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State of Hawaii Energy Data and Trends

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Introduction

Energy plays an important role in Hawaii's economy. Because of the state's heavy dependence on imported petroleum and rapid increase in petroleum prices in recent years, Hawaii's total primary energy expenditure reached a peak of about $5.3 billion in 2008. Hawaii's total energy expenditure (including electricity additions) reached about $6.9 billion in 2008. From 2008 to 2010, due to decreased petroleum prices, Hawaii's total energy expenditures decreased to about $5.7 billion, accounted for about 8.7 percent of Hawaii's total Gross Domestic Product (GDP) in 2010. Petroleum accounted for about 96.7 percent of Hawaii's primary energy expenditures in 2010.

With the rapid increase in petroleum price in recent years, total energy expenditure in Hawaii is growing rapidly. From 1970 to 2010, Hawaii's primary energy expenditures increased 8.0 percent per year on average; Hawaii's total energy expenditures increased 7.9 percent per year.

This report brings together the most comprehensive statistical picture of Hawaii's energy use to date. It uses the most current data available (with the notation that comprehensive energy data are usually several years old).

This report is an update on the State of Hawaii Energy Annual Report published in March 2011. This report intends to bring together economic data, consumption data, economic impact and available historical data. In future reports, analysis of trends and measurement of success may assist policymakers as they monitor Hawaii's clean energy initiatives.

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1. INTRODUCTION

Energy plays an important role in Hawaii's economy. Because of the state's heavy dependence on imported petroleum and rapid increase in petroleum prices in recent years, Hawaii's total primary energy expenditure reached a peak of about $5.3 billion in 2008. Hawaii's total energy expenditure (including electricity additions) reached about $6.9 billion in 2008. Due to decreased petroleum price and reduced petroleum consumption, Hawaii's total energy expenditure decreased to about $5.7 billion in 2010. This value accounted for about 8.7 percent of Hawaii's total Gross Domestic Product (GDP) in 2010. Petroleum accounted for about 96.7 percent of Hawaii's primary energy expenditures.

With the rapid increase in petroleum price in recent years, total energy expenditure in Hawaii is growing rapidly. From 1970 to 2010, Hawaii's primary energy expenditures increased 8.0 percent per year on average; Hawaii's total energy expenditures increased 7.9 percent per year.

This report brings together the most comprehensive statistical picture of Hawaii's energy use to date. It uses the most current data available (with the notation that comprehensive energy data are usually several years old).

This report is an update on the State of Hawaii Energy Annual Report published in March 2011. This report intends to bring together economic data, consumption data, economic impact and available historical data. In future reports, analysis of trends and measurement of success may assist policymakers as they monitor Hawaii's clean energy initiatives.

This report provides a detailed picture about Hawaii's historical and current energy consumption and expenditures by sources of energy and end-users. It shows, for example, that:

- At 86 percent, Hawaii remains strongly dependent on oil for its primary energy needs.
- From a high of 9.8 percent in 1993, renewable energy use in Hawaii has actually declined during the last 17 years, due to reduced biomass use.
- Heavy fuel oil for electrical generation, jet fuel and gasoline remain the primary fuels in the state demand profile.
- As an energy resource, the share of imported coal in total primary energy consumption changed only slightly over the past 15 years from 1995 to 2010, although coal generated electricity is much cheaper than petroleum generated electricity.

Section 2 of this study examines the total energy consumption by end-use sector and by primary energy sources. It shows that:

- Half of Hawaii's primary energy is used in the transportation sector, about 36 percent of the primary energy is used in electricity generation, and the industrial, commercial, and residential sectors account for only about 15 percent of primary energy consumption.
- Electricity generated in Hawaii is consumed almost evenly in the residential, commercial, and industrial sector.
- Hawaii refiners must import significant amounts of jet fuel to meet demand.
- Coal in Hawaii is being used mainly to produce electricity.

Section 3 examines the trends of energy expenditures and prices of the major end-use sectors in Hawaii. It shows that:

- In terms of energy use, more money is expended on gasoline than any other fuel.
- Almost two-thirds (66.6 percent) of the money spent on primary energy (excluding electricity generation) is spent on transportation; while
- Expenditure on electrical generation accounted for 26.1 percent of primary energy expenditures.
- Since 2002, the price of petroleum fuels has increased rapidly.

Section 4 examines the historical trends of Hawaii's energy efficiency and intensity. It shows that:

- On a per capita basis, total energy used has been relatively consistent from 1970 to 2007, but decreased more than 20 percent from 2007 to 2010.
- On a per capita basis, electricity used has increased dramatically from 1970 to 2004, but decreased more than 10 percent from 2004 to 2010; while petroleum consumption has been relatively consistent from 1970 to 2007, it decreased significantly from 2007 to 2010.
- In constant dollars, from 1970 to 2010, Hawaii's expenditures for energy per dollar of the real gross domestic product (GDP) increased about 42 percent.
- In constant dollars, in 2010, each person in Hawaii is paying more than twice as much for energy than they did in 1970.

Section 5 examines the energy consumption and intensity changes over time by sectors. It shows that:

- In the transportation sector, gasoline's share of the total profile increased most dramatically since 1960.
- Hawaii's industrial sector uses about 24 percent of the total energy consumed.
- Renewable energy (biomass, geothermal, hydro, wind, and solar) accounts for only about 4.9 percent of total electric power sector energy consumption.
- Of the renewable energy resources used for electricity generation, wind and geothermal are contributing the most to the Hawaii energy consumption.
- Electricity is still mainly produced by utility companies and not Independent Power Producers.

Section 6 examines the environmental impacts of electricity generation in Hawaii and it shows that:

- From 1990 to 2010, total CO_2 emission in the electric power industry was relatively stable, NOX emissions increased over time, but SO_2 emissions decreased over time (in line with changes in federal clean air standards).

The information provided in this report is mainly based on publicly available annual state level data from the U.S. Energy Information Administration (EIA). Some other sources include the U.S. Bureau of Economic Analysis (BEA), the U.S. Census Bureau, the State of Hawaii Data Book, the State of Hawaii Department of Taxation, and the State of Hawaii Department of Transportation.

2. HAWAII'S ENERGY USE

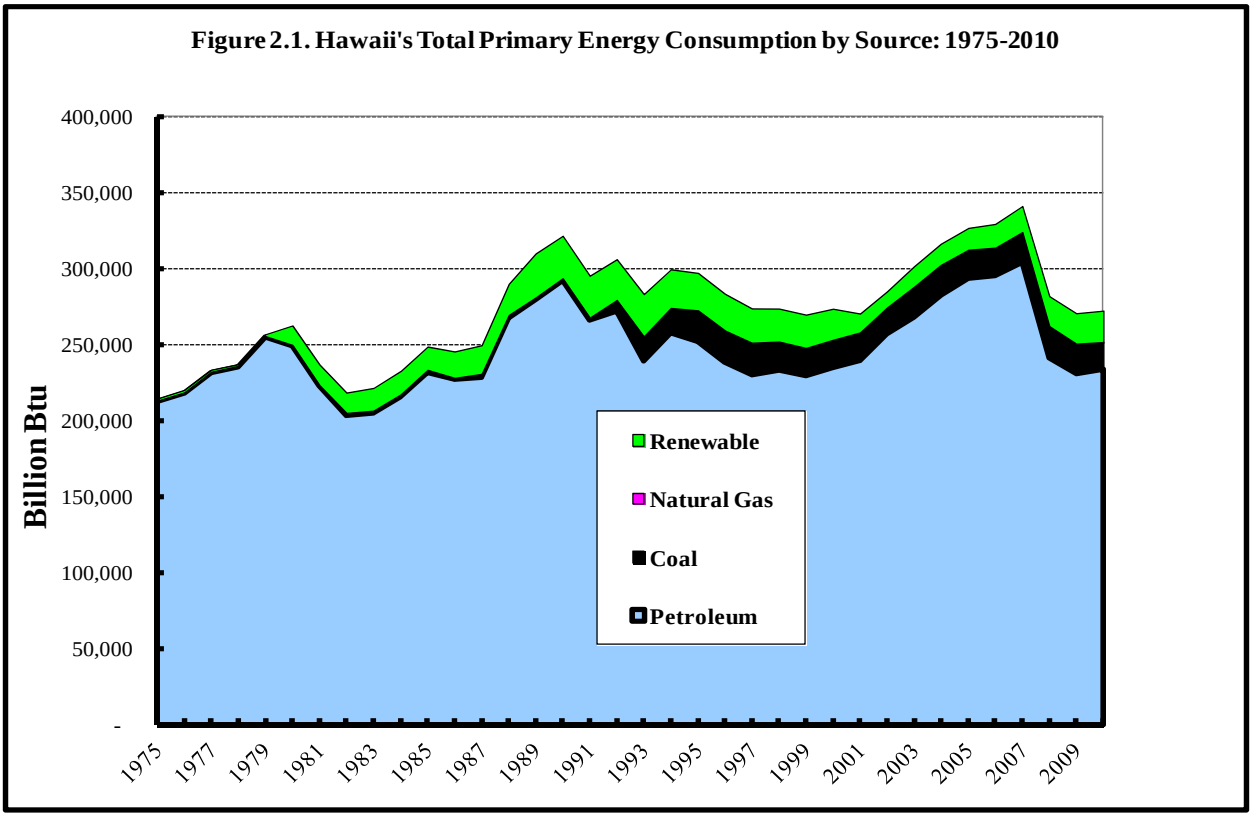
2.1. Primary Energy Consumption by Source

Hawaii's total primary energy consumption increased from less than 100 trillion Btu in 1960 to 272 trillion Btu in 2010, with an average annual growth rate of 2.1 percent. The growth of energy consumption was not consistent over time. From 1960 to 1990, energy consumption increased 4.2 percent per year on average; and consumption increased in most years except a few years after the two oil crisis. From 1990 to 2001, energy consumption decreased from 321 trillion Btu to 272 trillion Btu. Energy consumption increased 3.9 percent per year from 2001 to 2007 and then decreased 7.2 percent per year from 2007 to 2010.

Before 1980, Hawaii's primary energy consumption was almost entirely dependent on imported petroleum. Increased consumption of biomass and coal consumption (mainly due to the operation of the coal-fired power plant on Oahu) in the 1980s reduced the dependence on imported petroleum by about 10 percent.

From 1991 to 2010, the share of petroleum in total primary energy consumption decreased from 91.1 to 86.1 percent; the share of renewable energy (primarily biomass decreased from 9.3 to 7.6 percent; only the share of coal increased from 0.4 to 6.3 percent.

Figure 2.1. Hawaii's Total Primary Energy Consumption by Source: 1975-2010



The historical trend of Hawaii's primary energy consumption by source is provided in Table 2.1.

Table 2.1. Hawaii's Primary Energy Consumption by Source

	Total Energy Consumption	Energy Consumption By Source % in Total				Renewable Energy % in Total				
Year	Billion Btu	Petroleum	Coal	Natural Gas	Renewable	Biomass	Geothermal	Hydro	Solar	Wind
1960	94,855	99.7	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0
1970	196,979	99.2	0.0	0.0	0.8	0.2	0.0	0.6	0.0	0.0
1975	214,429	99.3	0.0	0.0	0.7	0.3	0.0	0.4	0.0	0.0
1980	262,456	95.1	0.0	0.0	4.9	4.5	0.0	0.3	0.0	0.0
1981	236,808	94.3	0.0	0.0	5.7	5.4	0.0	0.4	0.0	0.0
1982	218,287	93.3	0.5	0.0	6.1	5.7	0.0	0.4	0.0	0.0
1983	221,347	92.8	0.5	0.0	6.7	6.3	0.0	0.4	0.0	0.0
1984	232,426	93.0	0.4	0.0	6.6	6.2	0.1	0.4	0.0	0.0
1985	248,555	93.4	0.5	0.0	6.2	5.7	0.1	0.4	0.0	0.0
1986	245,329	92.8	0.2	0.0	7.1	6.6	0.1	0.3	0.0	0.0
1987	249,461	91.8	0.6	0.1	7.5	7.2	0.1	0.3	0.0	0.0
1988	289,692	92.5	0.4	0.0	7.1	6.7	0.1	0.3	0.0	0.0
1989	309,779	90.4	0.3	0.0	9.3	8.7	0.0	0.2	0.3	0.1
1990	321,434	91.1	0.2	0.0	8.7	8.1	0.0	0.3	0.3	0.1
1991	295,171	90.3	0.4	0.0	9.3	8.6	0.0	0.3	0.3	0.1
1992	306,060	89.0	2.2	0.0	8.8	8.1	0.0	0.2	0.3	0.1
1993	283,089	84.7	5.5	0.0	9.8	8.6	0.6	0.2	0.4	0.1
1994	299,395	86.2	5.3	0.0	8.5	6.9	0.6	0.5	0.4	0.1
1995	297,066	85.0	6.7	0.0	8.3	6.7	0.8	0.3	0.4	0.1
1996	283,301	84.3	7.2	0.0	8.5	6.7	0.9	0.4	0.4	0.1
1997	273,618	84.3	7.5	0.0	8.2	6.4	0.9	0.4	0.5	0.1
1998	273,559	85.4	6.7	0.0	7.9	6.0	0.9	0.5	0.5	0.1
1999	269,516	85.3	6.6	0.0	8.1	6.3	0.8	0.4	0.5	0.1
2000	273,488	86.0	6.5	0.0	7.5	5.6	1.0	0.4	0.5	0.1
2001	270,323	88.8	6.6	0.0	4.6	2.9	0.8	0.4	0.5	0.0
2002	284,917	90.4	5.8	0.0	3.7	2.6	0.3	0.3	0.5	0.0
2003	301,416	89.1	6.4	0.0	4.5	3.1	0.6	0.3	0.5	0.0
2004	316,362	89.5	6.1	0.0	4.4	3.0	0.7	0.3	0.4	0.0
2005	326,574	90.1	5.5	0.1	4.4	2.9	0.7	0.3	0.5	0.0
2006	329,265	89.9	5.3	0.1	4.7	3.0	0.6	0.4	0.5	0.2
2007	341,032	89.4	5.6	0.1	5.0	2.8	0.7	0.3	0.6	0.7
2008	281,685	85.8	7.2	0.1	7.0	4.2	0.8	0.3	0.8	0.8
2009	270,471	85.5	7.0	0.1	7.4	4.5	0.6	0.4	1.0	0.9
2010	272,156	86.1	6.3	0.1	7.6	4.4	0.7	0.3	1.3	0.9

Source: Energy Information Administration, State Energy Data System

Table 2.2 provides major primary energy consumption in physical units by source. Hawaii's petroleum consumption mainly includes residual fuel, jet fuel, motor gasoline and distillate fuel, they accounted for about 29.4 percent, 21.7 percent, 23.9 percent, and 16.8 percent of total petroleum consumption, respectively, in 2010.

Table 2.2. Hawaii's Energy Consumption in Physical Units

	Energy Consumption By Source									
	Petroleum									
Year	Jet Fuel T BBL	Residual Fuel T BBL	Motor Gasoline T BBL	Distillate Fuel T BBL	Other Petroleum T BBL	Total Petroleum T BBL	Coal T ST	Natural Gas MCF	Renewable Electricity M KWH	Total Electricity M KWH
1960	4,321	4,766	3,429	886	3,442	16,844	-	-	27	1,285
1965	7,618	7,230	4,082	1,612	1,936	22,478	-	-	22	2,452
1970	14,273	10,154	5,691	1,695	2,292	34,105	-	-	22	3,776
1975	14,849	11,255	6,766	1,948	2,279	37,097	-	-	18	5,310
1980	14,116	13,196	7,231	5,987	3,032	43,562	-	3,131	20	6,331
1985	13,260	13,185	7,594	4,526	1,441	40,006	46	2,483	38	6,635
1986	10,176	14,326	7,878	4,627	2,037	39,044	16	2,462	30	7,032
1987	11,481	13,595	8,186	3,685	2,442	39,389	63	2,610	28	7,298
1988	11,972	16,935	8,476	5,631	2,888	45,902	50	2,612	30	7,719
1989	13,239	17,355	8,754	5,745	2,928	48,021	32	2,694	69	7,970
1990	12,646	19,067	8,670	6,489	3,143	50,015	29	2,788	52	8,311
1991	11,123	15,599	8,970	7,210	2,856	45,758	45	2,694	56	8,524
1992	9,993	17,856	8,870	6,219	3,717	46,655	303	2,695	35	8,667
1993	8,891	13,845	9,060	5,929	3,667	41,392	691	2,681	188	8,658
1994	9,472	15,120	9,343	6,321	4,587	44,843	704	2,778	268	8,948
1995	9,940	14,473	9,416	5,787	4,226	43,842	895	2,773	289	9,188
1996	10,087	12,667	9,374	4,950	4,553	41,631	930	2,672	304	9,379
1997	10,221	12,218	9,358	4,640	3,392	39,829	933	2,611	310	9,363
1998	9,999	13,243	9,342	4,451	3,458	40,493	822	2,654	302	9,261
1999	9,474	12,945	8,953	5,314	2,976	39,662	801	2,735	272	9,381
2000	9,438	13,520	9,289	5,094	3,250	40,591	816	2,841	322	9,691
2001	8,895	13,284	9,710	6,040	3,550	41,479	829	2,818	259	9,785
2002	10,189	12,738	10,419	8,086	3,340	44,772	748	2,734	110	9,892
2003	12,708	12,079	10,597	8,031	3,271	46,686	837	2,732	220	10,391
2004	13,379	13,110	10,741	8,634	3,234	49,098	857	2,774	277	10,732
2005	16,372	13,210	10,978	7,307	3,400	51,267	805	2,795	291	10,539
2006	15,334	14,687	11,533	6,691	3,319	51,564	778	2,783	374	10,568
2007	12,756	16,318	11,348	9,294	3,189	52,905	850	2,850	523	10,585
2008	10,702	12,465	10,675	5,665	3,098	42,605	937	2,701	519	10,390
2009	8,294	12,444	10,834	6,120	3,216	40,908	878	2,608	497	10,126
2010	9,001	12,196	9,932	6,969	3,383	41,481	803	2,627	493	10,017

Source: Energy Information Administration, State Energy Data System

Other petroleum consumption accounted for about 8.2 percent of total petroleum consumption in 2010. Other petroleum consumption includes mainly still gas and LPG.

Table 2.2. Hawaii's Energy Consumption in Physical Units - Continued

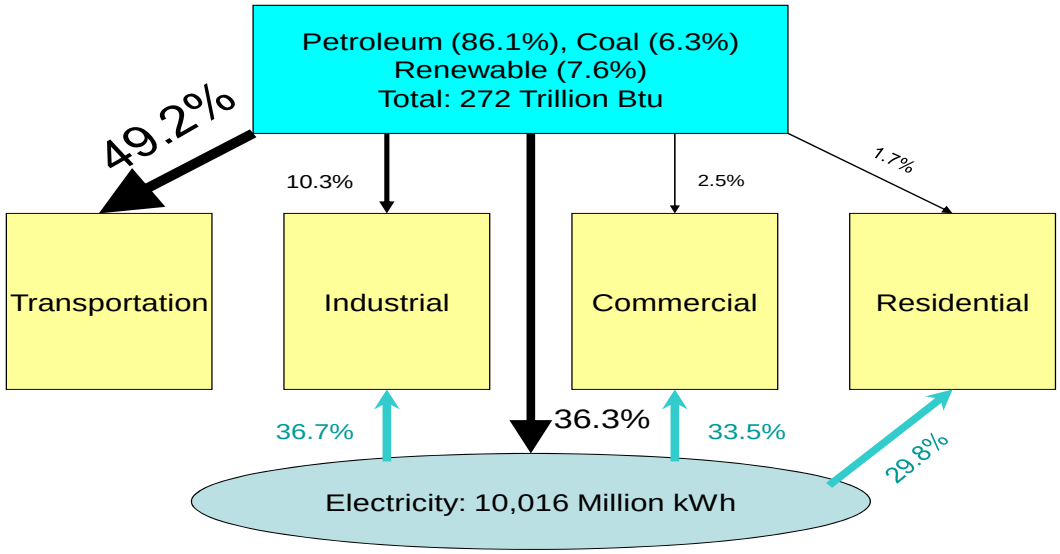
	Other Petroleum Consumption in 1000 BBL (T BBL)							
Year	Aviation Gosoline T BBL	Asphalt Road Oil T BBL	Kerosene T BBL	LPG T BBL	Lubricants T BBL	Still Gas T BBL	Petroleum Coke T BBL	Total Other T BBL
1960	2,640	29	91	112	38	430	103	3,442
1965	613	306	49	219	94	466	159	1,936
1970	133	377	153	938	71	453	131	2,292
1975	116	379	76	872	104	472	220	2,279
1980	199	285	9	1,573	94	525	306	3,032
1985	155	308	2	133	86	658	372	1,441
1986	279	272	3	126	84	1,785	361	2,037
1987	249	397	2	157	95	1,810	403	2,442
1988	281	351	-	178	91	2,067	415	2,888
1989	287	296	-	186	94	2,171	375	2,928
1990	272	381	-	178	96	2,401	333	3,143
1991	261	383	-	214	86	2,324	381	2,856
1992	243	431	-	651	88	2,388	367	3,717
1993	198	444	1	884	90	2,372	344	3,667
1994	210	407	1	1,619	94	2,346	356	4,587
1995	218	438	1	1,316	92	2,310	368	4,226
1996	165	401	1	1,319	89	2,329	411	4,553
1997	121	396	1	241	94	2,290	390	3,392
1998	107	322	-	844	99	2,200	362	3,458
1999	58	353	-	376	100	2,165	351	2,976
2000	45	604	-	562	98	2,181	366	3,250
2001	48	342	-	582	90	2,219	376	3,550
2002	18	107	-	770	89	2,179	372	3,340
2003	15	110	-	492	82	2,254	381	3,271
2004	39	120	-	462	83	2,235	388	3,234
2005	44	199	-	432	83	2,241	382	3,400
2006	41	3	-	471	81	2,247	361	3,319
2007	41	3	-	419	83	2,179	357	3,189
2008	28	2	-	674	77	2,088	300	3,098
2009	30	2	-	819	70	2,123	287	3,216
2010	36	2	-	827	77	2,136	256	3,383

Source: Energy Information Administration, State Energy Data System

2.2. Total Energy Consumption by Sector

Hawaii's primary energy is used in four end-use sectors and electricity generation. In 2010, about 49.2 percent of Hawaii's total primary energy was directly used in the transportation sector, 10.3 percent in the industrial sector, 2.5 percent in the commercial sector, and 1.7 percent in the residential sector; about 36.3 percent of the total primary energy was used in electricity generation. The electricity generated was mainly consumed in the industrial (36.7%), commercial (33.5%), and residential (29.8%) sectors.

Figure 2.2. 2010 Hawaii Energy Use by Sector



The historical trend of Hawaii's end-use energy consumption by sector is provided in Figure 2.2 and Table 2.3. End-use energy consumption in each sector includes the primary energy directly consumed by the sector, electricity consumed by (i.e., sold to) the sector, and the sector's share of electrical system energy losses.

From 1960 to 2010, the shares of the residential sector and the commercial sector increased from 7.5 and 5.6 percent to 12.5 and 14.6 percent, respectively; the share of the industrial sector increased slightly from 21.8 to 23.6 percent; and the share of transportation sector decreased from 65.1 to 49.2 percent. In addition, the share of energy used in electricity generation increased from 18.6 to 36.3 percent.

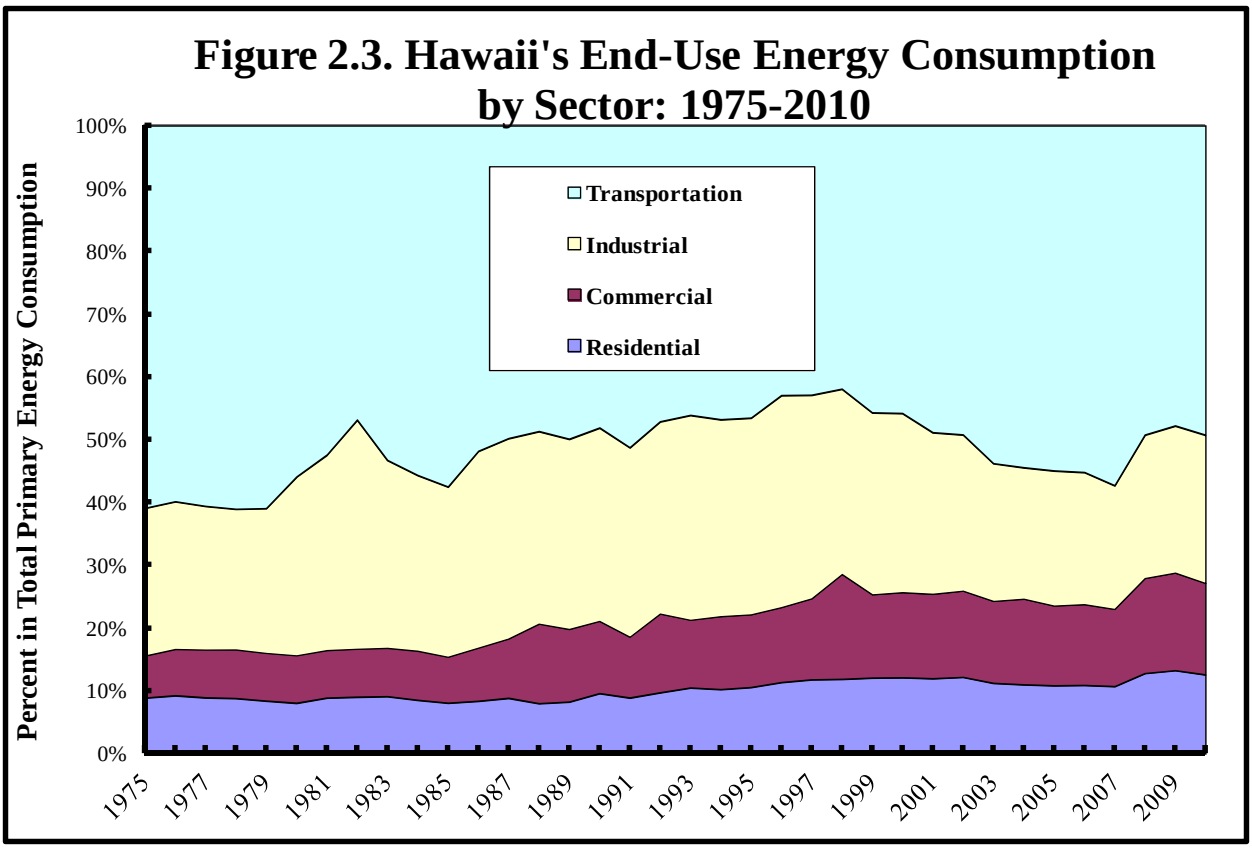


Table 2.3. Hawaii's End-Use Energy Consumption by Sector

	End-Use Energy Consumption By Sector					
	Units: Billion Btu					Electric
Year	Residential	Commercial	Industrial	Transportation	Total	Power
1960	7,144	5,300	20,633	61,778	94,855	17,603
1970	15,460	12,519	43,657	125,344	196,980	43,176
1975	18,957	14,533	50,397	130,543	214,430	58,778
1980	21,020	20,073	74,651	146,713	262,457	69,749
1985	19,928	18,392	67,347	142,887	248,554	69,758
1990	30,739	37,209	98,940	154,545	321,433	105,928
1995	31,289	34,609	93,012	138,155	297,065	105,531
2000	33,058	37,283	77,960	125,188	273,489	108,494
2005	35,276	41,764	70,158	179,377	326,575	109,805
2006	35,785	42,601	69,236	181,643	329,265	110,613
2007	36,406	42,214	67,089	195,323	341,032	111,819
2008	35,972	42,836	64,271	138,606	281,685	108,951
2009	35,767	42,228	63,301	129,176	270,472	105,573
2010	34,152	39,814	64,218	133,972	272,156	98,783

Source: Energy Information Administration, State Energy Data System

2.3. Petroleum Consumption by Sector

Petroleum is mainly consumed in transportation and electricity generation in Hawaii. In 2010, transportation and electricity generation accounted for about 56.2 and 32.8 percent of total petroleum consumption, respectively. From 1960 to 2010, the transportation sector's share and the industrial sector's share in total petroleum consumption decreased from 65.3 and 15.1 percent to 56.2 percent and 9.1 percent, respectively; the power sector's share increased from 18.3 percent to 32.8 percent.

Table 2.4. Hawaii's Petroleum Consumption by Sector

	Petroleum Consumption	Petroleum Consumption By Sector (Including Ethanol) % in Total Petroleum Consumption				
Year	Billion Btu	Transportation	Electricity	Industrial	Commercial	Residential
1960	94,564	65.3	18.3	15.1	1.2	0.1
1970	195,420	64.1	21.8	11.7	1.9	0.4
1975	212,931	61.3	27.4	10.0	1.1	0.3
1980	249,649	58.8	27.9	11.5	1.6	0.3
1985	232,123	61.6	29.8	8.0	0.6	0.1
1990	292,762	52.8	33.3	10.9	2.9	0.1
1991	266,575	56.7	30.1	11.5	1.6	0.1
1992	272,492	52.9	31.6	11.2	4.0	0.3
1993	239,664	54.4	31.8	12.5	1.2	0.1
1994	258,227	54.2	30.6	13.0	2.1	0.1
1995	252,515	54.7	31.8	12.4	1.1	0.1
1996	238,809	50.9	34.6	13.7	0.7	0.1
1997	230,567	50.9	35.5	12.2	1.3	0.1
1998	233,636	49.1	35.2	9.5	5.8	0.4
1999	230,004	53.5	36.3	8.9	1.1	0.2
2000	235,308	53.2	35.9	9.5	1.1	0.3
2001	239,946	55.0	35.0	8.7	0.9	0.3
2002	257,610	54.4	35.5	8.6	1.2	0.3
2003	268,563	60.3	30.3	8.2	1.0	0.2
2004	283,034	60.8	30.0	7.8	1.2	0.2
2005	295,277	60.7	29.2	8.8	1.1	0.2
2006	297,271	61.1	29.1	8.4	1.1	0.2
2007	306,447	63.7	27.8	7.4	0.8	0.2
2008	244,874	56.6	33.5	8.3	1.2	0.4
2009	234,958	55.0	34.2	8.8	1.6	0.4
2010	238,589	56.2	32.8	9.1	1.5	0.4

Source: Energy Information Administration, State Energy Data System

Table 2.4. Hawaii's Petroleum Consumption by Sector - Continued

	Petroleum Consumption By Sector Unit: 1000 BBL (T BBL)					
Year	Total	Transportation	Electric	Industrial	Commercial	Residential
1960	16,845	11,487	2,756	2,367	209	26
1970	34,105	22,473	6,798	3,874	760	200
1975	37,097	23,520	9,309	3,648	477	143
1980	43,563	26,317	11,127	5,135	792	192
1985	40,005	25,641	11,047	2,997	275	45
1986	39,044	22,884	11,575	4,173	369	43
1987	39,390	22,474	12,196	4,070	596	54
1988	45,902	25,361	13,044	4,961	2,475	61
1989	48,021	27,691	13,686	4,469	2,113	62
1990	50,014	27,639	15,657	5,231	1,430	57
1991	45,757	27,034	12,903	4,989	773	58
1992	46,655	25,631	13,865	5,078	1,897	184
1993	41,392	23,305	12,272	5,250	524	41
1994	44,844	25,017	12,735	6,151	899	42
1995	43,843	24,759	12,921	5,643	480	40
1996	41,631	22,058	13,319	5,880	326	48
1997	39,829	21,334	13,175	4,672	560	88
1998	40,493	20,876	13,264	3,765	2,338	250
1999	39,663	22,177	13,453	3,380	511	142
2000	40,592	22,532	13,623	3,685	558	194
2001	41,480	23,704	13,588	3,513	478	197
2002	44,772	25,306	14,842	3,779	648	197
2003	46,686	29,194	13,098	3,721	527	146
2004	49,098	30,897	13,704	3,704	644	149
2005	51,267	32,278	13,888	4,298	651	152
2006	51,564	32,597	13,952	4,194	662	159
2007	52,905	34,678	13,738	3,844	517	128
2008	42,604	25,087	13,209	3,396	647	265
2009	40,907	23,404	12,954	3,475	832	242
2010	41,480	24,144	12,610	3,670	817	239

Source: Energy Information Administration, State Energy Data System

Table 2.5. Hawaii's Foreign Petroleum Imports by Major Type

	2005 Annual TBBL	2006 Annual TBBL	2007 Annual TBBL	2008 Annual TBBL	2009 Annual TBBL	2010 Annual TBBL	2011 Annual TBBL	2012* Annual TBBL
Total Foreigh Imports (EIA)	49,107	53,963	52,937	46,220	43,616	47,176	46,497	42,463
Crude Oil	45,037	49,033	46,137	41,447	40,981	42,331	42,316	39,351
Jet Fuel, Kerosene-Type	3,067	2,542	4,956	3,781	1,608	3,873	3,641	2,143
Fuel Ethanol	379	1,243	767	496	606	-	-	-
Residual Fuel	296	584	567	196	78	297	-	117
Distillate	32	238	181	76	-	-	-	-
Propane/NGL	175	134	134	224	125	338	381	442
Others	121	189	195	-	218	337	159	410
% in Total Foreign Imports	2005	2006	2007	2008	2009	2010	2011	2012*
Total Foreigh Imports	100%	100%	100%	100%	100%	100%	100%	100%
Crude Oil	92%	91%	87%	90%	94%	90%	91%	93%
Jet Fuel, Kerosene-Type	6%	5%	9%	8%	4%	8%	8%	5%
Fuel Ethanol	1%	2%	1%	1%	1%	0%	0%	0%
Residual Fuel	1%	1%	1%	0%	0%	1%	0%	0%
Distillate	0%	0%	0%	0%	0%	0%	0%	0%
Propane/NGL	0%	0%	0%	0%	0%	1%	1%	1%
Others	0%	0%	0%	0%	0%	1%	0%	1%

* Estimated based on annualized YTD data.

Source: EIA

Table 2.6. Hawaii Petroleum Net Imports and Consumption

	2005 Annual	2006 Annual	2007 Annual	2008 Annual	2009 Annual	2010 Annual	2011 Annual	2012* Annual
Physical Unit of Imports								
Total Foreign Imports (TBBL)	49,345	52,981	54,508	45,917	44,176	41,391	42,970	42,855
Crude Oil (TBBL)	45,120	50,264	49,176	41,201	43,971	40,298	42,507	41,700
Jet Fuel, Kerosene-Type (TBBL)	3,312	1,745	4,356	3,797	0	385	50	616
Propane/NGL (TBBL)	134	133	133	205	124	364	380	416
Others (TBBL)	780	839	843	714	81	344	33	123
Value of Imports								
Total Foreign Imports ($M)	2,589	3,412	3,869	4,730	2,629	3,234	4,582	4,870
Crude Oil ($M)	2,334	3,210	3,435	4,138	2,622	3,160	4,549	4,761
Jet Fuel, Kerosene-Type ($M)	209	140	366	522	0	33	6	79
Propane/NGL ($M)	6	6	7	12	5	16	24	18
Others ($M)	40	56	61	57	3	26	3	12
Average Unit Value of Imports								
Total Foreign Imports ($/BBL)	52	64	71	103	60	78	107	114
Crude Oil ($/BBL)	52	64	70	100	60	78	107	114
Jet Fuel, Kerosene-Type ($/BBL)	63	80	84	138	NA	86	129	128
Propane/NGL ($/BBL)	45	43	51	60	41	44	63	44
Others ($/BBL)	52	67	73	80	32	74	87	94
Total Foreign Exports (TBBL)	1,981	2,111	2,366	1,829	1,266	1,071	866	402
Total Value of Exports ($M)	99	153	187	183	74	87	92	49
Average Unit Value of Exports	50	72	79	100	58	81	106	121
Net Foreign Imports (TBBL)	47,364	50,870	52,142	44,088	42,910	40,320	42,104	42,453
Net Value of Foreign Imports ($M)	2,490	3,259	3,683	4,546	2,555	3,148	4,490	4,821
Net Domestic Imports (TBBL) 1/	*3,903*	*694*	*763*	*-1,483*	*-2,002*	*1,161*	*959*	*495*
Petroleum Consumption (TBBL) 2/	51,267	51,564	52,905	42,605	40,908	41,481	*43,064*	*42,948*
Petroleum Expenditure ($M) 2/	3,787	4,421	4,873	5,171	3,275	4,238	*6,046*	*6,492*

1/ Net domestic imports are estimated based on total consumption and net foreign imports.

2/ Data from 2005 to 2010 are from EIA, values after 2011 are estimated.

Source: WISERTrade and EIA

2.4. Electricity Consumption by Sector

Electricity generated in Hawaii is consumed almost evenly in the residential, commercial, and industrial sector.

In 2010, electricity consumed in the residential, commercial, and industrial sector accounted for about 29.7, 33.7, and 36.6 percent of total electricity consumption, respectively. From 1960 to 1980, the residential sector's share decreased more than 10 percentage points, while the industrial sector's share increased more than 10 percentage points.

From 1980 to 2010, the industrial sector's share decreased more than 10 percentage points, while the commercial sector's share increased more than 10 percentage points.

Table 2.7. Hawaii's Electricity Consumption by Sector

	Electricity Consumption by Sector						
	Residential	Commercial	Industrial	Total	% in Total		
Year	Million kWh	Million kWh	Million kWh	Million kWh	Residential	Commercial	Industrial
1960	514	306	465	1,285	40.0	23.8	36.2
1970	1,285	771	1,720	3,776	34.0	20.4	45.6
1980	1,841	1,462	3,028	6,331	29.1	23.1	47.8
1990	2,324	2,253	3,734	8,311	28.0	27.1	44.9
1995	2,606	2,779	3,803	9,188	28.4	30.2	41.4
1996	2,676	2,819	3,884	9,379	28.5	30.1	41.4
1997	2,668	2,839	3,856	9,363	28.5	30.3	41.2
1998	2,641	2,833	3,787	9,261	28.5	30.6	40.9
1999	2,689	2,944	3,748	9,381	28.7	31.4	40.0
2000	2,765	3,092	3,834	9,691	28.5	31.9	39.6
2001	2,802	3,192	3,790	9,784	28.6	32.6	38.7
2002	2,898	3,223	3,770	9,891	29.3	32.6	38.1
2003	3,028	3,517	3,846	10,391	29.1	33.8	37.0
2004	3,162	3,632	3,937	10,731	29.5	33.8	36.7
2005	3,164	3,463	3,912	10,539	30.0	32.9	37.1
2006	3,182	3,490	3,896	10,568	30.1	33.0	36.9
2007	3,201	3,520	3,864	10,585	30.2	33.3	36.5
2008	3,085	3,501	3,804	10,390	29.7	33.7	36.6
2009	3,055	3,388	3,683	10,126	30.2	33.5	36.4
2010	2,989	3,355	3,672	10,016	29.8	33.5	36.7

Source: Energy Information Administration, State Energy Data System

2.5. Other Energy Consumption by Sector

Other primary energy sources consumed in Hawaii include coal, biomass, natural gas, and renewable energy sources (mainly biomass geothermal, hydropower, solar, and wind).

Hawaii's industrial sector started to consume coal in 1982. In 1990, the electric power sector also started to consume coal. Currently, coal is mainly used in electricity generation in Hawaii. From 1995 to 2010, coal consumption in Hawaii is relatively stable, but the share of coal consumed in electric power sector increased 12.4 percentage points from about 79.2 percent to 91.7 percent.

Table 2.8. Hawaii's Coal Consumption by Sector

	Coal Consumption By Sector Units: Billion Btu			Coal Consumption By Sector % in Coal Consumption		
Year	Total Billion Btu	Electric Power	Industrial	Total	Electric Power	Industrial
1982	1,149	-	1,149	100.00	0.00	100.00
1990	721	26	695	100.00	3.61	96.39
1991	1,063	144	919	100.00	13.55	86.45
1992	6,750	5,583	1,167	100.00	82.71	17.29
1993	15,575	13,762	1,813	100.00	88.36	11.64
1994	15,740	13,891	1,849	100.00	88.25	11.75
1995	19,914	15,795	4,119	100.00	79.32	20.68
1996	20,371	16,731	3,640	100.00	82.13	17.87
1997	20,513	16,778	3,735	100.00	81.79	18.21
1998	18,223	14,859	3,364	100.00	81.54	18.46
1999	17,691	14,999	2,692	100.00	84.78	15.22
2000	17,653	15,514	2,139	100.00	87.88	12.12
2001	17,774	15,730	2,044	100.00	88.50	11.50
2002	16,618	15,963	655	100.00	96.06	3.94
2003	19,256	17,882	1,374	100.00	92.86	7.14
2004	19,254	18,001	1,253	100.00	93.49	6.51
2005	17,956	16,545	1,411	100.00	92.14	7.86
2006	17,527	15,889	1,638	100.00	90.65	9.35
2007	19,007	17,213	1,794	100.00	90.56	9.44
2008	20,158	17,847	2,311	100.00	88.54	11.46
2009	18,958	16,925	2,033	100.00	89.28	10.72
2010	17,117	15,702	1,415	100.00	91.73	8.27

Source: Energy Information Administration, State Energy Data System

Hawaii started to consume biomass in 1963. Before 2005, biomass consumed in Hawaii was only wood and waste consumed mainly in the industrial sector and electricity generation.

Since 2005, ethanol has been consumed in the transportation sector. In 2010, biomass accounted for about 4.4 percent of total energy consumption; about 38.0 percent of biomass (ethanol) was consumed in the transportation sector; other biomass (wood and waste) was mainly consumed in the industrial sector and the commercial sector.

Table 2.9. Hawaii's Biomass Consumption by Sector

	Biomass Consumption By Sector (Including Ethanol)				
	% in Biomass Consumption				
	Total	Wood & Waste			Ethanol
Year	Billion Btu	Electric Power	Industrial	Commercial	Transportation
1963	206	-	100.0	-	-
1965	172	-	100.0	-	-
1966	144	16.0	84.0	-	-
1970	429	59.9	40.1	-	-
1975	569	45.5	54.5	-	-
1980	11,910	-	100.0	-	-
1985	14,217	1.8	98.2	-	-
1990	25,924	30.0	70.0	-	-
1995	19,803	33.1	66.9	-	-
1996	19,066	25.8	74.2	-	-
1997	17,433	32.2	67.8	-	-
1998	16,548	32.8	67.2	-	-
1999	16,981	31.9	68.1	-	-
2000	15,194	35.0	65.0	-	-
2001	7,947	35.6	64.4	-	-
2002	7,480	32.1	67.9	-	-
2003	9,305	82.1	17.9	-	-
2004	9,336	53.4	19.4	27.2	-
2005	9,565	44.2	17.9	23.7	14.2
2006	9,875	44.9	13.4	26.5	15.3
2007	9,686	42.7	13.5	24.3	19.5
2008	11,792	33.6	11.8	26.0	28.6
2009	12,047	28.1	15.1	25.1	31.7
2010	11,859	0.3	37.0	24.7	38.0

Source: Energy Information Administration, State Energy Data System

Hawaii's natural gas consumption is mainly supplemental gaseous fuels (SGF), which is not a source of primary energy. Primary natural gas accounted for only about 5.9 percent of total natural gas consumption in 2010.

Natural gas was not consumed in Hawaii until 1980. From 1980 to 2010, natural gas consumption remained at about the same level, but the share of residential consumption decreased while the shares of industrial and commercial consumptions increased. In 2010, natural gas was consumed mainly in the commercial sector (67.6%), the residential sector (19.4%), and the industrial sector (12.9%).

Table 2.10. Hawaii's Natural Gas Consumption by Sector

		Natural Gas Consumption By Sector			
	Total	% in Natural Gas Consumption			
Year	Consumption Billion Btu	Residential	Commercial	Industrial	Transportation
1980	3,015	45.2	54.8	-	-
1985	2,687	25.2	74.8	-	-
1990	2,983	20.3	79.7	-	-
1995	2,906	20.7	79.3	-	-
1996	2,825	20.2	79.8	-	-
1997	2,689	19.8	67.1	13.1	-
1998	2,803	20.2	65.8	14.0	-
1999	2,886	19.1	63.9	16.9	-
2000	2,975	18.8	62.3	18.9	-
2001	2,920	19.1	62.1	18.9	-
2002	2,898	19.7	62.9	17.4	-
2003	2,861	19.6	64.1	16.3	-
2004	2,907	18.9	65.0	16.1	0.1
2005	2,898	18.5	65.7	15.7	0.1
2006	2,914	18.6	65.1	16.2	0.1
2007	2,956	17.9	64.4	17.6	0.1
2008	2,817	18.5	65.5	16.0	0.1
2009	2,712	19.5	67.2	13.2	0.1
2010	2,732	19.4	67.6	12.9	0.1

Source: Energy Information Administration, State Energy Data System

Other renewable energy sources, including geothermal, hydro, solar, and wind, currently accounted for about 3.2 percent of Hawaii's total primary energy consumption. Other renewable energy sources are mainly used in electricity generation.

3. HAWAII'S ENERGY EXPENDITURES AND PRICES

3.1. Energy Expenditures by Source

From 1970 to 2010, Hawaii's total primary energy expenditure increased 8.0 percent per year on average from $204 million in 1970 to $4,383 million in 2010; the additional expenditures on electricity (total expenditures on retail electricity minus the fuel cost of electricity generation) increased about 7.6 percent per year from $70 million in 1970 to $1,331 million; and total energy expenditure increased 7.9 percent per year from $274 million in 1970 to $5,714 million in 2010. In 2010, total primary energy expenditure accounted for about 76.7 percent of total energy expenditure; electricity additional expenditure accounted for 23.3 percent.

Table 3.1. Hawaii's Energy Expenditures by Source

	Energy Expenditures By Source: $ Million										
	Petroleum										
Year	Jet Fuel	Residual Fuel	Motor Gasoline	Distillate Fuel	Other Petroleum	Total Petroleum	Coal	Natural Gas	Biomass	Primary Energy	Energy Total
1970	58	25	99	10	11	204	-	-	0	204	274
1975	170	109	194	26	20	518	-	-	1	519	652
1980	492	309	411	229	50	1,490	-	39	10	1,540	1,721
1985	462	395	444	207	33	1,542	3	38	12	1,594	1,907
1990	425	469	533	297	37	1,761	1	37	5	1,804	2,114
1991	323	303	490	330	39	1,485	2	41	9	1,537	2,026
1992	277	310	510	261	56	1,415	9	39	8	1,471	1,982
1993	241	255	528	260	47	1,330	21	37	8	1,397	2,015
1994	232	248	553	273	69	1,374	22	37	7	1,440	2,121
1995	251	267	564	246	64	1,392	29	39	9	1,469	2,201
1996	300	269	594	223	67	1,453	32	41	6	1,532	2,305
1997	292	268	598	174	42	1,374	33	42	5	1,454	2,270
1998	208	212	584	151	71	1,225	27	38	6	1,295	2,091
1999	257	257	528	218	46	1,306	26	38	6	1,376	2,159
2000	373	416	650	276	66	1,781	26	47	6	1,860	2,702
2001	296	400	735	316	63	1,810	22	48	8	1,888	2,776
2002	315	376	673	371	61	1,796	28	47	9	1,880	2,686
2003	474	359	838	490	50	2,210	55	54	14	2,332	3,315
2004	714	405	962	645	56	2,782	36	58	13	2,889	4,017
2005	1,200	670	1,182	668	68	3,787	27	69	16	3,899	4,992
2006	1,313	858	1,434	741	74	4,421	30	79	15	4,545	5,725
2007	1,173	1,102	1,436	1,090	73	4,873	37	78	16	5,004	6,171
2008	1,359	1,226	1,607	859	119	5,171	46	101	19	5,337	6,851
2009	595	710	1,264	597	109	3,275	44	77	13	3,409	4,661
2010	836	978	1,408	886	130	4,238	40	95	10	4,383	5,714

Source: Energy Information Administration, State Energy Data System

Petroleum accounted for almost total primary energy expenditures (about 97%) in Hawaii; coal, natural gas, and biomass together accounted for only about 3 percent of the primary energy expenditures.

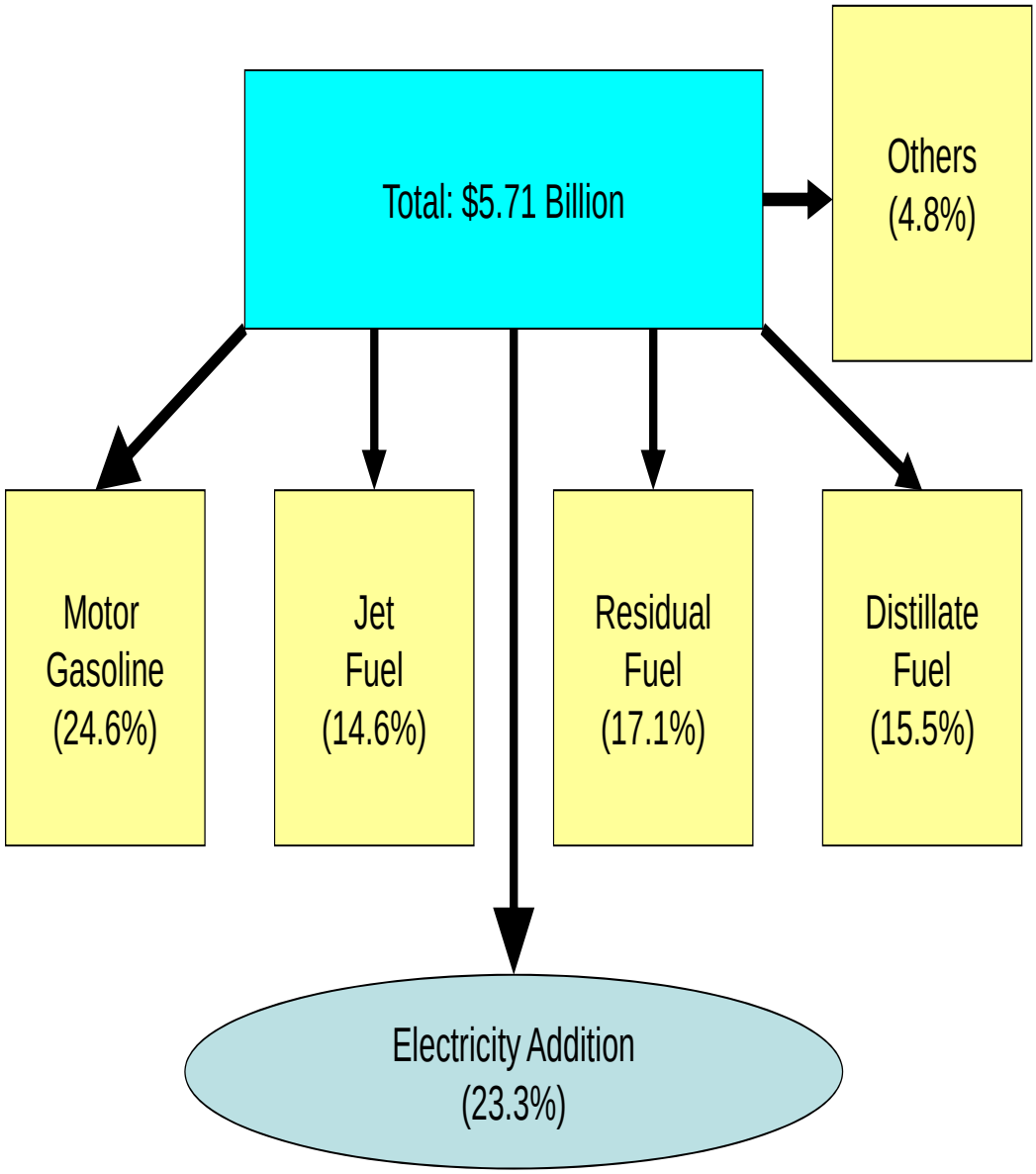
Primary energy expenditures are mainly due to expenditures on motor gasoline, residual fuel, distillate fuel, and jet fuel. In 2010, these expenditures accounted for 32.1 percent, 22.3 percent, 20.2 percent, and 19.1 percent of total primary energy expenditures, respectively.

Table 3.1. Hawaii's Energy Expenditures by Source - Continued

	% of Primary Energy Expenditures								
	Petroleum								
Year	Jet Fuel	Residual Fuel	Motor Gasoline	Distillate Fuel	Other Petroleum	Total Petroleum	Coal	Natural Gas	Biomass
1970	28.7	12.1	48.7	4.9	5.5	99.9	-	-	0.1
1975	32.8	20.9	37.3	4.9	3.9	99.9	-	-	0.1
1980	32.0	20.0	26.7	14.9	3.2	96.8	-	2.6	0.6
1985	29.0	24.8	27.9	13.0	2.1	96.7	0.2	2.4	0.7
1990	23.6	26.0	29.6	16.5	2.1	97.6	0.1	2.0	0.3
1991	21.0	19.7	31.9	21.5	2.5	96.6	0.1	2.7	0.6
1992	18.8	21.1	34.7	17.8	3.8	96.2	0.6	2.6	0.6
1993	17.3	18.2	37.8	18.6	3.4	95.2	1.5	2.7	0.6
1994	16.1	17.2	38.4	18.9	4.8	95.4	1.5	2.6	0.5
1995	17.1	18.2	38.4	16.7	4.4	94.7	2.0	2.6	0.6
1996	19.6	17.6	38.8	14.6	4.3	94.8	2.1	2.7	0.4
1997	20.1	18.5	41.1	11.9	2.9	94.5	2.2	2.9	0.4
1998	16.1	16.4	45.0	11.6	5.5	94.6	2.1	2.9	0.4
1999	18.7	18.7	38.4	15.8	3.3	94.9	1.9	2.8	0.4
2000	20.1	22.3	34.9	14.8	3.6	95.7	1.4	2.5	0.3
2001	15.7	21.2	38.9	16.7	3.3	95.9	1.2	2.6	0.4
2002	16.8	20.0	35.8	19.7	3.3	95.5	1.5	2.5	0.5
2003	20.3	15.4	35.9	21.0	2.1	94.8	2.4	2.3	0.6
2004	24.7	14.0	33.3	22.3	1.9	96.3	1.2	2.0	0.4
2005	30.8	17.2	30.3	17.1	1.7	97.1	0.7	1.8	0.4
2006	28.9	18.9	31.6	16.3	1.6	97.3	0.7	1.7	0.3
2007	23.4	22.0	28.7	21.8	1.5	97.4	0.7	1.6	0.3
2008	25.5	23.0	30.1	16.1	2.2	96.9	0.9	1.9	0.4
2009	17.5	20.8	37.1	17.5	3.2	96.1	1.3	2.3	0.4
2010	19.1	22.3	32.1	20.2	3.0	96.7	0.9	2.2	0.2

Source: Energy Information Administration, State Energy Data System

Figure 3.1. 2010 Hawaii Energy Expenditures



3.2. Total Energy Expenditures by Sector

Table 3.2 shows Hawaii's total energy expenditures, including electricity expenditures, by four major sectors. In 2010, total energy expenditures in Hawaii reached $5,714 million; the transportation sector accounted for more than half of total energy expenditures in Hawaii. The residential sector, commercial sector, and industrial sector accounted for 16.0, 17.7, and 15.2 percent of total energy expenditures, respectively.

Table 3.2. Hawaii's Energy Expenditures by Sector

	Total Energy Expenditures By Sector $ Million				
Year	Residential	Commercial	Industrial	Transportation	Total
1970	39	31	36	168	274
1975	86	69	110	387	652
1980	176	176	283	1,086	1,721
1985	227	227	337	1,116	1,907
1990	252	297	342	1,223	2,114
1991	269	297	346	1,116	2,026
1992	288	329	349	1,016	1,982
1993	316	326	399	976	2,015
1994	331	352	412	1,026	2,121
1995	361	381	432	1,028	2,201
1996	396	409	467	1,032	2,305
1997	415	424	451	981	2,271
1998	402	423	398	868	2,091
1999	409	418	394	939	2,160
2000	486	515	498	1,203	2,702
2001	492	529	476	1,280	2,776
2002	487	514	444	1,241	2,686
2003	538	587	492	1,698	3,315
2004	604	669	555	2,190	4,017
2005	692	760	667	2,872	4,992
2006	785	863	751	3,326	5,725
2007	811	876	770	3,714	6,171
2008	1,076	1,188	1,052	3,535	6,851
2009	802	861	713	2,285	4,661
2010	916	1,012	866	2,920	5,714

Source: Energy Information Administration, State Energy Data System

Table 3.2. Hawaii's Energy Expenditures by Sector - Continued

	Total Energy Expenditures By Sector % in Total				
Year	Residential	Commercial	Industrial	Transportation	Total
1970	14.3	11.4	13.0	61.3	100.0
1975	13.2	10.6	16.9	59.3	100.0
1980	10.2	10.2	16.4	63.1	100.0
1985	11.9	11.9	17.7	58.5	100.0
1990	11.9	14.1	16.2	57.8	100.0
1991	13.3	14.6	17.1	55.1	100.0
1992	14.5	16.6	17.6	51.3	100.0
1993	15.7	16.2	19.8	48.4	100.0
1994	15.6	16.6	19.4	48.4	100.0
1995	16.4	17.3	19.6	46.7	100.0
1996	17.2	17.7	20.3	44.8	100.0
1997	18.3	18.7	19.9	43.2	100.0
1998	19.2	20.2	19.0	41.5	100.0
1999	18.9	19.4	18.2	43.5	100.0
2000	18.0	19.1	18.4	44.5	100.0
2001	17.7	19.1	17.1	46.1	100.0
2002	18.1	19.1	16.5	46.2	100.0
2003	16.2	17.7	14.8	51.2	100.0
2004	15.0	16.6	13.8	54.5	100.0
2005	13.9	15.2	13.4	57.5	100.0
2006	13.7	15.1	13.1	58.1	100.0
2007	13.1	14.2	12.5	60.2	100.0
2008	15.7	17.3	15.4	51.6	100.0
2009	17.2	18.5	15.3	49.0	100.0
2010	16.0	17.7	15.2	51.1	100.0

Source: Energy Information Administration, State Energy Data System

3.3. Primary Energy Expenditures by Sector

In 2010, Hawaii's total primary energy expenditures reached $4,383 million. The fuel cost of electricity generation accounted for about 26.1 percent; the transportation sector accounted for about 66.6 percent; and the remaining three sectors together accounted for only about 7.3 percent of total primary energy expenditures.

Table 3.3. Hawaii's Primary Energy Expenditures by Sector

Primary Energy Expenditures By Sector Units: $ Million						
Year	Residential	Commercial	Industrial	Transportation	Electricity	Total
1970	3	5	10	168	17	204
1975	3	7	30	387	92	519
1980	27	44	106	1,086	276	1,540
1981	29	41	116	1,136	464	1,785
1982	28	38	167	950	422	1,604
1983	29	36	68	998	382	1,513
1984	20	32	73	1,058	382	1,565
1985	14	38	85	1,116	343	1,594
1986	12	32	64	814	216	1,138
1987	12	40	68	788	270	1,178
1988	12	72	67	874	241	1,266
1989	13	73	56	1,036	284	1,461
1990	13	69	77	1,223	423	1,804
1991	17	54	72	1,116	280	1,537
1992	22	75	67	1,016	291	1,471
1993	12	43	81	976	285	1,397
1994	13	48	96	1,026	257	1,440
1995	14	43	99	1,028	285	1,469
1996	15	43	95	1,032	346	1,532
1997	20	47	69	981	336	1,454
1998	37	74	58	868	259	1,295
1999	24	43	47	939	323	1,376
2000	32	57	68	1,203	499	1,860
2001	34	55	54	1,280	465	1,888
2002	34	57	53	1,241	495	1,880
2003	32	59	48	1,698	496	2,332
2004	32	81	60	2,190	527	2,889
2005	37	101	84	2,872	805	3,899
2006	42	116	89	3,326	973	4,545
2007	39	105	100	3,714	1,046	5,004
2008	74	147	117	3,535	1,465	5,337
2009	62	120	81	2,285	860	3,409
2010	76	142	103	2,920	1,142	4,383

Source: Energy Information Administration, State Energy Data System

Table 3.3. Hawaii's Primary Energy Expenditures by Sector - Continued

	Primary Energy Expenditures By Sector % in Total					
Year	Residential	Commercial	Industrial	Transportation	Electricity	Total
1970	1.5	2.5	5.1	82.3	8.5	100.0
1975	0.7	1.3	5.7	74.5	17.8	100.0
1980	1.8	2.9	6.9	70.6	17.9	100.0
1981	1.6	2.3	6.5	63.7	26.0	100.0
1982	1.7	2.4	10.4	59.2	26.3	100.0
1983	1.9	2.4	4.5	66.0	25.3	100.0
1984	1.3	2.0	4.6	67.6	24.4	100.0
1985	0.9	2.4	5.3	70.0	21.5	100.0
1986	1.0	2.8	5.6	71.6	19.0	100.0
1987	1.0	3.4	5.8	66.9	22.9	100.0
1988	0.9	5.7	5.3	69.1	19.0	100.0
1989	0.9	5.0	3.8	70.9	19.4	100.0
1990	0.7	3.8	4.3	67.8	23.4	100.0
1991	1.1	3.5	4.7	72.6	18.2	100.0
1992	1.5	5.1	4.5	69.1	19.8	100.0
1993	0.9	3.1	5.8	69.8	20.4	100.0
1994	0.9	3.4	6.7	71.2	17.8	100.0
1995	0.9	2.9	6.7	70.0	19.4	100.0
1996	1.0	2.8	6.2	67.4	22.6	100.0
1997	1.4	3.2	4.8	67.5	23.1	100.0
1998	2.8	5.7	4.4	67.0	20.0	100.0
1999	1.8	3.1	3.4	68.2	23.5	100.0
2000	1.7	3.1	3.7	64.7	26.8	100.0
2001	1.8	2.9	2.9	67.8	24.6	100.0
2002	1.8	3.1	2.8	66.0	26.3	100.0
2003	1.4	2.5	2.1	72.8	21.3	100.0
2004	1.1	2.8	2.1	75.8	18.2	100.0
2005	0.9	2.6	2.1	73.7	20.6	100.0
2006	0.9	2.5	2.0	73.2	21.4	100.0
2007	0.8	2.1	2.0	74.2	20.9	100.0
2008	1.4	2.8	2.2	66.2	27.4	100.0
2009	1.8	3.5	2.4	67.0	25.2	100.0
2010	1.7	3.2	2.3	66.6	26.1	100.0

Source: Energy Information Administration, State Energy Data System

3.4. Electricity Expenditures by Sector

As shown in Table 3.4, in 2010, Hawaii's total electricity expenditures (including about $1,142 million fuel expenditures in electricity generation) reached about $2,473 million. The residential, commercial, and industrial sector each accounted for around one-third of total electricity expenditures in Hawaii.

Table 3.4. Hawaii's Electricity Expenditures by Sector

	Electricity Expenditures by Sector Units: $ Million				% in Total Electricity Expenditures			
Year	Residential	Commercial	Industrial	Total	Residential	Commercial	Industrial	Total
1970	36	26	25	87	41	30	29	100
1975	83	63	80	225	37	28	36	100
1980	149	132	177	457	33	29	39	100
1985	213	189	252	655	33	29	38	100
1986	182	170	186	539	34	32	35	100
1987	195	182	193	571	34	32	34	100
1988	190	181	194	566	34	32	34	100
1989	208	198	224	630	33	31	36	100
1990	238	229	266	733	33	31	36	100
1991	252	243	274	769	33	32	36	100
1992	266	254	283	803	33	32	35	100
1993	303	282	318	904	34	31	35	100
1994	318	303	316	937	34	32	34	100
1995	347	338	333	1,018	34	33	33	100
1996	382	366	372	1,120	34	33	33	100
1997	395	376	382	1,153	34	33	33	100
1998	365	349	341	1,054	35	33	32	100
1999	385	375	347	1,107	35	34	31	100
2000	454	458	430	1,341	34	34	32	100
2001	458	474	421	1,353	34	35	31	100
2002	453	456	391	1,300	35	35	30	100
2003	507	528	444	1,479	34	36	30	100
2004	571	588	496	1,655	35	36	30	100
2005	655	659	584	1,898	35	35	31	100
2006	743	748	662	2,152	35	35	31	100
2007	772	771	670	2,213	35	35	30	100
2008	1,003	1,041	935	2,978	34	35	31	100
2009	740	741	632	2,112	35	35	30	100
2010	840	870	763	2,473	34	35	31	100

Source: Energy Information Administration, State Energy Data System

3.5. Average Energy Expenditures and Energy Prices

The average energy expenditures and energy prices by source from 1970 to 2010 are provided in Tables 3.5 and 3.6.

After substantial increases in both the average petroleum products expenditures and the prices during the 1970s, most of the average expenditures and prices decreased during the 1980s and remained relatively low during most of the 1990s.

Since 2002; however, both average expenditures and prices of petroleum products started to increase rapidly.

Table 3.5. Hawaii's Average Energy Expenditures by Source

	Average Energy Expenditures By Source								
	Petroleum								
Year	Jet Fuel $/BBL	Residual Fuel $/BBL	Motor Gasoline $/BBL	Distillate Fuel $/BBL	Other Petroleum $/BBL	Total Petroleum $/BBL	Coal $/ST	Natural Gas $/TCF	Retail Electricity $/kWh
1970	4.1	2.4	17.4	5.8	4.9	6.0			0.023
1975	11.5	9.6	28.6	13.1	8.9	14.0			0.042
1980	34.9	23.4	56.8	38.2	16.5	34.2		12.6	0.072
1985	34.8	30.0	58.5	45.8	22.7	38.5	56.5	15.3	0.099
1990	33.6	24.6	61.5	45.8	11.8	35.2	44.8	13.1	0.088
1995	25.2	18.4	59.9	42.5	15.2	31.7	32.8	14.0	0.111
1996	29.7	21.2	63.4	45.0	14.6	34.9	33.9	15.5	0.119
1997	28.5	22.0	63.9	37.4	12.4	34.5	34.9	16.2	0.123
1998	20.8	16.0	62.5	33.8	20.6	30.3	32.4	14.3	0.114
1999	27.1	19.9	59.0	41.0	15.4	32.9	32.2	14.0	0.118
2000	39.6	30.7	70.0	54.1	20.4	43.9	32.2	16.6	0.138
2001	33.3	30.1	75.7	52.3	17.7	43.6	26.3	17.1	0.138
2002	30.9	29.5	64.6	45.9	18.3	40.1	36.8	17.3	0.131
2003	37.3	29.7	79.0	61.0	15.3	47.3	65.7	19.6	0.142
2004	53.4	30.9	89.6	74.7	17.4	56.7	42.0	21.0	0.154
2005	73.3	50.7	107.6	91.4	20.1	73.9	33.0	24.8	0.180
2006	85.6	58.4	124.4	110.7	22.4	85.7	38.7	28.3	0.204
2007	92.0	67.5	126.5	117.2	22.8	92.1	43.1	27.2	0.209
2008	127.0	98.4	150.5	151.7	38.5	121.4	49.0	37.5	0.287
2009	71.8	57.1	116.6	97.6	33.9	80.1	50.1	29.5	0.209
2010	92.9	80.2	141.8	127.1	38.3	102.2	49.4	36.0	0.247

Source: Energy Information Administration, State Energy Data System

Table 3.6. Hawaii's Energy Price by Source

	Energy Price By Source							
	Petroleum							
Year	Jet Fuel $/MBTU	Residual Fuel $/MBTU	Motor Gasoline $/MBTU	Distillate Fuel $/MBTU	Total Petroleum $/MBTU	Coal $/MBTU	Natural Gas $/MBTU	Retail Electricity $/MBTU
1970	0.7	0.4	3.3	1.0	1.1	-	-	6.98
1975	2.0	1.6	5.4	2.3	2.5	-	-	12.80
1980	6.2	3.8	10.8	6.6	6.2	-	13.06	22.01
1981	7.6	6.2	12.5	8.1	8.0	-	15.76	33.69
1982	7.4	6.0	12.3	8.6	7.9	2.1	15.02	35.55
1983	6.9	5.5	11.7	7.8	7.3	2.1	15.10	31.60
1984	6.6	5.4	11.6	7.5	7.2	1.9	16.91	31.34
1985	6.2	4.8	11.1	7.9	6.8	2.3	14.20	29.81
1986	4.4	2.8	9.6	6.3	5.0	2.4	11.96	23.66
1987	4.3	3.4	9.5	6.0	5.2	2.0	11.89	24.49
1988	4.0	2.8	9.6	6.1	4.8	1.8	11.52	22.53
1989	4.6	3.2	10.4	6.8	5.4	1.8	11.41	23.76
1990	6.0	4.0	11.7	7.9	6.4	1.8	12.24	26.56
1991	5.2	3.2	10.4	7.9	5.9	1.8	14.16	27.14
1992	4.9	2.8	11.0	7.2	5.5	1.4	13.33	27.79
1993	4.8	3.0	11.1	7.5	6.0	1.4	13.05	31.37
1994	4.3	2.7	11.3	7.4	5.7	1.4	12.68	31.44
1995	4.4	3.0	11.5	7.3	5.9	1.5	13.30	33.24
1996	5.2	3.5	12.2	7.7	6.6	1.6	14.66	35.65
1997	5.0	3.6	12.3	6.4	6.5	1.6	15.88	36.71
1998	3.7	2.6	12.0	5.8	5.6	1.5	13.71	33.99
1999	4.8	3.2	11.3	7.1	6.0	1.5	13.54	35.21
2000	7.0	5.0	13.4	9.3	8.0	1.5	16.18	41.24
2001	5.9	4.8	14.5	9.0	8.1	1.2	16.85	41.30
2002	5.5	4.9	12.4	7.9	7.5	1.7	16.67	39.42
2003	6.6	4.9	15.2	10.5	8.8	2.9	19.03	42.55
2004	9.4	5.1	17.2	12.8	10.5	1.9	20.33	46.16
2005	12.9	8.5	20.6	15.7	13.8	1.5	24.30	53.88
2006	15.1	9.8	23.8	19.0	16.0	1.7	27.54	60.91
2007	16.2	11.0	24.2	20.1	16.9	1.9	26.83	62.57
2008	22.4	16.2	28.9	26.1	22.6	2.3	36.73	85.78
2009	12.7	9.4	22.4	16.8	15.0	2.3	28.82	62.36
2010	16.4	13.4	27.2	21.8	19.2	2.3	35.29	73.80

Source: Energy Information Administration, State Energy Data System

3.6. Average Electricity and Gas Prices by Sector

Table 3.7 provides Hawaii's average electricity and gas prices in both nominal value and in constant 2012 dollar. From 1960 to 2011, residential electricity price in 2012 constant value increased 0.8 percent per year on average, while other electricity price increased 1.2 percent per year; residential and other gas price increased 1.5 and 1.6percent per year on average, respectively.

Table 3.7. Hawaii's Average Electricity and Gas Prices

		Average Electricity Price				Average Gas Price			
		In Nominal Value		In Constant 2012 Dollar		In Nominal Value		In Constant 2012 Dollar	
	Honolulu	Residential	Other	Residential	Other	Residential	Other	Residential	Other
Year	CPI-U	$/kWh	$/kWh	2012$/kWh	2012$/kWh	$/Therm	$/Therm	2012$/Therm	2012$/Therm
1960	31.30	0.0297	0.0216	0.2378	0.1725	0.3619	0.2280	2.8957	1.8243
1970	41.50	0.0268	0.0201	0.1618	0.1214	0.3619	0.2227	2.1840	1.3439
1975	56.30	0.0459	0.0379	0.2040	0.1688	0.8172	0.6358	3.6353	2.8284
1980	83.00	0.0790	0.0696	0.2384	0.2101	1.4658	1.2595	4.4230	3.8004
1985	106.80	0.1136	0.0965	0.2664	0.2264	1.7693	1.3382	4.1491	3.1381
1986	109.40	0.0929	0.0751	0.2128	0.1718	1.5715	1.1203	3.5976	2.5646
1987	114.90	0.0943	0.0779	0.2056	0.1698	1.5720	1.1049	3.4265	2.4084
1988	121.70	0.0883	0.0714	0.1817	0.1470	1.5496	1.0784	3.1889	2.2192
1989	128.70	0.0927	0.0759	0.1803	0.1476	1.5420	1.0649	3.0007	2.0722
1990	138.10	0.1026	0.0854	0.1861	0.1549	1.6285	1.1483	2.9532	2.0825
1991	148.00	0.1054	0.0873	0.1783	0.1477	1.7865	1.2529	3.0231	2.1201
1992	155.10	0.1093	0.0890	0.1765	0.1437	1.7905	1.2547	2.8912	2.0259
1993	160.10	0.1231	0.1001	0.1925	0.1565	1.7596	1.2259	2.7526	1.9177
1994	164.50	0.1246	0.0997	0.1898	0.1518	1.7199	1.1946	2.6185	1.8186
1995	168.10	0.1334	0.1049	0.1987	0.1563	1.7967	1.2516	2.6768	1.8647
1996	170.70	0.1427	0.1127	0.2094	0.1653	2.1040	1.3358	3.0869	1.9598
1997	171.90	0.1484	0.1158	0.2162	0.1688	2.2908	1.4001	3.3374	2.0399
1998	171.50	0.1388	0.1068	0.2027	0.1560	2.1624	1.2593	3.1577	1.8390
1999	173.30	0.1431	0.1104	0.2068	0.1595	2.1727	1.2403	3.1398	1.7924
2000	176.30	0.1641	0.1308	0.2331	0.1859	2.4536	1.4856	3.4854	2.1104
2001	178.40	0.1634	0.1310	0.2293	0.1838	2.5923	1.5630	3.6391	2.1941
2002	180.30	0.1570	0.1251	0.2181	0.1737	2.8734	1.5064	3.9913	2.0924
2003	184.50	0.1674	0.1363	0.2273	0.1850	3.0576	1.7123	4.1504	2.3243
2004	190.60	0.1803	0.1479	0.2369	0.1944	3.2347	1.8794	4.2503	2.4695
2005	197.80	0.2066	0.1728	0.2615	0.2188	3.6421	2.2658	4.6115	2.8688
2006	209.35	0.2336	0.1959	0.2794	0.2344	3.8742	2.4624	4.6346	2.9457
2007	219.50	0.2412	0.2006	0.2752	0.2289	3.9355	2.5252	4.4903	2.8812
2008	228.86	0.3250	0.2781	0.3556	0.3043	4.8935	3.4696	5.3550	3.7968
2009	230.05	0.2420	0.1992	0.2635	0.2169	4.1882	2.6806	4.5595	2.9182
2010	234.87	0.2810	0.2386	0.2996	0.2544	4.9865	3.2743	5.3172	3.4915
2011	243.62	0.3468	0.3030	0.3565	0.3115	6.0539	4.0206	6.2234	4.1332

Source: The State of Hawaii Data Book.

3.7. Average Petroleum Products Prices in Constant Dollar

Table 3.8 provides the average petroleum prices in 2012 constant dollar.

Table 3.8. Hawaii's Average Petroleum Prices in 2012 Constant Dollar

	Average Price in 2012 Condant Dollar					
Year	Jet Fuel $/MBTU	Residual Fuel $/MBTU	Motor Gasoline $/MBTU	Distillate Fuel $/MBTU	Total Petroleum $/MBTU	Motor Gasoline $/Gallon
1970	4.4054	2.4139	20.0355	6.2762	6.5176	2.67
1975	9.0747	7.0729	24.1992	10.2313	11.2099	3.23
1980	18.7380	11.4661	32.6180	19.8544	18.5871	4.35
1985	14.5623	11.2793	26.1230	18.4315	15.9224	3.48
1986	9.9811	6.4786	22.0454	14.3994	11.5378	2.94
1987	9.3726	7.4327	20.6414	13.1652	11.3343	2.75
1988	8.3138	5.7621	19.6527	12.5736	9.9190	2.62
1989	8.9319	6.2270	20.2768	13.1741	10.4497	2.70
1990	10.8628	7.3084	21.2360	14.2541	11.5701	2.83
1991	8.7486	5.4319	17.5987	13.3175	10.0008	2.35
1992	7.9121	4.5697	17.6812	11.6583	8.9294	2.36
1993	7.4930	4.6929	17.3480	11.7791	9.3075	2.31
1994	6.5618	4.0802	17.2342	11.2814	8.7237	2.30
1995	6.6149	4.4397	17.1035	10.8908	8.7752	2.28
1996	7.6879	5.1791	17.8259	11.3558	9.7419	2.38
1997	7.3283	5.3032	17.8618	9.3825	9.4262	2.38
1998	5.3593	3.7968	17.4945	8.4990	8.1631	2.33
1999	6.9222	4.6389	16.3590	10.1883	8.7287	2.18
2000	9.9155	7.0886	19.0780	13.2111	11.4070	2.54
2001	8.2405	6.7243	20.3977	12.6204	11.3008	2.72
2002	7.5703	6.7507	17.2380	10.9456	10.3761	2.30
2003	8.9318	6.6106	20.6056	14.2122	11.9724	2.75
2004	12.3645	6.6487	22.5741	16.8583	13.7836	3.01
2005	16.3713	10.7876	26.1206	19.8785	17.4475	3.48
2006	18.0640	11.6638	28.5076	22.7534	19.1167	3.80
2007	18.5062	12.5847	27.6567	22.9788	19.3163	3.69
2008	24.5125	17.6730	31.5707	28.5176	24.7641	4.21
2009	13.7824	10.2769	24.3315	18.2459	16.3516	3.24
2010	17.4768	14.2353	28.9717	23.2882	20.4945	3.86

Source: Energy Information Administration, State Energy Data System

4. HAWAII'S ENERGY EFFICIENCY AND INTENSITY

4.1. Energy Consumption per Dollar of Real Gross Domestic Product

From 1970 to 2010, Hawaii's total energy consumption per dollar of real GDP decreased 46.8 percent; total petroleum consumption per dollar of real GDP decreased about 53.1 percent; but electricity consumption per dollar of real GDP increased 2.2 percent.

Table 4.1. Energy Consumption per Dollar of GDP

		Energy Consumption per 1000 Dollar of Real GDP				Energy Intensity Index		
	Hawaii	Hawaii	U.S.	Hawaii	Hawaii	Hawaii	Hawaii	Hawaii
	Real GDP	Total Energy	Total Energy	Petroleum	Electricity	Total Energy	Petroleum	Electricity
Year	in 2005 $M	Mbtu/$1000	Mbtu/$1000	BBL/$1000	kWh/$1000	1970=100	1970=100	1970=100
1970	22,384	8.80	15.88	1.52	169	100	100	100
1975	28,150	7.62	14.77	1.32	189	87	86	112
1980	33,187	7.91	13.39	1.31	191	90	86	113
1985	37,040	6.71	11.17	1.08	179	76	71	106
1986	38,351	6.40	10.82	1.02	183	73	67	109
1987	40,109	6.22	10.81	0.98	182	71	64	108
1988	42,849	6.76	10.88	1.07	180	77	70	107
1989	45,396	6.82	10.76	1.06	176	78	69	104
1990	48,534	6.62	10.53	1.03	171	75	68	102
1991	49,252	5.99	10.54	0.93	173	68	61	103
1992	50,588	6.05	10.36	0.92	171	69	61	102
1993	49,743	5.69	10.27	0.83	174	65	55	103
1994	49,631	6.03	10.05	0.90	180	69	59	107
1995	49,000	6.06	10.03	0.89	188	69	59	111
1996	48,479	5.84	9.98	0.86	193	66	56	115
1997	48,395	5.65	9.62	0.82	193	64	54	115
1998	47,158	5.80	9.25	0.86	196	66	56	116
1999	47,545	5.67	8.97	0.83	197	64	55	117
2000	48,819	5.60	8.81	0.83	199	64	55	118
2001	48,444	5.58	8.48	0.86	202	63	56	120
2002	49,595	5.74	8.46	0.90	199	65	59	118
2003	51,684	5.83	8.28	0.90	201	66	59	119
2004	54,304	5.83	8.18	0.90	198	66	59	117
2005	56,901	5.74	7.94	0.90	185	65	59	110
2006	58,743	5.61	7.69	0.88	180	64	58	107
2007	59,548	5.73	7.67	0.89	178	65	58	105
2008	60,098	4.69	7.54	0.71	173	53	47	102
2009	57,313	4.72	7.41	0.71	177	54	47	105
2010	58,106	4.68	7.48	0.71	172	53	47	102

Source: U.S. EIA and BEA.

4.2. Energy Consumption per Capita

Energy consumption per capita can be measured based on both resident population and de facto population. Tables 4.2 and 4.3 provide total energy, petroleum, and electricity consumption per capita of resident population and of de facto population, respectively.

Table 4.2. Hawaii's Energy Consumption per Capita of Resident Population

		Energy Consumption per Capita			Energy Intensity Index		
Year	Resident Population	Total Energy Mbtu/Capita	Petroleum BBL/Capita	Electricity kWh/Capita	Total Energy 1970=100	Petroleum 1970=100	Electricity 1970=100
1970	771,700	255	44	4,893	100	100	100
1975	886,200	242	42	5,992	95	95	122
1980	968,500	271	45	6,537	106	102	134
1985	1,039,698	239	38	6,382	94	87	130
1986	1,051,762	233	37	6,686	91	84	137
1987	1,067,917	234	37	6,834	92	83	140
1988	1,079,827	268	43	7,148	105	96	146
1989	1,094,588	283	44	7,281	111	99	149
1990	1,113,491	289	45	7,464	113	102	153
1991	1,136,754	260	40	7,499	102	91	153
1992	1,158,613	264	40	7,480	103	91	153
1993	1,172,838	241	35	7,382	95	80	151
1994	1,187,536	252	38	7,535	99	85	154
1995	1,196,854	248	37	7,677	97	83	157
1996	1,203,755	235	35	7,791	92	78	159
1997	1,211,640	226	33	7,728	88	74	158
1998	1,215,233	225	33	7,621	88	75	156
1999	1,210,300	223	33	7,751	87	74	158
2000	1,213,519	225	33	7,986	88	76	163
2001	1,225,948	221	34	7,982	86	77	163
2002	1,239,613	230	36	7,980	90	82	163
2003	1,251,154	241	37	8,305	94	84	170
2004	1,273,569	248	39	8,427	97	87	172
2005	1,292,729	253	40	8,153	99	90	167
2006	1,309,731	251	39	8,069	98	89	165
2007	1,315,675	259	40	8,045	102	91	164
2008	1,332,213	211	32	7,799	83	72	159
2009	1,346,717	201	30	7,519	79	69	154
2010	1,363,359	200	30	7,347	78	69	150

Source: U.S. EIA and Census.

Table 4.3. Hawaii's Energy Consumption per Capita of De Facto Population

		Energy Consumption per Capita			Energy Intensity Index		
Year	De Facto Population	Total Energy Mbtu/Capita	Petroleum BBL/Capita	Electricity kWh/Capita	Total Energy 1970=100	Petroleum 1970=100	Electricity 1970=100
1970	798,600	247	43	4,728	100	100	100
1975	943,500	227	39	5,628	92	92	119
1980	1,054,218	249	41	6,005	101	97	127
1981	1,061,588	223	37	6,260	90	86	132
1982	1,082,311	202	33	6,003	82	77	127
1983	1,107,563	200	33	5,942	81	77	126
1984	1,129,088	206	33	5,850	83	77	124
1985	1,136,160	219	35	5,840	89	82	124
1986	1,165,826	210	33	6,032	85	78	128
1987	1,185,394	210	33	6,157	85	78	130
1988	1,198,637	242	38	6,440	98	90	136
1989	1,234,640	251	39	6,455	102	91	137
1990	1,240,013	259	40	6,702	105	94	142
1991	1,252,265	236	37	6,807	96	86	144
1992	1,271,662	241	37	6,815	98	86	144
1993	1,267,849	223	33	6,829	91	76	144
1994	1,289,804	232	35	6,937	94	81	147
1995	1,298,096	229	34	7,078	93	79	150
1996	1,303,915	217	32	7,193	88	75	152
1997	1,327,930	206	30	7,051	84	70	149
1998	1,334,125	205	30	6,942	83	71	147
1999	1,332,442	202	30	7,040	82	70	149
2000	1,336,005	205	30	7,254	83	71	153
2001	1,337,629	202	31	7,315	82	73	155
2002	1,353,051	211	33	7,311	85	77	155
2003	1,358,755	222	34	7,647	90	80	162
2004	1,387,569	228	35	7,734	92	83	164
2005	1,412,500	231	36	7,461	94	85	158
2006	1,430,516	230	36	7,388	93	84	156
2007	1,433,461	238	37	7,384	96	86	156
2008	1,432,620	197	30	7,252	80	70	153
2009	1,442,556	187	28	7,019	76	66	148
2010	1,468,091	185	28	6,823	75	66	144

Source: U.S. EIA and State of Hawaii Data Book.

4.3. Energy Expenditures in Constant Dollar per Dollar of Real GDP

Table 4.4 provides energy expenditures in constant 2012 dollar. The Honolulu CPI-U was used to convert current dollar energy expenses to constant dollar expenses. From 1970 to 2012, total energy expenditure in constant 2012 dollar increased 269 percent in Hawaii.

Table 4.4. Hawaii's Energy Expenditures in Constant 2012 Dollar

		Energy Expenditures in 2012 Constant Dollar		
Year	Honolulu CPI-U	Total Energy $Million	Petroleum $Million	Electricity* $Million
1970	42	1,653	1,228	423
1975	56	2,898	2,305	591
1980	83	5,192	4,497	546
1985	107	4,471	3,615	732
1990	138	3,834	3,194	563
1991	148	3,429	2,513	827
1992	155	3,201	2,284	826
1993	160	3,153	2,081	968
1994	165	3,229	2,092	1,036
1995	168	3,280	2,073	1,091
1996	171	3,382	2,131	1,135
1997	172	3,308	2,001	1,190
1998	172	3,054	1,789	1,162
1999	173	3,121	1,887	1,132
2000	176	3,838	2,530	1,196
2001	178	3,897	2,541	1,247
2002	180	3,730	2,495	1,119
2003	185	4,500	3,000	1,334
2004	191	5,278	3,655	1,483
2005	198	6,320	4,795	1,384
2006	209	6,848	5,288	1,411
2007	220	7,040	5,560	1,332
2008	229	7,497	5,658	1,657
2009	230	5,074	3,566	1,363
2010	235	6,092	4,519	1,419

* Excluding fuel cost of electricity generation.

Source: U.S. EIA and State of Hawaii Data Book.

Table 4.5 shows that Hawaii's energy expenditures per dollar of GDP in constant 2012 dollar increased 42 percent from 1970 to 2010.

Table 4.5. Hawaii's Energy Expenditures per Dollar of GDP

	Expenditures per Dollar of Real GDP*			Index		
Year	Total Energy Cents/$GDP	Petroleum Cents/$GDP	Electricity** Cents/$GDP	Total Energy 1970=100	Petroleum 1970=100	Electricity 1970=100
1970	7.4	5.5	1.9	100	100	100
1975	10.3	8.2	2.1	139	149	111
1980	15.6	13.5	1.6	212	247	87
1985	12.1	9.8	2.0	163	178	105
1990	7.9	6.6	1.2	107	120	61
1991	7.0	5.1	1.7	94	93	89
1992	6.3	4.5	1.6	86	82	86
1993	6.3	4.2	1.9	86	76	103
1994	6.5	4.2	2.1	88	77	110
1995	6.7	4.2	2.2	91	77	118
1996	7.0	4.4	2.3	94	80	124
1997	6.8	4.1	2.5	93	75	130
1998	6.5	3.8	2.5	88	69	130
1999	6.6	4.0	2.4	89	72	126
2000	7.9	5.2	2.5	106	94	130
2001	8.0	5.2	2.6	109	96	136
2002	7.5	5.0	2.3	102	92	119
2003	8.7	5.8	2.6	118	106	137
2004	9.7	6.7	2.7	132	123	144
2005	11.1	8.4	2.4	150	154	129
2006	11.7	9.0	2.4	158	164	127
2007	11.8	9.3	2.2	160	170	118
2008	12.5	9.4	2.8	169	172	146
2009	8.9	6.2	2.4	120	113	126
2010	10.5	7.8	2.4	142	142	129

* Expenditures in constant 2012 dollar.

** Excluding fuel cost of electricity generation.

Source: U.S. EIA and BEA.

4.4. Energy Expenditures in Constant Dollar per Capita

Table 4.6 shows that Hawaii's energy expenditures per capita of resident population in constant 2012 dollar increased 109 percent from 1970 to 2010.

Table 4.6. Hawaii's Energy Expenditures per Capita of Resident Population

	Energy Expenditures per Capita*			Index		
Year	Total Energy $/Capita	Petroleum $/Capita	Electricity** $/Capita	Total Energy 1970=100	Petroleum 1970=100	Electricity 1970=100
1970	2,142	1,591	548	100	100	100
1975	3,270	2,601	667	153	163	122
1980	5,361	4,643	564	250	292	103
1985	4,300	3,477	704	201	219	128
1990	3,444	2,869	505	161	180	92
1991	3,016	2,211	728	141	139	133
1992	2,762	1,971	713	129	124	130
1993	2,688	1,774	825	125	111	151
1994	2,719	1,762	872	127	111	159
1995	2,740	1,732	912	128	109	166
1996	2,809	1,770	943	131	111	172
1997	2,730	1,652	982	127	104	179
1998	2,513	1,472	956	117	93	174
1999	2,578	1,559	935	120	98	171
2000	3,163	2,084	986	148	131	180
2001	3,179	2,073	1,017	148	130	185
2002	3,009	2,013	902	140	126	165
2003	3,597	2,398	1,066	168	151	195
2004	4,145	2,870	1,164	193	180	212
2005	4,889	3,709	1,070	228	233	195
2006	5,229	4,038	1,078	244	254	197
2007	5,351	4,226	1,012	250	266	185
2008	5,627	4,247	1,243	263	267	227
2009	3,768	2,648	1,012	176	166	185
2010	4,469	3,315	1,041	209	208	190

* Expenditures in constant 2012 dollar.

** Excluding fuel cost of electricity generation.

Source: U.S. EIA and State of Hawaii Data Book.

From 1970 to 2010, Hawaii's energy expenditures per capita of de facto population in 2012 constant dollar increased more than 100 percent from $2,070 in 1970 to $4,150 in 2010.

Table 4.7. Hawaii's Energy Consumption per Capita of De Facto Population

	Energy Expenditures per Capita*			Index		
Year	Total Energy $/Capita	Petroleum $/Capita	Electricity** $/Capita	Total Energy 1970=100	Petroleum 1970=100	Electricity 1970=100
1970	2,070	1,538	530	100	100	100
1975	3,072	2,443	627	148	159	118
1980	4,925	4,266	518	238	277	98
1985	3,935	3,182	644	190	207	122
1990	3,092	2,576	454	149	168	86
1991	2,738	2,007	661	132	131	125
1992	2,517	1,796	650	122	117	123
1993	2,487	1,641	763	120	107	144
1994	2,503	1,622	803	121	105	152
1995	2,527	1,597	841	122	104	159
1996	2,594	1,634	870	125	106	164
1997	2,491	1,507	896	120	98	169
1998	2,289	1,341	871	111	87	164
1999	2,342	1,416	850	113	92	160
2000	2,873	1,893	895	139	123	169
2001	2,914	1,900	932	141	124	176
2002	2,757	1,844	827	133	120	156
2003	3,312	2,208	982	160	144	185
2004	3,804	2,634	1,068	184	171	202
2005	4,474	3,395	979	216	221	185
2006	4,787	3,697	987	231	240	186
2007	4,912	3,879	929	237	252	175
2008	5,233	3,950	1,156	253	257	218
2009	3,518	2,472	945	170	161	178
2010	4,150	3,078	967	201	200	182

* Expenditures in constant 2012 dollar.

** Excluding fuel cost of electricity generation.

Source: U.S. EIA and State of Hawaii Data Book.

5. SECTOR TRENDS IN ENERGY CONSUMPTION AND INTENSITY

5.1. Transportation Sector

Hawaii's transportation sector consumed about 134 trillion Btu or 24 million barrels of petroleum products in 2010. Jet fuel accounted for 38.1 percent of the total transportation fuel consumption in 2010, followed by motor gasoline (37.5%), distillate fuel (17.9%), and residual fuel (6.1%).

Table 5.1. Transportation End-Use Energy Consumption by Fuel

		Transportation Energy Consumption By Fuel % in Total Transportation						
Year	Total Billion Btu	Jet Fuel	Motor Gasoline	Distillate Fuel	Residual Fuel	Aviation Gasoline	Other Fuels	Total
1960	61,778	38.1	28.0	2.3	9.9	21.6	0.2	100.0
1970	125,344	63.9	23.1	3.4	8.7	0.5	0.4	100.0
1975	130,543	63.9	26.6	3.7	4.9	0.4	0.4	100.0
1980	146,713	54.0	25.5	13.2	6.2	0.7	0.4	100.0
1985	142,887	52.1	27.4	13.0	6.7	0.5	0.3	100.0
1990	154,545	46.0	28.8	13.2	10.8	0.9	0.3	100.0
1995	138,155	40.8	34.6	11.3	12.2	0.8	0.3	100.0
1996	121,588	47.0	39.1	9.2	3.6	0.7	0.4	100.0
1997	117,261	49.4	40.5	6.6	2.6	0.5	0.4	100.0
1998	114,607	49.5	41.2	6.3	2.1	0.5	0.4	100.0
1999	123,081	43.6	37.2	9.8	8.7	0.2	0.4	100.0
2000	125,188	42.7	37.9	7.6	11.2	0.2	0.4	100.0
2001	132,014	38.2	37.8	10.8	12.7	0.2	0.3	100.0
2002	140,161	41.2	38.1	13.8	6.4	0.1	0.3	100.0
2003	162,032	44.5	33.6	18.1	3.5	0.0	0.3	100.0
2004	172,136	44.1	32.0	18.1	5.5	0.1	0.2	100.0
2005	179,377	51.8	31.5	12.4	3.9	0.1	0.3	100.0
2006	181,643	47.9	32.7	10.9	8.2	0.1	0.2	100.0
2007	195,323	37.0	29.6	18.6	14.4	0.1	0.2	100.0
2008	138,606	43.8	39.2	12.1	4.6	0.1	0.3	100.0
2009	129,176	36.4	42.8	14.3	6.1	0.1	0.3	100.0
2010	133,972	38.1	37.5	17.9	6.1	0.1	0.3	100.0

Source: Energy Information Administration, State Energy Data System

Table 5.2. Transportation Fuel Consumption in Barrels

	Transportation Energy Consumption By Fuel Units: 1000 BBL						
Year	Jet Fuel	Motor Gasoline	Distillate Fuel	Residual Fuel	Aviation Gasoline	Other Fuels	Total
1960	4,321	3,290	247	968	2,640	21	11,487
1965	7,618	3,947	844	1,195	613	77	14,294
1970	14,273	5,508	722	1,744	133	93	22,473
1975	14,849	6,615	831	1,013	116	96	23,520
1980	14,116	7,129	3,331	1,441	199	101	26,317
1985	13,260	7,443	3,184	1,526	155	73	25,641
1990	12,646	8,477	3,498	2,657	272	89	27,639
1991	11,123	8,771	4,201	2,594	261	84	27,034
1992	9,993	8,674	2,860	3,756	243	105	25,631
1993	8,891	8,808	2,674	2,654	198	80	23,305
1994	9,472	9,088	3,223	2,936	210	88	25,017
1995	9,940	9,160	2,683	2,677	218	81	24,759
1996	10,087	9,104	1,928	702	165	72	22,058
1997	10,221	9,104	1,322	489	121	77	21,334
1998	9,999	9,065	1,242	383	107	80	20,876
1999	9,474	8,786	2,071	1,708	58	80	22,177
2000	9,438	9,118	1,627	2,226	45	78	22,532
2001	8,895	9,576	2,455	2,658	48	72	23,704
2002	10,189	10,262	3,329	1,437	18	71	25,306
2003	12,708	10,448	5,033	914	15	76	29,194
2004	13,379	10,560	5,359	1,493	39	67	30,897
2005	16,372	10,833	3,827	1,121	44	81	32,278
2006	15,334	11,379	3,387	2,375	41	81	32,597
2007	12,756	11,092	6,246	4,465	41	78	34,678
2008	10,702	10,416	2,869	1,008	28	64	25,087
2009	8,294	10,588	3,174	1,257	30	61	23,404
2010	9,001	9,635	4,115	1,291	36	66	24,144

Source: Energy Information Administration, State Energy Data System

Table 5.3 shows that the transportation sector accounted for about 58 percent of total petroleum consumption in Hawaii in 2010. All jet fuel and aviation gasoline and almost all motor gasoline were consumed by the transportation sector. About 59 percent of the distillate fuel and 11 percent of residual fuel were also consumed by the transportation sector in 2010.

Table 5.3. Percentage of Transportation Petroleum Consumption

	% of Transportation Sector Petroleum Consumption						
	% in Total BBL Consumption						
Year	Jet Fuel	Motor Gasoline	Distillate Fuel	Residual Fuel	Aviation Gasoline	Others	Petroleum Total
1960	100	96	28	20	100	3	68
1965	100	97	52	17	100	6	64
1970	100	97	43	17	100	4	66
1975	100	98	43	9	100	4	63
1980	100	99	56	11	100	4	60
1985	100	98	70	12	100	6	64
1990	100	98	54	14	100	3	55
1991	100	98	58	17	100	3	59
1992	100	98	46	21	100	3	55
1993	100	97	45	19	100	2	56
1994	100	97	51	19	100	2	56
1995	100	97	46	18	100	2	56
1996	100	97	39	6	100	2	53
1997	100	97	28	4	100	2	54
1998	100	97	28	3	100	2	52
1999	100	98	39	13	100	3	56
2000	100	98	32	16	100	2	56
2001	100	99	41	20	100	2	57
2002	100	98	41	11	100	2	57
2003	100	99	63	8	100	2	63
2004	100	98	62	11	100	2	63
2005	100	99	52	8	100	2	63
2006	100	99	51	16	100	2	63
2007	100	98	67	27	100	2	66
2008	100	98	51	8	100	2	59
2009	100	98	52	10	100	2	57
2010	100	97	59	11	100	2	58

Source: Energy Information Administration, State Energy Data System

Table 5.4 provides selected motor vehicle fuel consumption intensity measures. From 1960 to 2011, Hawaii's average motor vehicle fuel consumption per vehicle decreased from 616 gallon per vehicle to 462 gallon per vehicle. The average miles per gallon of fuel increased from 14.0 miles/gallon in 1960 to 19.5 miles/gallon in 2011. The combination of higher fuel price (in constant dollar) and increased vehicle fuel efficiency let to unchanged fuel cost per mile at 19 cents per mile from 1970 to 2010. However, due to substantial increases in vehicle miles traveled per capita, total land transportation fuel cost per capita increased from $843 in 1970 to $1,419 in 2010.

Table 5.4. Motor Vehicle Fuel Consumption Intensity

Year	Total Motor Vehicle Registration	Highway Fuel Consumption 1000 Gal	Average Fuel Consumption Gal/Vehicle	Vehical Miles Millions	Average Annual Miles Miles/Vehicle	Vehicle Miles Traveled per Capita	Average Miles per Gallon	Fuel Cost* Per Mile Cents/Mile	Fuel Cost* Per Capita $/Capita
1960	230,709	142,117	616	1,990	8,624	3,101	14.0		
1965	309,155	174,982	566	2,450	7,924	3,481	14.0		
1970	412,930	243,482	590	3,409	8,255	4,417	14.0	19	843
1975	506,434	296,160	585	4,146	8,187	4,679	14.0	23	1,078
1980	617,571	330,734	536	5,570	9,019	5,751	16.8	26	1,485
1985	749,034	345,672	461	6,762	9,027	6,503	19.6	18	1,158
1990	889,096	395,185	444	8,065	9,071	7,243	20.4	14	1,005
1991	897,193	406,819	453	8,142	9,075	7,163	20.0	12	840
1992	885,761	405,963	458	8,066	9,106	6,961	19.9	12	826
1993	880,152	409,940	466	7,945	9,027	6,774	19.4	12	808
1994	875,144	428,558	490	7,925	9,056	6,674	18.5	12	829
1995	877,756	422,884	482	7,944	9,050	6,637	18.8	12	806
1996	884,617	426,370	482	8,006	9,050	6,651	18.8	13	842
1997	884,267	421,499	477	8,003	9,050	6,605	19.0	13	828
1998	893,427	422,928	473	8,090	9,055	6,657	19.1	12	812
1999	906,935	417,374	460	8,215	9,058	6,788	19.7	11	752
2000	941,242	428,425	455	8,526	9,058	7,026	19.9	13	898
2001	967,146	445,558	461	8,754	9,052	7,141	19.6	14	988
2002	987,598	477,518	484	8,937	9,050	7,210	18.7	12	885
2003	1,030,845	483,232	469	9,325	9,046	7,453	19.3	14	1,061
2004	1,072,211	498,816	465	9,735	9,079	7,644	19.5	15	1,179
2005	1,119,838	505,418	451	10,129	9,045	7,835	20.0	17	1,362
2006	1,127,467	531,505	471	10,196	9,044	7,785	19.2	20	1,542
2007	1,134,542	541,956	478	10,260	9,043	7,798	18.9	19	1,519
2008	1,127,567	540,910	480	10,189	9,036	7,648	18.8	22	1,709
2009	1,117,790	545,413	488	10,095	9,031	7,496	18.5	18	1,314
2010	1,120,080	500,987	447	10,111	9,027	7,416	20.2	19	1,419
2011	1,181,148	546,247	462	10,654	9,020	7,749	19.5	NA	NA

* Fuel cost in Constant 2012 dollar.

Source: Hawaii State Deparment of Transportation and State of Hawaii Data Book.

Table 5.5 shows that Hawaii's average aviation fuel (jet fuel and aviation gasoline) per landing passenger decreased in the 1980s, remained relatively low in most of the 1990s, increased from 2001 to 2005, and then decreased from 2005 to 2010.

Table 5.5. Air Transportation Fuel Consumption per Passenger

	Aviation Fuel	Passengers Landing			Visitor Arrival			Aviation Fuel per	
	Consumption	Total	Domestic	International	Total	Domestic	International	Passenger	Visitor
Year	T BBL							BBL/Passenger	BBL/Visitor
1960	6,961				296,517				23.5
1965	8,231				686,314	539,211	147,103		12.0
1970	14,406				1,745,904	1,273,639	472,265		8.3
1975	14,965				2,818,082	2,028,068	790,014		5.3
1980	14,315	4,172,640			3,928,789	2,793,101	1,135,688	3.4	3.6
1985	13,415	5,338,170			4,843,414	3,522,126	1,321,288	2.5	2.8
1990	12,918	7,453,550	5,127,690	2,325,860	6,723,530	4,315,159	2,408,371	1.7	1.9
1991	11,384	7,286,140	4,913,650	2,372,490	6,518,460	4,068,508	2,449,952	1.6	1.7
1992	10,236	7,266,350	4,664,350	2,602,000	6,473,675	3,791,951	2,681,724	1.4	1.6
1993	9,089	6,945,630	4,520,430	2,425,200	6,070,987	3,570,051	2,500,936	1.3	1.5
1994	9,682	7,263,820	4,772,380	2,491,440	6,364,675	3,813,280	2,551,395	1.3	1.5
1995	10,158	7,466,710	4,725,150	2,741,560	6,546,762	3,743,477	2,803,285	1.4	1.6
1996	10,252	7,648,880	4,801,570	2,847,310	6,723,150	3,794,122	2,929,028	1.3	1.5
1997	10,342	7,723,580	4,907,620	2,815,960	6,761,148	3,890,811	2,870,337	1.3	1.5
1998	10,106	7,545,230	5,033,100	2,512,130	6,595,790	4,014,140	2,581,650	1.3	1.5
1999	9,532	7,708,206	5,088,781	2,619,425	6,741,037	4,255,621	2,485,416	1.2	1.4
2000	9,483	7,981,480	5,318,419	2,663,061	6,948,595	4,446,936	2,501,659	1.2	1.4
2001	8,943	7,318,235	5,071,551	2,246,684	6,303,791	4,224,321	2,079,470	1.2	1.4
2002	10,207	7,424,621	5,253,652	2,170,969	6,389,058	4,358,850	2,030,208	1.4	1.6
2003	12,723	7,438,045	5,461,554	1,976,491	6,380,439	4,531,289	1,849,150	1.7	2.0
2004	13,418	8,101,166	5,911,004	2,190,162	6,912,094	4,892,960	2,019,134	1.7	1.9
2005	16,416	8,713,112	6,436,275	2,276,837	7,416,574	5,313,281	2,103,293	1.9	2.2
2006	15,375	8,937,555	6,772,702	2,164,853	7,528,106	5,550,125	1,977,981	1.7	2.0
2007	12,797	8,910,672	6,791,906	2,118,766	7,496,820	5,582,530	1,914,290	1.4	1.7
2008	10,730	8,021,780	6,005,133	2,016,647	6,713,436	4,901,893	1,811,543	1.3	1.6
2009	8,324	7,709,202	5,748,379	1,960,823	6,420,448	4,672,001	1,748,447	1.1	1.3
2010	9,037	8,255,465	6,083,060	2,172,405	6,916,894	4,957,352	1,959,542	1.1	1.3
2011	NA	8,510,128	6,258,790	2,251,338	7,174,397	5,127,291	2,047,106	NA	NA

Source: U.S. EIA and State of Hawaii Data Book.

5.2. Residential Sector

The residential sector consumed about 34 trillion Btu or about 12.5 percent of Hawaii's total energy in 2010. Electricity (both retail electricity and allocated electric system losses) accounted for about 86.3 percent of total residential energy consumption, followed by solar energy (10.4%) and petroleum (mainly LPG) (2.7%).

Table 5.6. Residential Energy Consumption by Fuel

		Residential Energy Consumption By Source % in Total Residential Energy Consumption				
Year	Total Billion Btu	Natural Gas	Petroleum	Solar/PV	Retail Electricity	Electrical System Losses
1960	7,144	0.0	1.4	0.0	24.6	74.0
1965	9,875	0.0	2.0	0.0	29.8	68.3
1970	15,460	0.0	5.0	0.0	28.4	66.7
1975	18,957	0.0	2.9	0.0	29.9	67.2
1980	21,020	0.0	3.5	0.0	29.9	66.6
1985	19,928	0.0	0.9	0.0	32.2	67.0
1990	30,739	0.0	0.7	2.9	25.8	70.6
1995	31,289	0.0	0.5	3.8	28.4	67.3
1996	32,085	0.0	0.6	3.9	28.5	67.1
1997	32,179	0.0	1.1	3.9	28.3	66.7
1998	32,384	0.0	3.0	4.0	27.8	65.2
1999	32,435	0.0	1.7	4.1	28.3	65.9
2000	33,058	0.0	2.3	4.1	28.5	65.1
2001	32,254	0.1	2.3	4.1	29.6	63.9
2002	34,630	0.1	2.2	3.9	28.6	65.3
2003	33,745	0.1	1.7	4.1	30.6	63.6
2004	34,669	0.1	1.7	4.1	31.1	63.0
2005	35,276	0.1	1.7	4.3	30.6	62.9
2006	35,785	0.1	1.7	4.7	30.3	62.7
2007	36,406	0.1	1.4	5.2	30.0	62.9
2008	35,972	0.1	2.8	6.6	29.3	60.7
2009	35,767	0.1	2.6	7.7	29.1	59.9
2010	34,152	0.1	2.7	10.4	29.9	56.5

Source: Energy Information Administration, State Energy Data System

In 2010, Hawaii's residential sector consumed about 500 million cubic feet (MCF) of natural gas, about 239 thousand barrels (TBBL) of petroleum products (mostly LPG), and about 2,989 million kWh of electricity.

Table 5.7. Residential Energy Consumption in Physical Units

	Residential Energy Consumption By Source		
	Natural Gas	Petroleum	Electricity
Year	MCF	TBBL	Million kWh
1960	-	26	514
1965	-	51	861
1970	-	200	1,285
1975	-	143	1,663
1980	1,416	192	1,841
1985	625	45	1,879
1990	565	57	2,324
1991	545	58	2,396
1992	551	184	2,438
1993	558	41	2,469
1994	578	42	2,557
1995	574	40	2,606
1996	540	48	2,676
1997	517	88	2,668
1998	535	250	2,641
1999	524	142	2,689
2000	535	194	2,765
2001	537	197	2,802
2002	539	197	2,898
2003	537	146	3,028
2004	524	149	3,162
2005	516	152	3,164
2006	518	159	3,182
2007	509	128	3,201
2008	499	265	3,085
2009	510	242	3,055
2010	509	239	2,989

Source: Energy Information Administration, State Energy Data System

Table 5.8 shows the residential energy consumption per household in Hawaii. From 1960 to 2010, residential energy consumption per household increased about 56 percent from 47 MBTU per household to 73 MBTU in 2010; residential electricity consumption per household increased about 90 percent from 3,381 kWh per household to 6,424 kWh per household.

Table 5.8. Residential Energy Consumption per Household

	Hawaii	Residential Energy Consumption per Household					
	State	Total		Other	Index		
	Household	Energy	Electricity	Energy	Total Energy	Electricity	Others
Year	HH	MBTU/HH	kWh/HH	MBTU/HH	1970=100	1970=100	1970=100
1960	152,014	47	3,381	1	62	54	17
1965	174,998	56	4,920	1	75	78	30
1970	204,505	76	6,283	4	100	100	100
1975	251,986	75	6,600	2	100	105	58
1980	296,074	71	6,218	7	94	99	189
1985	322,687	62	5,823	3	82	93	70
1990	356,267	86	6,523	5	114	104	129
1991	361,403	72	6,630	5	96	106	132
1992	367,095	81	6,641	6	107	106	168
1993	371,002	80	6,655	5	106	106	132
1994	375,478	81	6,810	5	108	108	135
1995	382,340	82	6,816	5	108	108	136
1996	388,840	83	6,882	5	109	110	137
1997	391,637	82	6,812	5	109	108	145
1998	395,139	82	6,684	7	108	106	190
1999	399,712	81	6,727	6	107	107	162
2000	404,391	82	6,837	7	108	109	174
2001	409,863	79	6,836	6	104	109	171
2002	415,228	83	6,979	6	110	111	171
2003	421,614	80	7,182	6	106	114	158
2004	427,125	81	7,403	6	107	118	158
2005	432,097	82	7,322	6	108	117	162
2006	435,287	82	7,310	6	109	116	173
2007	447,509	81	7,153	7	108	114	174
2008	453,134	79	6,808	9	105	108	231
2009	458,067	78	6,669	9	103	106	246
2010	465,310	73	6,424	11	97	102	286

Source: Energy Information Administration, State Energy Data System

The residential energy expenditure per household both in current dollars and in constant 2012 dollars are provided in Table 5.9. In 2010, average energy expenditures per household in constant 2012 dollar reached $2,099. From 1970 to 2010, Hawaii's average residential energy expenditures increased 82 percent in constant value; average residential electricity expenditures increased 81 percent in constant value.

Table 5.9. Residential Energy Expenditures per Household

		Residential Energy Expenditures per Household					
		Total	Electricity	Total	Electricity	Constant $ Index	
	Honolulu	Current $	Current $	Constant $	Constant $	Total Energy	Electricity
Year	CPI-U	$/HH	$/HH	2012$/HH	2012$/HH	1970=100	1970=100
1970	41.50	191	176	1,154	1,062	100	100
1975	56.30	342	328	1,520	1,460	132	137
1980	83.00	593	502	1,789	1,513	155	142
1985	106.80	704	661	1,652	1,551	143	146
1990	138.10	706	669	1,281	1,214	111	114
1991	148.00	743	697	1,258	1,180	109	111
1992	155.10	784	724	1,266	1,170	110	110
1993	160.10	850	817	1,330	1,278	115	120
1994	164.50	882	848	1,343	1,291	116	121
1995	168.10	943	908	1,406	1,353	122	127
1996	170.70	1,019	981	1,496	1,439	130	135
1997	171.90	1,060	1,008	1,544	1,469	134	138
1998	171.50	1,017	923	1,485	1,349	129	127
1999	173.30	1,023	962	1,478	1,390	128	131
2000	176.30	1,202	1,122	1,707	1,593	148	150
2001	178.40	1,199	1,117	1,684	1,568	146	148
2002	180.30	1,173	1,091	1,629	1,516	141	143
2003	184.50	1,277	1,201	1,733	1,631	150	154
2004	190.60	1,413	1,337	1,857	1,757	161	165
2005	197.80	1,601	1,516	2,027	1,919	176	181
2006	209.35	1,804	1,707	2,158	2,042	187	192
2007	219.50	1,812	1,725	2,068	1,969	179	185
2008	228.86	2,375	2,212	2,599	2,421	225	228
2009	230.05	1,750	1,614	1,905	1,758	165	165
2010	234.87	1,969	1,805	2,099	1,925	182	181
2011	243.62						

Source: Energy Information Administration, State Energy Data System

5.3. Commercial Sector

In 2010, the commercial sector consumed about 40 trillion Btu or about 14.6 percent of Hawaii's total primary energy. Electricity accounted for 83.1 percent of total commercial energy consumption, followed by petroleum (6.5%), and biomass (7.3%). Natural gas consumed in the commercial sector is mainly supplemental gaseous fuels which are not sources of primary energy.

Table 5.10. Commercial Energy Consumption by Fuel

		Commercial Sector Energy Consumption By Source % in Total Commercial Energy Consumption				
Year	Total Energy Billion Btus	Natural Gas	Petroleum	Biomass	Retail Electricity	Electrical System Losses
1960	5,300	0.0	21.0	0.0	19.7	59.3
1965	7,024	0.0	20.8	0.0	24.0	55.2
1970	12,519	0.0	29.6	0.0	21.0	49.4
1975	14,533	0.0	15.5	0.0	26.0	58.4
1980	20,073	0.0	19.8	0.0	24.8	55.4
1985	18,392	0.0	7.8	0.0	29.9	62.3
1990	37,209	0.0	22.8	0.0	20.7	56.5
1995	34,609	0.0	7.8	0.0	27.4	64.8
1996	34,036	0.0	5.1	0.0	28.3	66.6
1997	35,504	0.0	8.4	0.0	27.3	64.4
1998	45,896	0.0	29.6	0.0	21.1	49.4
1999	35,963	0.0	7.0	0.0	27.9	65.1
2000	37,283	0.1	7.0	0.0	28.3	64.6
2001	36,572	0.2	5.8	0.0	29.8	64.1
2002	39,357	0.2	7.9	0.0	27.9	63.9
2003	39,593	0.2	6.5	0.0	30.3	62.9
2004	43,401	0.2	7.5	5.9	28.6	57.8
2005	41,764	0.3	7.9	5.4	28.3	58.1
2006	42,601	0.3	7.8	6.1	28.0	57.8
2007	42,214	0.3	6.1	5.6	28.5	59.6
2008	42,836	0.2	6.9	7.2	27.9	57.8
2009	42,228	0.3	8.9	7.2	27.4	56.3
2010	39,814	0.3	9.3	7.3	28.7	54.3

Source: Energy Information Administration, State Energy Data System

In 2010, Hawaii's commercial sector consumed about 1,777 MCF of natural gas, about 817 TBBL of petroleum products (mostly distillate fuels and LPG), and about 3,355 million kWh of electricity.

Table 5.11. Commercial Energy Consumption in Physical Units

	Commercial Sector Energy Consumption By Source							
		Petroleum						
Year	Natural Gas MCF	Total Petroleum TBBL	Distillate Fuels TBBL	Motor Gasoline TBBL	Residual Fuel TBBL	LPG TBBL	Other Petroleum TBBL	Electricity Million kWh
1960	0	209	48	55	41	42	23	306
1965	0	283	71	59	31	83	39	495
1970	0	760	174	133	38	328	87	771
1975	0	477	84	98	15	235	45	1,109
1980	1,715	792	398	54	25	315	0	1,462
1985	1,858	275	132	47	21	74	1	1,612
1986	1,883	369	183	46	67	70	3	1,831
1987	2,019	596	409	44	53	88	2	1,942
1988	2,049	2,475	562	53	1,762	98	0	2,072
1989	2,129	2,113	501	52	1,457	102	1	2,152
1990	2,223	1,430	453	59	825	93	0	2,253
1991	2,148	773	610	49	18	96	0	2,355
1992	2,144	1,897	498	45	1,052	302	0	2,417
1993	2,123	524	414	11	34	64	1	2,419
1994	2,200	899	389	11	433	66	0	2,601
1995	2,199	480	343	11	62	63	1	2,779
1996	2,132	326	224	11	13	78	0	2,819
1997	1,751	560	392	11	11	145	1	2,839
1998	1,747	2,338	211	11	1,704	412	0	2,833
1999	1,749	511	260	11	6	234	0	2,944
2000	1,771	558	218	11	8	320	1	3,092
2001	1,749	478	136	12	5	324	1	3,192
2002	1,720	648	310	12	0	326	0	3,223
2003	1,751	527	274	12	0	241	0	3,517
2004	1,803	644	382	12	4	246	0	3,632
2005	1,838	651	384	12	3	251	1	3,463
2006	1,813	662	392	12	1	257	0	3,490
2007	1,836	517	282	12	0	223	0	3,520
2008	1,769	647	232	12	0	403	0	3,501
2009	1,752	832	279	12	0	540	1	3,388
2010	1,777	817	272	12	0	533	0	3,355

Source: Energy Information Administration, State Energy Data System

Table 5.12 provides the commercial sector energy consumption per million dollar real commercial GDP in Hawaii.[1] From 1990 to 2010, commercial total energy consumption per million dollar real commercial GDP decreased 14.4 percent. The increase in commercial electricity consumption per million dollar real GDP was more than offset by the decrease in other energy sources per million dollar real GDP.

Table 5.12. Energy Consumption per Million Dollar of Commercial Real GDP

	Hawaii	Energy Consumption per $M Real GDP					
	Commetial	Total		Other	Index		
	Real GDP	Energy	Electricity	Energy	Total Energy	Electricity	Others
Year	2005$M	MBTU/$M	kWh/$M	MBTU/$M	1990=100	1990=100	1990=100
1990	41,767	891	53,942	260	100	100	100
1991	42,183	683	55,828	157	77	103	60
1992	43,707	883	55,300	302	99	103	116
1993	43,015	714	56,236	121	80	104	46
1994	43,401	807	59,930	175	91	111	67
1995	42,959	806	64,690	116	90	120	45
1996	42,855	794	65,781	93	89	122	36
1997	43,156	823	65,785	111	92	122	42
1998	42,205	1,087	67,125	365	122	124	140
1999	42,516	846	69,245	102	95	128	39
2000	43,478	858	71,116	103	96	132	39
2001	43,401	843	73,547	91	95	136	35
2002	44,257	889	72,825	112	100	135	43
2003	45,944	862	76,550	96	97	142	37
2004	48,520	894	74,856	158	100	139	61
2005	50,736	823	68,255	147	92	127	56
2006	52,495	812	66,483	150	91	123	57
2007	53,277	792	66,070	128	89	122	49
2008	53,548	800	65,381	147	90	121	56
2009	51,400	822	65,914	168	92	122	64
2010	52,220	762	64,247	162	86	119	62

Source: Energy Information Administration, State Energy Data System

[1] The commercial sector GDP is calculated using total GDP provided by the U.S. BEA minus the industrial GDP. The industrial GDP includes GDP from the following five sectors: (1) Agriculture, (2) Mining, (3) Construction, (4) Utility, and (5) Manufacture.

The commercial sector energy expenditures per dollar of real GDP (both in current dollars and constant 2012 dollars) are provided in Table 5.13. From 1990 to 2010, Hawaii's average commercial energy expenditures per dollar of real GDO increased 60 percent in constant value; average commercial electricity expenditures increased 79 percent in constant value.

Table 5.13. Energy Expenditures per Dollar of Commercial Real GDP

		Energy Expenditures per $ Real Commercial GDP					
		Total	Electricity	Total	Electricity	Constant $ Index	
	Honolulu	Current $	Current $	Constant 2012$	Constant 2012$	Total Energy	Electricity
Year	CPI-U	Cents/$GDP	Cents/$GDP	Cents/$GDP	Cents/$GDP	1990=100	1990=100
1990	138.10	0.71	0.55	1.29	0.99	100	100
1991	148.00	0.70	0.58	1.19	0.97	92	98
1992	155.10	0.75	0.58	1.22	0.94	94	94
1993	160.10	0.76	0.66	1.18	1.03	92	103
1994	164.50	0.81	0.70	1.23	1.06	96	107
1995	168.10	0.89	0.79	1.32	1.17	102	118
1996	170.70	0.95	0.85	1.40	1.25	108	126
1997	171.90	0.98	0.87	1.43	1.27	111	128
1998	171.50	1.00	0.83	1.46	1.21	113	121
1999	173.30	0.98	0.88	1.42	1.27	110	128
2000	176.30	1.19	1.05	1.68	1.50	130	151
2001	178.40	1.22	1.09	1.71	1.53	133	154
2002	180.30	1.16	1.03	1.61	1.43	125	144
2003	184.50	1.28	1.15	1.74	1.56	134	157
2004	190.60	1.38	1.21	1.81	1.59	140	160
2005	197.80	1.50	1.30	1.90	1.65	147	166
2006	209.35	1.64	1.42	1.97	1.70	152	171
2007	219.50	1.64	1.45	1.88	1.65	145	166
2008	228.86	2.22	1.94	2.43	2.13	188	214
2009	230.05	1.67	1.44	1.82	1.57	141	158
2010	234.87	1.94	1.67	2.07	1.78	160	179
2011	243.62						

Source: Energy Information Administration, State Energy Data System

5.4. Industrial Sector

The industrial sector consumed about 64 trillion Btu or about 23.6 percent of Hawaii's total energy in 2010. Electricity accounted for about 56.4 percent of total industrial energy consumption, followed by petroleum (33.9%), biomass (6.8%), and coal (2.2%).

Table 5.14. Industrial Energy Consumption by Fuel

	Industrial Sector Energy Consumption By Source % in Total Industrial Energy Consumption							
Year	Total Billion Btu	Primary Natural Gas	Coal	Petroleum	Retail Electricity	Electrical System Losses	Biomass	Hydro & Geothermal
1960	20,633	-	-	69.11	7.69	23.20	-	-
1965	34,710	-	-	61.51	10.78	24.73	0.50	2.49
1970	43,657	-	-	52.48	13.44	31.61	0.39	2.07
1975	50,397	-	-	42.17	17.18	38.56	0.62	1.47
1980	74,651	-	-	38.43	13.84	30.85	15.95	0.93
1985	67,347	-	1.67	27.50	15.92	33.15	20.72	1.03
1990	98,940	-	0.70	32.25	12.88	35.23	18.35	0.60
1995	93,012	-	4.43	33.65	13.95	33.01	14.25	0.71
1996	95,592	-	3.81	34.14	13.86	32.69	14.80	0.70
1997	88,674	-	4.21	31.84	14.84	35.01	13.34	0.77
1998	80,672	-	4.17	27.53	16.02	37.54	13.79	0.95
1999	78,037	-	3.45	26.23	16.39	38.18	14.83	0.92
2000	77,960	0.02	2.74	28.73	16.78	38.28	12.66	0.79
2001	69,482	0.04	2.94	30.21	18.61	40.09	7.36	0.75
2002	70,768	0.04	0.93	31.23	18.18	41.58	7.18	0.87
2003	66,045	0.03	2.08	33.46	19.87	41.25	2.53	0.78
2004	66,155	0.04	1.89	33.35	20.31	41.13	2.73	0.56
2005	70,158	0.04	2.01	36.93	19.02	39.07	2.44	0.49
2006	69,236	0.04	2.36	36.24	19.20	39.70	1.91	0.55
2007	67,089	0.04	2.68	33.92	19.65	41.19	1.95	0.56
2008	64,271	0.04	3.60	31.52	20.20	41.87	2.17	0.61
2009	63,301	0.03	3.21	32.67	19.85	40.81	2.88	0.55
2010	64,218	0.03	2.20	33.89	19.51	36.89	6.83	0.64

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.15, Hawaii's industrial sector consumed about 61,000 short tons (ST) of coal, 339 MCF of natural gas, about 3,670 TBBL of petroleum products, and about 3,672 million kWh of electricity in 2010.

Table 5.15. Industrial Energy Consumption in Physical Units

	Industrial Energy Consumption By Source				Industrial Sector % in Total Consumption					
Year	Coal 1000 ST	Natural Gas MCF	Petroleum TBBL	Electricity Million kWh	Coal	Natural Gas	Petroleum	Electricity	Biomass	Hydro & Geothermal
1960	0	0	2,367	465			14.1	36.2		0.0
1965	0	0	3,497	1,096			15.6	44.7	100.0	79.0
1970	0	0	3,874	1,720			11.4	45.6	40.1	80.0
1975	0	0	3,648	2,538			9.8	47.8	54.5	79.7
1980	0	0	5,135	3,028		0.0	11.8	47.8	100.0	77.1
1985	46	0	2,997	3,143	100.0	0.0	7.5	47.4	98.2	63.9
1986	16	0	4,173	3,239	100.0	0.0	10.7	46.1	100.0	69.5
1987	63	0	4,070	3,284	100.0	0.0	10.3	45.0	100.0	70.3
1988	50	0	4,961	3,495	100.0	0.0	10.8	45.3	100.0	68.6
1989	32	0	4,469	3,576	100.0	0.0	9.3	44.9	98.7	47.8
1990	28	0	5,231	3,734	96.6	0.0	10.5	44.9	70.0	71.3
1991	37	0	4,989	3,773	82.2	0.0	10.9	44.3	69.9	71.3
1992	47	0	5,078	3,811	15.5	0.0	10.9	44.0	71.0	81.2
1993	73	0	5,250	3,770	10.6	0.0	12.7	43.5	68.7	20.4
1994	86	0	6,151	3,791	12.2	0.0	13.7	42.4	68.3	23.6
1995	192	0	5,643	3,803	21.5	0.0	12.9	41.4	66.9	19.2
1996	169	0	5,880	3,884	18.2	0.0	14.1	41.4	74.2	18.8
1997	166	342	4,672	3,856	17.8	13.1	11.7	41.2	67.8	18.5
1998	146	373	3,765	3,787	17.8	14.1	9.3	40.9	67.2	21.0
1999	117	463	3,380	3,748	14.6	16.9	8.5	40.0	68.1	21.6
2000	110	536	3,685	3,834	13.5	18.9	9.1	39.6	65.0	16.5
2001	113	532	3,513	3,790	13.6	18.9	8.5	38.7	64.4	16.4
2002	50	475	3,779	3,770	6.7	17.4	8.4	38.1	68.0	35.7
2003	52	444	3,721	3,846	6.2	16.3	8.0	37.0	18.0	18.6
2004	53	446	3,704	3,937	6.2	16.1	7.5	36.7	19.4	11.9
2005	59	439	4,298	3,912	7.3	15.7	8.4	37.1	17.9	10.7
2006	59	451	4,194	3,896	7.6	16.2	8.1	36.9	13.4	11.6
2007	72	502	3,844	3,864	8.5	17.6	7.3	36.5	13.5	11.7
2008	99	431	3,396	3,804	10.6	16.0	8.0	36.6	11.8	12.4
2009	88	344	3,475	3,683	10.0	13.2	8.5	36.4	15.1	12.7
2010	61	339	3,670	3,672	7.6	12.9	8.8	36.7	37.0	15.4

Source: Energy Information Administration, State Energy Data System

Table 5.16 shows that petroleum products consumed in 2010 include: 541 TBBL of residual fuel, 335 TBBL of distillate fuel, 285 TBBL of motor gasoline, and 2,509 TBBL of other petroleum products, which include mostly still gas used in refineries and petroleum coke.

Table 5.16. Industrial Petroleum Consumption by Fuel

	Industrial Sector Petroleum Consumption					Industrial Sector % in Total Industrial Petroleum Consumption			
Year	Residual Fuel T BBL	Distillate Fuel T BBL	Motor Gasoline T BBL	Other Petroleum T BBL	Petroleum Total T BBL	Residual Fuel	Distillate Fuel	Motor Gasoline	Other Petroleum
1960	1,038	554	83	692	2,367	43.9	23.4	3.5	29.2
1965	1,712	635	76	1,074	3,497	49.0	18.2	2.2	30.7
1970	1,671	701	49	1,453	3,874	43.1	18.1	1.3	37.5
1975	1,346	603	53	1,646	3,648	36.9	16.5	1.5	45.1
1980	1,491	1,369	49	2,226	5,135	29.0	26.7	1.0	43.3
1985	1,344	458	104	1,091	2,997	44.8	15.3	3.5	36.4
1986	1,952	549	101	1,571	4,173	46.8	13.2	2.4	37.6
1987	1,332	658	108	1,972	4,070	32.7	16.2	2.7	48.5
1988	1,768	715	110	2,368	4,961	35.6	14.4	2.2	47.7
1989	1,427	520	129	2,393	4,469	31.9	11.6	2.9	53.5
1990	1,740	725	133	2,633	5,231	33.3	13.9	2.5	50.3
1991	1,793	689	150	2,357	4,989	35.9	13.8	3.0	47.2
1992	1,356	687	152	2,883	5,078	26.7	13.5	3.0	56.8
1993	1,056	669	241	3,284	5,250	20.1	12.7	4.6	62.6
1994	1,184	540	245	4,182	6,151	19.2	8.8	4.0	68.0
1995	1,024	548	245	3,826	5,643	18.1	9.7	4.3	67.8
1996	957	475	259	4,189	5,880	16.3	8.1	4.4	71.2
1997	845	623	242	2,962	4,672	18.1	13.3	5.2	63.4
1998	305	584	266	2,610	3,765	8.1	15.5	7.1	69.3
1999	332	427	155	2,466	3,380	9.8	12.6	4.6	73.0
2000	438	473	160	2,614	3,685	11.9	12.8	4.3	70.9
2001	8	473	122	2,910	3,513	0.2	13.5	3.5	82.8
2002	446	459	145	2,729	3,779	11.8	12.1	3.8	72.2
2003	364	426	137	2,794	3,721	9.8	11.4	3.7	75.1
2004	395	407	169	2,733	3,704	10.7	11.0	4.6	73.8
2005	781	512	133	2,872	4,298	18.2	11.9	3.1	66.8
2006	811	456	141	2,786	4,194	19.3	10.9	3.4	66.4
2007	428	451	244	2,721	3,844	11.1	11.7	6.3	70.8
2008	448	362	247	2,339	3,396	13.2	10.7	7.3	68.9
2009	482	414	234	2,345	3,475	13.9	11.9	6.7	67.5
2010	541	335	285	2,509	3,670	14.7	9.1	7.8	68.4

Source: Energy Information Administration, State Energy Data System

Table 5.17 provides the industrial sector energy consumption per million dollar real industrial GDP in Hawaii. From 1990 to 2010, industrial total energy consumption per million dollar real industrial GDP decreased 25.4 percent. The increase in industrial electricity consumption per million dollar real GDP was more than offset by the decrease in other energy sources per million dollar real GDP.

Table 5.17. Energy Consumption per Million Dollar of Industrial Real GDP

	Hawaii	Energy Consumption per $M Real GDP					
	Industrial	Total		Other	Index		
	Real GDP	Energy	Electricity	Energy	Total Energy	Electricity	Others
Year	2005$M	MBTU/$M	kWh/$M	MBTU/$M	1990=100	1990=100	1990=100
1990	6,767	14,621	551,814	7,588	100	100	100
1991	7,069	12,594	533,741	7,039	86	97	93
1992	6,881	13,609	553,842	7,261	93	100	96
1993	6,728	13,725	560,362	7,287	94	102	96
1994	6,231	15,056	608,436	8,101	103	110	107
1995	6,041	15,398	629,581	8,167	105	114	108
1996	5,625	16,995	690,525	9,083	116	125	120
1997	5,239	16,926	736,018	8,489	116	133	112
1998	4,953	16,288	764,587	7,565	111	139	100
1999	5,029	15,517	745,277	7,050	106	135	93
2000	5,341	14,597	717,843	6,560	100	130	86
2001	5,043	13,778	751,537	5,691	94	136	75
2002	5,338	13,257	706,257	5,335	91	128	70
2003	5,740	11,506	670,035	4,473	79	121	59
2004	5,784	11,438	680,671	4,411	78	123	58
2005	6,165	11,380	634,550	4,769	78	115	63
2006	6,248	11,081	623,560	4,555	76	113	60
2007	6,271	10,698	616,170	4,189	73	112	55
2008	6,550	9,812	580,763	3,722	67	105	49
2009	5,913	10,705	622,865	4,212	73	113	56
2010	5,886	10,910	623,853	4,757	75	113	63

Source: Energy Information Administration, State Energy Data System

The industrial sector energy expenditures per dollar of real GDP (both in current dollars and constant 2012 dollars) are provided in Table 5.18. From 1990 to 2010, Hawaii's average industrial energy expenditures per dollar of real GDP increased 71 percent in constant value; average industrial electricity expenditures per dollar of real GDP increased 94 percent in constant value.

Table 5.18. Energy Expenditures per Dollar of Industrial Real GDP

		Energy Expenditures per $ Real Commercial GDP					
		Total	Electricity	Total	Electricity	Constant $ Index	
	Honolulu	Current $	Current $	Constant 2012$	Constant 2012$	Total Energy	Electricity
Year	CPI-U	Cents/$GDP	Cents/$GDP	Cents/$GDP	Cents/$GDP	1990=100	1990=100
1990	138.10	5.06	3.93	9.18	7.12	100	100
1991	148.00	4.89	3.87	8.27	6.56	90	92
1992	155.10	5.08	4.11	8.20	6.63	89	93
1993	160.10	5.93	4.73	9.27	7.39	101	104
1994	164.50	6.61	5.06	10.06	7.71	110	108
1995	168.10	7.15	5.51	10.65	8.20	116	115
1996	170.70	8.31	6.62	12.19	9.71	133	136
1997	171.90	8.61	7.28	12.54	10.61	137	149
1998	171.50	8.04	6.88	11.74	10.04	128	141
1999	173.30	7.83	6.90	11.32	9.97	123	140
2000	176.30	9.32	8.04	13.24	11.42	144	160
2001	178.40	9.43	8.36	13.24	11.73	144	165
2002	180.30	8.32	7.32	11.55	10.17	126	143
2003	184.50	8.57	7.74	11.63	10.50	127	147
2004	190.60	9.60	8.57	12.61	11.26	137	158
2005	197.80	10.82	9.47	13.70	11.99	149	168
2006	209.35	12.01	10.59	14.37	12.67	157	178
2007	219.50	12.27	10.68	14.00	12.19	153	171
2008	228.86	16.07	14.28	17.58	15.62	192	219
2009	230.05	12.06	10.68	13.13	11.63	143	163
2010	234.87	14.71	12.97	15.69	13.83	171	194

Source: Energy Information Administration, State Energy Data System

5.5. Electricity Generation

Before 1990, Hawaii's electricity was almost all generated from petroleum products. Since 1990, electricity generated from waste, coal and geothermal energy become significant. From 1990 to 2010, the share of waste in total electricity generation energy consumption decreased from 7.3 percent to almost zero percent; the shares of coal and geothermal increased from both zero percent to 15.9 percent and 2.0 percent, respectively. In 2010, about 99 trillion Btu or 36.3 percent of Hawaii's total energy was used to generate electricity. Fossil fuel accounted for about 95.1 percent of total energy consumption; renewable energy accounted for only 4.9 percent of total electric power sector energy consumption.

Table 5.19. Electric Power Sector Energy Consumption by Fuel

	Total Energy Consumption	Electric Power Sector Energy Consumption By Source % in Total Electrc Power Energy Consumption							
Year	Billion Btu	Residual Fuel	Distillate Fuel Oil	Coal	Waste Biomass	Geothermal	Hydro	Wind	Solar
1960	17,603	97.11	1.24	-	-	-	1.66	-	-
1965	27,568	97.88	1.29	-	-	-	0.83	-	-
1970	43,176	97.59	1.29	-	0.60	-	0.53	-	-
1975	58,778	94.98	4.25	-	0.44	-	0.32	-	-
1980	69,749	92.29	7.41	-	-	-	0.29	-	-
1985	69,758	92.78	6.28	-	0.38	0.28	0.28	-	-
1990	105,928	82.17	9.97	0.02	7.33	-	0.22	0.28	-
1995	105,531	63.80	12.21	14.97	6.20	2.29	0.33	0.20	-
1996	107,454	64.33	12.59	15.57	4.58	2.33	0.38	0.22	-
1997	107,317	63.70	12.50	15.63	5.23	2.34	0.46	0.15	-
1998	105,643	64.58	13.31	14.07	5.13	2.29	0.44	0.19	-
1999	106,591	64.28	13.96	14.07	5.08	2.02	0.43	0.16	-
2000	108,494	62.86	14.90	14.30	4.91	2.46	0.41	0.16	-
2001	105,291	63.37	16.46	14.94	2.69	2.03	0.49	0.02	-
2002	110,941	61.52	20.93	14.39	2.16	0.67	0.32	0.01	-
2003	109,062	62.26	12.27	16.40	7.00	1.67	0.38	0.01	-
2004	110,784	63.66	13.07	16.25	4.50	1.93	0.52	0.07	-
2005	109,805	64.72	13.71	15.07	3.85	2.02	0.57	0.06	-
2006	110,613	65.36	12.92	14.36	4.01	1.90	0.73	0.71	-
2007	111,819	64.24	12.05	15.39	3.70	2.03	0.48	2.11	-
2008	108,951	63.53	11.76	16.38	3.63	2.12	0.41	2.17	-
2009	105,573	63.74	12.42	16.03	3.21	1.55	0.71	2.32	0.01
2010	98,783	65.96	13.24	15.90	0.04	1.98	0.28	2.58	0.02

Source: Energy Information Administration, State Energy Data System

Table 5.20 shows the fossil fuel consumption of Hawaii's electric power sector in physical units. Residual fuel oil used in electricity generation increased from 2,719 TBBLs in 1960 to a peak of 13,844 TBBLs in 1990; stabilized at about 11,000 TBBLs from 1991 to 2008; and then decreased from 11,009 TBBLs in 2008 to 10,364 TBBLs in 2010. Distillate fuel oil used in electricity generation increased from 37 TBBLs in 1960 to almost 4,000 TBBLs in 2002; and then decreased to 2,246 TBBLs in 2010. Coal was used in electricity generation in 1990. Since 1993, coal used in electricity generation was stabilized between 600 to 800 thousand short tons (ST).

Table 5.20. Electric Power Sector Energy Consumption in Physical Units

	Electric Power Energy Consumption			% in Total Consumption		
Year	Residual Fuel T BBL	Distillate Fuel T BBL	Coal T ST	Residual Fuel	Distillate Fuel	Coal
1960	2,719	37	0	57	4	
1965	4,292	61	0	59	4	
1970	6,702	96	0	66	6	
1975	8,880	429	0	79	22	
1980	10,239	888	0	78	15	
1985	10,295	752	0	78	17	0
1990	13,844	1,813	1	73	28	3
1995	10,709	2,211	703	74	38	79
1996	10,996	2,323	761	87	47	82
1997	10,873	2,302	767	89	50	82
1998	10,851	2,413	676	82	54	82
1999	10,898	2,555	684	84	48	85
2000	10,848	2,775	706	80	54	87
2001	10,613	2,975	716	80	49	86
2002	10,855	3,987	698	85	49	93
2003	10,801	2,297	785	89	29	94
2004	11,218	2,486	804	86	29	94
2005	11,304	2,584	746	86	35	93
2006	11,499	2,453	720	78	37	93
2007	11,426	2,313	778	70	25	92
2008	11,009	2,199	838	88	39	89
2009	10,704	2,250	790	86	37	90
2010	10,364	2,246	742	85	32	92

Source: Energy Information Administration, State Energy Data System

Table 5.21 shows electricity generated by selected renewable energy sources (excluding waste). From 1960 to 2010, total electricity generated from selected renewable energy sources increased from 27 million kWh to 493 million kWh; the share of electricity generated from selected renewable energy sources in total electricity consumption increased from 2.1 percent to 4.9 percent. Increased share of renewable electricity is mainly due to additional wind generated electricity since 2007.

Table 5.21. Electricity Generated by Selected Renewable Energy Sources

	Electricity By Selected Renewable Energy Units: Million kWh					Total Electricity Consumption	% of Selected Renewable in Total
Year	Geothermal	Hydro	Wind	Solar	Sum	Million kWh	Consumption
1960	0	27	0	0	27	1,285	2.1
1965	0	22	0	0	22	2,452	0.9
1970	0	22	0	0	22	3,776	0.6
1975	0	18	0	0	18	5,310	0.3
1980	0	20	0	0	20	6,331	0.3
1985	19	19	0	0	38	6,634	0.6
1990	0	23	29	0	52	8,311	0.6
1995	235	34	20	0	289	9,188	3.1
1996	242	39	23	0	304	9,379	3.2
1997	245	49	16	0	310	9,363	3.3
1998	237	46	19	0	302	9,261	3.3
1999	211	45	16	0	272	9,381	2.9
2000	262	43	17	0	322	9,691	3.3
2001	207	50	2	0	259	9,784	2.6
2002	73	35	2	0	110	9,891	1.1
2003	178	40	2	0	220	10,391	2.1
2004	213	57	7	0	277	10,731	2.6
2005	222	62	7	0	291	10,539	2.8
2006	212	82	80	0	374	10,568	3.5
2007	230	55	238	0	523	10,585	4.9
2008	234	45	240	0	519	10,390	5.0
2009	168	77	251	1	497	10,126	4.9
2010	201	29	261	2	493	10,016	4.9

Source: Energy Information Administration, State Energy Data System

Electricity consumed in Hawaii is generated by 5 types of producers: (1) Electric Utility, (2) Independent Power Producers (IPP), (3) Combined Heat and Power (CHP) – Electric Power, (4) CHP – Industrial Power, and (5) CHP – Commercial Power. Tables 5.22 to 5.27 show electricity generation by types of fuels for the total electric power industry and each type of electricity producers in Hawaii.

Table 5.22. Electricity Generation by Fuel: Total Electric Power Industry

	Total Electricity Generation	% in Total Electricity Generation									
Year	MWH	Coal	Petroleum	Other Gases 1/	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	9,702,752	0.0	90.0	0.2	8.7	-	-	0.8	0.3	-	-
1991	8,703,235	0.1	88.6	0.6	9.5	-	-	0.8	0.4	-	-
1992	9,844,461	5.7	84.7	0.6	8.2	0.0	0.0	0.6	0.2	-	-
1993	9,943,687	14.9	74.4	0.6	7.8	0.0	1.5	0.6	0.2	-	-
1994	10,108,902	13.1	75.6	0.7	7.2	0.0	1.8	1.4	0.2	-	-
1995	10,303,983	15.2	74.5	0.7	6.2	0.0	2.3	0.9	0.2	-	0.0
1996	10,627,894	15.5	74.9	0.6	5.6	0.0	2.3	1.0	0.2	-	-
1997	10,312,247	15.3	74.6	0.6	5.9	0.0	2.4	1.1	0.2	-	-
1998	10,228,082	14.0	76.8	0.6	4.9	-	2.3	1.2	0.2	-	-
1999	10,403,926	13.8	76.8	0.5	5.5	-	2.0	1.1	0.2	-	-
2000	10,593,403	14.9	76.0	0.4	5.1	-	2.5	1.0	0.2	-	-
2001	10,633,093	15.1	77.3	0.4	2.7	-	1.9	0.9	0.0	-	1.6
2002	11,663,070	13.3	81.2	0.3	2.5	-	0.6	0.8	0.0	-	1.2
2003	10,976,371	15.0	77.5	0.4	3.2	-	1.6	0.8	0.0	-	1.6
2004	11,410,403	14.1	78.4	0.4	2.9	-	1.9	0.8	0.1	-	1.5
2005	11,522,805	14.2	78.7	0.4	2.7	-	1.9	0.8	0.1	-	1.3
2006	11,559,174	13.4	78.3	0.4	2.8	-	1.8	1.0	0.7	-	1.5
2007	11,533,350	13.7	77.3	0.4	2.5	-	2.0	0.8	2.1	-	1.3
2008	11,376,385	14.5	76.2	0.3	2.7	-	2.1	0.7	2.1	0.0	1.4
2009	11,010,533	13.6	75.3	0.2	2.6	-	1.5	1.0	2.3	0.0	3.5
2010	10,836,036	14.3	74.6	0.2	2.6	0.0	1.9	0.6	2.4	0.0	3.4

1. Other gases includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.
Source: Energy Information Administration, State Energy Data System

Table 5.23. Electricity Generation by Fuel: Electric Utilities

Year	Total Electricity Generation MWH	% in Total Electricity Generation									
		Coal	Petroleum	Other Gases 1/	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	7,996,096	-	99.6	-	0.1	-	-	0.3	-	-	-
1991	7,333,192	-	99.7	-	-	-	-	0.3	-	-	-
1992	6,861,255	-	99.9	-	-	-	-	0.1	-	-	-
1993	6,083,815	-	99.8	-	-	-	-	0.2	-	-	-
1994	6,055,087	-	99.7	-	-	-	-	0.3	-	-	-
1995	6,190,584	-	99.7	-	-	-	-	0.3	-	-	-
1996	6,420,195	-	99.7	-	-	-	-	0.3	-	-	-
1997	6,212,643	-	99.7	-	-	-	-	0.3	-	-	-
1998	6,301,169	-	99.8	-	-	-	-	0.2	0.0	-	-
1999	6,452,068	-	99.6	-	-	-	-	0.3	0.1	-	-
2000	6,534,692	-	99.7	-	-	-	-	0.2	0.0	-	-
2001	6,383,088	-	99.7	-	-	-	-	0.3	0.0	-	-
2002	7,513,051	-	99.9	-	-	-	-	0.1	0.0	-	-
2003	6,493,205	-	99.9	-	-	-	-	0.0	0.0	-	-
2004	6,982,469	-	99.8	-	-	-	-	0.1	0.0	-	-
2005	6,915,159	-	99.8	-	-	-	-	0.1	0.0	-	-
2006	7,040,473	-	99.7	-	-	-	-	0.3	0.0	-	-
2007	6,928,397	-	99.8	-	-	-	-	0.2	0.0	-	-
2008	6,700,636	-	99.7	-	-	-	-	0.3	0.0	-	-
2009	6,509,550	-	96.2	-	0.1	-	-	0.4	0.0	-	3.3
2010	6,416,068	-	96.3	-	0.0	-	-	0.3	-	-	3.4

1. Other gases includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.

Source: Energy Information Administration, State Energy Data System

Table 5.24. Electricity Generation by Fuel: IPP

Year	Total Electricity Generation MWH	% in Total Electricity Generation									
		Coal	Petroleum	Other Gases 1/	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	385,510	-	3.6	-	88.9	-	-	-	7.5	-	-
1991	376,591	-	-	-	90.5	-	-	-	9.5	-	-
1992	408,419	-	4.8	-	89.1	-	0.5	-	5.6	-	-
1993	512,344	-	-	-	66.0	-	29.7	-	4.3	-	-
1994	622,693	-	-	-	59.9	-	29.8	7.1	3.3	-	-
1995	641,018	-	-	-	57.4	-	36.6	2.8	3.2	-	-
1996	606,406	-	0.3	-	52.5	-	39.9	3.5	3.7	-	-
1997	656,259	-	0.3	-	55.4	-	37.4	4.5	2.4	-	-
1998	647,103	-	0.4	-	55.1	-	36.6	5.0	2.9	-	-
1999	602,820	-	0.4	-	58.2	-	35.0	4.3	2.1	-	-
2000	656,303	-	0.3	-	53.3	-	39.9	4.3	2.2	-	-
2001	521,236	-	-	-	31.5	-	39.6	6.2	0.0	-	22.7
2002	400,254	-	-	-	42.3	-	18.2	6.6	0.0	-	32.9
2003	551,293	-	0.1	-	33.3	-	32.3	7.0	0.0	-	27.2
2004	266,841	-	-	-	-	-	79.9	17.8	2.3	-	-
2005	279,684	-	-	-	-	-	79.2	19.0	1.8	-	-
2006	349,246	-	-	-	-	-	60.8	16.6	22.6	-	-
2007	507,515	-	-	-	-	-	45.3	7.9	46.8	-	-
2008	900,933	-	44.3	-	-	-	26.0	3.0	26.6	0.0	-
2009	803,741	-	41.7	-	-	-	20.9	6.1	31.3	0.2	-
2010	761,548	-	37.6	-	-	-	26.3	1.6	34.3	0.2	-

1. Other gases includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.

Source: Energy Information Administration, State Energy Data System

Table 5.25. Electricity Generation by Fuel: CHP-Electric Power

Year	Total Electricity Generation MWH	% in Total Electricity Generation									
		Coal	Petroleum	Other Gases 1/	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	542,290	0.2	84.4	-	15.3	-	-	-	-	-	-
1991	145,717	4.6	41.8	-	53.5	-	-	-	-	-	-
1992	1,760,037	29.9	67.0	-	3.1	-	-	-	-	-	-
1993	2,584,600	56.5	40.8	-	2.7	-	-	-	-	-	-
1994	2,713,003	47.9	50.7	-	1.5	-	-	-	-	-	-
1995	2,808,818	53.5	46.5	-	-	-	-	-	-	-	-
1996	2,931,878	54.0	46.0	-	0.0	-	-	-	-	-	-
1997	2,868,654	52.8	47.0	-	0.2	-	-	-	-	-	-
1998	2,789,931	50.8	49.0	-	0.3	-	-	-	-	-	-
1999	2,782,035	51.2	48.4	-	0.4	-	-	-	-	-	-
2000	2,859,573	53.7	46.3	-	-	-	-	-	-	-	-
2001	3,224,983	48.4	51.6	-	-	-	-	-	-	-	-
2002	3,288,683	46.2	53.5	-	-	-	-	-	-	-	0.4
2003	3,640,052	45.2	50.0	-	4.3	-	-	-	-	-	0.6
2004	3,568,387	44.9	50.4	-	3.9	-	-	-	-	-	0.7
2005	3,769,263	43.3	52.6	-	3.5	-	-	-	-	-	0.6
2006	3,566,361	43.4	52.2	-	3.6	-	-	-	-	-	0.8
2007	3,524,900	44.8	51.6	-	3.1	-	-	-	-	-	0.5
2008	3,190,376	51.6	44.4	-	3.5	-	-	-	-	-	0.5
2009	3,121,676	48.1	48.3	-	2.9	-	-	-	-	-	0.8
2010	2,945,122	50.8	48.9	-	-	-	-	-	-	-	0.3

1. Other gases includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.

Source: Energy Information Administration, State Energy Data System

Table 5.26. Electricity Generation by Fuel: CHP-Industrial Power

Year	Total Electricity Generation MWH	% in Total Electricity Generation									
		Coal	Petroleum	Other Gases 1/	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	778,856	0.2	38.1	2.1	52.4	-	-	7.3	-	-	-
1991	847,735	0.1	40.2	6.1	47.7	-	-	6.0	-	-	-
1992	814,750	3.6	34.9	7.7	47.5	0.0	-	6.3	-	-	-
1993	762,928	2.5	35.3	8.3	48.3	0.0	-	5.6	-	-	-
1994	718,119	3.9	32.1	9.2	44.2	0.0	-	10.7	-	-	-
1995	663,563	9.0	29.7	10.4	40.8	0.2	-	9.6	-	-	0.3
1996	669,415	8.9	31.6	9.0	40.7	0.1	-	9.7	-	-	-
1997	574,691	10.4	25.2	11.4	41.4	0.1	-	11.6	-	-	-
1998	489,879	3.9	39.9	12.3	28.5	-	-	15.4	-	-	-
1999	567,003	2.9	38.4	8.7	37.6	-	-	12.4	-	-	-
2000	542,835	7.8	38.6	7.8	34.7	-	-	11.1	-	-	-
2001	503,786	8.9	38.9	7.5	24.5	-	-	10.0	-	-	10.2
2002	461,082	5.9	44.6	8.9	27.6	-	-	13.1	-	-	-
2003	291,821	-	66.1	13.8	3.0	-	-	17.1	-	-	-
2004	267,450	-	64.6	17.9	3.8	-	-	13.7	-	-	-
2005	265,767	-	66.9	15.5	4.9	-	-	12.7	-	-	-
2006	264,445	-	66.5	16.2	2.8	-	-	14.5	-	-	-
2007	268,417	-	66.6	16.8	2.5	-	-	14.1	-	-	-
2008	254,554	-	67.0	15.2	2.4	-	-	15.4	-	-	-
2009	252,535	-	73.0	8.8	4.1	-	-	14.0	-	-	-
2010	400,491	12.3	44.9	5.5	26.8	0.0	-	10.4	-	-	-

1. Other gases includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.

Source: Energy Information Administration, State Energy Data System

Table 5.27. Electricity Generation by Fuel: CHP-Commercial Power

Year	Total Electricity Generation MWH	% in Total Electricity Generation									
		Coal	Petroleum	Other Gases 1/	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
2004	325,256	-	0.4	-	54.8	-	-	-	-	-	44.8
2005	292,932	-	0.6	-	55.6	-	-	-	-	-	43.7
2006	338,649	-	0.3	-	55.9	-	-	-	-	-	43.9
2007	304,121	-	0.5	-	55.7	-	-	-	-	-	43.8
2008	329,887	-	0.4	-	55.8	-	-	-	-	-	43.8
2009	323,032	-	0.5	-	55.7	-	-	-	-	-	43.8
2010	312,807	-	0.4	-	55.8	-	-	-	-	-	43.8

1. Other gases includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.

Source: Energy Information Administration, State Energy Data System

Tables 5.28 to 5.31 show electricity generation by types of electricity producers for major types of fuels in Hawaii.

Table 5.28. Electricity Generation by Producer

	Electricity Generation Units: MWH						% in Total Generation Units: %				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	Total	Utility	IPP	Electric	Industry	Commercial
1990	7,996,096	385,510	542,290	778,856		9,702,752	82.4	4.0	5.6	8.0	-
1991	7,333,192	376,591	145,717	847,735		8,703,235	84.3	4.3	1.7	9.7	-
1992	6,861,255	408,419	1,760,037	814,750		9,844,461	69.7	4.1	17.9	8.3	-
1993	6,083,815	512,344	2,584,600	762,928		9,943,687	61.2	5.2	26.0	7.7	-
1994	6,055,087	622,693	2,713,003	718,119		10,108,902	59.9	6.2	26.8	7.1	-
1995	6,190,584	641,018	2,808,818	663,563		10,303,983	60.1	6.2	27.3	6.4	-
1996	6,420,195	606,406	2,931,878	669,415		10,627,894	60.4	5.7	27.6	6.3	-
1997	6,212,643	656,259	2,868,654	574,691		10,312,247	60.2	6.4	27.8	5.6	-
1998	6,301,169	647,103	2,789,931	489,879		10,228,082	61.6	6.3	27.3	4.8	-
1999	6,452,068	602,820	2,782,035	567,003		10,403,926	62.0	5.8	26.7	5.4	-
2000	6,534,692	656,303	2,859,573	542,835		10,593,403	61.7	6.2	27.0	5.1	-
2001	6,383,088	521,236	3,224,983	503,786		10,633,093	60.0	4.9	30.3	4.7	-
2002	7,513,051	400,254	3,288,683	461,082		11,663,070	64.4	3.4	28.2	4.0	-
2003	6,493,205	551,293	3,640,052	291,821		10,976,371	59.2	5.0	33.2	2.7	-
2004	6,982,469	266,841	3,568,387	267,450	325,256	11,410,403	61.2	2.3	31.3	2.3	2.9
2005	6,915,159	279,684	3,769,263	265,767	292,932	11,522,805	60.0	2.4	32.7	2.3	2.5
2006	7,040,473	349,246	3,566,361	264,445	338,649	11,559,174	60.9	3.0	30.9	2.3	2.9
2007	6,928,397	507,515	3,524,900	268,417	304,121	11,533,350	60.1	4.4	30.6	2.3	2.6
2008	6,700,636	900,933	3,190,376	254,554	329,887	11,376,386	58.9	7.9	28.0	2.2	2.9
2009	6,509,550	803,741	3,121,676	252,535	323,032	11,010,534	59.1	7.3	28.4	2.3	2.9
2010	6,416,068	761,548	2,945,122	400,491	312,807	10,836,036	59.2	7.0	27.2	3.7	2.9

Source: Energy Information Administration, State Energy Data System

Table 5.29. Petroleum Generated Electricity by Producer

	Electricity Generation Units: MWH						% in Total Generation Units: %				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	Total	Utility	IPP	Electric	Industry	Commercial
1990	7,967,354	13,834	457,941	296,733		8,735,862	91.2	0.2	5.2	3.4	-
1991	7,312,791	-	60,977	340,685		7,714,453	94.8	-	0.8	4.4	-
1992	6,851,432	19,520	1,179,093	284,158		8,334,203	82.2	0.2	14.1	3.4	-
1993	6,070,063	-	1,054,286	269,632		7,393,981	82.1	-	14.3	3.6	-
1994	6,036,282	-	1,374,306	230,325		7,640,913	79.0	-	18.0	3.0	-
1995	6,174,627	-	1,307,279	197,089		7,678,995	80.4	-	17.0	2.6	-
1996	6,402,329	2,004	1,347,448	211,336		7,963,117	80.4	0.0	16.9	2.7	-
1997	6,193,852	1,783	1,348,788	144,717		7,689,140	80.6	0.0	17.5	1.9	-
1998	6,287,107	2,542	1,365,972	195,447		7,851,068	80.1	0.0	17.4	2.5	-
1999	6,429,429	2,260	1,345,863	217,770		7,995,322	80.4	0.0	16.8	2.7	-
2000	6,516,929	1,890	1,323,560	209,403		8,051,782	80.9	0.0	16.4	2.6	-
2001	6,362,846	-	1,665,045	195,933		8,223,824	77.4	-	20.2	2.4	-
2002	7,502,913	-	1,758,336	205,741		9,466,990	79.3	-	18.6	2.2	-
2003	6,489,565	784	1,819,298	192,903		8,502,550	76.3	0.0	21.4	2.3	-
2004	6,971,259	-	1,799,282	172,803	1,353	8,944,697	77.9	-	20.1	1.9	0.0
2005	6,904,293	-	1,983,609	177,835	1,855	9,067,592	76.1	-	21.9	2.0	0.0
2006	7,015,977	-	1,861,682	175,954	860	9,054,473	77.5	-	20.6	1.9	0.0
2007	6,913,231	-	1,820,576	178,868	1,532	8,914,207	77.6	-	20.4	2.0	0.0
2008	6,682,593	399,529	1,415,939	170,566	1,308	8,669,935	77.1	4.6	16.3	2.0	0.0
2009	6,262,182	334,767	1,506,250	184,424	1,484	8,289,107	75.5	4.0	18.2	2.2	0.0
2010	6,178,666	286,176	1,441,233	179,961	1,300	8,087,336	76.4	3.5	17.8	2.2	0.0

Source: Energy Information Administration, State Energy Data System

Table 5.30. Coal Generated Electricity by Producer

	Electricity Generation Units: MWH						% in Total Generation Units: %				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	Total	Utility	IPP	Electric	Industry	Commercial
1990	-	-	1,185	1,196		2,381	-	-	49.8	50.2	-
1991	-	-	6,771	841		7,612	-	-	89.0	11.0	-
1992	-	-	527,080	29,548		556,628	-	-	94.7	5.3	-
1993	-	-	1,459,821	19,253		1,479,074	-	-	98.7	1.3	-
1994	-	-	1,298,733	28,009		1,326,742	-	-	97.9	2.1	-
1995	-	-	1,501,539	59,665		1,561,204	-	-	96.2	3.8	-
1996	-	-	1,583,438	59,665		1,643,103	-	-	96.4	3.6	-
1997	-	-	1,515,066	59,665		1,574,731	-	-	96.2	3.8	-
1998	-	-	1,415,985	18,883		1,434,868	-	-	98.7	1.3	-
1999	-	-	1,423,825	16,420		1,440,245	-	-	98.9	1.1	-
2000	-	-	1,536,013	42,572		1,578,585	-	-	97.3	2.7	-
2001	-	-	1,559,938	44,826		1,604,764	-	-	97.2	2.8	-
2002	-	-	1,518,723	27,074		1,545,797	-	-	98.2	1.8	-
2003	-	-	1,644,137	-		1,644,137	-	-	100.0	-	-
2004	-	-	1,603,751	-	-	1,603,751	-	-	100.0	-	-
2005	-	-	1,630,918	-	-	1,630,918	-	-	100.0	-	-
2006	-	-	1,548,595	-	-	1,548,595	-	-	100.0	-	-
2007	-	-	1,578,931	-	-	1,578,931	-	-	100.0	-	-
2008	-	-	1,647,592	-	-	1,647,592	-	-	100.0	-	-
2009	-	-	1,500,166	-	-	1,500,166	-	-	100.0	-	-
2010	-	-	1,496,139	49,375	-	1,545,514	-	-	96.8	3.2	-

Source: Energy Information Administration, State Energy Data System

Table 5.31. Other Energy Generated Electricity by Producer

	Electricity Generation Units: MWH						% in Total Generation Units: %				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	Total	Utility	IPP	Electric	Industry	Commercial
1990	28,742	371,676	83,164	480,927	-	964,509	3.0	38.5	8.6	49.9	-
1991	20,401	376,591	77,969	506,209	-	981,170	2.1	38.4	7.9	51.6	-
1992	9,823	388,899	53,864	501,044	-	953,630	1.0	40.8	5.6	52.5	-
1993	13,752	512,344	70,493	474,043	-	1,070,632	1.3	47.9	6.6	44.3	-
1994	18,805	622,693	39,964	459,785	-	1,141,247	1.6	54.6	3.5	40.3	-
1995	15,957	641,018	-	406,809	-	1,063,784	1.5	60.3	-	38.2	-
1996	17,866	604,402	992	398,414	-	1,021,674	1.7	59.2	0.1	39.0	-
1997	18,791	654,476	4,800	370,309	-	1,048,376	1.8	62.4	0.5	35.3	-
1998	14,062	644,561	7,974	275,549	-	942,146	1.5	68.4	0.8	29.2	-
1999	22,639	600,560	12,347	332,813	-	968,359	2.3	62.0	1.3	34.4	-
2000	17,763	654,413	-	290,860	-	963,036	1.8	68.0	-	30.2	-
2001	20,242	521,236	-	263,027	-	804,505	2.5	64.8	-	32.7	-
2002	10,138	400,254	11,624	228,267	-	650,283	1.6	61.6	1.8	35.1	-
2003	3,640	550,509	176,617	98,918	-	829,684	0.4	66.4	21.3	11.9	-
2004	11,210	266,841	165,354	94,647	323,903	861,955	1.3	31.0	19.2	11.0	37.6
2005	10,866	279,684	154,736	87,932	291,077	824,295	1.3	33.9	18.8	10.7	35.3
2006	24,496	349,246	156,084	88,491	337,789	956,106	2.6	36.5	16.3	9.3	35.3
2007	15,166	507,515	125,393	89,549	302,589	1,040,212	1.5	48.8	12.1	8.6	29.1
2008	18,043	501,404	126,845	83,988	328,579	1,058,859	1.7	47.4	12.0	7.9	31.0
2009	247,368	468,974	115,260	68,111	321,548	1,221,261	20.3	38.4	9.4	5.6	26.3
2010	237,402	475,372	7,750	171,155	311,507	1,203,186	19.7	39.5	0.6	14.2	25.9

Source: Energy Information Administration, State Energy Data System

Tables 5.32 to 5.37 show fuel consumptions and unit fuel consumptions by types of electricity producers.

Table 5.32. Fuel Consumption by All Electricity Producers

	Fuel Consumption			Fuel Consumption Per MWH			Fuel Consumption Per KWH		
Year	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BTU	Coal BTU	Other Gases BTU
1990	16,033,262	2,013	211	1.84	0.85	0.01	11.45	21.98	13.05
1991	13,464,028	5,555	729	1.75	0.73	0.01	10.87	13.14	14.16
1992	14,220,256	265,043	1,027	1.71	0.48	0.02	10.61	10.38	16.46
1993	12,605,395	603,669	1,044	1.70	0.41	0.02	10.59	9.09	16.55
1994	12,933,103	596,431	913	1.69	0.45	0.01	10.52	10.10	13.89
1995	13,034,983	688,499	663	1.70	0.44	0.01	10.55	9.91	9.57
1996	13,451,479	742,026	1,027	1.69	0.45	0.02	10.49	9.93	17.01
1997	13,226,872	754,453	622	1.72	0.48	0.01	10.68	10.48	9.51
1998	13,262,910	638,057	811	1.69	0.44	0.01	10.49	9.77	13.42
1999	13,544,370	646,215	447	1.69	0.45	0.01	10.51	9.84	9.03
2000	13,754,387	691,513	388	1.71	0.44	0.01	10.59	9.63	9.20
2001	13,661,310	717,290	315	1.66	0.45	0.01	10.29	9.82	8.32
2002	15,661,770	706,734	325	1.65	0.46	0.01	10.21	10.46	7.96
2003	13,133,452	751,987	361	1.54	0.46	0.01	9.59	10.42	8.97
2004	13,995,473	702,545	269	1.56	0.44	0.01	9.71	9.81	5.62
2005	14,131,327	703,865	231	1.56	0.43	0.01	9.67	9.57	5.62
2006	14,211,287	674,909	240	1.57	0.44	0.01	9.75	9.62	5.62
2007	13,943,232	689,627	254	1.56	0.44	0.01	9.72	9.66	5.62
2008	13,407,277	746,642	213	1.55	0.45	0.01	9.61	9.65	5.51
2009	12,739,777	663,171	126	1.54	0.44	0.01	9.55	9.47	5.62
2010	12,334,599	733,480	123	1.53	0.47	0.01	9.47	10.04	5.62

Source: Energy Information Administration, State Energy Data System

Table 5.33. Fuel Consumption by Electric Utility

	Fuel Consumption			Fuel Consumption Per MWH			Fuel Consumption Per KWH		
Year	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BTU	Coal BTU	Other Gases BTU
1990	13,769,448			1.73			10.78		
1991	12,695,906			1.74			10.82		
1992	11,988,722			1.75			10.88		
1993	10,656,101			1.76			10.90		
1994	10,409,083			1.72			10.71		
1995	10,712,608			1.73			10.78		
1996	10,980,227			1.72			10.65		
1997	10,792,923			1.74			10.82		
1998	10,864,385			1.73			10.73		
1999	11,195,221			1.74			10.80		
2000	11,439,206			1.76			10.88		
2001	11,055,880			1.74			10.76		
2002	12,825,449			1.71			10.55		
2003	11,099,634			1.71			10.62		
2004	12,046,236			1.73			10.73		
2005	12,039,252			1.74			10.82		
2006	12,238,861			1.74			10.83		
2007	12,027,927			1.74			10.81		
2008	11,516,852			1.72			10.71		
2009	10,859,417			1.73			10.77		
2010	10,601,260			1.72			10.65		

Source: Energy Information Administration, State Energy Data System

Table 5.34. Fuel Consumption by CHP-Electric Power

	Fuel Consumption			Fuel Consumption Per MWH			Fuel Consumption Per KWH		
Year	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BTU	Coal BTU	Other Gases BTU
1990	1,629,135	839		3.56	0.71		22.19	18.41	
1991	123,869	4,975		2.03	0.73		12.66	13.23	
1992	1,631,993	242,989		1.38	0.46		8.61	10.05	
1993	1,423,808	588,420		1.35	0.40		8.39	8.98	
1994	2,120,369	578,365		1.54	0.45		9.59	10.01	
1995	2,001,923	649,495		1.53	0.43		9.51	9.72	
1996	2,128,745	703,022		1.58	0.44		9.81	9.76	
1997	2,167,435	715,449		1.61	0.47		9.98	10.33	
1998	2,133,250	628,405		1.56	0.44		9.70	9.75	
1999	2,010,925	638,812		1.49	0.45		9.27	9.84	
2000	2,057,145	672,330		1.55	0.44		9.63	9.62	
2001	2,357,310	697,330		1.42	0.45		8.77	9.82	
2002	2,565,805	684,122		1.46	0.45		9.00	10.30	
2003	1,841,363	751,987		1.01	0.46		6.29	10.42	
2004	1,785,942	702,545		0.99	0.44		6.16	9.81	
2005	1,923,500	703,865		0.97	0.43		6.02	9.57	
2006	1,807,204	674,909		0.97	0.44		6.03	9.62	
2007	1,755,828	689,627		0.96	0.44		5.99	9.66	
2008	1,088,137	746,642		0.77	0.45		4.78	9.65	
2009	1,160,328	663,171		0.77	0.44		4.79	9.47	
2010	1,084,478	712,312		0.75	0.48		4.67	10.08	

Source: Energy Information Administration, State Energy Data System

Table 5.35. Fuel Consumption by IPP

	Fuel Consumption			Fuel Consumption Per MWH			Fuel Consumption Per KWH		
Year	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BTU	Coal BTU	Other Gases BTU
1990	34,680			2.51			15.64		
1991									
1992	34,680			1.78			11.05		
1993									
1994									
1995									
1996	6,180			3.08			19.15		
1997	5,500			3.08			19.16		
1998	7,680			3.02			18.76		
1999	6,800			3.01			18.67		
2000	5,750			3.04			18.86		
2001									
2002									
2003	1,933			2.47			15.31		
2004									
2005									
2006									
2007									
2008	657,789			1.65			10.23		
2009	555,860			1.66			10.31		
2010	486,952			1.70			10.57		

Source: Energy Information Administration, State Energy Data System

Table 5.36. Fuel Consumption by CHP-Industrial Power

	Fuel Consumption			Fuel Consumption Per MWH			Fuel Consumption Per KWH		
Year	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BTU	Coal BTU	Other Gases BTU
1990	599,999	1,174	211	2.02	0.98	0.0131	12.61	25.52	13.05
1991	644,253	580	729	1.89	0.69	0.0142	11.78	12.41	14.16
1992	564,861	22,054	1,027	1.99	0.75	0.0165	12.36	16.28	16.46
1993	525,486	15,249	1,044	1.95	0.79	0.0166	12.10	17.64	16.55
1994	403,651	18,066	913	1.75	0.65	0.0139	10.89	14.50	13.89
1995	320,452	39,004	663	1.63	0.65	0.0096	10.10	14.69	9.57
1996	336,327	39,004	1,027	1.59	0.65	0.0170	9.88	14.37	17.01
1997	261,014	39,004	622	1.80	0.65	0.0095	11.20	14.30	9.51
1998	257,595	9,652	811	1.32	0.51	0.0134	8.18	11.24	13.42
1999	331,424	7,403	447	1.52	0.45	0.0090	9.44	9.89	9.03
2000	252,286	19,183	388	1.20	0.45	0.0092	7.47	9.90	9.20
2001	248,120	19,960	315	1.27	0.45	0.0083	7.84	9.78	8.32
2002	270,516	22,611	325	1.31	0.84	0.0080	8.11	19.10	7.96
2003	190,522		361	0.99		0.0090	6.13	-	8.97
2004	159,838		269	0.92		0.0056	5.74	-	5.62
2005	164,246		231	0.92		0.0056	5.73	-	5.62
2006	163,225		240	0.93		0.0056	5.76	-	5.62
2007	155,832		254	0.87		0.0056	5.41	-	5.62
2008	140,804		213	0.83		0.0055	5.13	-	5.51
2009	159,962		126	0.87		0.0056	5.39	-	5.62
2010	158,213	21,168	123	0.88	0.43	0.0056	5.46	9.07	5.62

Source: Energy Information Administration, State Energy Data System

Table 5.37. Fuel Consumption by CHP-Commercial Power

	Fuel Consumption			Fuel Consumption Per MWH			Fuel Consumption Per KWH		
Year	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BBL	Coal ST	Other Gases Billion BTU	Petroleum BTU	Coal BTU	Other Gases BTU
2004	3,457			2.56			15.86		
2005	4,329			2.33			14.48		
2006	1,998			2.32			14.43		
2007	3,645			2.38			14.78		
2008	3,695			2.82			17.56		
2009	4,210			2.84			17.62		
2010	3,696			2.84			17.65		

Source: Energy Information Administration, State Energy Data System

Tables 5.38 to 5.43 show power generating capacity by types of electricity producers.

Table 5.38. Total Power Generating Capacity by Type

	Power Generating Capacity Units: MW								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	1,692	24	9	211		18	23		1,976
1991	1,910	24	9	204		18	23		2,187
1992	1,947	228	9	230	30	18	23		2,484
1993	1,976	228	9	222	30	18	23		2,505
1994	1,976	228	9	206	30	28	23		2,498
1995	1,976	228	9	193	35	29	22		2,491
1996	1,984	228	9	193	35	29	22		2,500
1997	1,972	228	9	178	35	29	20		2,471
1998	1,997	228	9	164	35	29	20		2,482
1999	2,007	228	9	156	35	28	9		2,473
2000	2,091	228	9	155	35	27	12		2,557
2001	2,093	227	9	151	35	26	11		2,552
2002	2,093	227	9	110	35	25	11		2,510
2003	2,089	227	9	114	35	23	11		2,508
2004	2,178	203	9	114	35	23	11		2,573
2005	2,192	203	9	114	35	25	11		2,589
2006	2,220	203	9	114	35	25	43		2,649
2007	2,224	203	9	114	35	25	64		2,674
2008	2,224	203	9	114	35	25	64	1	2,675
2009	2,242	203	9	227	35	25	64	1	2,806
2010	2,214	203	9	227	35	25	62	2	2,777

Source: Energy Information Administration, State Energy Data System

Table 5.39. Power Generating Capacity: Electric Utility

	Power Generating Capacity Units: MW								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	1,538					3			1,542
1991	1,574					3			1,577
1992	1,617					3			1,621
1993	1,655					3			1,659
1994	1,655					3			1,659
1995	1,655					3			1,659
1996	1,664					3			1,667
1997	1,652					3			1,655
1998	1,677					3			1,680
1999	1,687					3			1,690
2000	1,705					3	2		1,710
2001	1,703					3	2		1,708
2002	1,702					2	2		1,706
2003	1,702					2	2		1,706
2004	1,791					2	2		1,795
2005	1,806					4	2		1,812
2006	1,833					4	2		1,839
2007	1,838					4	2		1,844
2008	1,838					4	2		1,844
2009	1,856			113		4	2		1,975
2010	1,827			113		4			1,944

Source: Energy Information Administration, State Energy Data System

Table 5.40. Power Generating Capacity: CHP-Electric Power

	Power Generating Capacity Units: MW								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	119	24							143
1991	299	24							323
1992	299	228							527
1993	299	228							527
1994	299	228							527
1995	299	228							527
1996	299	228							527
1997	299	228							527
1998	299	228							527
1999	299	228							527
2000	364	228							592
2001	365	203		62		1			631
2002	365	203		46					614
2003	365	227		46					638
2004	365	203		46					614
2005	365	203		46					614
2006	365	203		46					614
2007	299	203		46					548
2008	299	203		46					548
2009	299	203		46					548
2010	299	203							502

Source: Energy Information Administration, State Energy Data System

Table 5.41. Power Generating Capacity: IPP

	Power Generating Capacity Units: MW								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	3			67			23		93
1991				64			23		86
1992	4			67	30		23		123
1993				67	30		23		119
1994				67	30	10	23		130
1995				67	35	10	22		134
1996				67	35	10	22		134
1997				67	35	10	20		132
1998				67	35	10	20		132
1999				67	35	10	9		121
2000				67	35	10	9		121
2001		24		67	35	15	9		150
2002		24		64	35	16	9		148
2003				64	35	16	9		124
2004					35	16	9		60
2005					35	15	9		59
2006					35	15	41		91
2007	66				35	15	62		178
2008	66				35	15	62	1	179
2009	66				35	15	62	1	179
2010	66				35	10	62	2	175

Source: Energy Information Administration, State Energy Data System

Table 5.42. Power Generating Capacity: CHP-Industrial Power

	Power Generating Capacity Units: MW								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	32		9	144		15			199
1991	37		9	140		15			201
1992	26		9	163		15			213
1993	21		9	155		15			200
1994	21		9	139		14			182
1995	21		9	126		15			171
1996	21		9	126		15			171
1997	21		9	111		15			157
1998	21		9	97		15			142
1999	21		9	89		15			134
2000	21		9	88		13			131
2001	25		9	22		7			63
2002	25		9			7			41
2003	21		9	4		6			40
2004	21		9	4		6			40
2005	21		9	4		6			40
2006	21		9	4		6			40
2007	21		9	4		6			40
2008	21		9	4		6			40
2009	20		9	4		6			39
2010	21		9	50		10			90

Source: Energy Information Administration, State Energy Data System

Table 5.43. Power Generating Capacity: CHP-Commercial Power

	Power Generating Capacity Units: MW								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
2004				64					64
2005				64					64
2006				64					64
2007				64					64
2008				64					64
2009				64					64
2010				64					64

Source: Energy Information Administration, State Energy Data System

Tables 5.44 to 5.49 show average annual operating hours by types of electricity producers and by types of fuels.

Table 5.44. Average Operating Hours: Total Electric Power Industry

	Average Operating Hours Units: Hours/Year								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	5,163	100	1,796	3,990		4,418	1,245		4,909
1991	4,038	320	5,720	4,044		3,944	1,580		3,979
1992	4,281	2,443	6,933	3,508	71	3,396	1,006		3,964
1993	3,743	6,493	7,008	3,500	5,075	3,125	973		3,970
1994	3,868	5,824	7,302	3,553	6,177	5,052	902		4,047
1995	3,887	6,853	7,701	3,308	6,701	3,384	932		4,136
1996	4,014	7,213	6,707	3,066	6,914	3,600	1,023		4,252
1997	3,899	6,913	7,265	3,403	7,011	3,950	792		4,173
1998	3,931	6,299	6,716	3,073	6,774	4,196	952		4,121
1999	3,983	6,322	5,501	3,696	6,024	4,046	1,783		4,208
2000	3,851	6,924	4,686	3,473	7,487	3,832	1,417		4,143
2001	3,929	7,069	4,206	1,905	5,903	3,875	193		4,167
2002	4,523	6,810	4,535	2,696	2,079	3,803	147		4,647
2003	4,070	7,243	4,472	3,045	5,094	3,935	143		4,377
2004	4,107	7,900	5,323	2,884	6,094	4,083	681		4,435
2005	4,137	8,034	4,570	2,717	6,331	3,848	603		4,451
2006	4,079	7,629	4,751	2,857	6,065	4,803	1,853		4,364
2007	4,008	7,778	5,025	2,502	6,568	3,694	3,722		4,313
2008	3,898	8,116	4,286	2,653	6,695	3,374	3,750	18	4,253
2009	3,697	7,390	2,483	1,253	4,788	4,506	3,929	1,390	3,924
2010	3,653	7,613	2,435	1,249	5,731	2,817	4,212	885	3,902

Source: Energy Information Administration, State Energy Data System

Table 5.45. Electricity Generation by Fuel: Electric Utilities

	Average Operating Hours Units: Hours/Year								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	5,180					6,789			5,187
1991	4,647					6,090			4,650
1992	4,236					2,932			4,233
1993	3,667					4,105			3,668
1994	3,646					5,613			3,650
1995	3,730					4,763			3,732
1996	3,848					5,333			3,851
1997	3,749					5,609			3,753
1998	3,749					4,104			3,750
1999	3,811					5,625			3,817
2000	3,822					5,038	1,325		3,821
2001	3,736					6,044	1,055		3,737
2002	4,408					4,267	803		4,404
2003	3,813					1,039	781		3,806
2004	3,892					4,862	743		3,890
2005	3,823					2,292	849		3,816
2006	3,828					5,914	420		3,828
2007	3,761					3,682	219		3,757
2008	3,636					4,468	86		3,634
2009	3,374					7,152	43		3,296
2010	3,382					4,180			3,300

Source: Energy Information Administration, State Energy Data System

Table 5.46. Electricity Generation by Fuel: CHP-Electric Power

	Average Operating Hours Units: Hours/Year								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	3,842	50							3,792
1991	204	284							451
1992	3,937	2,314							3,338
1993	3,521	6,408							4,902
1994	4,589	5,701							5,145
1995	4,365	6,591							5,327
1996	4,500	6,951							5,561
1997	4,504	6,651							5,441
1998	4,561	6,216							5,291
1999	4,494	6,250							5,276
2000	3,636	6,737							4,830
2001	4,562	7,684		0					5,111
2002	4,817	7,481		0					5,356
2003	4,984	7,243		3,368					5,705
2004	4,930	7,900		3,056					5,812
2005	5,435	8,034		2,909					6,139
2006	5,100	7,629		2,806					5,808
2007	6,089	7,778		2,375					6,432
2008	4,736	8,116		2,441					5,822
2009	5,038	7,390		1,972					5,696
2010	4,820	7,370							5,867

Source: Energy Information Administration, State Energy Data System

Table 5.47. Electricity Generation by Fuel: IPP

	Average Operating Hours Units: Hours/Year								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	5,124			5,136			1,245		4,163
1991				5,349			1,580		4,364
1992	5,422			5,455	71		1,006		3,323
1993				5,066	5,075		973		4,295
1994				5,587	6,177	4,238	902		4,801
1995				5,515	6,701	1,735	932		4,784
1996				4,774	6,914	2,043	1,023		4,520
1997				5,443	7,011	2,862	792		4,957
1998				5,338	6,774	3,095	937		4,887
1999				5,260	6,024	2,491	1,373		4,966
2000				5,222	7,487	2,810	1,595		5,424
2001		0		2,451	5,903	2,143	1		3,475
2002		0		2,646	2,079	1,644	1		2,704
2003				2,869	5,094	2,399	1		4,446
2004					6,094	2,972	668		4,447
2005					6,331	3,543	548		4,740
2006					6,065	3,876	1,923		3,838
2007	0				6,568	2,659	3,835		2,851
2008	6,053				6,695	1,813	3,869	18	5,033
2009	5,072				4,788	3,243	4,054	1,390	4,490
2010	4,336				5,731	1,189	4,212	885	4,352

Source: Energy Information Administration, State Energy Data System

Table 5.48. Electricity Generation by Fuel: CHP-Industrial Power

Average Operating Hours
Units: Hours/Year

Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
1990	9,331		1,796	2,838		3,875			3,910
1991	9,158		5,720	2,892		3,453			4,226
1992	10,846		6,933	2,378		3,502			3,832
1993	12,963		7,008	2,373		2,900			3,820
1994	11,073		7,302	2,286		5,527			3,937
1995	9,475		7,701	2,142		4,212			3,876
1996	10,160		6,707	2,155		4,285			3,910
1997	6,958		7,265	2,137		4,322			3,672
1998	9,396		6,716	1,437		4,973			3,445
1999	10,470		5,501	2,388		4,789			4,241
2000	9,972		4,686	2,141		4,634			4,144
2001	7,837		4,206	5,614		7,210			7,997
2002	8,230		4,535			8,604			11,246
2003	9,186		4,472	2,157		8,340			7,296
2004	8,229		5,323	2,527		6,106			6,686
2005	8,468		4,570	3,233		5,645			6,644
2006	8,379		4,751	1,860		6,383			6,611
2007	8,518		5,025	1,648		6,289			6,710
2008	8,122		4,286	1,537		6,545			6,364
2009	9,221		2,483	2,594		5,898			6,475
2010	8,570		2,435	2,148		4,182			4,450

Source: Energy Information Administration, State Energy Data System

Table 5.49. Electricity Generation by Fuel: CHP-Commercial Power

	Average Operating Hours Units: Hours/Year								
Year	Petroleum	Coal	Other Gases	Other Biomass	Geothermal	Hydro	Wind	Solar	Total
2004				2,784					5,082
2005				2,547					4,577
2006				2,956					5,291
2007				2,648					4,752
2008				2,875					5,154
2009				2,814					5,047
2010				2,726					4,888

Source: Energy Information Administration, State Energy Data System

Table 5.50 shows the average electricity price by sectors in Hawaii.

Table 5.50. Average Electricity Price by Sector in Hawaii

Year	Residential Cents/kWh	Commercial Cents/kWh	Industrial Cents/kWh	Total Cents/kWh
1990	10.26	10.18	7.57	9.02
1991	10.52	10.33	7.71	9.22
1992	10.90	10.53	7.83	9.44
1993	12.28	11.68	8.95	10.66
1994	12.45	11.67	8.82	10.68
1995	13.32	12.16	9.27	11.29
1996	14.26	12.99	10.03	12.12
1997	14.80	13.26	10.32	12.49
1998	13.82	12.31	9.41	11.56
1999	14.30	12.74	9.70	11.97
2000	16.41	14.81	11.69	14.03
2001	16.34	14.81	11.68	14.05
2002	15.63	14.11	11.02	13.39
2003	16.73	15.02	12.20	14.47
2004	18.06	16.19	13.35	15.70
2005	20.70	19.04	15.79	18.33
2006	23.35	21.42	17.96	20.72
2007	24.12	21.91	18.38	21.29
2008	32.50	29.72	26.05	29.20
2009	24.20	21.86	18.14	21.21
2010	28.10	25.93	21.94	25.12

Source: Energy Information Administration, State Energy Data System

Table 5.51 shows retail electricity sales by sector in Hawaii.

Table 5.51. Retail Electricity Sales by Sector in Hawaii

Year	Residential GWH	Commercial GWH	Industrial GWH	Total GWH	Residential %	Commercial %	Industrial %
1990	2,324	2,194	3,734	8,310	28.0	26.4	44.9
1991	2,396	2,298	3,773	8,525	28.1	27.0	44.3
1992	2,438	2,356	3,811	8,666	28.1	27.2	44.0
1993	2,469	2,363	3,770	8,658	28.5	27.3	43.5
1994	2,557	2,543	3,791	8,949	28.6	28.4	42.4
1995	2,606	2,721	3,803	9,187	28.4	29.6	41.4
1996	2,676	2,761	3,884	9,379	28.5	29.4	41.4
1997	2,668	2,782	3,856	9,363	28.5	29.7	41.2
1998	2,641	2,776	3,787	9,261	28.5	30.0	40.9
1999	2,689	2,887	3,748	9,381	28.7	30.8	40.0
2000	2,765	3,036	3,834	9,691	28.5	31.3	39.6
2001	2,802	3,129	3,790	9,784	28.6	32.0	38.7
2002	2,898	3,168	3,770	9,891	29.3	32.0	38.1
2003	3,028	3,517	3,846	10,391	29.1	33.8	37.0
2004	3,162	3,632	3,937	10,731	29.5	33.8	36.7
2005	3,164	3,463	3,912	10,539	30.0	32.9	37.1
2006	3,182	3,490	3,896	10,568	30.1	33.0	36.9
2007	3,201	3,520	3,864	10,585	30.2	33.3	36.5
2008	3,085	3,501	3,804	10,390	29.7	33.7	36.6
2009	3,055	3,388	3,683	10,126	30.2	33.5	36.4
2010	2,989	3,355	3,672	10,016	29.8	33.5	36.7

Source: Energy Information Administration, State Energy Data System

Table 5.52 shows revenues from retail electricity sales by sector in Hawaii.

Table 5.52. Revenue from Retail Electricity Sales by Sector in Hawaii

Year	Residential $M	Commercial $M	Industrial $M	Total $M	Residential %	Commercial %	Industrial %
1990	238	223	283	749	31.8	29.8	37.8
1991	252	237	291	786	32.1	30.2	37.0
1992	266	248	299	819	32.5	30.3	36.5
1993	303	276	337	922	32.9	29.9	36.6
1994	318	297	334	956	33.3	31.1	34.9
1995	347	331	352	1,037	33.5	31.9	33.9
1996	382	359	390	1,138	33.6	31.5	34.3
1997	395	369	398	1,170	33.8	31.5	34.0
1998	365	342	357	1,071	34.1	31.9	33.3
1999	384	368	364	1,123	34.2	32.8	32.4
2000	454	450	448	1,360	33.4	33.1	32.9
2001	458	464	443	1,376	33.3	33.7	32.2
2002	453	447	415	1,324	34.2	33.8	31.3
2003	507	528	469	1,504	33.7	35.1	31.2
2004	571	588	526	1,685	33.9	34.9	31.2
2005	655	659	618	1,932	33.9	34.1	32.0
2006	743	748	700	2,191	33.9	34.1	31.9
2007	772	771	710	2,253	34.3	34.2	31.5
2008	1,003	1,040	991	3,034	33.1	34.3	32.7
2009	739	741	668	2,148	34.4	34.5	31.1
2010	840	870	806	2,516	33.4	34.6	32.0

Source: Energy Information Administration, State Energy Data System

Table 5.53 shows the number of electricity retail customers by sector in Hawaii.

Table 5.53. Number of Retail Customers by Sector in Hawaii

Year	Residential Customers	Commercial Customers	Industrial Customers	Total Customers	Residential %	Commercial %	Industrial %
1990	316,459	47,997	705	366,698	86.3	13.1	0.2
1991	325,703	49,572	727	377,533	86.3	13.1	0.2
1992	331,347	49,756	744	383,801	86.3	13.0	0.2
1993	337,364	50,603	753	390,280	86.4	13.0	0.2
1994	345,551	51,208	711	401,771	86.0	12.7	0.2
1995	350,644	52,276	684	407,966	85.9	12.8	0.2
1996	354,421	52,424	693	411,691	86.1	12.7	0.2
1997	357,329	52,367	685	414,565	86.2	12.6	0.2
1998	359,986	52,438	683	417,344	86.3	12.6	0.2
1999	363,680	52,986	661	421,581	86.3	12.6	0.2
2000	368,361	53,782	661	427,108	86.2	12.6	0.2
2001	375,021	54,809	654	434,862	86.2	12.6	0.2
2002	375,668	54,571	643	434,808	86.4	12.6	0.1
2003	385,827	61,088	669	447,584	86.2	13.6	0.1
2004	389,411	62,107	673	452,191	86.1	13.7	0.1
2005	395,079	60,147	684	455,910	86.7	13.2	0.2
2006	401,592	61,334	689	463,615	86.6	13.2	0.1
2007	407,146	62,001	682	469,829	86.7	13.2	0.1
2008	409,668	61,684	673	472,025	86.8	13.1	0.1
2009	412,843	60,869	688	474,400	87.0	12.8	0.1
2010	414,568	60,479	686	475,733	87.1	12.7	0.1

Source: Energy Information Administration, State Energy Data System

Table 5.54 shows the average revenue per retail electricity customers by sector in Hawaii.

Table 5.54. Revenue Per Retail Customers by Sector in Hawaii

Year	Residential $/Customer	Commercial $/Customer	Industrial $/Customer	Total $/Customer
1990	752	4,646	401,418	2,043
1991	774	4,781	400,275	2,082
1992	803	4,984	401,882	2,134
1993	898	5,454	447,543	2,362
1994	920	5,800	469,761	2,379
1995	990	6,332	514,620	2,542
1996	1,078	6,848	562,771	2,764
1997	1,105	7,046	581,022	2,822
1998	1,014	6,522	522,694	2,566
1999	1,056	6,945	550,681	2,664
2000	1,232	8,367	677,761	3,184
2001	1,221	8,466	677,370	3,164
2002	1,206	8,191	645,412	3,045
2003	1,314	8,643	701,046	3,360
2004	1,466	9,468	781,575	3,726
2005	1,658	10,956	903,509	4,238
2006	1,850	12,196	1,015,965	4,726
2007	1,896	12,435	1,041,056	4,795
2008	2,448	16,860	1,472,511	6,428
2009	1,790	12,174	970,930	4,528
2010	2,026	14,385	1,174,927	5,289

Source: Energy Information Administration, State Energy Data System

Table 5.55 provides selected major operating indicators of electric utilities in Hawaii from 2006 to 2011.

Table 5.55. State of Hawaii Electric Utility Major Operating Indicators

	Units	2006 Annual	2007 Annual	2008 Annual	2009 Annual	2010 Annual	2011 Annual	Average 06 to 11
Total Operating Revenues	$M	2,196	2,260	3,043	2,156	2,523	3,156	2,556
Total Operating Expenses	$M	2,061	2,139	2,895	2,028	2,388	2,983	2,416
Operating Income	$M	135	121	148	129	135	173	140
Operating Income as % of Revenue	%	6	5	5	6	5	5	6
% in Total Operating Expenses								
Fuel Cost	%	41	40	46	36	41	45	41
Purchased Power	%	25	25	24	25	23	23	24
Fuel and Purchased Power	%	66	65	70	61	64	69	66
Operation and Maintenance	%	6	6	5	7	6	5	6
Transmission Expenses	%	1	1	1	1	1	1	1
Distribution Expenses	%	2	2	2	2	2	2	2
Customer Accounts Expenses	%	1	1	1	1	1	1	1
Customer Service Expenses	%	1	1	1	2	1	0	1
Admin & Gen Expenses	%	5	5	4	6	6	5	5
Sub-Total Utility Operating Expense	%	81	81	83	80	81	83	81
Depreciation and Amortization	%	7	7	5	8	7	5	7
Taxes	%	12	11	11	12	12	12	12
Other Expense	%	0	0	0	0	0	0	0
Total Electricity Sold	GWh	10,568	10,585	10,390	10,126	10,013	9,962	10,274
Generated by Utility	GWh	6,439	6,330	6,113	5,972	5,923	5,915	6,115
Electricity Purchased	GWh	4,129	4,255	4,277	4,154	4,090	4,046	4,159
% of Electricity Purchased	%	39	40	41	41	41	41	40
Average Revenue per kWh Sold	$/kWh	0.208	0.214	0.293	0.213	0.252	0.317	0.249
Fuel	$/kWh	0.121	0.123	0.186	0.112	0.142	0.196	0.147
Operation and Maintenance	$/kWh	0.018	0.021	0.022	0.023	0.026	0.025	0.022
Transmission Expenses	$/kWh	0.001	0.002	0.002	0.002	0.002	0.002	0.002
Distribution Expenses	$/kWh	0.004	0.004	0.004	0.005	0.006	0.006	0.005
Customer Accounts Expenses	$/kWh	0.002	0.002	0.003	0.003	0.002	0.003	0.002
Customer Service Expenses	$/kWh	0.002	0.003	0.004	0.003	0.001	0.001	0.002
Admin & Gen Expenses	$/kWh	0.009	0.011	0.011	0.012	0.015	0.014	0.012
Depreciation and Amortization	$/kWh	0.014	0.014	0.015	0.016	0.016	0.015	0.015
Taxes	$/kWh	0.023	0.023	0.032	0.025	0.028	0.036	0.028
Other Expense	$/kWh	0.001	0.000	0.000	0.000	0.001	0.000	0.000
Net Income	$/kWh	0.013	0.011	0.014	0.013	0.014	0.017	0.014
Average Cost of Purchased KWH	$/kWh	0.124	0.127	0.163	0.121	0.135	0.172	0.141
Average Fuel Cost of Net Generated KWH	$/kWh	0.131	0.134	0.217	0.121	0.164	0.229	0.166
Cost of Fuel Oil / KWH Generated	$/kWh	0.108	0.110	0.188	0.104	0.145	0.205	0.143
Cost of Diesel Oil / KWH Generated	$/kWh	0.075	0.087	0.101	0.075	0.087	0.121	0.091
Fuel Oil Consumed	TBBL	9,442	9,358	8,971	8,618	8,358	8,264	8,835
Diesel Oil Consumed	TBBL	2,795	2,687	2,546	2,627	2,641	2,692	2,665
Total Oil Consumed	TBBL	12,237	12,045	11,517	11,245	10,999	10,956	11,500
Total Cost of Oil	$M	845	850	1,327	724	969	1,356	1,012
Total Cost of Fuel Oil	$M	588	592	979	519	708	993	730
Total Cost of Diesel Oil	$M	258	258	348	205	261	363	282
Average Cost of Fuel Oil	$/BBL	62	63	109	60	85	120	83
Average Cost of Diesel Oil	$/BBL	92	96	137	78	99	135	106

Tables 5.56 to 5.61 provide selected major operating indicators of electric utilities by county in Hawaii from 2006 to 2011.

Table 5.56. County Electric Power Sector Annual Data - 2011

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	3,156	2,110	444	419	183
Total Operating Expenses	$M	2,983	2,020	406	393	165
Operating Income	$M	173	90	38	27	18
Operating Income as % of Revenue	%	5	4	9	6	10
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	45	45	30	60	55
Purchased Power	%	23	26	34	8	5
Fuel and Purchased Power	%	69	71	64	67	60
Operation and Maintenance	%	5	4	5	6	9
Transmission Expenses	%	1	1	1	1	1
Distribution Expenses	%	2	2	3	2	2
Customer Accounts Expenses	%	1	1	1	1	2
Customer Service Expenses	%	0	1	0	0	0
Admin & Gen Expenses	%	5	5	4	4	9
Sub-Total Utility Operating Expense	%	83	84	78	82	83
Depreciation and Amortization	%	5	4	8	5	8
Taxes	%	12	11	14	13	9
Other Expense	%	0	0	0	0	0
Total Electricity Sold	GWH	9,962	7,242	1,104	1,181	435
Generated by Utility	GWH	5,915	4,055	472	990	398
Electricity Purchased	GWH	4,046	3,187	631	191	37
% of Electricity Purchased	%	41	44	57	16	8
Average Revenue per kWh Sold	$/kWh	0.317	0.291	0.403	0.355	0.420
Fuel (All)	$/kWh	0.196	0.188	0.212	0.219	0.223
Operation and Maintenance	$/kWh	0.025	0.022	0.040	0.025	0.037
Transmission Expenses	$/kWh	0.002	0.002	0.002	0.002	0.002
Distribution Expenses	$/kWh	0.006	0.005	0.010	0.007	0.009
Customer Accounts Expenses	$/kWh	0.003	0.002	0.004	0.004	0.006
Customer Service Expenses	$/kWh	0.001	0.001	0.001	0.001	0.001
Admin & Gen Expenses	$/kWh	0.014	0.013	0.016	0.013	0.034
Depreciation and Amortization	$/kWh	0.015	0.012	0.029	0.017	0.031
Taxes	$/kWh	0.036	0.032	0.052	0.043	0.035
Other Expense	$/kWh	0.000	0.000	0.000	0.001	0.000
Net Income	$/kWh	0.017	0.012	0.035	0.023	0.041
Average Cost of Purchased KWH	$/kWh	0.172	0.164	0.218	0.157	0.209
Average Fuel Cost of Utility	$/kWh	0.229	0.206	0.219	0.221	0.217
Cost of Fuel Oil / KWH Generated	$/kWh	0.205	0.203	0.214	0.226	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.121	0.354	0.271	-	0.226
Fuel Oil Consumed	TBBL	8,264	7,285	577	402	-
Diesel Oil Consumed	TBBL	2,692	110	455	1,405	722
Total Cost of Fuel Oil	$M	993	889	62	42	-
Total Cost of Diesel Oil	$M	363	20	60	192	91
Average Cost of Fuel Oil	$/BBL	120	122	107	105	-
Average Cost of Diesel Oil	$/BBL	135	184	132	137	125

Table 5.57. County Electric Power Sector Annual Data - 2010

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	2,523	1,650	373	345	155
Total Operating Expenses	$M	2,388	1,575	346	327	140
Operating Income	$M	135	75	27	18	15
Operating Income as % of Revenue	%	5	5	7	5	10
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	41	40	27	54	49
Purchased Power	%	23	26	33	7	3
Fuel and Purchased Power	%	64	66	60	61	52
Operation and Maintenance	%	6	5	7	10	10
Transmission Expenses	%	1	1	1	1	1
Distribution Expenses	%	2	2	2	3	3
Customer Accounts Expenses	%	1	1	1	1	2
Customer Service Expenses	%	1	1	1	0	1
Admin & Gen Expenses	%	6	6	5	5	10
Total Utility Operating Expense	%	81	83	76	80	78
Depreciation and Amortization	%	7	5	10	8	10
Taxes	%	12	12	13	12	9
Other Expense	%	0	0	0	0	0
Total Electricity Sold	GWH	10,013	7,277	1,110	1,192	435
Generated by Utility	GWH	5,923	4,047	468	1,001	407
Electricity Purchased	GWH	4,090	3,231	641	191	27
% of Electricity Purchased	%	41	44	58	16	6
Average Revenue per kWh Sold	$/kWh	0.252	0.227	0.336	0.290	0.357
Fuel (All)	$/kWh	0.142	0.134	0.156	0.162	0.174
Operation and Maintenance	$/kWh	0.026	0.021	0.052	0.033	0.033
Transmission Expenses	$/kWh	0.002	0.002	0.002	0.002	0.002
Distribution Expenses	$/kWh	0.006	0.005	0.008	0.008	0.009
Customer Accounts Expenses	$/kWh	0.002	0.002	0.003	0.003	0.006
Customer Service Expenses	$/kWh	0.001	0.002	0.002	0.000	0.002
Admin & Gen Expenses	$/kWh	0.015	0.014	0.016	0.012	0.033
Depreciation and Amortization	$/kWh	0.016	0.012	0.032	0.022	0.034
Taxes	$/kWh	0.028	0.025	0.040	0.032	0.030
Other Expense	$/kWh	0.001	0.001	0.001	0.000	0.000
Net Income	$/kWh	0.014	0.010	0.024	0.015	0.035
Average Cost of Purchased KWH	$/kWh	0.135	0.128	0.176	0.124	0.162
Average Fuel Cost of Utility	$/kWh	0.164	0.143	0.169	0.164	0.162
Cost of Fuel Oil / KWH Generated	$/kWh	0.145	0.141	0.169	0.171	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.087	0.352	0.200	-	0.165
Fuel Oil Consumed	TBBL	8,358	7,307	613	438	-
Diesel Oil Consumed	TBBL	2,641	75	434	1,409	723
Total Cost of Fuel Oil	$M	708	623	50	35	-
Total Cost of Diesel Oil	$M	261	8	43	141	69
Average Cost of Fuel Oil	$/BBL	85	85	82	79	-
Average Cost of Diesel Oil	$/BBL	99	107	100	100	95

Table 5.58. County Electric Power Sector Annual Data - 2009

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	2,156	1,385	344	298	130
Total Operating Expenses	$M	2,028	1,314	320	278	115
Operating Income	$M	129	71	24	19	14
Operating Income as % of Revenue	%	6	5	7	7	11
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	36	35	23	49	45
Purchased Power	%	25	28	35	7	3
Fuel and Purchased Power	%	61	63	58	57	48
Operation and Maintenance	%	7	6	7	10	11
Transmission Expenses	%	1	1	1	1	1
Distribution Expenses	%	2	2	3	3	3
Customer Accounts Expenses	%	1	1	2	1	2
Customer Service Expenses	%	2	2	1	1	1
Admin & Gen Expenses	%	6	6	5	5	10
Sub-Total Utility Operating Expense	%	80	81	77	77	76
Depreciation and Amortization	%	8	6	10	10	14
Taxes	%	12	13	13	12	9
Other Expense	%	0	0	0	0	0
Total Electricity Sold	GWH	10,126	7,378	1,120	1,192	436
Generated by Utility	GWH	5,972	4,111	451	1,008	402
Electricity Purchased	GWH	4,154	3,267	669	185	34
% of Electricity Purchased	%	41	44	60	15	8
Average Revenue per kWh Sold	$/kWh	0.213	0.188	0.307	0.250	0.297
Fuel (All)	$/kWh	0.112	0.104	0.137	0.128	0.125
Operation and Maintenance	$/kWh	0.023	0.018	0.051	0.026	0.032
Transmission Expenses	$/kWh	0.002	0.002	0.002	0.002	0.002
Distribution Expenses	$/kWh	0.005	0.004	0.008	0.006	0.008
Customer Accounts Expenses	$/kWh	0.003	0.002	0.005	0.003	0.005
Customer Service Expenses	$/kWh	0.003	0.003	0.002	0.002	0.002
Admin & Gen Expenses	$/kWh	0.012	0.011	0.014	0.012	0.026
Depreciation and Amortization	$/kWh	0.016	0.011	0.029	0.024	0.038
Taxes	$/kWh	0.025	0.022	0.038	0.029	0.025
Other Expense	$/kWh	0.000	0.000	0.000	0.000	0.000
Net Income	$/kWh	0.013	0.010	0.021	0.016	0.032
Average Cost of Purchased KWH	$/kWh	0.121	0.112	0.168	0.109	0.113
Average Fuel Cost of Utility	$/kWh	0.121	0.102	0.144	0.127	0.122
Cost of Fuel Oil / KWH Generated	$/kWh	0.104	0.101	0.128	0.129	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.075	0.268	0.176	-	0.127
Fuel Oil Consumed	TBBL	8,618	7,412	735	471	-
Diesel Oil Consumed	TBBL	2,627	143	355	1,398	730
Total Cost of Fuel Oil	$M	519	447	44	28	-
Total Cost of Diesel Oil	$M	205	13	30	110	52
Average Cost of Fuel Oil	$/BBL	60	60	60	59	-
Average Cost of Diesel Oil	$/BBL	78	90	86	78	71

Table 5.59. County Electric Power Sector Annual Data - 2008

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	3,043	1,955	446	453	190
Total Operating Expenses	$M	2,895	1,878	420	426	171
Operating Income	$M	148	76	26	27	18
Operating Income as % of Revenue	%	5	4	6	6	10
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	46	46	26	59	57
Purchased Power	%	24	25	42	9	4
Fuel and Purchased Power	%	70	71	68	68	61
Operation and Maintenance	%	5	4	4	5	8
Transmission Expenses	%	1	1	1	0	1
Distribution Expenses	%	2	1	2	2	2
Customer Accounts Expenses	%	1	1	1	1	1
Customer Service Expenses	%	1	2	1	1	1
Admin & Gen Expenses	%	4	4	3	3	7
Sub-Total Utility Operating Expense	%	83	84	80	81	81
Depreciation and Amortization	%	5	4	7	6	10
Taxes	%	11	11	12	12	9
Other Expense	%	0	0	0	0	0
Total Electricity Sold	GWH	10,390	7,556	1,141	1,239	454
Generated by Utility	GWH	6,113	4,290	360	1,038	425
Electricity Purchased	GWH	4,277	3,266	781	201	29
% of Electricity Purchased	%	41	43	68	16	6
Average Revenue per kWh Sold	$/kWh	0.293	0.259	0.391	0.365	0.418
Fuel (All)	$/kWh	0.186	0.170	0.215	0.231	0.229
Operation and Maintenance	$/kWh	0.022	0.018	0.052	0.022	0.032
Transmission Expenses	$/kWh	0.002	0.001	0.002	0.002	0.002
Distribution Expenses	$/kWh	0.004	0.003	0.006	0.006	0.008
Customer Accounts Expenses	$/kWh	0.003	0.002	0.005	0.003	0.005
Customer Service Expenses	$/kWh	0.004	0.004	0.003	0.004	0.002
Admin & Gen Expenses	$/kWh	0.011	0.010	0.012	0.010	0.027
Depreciation and Amortization	$/kWh	0.015	0.011	0.027	0.022	0.036
Taxes	$/kWh	0.032	0.028	0.046	0.042	0.035
Other Expense	$/kWh	0.000	0.000	0.001	0.001	0.000
Net Income	$/kWh	0.014	0.010	0.023	0.022	0.041
Average Cost of Purchased KWH	$/kWh	0.163	0.145	0.226	0.191	0.226
Average Fuel Cost of Utility	$/kWh	0.217	0.185	0.236	0.227	0.220
Cost of Fuel Oil / KWH Generated	$/kWh	0.188	0.184	0.213	0.212	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.101	0.333	0.290	-	0.229
Fuel Oil Consumed	TBBL	8,971	7,747	758	466	-
Diesel Oil Consumed	TBBL	2,546	70	248	1,445	783
Total Cost of Fuel Oil	$M	979	858	76	45	-
Total Cost of Diesel Oil	$M	348	9	34	207	98
Average Cost of Fuel Oil	$/BBL	109.2	111	100	97	-
Average Cost of Diesel Oil	$/BBL	136.7	122	137	143	125

Table 5.60. County Electric Power Sector Annual Data - 2007

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	2,260	1,385	361	350	163
Total Operating Expenses	$M	2,139	1,331	336	329	142
Operating Income	$M	121	54	25	21	21
Operating Income as % of Revenue	%	5	4	7	6	13
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	40	39	22	53	54
Purchased Power	%	25	28	40	10	3
Fuel and Purchased Power	%	65	67	62	63	57
Operation and Maintenance	%	6	5	7	8	8
Transmission Expenses	%	1	1	1	1	1
Distribution Expenses	%	2	2	2	2	2
Customer Accounts Expenses	%	1	1	1	1	2
Customer Service Expenses	%	1	2	1	1	1
Admin & Gen Expenses	%	5	5	5	4	8
Sub-Total Utility Operating Expense	%	81	83	78	80	79
Depreciation and Amortization	%	7	6	9	8	11
Taxes	%	11	11	13	12	10
Other Expense	%	0	0	0	0	-
Total Electricity Sold	GWH	10,585	7,675	1,163	1,280	467
Generated by Utility	GWH	6,330	4,437	394	1,059	440
Electricity Purchased	GWH	4,255	3,238	769	221	27
% of Electricity Purchased	%	40	42	66	17	6
Average Revenue per kWh Sold	$/kWh	0.214	0.180	0.311	0.274	0.349
Fuel (All)	$/kWh	0.123	0.110	0.144	0.157	0.172
Operation and Maintenance	$/kWh	0.021	0.016	0.056	0.025	0.027
Transmission Expenses	$/kWh	0.002	0.001	0.002	0.002	0.003
Distribution Expenses	$/kWh	0.004	0.003	0.006	0.005	0.008
Customer Accounts Expenses	$/kWh	0.002	0.002	0.003	0.002	0.006
Customer Service Expenses	$/kWh	0.003	0.003	0.002	0.003	0.002
Admin & Gen Expenses	$/kWh	0.011	0.009	0.014	0.010	0.024
Depreciation and Amortization	$/kWh	0.014	0.010	0.025	0.021	0.035
Taxes	$/kWh	0.023	0.019	0.037	0.030	0.029
Other Expense	$/kWh	0.000	0.000	0.001	0.001	-
Net Income	$/kWh	0.011	0.007	0.021	0.017	0.044
Average Cost of Purchased KWH	$/kWh	0.127	0.114	0.175	0.151	0.175
Average Fuel Cost of Utility	$/kWh	0.134	0.108	0.153	0.153	0.165
Cost of Fuel Oil / KWH Generated	$/kWh	0.110	0.107	0.130	0.130	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.087	0.411	0.205	-	0.172
Fuel Oil Consumed	TBBL	9,358	8,098	787	473	-
Diesel Oil Consumed	TBBL	2,687	97	280	1,487	823
Total Cost of Fuel Oil	$M	592	516	48	28	-
Total Cost of Diesel Oil	$M	258	9	27	145	76
Average Cost of Fuel Oil	$/BBL	63.3	64	60	60	-
Average Cost of Diesel Oil	$/BBL	96.1	96	98	98	93

Table 5.61. County Electric Power Sector Annual Data - 2006

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	2,196	1,366	340	345	146
Total Operating Expenses	$M	2,061	1,290	323	320	128
Operating Income	$M	135	75	17	25	18
Operating Income as % of Revenue	%	6	6	5	7	12
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	41	40	26	56	50
Purchased Power	%	25	28	38	8	4
Fuel and Purchased Power	%	66	68	64	65	54
Operation and Maintenance	%	6	5	7	6	10
Transmission Expenses	%	1	1	1	1	1
Distribution Expenses	%	2	2	2	2	3
Customer Accounts Expenses	%	1	1	1	1	2
Customer Service Expenses	%	1	1	1	1	1
Admin & Gen Expenses	%	5	5	4	3	8
Sub-Total Utility Operating Expense	%	81	82	80	78	78
Depreciation and Amortization	%	7	6	9	8	12
Taxes	%	12	12	11	13	10
Other Expense	%	0	0	0	1	-
Total Electricity Sold	GWH	10,568	7,701	1,149	1,266	452
Generated by Utility	GWH	6,439	4,451	460	1,111	418
Electricity Purchased	GWH	4,129	3,250	689	156	34
% of Electricity Purchased	%	39	42	60	12	8
Average Revenue per kWh Sold	$/kWh	0.208	0.177	0.296	0.273	0.323
Fuel (All)	$/kWh	0.121	0.108	0.152	0.161	0.151
Operation and Maintenance	$/kWh	0.018	0.014	0.048	0.018	0.030
Transmission Expenses	$/kWh	0.001	0.001	0.002	0.001	0.002
Distribution Expenses	$/kWh	0.004	0.003	0.006	0.004	0.008
Customer Accounts Expenses	$/kWh	0.002	0.002	0.003	0.002	0.005
Customer Service Expenses	$/kWh	0.002	0.002	0.002	0.003	0.002
Admin & Gen Expenses	$/kWh	0.009	0.008	0.010	0.008	0.024
Depreciation and Amortization	$/kWh	0.014	0.010	0.025	0.020	0.035
Taxes	$/kWh	0.023	0.020	0.031	0.034	0.027
Other Expense	$/kWh	0.001	0.000	0.001	0.001	-
Net Income	$/kWh	0.013	0.010	0.015	0.020	0.040
Average Cost of Purchased KWH	$/kWh	0.124	0.110	0.178	0.170	0.161
Average Fuel Cost of Utility	$/kWh	0.131	0.106	0.151	0.151	0.144
Cost of Fuel Oil / KWH Generated	$/kWh	0.108	0.105	0.125	0.123	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.075	0.330	0.203	-	0.150
Fuel Oil Consumed	TBBL	9,442	8,077	844	521	-
Diesel Oil Consumed	TBBL	2,795	74	370	1,588	763
Total Cost of Fuel Oil	$M	588	509	49	30	-
Total Cost of Diesel Oil	$M	258	7	36	151	64
Average Cost of Fuel Oil	$/BBL	62.3	63	58	57	-
Average Cost of Diesel Oil	$/BBL	92.1	95	97	95	84

6. EMISSIONS OF HAWAII'S ELECTRIC POWER INDUSTRY

The estimated emissions of Hawaii's electric power industry from 1990 to 2010 are provided in Table 6.1. Total CO_2 emission in the electric power industry was relatively stable from 1990 to 2010, while NOX emissions from the electric power sector increased over time, but SO_2 emissions decreased over time.

Table 6.1. Emissions of Electric Power Industry

	Total Electric Power Industry In Thousand Metric Tons			% of Petroleum % of Total Emission			% of Coal % of Total Emission		
Year	CO2	SO2	NOX	CO2	SO2	NOX	CO2	SO2	NOX
1990	8,064	35	15	97	100	93	0	0	0
1991	6,888	27	11	96	96	91	0	0	0
1992	7,835	28	14	89	93	71	8	7	14
1993	7,770	22	15	80	86	60	17	14	33
1994	7,967	21	15	80	81	60	17	14	33
1995	8,350	39	27	77	90	78	19	10	15
1996	8,532	44	28	78	89	75	20	9	18
1997	8,460	44	27	77	89	78	20	9	19
1998	8,363	46	28	79	91	75	18	9	14
1999	8,386	44	28	80	93	79	17	7	14
2000	8,679	51	26	79	76	85	19	22	12
2001	8,806	26	27	77	92	89	19	4	4
2002	9,347	23	32	81	87	88	17	9	9
2003	8,750	23	28	78	91	89	20	4	4
2004	9,203	24	29	79	92	90	19	4	3
2005	9,132	21	30	80	95	90	18	5	3
2006	9,138	22	29	81	95	93	17	5	3
2007	9,026	22	23	80	95	91	18	5	4
2008	9,048	21	22	79	95	86	18	10	5
2009	8,661	22	22	79	95	91	18	9	5
2010	8,287	17	21	78	88	86	19	6	5

Source: Energy Information Administration, State Energy Data System