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Section 17

ENERGY AND SCIENCE

This section presents statistics on fuel resources, energy production and consumption, the electric and gas utility industries, research and development, and scientific, engineering, and technological resources. Related series are cited in Sections 12 (utility employment), 14 (prices), and 18 (gasoline consumption).

Information on energy and science can be obtained from reports and records of the U.S. Department of Energy; U.S. Patent and Trademark Office; U.S. Bureau of Labor Statistics; National Science Foundation; Hawaii State Department of Taxation; Hawaii State Department of Commerce and Consumer Affairs; Hawaii State Department of Business, Economic Development & Tourism, Strategic Industries Division; University of Hawaii, Institute of Astronomy; and individual utility companies. *Historical Statistics of Hawaii*, Section 19, presents data for earlier years. Data for the nation as a whole can be found in the *Statistical Abstract of the United States: 2012*, Sections 16 and 19.

**Table 17.01-- CONSUMPTION OF ENERGY, BY SOURCE
(PHYSICAL UNITS): 1960 TO 2009**

Year	Coal (1,000 short tons)	Natural gas 1/ (billion cubic feet)	Petroleum (1,000 barrels)	Hydroelectric power 2/ (million kWh)	Fuel ethanol 3/
1960	-	-	16,844	27	(NA)
1961	-	-	20,074	24	(NA)
1962	-	-	19,015	20	(NA)
1963	-	-	19,931	23	(NA)
1964	-	-	21,257	115	(NA)
1965	-	-	22,478	105	(NA)
1966	-	-	25,113	112	(NA)
1967	-	-	28,252	108	(NA)
1968	-	-	31,456	94	(NA)
1969	-	-	33,007	100	(NA)
1970	-	-	34,105	108	(NA)
1971	-	-	36,734	89	(NA)
1972	-	-	37,753	91	(NA)
1973	-	-	38,826	95	(NA)
1974	-	-	36,739	92	(NA)
1975	-	-	37,097	89	(NA)
1976	-	-	38,047	93	(NA)
1977	-	-	40,326	86	(NA)
1978	-	-	40,945	84	(NA)
1979	-	-	44,660	90	(NA)
1980	-	3	43,562	86	(NA)
1981	-	3	38,811	80	4
1982	47	3	35,706	90	1
1983	42	3	36,291	84	-
1984	38	2	37,297	82	-
1985	46	2	40,006	86	-
1986	16	2	39,044	78	-
1987	63	3	39,389	82	-
1988	50	3	45,902	81	-
1989	32	3	48,021	56	-
1990	29	3	50,015	80	-
1991	45	3	45,758	71	-
1992	303	3	46,655	61	-
1993	691	3	41,392	56	-
1994	704	3	44,843	139	-
1995	895	3	43,842	98	-
1996	930	3	41,631	104	-
1997	933	3	39,829	115	-
1998	822	3	40,493	121	-
1999	801	3	39,662	115	-
2000	816	3	40,591	103	-

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**Table 17.01-- CONSUMPTION OF ENERGY, BY SOURCE
(PHYSICAL UNITS): 1960 TO 2009-- Con.**

Year	Coal (1,000 short tons)	Natural gas 1/ (billion cubic feet)	Petroleum (1,000 barrels)	Hydroelectric power 2/ (million kWh)	Fuel ethanol 3/
2001	829	3	41,479	101	-
2002	748	3	44,772	95	-
2003	837	3	46,686	91	-
2004	857	3	49,098	94	-
2005	805	3	51,267	96	341
2006	778	3	4/ 51,563	120	390
2007	850	3	4/ 52,904	92	497
2008	937	3	4/ 42,604	84	918
2009	878	3	40,829	113	1,051

NA Not available.

1/ Includes supplemental gaseous fuels.

2/ Conventional hydroelectric power. Does not include pumped-storage hydroelectricity.

3/ Includes denaturant.

4/ Revised from previous *Data Book*.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data System (SEDS)

Table CT1. Energy Consumption Estimates for Major Energy Sources in Physical Units, 1960-2009, Hawaii

<http://www.eia.doe.gov/emeu/states/hf.jsp?incfile=sep_use/total/use_tot_hia.html&mstate=HAWAII>

accessed April 25, 2012.

Table 17.02-- CONSUMPTION OF ENERGY, BY SOURCE: 1960 TO 2009

[Trillion Btu]

Year	Total 1/	Fossil fuels			Renewable energy					Fossil fuels (as commingled)	
		Coal	Natural gas 2/	Petro-leum	Hydro-electric power 3/	Biomass	Geo-thermal	Solar/PV 4/	Wind	Natural Gas 2/ 5/	Motor Gasoline 2/ 6/
1960	94.9	-	-	94.6	0.3	-	-	(NA)	(NA)	-	18.0
1961	113.8	-	-	113.5	0.3	-	-	(NA)	(NA)	-	18.6
1962	108.3	-	-	108.1	0.2	-	-	(NA)	(NA)	-	19.5
1963	114.3	-	-	113.9	0.2	0.2	-	(NA)	(NA)	-	19.7
1964	123.5	-	-	122.1	1.2	0.2	-	(NA)	(NA)	-	20.3
1965	130.6	-	-	129.3	1.1	0.2	-	(NA)	(NA)	-	21.4
1966	145.5	-	-	144.2	1.2	0.1	-	(NA)	(NA)	-	22.6
1967	163.9	-	-	162.5	1.1	0.3	-	(NA)	(NA)	-	23.8
1968	182.8	-	-	181.1	1.0	0.7	-	(NA)	(NA)	-	25.6
1969	190.9	-	-	189.1	1.0	0.7	-	(NA)	(NA)	-	27.2
1970	197.0	-	-	195.4	1.1	0.4	-	(NA)	(NA)	-	29.9
1971	211.7	-	-	210.4	0.9	0.3	-	(NA)	(NA)	-	30.8
1972	218.1	-	-	216.6	0.9	0.6	-	(NA)	(NA)	-	32.6
1973	224.3	-	-	222.8	1.0	0.5	-	(NA)	(NA)	-	34.7
1974	212.1	-	-	210.6	1.0	0.6	-	(NA)	(NA)	-	34.4
1975	214.4	-	-	212.9	0.9	0.6	-	(NA)	(NA)	-	35.5
1976	220.0	-	-	218.4	1.0	0.7	-	(NA)	(NA)	-	36.9
1977	233.3	-	-	231.9	0.9	0.5	-	(NA)	(NA)	-	38.9
1978	236.9	-	-	235.7	0.9	0.3	-	(NA)	(NA)	-	40.1
1979	256.6	-	-	255.3	0.9	0.3	-	(NA)	(NA)	-	39.4
1980	262.4	-	-	249.6	0.9	11.9	-	(NA)	(NA)	3.0	38.0
1981	236.7	-	-	223.2	0.8	12.7	-	(NA)	(NA)	2.8	37.7
1982	218.3	1.1	-	203.7	0.9	12.4	-	(NA)	(NA)	2.8	38.1
1983	221.3	1.0	-	205.4	0.9	14.0	-	(NA)	-	2.7	38.0
1984	7/ 232.4	0.9	-	216.1	0.9	14.3	7/ 0.2	-	-	2.4	39.5
1985	7/ 248.5	1.1	-	232.1	0.9	14.2	7/ 0.2	-	-	2.7	39.9
1986	7/ 245.3	0.4	-	227.6	0.8	16.3	7/ 0.2	-	-	2.7	41.4
1987	7/ 249.4	1.6	0.2	228.9	0.9	17.8	7/ 0.1	-	-	2.8	43.0
1988	7/ 289.7	1.2	-	268.0	0.8	19.4	7/ 0.2	-	-	2.8	44.5
1989	7/ 309.8	0.8	-	280.1	0.6	27.0	7/ 0.1	0.8	0.3	2.9	46.0
1990	321.4	0.7	-	292.7	0.8	25.9	(8/)	0.9	0.3	3.0	45.5
1991	295.1	1.1	-	266.5	0.7	25.4	(8/)	1.0	0.4	2.9	47.1
1992	306.0	6.8	-	272.4	0.6	24.9	(8/)	1.0	0.2	2.9	46.6
1993	7/ 283.1	15.6	-	239.7	0.6	24.4	7/ 1.6	1.1	0.2	2.8	47.6
1994	7/ 299.4	15.7	-	258.3	1.4	20.7	7/ 1.9	7/ 1.1	0.2	2.9	48.9
1995	7/ 297.1	19.9	-	252.6	1.0	19.8	7/ 2.4	1.2	0.2	2.9	49.1
1996	7/ 283.3	20.4	-	238.9	1.1	19.1	7/ 2.5	7/ 1.2	0.2	2.8	48.9
1997	7/ 273.6	20.5	-	230.5	1.2	17.4	7/ 2.5	1.3	0.2	2.7	48.8
1998	7/ 273.4	18.2	-	233.5	1.2	16.5	7/ 2.4	1.3	0.2	2.8	48.7
1999	7/ 269.4	17.7	-	229.9	1.2	17.0	7/ 2.2	7/ 1.3	0.2	2.9	46.7
2000	7/ 273.4	17.7	0.1	235.2	1.1	15.2	7/ 2.7	7/ 1.3	0.2	3.0	48.4

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Table 17.02-- CONSUMPTION OF ENERGY, BY SOURCE: 1960 TO 2009-- Con.

[Trillion Btu]

Year	Total 1/	Fossil fuels			Renewable energy					Fossil fuels (as commingled)	
		Coal	Natural gas 2/	Petro-leum	Hydro-electric power 3/	Biomass	Geo-thermal	Solar/PV 4/	Wind	Natural Gas 2/ 5/	Motor Gasoline 2/ 6/
2001	7/ 270.2	17.8	0.1	239.8	1.0	7.9	7/ 2.1	7/ 1.3	(8/)	2.9	50.6
2002	7/ 284.8	16.6	0.1	257.5	1.0	7.5	7/ 0.7	1.3	(8/)	2.9	54.3
2003	7/ 301.3	19.3	0.1	268.5	0.9	9.3	7/ 1.8	7/ 1.4	(8/)	2.9	55.2
2004	7/ 316.3	19.3	0.2	283.0	0.9	9.3	7/ 2.1	7/ 1.5	0.1	2.9	56.0
2005	7/ 326.5	18.0	0.2	294.0	1.0	7/ 9.6	7/ 2.2	7/ 1.7	0.1	2.9	57.3
2006	7/ 329.2	17.5	0.2	7/ 295.8	1.2	7/ 9.9	7/ 2.1	7/ 1.9	0.8	2.9	60.2
2007	7/ 341.0	19.0	0.2	7/ 304.6	0.9	7/ 9.7	7/ 2.3	7/ 2.4	2.4	3.0	59.2
2008	7/ 281.5	20.2	0.1	7/ 241.5	0.8	7/ 11.8	7/ 2.3	2.4	2.4	2.8	55.7
2009	269.8	19.0	0.2	230.7	1.1	12.0	1.6	2.8	2.5	2.7	56.1

1/ Excluding fossil fuels as commingled.

2/ Supplemental gaseous fuels (SGF) and fuel ethanol are consumed with natural gas and motor gasoline, respectively.

On this table, natural gas excluding SGF and motor gasoline excluding fuel ethanol are presented so that a fossil fuel total can be calculated. Natural gas including SGF and motor gasoline including fuel ethanol are presented separately for reference.

3/ Conventional hydroelectric power. Does not include pumped-storage hydroelectricity.

4/ Solar thermal and photovoltaic energy.

5/ Including Supplemental Gaseous Fuels.

6/ Including Fuel Ethanol.

7/ Revised from previous *Data Book*.

8/ Value less than +0.05 and greater than -0.05.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data System (SEDS)

Table CT2. Primary Energy Consumption Estimates, Selected Years, 1960-2009, Hawaii

<http://www.eia.doe.gov/emeu/states/hf.jsp?incfile=sep_use/total/use_tot_hicb.html&mstate=HAWAII>

accessed April 25, 2012.

**Table 17.03-- CONSUMPTION OF ENERGY BY END-USE SECTOR:
1960 TO 2009**

[Trillion Btu]

Year	Residential 1/ 2/	Commercial 1/ 3/ 4/ 5/	Industrial 1/ 4/ 5/	Transportation 1/ 4/	Electric power 1/ 2/
1960	7.1	5.3	20.6	61.8	17.6
1961	7.3	5.6	26.8	74.0	19.4
1962	7.7	5.8	28.7	66.1	21.4
1963	8.7	6.3	29.9	69.5	24.2
1964	9.4	6.9	32.4	74.8	26.7
1965	9.9	7.0	34.7	79.0	27.6
1966	10.5	7.7	35.8	91.5	29.7
1967	11.7	8.4	38.7	105.1	31.3
1968	12.6	9.2	38.9	122.0	35.0
1969	14.0	10.7	41.0	125.1	38.7
1970	15.4	12.5	43.7	125.3	43.2
1971	16.7	12.5	43.6	138.8	47.7
1972	18.6	13.7	49.3	136.5	54.1
1973	19.0	14.5	50.0	140.9	55.6
1974	19.3	14.3	49.9	128.7	57.5
1975	18.9	14.5	50.4	130.5	58.8
1976	20.2	16.3	51.8	131.7	62.5
1977	20.7	17.9	53.4	141.3	65.2
1978	20.7	18.4	53.1	144.6	66.8
1979	21.4	19.6	59.2	156.4	67.7
1980	21.0	20.0	74.7	146.7	69.7
1981	20.9	18.0	73.7	124.1	69.9
1982	19.6	16.8	79.7	102.2	66.9
1983	20.0	17.1	66.3	117.9	68.6
1984	6/ 19.7	6/ 18.3	6/ 65.0	129.3	6/ 70.4
1985	6/ 19.9	18.4	6/ 67.3	142.9	6/ 69.8
1986	6/ 20.4	6/ 20.9	6/ 76.9	127.1	6/ 72.7
1987	22.0	23.8	6/ 79.6	124.1	6/ 76.5
1988	6/ 23.0	6/ 36.9	6/ 88.8	140.9	6/ 81.7
1989	25.4	36.1	6/ 93.8	154.5	6/ 86.5
1990	30.7	37.2	98.9	154.5	105.9
1991	26.1	28.8	89.0	151.2	88.7
1992	29.6	6/ 38.6	93.7	144.1	99.3
1993	6/ 29.6	6/ 30.7	6/ 92.4	130.4	6/ 99.5
1994	6/ 30.5	6/ 35.0	6/ 93.9	140.0	6/ 102.3
1995	6/ 31.3	6/ 34.6	6/ 93.1	138.2	6/ 105.5
1996	6/ 32.1	6/ 34.0	6/ 95.7	121.6	6/ 107.5
1997	6/ 32.2	6/ 35.5	6/ 88.7	117.3	6/ 107.3
1998	6/ 32.3	6/ 45.8	6/ 80.7	114.6	6/ 105.6
1999	6/ 32.4	6/ 35.9	6/ 78.0	123.1	6/ 106.6
2000	6/ 33.0	6/ 37.2	6/ 78.0	125.2	6/ 108.5

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**Table 17.03-- CONSUMPTION OF ENERGY BY END-USE SECTOR:
1960 TO 2009-- Con.**

[Trillion Btu]

Year	Residential 1/ 2/	Commercial 1/ 3/ 4/ 5/	Industrial 1/ 4/ 5/	Transportation 1/ 4/	Electric power 1/ 2/
2001	6/ 32.2	6/ 36.5	6/ 69.5	132.0	6/ 105.3
2002	6/ 34.6	6/ 39.3	6/ 70.8	140.2	6/ 110.9
2003	6/ 33.7	6/ 39.5	6/ 66.1	162.0	6/ 109.1
2004	6/ 34.6	6/ 43.3	6/ 66.2	172.1	6/ 110.8
2005	6/ 35.2	6/ 41.7	6/ 70.2	179.4	6/ 109.8
2006	6/ 35.8	6/ 42.5	6/ 69.2	181.6	6/ 110.6
2007	6/ 36.4	6/ 42.2	6/ 67.1	195.3	6/ 111.8
2008	6/ 35.9	6/ 42.7	6/ 64.3	6/ 138.6	6/ 109.0
2009	35.7	42.1	63.3	128.8	105.6

1/ There is a discontinuity between 1988 and 1989 due to the expanded coverage of renewable energy sources beginning in 1989.

2/ Beginning in 1980, adjusted for the double-counting of supplemental gaseous fuels, which are included in both natural gas and the other fossil fuels from which they are mostly derived, but should be counted only once in net energy and total.

3/ Small amounts of solar thermal and photovoltaic energy consumed in the commercial sector cannot be separately identified and are included in residential consumption.

4/ From 1981 through 1992, includes fuel ethanol blended into motor gasoline that is not included in the motor gasoline column.

5/ Beginning in 1980, adjusted for the double-counting of supplemental gaseous fuels, which are included in both natural gas and the other fossil fuels from which they are mostly derived, but should be counted only once in net energy and total.

6/ Revised from previous *Data Book*.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data System (SEDS) Consumption, 1960-2009, Hawaii

<http://www.eia.gov/state/seds/seds-states.cfm?q_state_a=HI&q_state=Hawaii#undefined>
accessed April 25, 2012.

Table 17.04-- PRIMARY ENERGY CONSUMPTION AND ELECTRICITY SALES, TOTAL AND PER CAPITA: 1992 TO 2010

[Include photovoltaic]

Year	Primary energy consumption		Electricity sales by utilities	
	Total (trillion Btu)	Per capita 1/ (million Btu)	Total (1,000 kWh)	Per capita 1/ (kWh)
1992	339.0912	266.652	8,666,889	6,815
1993	307.7465	242.731	8,657,903	6,829
1994	327.4778	253.897	8,948,458	6,938
1995	315.1186	242.754	9,187,430	7,078
1996	315.9492	242.308	9,378,962	7,193
1997	315.9927	237.959	9,345,281	7,037
1998	302.8773	227.023	9,261,070	6,942
1999	308.4009	231.455	9,379,808	7,040
2000	325.2151	2/ 243.424	9,690,598	2/ 7,253
2001	304.6372	2/ 227.744	9,776,882	2/ 7,309
2002	306.2823	2/ 226.364	9,958,768	2/ 7,360
2003	320.3960	2/ 235.801	10,206,405	2/ 7,512
2004	324.0634	2/ 233.548	10,508,642	2/ 7,573
2005	324.5737	2/ 229.787	10,538,507	2/ 7,461
2006	322.7571	2/ 222.820	10,567,913	2/ 7,387
2007	330.2127	2/ 230.360	10,585,038	2/ 7,384
2008	301.4710	2/ 210.433	10,390,012	2/ 7,252
2009	287.2016	2/ 199.092	10,125,935	2/ 7,019
2010 3/	262.4821	178.652	10,013,104	6,815

1/ Based on estimated de facto population.

2/ Revised from the previous *Data Book*.

3/ Preliminary.

Source: Hawaii State Department of Business, Economic Development & Tourism, Strategic Industries Division, Energy Planning & Policy Branch, records.

**Table 17.05-- PRIMARY ENERGY CONSUMPTION, BY SOURCE:
1992 TO 2010**

[Trillion Btu]

Year	Total	Petroleum	Biomass	Solar hot water
1992	339.0912	305.7758	16.9840	2.3000
1993	307.7465	266.9516	16.8310	2.3000
1994	327.4778	285.5010	16.3660	2.3000
1995	315.1186	273.9590	11.8232	2.8386
1996	315.9492	277.1298	10.3994	3.1225
1997	315.9927	278.3480	8.9527	3.1225
1998	302.8773	269.1272	7.5220	3.1225
1999	308.4009	272.4720	9.2784	3.5483
2000	325.2151	290.2354	7.1331	3.5483
2001	304.6372	273.7797	3.4243	3.6792
2002	306.2823	272.8375	5.5584	4.0214
2003	320.3960	284.4207	6.0847	4.0687
2004	324.0634	287.7538	6.1256	4.3053
2005	324.5542	291.5014	5.2839	4.4945
2006	318.7241	283.6873	5.5054	4.6364
2007	328.2610	290.1559	6.8140	4.7311
2008	301.3199	258.1509	8.8310	5.2042
2009	286.8396	244.0992	8.8118	5.7499
2010	262.4821	224.4969	4.4399	6.3491

Year	Hydroelectric	Coal	Wind	Geothermal	Solid waste
1992	0.7226	6.9207	0.2573	0.0168	6.1140
1993	0.8024	13.2237	0.2352	1.5988	5.8038
1994	1.5300	13.5599	0.2251	1.8060	6.1898
1995	1.0632	16.5249	0.2364	2.3045	6.3688
1996	1.1332	16.9294	0.2244	2.3566	4.6539
1997	0.9544	16.7772	0.1796	2.3633	5.2950
1998	0.7654	14.7665	0.2159	2.2782	5.0796
1999	1.2410	14.5187	0.1738	2.0255	5.1432
2000	0.9481	15.4724	0.1794	2.5855	5.1086
2001	1.0439	15.7719	0.1809	2.1356	4.6107
2002	1.0318	17.1440	0.1354	0.7637	4.7791
2003	0.7962	18.2279	0.1137	1.8181	4.8467
2004	0.9034	17.8472	0.0788	2.1765	4.8533
2005	1.1463	15.5778	0.0692	2.2801	4.2010
2006	1.2983	15.8569	0.8466	2.1937	4.6995
2007	0.9617	16.5752	2.5006	2.3756	4.1469
2008	0.9373	17.8834	2.4686	2.4216	5.4229
2009	1.0799	16.5746	1/ 3.4414	1.7319	5.3509
2010	0.8380	17.1366	2.6993	2.0832	4.4390

1/ Revised from previous *Data Book*.

Source: Hawaii State Department of Business, Economic Development & Tourism, Strategic Industries Division, Energy Planning & Policy Branch, records.

Table 17.06-- ELECTRICITY GENERATION BY SOURCE: 1992 TO 2010

[Millions of kWh generated]

Year	Total	Petroleum	Biomass	MSW 1/	Hydroelectric
1992	10,104	8,556	460	-	67
1993	10,219	7,576	435	349	78
1994	10,341	7,793	423	379	148
1995	10,563	7,853	292	383	103
1996	10,742	8,027	270	326	110
1997	10,424	7,805	226	371	93
1998	10,455	8,009	178	364	87
1999	10,719	8,144	333	361	113
2000	12,008	9,360	211	362	99
2001	10,839	8,449	153	275	109
2002	10,858	8,651	137	300	99
2003	10,978	8,548	174	338	71
2004	11,654	9,071	181	325	101
2005	11,676	9,135	174	337	111
2006	11,701	9,110	170	388	127
2007	11,268	8,670	155	303	94
2008	11,392	8,702	133	329	91
2009	11,137	8,598	130	322	114
2010	10,900	8,336	109	312	81

Year	Geothermal	Wind	Coal	PV 2/	Other 3/
1992	1	21	-	-	999
1993	155	24	1,592	(4/)	10
1994	175	22	1,382	(4/)	19
1995	223	23	1,674	(4/)	12
1996	228	22	1,740	(4/)	19
1997	229	17	1,663	(4/)	20
1998	220	21	1,553	(4/)	20
1999	196	13	1,541	(4/)	18
2000	250	17	1,695	(4/)	14
2001	207	18	1,616	5/ 1	12
2002	74	13	1,580	-	4
2003	176	13	1,658	5/ 2	-
2004	211	8	1,757	5/ 2	-
2005	221	7	1,691	5/ 2	-
2006	212	82	1,612	5/ 4	-
2007	230	238	1,578	5/ 8	-
2008	234	240	1,648	5/ 15	-
2009	168	252	1,500	5/ 36	-
2010	201	261	1,546	5/ 56	-

Continued on next page.

Table 17.06-- ELECTRICITY GENERATION BY SOURCE: 1992 TO 2010 -- Con.

1/ Electricity generated from Honolulu municipal solid waste plant.

2/ Electricity generated from photovoltaic.

3/ From 1989 to 1992, includes electricity production by coal, geothermal (a test well which ceased operation in 1989), and photovoltaic.

4/ Less than 500,000 kWh.

5/ Data may not be complete.

Source: Hawaii State Department of Business, Economic Development & Tourism, Strategic Industries Division, records; Hawaii State Department of Commerce and Consumer Affairs, records; and Hawaii Agriculture Research Center, records.

**Table 17.07-- ELECTRICITY PRODUCTION, BY SOURCE, BY ISLAND:
2010**

[Million kWh]

Island	Total	Petroleum	Biomass	MSW 1/	Hydroelectric
State total	10,900	8,336	109	312	81
Hawaii	1,154	772	-	-	29
Maui	1,322	1,019	107	-	18
Lanai	21	20	-	-	-
Molokai	35	35	-	-	-
Oahu	7,912	6,074	2	312	-
Kauai	457	417	-	-	34
Island	Wind	Geothermal	Coal	PV 2/ 3/	Other
State total	261	201	1,546	56	-
Hawaii	141	201	-	12	-
Maui	120	-	49	8	-
Lanai	-	-	-	2	-
Molokai	-	-	-	-	-
Oahu	-	-	1,496	29	-
Kauai	-	-	-	6	-

1/ Electricity generated from Honolulu municipal solid waste plant.

2/ Electricity generated from photovoltaic.

3/ Data may not be complete.

Source: Hawaii State Department of Business, Economic Development & Tourism, Strategic Industries Division, records; and Hawaii State Department of Commerce and Consumer Affairs, records.

Table 17.08 -- FUEL, ELECTRICITY, AND TOTAL ENERGY EXPENDITURES BY SOURCE: 1992 TO 2010

[Millions of dollars]

Year	Total energy expenditures	Fuel expenditures			Plus: electricity expenditures by customers	Minus: electric utility fuel expenditures 1/
		Total	Electric utility	Other		
1992	2,340.3	1,760.0	238.2	1,521.8	818.5	238.2
1993	2,369.9	1,660.4	213.3	1,447.1	922.8	213.3
1994	2,397.0	1,642.5	201.4	1,441.1	955.9	201.4
1995	2,459.4	1,645.2	223.5	1,421.7	1,037.7	223.5
1996	2,712.0	1,843.9	268.9	1,575.0	1,137.0	268.9
1997	2,756.5	1,863.6	276.2	1,587.4	1,169.2	276.2
1998	2,442.9	1,580.2	210.9	1,369.3	1,073.6	210.9
1999	2,544.6	1,656.2	234.7	1,421.5	1,123.1	234.7
2000	3,305.5	2,339.9	394.2	1,945.7	1,359.8	394.2
2001	3,373.4	2,377.2	374.9	2,002.3	1,371.1	374.9
2002	3,078.5	2,073.0	333.5	1,739.5	1,339.0	333.5
2003	3,690.9	2,605.7	400.0	2,205.6	1,485.2	400.0
2004	4,346.1	3,213.9	524.5	2,689.4	1,656.8	524.5
2005	5,492.9	4,258.5	693.5	3,565.0	1,927.9	693.5
2006	6,169.1	4,728.0	749.1	3,978.9	2,190.2	749.1
2007	6,152.9	4,748.2	848.7	3,899.5	2,253.4	848.7
2008	8,422.8	6,714.0	1,325.1	5,388.9	3,033.9	1,325.1
2009	6,028.1	4,603.9	723.9	3,880.0	2,148.1	723.9
2010	6,886.0	5,339.6	969.3	4,370.3	2,515.7	969.3

1/ Electric utility fuel expenditures are subtracted from the sum of total fuel expenditures and electricity expenditures by customers to avoid double counting when calculating total energy expenditures.

Source: Hawaii State Department of Business, Economic Development & Tourism, Strategic Industries Division, Energy Planning & Policy Branch, records.

Table 17.09-- ELECTRIC UTILITIES: 1998 TO 2011

Year	Customers, Dec. 31			Power sold (1,000 kWh)		
	Total	Residen- tial 1/	Other	Total	Residen- tial 1/	Other
1998	418,989	361,429	57,560	9,261,070	2,634,172	6,626,899
1999	424,603	366,273	58,330	9,379,808	2,683,408	6,696,400
2000	430,354	370,928	59,426	9,690,598	2,764,619	6,925,980
2001	436,150	376,054	60,096	9,776,882	2,802,432	6,974,450
2002	441,323	380,608	60,715	9,958,768	2,921,563	7,037,206
2003	449,354	387,162	62,192	10,206,405	3,024,509	7,181,897
2004	455,278	391,567	63,711	10,508,642	3,156,499	7,352,142
2005	463,088	398,332	64,756	10,538,507	3,164,029	7,374,478
2006	469,013	403,278	65,735	10,567,913	3,180,852	7,387,061
2007	475,104	408,923	66,181	10,585,038	3,200,675	7,384,363
2008	476,124	410,477	65,647	10,390,012	3,085,183	7,304,829
2009	478,588	413,641	64,947	10,125,935	3,055,242	7,070,693
2010	480,918	416,141	64,777	10,013,104	2,989,437	7,023,667
2011	482,498	418,174	64,324	9,961,653	2,928,743	7,032,910

Year	Average annual use (kWh) 2/		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residen- tial 1/	Other	Residen- tial 1/	Other	Total	Residen- tial 1/	Other
1998	7,288	115,130	0.13884	0.10682	1,073,610	365,719	707,891
1999	7,326	114,802	0.14312	0.11037	1,123,126	384,043	739,083
2000	7,453	116,548	0.16409	0.13083	1,359,756	453,650	906,106
2001	7,452	116,055	0.16336	0.13095	1,371,113	457,797	913,317
2002	7,676	115,906	0.15703	0.12508	1,338,980	458,781	880,199
2003	7,812	115,479	0.16743	0.13629	1,485,234	506,399	978,835
2004	8,061	115,398	0.18031	0.14793	1,656,764	569,162	1,087,601
2005	7,943	113,881	0.20656	0.17280	1,927,872	653,568	1,274,304
2006	7,887	112,376	0.23358	0.19590	2,190,152	742,994	1,447,158
2007	7,827	111,578	0.24122	0.20061	2,253,432	772,065	1,481,368
2008	7,516	111,274	0.32497	0.27809	3,033,951	1,002,582	2,031,369
2009	7,386	108,869	0.24202	0.19923	2,148,123	739,416	1,408,707
2010	7,184	108,428	0.28101	0.23857	2,515,731	840,066	1,675,665
2011	7,004	109,336	0.34681	0.30304	3,146,960	1,015,703	2,131,256

1/ Residential refers to single-metered residential customers which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents which are classified as commercial customers.

2/ Based on number of customers at end of year.

Source: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy; and Hawaii State Department of Business, Economic Development and Tourism, Strategic Industries Division, records.

Table 17.10-- ELECTRIC UTILITIES, BY ISLAND: 2011

Island	Customers, Dec. 31			Gross System Peak 2/	Power sold (1,000 kWh)		
	Total	Residential 1/	Other	(mW)	Total	Residential 1/	Other
State total	482,498	418,174	64,324	(X)	9,961,653	2,928,743	7,032,910
Oahu	296,800	263,384	33,416	1,777.0	7,242,311	1,924,953	5,317,357
Hawaii	81,199	68,423	12,776	189.2	1,103,572	426,793	676,779
Kauai	36,269	28,041	8,228	72.1	434,745	159,071	275,674
Lanai	1,633	1,410	223	4.7	24,785	7,358	17,427
Maui	63,433	54,305	9,128	194.1	1,125,556	398,869	726,687
Molokai	3,164	2,611	553	5.8	30,685	11,700	18,985
Island	Average annual use (kWh) 3/		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residential 1/	Other	Residential 1/	Other	Total	Residential 1/	Other
State total	7,004	109,336	0.34681	0.30304	3,146,960	1,015,703	2,131,256
Oahu	7,309	159,126	0.32041	0.27966	2,103,859	616,782	1,487,077
Hawaii	6,238	52,973	0.41918	0.39050	443,189	178,904	264,285
Kauai	5,673	33,504	0.43409	0.41139	182,461	69,050	113,411
Lanai	5,218	78,149	0.44049	0.44506	10,997	3,241	7,756
Maui	7,345	79,611	0.35774	0.34467	393,156	142,692	250,464
Molokai	4,481	34,332	0.43025	0.43526	13,298	5,034	8,264

X Not applicable.

1/ Residential refers to single-metered residential customers which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents which are classified as commercial customers.

2/ System peak is the maximum amount of energy required by the electrical system at a point in time. The island electrical systems are not interconnected, therefore, peaks are reported separately for each island.

3/ Based on number of customers at end of year.

Source: Hawaii State Department of Business, Economic Development and Tourism, Strategic Industries Division, records.

Table 17.11-- GAS UTILITIES: 1998 TO 2011

[Excludes bottled gas]

Year	Customers, Dec. 31			Gas sold (1,000 therms)		
	Total	Residential 1/	Other	Total	Residential 1/	Other
1998	36,225	32,630	3,595	33,095	5,702	27,393
1999	36,363	32,757	3,606	34,099	5,577	28,522
2000	36,404	32,804	3,600	34,820	5,477	29,343
2001	36,431	32,833	3,598	34,159	5,401	28,758
2002	36,236	32,629	3,607	33,974	5,357	28,617
2003	36,046	32,415	3,631	33,556	5,170	28,386
2004	36,049	32,413	3,636	34,241	5,087	29,154
2005	35,850	32,229	3,621	34,249	5,041	29,208
2006	35,793	32,164	3,629	34,340	4,983	29,357
2007	35,692	32,078	3,614	34,685	4,933	29,752
2008	35,364	31,752	3,612	33,100	4,807	28,293
2009	35,449	31,821	3,628	31,924	4,746	27,178
2010	35,317	31,656	3,661	32,279	4,742	27,537
2011	35,226	31,552	3,674	32,410	4,542	27,867

Year	Average annual use (therms) 2/		Average rate (dollars per therm)		Revenues (\$1,000)		
	Residential 1/	Other	Residential 1/	Other	Total	Residential 1/	Other
1998	175	7,620	2.16236	1.25934	46,826	12,329	34,497
1999	170	7,910	2.17266	1.24026	47,491	12,116	35,375
2000	167	8,151	2.45358	1.48560	57,031	13,439	43,592
2001	165	7,993	2.59225	1.56297	58,949	14,001	44,948
2002	164	7,934	2.87341	1.50635	58,500	15,393	43,107
2003	159	7,818	3.05760	1.71228	64,412	15,807	48,605
2004	157	8,018	3.23468	1.87938	71,245	16,453	54,792
2005	156	8,066	3.64213	2.26578	84,539	18,360	66,179
2006	155	8,090	3.87417	2.46238	91,593	19,305	72,288
2007	154	8,232	3.93554	2.52524	94,545	19,414	75,131
2008	151	7,833	4.89349	3.46955	121,687	23,523	98,164
2009	149	7,491	4.18816	2.68055	92,729	19,877	72,852
2010	150	7,522	4.98652	3.27435	113,810	23,644	90,166
2011	144	7,585	6.05389	4.02058	139,541	27,499	112,042

1/ Residential refers to single-metered residential customers which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents which are classified as commercial customers.

2/ Based on number of customers at end of year.

Source: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy; and Hawaii State Department of Business, Economic Development and Tourism, Strategic Industries Division, records.

Table 17.12-- GAS UTILITIES, BY ISLAND: 2011

[Excludes bottled gas]

Island	Customers, December 31			Gas sold (1,000 therms)		
	Total	Residen- tial 1/	Other	Total	Residen- tial 1/	Other
State total	35,226	31,552	3,674	32,410	4,542	27,867
Oahu	31,978	28,710	3,268	29,108	4,041	25,067
Hawaii	1,761	1,458	303	2,281	288	1,993
Kauai	865	848	17	150	91	58
Lanai	22	22	-	1	1	-
Maui	517	431	86	858	109	749
Molokai	83	83	-	12	12	-

Island	Average annual use (therms) 2/		Average rate (dollars per therm)		Revenues (\$1,000)		
	Residen- tial 1/	Other	Residen- tial 1/	Other	Total	Residen- tial 1/	Other
State total	144	7,585	6.05389	4.02058	139,541	27,499	112,042
Oahu	141	7,670	6.18133	4.13756	128,696	24,981	103,715
Hawaii	197	6,577	5.23093	2.99073	7,466	1,506	5,960
Kauai	107	3,439	5.21847	3.11699	657	475	182
Lanai	65	-	6.70154	-	10	10	-
Maui	252	8,711	4.30770	2.91648	2,653	468	2,185
Molokai	145	-	4.94771	-	60	60	-

1/ Residential refers to single-metered residential customers which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents which are classified as commercial customers.

2/ Based on number of customers at end of year.

Source: Hawaii State Department of Business, Economic Development and Tourism, Strategic Industries Division, records.

**Table 17.13-- SERVICE PROVIDED BY HAWAIIAN ELECTRIC COMPANY, INC.,
ON OAHU: 1991 TO 2011**

Year	Number of customers, Dec. 31		Net input 1/ (1,000 kWh)	Electricity sales (1,000 kWh)	Average annual residential use 2/ (kWh)	Average residential rate (dollars per kWh)	Generating capability Dec. 31 3/ (1000 kW)
	Total	Residential only					
1991	255,176	223,304	6,876,964	6,538,952	7,610	0.09354	1,440
1992	257,442	225,229	7,061,157	6,650,449	7,711	0.09925	1,666
1993	263,478	230,192	7,029,839	6,607,424	7,581	0.11414	1,669
1994	264,992	232,115	7,222,978	6,797,364	7,681	0.11342	1,669
1995	269,307	235,905	7,359,195	6,962,794	7,732	0.12302	1,669
1996	271,602	237,860	7,499,202	7,091,147	7,868	0.12944	1,669
1997	271,801	238,825	7,424,259	7,040,291	7,773	0.13360	1,669
1998	272,675	239,945	7,299,149	6,938,326	7,603	0.12556	1,669
1999	275,467	242,579	7,356,725	6,997,936	7,654	0.12741	1,669
2000	278,260	245,027	7,589,409	7,211,760	7,793	0.14477	1,669
2001	280,911	247,672	7,643,288	7,276,681	7,816	0.14255	1,669
2002	283,161	249,896	7,757,699	7,390,367	8,050	0.13859	1,669
2003	286,677	253,033	7,908,957	7,522,230	8,224	0.14888	1,669
2004	288,456	254,797	8,126,998	7,732,834	8,481	0.15690	1,669
2005	291,580	257,804	8,104,303	7,721,296	8,360	0.17673	1,712
2006	292,988	259,098	8,104,872	7,700,605	8,248	0.20063	1,722
2007	294,591	260,583	8,089,115	7,675,355	8,214	0.20519	1,727
2008	293,740	259,929	7,950,649	7,555,962	7,868	0.28892	1,727
2009	295,282	261,630	7,761,597	7,377,537	7,759	0.21533	1,847
2010	296,422	262,635	7,657,018	7,277,229	7,540	0.25474	1,817
2011	296,800	263,384	7,593,813	7,242,311	7,319	0.32041	1,817

1/ Net generation plus purchased power.

2/ Based on average number of customers during the year.

3/ Gross capability including firm purchase power.

Source: Hawaiian Electric Company, Inc., records.

**Table 17.14-- UTILITY SERVICE PROVIDED BY THE GAS COMPANY
ON OAHU: 1991 TO 2011**

Year	Customers, Dec. 31		Sales (1,000 therms) 1/		Average annual residential usage (therms) 1/
	Total	Residential	Total	Residential	
1991	32,487	29,278	30,866	5,331	182
1992	32,598	29,375	30,528	5,285	180
1993	33,206	29,984	30,027	5,287	176
1994	33,597	30,344	30,762	5,372	177
1995	33,472	30,492	30,582	5,332	175
1996	33,914	30,668	30,339	5,203	170
1997	33,800	30,574	29,836	5,176	169
1998	33,705	30,497	29,930	5,284	173
1999	33,614	30,384	30,830	5,154	170
2000	33,613	30,383	31,619	5,054	166
2001	33,625	30,403	31,071	4,990	164
2002	33,446	30,202	30,852	4,962	164
2003	33,252	29,990	30,470	4,781	159
2004	33,231	29,964	31,011	4,701	157
2005	32,991	29,744	30,965	4,641	156
2006	32,776	29,519	30,935	4,530	153
2007	32,673	29,434	31,219	4,447	151
2008	32,358	29,123	29,930	4,320	148
2009	32,179	28,951	28,957	4,263	147
2010	32,109	28,867	28,823	4,197	145
2011	31,978	28,710	29,266	4,059	141

1/ Includes liquefied petroleum gas.

Source: The Gas Company LLC, formerly The Gas Company, Inc., records.

Table 17.15-- LIQUID FUEL TAX BASE: 1997 TO 2011

[In thousands of gallons. Liquid fuel sold in a given month is usually reported the following month.
Annual totals accordingly refer to fuel sold during a 12-month period ending November 30]

Year reported	All types		Gasoline	Diesel oil		
	Total	Excluding aviation		Non-hwy.	Hwy. use	
1997	955,834	585,400	400,435	150,737		30,109
1998	954,860	597,410	394,674	169,930		28,983
1999	969,434	621,832	384,260	201,664		32,098
2000	1,053,114	684,247	400,920	246,426		33,282
2001	962,973	627,076	409,910	179,000		34,018
2002	994,141	646,185	429,613	175,096		36,157
2003	835,991	587,927	452,499	91,988		37,004
2004	1,066,808	727,943	459,321	220,562		43,223
2005	972,642	647,843	454,115	146,922		43,440
2006	869,789	657,355	472,658	131,665		50,065
2007	1,018,233	782,580	480,632	230,812		52,826
2008	920,042	710,863	443,918	158,894		57,613
2009	898,720	713,534	438,849	166,209		53,437
2010	820,268	638,300	416,134	132,451		51,512
2011	881,047	671,169	449,606	133,480		51,512

Year reported	Liquefied petroleum gas		Aviation fuel	Small boats		Other fuel
	Off hwy.	Hwy. use		Gasoline	Diesel oil	
1997	3,587	328	370,433	41	164	(X)
1998	3,280	383	357,450	9	151	(X)
1999	3,326	360	347,602	4	119	(X)
2000	3,250	332	368,867	2	35	(X)
2001	3,783	310	335,897	9	47	(X)
2002	4,991	267	347,956	5	40	16
2003	5,739	391	248,065	2	22	281
2004	3,368	246	338,866	8	16	1,200
2005	1,222	300	324,799	15	42	1,786
2006	1	142	212,434	23	45	2,756
2007	-	108	235,653	262	626	17,314
2008	-	96	209,179	452	5,004	44,886
2009	-	66	185,185	1,215	1,324	52,434
2010	-	62	181,968	787	947	36,406
2011	-	50	209,878	1,103	4,022	35,672

X Not applicable.

Source: Hawaii State Department of Taxation, Tax Research & Planning, "Liquid Fuel Tax Base & Tax Collections" (annual) <http://www6.hawaii.gov/tax/a5_3txcolrptarchive.htm> accessed May 21, 2012.

Table 17.16-- LIQUID FUEL TAX BASE, BY COUNTY: 2011

[In thousands of gallons. Liquid fuel sold in a given month is usually reported the following month. Annual totals accordingly refer to fuel sold during a 12-month period ending November 30]

Type of fuel	State total	City and Co. of Honolulu	County of Maui	County of Hawaii	County of Kauai
Total	881,047	505,142	154,287	137,573	84,045
Gasoline	449,606	283,792	62,935	76,267	26,611
Diesel oil, non-hwy.	133,480	86,551	23,972	6,080	16,877
Diesel oil, hwy. use	47,237	25,588	5,751	10,815	5,083
Liq. pet. gas, hwy. use	50	41	(1/)	6	3
Small boats, gasoline	1,103	728	-	375	-
Small boats, diesel oil	4,022	3,367	62	74	518
Aviation fuel	209,878	103,157	61,373	26,204	19,144
Other fuel	35,672	1,918	193	17,753	15,808

1/ 432.1 gallons.

Source: Hawaii State Department of Taxation, Tax Research & Planning, "Liquid Fuel Tax Base & Tax Collections - CY Ending December 31, 2011" <http://www6.hawaii.gov/tax/a5_3txcolrptarchive.htm> accessed May 21, 2012.

**Table 17.17-- GASOLINE STATIONS (NAICS 447), BY COUNTY:
1998 TO 2009**

[Excludes most government employees, railroad employees, and self-employed persons. Statistics based on the North American Industry Classification System (NAICS) which replaced the Standard Industrial Classification (SIC) system used in the *County Business Patterns* prior to 1998. Therefore, comparability between the current data and data prior to 1998 may be limited]

Year	State total	City and County of Honolulu	Hawaii County	Kauai County	Maui County
1998	350	219	67	19	45
1999	334	206	63	19	46
2000	328	207	61	20	40
2001	322	204	61	17	40
2002	321	200	62	19	40
2003	314	194	63	19	38
2004	294	181	60	18	35
2005	301	188	59	19	35
2006	305	190	63	17	35
2007	289	179	58	14	38
2008	281	177	57	14	33
2009	277	169	58	15	35

Source: U.S. Census Bureau, *County Business Patterns, Hawaii* (annual). See also <http://factfinder.census.gov/> accessed December 16, 2011.

**Table 17.18-- BOILERS AND PRESSURE VESSELS, BY ISLAND:
2010 AND 2011**

[As of December 31]

Island	Total	Power boilers	Heating boilers	Pressure vessels
2010				
State total	10,549	495	2,267	7,787
Hawaii	1,354	65	281	1,008
Maui	1,279	66	291	922
Lanai	35	1	8	26
Molokai	47	2	11	34
Oahu	7,308	322	1,587	5,399
Kauai	526	39	89	398
2011				
State total	10,403	438	2,245	7,720
Hawaii	1,462	71	300	1,091
Maui	1,214	57	298	859
Lanai	33	1	8	24
Molokai	58	3	12	43
Oahu	7,100	273	1,516	5,311
Kauai	536	33	111	392

Source: Hawaii State Department of Labor and Industrial Relations, Hawaii Occupational Safety & Health Division (HIOSH), Boiler and Elevator Inspection Branch, records.

Table 17.19-- FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT AND FOR R&D PLANT IN HAWAII: 1999 TO 2008

[Millions of dollars. For fiscal year ending September 30]

Year	R&D	R&D plant	Year	R&D	R&D plant
1999	198.8	9.3	2004	392.6	7.0
2000	209.7	1.8	2005	384.4	43.8
2001	293.1	2.8	2006	340.1	5.6
2002	375.2	6.4	2007	343.6	8.0
2003	349.6	1.9	2008	347.8	3.1

Source: National Science Foundation/Division of Science Resources Statistics, *Federal Funds for Research and Development*, various issues, and records.

Table 17.20-- PRIVATE SECTOR TECHNOLOGY JOBS AND EARNINGS: 2003 TO 2011

[Jobs includes paid employees and proprietors. Earnings include wages/salaries and benefits]

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Earnings in 2011
Technology sector	23,645	24,044	25,465	26,355	27,303	27,756	27,636	27,821	27,836	70,379
Computer services	5,644	5,917	5,985	6,378	6,362	6,470	6,546	6,448	6,428	68,674
Engineering and related services	5,122	5,198	5,248	5,452	5,723	5,716	5,468	5,329	5,288	78,798
Information and telecommunication technology	4,446	4,369	4,511	4,912	4,693	4,420	4,210	4,127	4,025	84,622
Medical and diagnostic testing	1,482	1,533	1,592	1,625	1,719	1,719	1,689	1,698	1,731	59,824
Research & development services	2,920	3,023	3,221	3,295	3,402	3,674	4,009	3,938	4,015	67,187
Biotech R&D	1,342	1,409	1,556	1,613	1,464	1,547	1,858	1,981	2,046	49,332
Technical consulting services	2,626	2,736	3,389	3,201	3,890	4,015	3,939	4,081	4,236	53,717
Technology equipment distribution	844	852	890	815	805	879	865	817	787	83,792
Technology manufacturing	561	416	629	677	709	863	910	1,383	1,326	70,550

Source: Hawaii State Department of Business, Economic Development and Tourism, records.

**Table 17.21-- TOP 30 STATES FOR TECHNOLOGY AND
SCIENCE INDEX: 2010**

[The State Technology and Science Index observes 79 unique indicators that are categorized into five major components. These components are human capital investment, research and development inputs, risk capital and entrepreneurial infrastructure, technology and science work force and technology concentration and dynamism]

State	Average score	State ranking
Massachusetts	82.6	1
Maryland	77.1	2
Colorado	75.7	3
California	73.9	4
Utah	71.3	5
Washington	70.2	6
New Hampshire	68.7	7
Virginia	68.1	8
Connecticut	66.6	9
Delaware	63.3	10
New Jersey	63.0	11
Minnesota	62.7	12
North Carolina	61.4	13
Pennsylvania	60.8	14
Arizona	60.2	15
New York	59.5	16
Vermont	59.3	17
New Mexico	59.1	18
Texas	58.3	19
Illinois	57.1	20
Oregon	56.5	21
Rhode Island	55.5	22
Kansas	55.5	23
Wisconsin	55.0	24
Georgia	51.7	25
Michigan	50.7	26
Idaho	49.8	27
Indiana	49.7	28
Ohio	49.5	29
Missouri	48.4	30
Hawaii	43.9	36

Source: Milken Institute "State Technology and Science Index: Enduring Lessons for the Intangible Economy January 2011 " 2010 Overall Ranking, State Overall Ranking <<http://www.milkeninstitute.org/tech/tech2010.taf>> accessed May 23, 2011.

**Table 17.22-- RESEARCH AND NON-RESEARCH EXTRAMURAL FUNDING,
FOR THE UNIVERSITY OF HAWAII: 1991-1992 TO 2010-2011**

[Research and non-research awards received through the Office of Research Services, University of Hawaii, and non-competitive awards from the U.S. Department of Agriculture]

Fiscal year ending June 30	Total		Research		Non-research	
	Awards	Amount (dollars)	Awards	Amount (dollars)	Awards	Amount (dollars)
1991-1992	1,221	124,876,638	703	65,791,624	518	59,085,014
1992-1993	1,146	131,075,215	636	61,059,928	510	70,015,287
1993-1994	1,322	142,563,794	755	77,763,782	567	64,800,012
1994-1995	1,147	139,199,221	616	70,222,653	531	68,976,568
1995-1996	1,191	134,469,155	697	76,698,552	494	57,770,603
1996-1997	1,255	160,859,800	724	89,131,636	531	71,728,164
1997-1998	1,300	159,948,612	763	91,746,988	537	68,201,624
1998-1999	1,254	164,168,101	707	92,737,645	547	71,430,456
1999-2000	1,379	180,629,855	767	102,845,010	612	77,784,845
2000-2001	1,405	216,233,918	835	132,833,308	570	83,400,610
2001-2002	1,629	252,370,477	971	141,875,022	658	110,495,455
2002-2003	1,646	323,868,218	976	190,374,465	670	133,493,753
2003-2004	1,675	328,982,431	1,002	199,944,709	673	129,037,722
2004-2005	1,742	354,127,142	1,022	209,196,531	720	144,930,611
2005-2006	1,785	433,360,395	1,068	236,708,881	717	196,651,514
2006-2007	1,778	354,031,667	1,081	209,909,883	697	144,121,784
2007-2008	1,758	367,580,150	1,093	211,778,184	665	155,801,966
2008-2009	1,990	413,963,739	1,147	246,546,713	843	167,417,026
2009-2010	1,944	452,408,669	1,161	255,734,059	783	196,674,610
2010-2011	1,799	488,597,908	1,070	281,745,764	729	206,852,144

Source: University of Hawaii, Office of Research Services, *2010-2011 Online Executive Managerial Report* <<http://www.ors.hawaii.edu/index.php/component/content/article/111-annual-reports-reports/annual-reports/241-2010-2011-annual-report>> accessed May 1, 2012 and previous reports.

Table 17.23-- RESEARCH AND DEVELOPMENT EXPENDITURES AT DOCTORATE-GRANTING INSTITUTIONS: 1991 TO 2009

[In thousands of dollars. For fiscal year ending June 30]

Year	Total	Federally financed	State and local government financed	Industry financed	Institutionally financed	All other sources
1991	78,166	44,857	27,321	856	3,391	1,741
1992	80,258	47,684	26,775	337	3,319	2,143
1993	73,961	41,362	27,099	151	3,109	2,240
1994	70,079	39,392	25,204	434	3,290	1,759
1995	78,429	44,238	26,789	299	3,738	3,365
1996	111,202	66,902	31,826	8,088	4,386	-
1997	120,107	72,421	28,440	5,944	13,297	5
1998	148,007	86,886	37,002	10,949	13,170	-
1999	156,810	93,418	35,111	13,021	15,260	-
2000	161,300	95,419	35,474	11,158	19,249	-
2001	156,976	97,716	33,125	7,232	18,903	-
2002	172,664	119,381	31,062	9,971	12,232	18
2003	184,602	148,662	11,822	6,931	17,171	16
2004	241,346	191,252	8,815	21,234	19,892	153
2005	240,247	199,135	7,077	12,155	21,282	598
2006	257,478	210,097	8,933	12,551	25,888	9
2007	274,373	215,806	15,534	22,080	16,352	4,601
2008	278,751	200,385	18,192	26,928	28,132	5,114
2009	300,302	211,256	17,479	30,357	32,198	9,012

Source: National Science Foundation, Division of Science Resources Statistics, Academic Research and Development Expenditures: Fiscal Year (annual) Table 17
<http://www.nsf.gov/statistics/rdexpenditures/> accessed November 4, 2011.

Table 17.24-- PATENTS ISSUED TO HAWAII RESIDENTS: 1991 TO 2011

Year	Patents	Year	Patents	Year	Patents
1991	80	1998	93	2005	58
1992	81	1999	97	2006	101
1993	106	2000	93	2007	82
1994	99	2001	107	2008	101
1995	84	2002	91	2009	96
1996	104	2003	96	2010	144
1997	93	2004	86	2011	128

Source: U.S. Patent and Trademark Office, Electronic Information Products Division / PTMT, *Patent Counts by Country/State and Year, All Patents, All Types, January 1, 1977 -- December 31, 2011* (December 2011) <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_all.pdf> accessed May 10, 2012.

**Table 17.25-- ASTRONOMY AND RELATED FACILITIES AT
THE SUMMITS OF MAUNA KEA AND HALEAKALA: 2011**

Facility (mirror diameter in meters)	Capital cost 1/ (\$ mil)	Annual operating cost (\$ mil)	County based staff	Opera- tional
Mauna Kea observatories				
Total	611	75.3	527	(X)
UH 2.2-m (Optical/Infrared)	5	1.5	7	1970
Canada-France-Hawaii 3.6-m (Optical/Infrared)	30	7.0	45	1979
NASA IRTF 3.0-m (Infrared)	10	4.3	19	1979
United Kingdom 3.8-m (Infrared)	5	2.0	12	1979
James Clerk Maxwell 15-m Submillimeter	32	5.0	27	1986
Caltech 10.4-m Submillimeter	10	2.6	11	1986
VLBA Antenna 25-m (Radio)	7	0.3	2	1992
W.M. Keck Observatory (Keck I & II) 10-m x 2 (Optical/Infrared)	170	13.0	130	1992/1996
Subaru (Japan National Large Telescope) 8-m (Optical/Infrared)	170	19.5	96	1999
Fredrick C. Gillett Gemini 8m (Optical/Infrared)	92	13.9	112	1999
Submillimeter Array 8x6-m	80	5.0	27	2003
Mauna Kea Observatories Support Services	(X)	2/ 4.3	39	1980
Haleakala observatories				
Total	289.7	54.73	244	(X)
Mees Solar Observatory	0.5	0.51	2	1968
Haleakala Observatories Projects	(NA)	1.39	9	(NA)
Maui Space Surveillance Site (MSSS) 3/ Advanced Electro-Optical System	200.0	26.70	140	1979
3.7-m Telescope (AEOS)	50.0	20.60	65	1997
Faulkes 2-m Telescope	10.0	0.60	2	2003
Transportable Laser Ranging System (TLRS4)	0.6	0.53	5	2005
Panoramic Survey Telescope And Rapid Response System (Pan-STARRS) PS1 @ LURE Observatory	20.0	3.20	9	2009
Haleakala Support Facilities	8.6	1.20	12	1962/2008

NA Not available.

X Not applicable.

1/ Historical cost, not adjusted for inflation, and not including subsequent capital improvements for Mauna Kea Observation.

2/ Only \$1.2 million of this included in total as the other \$3.1 million are part of facility operating costs.

3/ Formerly Air Force Maui Optical Station (AMOS).

Source: University of Hawaii at Manoa, Institute for Astronomy, records.