

**Table 1.5 Historical renewable energy consumption by sector and energy source, 1989 – 2009**

(quadrillion Btu)

Sector and Source	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Total</b>	6.235	6.041	6.069	5.821	6.083	5.988	6.561	7.014	7.016	6.493	6.516
Biomass	3.159	2.735	2.782	2.932	2.908	3.028	3.101	3.157	3.105	2.928	2.963
Biofuels <sup>1</sup>	0.125	0.111	0.128	0.145	0.169	0.188	0.200	0.143	0.184	0.201	0.209
Waste <sup>2</sup>	0.354	0.408	0.440	0.473	0.479	0.515	0.531	0.577	0.551	0.542	0.540
Wood and Derived Fuels <sup>3</sup>	2.680	2.216	2.214	2.313	2.260	2.324	2.370	2.437	2.371	2.184	2.214
Geothermal	0.162	0.171	0.178	0.179	0.186	0.173	0.152	0.163	0.167	0.168	0.171
Hydroelectric Conventional	2.837	3.046	3.016	2.617	2.892	2.683	3.205	3.590	3.640	3.297	3.268
Solar Thermal/PV <sup>4</sup>	0.055	0.059	0.062	0.064	0.066	0.068	0.069	0.070	0.070	0.069	0.068
Wind	0.022	0.029	0.031	0.030	0.031	0.036	0.033	0.033	0.034	0.031	0.046
<b>Residential</b>	0.977	0.641	0.673	0.706	0.618	0.589	0.591	0.612	0.502	0.452	0.461
Biomass	0.920	0.580	0.610	0.640	0.550	0.520	0.520	0.540	0.430	0.380	0.390
Wood and Derived Fuels	0.920	0.580	0.610	0.640	0.550	0.520	0.520	0.540	0.430	0.380	0.390
Geothermal	0.005	0.006	0.006	0.006	0.007	0.006	0.007	0.007	0.008	0.008	0.009
Solar Thermal/PV <sup>4</sup>	0.052	0.056	0.057	0.059	0.061	0.063	0.064	0.065	0.064	0.064	0.063
<b>Commercial</b>	0.102	0.098	0.100	0.109	0.114	0.112	0.118	0.135	0.138	0.127	0.129
Biomass	0.099	0.094	0.095	0.105	0.109	0.106	0.113	0.129	0.131	0.118	0.121
Biofuels <sup>5</sup>	0.001	*	*	*	*	*	*	*	*	*	*
Waste <sup>2</sup>	0.022	0.028	0.026	0.032	0.033	0.035	0.040	0.053	0.058	0.054	0.054
Wood and Derived Fuels <sup>3</sup>	0.076	0.066	0.068	0.072	0.076	0.072	0.072	0.076	0.073	0.064	0.067
Geothermal	0.003	0.003	0.003	0.003	0.003	0.004	0.005	0.005	0.006	0.007	0.007
Hydroelectric Conventional	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Solar Thermal/PV	-	-	-	-	-	-	-	-	-	-	-
Wind	-	-	-	-	-	-	-	-	-	-	-
<b>Industrial</b>	1.871	1.717	1.684	1.737	1.773	1.927	1.992	2.033	2.057	1.929	1.934
Biomass	1.841	1.684	1.652	1.705	1.741	1.862	1.934	1.969	1.996	1.872	1.882
Biofuels <sup>6</sup>	0.057	0.050	0.057	0.065	0.075	0.083	0.087	0.062	0.081	0.088	0.091
Waste <sup>2</sup>	0.200	0.192	0.185	0.179	0.181	0.199	0.195	0.224	0.184	0.180	0.171
Wood and Derived Fuels <sup>3</sup>	1.584	1.442	1.410	1.461	1.484	1.580	1.652	1.683	1.731	1.603	1.620
Geothermal	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004
Hydroelectric Conventional	0.028	0.031	0.030	0.031	0.030	0.062	0.055	0.061	0.058	0.055	0.049
Solar Thermal/PV	-	-	-	-	-	-	-	-	-	-	-
Wind	-	-	-	-	-	-	-	-	-	-	-
<b>Transportation</b>	0.068	0.060	0.070	0.080	0.094	0.105	0.113	0.081	0.102	0.113	0.118
Biomass	0.068	0.060	0.070	0.080	0.094	0.105	0.113	0.081	0.102	0.113	0.118
Biofuels <sup>7</sup>	0.068	0.060	0.070	0.080	0.094	0.105	0.113	0.081	0.102	0.113	0.118
<b>Electric Power<sup>8</sup></b>	3.217	3.524	3.542	3.189	3.484	3.255	3.747	4.153	4.216	3.872	3.874
<b>Electric Utilities</b>	2.883	3.059	3.029	2.626	2.873	2.641	3.122	3.498	3.562	3.223	3.105
Biomass	0.020	0.022	0.021	0.022	0.021	0.021	0.017	0.020	0.020	0.021	0.020
Waste <sup>2</sup>	0.010	0.013	0.014	0.013	0.011	0.013	0.010	0.012	0.013	0.013	0.013
Wood and Derived Fuels <sup>3</sup>	0.010	0.008	0.008	0.008	0.009	0.008	0.007	0.008	0.008	0.007	0.007
Geothermal	0.097	0.089	0.084	0.084	0.078	0.072	0.049	0.054	0.056	0.053	0.017
Hydroelectric Conventional	2.765	2.948	2.923	2.521	2.774	2.549	3.056	3.423	3.485	3.149	3.067
Solar Thermal/PV	*	*	*	*	*	*	*	*	*	*	*
Wind	*	*	*	*	*	*	*	*	*	*	*
<b>Independent Power Producers</b>	0.333	0.465	0.513	0.563	0.612	0.614	0.624	0.655	0.655	0.650	0.769
Biomass	0.211	0.295	0.333	0.381	0.394	0.413	0.405	0.418	0.426	0.424	0.433
Waste <sup>2</sup>	0.122	0.175	0.215	0.249	0.253	0.269	0.286	0.288	0.296	0.294	0.302
Wood and Derived Fuels <sup>3</sup>	0.089	0.120	0.118	0.132	0.141	0.144	0.119	0.130	0.129	0.129	0.131
Geothermal	0.055	0.071	0.082	0.083	0.095	0.089	0.089	0.094	0.095	0.098	0.134
Hydroelectric Conventional	0.043	0.066	0.062	0.065	0.087	0.072	0.093	0.104	0.096	0.092	0.151
Solar Thermal/PV	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 1.5 Historical renewable energy consumption by sector and energy source, 1989 – 2009 (cont.)**

(quadrillion Btu)

Sector and Source	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>Total</b>	6.106	5.163	5.729	5.983	6.082	6.242	6.659	6.551	7.191	7.587
<b>Biomass</b>	3.008	2.622	2.701	2.807	3.010	3.117	3.277	3.503	3.852	3.899
Biofuels <sup>1</sup>	0.236	0.253	0.303	0.404	0.500	0.577	0.771	0.991	1.372	1.567
Waste <sup>2</sup>	0.511	0.364	0.402	0.401	0.389	0.403	0.397	0.413	0.436	0.452
Wood and Derived Fuels <sup>3</sup>	2.262	2.006	1.995	2.002	2.121	2.136	2.109	2.098	2.044	1.881
Geothermal	0.164	0.164	0.171	0.175	0.178	0.181	0.181	0.186	0.192	0.200
Hydroelectric Conventional	2.811	2.242	2.689	2.825	2.690	2.703	2.869	2.446	2.512	2.669
Solar Thermal/PV <sup>4</sup>	0.065	0.064	0.063	0.062	0.063	0.063	0.068	0.076	0.089	0.098
Wind	0.057	0.070	0.105	0.115	0.142	0.178	0.264	0.341	0.546	0.721
<b>Residential</b>	0.489	0.438	0.448	0.470	0.481	0.504	0.472	0.522	0.556	0.552
Biomass	0.420	0.370	0.380	0.400	0.410	0.430	0.390	0.430	0.450	0.430
Wood and Derived Fuels	0.420	0.370	0.380	0.400	0.410	0.430	0.390	0.430	0.450	0.430
Geothermal	0.009	0.009	0.010	0.013	0.014	0.016	0.018	0.022	0.026	0.033
Solar Thermal/PV <sup>4</sup>	0.060	0.059	0.057	0.057	0.057	0.058	0.063	0.070	0.080	0.089
<b>Commercial</b>	0.128	0.101	0.104	0.113	0.118	0.119	0.117	0.118	0.125	0.129
Biomass	0.119	0.092	0.095	0.101	0.105	0.105	0.102	0.102	0.109	0.112
Biofuels <sup>5</sup>	*	*	*	0.001	0.001	0.001	0.001	0.002	0.002	0.003
Waste <sup>2</sup>	0.047	0.025	0.026	0.029	0.034	0.034	0.036	0.031	0.034	0.036
Wood and Derived Fuels <sup>3</sup>	0.071	0.067	0.069	0.071	0.070	0.070	0.065	0.069	0.073	0.072
Geothermal	0.008	0.008	0.009	0.011	0.012	0.014	0.014	0.014	0.015	0.017
Hydroelectric Conventional	0.001	0.001	*	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Solar Thermal/PV	-	-	-	-	-	-	-	-	*	-
Wind	-	-	-	-	-	-	-	-	-	*
<b>Industrial</b>	1.928	1.719	1.720	1.726	1.853	1.873	1.930	1.964	2.053	2.005
Biomass	1.881	1.681	1.676	1.679	1.817	1.837	1.897	1.944	2.031	1.982
Biofuels <sup>6</sup>	0.100	0.110	0.133	0.173	0.209	0.237	0.295	0.387	0.544	0.630
Waste <sup>2</sup>	0.145	0.129	0.146	0.142	0.132	0.148	0.130	0.144	0.144	0.154
Wood and Derived Fuels <sup>3</sup>	1.636	1.443	1.396	1.363	1.476	1.452	1.472	1.413	1.344	1.198
Geothermal	0.004	0.005	0.005	0.003	0.004	0.004	0.004	0.005	0.005	0.004
Hydroelectric Conventional	0.042	0.033	0.039	0.043	0.033	0.032	0.029	0.016	0.017	0.018
Solar Thermal/PV	-	-	-	-	-	-	-	-	-	-
Wind	-	-	-	-	-	-	-	-	-	-
<b>Transportation</b>	0.135	0.142	0.170	0.230	0.290	0.339	0.475	0.603	0.827	0.934
Biomass	0.135	0.142	0.170	0.230	0.290	0.339	0.475	0.603	0.827	0.934
Biofuels <sup>7</sup>	0.135	0.142	0.170	0.230	0.290	0.339	0.475	0.603	0.827	0.934
<b>Electric Power<sup>8</sup></b>	3.427	2.763	3.288	3.445	3.340	3.407	3.665	3.345	3.630	3.967
<b>Electric Utilities</b>	2.605	2.061	2.514	2.602	2.509	2.518	2.675	2.343	2.391	2.573
Biomass	0.021	0.014	0.033	0.029	0.031	0.040	0.042	0.048	0.047	0.047
Waste <sup>2</sup>	0.014	0.008	0.022	0.012	0.011	0.013	0.015	0.016	0.018	0.017
Wood and Derived Fuels <sup>3</sup>	0.007	0.006	0.011	0.017	0.020	0.027	0.027	0.032	0.029	0.030
Geothermal	0.002	0.002	0.014	0.013	0.013	0.011	0.012	0.011	0.012	0.012
Hydroelectric Conventional	2.582	2.044	2.465	2.556	2.461	2.455	2.598	2.241	2.263	2.413
Solar Thermal/PV	*	*	*	*	*	*	*	*	*	*
Wind	*	0.001	0.002	0.004	0.004	0.010	0.023	0.043	0.068	0.101
<b>Independent Power Producers</b>	0.821	0.702	0.774	0.844	0.832	0.889	0.990	1.001	1.239	1.395
Biomass	0.432	0.323	0.347	0.368	0.357	0.365	0.370	0.376	0.388	0.394
Waste <sup>2</sup>	0.305	0.202	0.208	0.218	0.212	0.208	0.216	0.221	0.240	0.244
Wood and Derived Fuels <sup>3</sup>	0.127	0.121	0.140	0.151	0.145	0.158	0.154	0.154	0.148	0.150
Geothermal	0.142	0.140	0.133	0.135	0.136	0.136	0.133	0.133	0.134	0.135
Hydroelectric Conventional	0.185	0.165	0.185	0.224	0.196	0.215	0.242	0.189	0.231	0.237
Solar Thermal/PV	0.005	0.006	0.006	0.005	0.006	0.005	0.005	0.006	0.008	0.008
Wind	0.057	0.068	0.103	0.111	0.138	0.168	0.240	0.297	0.478	0.620

See footnotes at end of table.

**Table 1.5 Historical renewable energy consumption by sector and energy source, 1989– 2009 (cont.)**

<sup>1</sup>Biofuels and biofuel losses and coproducts.

<sup>2</sup>Municipal solid waste biogenic, landfill gases, agriculture byproducts/crops, sludge waste, and other biomass solids,

<sup>3</sup>Black liquor, and wood/wood waste solids and liquids.

<sup>4</sup>Includes small amounts of distributed solar thermal and photovoltaic energy used in the commercial, industrial and

<sup>5</sup>Ethanol primarily derived from corn minus denaturant.

<sup>6</sup>Ethanol primarily derived from corn and losses and coproducts from production of biodiesel and ethanol.

<sup>7</sup>Biodiesel primarily derived from soybean oil and ethanol primarily derived from corn.

<sup>8</sup>The electric power sector comprises electricity-only and combined-heat-power (CHP) plants within North American PV = Photovoltaic.

\* = Less than 500 billion Btu.

- = No data reported.

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

Energy consumption for the noncombustible renewable energy sources (hydroelectric conventional, solar thermal, PV and wind) used in electricity generation is determined by multiplying generation times the fossil fuel equivalent heat rate.

Energy consumption for geothermal energy used in electricity generation is determined by multiplying generation times the geothermal heat rate. See U.S. Energy Information Administration (EIA), Annual Energy Review (AER) 2009, DOE/EIA-0384 (2009) (Washington, DC, August 2010), Table A6.

**Sources:** Analysis conducted by U.S. Energy Information Administration, Office of Electricity, Coal, Nuclear, and Renewables Analysis and specific sources described as follows. Residential: U.S. Energy Information Administration, Form EIA-457A/G, "Residential Energy Consumption Survey;" Oregon Institute of Technology, Geo-Heat Center and U.S. Energy Information Administration, Form EIA-63-A, "Annual Solar Thermal Collector Manufacturers Survey" and Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey." Commercial: U.S. 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," Form EIA-923, "Power Plant Operations Report;" and Oregon Institute of Technology, Geo-Heat Center. Industrial: U.S. 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," Form EIA-906, "Power Plant Report," Form EIA-920, "Combined Heat and Power Report," Form EIA-923, "Power Plant Operations Report;" 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 calculated as the difference between energy in feedstocks and production and from the production of ethanol calculated as the difference between energy feedstocks and production less denaturants. Biofuels for Transportation: Biodiesel Consumption: 2001-2008: Calculated as biodiesel production plus net imports, 2009: January and February: EIA, Petroleum Supply Monthly, Table 1, data for refinery and blender net inputs of renewable fuels except ethanol. March through December: Calculated as biodiesel production plus biodiesel net imports minus biodiesel stock change; 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), 2007: 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, and 2008: U.S. Energy Information Administration, Form EIA-22S, "Supplement to the Monthly Biodiesel Production Survey," 2009: U.S. Energy Information Administration, "Form EIA-22M, Monthly Biodiesel Production Survey;" 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; Stock Change: EIA Petroleum Supply Annual (PSA) various reports. Table 1 data for renewable fuels except ethanol; and Ethanol: 1989: EIA, Estimates of U.S. Biofuels Consumption 1990, Table 10, 1990-1992: EIA, Estimates of U.S. Biomass Energy Consumption 1992, Table D2, 1993-2004: EIA, Petroleum Supply Monthly, Tables 2 and 16. Calculated as ten percent of oxygenated finished motor gasoline field production (Table 2) plus fuel ethanol refinery input (Table 16). 2005-2008: 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). 2009: EIA Petroleum Supply Annual 2009, Table 1. Calculated as fuel ethanol refinery and blender net inputs minus fuel ethanol adjustments.

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: U.S. 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," Form EIA-920, "Combined Heat and Power Plant Report," and Form EIA-923, "Power Plant Operations Report."