklahoma	7	9,342	195	9,537	6,758
Oregon	12	52,655	1,247	53,902	42,139
Pennsylvania	3	36,299	29	36,328	74,676
Rhode Island	2	1,469	36	1,505	
South Carolina	8	1,842	234	2,076	1,725
South Dakota	8	460	13	473	624
Tennessee	1	6,216	307	6,523	1
Texas	4	62,331	6,049	68,380	68,611
Utah	3	13,660	407	14,067	15,480
Vermont	1	868	31	899	
Virginia	2	3,418	20	3,438	4,639
Washington	19	27,554	555	28,109	16,858
West Virginia					
Wisconsin	56	28,607	592	29,199	26,595
Wyoming	6	2,743	53	2,796	1,573
Total	403	864,794	63,539	928,333	877,126

^a Includes entities with green pricing programs in more than one state.

^p = Preliminary

Note: Non-residential may include some customers for whom 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 64. Estimated U.S. Net Metering Customers by State and Customer Class, 2003 and 2004

State	Electric Industry Participants 2004 ^a	Participating Customers			
		2004 ^p			2003
		Residential	Non-residential	Total	Total
Alabama	1			13	13
Alaska					2
Arizona	2	41	2	43	330
Arkansas	2	2	1	3	
California	13	12,253	1,253	13,506	5,242
Colorado	10	81	6	87	163
Connecticut	2	21	10	31	28
Delaware					10
District of Columbia					
Florida	4	19	11	30	10
Georgia	1	2		2	1
Hawaii	3	42	4	46	31
Idaho	3	16	3	19	18
Illinois	2	1	1	2	1
Indiana	2	8	8	16	3
Iowa	6	6	2	8	2
Kansas	3	7	3	10	5
Kentucky	2		2	2	14
Maine					
Maryland	4	7	2	9	5
Massachusetts	4	161	9	170	91
Michigan	2	3	2	5	3
Minnesota	23	226	7	233	140
Mississippi	1	1		1	
Missouri	2	1	1	2	2
Montana	2	119	67	186	3
Nebraska					
Nevada	2	89	11	100	56
New Hampshire	4	55	26	81	73
New Jersey	2	277	30	307	
New Mexico	4	5	6	11	10
New York	2	48	39	87	46
North Carolina	1		1	1	
North Dakota	2	4		4	2
Ohio	5	11	7	18	11
Oklahoma	2	1	30	31	36
Oregon	7	202	30	232	37
Pennsylvania	4	68	21	89	60
Rhode Island	2	18	7	25	16
South Carolina					
South Dakota					
Tennessee	1	7		7	
Texas	5	10	6	16	13
Utah	2	8	2	10	1
Vermont	3	55	12	67	52
Virginia	8	18	1	19	12
Washington	11	55	18	73	48
West Virginia	1		1	1	2
Wisconsin	9	157	55	212	232
Wyoming	6	9	2	11	2
Total	166	14,114	1,712	15,826	6,813

^a Includes entities with net metering programs in more than one state.

^p = Preliminary

Note: Non-residential may include some customers for whom 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."