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Renewable Energy Consumption and Electricity Preliminary Statistics 2008

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Preface

This report, *Renewable Energy Consumption and Electricity - Preliminary 2008 Statistics*, presents preliminary information on renewable energy consumption and electricity generation and capacity for 2008. Final renewable energy consumption and electricity data will be included as a chapter in the *Renewable Energy Annual 2008* scheduled to be released early in 2010.

The renewable energy resources in the report include: biomass (wood and derived fuels, municipal solid waste biogenic, landfill gas, ethanol and biodiesel and other biomass); geothermal; wind; solar/PV (solar thermal and photovoltaic); and hydroelectric conventional. Hydroelectric pumped storage is excluded, because it is usually based on non-renewable energy sources.

Definitions for terms used in this report can be found in EIA's Energy Glossary: <http://www.eia.doe.gov/glossary/index.html>. General information about all the EIA surveys with data related to renewable energy and referenced in this report can be found at: <http://www.eia.doe.gov/oss/forms.html>.

Contents

Renewable Energy Consumption and Electricity Preliminary 2008 Statistics	1
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Tables

Renewable Energy Consumption and Electricity Preliminary 2008 Statistics	1
Table 1 U.S. Energy Consumption by Energy Source, 2004 - 2008	4
Table 2 Renewable Energy Consumption by Energy Use Sector and Energy Source, 2004 - 2008	5
Table 3 Electricity Net Generation From Renewable Energy by Energy Use Sector and Energy Source, 2004 - 2008.....	7
Table 4 U.S. Electric Net Summer Capacity, 2004 - 2008	8
Table 5 Total Renewable Net Generation by Energy Source and State, 2007	9
Table 6 Total Renewable Net Generation by Energy Source and State, 2008	10
Table 7 Total Renewable Net Summer Capacity by Energy Source and State, 2007.....	11
Table 8 Total Renewable Net Summer Capacity by Energy Source and State, 2008.....	12

Illustrations

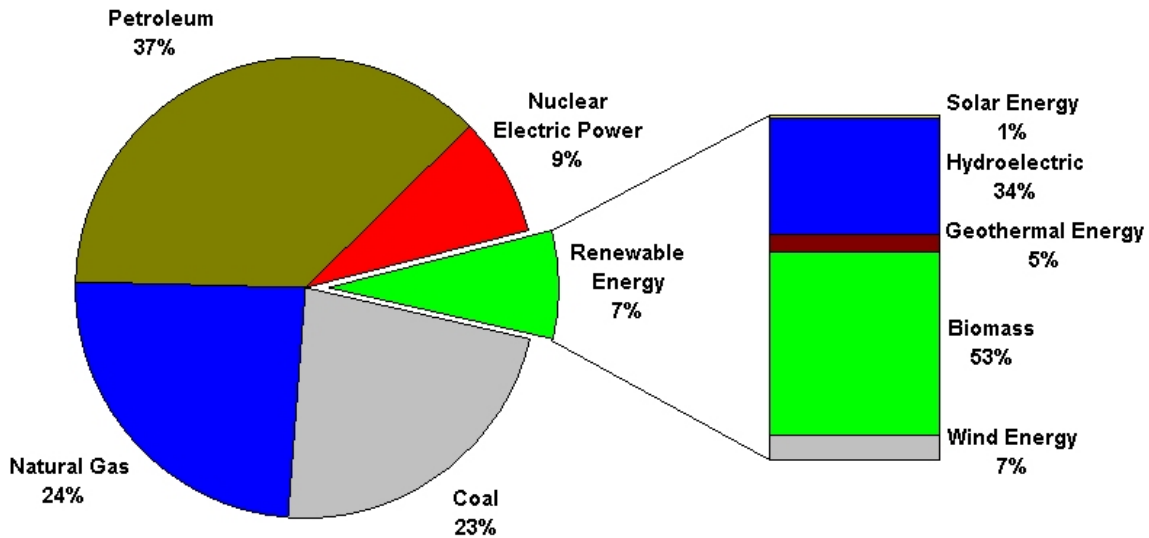
Renewable Energy Consumption and Electricity Preliminary 2008 Statistics	1
Figure 1. Renewable Energy Consumption in the Nation's Energy Supply, 2008.....	1

Renewable Energy Consumption and Electricity Preliminary 2008 Statistics

Consumption

Renewable energy consumption grew by 7 percent between 2007 and 2008, despite a 2 percent decline in total U.S. energy consumption (Table 1). Total renewable energy consumption increased by 487 trillion Btu to 7,301 trillion Btu. This is the highest level attained based on EIA estimates of renewable energy back to 1949, and is due to substantial increases in the use of biofuels, wind and solar energy. Renewable energy's share of total U.S. energy consumption was over 7 percent in 2008, compared to 6 percent in 2004 (Figure 1).

Figure 1. Renewable Energy Consumption in the Nation's Energy Supply, 2008
Total = 99.305 Quadrillion Btu **Total = 7.301 Quadrillion Btu**



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

Renewable energy is consumed across all 5 energy use sectors (Table 2). The two largest consuming sectors are electric power and industrial, though patterns are changing. In 2008, the electric power sector accounted for 51 percent of renewable energy consumption and the industrial sector 28 percent, down from 56 and 30 percent, respectively, in 2004. This was due in some measure to the substantial change in the transportation sector, whose share rose from 5 to 11 percent between 2004 and 2008. The gain was due to increased consumption of biofuels, primarily ethanol derived from corn, but also to a lesser extent biodiesel. Both are fuels needed to meet the Federal Renewable Fuel Standard, which requires an increasing supply of renewable fuels through 2022.

The Renewable Fuels Association reported that the number of operating ethanol refineries in the U.S. more than doubled in number from 81 in January 2005 to 170 in January 2009.¹ Capacity was spread across the United States but concentrated in the midwestern states. These refineries were responsible for producing 220 million barrels, or 778 trillion Btu of fuel ethanol in 2008, up from 81 million barrels or 287 trillion Btu in 2004.² When trade and stock changes are accounted for, ethanol consumption was 229 million barrels, or 809 trillion Btu in 2008. Related ethanol co-products and losses in the industrial sector increased from 210 to 562 trillion Btu between 2004 and 2008.

Biodiesel consumption declined from 46 trillion Btu in 2007 to 41 trillion Btu in 2008 due to the large volume of exports. U.S. domestic biodiesel production was actually up from 62 to 87 trillion Btu between 2007 and 2008.³

Finally the two smallest sectors, residential and commercial, maintained their shares of total renewable energy consumption at 8 and 2 percent, respectively.

Electricity

While total U.S. generation declined slightly to 4,110 billion kilowatthours in 2008, renewable generation increased by 5 percent compared to 2007 to 372 billion kilowatthours (Table 3).⁴ The biggest increase in renewable generation was the 51 percent, or 18 billion kilowatthours, increase for wind. By the end of 2008, wind provided 1.3 percent of total U.S. generation (from all energy sources), up from 0.4 percent in 2004. This is largely attributed to dramatic expansion in wind capacity in the last few years.

Conventional hydroelectric generation, by far the largest source of renewable electricity, stayed about the same at 248 billion kilowatthours. Following a sharp decline in 2007, California's hydroelectric generation declined by another 9 billion kilowatthours in 2008 due to worsening drought conditions since 2006.⁵ But California's hydroelectric losses were largely offset by increases in other regions of the U.S. Washington State remained the largest source of hydroelectric power with 77 billion kilowatthours.

According to preliminary data collected by EIA, U.S. total electric net summer capacity increased by 13,718 megawatts to 1,008,606 megawatts between 2007 and 2008 (Table 4). More than half of this net change was accounted for by wind (7,332 megawatts), followed closely by natural gas.⁶ Total wind capacity stood at 23,847 megawatts at

¹ Renewable Fuels Association, Growing Innovation – America's Energy Future Starts at Home (Washington, DC, February 2009), here: <http://www.ethanolrfa.org/industry/outlook/>.

² Energy Information Administration, Monthly Energy Review (Washington, DC, April 2009) Table 10.3.

³ Energy Information Administration, Monthly Energy Review (Washington, DC, April 2009) Table 10.4.

⁴ Energy Information Administration, Electric Power Monthly (Washington, DC, April 2009) Table 1.1.

⁵ California's hydroelectric generation actually stood at half of what it was in 2006.

⁶ Energy Information Administration, Electric Power Monthly April 2009 (Washington, DC, April 2009) Table ES-3.

year's end —up from just 6,456 megawatts in 2004. Some of the largest annual increases in wind capacity (in megawatts) were for:

- Texas 2,473
- Iowa 1,491
- North Dakota 369
- Wyoming 339
- Wisconsin 312
- Kansas 302

By year's end, seven states had more than 1,000 megawatts of wind capacity. They were led by Texas, followed by Iowa, which took over second place from California for the most installed wind capacity. Three states – Indiana, New Hampshire and Utah – reported having utility-scale wind capacity for the first time.

Landfill gas capacity also expanded by about 77 megawatts scattered over a number of states, while geothermal capacity increased by a total of 30 megawatts for Idaho and Nevada together.

The growing importance of state renewable portfolio standards and the proposals for a national renewable energy standard have sparked an interest in the share of U. S. generation provided by renewable energy. In 2008, renewable energy provided 9.0 percent of total electricity generated in the U.S. up from 8.5 percent in 2007. Nonhydroelectric renewable power provided 3.0 percent in 2008, up from 2.5 percent in the prior year. Among the states, California, with its diverse supply of renewable energy, continued to provide the most nonhydroelectric renewable power, about 25 billion kilowatthours in 2008. Texas was second with 15 billion kilowatthours.

Data Revisions

Revisions to estimates of biomass consumption were made for the release of this report. Ethanol losses and co-products from 1989-2007 were revised slightly to reflect updated information on corn yields. Biodiesel consumption now reflects the impact of trade on the energy balance from 2001 forward. In some years, this is particularly significant. Estimates of residential wood consumption from 2005 to 2007 were revised to reflect newly available information from the EIA's quadrennial Residential Energy Consumption Survey for 2005.

Table 1 U.S. Energy Consumption by Energy Source, 2004 - 2008**(Quadrillion Btu)**

Energy Source	2004	2005	2006	2007	2008
Total	100.349	100.485	99.876	101.552	99.305
Fossil Fuels	85.830	85.817	84.690	86.174	83.436
Coal	22.466	22.797	22.447	22.748	22.421
Coal Coke Net Imports	0.137	0.045	0.061	0.025	0.040
Natural Gas ¹	22.931	22.583	22.224	23.628	23.838
Petroleum ²	40.294	40.393	39.958	39.773	37.137
Electricity Net Imports	0.039	0.084	0.063	0.106	0.113
Nuclear Electric Power	8.222	8.160	8.214	8.458	8.455
Renewable Energy	6.260	6.423	6.909	6.814	7.301
Biomass ³	3.023	3.133	3.361	3.597	3.884
Biofuels	0.513	0.594	0.795	1.025	1.413
Waste	0.389	0.403	0.414	0.430	0.431
Wood Derived Fuels	2.121	2.136	2.152	2.142	2.041
Geothermal Energy	0.341	0.343	0.343	0.349	0.358
Hydroelectric Conventional	2.690	2.703	2.869	2.446	2.453
Solar/PV Energy	0.065	0.066	0.072	0.081	0.091
Wind Energy	0.142	0.178	0.264	0.341	0.514

¹Includes supplemental gaseous fuels.²Petroleum products supplied, including natural gas plant liquids and crude oil burned as fuel.³Biomass includes: biofuels, waste (landfill gas, MSW biogenic, and other biomass), wood and wood derived fuels.

PV = Photovoltaic.

Notes: Data revisions are discussed in the Highlights section.

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

Data for 2008 is preliminary.

Sources: Non-renewable energy: Energy Information Administration (EIA), Monthly Energy Review (MER) April 2009, DOE/EIA-0035 (2009/04) (Washington, DC, April 2009), Tables 1.3, 1.4a and 1.4b; Renewable Energy: Table 2 of this report.

Table 2 Renewable Energy Consumption by Energy Use Sector and Energy Source, 2004 - 2008
(Quadrillion Btu)

Sector and Source	2004	2005	2006	2007	2008
Total	6.260	6.423	6.909	6.814	7.301
Biomass	3.023	3.133	3.361	3.597	3.884
Biofuels	0.513	0.594	0.795	1.025	1.413
Biodiesel ¹	0.003	0.012	0.033	0.046	0.041
Ethanol ²	0.299	0.342	0.462	0.580	0.809
Losses and Coproducts	0.210	0.240	0.300	0.399	0.563
Biodiesel Feedstock ³	*	*	*	0.001	0.001
Ethanol Feedstock ⁴	0.210	0.240	0.299	0.398	0.562
Waste	0.389	0.403	0.414	0.430	0.431
Landfill Gas	0.144	0.148	0.157	0.173	0.187
MSW Biogenic ⁵	0.164	0.168	0.171	0.165	0.168
Other Biomass ⁶	0.081	0.088	0.086	0.092	0.076
Wood and Derived Fuels ⁷	2.121	2.136	2.152	2.142	2.041
Geothermal	0.341	0.343	0.343	0.349	0.358
Hydroelectric Conventional	2.690	2.703	2.869	2.446	2.453
Solar/PV	0.065	0.066	0.072	0.081	0.091
Wind	0.142	0.178	0.264	0.341	0.514
Residential	0.483	0.507	0.475	0.527	0.599
Biomass	0.410	0.430	0.390	0.430	0.490
Wood and Derived Fuels ⁸	0.410	0.430	0.390	0.430	0.490
Geothermal	0.014	0.016	0.018	0.022	0.026
Solar/PV ⁹	0.059	0.061	0.067	0.075	0.083
Commercial	0.118	0.119	0.117	0.118	0.123
Biomass	0.105	0.105	0.102	0.102	0.107
Biofuels	0.001	0.001	0.001	0.002	0.003
Ethanol ²	0.001	0.001	0.001	0.002	0.003
Waste	0.034	0.034	0.036	0.031	0.032
Landfill Gas	0.002	0.003	0.004	0.003	0.003
MSW Biogenic ⁵	0.025	0.025	0.026	0.021	0.022
Other Biomass ⁶	0.007	0.007	0.007	0.007	0.007
Wood and Derived Fuels ⁷	0.070	0.070	0.065	0.069	0.072
Geothermal	0.012	0.014	0.014	0.014	0.015
Hydroelectric Conventional	0.001	0.001	0.001	0.001	0.001
Industrial	1.860	1.883	2.005	2.048	2.056
Biomass	1.824	1.847	1.972	2.028	2.032
Biofuels	0.216	0.247	0.309	0.409	0.577
Ethanol ²	0.006	0.007	0.010	0.010	0.014
Losses and Coproducts	0.210	0.240	0.300	0.399	0.563
Biodiesel Feedstock ³	*	*	*	0.001	0.001
Ethanol Feedstock ⁴	0.210	0.240	0.299	0.398	0.562
Waste	0.132	0.148	0.147	0.162	0.157
Landfill Gas	0.076	0.081	0.081	0.093	0.105
MSW Biogenic ⁵	0.006	0.007	0.006	0.006	0.004
Other Biomass ⁶	0.050	0.061	0.061	0.063	0.047
Wood and Derived Fuels ⁷	1.476	1.452	1.515	1.457	1.298
Geothermal	0.004	0.004	0.004	0.005	0.005
Hydroelectric Conventional	0.033	0.032	0.029	0.016	0.019
Solar/PV	-	-	-	-	-
Wind	-	-	-	-	-
Transportation	0.295	0.346	0.484	0.614	0.833
Biomass	0.295	0.346	0.484	0.614	0.833
Biofuels	0.295	0.346	0.484	0.614	0.833
Biodiesel ¹	0.003	0.012	0.033	0.046	0.041
Ethanol ²	0.292	0.334	0.451	0.568	0.792
Electric Power ¹⁰	3.503	3.568	3.827	3.508	3.690
Biomass	0.388	0.406	0.412	0.423	0.423
Waste	0.223	0.221	0.231	0.237	0.242
Landfill Gas	0.066	0.065	0.073	0.077	0.079
MSW Biogenic ⁵	0.133	0.136	0.139	0.138	0.141
Other Biomass ⁶	0.023	0.020	0.019	0.022	0.022
Wood and Derived Fuels ⁷	0.165	0.185	0.182	0.186	0.181
Geothermal	0.311	0.309	0.306	0.308	0.312
Hydroelectric Conventional	2.656	2.670	2.839	2.430	2.433
Solar/PV	0.006	0.006	0.005	0.006	0.008
Wind	0.142	0.178	0.264	0.341	0.514

¹Biodiesel primarily derived from soy bean oil.

²Ethanol primarily derived from corn.

**Table 2 Renewable Energy Consumption by Energy Use Sector and Energy Source, 2004 - 2008
(Quadrillion Btu) (Continued)**

Sector and Source	2004	2005	2006	2007	2008
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³Difference between the energy in biodiesel feedstocks (principally soy bean oil) and the energy in biodiesel consumed in the transportation sector.

⁴Difference between energy in ethanol feedstocks (primarily corn) and its coproducts (wet and dry distiller grains), and the energy in ethanol consumed in the transportation sector.

⁵Includes paper and paper board, wood, food, leather, textiles and yard trimmings.

⁶Agriculture byproducts/crops, sludge waste, and other biomass solids, liquids and gases.

⁷Black liquor, and wood/woodwaste solids and liquids.

⁸Wood and wood pellet fuels.

⁹Includes small amounts of distributed solar thermal and photovoltaic energy used in the commercial, industrial and electric power sectors.

¹⁰The 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. MSW = Municipal Solid Waste.

PV = Photovoltaic.

* = Less than 500 billion Btu.

- = No data reported.

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

Data revisions are discussed in the Highlights section.

Revisions to biomass removed MSW non-biogenic and tires from renewable waste energy.

Data for 2008 is preliminary.

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-906, "Power Plant Report," Form EIA-920, "Combined Heat and Power Plant Report," and Form EIA-923, "Power Plant Operations 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-906, "Power Plant Report," Form EIA-920, "Combined Heat and Power Plant Report," and Form EIA-923, "Power Plant Operations Report;" and Oregon Institute of Technology, Geo-Heat Center; Government Advisory Associates, Resource Recovery Yearbook and Methane Recovery Yearbook; U.S. Environmental Protection Agency, Landfill Methane Outreach Program estimates; and losses and coproducts from the production of biodiesel and ethanol calculated as the difference between energy in feedstocks and production. Biofuels for Transportation: Biodiesel: Consumption: 2001-2008 Calculated as biodiesel production plus net imports; Production: 2001-2005: U.S. Department of Agriculture (USDA), Commodity Credit Corporation, Bioenergy Program, 2006: U.S. Department of Commerce, Bureau of Census, Current Industrial Reports, Fats and Oils - Production, Consumption and Stocks, data for soybean oil in methyl esters (biodiesel) and 2007- 2008: U.S. Department of Commerce, Bureau of Census, Current Industrial Reports, Fats and Oils - Production, Consumption and Stocks, data for fats and oils in methyl esters; Trade: USDA imports data for Harmonized Tariff Schedule code 3824.90.40.20 (Fatty Esters Animal/ Vegetable Mixture) and exports data for Schedule B code 3824.90.40.00 (Fatty Substances Animal/ Vegetable Mixture; and Ethanol: 2001-2004: EIA, Petroleum Supply Annual, Tables 2 and 16. Calculated as ten percent of oxygenated finished motor gasoline field production (Table 2) plus fuel ethanol refinery input (Table 16). 2005-2007: EIA Petroleum Supply Annual (Various Issues), Tables 1 and 15. Calculated as motor gasoline blending components adjustments (Table 1), plus finished motor gasoline adjustments (Table 1), plus fuel ethanol refinery and blender net inputs (Table 15). 2008: EIA Petroleum Supply Monthly (various reports), Tables 1 and 27. Calculated as motorgasoline blending components adjustments (Table 1), plus finished motor gasoline adjustments (Table 1), plus fuel ethanol refinery and blender net inputs (Table 27). Small amounts of ethanol consumption are distributed to the commercial and industrial sectors according to those sector's shares of U.S. motor gasoline supplied. Electric Power: Energy Information Administration, Form EIA-906, "Power Plant Report," Form EIA-920, "Combined Heat and Power Plant Report," and Form EIA-923, "Power Plant Operations Report."

Table 3 Electricity Net Generation From Renewable Energy by Energy Use Sector and Energy Source, 2004 - 2008

(Thousand Kilowatthours)

Sector/Source	2004	2005	2006	2007	2008
Total	351,484,632	357,650,653	385,771,908	352,747,486	371,688,391
Biomass	53,537,453	54,276,810	54,860,621	55,538,578	55,875,118
Waste	15,420,570	15,420,393	16,098,525	16,524,554	17,086,267
Landfill Gas	5,128,425	5,142,111	5,677,040	6,157,750	6,590,366
MSW Biogenic ¹	8,150,974	8,330,471	8,477,571	8,303,838	8,459,538
Other Biomass ²	2,141,171	1,947,810	1,943,913	2,062,966	2,036,363
Wood and Derived Fuels ³	38,116,883	38,856,417	38,762,096	39,014,024	38,788,851
Geothermal	14,810,975	14,691,745	14,568,029	14,637,213	14,859,238
Hydroelectric Conventional	268,417,308	270,321,255	289,246,416	247,509,974	248,085,084
Solar/PV	575,155	550,294	507,706	611,793	843,054
Wind	14,143,741	17,810,549	26,589,137	34,449,927	52,025,898
Commercial	1,680,155	1,758,789	1,712,691	1,691,439	1,715,913
Biomass	1,575,188	1,672,752	1,619,245	1,614,160	1,640,533
Waste	1,561,794	1,656,755	1,598,646	1,598,799	1,616,040
Landfill Gas	172,029	217,632	172,590	202,547	231,583
MSW Biogenic ¹	945,344	953,093	955,910	962,496	964,155
Other Biomass ²	444,421	486,031	470,146	433,756	420,303
Wood and Derived Fuels ³	13,394	15,997	20,599	15,361	24,493
Hydroelectric Conventional	104,967	86,037	93,446	77,279	75,380
Industrial	32,412,566	32,198,528	31,871,511	30,508,807	30,370,006
Biomass	29,164,073	29,003,087	28,972,463	28,918,826	28,460,443
Waste	796,988	732,553	572,447	631,452	597,960
Landfill Gas	120,018	113,155	28,786	27,087	21,265
MSW Biogenic ¹	30,213	34,441	34,541	39,782	13,357
Other Biomass ²	646,757	584,957	509,120	564,583	563,338
Wood and Derived Fuels ³	28,367,085	28,270,534	28,400,016	28,287,374	27,862,484
Hydroelectric Conventional	3,248,493	3,195,441	2,899,048	1,589,981	1,909,563
Electric Power ⁴	317,391,910	323,693,336	352,187,707	320,547,239	339,602,472
Biomass	22,798,191	23,600,971	24,268,913	25,005,592	25,774,142
Waste	13,061,787	13,031,084	13,927,432	14,294,304	14,872,266
Landfill Gas	4,836,377	4,811,325	5,475,664	5,928,117	6,337,518
MSW Biogenic ¹	7,175,417	7,342,938	7,487,120	7,301,560	7,482,026
Other Biomass ²	1,049,993	876,822	964,648	1,064,627	1,052,722
Wood and Derived Fuels ³	9,736,404	10,569,886	10,341,481	10,711,288	10,901,875
Geothermal	14,810,975	14,691,745	14,568,029	14,637,213	14,859,238
Hydroelectric Conventional	265,063,848	267,039,777	286,253,922	245,842,714	246,100,141
Solar/PV	575,155	550,294	507,706	611,793	843,054
Wind	14,143,741	17,810,549	26,589,137	34,449,927	52,025,898

¹Includes paper and paper board, wood, food, leather, textiles and yard trimmings.

²Agriculture byproducts/crops, sludge waste, and other biomass solids, liquids and gases.

³Black liquor, and wood/woodwaste solids and liquids.

⁴The 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.

MSW = Municipal Solid Waste.

PV = Photovoltaic.

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

Data revisions are discussed in the Highlights section.

Revisions to biomass removed MSW non-biogenic and tires from renewable waste energy.

Data for 2008 is preliminary.

Source: Electric Power: Energy Information Administration, Form EIA-923, "Power Plant Operations Report," and predecessor forms: Form EIA-906, "Power Plant Report," and Form EIA-920, "Combined Heat and Power Plant Report."

Table 4 U.S. Electric Net Summer Capacity, 2004 - 2008

(Megawatts)

Source	2004	2005	2006	2007	2008
Total	962,942	978,020	986,215	994,888	1,008,606
Renewable Total	96,357	98,746	101,934	107,954	115,459
Biomass	9,711	9,802	10,100	10,839	10,976
Waste	3,529	3,609	3,727	4,134	4,242
Landfill Gas	859	887	978	1,319	1,395
MSW ¹	2,196	2,167	2,188	2,218	2,215
Other Biomass ²	474	554	561	598	631
Wood and Derived Fuels ³	6,182	6,193	6,372	6,704	6,734
Geothermal	2,152	2,285	2,274	2,214	2,244
Hydroelectric Conventional	77,641	77,541	77,821	77,885	77,879
Solar/PV	398	411	411	502	514
Wind	6,456	8,706	11,329	16,515	23,847
Nonrenewable Total	866,585	879,274	884,281	886,934	893,147

¹Includes total capacity whose primary energy source is MSW.

²Agriculture byproducts/crops, sludge waste and other biomass solids, liquids and gases. Does not include tires.

³Black liquor, and wood/woodwaste solids and liquids.

MSW = Municipal Solid Waste.

PV = Photovoltaic.

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

Data revisions are discussed in the Highlights section.

Revisions to biomass capacity removed tires from renewable waste energy.

Data for 2008 is preliminary.

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

Table 5 Total Renewable Net Generation by Energy Source and State, 2007
(Thousand Kilowatthours)

State	Biomass			Geothermal	Hydroelectric Conventional	Solar/PV	Wind	Total
	Waste		Wood and Derived Fuels ³					
	Landfill Gas/MSW Biogenic ¹	Other Biomass ²						
Alabama	3,520	13,218	3,783,882	-	4,136,114	-	-	7,936,734
Alaska	-	10,196	s	-	1,291,223	-	1,012	1,302,453
Arizona	28,507	4,483	-	-	6,597,671	8,649	-	6,639,310
Arkansas	33,438	9,503	1,580,803	-	3,236,753	-	-	4,860,497
California	1,657,098	648,130	3,407,416	12,990,711	27,327,751	556,969	5,584,933	52,173,008
Colorado	-	31,105	-	-	1,729,533	2,208	1,291,516	3,054,362
Connecticut	728,164	-	1,676	-	363,261	-	-	1,093,100
Delaware	48,116	-	-	-	-	-	-	48,116
District of Columbia	-	-	-	-	-	-	-	-
Florida	1,794,490	578,529	1,929,798	-	154,446	-	-	4,457,264
Georgia	16,221	37,103	3,362,097	-	2,236,188	-	-	5,651,610
Hawaii	169,450	115,827	-	229,886	92,343	-	238,184	845,691
Idaho	-	-	480,582	-	9,021,690	-	172,267	9,674,539
Illinois	603,225	17,100	-	-	153,727	-	664,427	1,438,480
Indiana	231,247	-	-	-	449,936	-	-	681,183
Iowa	122,715	28,368	s	-	962,346	-	2,756,676	3,870,121
Kansas	-	-	-	-	10,501	-	1,152,538	1,163,039
Kentucky	93,440	1,973	370,210	-	1,668,587	-	-	2,134,210
Louisiana	-	81,512	2,898,371	-	826,642	-	-	3,806,525
Maine	208,081	52,262	3,847,566	-	3,738,168	-	99,071	7,945,147
Maryland	400,364	-	203,097	-	1,652,216	-	-	2,255,678
Massachusetts	1,094,431	26,636	119,157	-	797,482	-	-	2,037,706
Michigan	721,284	538	1,692,202	-	1,269,989	-	2,723	3,686,736
Minnesota	423,482	142,889	727,455	-	653,822	-	2,638,812	4,586,460
Mississippi	-	5,017	1,488,348	-	-	-	-	1,493,365
Missouri	21,944	7,245	s	-	1,204,326	-	-	1,233,635
Montana	-	-	110,945	-	9,364,336	-	495,776	9,971,057
Nebraska	46,184	15,075	-	-	347,444	-	216,765	625,468
Nevada	-	-	-	1,252,691	2,003,191	43,967	-	3,299,849
New Hampshire	152,816	-	970,456	-	1,265,229	-	-	2,388,501
New Jersey	822,453	713	-	-	20,909	-	20,412	864,487
New Mexico	-	15,994	-	-	267,978	-	1,393,239	1,677,211
New York	1,441,930	7,416	492,261	-	25,252,555	-	833,476	28,027,639
North Carolina	85,745	1,100	1,585,374	-	2,984,159	-	-	4,656,377
North Dakota	-	13,507	-	-	1,305,393	-	620,772	1,939,672
Ohio	10,972	10,045	399,378	-	410,436	-	14,748	845,579
Oklahoma	3,721	-	276,133	-	3,065,862	-	1,849,144	5,194,860
Oregon	100,389	38,345	842,565	-	33,587,439	-	1,246,994	35,815,732
Pennsylvania	1,440,683	15,928	619,567	-	2,235,982	-	470,018	4,782,178
Rhode Island	154,757	-	-	-	4,364	-	-	159,121
South Carolina	100,602	-	1,895,432	-	1,555,912	-	-	3,551,946
South Dakota	-	-	-	-	2,917,283	-	150,018	3,067,301
Tennessee	19,228	33,252	868,110	-	4,939,601	-	49,937	5,910,127
Texas	322,272	44,793	914,164	-	1,644,437	-	9,006,383	11,932,049
Utah	31,030	-	-	163,925	538,782	-	-	733,738
Vermont	-	-	453,038	-	646,605	-	10,511	1,110,153
Virginia	752,928	20,317	1,792,326	-	1,248,264	-	-	3,813,835
Washington	162,890	13,461	1,116,380	-	78,829,195	-	2,437,823	82,559,749
West Virginia	-	-	-	-	1,254,397	-	167,588	1,421,985
Wisconsin	413,771	21,384	785,079	-	1,516,083	-	109,283	2,845,600
Wyoming	-	-	-	-	729,424	-	754,881	1,484,305
U.S. Total	14,461,588	2,062,966	39,014,024	14,637,213	247,509,974	611,793	34,449,927	352,747,486

¹Includes landfill gas and MSW biogenic (paper and paper board, wood, food, leather, textiles and yard trimmings).

²Agriculture byproducts/crops, sludge waste, and other biomass solids, liquids and gases.

³Black liquor, and wood/woodwaste solids and liquids.

MSW = Municipal Solid Waste.

PV = Photovoltaic.

s = Less than 500 kilowatthours.

- = No data reported.

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

Revisions to biomass removed MSW non-biogenic and tires from renewable waste energy.

Source: Energy Information Administration, Form EIA-923, "Power Plant Operations Report," and predecessor forms: Form EIA-906, "Power Plant Report," and Form EIA-920, "Combined Heat and Power Plant Report."

Table 6 Total Renewable Net Generation by Energy Source and State, 2008
(Thousand Kilowatthours)

State	Biomass			Geothermal	Hydroelectric Conventional	Solar/PV	Wind	Total
	Waste		Wood and Derived Fuels ³					
	Landfill Gas/MSW Biogenic ¹	Other Biomass ²						
Alabama	2,894	30,074	3,595,040	-	5,883,743	-	-	9,511,751
Alaska	-	9,473	-	-	1,163,511	-	6,134	1,179,118
Arizona	14,276	4,268	76,900	-	7,328,797	13,807	-	7,438,048
Arkansas	34,337	16,794	1,554,646	-	4,754,468	-	-	6,360,245
California	1,807,204	655,684	3,659,844	13,196,075	18,651,639	666,544	5,418,921	44,055,910
Colorado	-	38,672	s	-	1,831,191	14,867	3,098,556	4,983,421
Connecticut	750,062	1,049	8,094	-	393,728	-	-	1,152,933
Delaware	158,505	-	-	-	-	-	-	158,505
District of Columbia	-	-	-	-	-	-	-	-
Florida	1,768,981	509,852	2,042,136	-	175,613	-	-	4,496,581
Georgia	22,141	45,171	3,079,943	-	2,290,890	-	-	5,438,145
Hawaii	184,009	111,888	-	234,333	81,335	-	237,014	848,579
Idaho	-	-	455,393	-	9,538,681	-	201,992	10,196,067
Illinois	658,704	8,325	611	-	162,015	-	2,125,491	2,955,145
Indiana	227,312	-	-	-	450,530	-	238,356	916,197
Iowa	116,528	35,190	703	-	878,122	-	3,801,453	4,831,997
Kansas	-	-	-	-	11,926	-	1,768,352	1,780,278
Kentucky	96,554	3,786	347,374	-	1,960,176	-	-	2,407,890
Louisiana	-	82,247	2,749,380	-	1,064,373	-	-	3,896,001
Maine	245,084	50,677	3,802,995	-	4,166,239	-	131,621	8,396,615
Maryland	414,451	-	190,962	-	1,937,271	-	-	2,542,685
Massachusetts	1,150,631	21,452	125,282	-	958,955	-	-	2,256,320
Michigan	712,610	506	1,682,504	-	1,280,978	-	117,298	3,793,896
Minnesota	456,400	144,111	715,922	-	668,282	-	4,051,292	6,036,007
Mississippi	-	4,912	1,503,579	-	-	-	-	1,508,491
Missouri	-	10,735	-	-	2,083,978	-	196,404	2,291,118
Montana	-	-	97,393	-	9,776,753	-	567,196	10,441,342
Nebraska	47,477	14,322	-	-	454,220	-	213,263	729,282
Nevada	-	-	-	1,174,553	1,749,277	147,836	-	3,071,666
New Hampshire	169,740	-	1,054,739	-	1,533,703	-	-	2,758,182
New Jersey	876,337	2,019	-	-	25,290	-	20,986	924,632
New Mexico	-	15,081	-	-	276,489	-	1,642,345	1,933,915
New York	1,483,686	6,236	509,977	-	26,535,695	-	1,294,313	29,829,907
North Carolina	96,124	18,530	1,741,522	-	3,357,832	-	-	5,214,007
North Dakota	-	11,159	-	-	1,252,790	-	1,525,499	2,789,448
Ohio	13,517	6,420	416,658	-	455,778	-	18,741	911,114
Oklahoma	4,257	-	283,027	-	3,514,225	-	2,309,218	6,110,727
Oregon	109,747	38,823	779,668	-	33,324,742	-	2,511,811	36,764,792
Pennsylvania	1,471,454	17,065	650,955	-	2,484,238	-	729,220	5,352,933
Rhode Island	150,944	-	-	-	4,912	-	-	155,856
South Carolina	107,719	-	1,696,847	-	1,402,031	-	-	3,206,598
South Dakota	-	1,665	-	-	3,008,721	-	135,923	3,146,309
Tennessee	20,482	31,792	777,061	-	5,795,149	-	50,117	6,674,601
Texas	338,414	35,758	926,330	-	1,680,830	-	14,230,610	17,211,943
Utah	33,927	-	-	254,277	653,187	-	-	941,391
Vermont	-	-	424,268	-	780,692	-	10,235	1,215,194
Virginia	700,989	20,824	1,974,031	-	1,156,141	-	-	3,851,985
Washington	170,100	11,726	1,089,553	-	77,422,476	-	3,648,690	82,342,545
West Virginia	-	-	s	-	1,272,320	-	391,910	1,663,841
Wisconsin	434,307	20,079	775,771	-	1,616,961	-	422,494	3,269,613
Wyoming	-	-	-	-	834,187	-	910,442	1,744,629
U.S. Total	15,049,904	2,036,363	38,788,851	14,859,238	248,085,084	843,054	52,025,898	371,688,391

¹Includes landfill gas and MSW biogenic (paper and paper board, wood, food, leather, textiles and yard trimmings).

²Agriculture byproducts/crops, sludge waste, and other biomass solids, liquids and gases.

³Black liquor, and wood/woodwaste solids and liquids.

MSW = Municipal Solid Waste.

PV = Photovoltaic.

s = Less than 500 kilowatthours.

- = No data reported.

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

Revisions to biomass removed MSW non-biogenic and tires from renewable waste energy.

Data for 2008 is preliminary.

Source: Energy Information Administration, Form EIA-923, "Power Plant Operations Report."

Table 7 Total Renewable Net Summer Capacity by Energy Source and State, 2007

(Megawatts)

State	Biomass			Geothermal	Hydroelectric Conventional	Solar/PV	Wind	Total
	Waste		Wood and Derived Fuels ³					
	Landfill Gas/MSW ¹	Other Biomass ²						
Alabama	-	-	574	-	3,272	-	-	3,846
Alaska	-	-	-	-	397	-	3	400
Arizona	4	-	3	-	2,720	9	-	2,736
Arkansas	5	6	292	-	1,321	-	-	1,623
California	380	102	596	1,940	10,041	404	2,312	15,774
Colorado	-	10	-	-	665	8	1,063	1,746
Connecticut	163	-	-	-	122	-	-	285
Delaware	7	-	-	-	-	-	-	7
District of Columbia	-	-	-	-	-	-	-	-
Florida	463	176	354	-	55	-	-	1,048
Georgia	10	44	621	-	2,032	-	-	2,706
Hawaii	60	49	-	31	24	-	64	227
Idaho	-	-	71	-	2,367	-	75	2,514
Illinois	131	13	-	-	33	-	740	916
Indiana	39	-	-	-	60	-	-	99
Iowa	11	3	-	-	131	-	1,170	1,316
Kansas	-	-	-	-	3	-	363	366
Kentucky	15	-	47	-	817	-	-	880
Louisiana	-	14	380	-	192	-	-	586
Maine	53	36	612	-	718	-	42	1,462
Maryland	130	-	3	-	590	-	-	723
Massachusetts	264	9	26	-	259	-	2	560
Michigan	156	-	231	-	249	-	2	638
Minnesota	128	55	161	-	176	-	1,139	1,658
Mississippi	-	-	229	-	-	-	-	229
Missouri	3	-	-	-	552	-	57	612
Montana	-	-	17	22	2,620	-	149	2,809
Nebraska	6	5	-	-	273	-	25	308
Nevada	-	-	-	189	1,048	79	-	1,316
New Hampshire	29	-	140	-	494	-	-	663
New Jersey	182	20	-	-	4	2	8	215
New Mexico	-	6	-	-	82	-	494	582
New York	324	-	37	-	4,301	-	425	5,087
North Carolina	18	-	324	-	1,960	-	-	2,301
North Dakota	-	10	-	-	486	-	383	879
Ohio	41	-	64	-	101	-	7	213
Oklahoma	16	-	63	-	851	-	689	1,618
Oregon	20	18	215	-	8,385	-	885	9,523
Pennsylvania	379	-	108	-	748	-	293	1,529
Rhode Island	24	-	-	-	4	-	-	28
South Carolina	29	-	220	-	1,337	-	-	1,587
South Dakota	-	-	-	-	1,463	-	43	1,506
Tennessee	8	2	165	-	2,635	-	29	2,838
Texas	72	21	130	-	673	-	4,490	5,385
Utah	5	-	-	33	255	-	-	293
Vermont	-	-	76	-	308	-	5	389
Virginia	254	-	418	-	675	-	-	1,347
Washington	36	-	296	-	21,333	1	1,162	22,828
West Virginia	-	-	-	-	264	-	66	330
Wisconsin	71	1	232	-	488	-	44	836
Wyoming	-	-	-	-	303	-	287	590
U.S. Total	3,536	598	6,704	2,214	77,885	502	16,515	107,954

¹Total capacity whose primary energy source is landfill gas or MSW.

²Agriculture byproducts/crops, sludge waste, and other biomass solids, liquids and gases.

³Black liquor, and wood/woodwaste solids and liquids.

MSW = Municipal Solid Waste.

PV = Photovoltaic.

- = No data reported.

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

Revisions to biomass capacity removed tires from renewable waste energy.

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

Table 8 Total Renewable Net Summer Capacity by Energy Source and State, 2008

(Megawatts)

State	Biomass			Geothermal	Hydroelectric Conventional	Solar/PV	Wind	Total
	Waste		Wood and Derived Fuels ³					
	Landfill Gas/MSW ¹	Other Biomass ²						
Alabama	-	-	574	-	3,272	-	-	3,846
Alaska	-	-	-	-	400	-	3	403
Arizona	4	-	32	-	2,720	9	-	2,766
Arkansas	5	5	292	-	1,321	-	-	1,623
California	399	126	596	1,940	10,041	408	2,357	15,866
Colorado	3	10	-	-	665	11	1,063	1,752
Connecticut	166	-	-	-	122	-	-	287
Delaware	7	-	-	-	-	-	-	7
District of Columbia	-	-	-	-	-	-	-	-
Florida	463	176	354	-	55	-	-	1,048
Georgia	7	44	621	-	2,032	-	-	2,704
Hawaii	60	49	-	31	24	1	64	228
Idaho	-	-	71	17	2,367	-	117	2,572
Illinois	133	13	-	-	33	-	962	1,140
Indiana	39	-	-	-	60	-	131	229
Iowa	11	3	-	-	131	-	2,661	2,807
Kansas	-	-	-	-	3	-	665	668
Kentucky	15	-	47	-	817	-	-	880
Louisiana	-	14	380	-	192	-	-	586
Maine	53	36	612	-	721	-	42	1,465
Maryland	132	-	3	-	590	-	-	725
Massachusetts	264	9	26	-	259	-	2	560
Michigan	161	-	231	-	249	-	124	765
Minnesota	128	55	161	-	176	-	1,362	1,881
Mississippi	-	-	229	-	-	-	-	229
Missouri	5	-	-	-	552	-	163	720
Montana	-	-	17	22	2,620	-	149	2,809
Nebraska	6	5	-	-	273	-	25	308
Nevada	-	-	-	201	1,048	79	-	1,328
New Hampshire	29	-	140	-	494	-	24	687
New Jersey	187	20	-	-	4	4	8	222
New Mexico	-	6	-	-	82	-	494	582
New York	328	-	37	-	4,301	-	707	5,373
North Carolina	18	-	324	-	1,960	1	-	2,302
North Dakota	-	10	-	-	486	-	752	1,248
Ohio	41	-	64	-	101	-	7	213
Oklahoma	16	-	63	-	851	-	689	1,618
Oregon	20	18	215	-	8,363	-	1,065	9,681
Pennsylvania	390	-	108	-	748	-	361	1,607
Rhode Island	24	-	-	-	4	-	-	28
South Carolina	32	-	220	-	1,337	-	-	1,590
South Dakota	-	-	-	-	1,463	-	193	1,656
Tennessee	8	2	165	-	2,635	-	29	2,838
Texas	72	30	130	-	673	-	6,963	7,867
Utah	5	-	-	33	255	-	19	311
Vermont	3	-	76	-	317	-	5	401
Virginia	269	-	418	-	677	-	-	1,364
Washington	36	-	296	-	21,333	1	1,333	22,999
West Virginia	-	-	-	-	264	-	330	594
Wisconsin	72	1	232	-	488	-	356	1,148
Wyoming	-	-	-	-	303	-	626	929
U.S. Total	3,611	631	6,734	2,244	77,879	514	23,847	115,459

¹Total capacity whose primary energy source is landfill gas or MSW.

²Agriculture byproducts/crops, sludge waste, and other biomass solids, liquids and gases.

³Black liquor, and wood/woodwaste solids and liquids.

MSW = Municipal Solid Waste.

PV = Photovoltaic.

- = No data reported.

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

Revisions to biomass capacity removed tires from renewable waste energy.

Data for 2008 is preliminary.

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