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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 about $5.3 billion in 2008. This value accounted for about 8.1 percent of Hawaii's total Gross Domestic Product (GDP) in 2008. Petroleum accounted for about 96.9 percent of Hawaii's primary energy expenditures. Hawaii's total energy expenditure (including electricity additions) reached about $6.9 billion in 2008, accounted for about 10.4 percent of total GDP in 2008.

With the rapid increase in petroleum price in recent years, total energy expenditure in Hawaii is growing rapidly. From 1970 to 2008, Hawaii's primary energy expenditures increased 9.0 percent per year on average; Hawaii's total energy expenditures increased 8.8 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).

The intent of this statistical report is that it will be the first in a series of annual reports that 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 about $5.3 billion in 2008. This value accounted for about 8.1 percent of Hawaii's total Gross Domestic Product (GDP) in 2008. Petroleum accounted for about 96.9 percent of Hawaii's primary energy expenditures. Hawaii's total energy expenditure (including electricity additions) reached about $6.9 billion in 2008, accounted for about 10.4 percent of total GDP in 2008.

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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).

The intent of this statistical report is that it will be the first in a series of annual reports that 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.

The importance of an on-going energy profile for the state is underscored by the fact that from 1970 to 2008, total energy expenditure in constant 2009 dollars increased 354 percent in Hawaii. Clearly, energy will be a major component in the state's future economic picture.

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 85 percent, Hawaii remains strongly dependent on oil for its primary energy needs.
- From a high of 10.4 percent in 1993, renewable energy use in Hawaii has actually declined during the last 15 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 use of imported coal is actually growing faster than renewable resources.

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 40 percent of the primary energy is used in electricity generation, and the industrial, commercial, and residential sectors account for only about 10 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.
- Hawaii imports all of the ethanol consumed in the state.

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 (66.3 percent) of the money spent on primary energy (excluding electricity generation) is spent on transportation; while
- Expenditure on electrical generation accounted for 27.4 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.
- On a per capita basis, electricity used since 1970 has increased dramatically, while petroleum use has declined.
- In constant dollars (2009), from 1970 to 2008, Hawaii's expenditures for energy per dollar of the real gross domestic product has increased more than 75 percent.
- In constant dollars (2009), in 2008, 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 the most dramatically since 1960.

- Hawaii's industrial sector uses about 23 percent of the total energy consumed.
- Renewable energy (biomass, geothermal, hydro, wind, and solar) accounts for only about 10.5 percent of total electric power sector energy consumption.
- Of the renewable energy resources used for electricity generation, geothermal, biomass, and wind 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 energy use in Hawaii and it shows that:

- From 1990 to 1999, Hawaii's energy-related carbon dioxide (CO_2) emissions decreased gradually from 21.7 million metric tons to 18.3 million metric tons;
- From 1999 to 2007, however, CO_2 emissions increased from 18.3 million metric tons to 24.2 million metric tons.
- From 1990 to 2008, total CO_2 and NOX emissions from the electric power sector increased over time, while 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

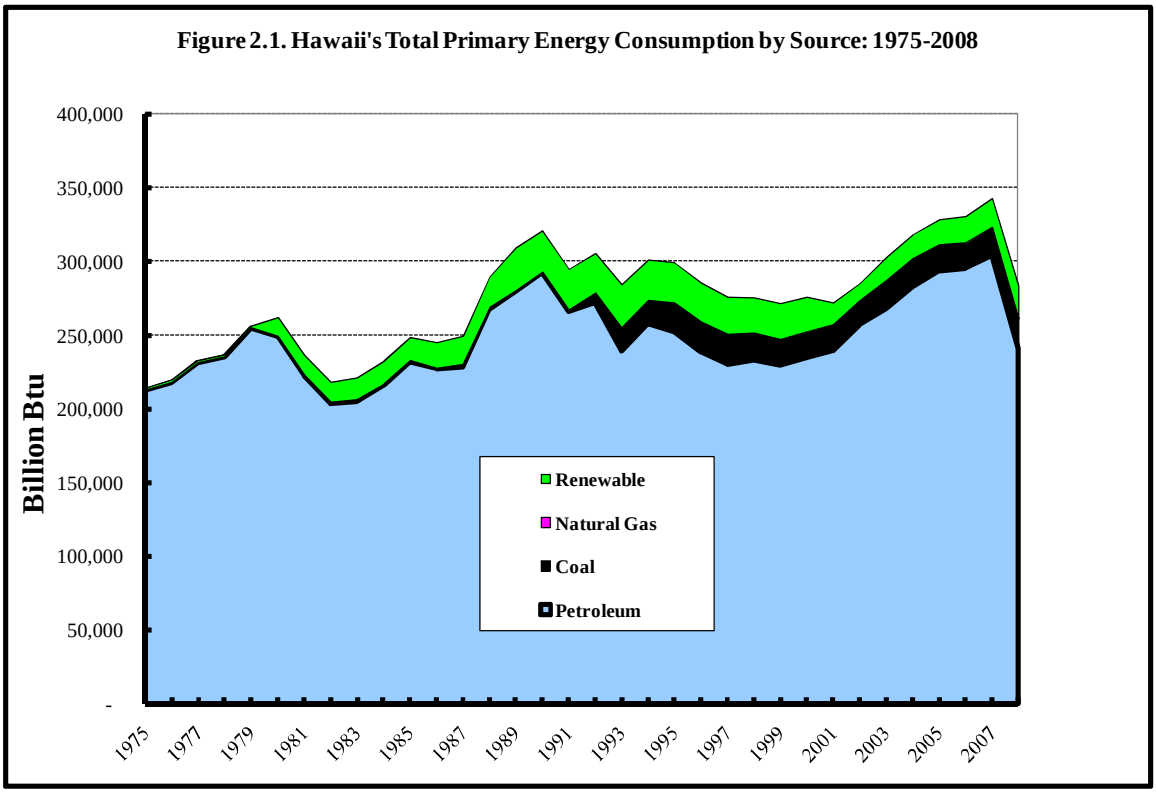
2.1. Primary Energy Consumption by Source

Hawaii's total primary energy consumption increased from less than 100 trillion Btu in 1960 to 284 trillion Btu in 2008, with an average annual growth rate of 2.3 percent. 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. From 2001 to 2007, energy consumption increased 3.9 percent per year.

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 2008, the share of petroleum in total primary energy consumption fluctuated between 84 to 90 percent. The share of renewable energy (primarily geothermal energy in electricity generation) fluctuated between 4 to 10 percent.

Figure 2.1. Hawaii's Total Primary Energy Consumption by Source: 1975-2008



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	94,861	99.7	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0
1970	196,964	99.2	0.0	0.0	0.8	0.2	0.0	0.6	0.0	0.0
1975	214,414	99.3	0.0	0.0	0.7	0.3	0.0	0.4	0.0	0.0
1980	262,413	95.1	0.0	0.0	4.9	4.5	0.0	0.3	0.0	0.0
1981	236,745	94.3	0.0	0.0	5.7	5.4	0.0	0.4	0.0	0.0
1982	218,264	93.3	0.5	0.0	6.1	5.7	0.0	0.4	0.0	0.0
1983	221,317	92.8	0.5	0.0	6.7	6.3	0.0	0.4	0.0	0.0
1984	232,624	92.9	0.4	0.0	6.7	6.1	0.2	0.4	0.0	0.0
1985	248,730	93.3	0.5	0.0	6.2	5.7	0.2	0.4	0.0	0.0
1986	245,497	92.7	0.2	0.0	7.1	6.6	0.2	0.3	0.0	0.0
1987	249,574	91.7	0.6	0.1	7.6	7.2	0.1	0.3	0.0	0.0
1988	289,836	92.5	0.4	0.0	7.1	6.7	0.1	0.3	0.0	0.0
1989	309,907	90.4	0.3	0.0	9.4	8.7	0.1	0.2	0.3	0.1
1990	321,406	91.1	0.2	0.0	8.7	8.1	0.0	0.3	0.3	0.1
1991	295,142	90.3	0.4	0.0	9.3	8.6	0.0	0.3	0.3	0.1
1992	305,983	89.0	2.2	0.0	8.8	8.1	0.0	0.2	0.3	0.1
1993	284,733	84.2	5.5	0.0	10.4	8.6	1.1	0.2	0.4	0.1
1994	301,418	85.7	5.2	0.0	9.1	6.9	1.3	0.5	0.4	0.1
1995	299,602	84.3	6.6	0.0	9.1	6.6	1.6	0.3	0.4	0.1
1996	285,923	83.5	7.1	0.0	9.3	6.7	1.8	0.4	0.4	0.1
1997	276,217	83.5	7.4	0.0	9.1	6.3	1.9	0.4	0.5	0.1
1998	276,002	84.6	6.6	0.0	8.8	6.0	1.8	0.4	0.5	0.1
1999	271,727	84.6	6.5	0.0	8.9	6.2	1.6	0.4	0.5	0.1
2000	276,226	85.1	6.4	0.0	8.4	5.5	2.0	0.4	0.5	0.1
2001	272,445	88.0	6.5	0.0	5.4	2.9	1.6	0.4	0.5	0.0
2002	285,638	90.2	5.8	0.0	4.0	2.6	0.5	0.3	0.5	0.0
2003	303,300	88.5	6.3	0.0	5.1	3.1	1.2	0.3	0.5	0.0
2004	318,670	88.8	6.0	0.0	5.1	2.9	1.4	0.3	0.5	0.0
2005	328,793	89.4	5.5	0.1	5.1	2.9	1.4	0.3	0.5	0.0
2006	331,233	89.3	5.3	0.1	5.4	2.9	1.3	0.4	0.5	0.2
2007	343,236	88.7	5.5	0.1	5.7	2.7	1.4	0.3	0.6	0.7
2008	283,783	85.0	7.1	0.1	7.8	4.0	1.7	0.3	0.9	0.8

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 percent, 25 percent, 25 percent, and 13 percent of total petroleum consumption, respectively, in 2008.

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	3,443	16,844	-	-	27	1,285
1965	7,618	7,230	4,082	1,612	1,936	22,478	-	-	105	2,452
1970	14,273	10,154	5,691	1,695	2,292	34,105	-	-	108	3,776
1975	14,849	11,255	6,766	1,948	2,280	37,097	-	-	89	5,310
1980	14,116	13,196	7,231	5,987	3,032	43,562	-	3,131	86	6,331
1985	13,260	13,185	7,594	4,526	1,441	40,006	46	2,483	104	6,635
1986	10,176	14,326	7,878	4,627	2,036	39,044	16	2,462	96	7,032
1987	11,481	13,595	8,186	3,685	2,444	39,389	63	2,610	95	7,298
1988	11,972	16,935	8,476	5,631	2,887	45,902	50	2,612	97	7,719
1989	13,239	17,355	8,754	5,745	2,928	48,021	32	2,694	103	7,970
1990	12,646	19,067	8,670	6,489	3,143	50,015	29	2,788	108	8,311
1991	11,123	15,599	8,970	7,210	2,855	45,758	45	2,694	107	8,524
1992	9,993	17,856	8,870	6,219	3,718	46,655	303	2,695	86	8,667
1993	8,891	13,845	9,060	5,929	3,666	41,392	691	2,681	230	8,658
1994	9,472	15,120	9,343	6,321	4,586	44,843	704	2,778	345	8,948
1995	9,940	14,473	9,416	5,787	4,226	43,842	895	2,773	353	9,188
1996	10,087	12,667	9,374	4,950	4,553	41,631	930	2,672	369	9,379
1997	10,221	12,218	9,358	4,640	3,392	39,829	933	2,611	377	9,363
1998	9,999	13,243	9,342	4,451	3,458	40,493	822	2,654	378	9,261
1999	9,474	12,945	8,953	5,314	2,977	39,662	801	2,735	342	9,381
2000	9,438	13,520	9,289	5,094	3,250	40,591	816	2,841	383	9,691
2001	8,895	13,284	9,710	6,040	3,551	41,479	829	2,818	309	9,785
2002	10,189	12,738	10,419	8,086	3,339	44,772	748	2,734	169	9,892
2003	12,708	12,079	10,597	8,031	3,272	46,686	837	2,732	270	10,391
2004	13,379	13,110	10,741	8,634	3,234	49,098	857	2,774	315	10,732
2005	16,372	13,210	10,978	7,307	3,400	51,267	805	2,795	324	10,539
2006	15,334	14,687	11,533	6,691	3,309	51,554	778	2,783	412	10,568
2007	12,756	16,318	11,348	9,294	3,181	52,897	850	2,850	560	10,585
2008	10,702	12,465	10,675	5,637	3,090	42,569	937	2,702	559	10,390

Source: Energy Information Administration, State Energy Data System

Other petroleum consumption accounted for about 7 percent of total petroleum consumption in 2008. Other petroleum consumption includes mainly still gas and LPG.

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

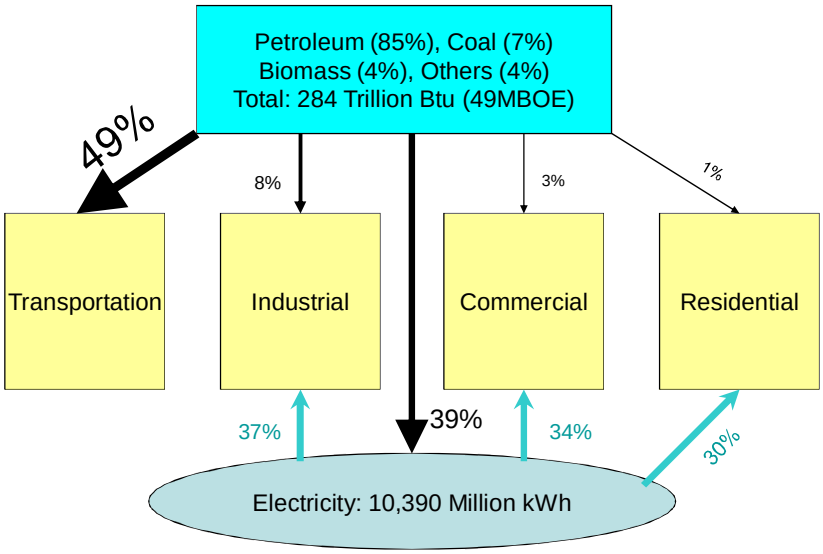
	Other Petroleum Consumption in 1000 BBL (T BBL)							
Year	Aviation Gosoline T BBL	Asphalt Road Oil T BBL	Kerosene T BBL	LPG T BBL	Lubricants T BBL	Still Gas T BBL	Petroleum Coke T BBL	Total Other T BBL
1960	2,640	29	91	112	38	430	103	3,443
1965	613	306	49	219	94	466	159	1,936
1970	133	377	153	938	71	453	131	2,292
1975	116	379	76	872	104	472	220	2,280
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	2,036
1987	249	397	2	157	95	1,810	403	2,444
1988	281	351	0	178	91	2,067	415	2,887
1989	287	296	0	186	94	2,171	375	2,928
1990	272	381	0	178	96	2,401	333	3,143
1991	261	383	0	214	86	2,324	381	2,855
1992	243	431	0	651	88	2,388	367	3,718
1993	198	444	1	884	90	2,372	344	3,666
1994	210	407	1	1,619	94	2,346	356	4,586
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	0	844	99	2,200	362	3,458
1999	58	353	0	376	100	2,165	351	2,977
2000	45	604	0	562	98	2,181	366	3,250
2001	48	342	0	582	90	2,219	376	3,551
2002	18	107	0	770	89	2,179	372	3,339
2003	15	110	0	492	82	2,254	381	3,272
2004	39	120	0	462	83	2,235	388	3,234
2005	44	199	0	432	83	2,241	382	3,400
2006	41	3	0	471	81	2,247	361	3,309
2007	41	3	0	419	83	2,179	357	3,181
2008	28	2	0	674	77	2,088	300	3,090

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 2008, about 49 percent of Hawaii's total primary energy was directly used in the transportation sector, 8 percent in the industrial sector, 3 percent in the commercial sector, and 1 percent in the residential sector; about 39 percent of the total primary energy was used in electricity generation. The electricity generated was mainly consumed in the industrial (37%), commercial (34%), and residential (30%) sectors.

Figure 2.2. 2008 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 2008, the shares of the residential sector and the commercial sector increased from 8 and 6 percent to 13 and 15 percent, respectively; the share of the industrial sector increased slightly from 22 to 23 percent; and the share of transportation sector decreased from 65 to 49 percent. In addition, the share of energy used in electricity generation increased from 19 to 39 percent.

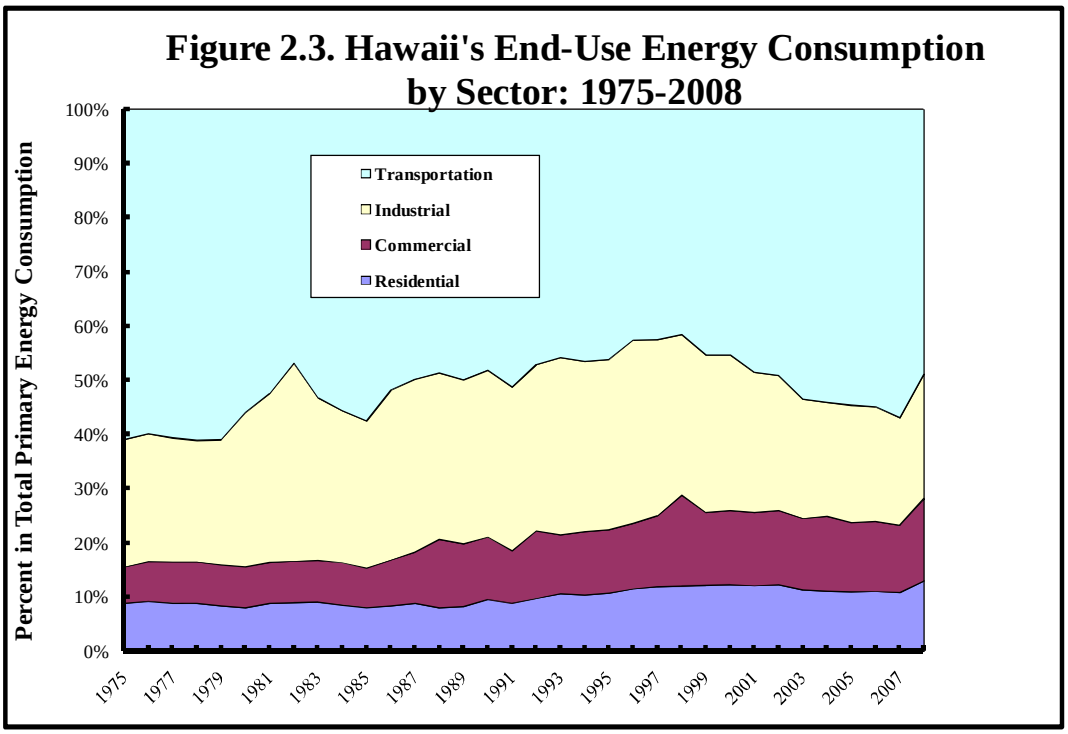


Table 2.3. Hawaii's End-Use Energy Consumption by Sector

	End-Use Energy Consumption By Sector					
	Units: Billion Btu					Electric
Year	Residential	Commercial	Industrial	Transportation	Total	Power
1960	7,148	5,307	20,627	61,779	94,861	17,603
1970	15,448	12,500	43,673	125,342	196,964	43,176
1975	18,939	14,505	50,430	130,540	214,414	58,778
1980	20,989	20,022	74,694	146,709	262,413	69,749
1985	19,976	18,425	67,444	142,886	248,730	69,962
1990	30,732	37,190	98,941	154,543	321,406	105,928
1995	31,996	35,347	94,104	138,154	299,602	108,017
2000	33,840	38,114	79,084	125,188	276,226	111,328
2001	32,869	37,221	70,341	132,014	272,445	107,498
2002	34,850	39,542	71,086	140,161	285,638	111,730
2003	34,314	40,194	66,763	162,030	303,300	110,983
2004	35,373	44,141	67,020	172,136	318,670	113,129
2005	35,871	42,484	71,065	179,374	328,793	112,246
2006	36,402	43,293	69,899	181,639	331,233	112,969
2007	37,125	42,983	67,807	195,320	343,236	114,378
2008	36,738	43,582	64,996	138,468	283,783	111,567

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 2008, transportation and electricity generation accounted for about 57 and 34 percent of total petroleum consumption, respectively. From 1960 to 2008, the transportation sector's share and the industrial sector's share in total petroleum consumption decreased from 65 and 15 percent to 57 percent and 8 percent, respectively; the power sector's share increased from 18 percent to 34 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	94,569	65.3	18.3	15.1	1.2	0.1
1970	195,404	64.1	21.8	11.7	1.9	0.4
1975	212,916	61.3	27.4	10.0	1.0	0.2
1980	249,605	58.8	27.9	11.5	1.6	0.3
1985	232,095	61.6	29.8	8.0	0.6	0.1
1990	292,730	52.8	33.3	10.9	2.9	0.1
1991	266,541	56.7	30.1	11.5	1.6	0.1
1992	272,389	52.9	31.6	11.2	4.0	0.2
1993	239,687	54.4	31.8	12.5	1.2	0.1
1994	258,278	54.2	30.6	13.1	2.0	0.1
1995	252,556	54.7	31.8	12.4	1.1	0.1
1996	238,853	50.9	34.6	13.7	0.7	0.1
1997	230,514	50.9	35.5	12.2	1.3	0.1
1998	233,498	49.1	35.2	9.5	5.8	0.4
1999	229,921	53.5	36.3	8.9	1.1	0.2
2000	235,194	53.2	35.9	9.5	1.1	0.3
2001	239,834	55.0	35.0	8.8	0.9	0.3
2002	257,510	54.4	35.5	8.6	1.2	0.3
2003	268,487	60.3	30.3	8.2	0.9	0.2
2004	282,950	60.8	30.0	7.8	1.1	0.2
2005	295,185	60.8	29.2	8.8	1.1	0.2
2006	297,121	61.1	29.1	8.4	1.1	0.2
2007	306,316	63.8	27.8	7.4	0.8	0.2
2008	244,509	56.6	33.5	8.3	1.2	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	16,844	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	43,562	26,317	11,127	5,135	792	192
1985	40,006	25,641	11,047	2,997	275	45
1986	39,044	22,884	11,575	4,173	369	43
1987	39,389	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	50,015	27,639	15,657	5,231	1,430	57
1991	45,758	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	44,843	25,017	12,735	6,151	899	42
1995	43,842	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	39,662	22,177	13,453	3,380	511	142
2000	40,591	22,532	13,623	3,685	558	194
2001	41,479	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	51,554	32,597	13,952	4,184	662	159
2007	52,897	34,678	13,738	3,836	517	128
2008	42,569	25,064	13,209	3,387	645	265

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	Average Annual TBBL
Total Foreigh Imports (EIA)	49,107	53,963	52,937	46,220	43,616	49,238	49,180
Crude Oil	45,037	49,033	46,137	41,447	40,981	44,080	44,453
Chevron	18,159	19,188	19,576	18,580	19,505	19,286	19,049
Tesoro	26,878	29,845	26,561	22,867	21,476	24,794	25,404
Jet Fuel, Kerosene-Type	3,067	2,542	4,956	3,781	1,608	4,314	3,378
Fuel Ethanol	379	1,243	767	496	606	-	582
Residual Fuel	296	584	567	196	78	-	287
Distillate	32	238	181	76	-	-	88
Propane/NGL	175	134	134	224	125	406	200
Others	121	189	195	-	218	438	194
% in Total Foreign Imports	2005	2006	2007	2008	2009	2010*	Average
Total Foreigh Imports	100%	100%	100%	100%	100%	100%	100%
Crude Oil	92%	91%	87%	90%	94%	90%	90%
Chevron	37%	36%	37%	40%	45%	39%	39%
Tesoro	55%	55%	50%	49%	49%	50%	52%
Jet Fuel, Kerosene-Type	6%	5%	9%	8%	4%	9%	7%
Fuel Ethanol	1%	2%	1%	1%	1%	0%	1%
Residual Fuel	1%	1%	1%	0%	0%	0%	1%
Distillate	0%	0%	0%	0%	0%	0%	0%
Propane/NGL	0%	0%	0%	0%	0%	1%	0%
Others	0%	0%	0%	0%	0%	1%	0%

* Estimated based on annualized YTD data.

Source: EIA

Table 2.6. Hawaii's Petroleum Net Imports and Consumption

	2005 Annual	2006 Annual	2007 Annual	2008 Annual	2009 Annual	2010E Annual	Average Annual
Physical Unit of Imports							
Total Foreign Imports (TBBL)	50,116	53,622	55,042	46,277	44,943	42,987	48,831
Crude Oil (TBBL)	45,120	50,264	49,176	41,201	43,971	40,722	45,076
Jet Fuel, Kerosene-Type (TBBL)	3,312	1,745	4,356	3,797	0	458	2,278
Propane/NGL (TBBL)	134	133	133	205	124	425	192
Others (TBBL)	1,551	1,480	1,377	1,074	848	1,382	1,285
Value of Imports							
Total Foreign Imports ($M)	2,583	3,407	3,855	4,700	2,637	3,298	3,413
Crude Oil ($M)	2,334	3,210	3,435	4,138	2,622	3,173	3,152
Jet Fuel, Kerosene-Type ($M)	209	140	366	522	0	40	213
Propane/NGL ($M)	6	6	7	12	5	20	9
Others ($M)	34	51	46	27	10	66	39
Average Unit Value of Imports							
Total Foreign Imports ($/BBL)	52	64	70	102	59	77	70
Crude Oil ($/BBL)	52	64	70	100	60	78	70
Jet Fuel, Kerosene-Type ($/BBL)	63	80	84	138	NA	87	93
Propane/NGL ($/BBL)	45	43	51	60	41	46	48
Others ($/BBL)	22	34	34	25	12	48	30
Total Foreign Exports (TBBL)	1,980	2,111	2,367	1,829	1,253	2,357	1,983
Total Value of Exports ($M)	99	153	187	183	74	112	135
Average Unit Value of Exports	50	73	79	100	59	47	68
Net Foreign Imports (TBBL)	48,135	51,511	52,675	44,448	43,690	40,630	46,848
Net Value of Foreign Imports ($M)	2,484	3,254	3,668	4,516	2,563	3,187	3,279
Net Domestic Imports (TBBL) 1/	*3,132*	*43*	*222*	*-1,879*	*0*	*0*	*253*
Petroleum Consumption (TBBL) 2/	51,267	51,554	52,897	42,569	*43,690*	*40,630*	*47,101*
Petroleum Expenditure ($M) 2/	3,787	4,419	4,871	5,171	*2,934*	*3,649*	*4,139*

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

2/ Data from 2005 to 2008 are from EIA, values after 2008 are estimated.

Source: WISERTrade and EIA

Table 2.7. Hawaii's Petroleum Foreign Exports by Type

	2005 Annual TBBL	2006 Annual TBBL	2007 Annual TBBL	2008 Annual TBBL	2009 Annual TBBL	2010E Annual TBBL	Average Annual TBBL
Total Foreign Exports	1,980	2,111	2,367	1,829	1,253	1,375	1,819
Naphthas, Except Motor Fuel Or Blending Stock	1,783	1,169	1,249	1,317	747	1,373	1,273
Light Fuel Oils (Distillate)	0	647	555	385	315	0	317
Automtve, Diesel Or Marine Engne Lub Oils	0	0	0	32	97	0	21
Hydrocarbon Mixtures	0	93	558	0	0	0	108
Heavy and No 4 Fuel Oils	0	200	0	0	0	0	33
Propane, Liquefied	3	2	3	2	0	1	2
Motor Fuel and Blending Stock	0	0	0	0	94	0	16
Unleaded Gasoline	194	0	0	93	0	0	48
Others	1	0	1	1	1	1	1
% in Total Foreigh Expors (%)							
Naphthas, Except Motor Fuel Or Blending Stock	90.02	55.39	52.77	72.01	59.64	99.86	69.98
Light Fuel Oils	0.00	30.63	23.46	21.03	25.11	0.00	17.42
Automtve, Diesel Or Marine Engne Lub Oils	0.00	0.00	0.00	1.74	7.70	0.00	1.18
Hydrocarbon Mixtures	0.00	4.38	23.59	0.00	0.00	0.00	5.96
Heavy and No 4 Fuel Oils	0.00	9.48	0.00	0.00	0.00	0.00	1.83
Propane, Liquefied	0.17	0.11	0.13	0.09	0.00	0.06	0.10
Motor Fuel and Blending Stock	0.00	0.00	0.00	0.01	7.48	0.02	0.86
Unleaded Gasoline	9.78	0.00	0.00	5.09	0.00	0.00	2.63
Others	0.03	0.01	0.05	0.03	0.07	0.06	0.04

Source: WISERTrade

2.4. Electricity Consumption by Sector

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

In 2008, electricity consumed in the residential, commercial, and industrial sector accounted for about 30, 34, and 37 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 2008, the industrial sector's share decreased more than 10 percentage points, while the commercial sector's share increased more than 10 percentage points.

Table 2.8. 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
1991	2,396	2,355	3,773	8,524	28.1	27.6	44.3
1992	2,438	2,417	3,811	8,667	28.1	27.9	44.0
1993	2,469	2,419	3,770	8,658	28.5	27.9	43.5
1994	2,557	2,601	3,791	8,948	28.6	29.1	42.4
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	39.9
2000	2,765	3,092	3,834	9,691	28.5	31.9	39.6
2001	2,802	3,192	3,790	9,785	28.6	32.6	38.7
2002	2,898	3,223	3,770	9,892	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	10,732	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

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 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 2008, coal consumption in Hawaii is relatively stable, but the share of electric power sector increased 10 percentage points from about 80 percent to about 90 percent.

Table 2.9. 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	13.54	86.46
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	79.31	20.69
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	92.87	7.13
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	1,637	100.00	90.66	9.34
2007	19,007	17,213	1,795	100.00	90.56	9.44
2008	20,158	17,847	2,311	100.00	88.54	11.46

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 2008, biomass accounted for about 4 percent of total energy consumption; about 28.5 percent of biomass

(ethanol) was consumed in the transportation sector; other biomass (wood and waste) was mainly consumed in the electric power sector and the commercial sector.

Table 2.10. 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	16.3	83.7	-	-
1970	429	59.9	40.1	-	-
1975	569	45.6	54.4	-	-
1980	11,910	-	100.0	-	-
1985	14,217	1.8	98.2	-	-
1990	25,924	30.0	70.0	-	-
1991	25,446	30.1	69.9	-	-
1992	24,901	29.0	71.0	-	-
1993	24,388	31.3	68.7	-	-
1994	20,724	31.7	68.3	-	-
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	82.0	18.0	-	-
2004	9,336	53.4	19.4	27.2	-
2005	9,394	45.0	18.2	23.8	12.9
2006	9,575	46.3	12.2	27.0	14.5
2007	9,362	44.2	12.1	24.8	18.9
2008	11,488	34.5	10.6	26.4	28.5

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 percent of total natural gas consumption in 2008.

Natural gas was not consumed in Hawaii until 1980. From 1980 to 2008, natural gas consumption remained at about the same level, but the share of residential consumption

decreased while the share of industrial consumption increased. In 2008, natural gas was consumed mainly in the commercial sector (65.5%), the residential sector (18.5%), and the industrial sector (16.0%).

Table 2.11. Hawaii's Natural Gas Consumption by Sector

		Natural Gas Consumption By Sector % in Natural Gas Consumption			
Year	Total 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	65.8	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	2,818	18.5	65.5	16.0	0.1

Source: Energy Information Administration, State Energy Data System

Other renewable energy sources, including geothermal, hydro, solar, and wind, currently accounted for about 3.8 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 2008, Hawaii's total primary energy expenditure increased about 9.0 percent per year on average from $204 million in 1970 to $5,336 million in 2008; the additional expenditures on electricity (total expenditures on retail electricity minus the fuel cost of electricity generation) increased about 8.4 percent per year from $70 million in 1970 to $1,514 million; and total energy expenditure increased 8.8 percent per year from $274 million in 1970 to $6,850 million in 2008. In 2008, total primary energy expenditure accounted for about 78 percent of total energy expenditure; electricity additional expenditure accounted for 22 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	108	194	26	20	518	-	-	0	518	651
1980	492	309	411	229	50	1,490	-	39	10	1,539	1,720
1985	462	395	444	207	33	1,542	3	38	12	1,594	1,906
1990	425	468	533	297	37	1,761	1	37	5	1,804	2,114
1991	323	303	490	330	38	1,485	2	41	9	1,537	2,026
1992	277	310	510	261	56	1,414	9	39	8	1,470	1,981
1993	241	255	528	260	47	1,330	21	37	8	1,396	2,015
1994	232	248	553	273	69	1,374	22	37	7	1,440	2,121
1995	250	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	291	268	598	174	42	1,374	33	42	5	1,454	2,270
1998	208	212	583	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	415	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	27	47	9	1,880	2,685
2003	474	359	838	490	50	2,210	55	53	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	15	3,898	4,991
2006	1,313	858	1,434	741	73	4,419	30	79	15	4,543	5,723
2007	1,173	1,102	1,436	1,090	71	4,871	37	78	15	5,001	6,168
2008	1,359	1,226	1,607	855	124	5,171	46	101	18	5,336	6,850

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.

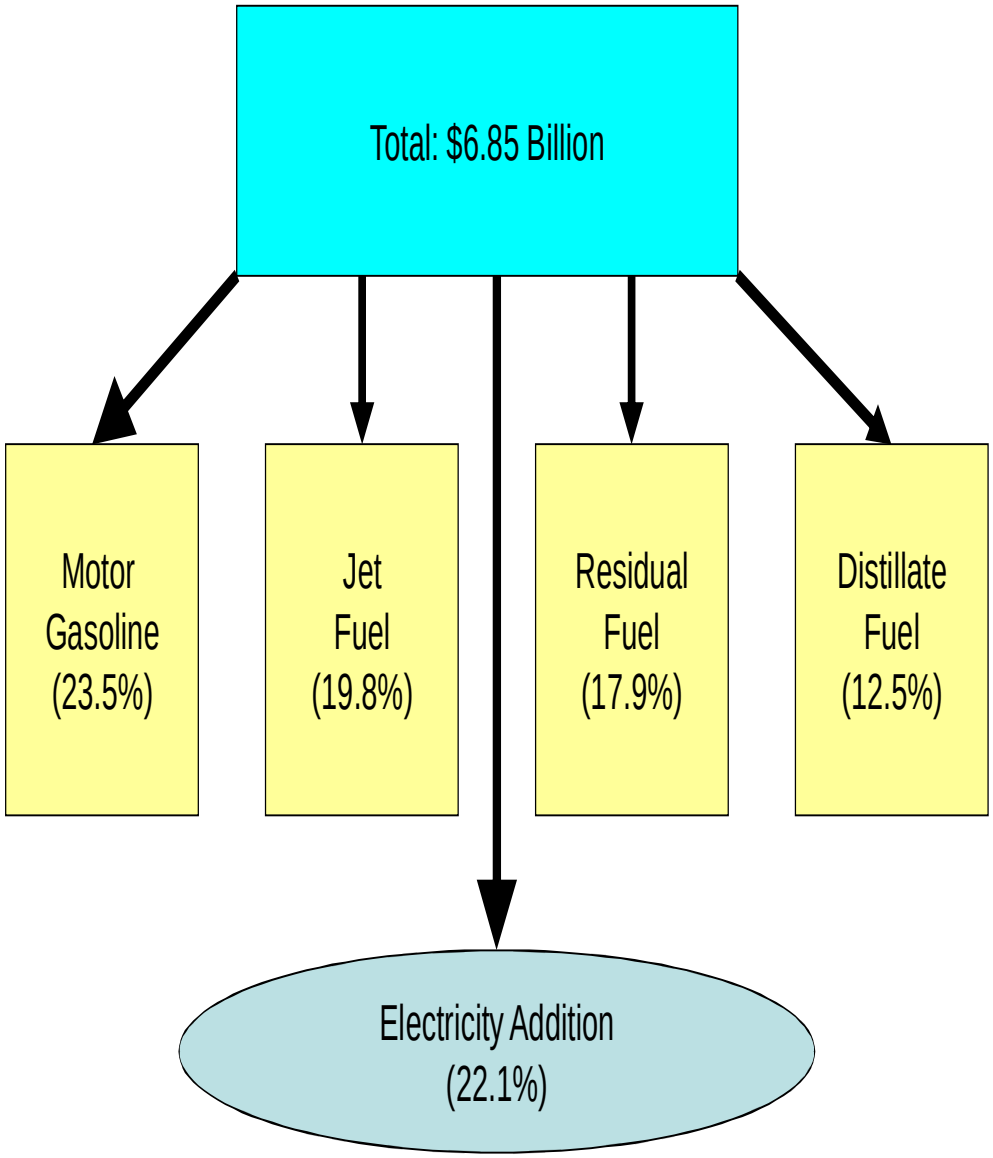
Primary energy expenditures are mainly due to expenditures on motor gasoline, jet fuel, residual fuel, and distillate fuel. In 2008, these expenditures accounted for 30.1 percent, 25.5 percent, 23.0 percent, and 16.0 percent of total primary energy expenditures, respectively.

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	28.6	12.1	48.7	4.9	5.6	99.8	-	-	0.2
1975	32.9	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	2.0	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	3.3	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	16.0	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	3.2	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	97.2	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	23.5	22.0	28.7	21.8	1.4	97.4	0.7	1.6	0.3
2008	25.5	23.0	30.1	16.0	2.3	96.9	0.9	1.9	0.3

Source: Energy Information Administration, State Energy Data System

Figure 3.1. 2008 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 2008, total energy expenditures in Hawaii reached $6,850 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 about 16, 17, and 15 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	651
1980	175	176	283	1,086	1,720
1985	227	227	337	1,116	1,906
1990	251	297	342	1,223	2,114
1991	268	296	346	1,116	2,026
1992	287	329	349	1,016	1,981
1993	315	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	423	451	981	2,270
1998	402	423	398	868	2,091
1999	409	418	394	939	2,159
2000	486	515	498	1,203	2,702
2001	492	529	476	1,280	2,776
2002	487	514	444	1,241	2,685
2003	538	587	492	1,698	3,315
2004	604	669	555	2,190	4,017
2005	691	760	667	2,872	4,991
2006	784	863	749	3,326	5,723
2007	810	876	768	3,714	6,168
2008	1,075	1,187	1,052	3,535	6,850

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	13.2	14.6	17.1	55.1	100.0
1992	14.5	16.6	17.6	51.3	100.0
1993	15.6	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	57.6	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

Source: Energy Information Administration, State Energy Data System

3.3. Primary Energy Expenditures by Sector

In 2008, Hawaii's total primary energy expenditures reached $5,336 million. The fuel cost of electricity generation accounted for about 27.4 percent; the transportation sector accounted for about 66.3 percent; and the remaining three sectors together accounted for only about 6.3 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	518
1980	27	44	106	1,086	276	1,539
1981	28	41	116	1,136	464	1,785
1982	27	38	167	950	422	1,603
1983	29	36	68	998	382	1,513
1984	20	32	73	1,058	382	1,565
1985	14	37	85	1,116	342	1,594
1986	12	32	64	814	216	1,138
1987	12	40	68	788	270	1,177
1988	12	72	67	874	240	1,266
1989	13	73	56	1,036	284	1,461
1990	13	69	77	1,223	423	1,804
1991	16	54	72	1,116	280	1,537
1992	21	75	67	1,016	291	1,470
1993	12	43	81	976	285	1,396
1994	13	48	96	1,026	257	1,440
1995	13	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	36	101	84	2,872	805	3,898
2006	41	115	88	3,326	973	4,543
2007	38	105	98	3,714	1,046	5,001
2008	72	147	117	3,535	1,464	5,336

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	82.4	8.5	100.0
1975	0.6	1.3	5.7	74.6	17.8	100.0
1980	1.7	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	1.4	5.1	4.6	69.1	19.8	100.0
1993	0.9	3.1	5.8	69.9	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	20.7	100.0
2006	0.9	2.5	1.9	73.2	21.4	100.0
2007	0.8	2.1	2.0	74.3	20.9	100.0
2008	1.4	2.8	2.2	66.3	27.4	100.0

Source: Energy Information Administration, State Energy Data System

3.4. Electricity Expenditures by Sector

As shown in Table 3.4, in 2008, Hawaii's total electricity expenditures (including about $1,464 million fuel expenditures in electricity generation) reached about $2,978 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	100.0
1975	83	62	80	225	37	28	36	100.0
1980	148	132	177	457	33	29	39	100.0
1981	234	187	318	739	32	25	43	100.0
1982	243	190	330	762	32	25	43	100.0
1983	221	176	290	686	32	26	42	100.0
1984	217	195	271	683	32	29	40	100.0
1985	213	189	252	655	33	29	38	100.0
1986	182	170	186	539	34	32	35	100.0
1987	195	182	193	571	34	32	34	100.0
1988	190	181	194	566	34	32	34	100.0
1989	208	198	224	630	33	31	36	100.0
1990	238	229	266	733	33	31	36	100.0
1991	252	243	274	769	33	32	36	100.0
1992	266	254	283	802	33	32	35	100.0
1993	303	282	318	904	34	31	35	100.0
1994	318	303	316	937	34	32	34	100.0
1995	347	338	333	1,018	34	33	33	100.0
1996	382	366	372	1,120	34	33	33	100.0
1997	395	376	382	1,153	34	33	33	100.0
1998	365	349	341	1,054	35	33	32	100.0
1999	384	375	347	1,107	35	34	31	100.0
2000	454	458	429	1,341	34	34	32	100.0
2001	458	474	421	1,353	34	35	31	100.0
2002	453	456	391	1,300	35	35	30	100.0
2003	507	528	444	1,479	34	36	30	100.0
2004	571	588	496	1,655	35	36	30	100.0
2005	655	659	584	1,898	35	35	31	100.0
2006	743	748	662	2,152	35	35	31	100.0
2007	772	771	670	2,213	35	35	30	100.0
2008	1,003	1,040	935	2,978	34	35	31	100.0

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 2008 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	8.8	14.0			0.042
1980	34.9	23.4	56.8	38.2	16.4	34.2		12.6	0.072
1985	34.8	30.0	58.5	45.8	22.6	38.5	56.8	15.4	0.099
1990	33.6	24.6	61.5	45.8	11.8	35.2	44.2	13.1	0.088
1991	29.1	19.4	54.6	45.8	13.4	32.5	41.1	15.3	0.090
1992	27.7	17.4	57.5	42.0	14.9	30.3	30.4	14.3	0.093
1993	27.1	18.4	58.2	43.8	12.7	32.1	30.4	13.9	0.104
1994	24.4	16.4	59.2	43.2	15.0	30.6	30.6	13.3	0.105
1995	25.2	18.4	59.9	42.5	15.2	31.7	32.8	13.9	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	32.3	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	26.4	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	20.0	73.9	33.1	24.8	0.180
2006	85.6	58.4	124.4	110.7	22.0	85.7	38.6	28.3	0.204
2007	92.0	67.5	126.5	117.2	22.3	92.1	43.1	27.2	0.209
2008	127.0	98.4	150.5	151.6	40.2	121.5	49.0	37.5	0.287

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	6.5	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	1.9	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	10.9	7.2	5.5	1.4	13.33	27.79
1993	4.8	3.0	11.1	7.5	5.9	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	1.5	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	7.0	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	9.7	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	16.1	28.8	26.0	22.7	2.3	36.72	85.78

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 2009 dollar. From 1960 to 2009, residential electricity price in 2009 constant value increased 0.2 percent per year on average, while other electricity price increased 0.5 percent per year; residential and other gas price increased about 1 percent per year on average.

Table 3.7. Hawaii's Average Electricity and Gas Prices

		Average Electricity Price				Average Gas Price			
		In Nominal Value		In Constant 2009 Dollar		In Nominal Value		In Constant 2009 Dollar	
Year	Honolulu CPI-U	Residential $/kWh	Other $/kWh	Residential 2009$/kWh	Other 2009$/kWh	Residential $/Therm	Other $/Therm	Residential 2009$/Therm	Other 2009$/Therm
1960	31.30	0.0297	0.0216	0.2185	0.1585	0.3619	0.2280	2.6599	1.6757
1970	41.50	0.0268	0.0201	0.1486	0.1115	0.3619	0.2227	2.0061	1.2345
1975	56.30	0.0459	0.0379	0.1874	0.1550	0.8172	0.6358	3.3393	2.5981
1980	83.00	0.0790	0.0696	0.2190	0.1930	1.4658	1.2595	4.0628	3.4909
1981	91.70	0.1156	0.1061	0.2901	0.2660	1.7259	1.5009	4.3296	3.7653
1982	97.20	0.1235	0.1106	0.2922	0.2618	1.7331	1.4389	4.1018	3.4055
1983	99.30	0.1135	0.0983	0.2629	0.2277	1.7972	1.4402	4.1635	3.3366
1984	103.50	0.1183	0.1018	0.2630	0.2263	1.7896	1.3749	3.9777	3.0559
1985	106.80	0.1136	0.0965	0.2447	0.2079	1.7693	1.3382	3.8112	2.8825
1986	109.40	0.0929	0.0751	0.1954	0.1578	1.5715	1.1203	3.3046	2.3557
1987	114.90	0.0943	0.0779	0.1888	0.1560	1.5720	1.1049	3.1475	2.2123
1988	121.70	0.0883	0.0714	0.1669	0.1350	1.5496	1.0784	2.9292	2.0385
1989	128.70	0.0927	0.0759	0.1656	0.1356	1.5420	1.0649	2.7563	1.9034
1990	138.10	0.1026	0.0854	0.1709	0.1423	1.6285	1.1483	2.7127	1.9129
1991	148.00	0.1054	0.0873	0.1638	0.1356	1.7865	1.2529	2.7769	1.9474
1992	155.10	0.1093	0.0890	0.1621	0.1320	1.7905	1.2547	2.6558	1.8609
1993	160.10	0.1231	0.1001	0.1769	0.1438	1.7596	1.2259	2.5284	1.7616
1994	164.50	0.1246	0.0997	0.1743	0.1395	1.7199	1.1946	2.4053	1.6705
1995	168.10	0.1334	0.1049	0.1825	0.1436	1.7967	1.2516	2.4588	1.7128
1996	170.70	0.1427	0.1127	0.1923	0.1519	2.1040	1.3358	2.8355	1.8002
1997	171.90	0.1484	0.1158	0.1986	0.1550	2.2908	1.4001	3.0656	1.8737
1998	171.50	0.1388	0.1068	0.1862	0.1433	2.1624	1.2593	2.9006	1.6893
1999	173.30	0.1431	0.1104	0.1900	0.1465	2.1727	1.2403	2.8841	1.6464
2000	176.30	0.1641	0.1308	0.2141	0.1707	2.4536	1.4856	3.2016	1.9385
2001	178.40	0.1634	0.1310	0.2107	0.1689	2.5923	1.5630	3.3427	2.0155
2002	180.30	0.1570	0.1251	0.2004	0.1596	2.8734	1.5064	3.6662	1.9220
2003	184.50	0.1674	0.1363	0.2088	0.1699	3.0576	1.7123	3.8124	2.1350
2004	190.60	0.1803	0.1479	0.2176	0.1785	3.2347	1.8794	3.9042	2.2683
2005	197.80	0.2066	0.1728	0.2402	0.2010	3.6421	2.2658	4.2359	2.6352
2006	209.35	0.2336	0.1959	0.2567	0.2153	3.8742	2.4624	4.2572	2.7058
2007	219.50	0.2412	0.2006	0.2528	0.2102	3.9355	2.5252	4.1246	2.6465
2008	228.86	0.3250	0.2781	0.3267	0.2795	4.8935	3.4696	4.9189	3.4876
2009	230.05	0.2420	0.1992	0.2420	0.1992	4.1882	2.6806	4.1882	2.6806

Source: The State of Hawaii Data Book.

3.7. Average Petroleum Products Prices in 2009 Constant Dollar

Table 3.8 provides the average petroleum prices in 2009 constant dollar.

Table 3.8. Hawaii's Average Petroleum Prices in 2009 Constant Dollar

	Average Price in 2009 Condant Dollar					
Year	Jet Fuel $/MBTU	Residual Fuel $/MBTU	Motor Gasoline $/MBTU	Distillate Fuel $/MBTU	Total Petroleum $/MBTU	Motor Gasoline $/Gallon
1970	4.0416	2.2171	18.3991	5.7465	5.9607	2.45
1975	8.3391	6.4802	22.2486	9.4044	10.2910	2.97
1980	17.2215	10.5236	29.9648	18.2484	17.0699	4.00
1981	18.9552	15.6427	31.2959	20.4048	19.9979	4.17
1982	17.4543	14.2368	29.0745	20.3463	18.6445	3.88
1983	15.9766	12.6986	27.1457	18.1247	16.9866	3.62
1984	14.5545	11.9584	25.7876	16.7171	15.9033	3.44
1985	13.3708	10.3530	23.9951	16.9331	14.6266	3.20
1986	9.1745	5.9498	20.2497	13.2289	10.6072	2.70
1987	8.6167	6.8267	18.9522	12.0955	10.4192	2.53
1988	7.6452	5.2920	18.0548	11.5528	9.1085	2.41
1989	8.2091	5.7174	18.6196	12.0968	9.5988	2.48
1990	9.9702	6.7055	19.5087	13.0974	10.6345	2.60
1991	8.0367	4.9909	16.1687	12.2293	9.1901	2.16
1992	7.2623	4.2022	16.2350	10.7051	8.2021	2.16
1993	6.8758	4.3172	15.9319	10.8191	8.5467	2.12
1994	6.0289	3.7536	15.8350	10.3663	8.0156	2.11
1995	6.0823	4.0795	15.7168	9.9971	8.0552	2.10
1996	7.0678	4.7585	16.3752	10.4307	8.9491	2.18
1997	6.7310	4.8654	16.4023	8.6146	8.6604	2.19
1998	4.9184	3.4942	16.0735	7.8023	7.5082	2.14
1999	6.3521	4.2550	15.0216	9.3569	8.0190	2.00
2000	9.1051	6.5132	17.5248	12.1315	10.4826	2.34
2001	7.5651	6.1817	18.7426	11.5963	10.3868	2.50
2002	6.9561	6.2014	15.8358	10.0594	9.5332	2.11
2003	8.2017	6.0771	18.9279	13.0597	10.9955	2.52
2004	11.3634	6.1103	20.7339	15.4796	12.6616	2.76
2005	15.0333	9.9054	23.9931	18.2647	16.0277	3.20
2006	16.5970	10.7094	26.1896	20.8953	17.5634	3.49
2007	17.0015	11.5600	25.4035	21.1055	17.7467	3.39
2008	22.5162	16.2326	28.9975	26.1827	22.7807	3.87

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 2008, Hawaii's total energy consumption per dollar of real GDP decreased about 44 percent; total petroleum consumption per dollar of real GDP decreased about 52 percent; but electricity consumption per dollar of real GDP increased about 6 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 2000 $M	Mbtu/$1000	Mbtu/$1000	BBL/$1000	kWh/$1000	1970=100	1970=100	1970=100
1970	19,216	10.25	17.90	1.77	197	100	100	100
1975	24,168	8.87	16.65	1.53	220	87	86	112
1980	28,464	9.22	15.10	1.53	222	90	86	113
1981	27,900	8.49	14.36	1.39	238	83	78	121
1982	27,923	7.82	14.05	1.28	233	76	72	118
1983	28,923	7.65	13.42	1.25	228	75	71	116
1984	29,921	7.77	13.15	1.25	221	76	70	112
1985	30,738	8.09	12.61	1.30	216	79	73	110
1986	31,690	7.75	12.22	1.23	222	76	69	113
1987	33,159	7.53	12.20	1.19	220	73	67	112
1988	35,165	8.24	12.28	1.31	220	80	74	112
1989	37,492	8.27	12.15	1.28	213	81	72	108
1990	40,962	7.85	11.89	1.22	203	77	69	103
1991	41,339	7.14	11.91	1.11	206	70	62	105
1992	42,215	7.25	11.70	1.11	205	71	62	104
1993	41,877	6.80	11.60	0.99	207	66	56	105
1994	41,253	7.31	11.35	1.09	217	71	61	110
1995	40,711	7.36	11.32	1.08	226	72	61	115
1996	40,330	7.09	11.27	1.03	233	69	58	118
1997	40,412	6.84	10.86	0.99	232	67	56	118
1998	39,568	6.98	10.44	1.02	234	68	58	119
1999	39,747	6.84	10.13	1.00	236	67	56	120
2000	40,202	6.87	9.93	1.01	241	67	57	123
2001	40,626	6.71	9.57	1.02	241	65	58	123
2002	41,093	6.95	9.55	1.09	241	68	61	122
2003	42,580	7.12	9.35	1.10	244	69	62	124
2004	44,636	7.14	9.23	1.10	240	70	62	122
2005	46,930	7.01	8.97	1.09	225	68	62	114
2006	48,713	6.80	8.67	1.06	217	66	60	110
2007	49,424	6.94	8.64	1.07	214	68	60	109
2008	49,782	5.70	8.42	0.86	209	56	48	106

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	6,381	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	7,282	111	99	149
1990	1,113,491	289	45	7,463	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	243	35	7,382	95	80	151
1994	1,187,536	254	38	7,535	99	85	154
1995	1,196,854	250	37	7,676	98	83	157
1996	1,203,755	238	35	7,791	93	78	159
1997	1,211,640	228	33	7,728	89	74	158
1998	1,215,233	227	33	7,621	89	75	156
1999	1,210,300	225	33	7,751	88	74	158
2000	1,211,566	228	34	7,998	89	76	163
2001	1,218,305	224	34	8,031	88	77	164
2002	1,228,069	233	36	8,055	91	82	165
2003	1,239,298	245	38	8,384	96	85	171
2004	1,252,782	254	39	8,566	100	89	175
2005	1,266,117	260	40	8,324	102	92	170
2006	1,275,599	260	40	8,285	102	91	169
2007	1,276,832	269	41	8,290	105	94	169
2008	1,287,481	220	33	8,070	86	75	165

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	84	77	124
1985	1,136,160	219	35	5,840	89	82	123
1986	1,165,826	211	33	6,032	85	78	128
1987	1,185,394	211	33	6,157	85	78	130
1988	1,198,637	242	38	6,440	98	90	136
1989	1,234,640	251	39	6,456	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	225	33	6,829	91	76	144
1994	1,289,804	234	35	6,938	95	81	147
1995	1,298,096	231	34	7,078	94	79	150
1996	1,303,915	219	32	7,193	89	75	152
1997	1,327,930	208	30	7,051	84	70	149
1998	1,334,125	207	30	6,942	84	71	147
1999	1,332,442	204	30	7,041	83	70	149
2000	1,334,052	207	30	7,264	84	71	154
2001	1,329,986	205	31	7,357	83	73	156
2002	1,341,507	213	33	7,374	86	78	156
2003	1,346,899	225	35	7,715	91	81	163
2004	1,366,782	233	36	7,852	95	84	166
2005	1,385,888	237	37	7,604	96	87	161
2006	1,396,384	237	37	7,568	96	86	160
2007	1,394,618	246	38	7,590	100	89	161
2008	1,387,888	204	31	7,486	83	72	158

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

4.3. Energy Expenditures in Constant 2009 Dollar per Dollar of Real GDP

Table 4.4 provides energy expenditures in constant 2009 dollar. The Honolulu CPI-U was used to convert current dollar energy expenses to constant dollar expenses. From 1970 to 2008, total energy expenditure in constant 2009 dollar increased 354 percent in Hawaii.

Table 4.4. Hawaii's Energy Expenditures in Constant 2009 Dollar

		Energy Expenditures in 2009 Constant Dollar		
Year	Honolulu CPI-U	Total Energy $Million	Petroleum $Million	Electricity* $Million
1970	42	1,518	1,128	388
1975	56	2,662	2,117	543
1980	83	4,768	4,130	502
1985	107	4,106	3,321	673
1986	109	3,071	2,312	679
1987	115	2,960	2,273	603
1988	122	3,007	2,316	614
1989	129	3,230	2,539	619
1990	138	3,522	2,934	517
1991	148	3,149	2,308	760
1992	155	2,939	2,097	759
1993	160	2,896	1,911	889
1994	165	2,966	1,922	951
1995	168	3,013	1,904	1,002
1996	171	3,106	1,958	1,042
1997	172	3,038	1,838	1,093
1998	172	2,805	1,643	1,067
1999	173	2,867	1,733	1,040
2000	176	3,526	2,324	1,099
2001	178	3,580	2,334	1,145
2002	180	3,426	2,292	1,028
2003	185	4,133	2,756	1,225
2004	191	4,849	3,358	1,362
2005	198	5,804	4,405	1,271
2006	209	6,288	4,856	1,296
2007	220	6,464	5,105	1,223
2008	229	6,885	5,198	1,522

* 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 2009 dollar increased more than 75 percent from 1970 to 2008.

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	7.9	5.9	2.0	100	100	100
1975	11.0	8.8	2.2	139	149	111
1980	16.8	14.5	1.8	212	247	87
1985	13.4	10.8	2.2	169	184	108
1986	9.7	7.3	2.1	123	124	106
1987	8.9	6.9	1.8	113	117	90
1988	8.6	6.6	1.7	108	112	86
1989	8.6	6.8	1.6	109	115	82
1990	8.6	7.2	1.3	109	122	62
1991	7.6	5.6	1.8	96	95	91
1992	7.0	5.0	1.8	88	85	89
1993	6.9	4.6	2.1	88	78	105
1994	7.2	4.7	2.3	91	79	114
1995	7.4	4.7	2.5	94	80	122
1996	7.7	4.9	2.6	97	83	128
1997	7.5	4.5	2.7	95	77	134
1998	7.1	4.2	2.7	90	71	134
1999	7.2	4.4	2.6	91	74	130
2000	8.8	5.8	2.7	111	98	135
2001	8.8	5.7	2.8	112	98	140
2002	8.3	5.6	2.5	106	95	124
2003	9.7	6.5	2.9	123	110	142
2004	10.9	7.5	3.1	137	128	151
2005	12.4	9.4	2.7	157	160	134
2006	12.9	10.0	2.7	163	170	132
2007	13.1	10.3	2.5	166	176	123
2008	13.8	10.4	3.1	175	178	151

* Expenditures in constant 2009 dollar.

** Excluding fuel cost of electricity generation.

Source: U.S. EIA and BEA.

4.4. Energy Expenditures in Constant 2009 Dollar per Capita

Table 4.6 shows that Hawaii's energy expenditures per capita of resident population in constant 2009 dollar increased 172 percent from 1970 to 2008.

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	1,967	1,462	503	100	100	100
1975	3,003	2,388	613	153	163	122
1980	4,923	4,264	518	250	292	103
1985	3,950	3,194	647	201	218	129
1986	2,920	2,198	645	148	150	128
1987	2,772	2,129	564	141	146	112
1988	2,785	2,145	569	142	147	113
1989	2,950	2,319	565	150	159	112
1990	3,163	2,635	464	161	180	92
1991	2,770	2,031	669	141	139	133
1992	2,537	1,810	655	129	124	130
1993	2,469	1,629	758	126	111	151
1994	2,497	1,618	801	127	111	159
1995	2,517	1,591	837	128	109	167
1996	2,581	1,626	866	131	111	172
1997	2,508	1,517	902	127	104	179
1998	2,308	1,352	878	117	93	175
1999	2,368	1,432	859	120	98	171
2000	2,910	1,918	907	148	131	180
2001	2,938	1,916	940	149	131	187
2002	2,790	1,866	837	142	128	166
2003	3,335	2,224	989	170	152	197
2004	3,870	2,680	1,087	197	183	216
2005	4,584	3,479	1,004	233	238	200
2006	4,930	3,807	1,016	251	260	202
2007	5,063	3,998	958	257	273	190
2008	5,348	4,037	1,182	272	276	235

* Expenditures in constant 2009 dollar.

** Excluding fuel cost of electricity generation.

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

From 1970 to 2008, Hawaii's energy expenditures per capita of de facto population in 2009 constant dollar increased 161 percent from $1,900 in 1970 to $4,961 in 2008.

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	1,901	1,413	486	100	100	100
1975	2,821	2,243	576	148	159	118
1980	4,523	3,917	476	238	277	98
1985	3,614	2,923	592	190	207	122
1986	2,634	1,983	582	139	140	120
1987	2,497	1,918	508	131	136	105
1988	2,509	1,932	513	132	137	105
1989	2,616	2,056	501	138	146	103
1990	2,840	2,366	417	149	167	86
1991	2,515	1,843	607	132	130	125
1992	2,311	1,649	597	122	117	123
1993	2,284	1,507	701	120	107	144
1994	2,299	1,490	738	121	105	152
1995	2,321	1,467	772	122	104	159
1996	2,382	1,501	799	125	106	164
1997	2,288	1,384	823	120	98	169
1998	2,102	1,232	800	111	87	165
1999	2,151	1,301	780	113	92	161
2000	2,643	1,742	824	139	123	169
2001	2,692	1,755	861	142	124	177
2002	2,554	1,708	766	134	121	158
2003	3,069	2,046	910	161	145	187
2004	3,547	2,457	996	187	174	205
2005	4,188	3,178	917	220	225	189
2006	4,503	3,478	928	237	246	191
2007	4,635	3,661	877	244	259	180
2008	4,961	3,745	1,096	261	265	226

* Expenditures in constant 2009 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 138 trillion Btu or 25 million barrels of petroleum products in 2008. Jet fuel accounted for about 44 percent of the total transportation fuel consumption in 2008, followed by motor gasoline (39%), distillate fuel (12%), and residual fuel (5%).

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	61,779	38.1	28.0	2.3	9.9	21.6	0.2	100.0
1970	125,342	63.9	23.1	3.4	8.7	0.5	0.4	100.0
1975	130,540	63.9	26.6	3.7	4.9	0.4	0.4	100.0
1980	146,709	54.0	25.5	13.2	6.2	0.7	0.4	100.0
1985	142,886	52.1	27.4	13.0	6.7	0.5	0.3	100.0
1990	154,543	46.0	28.8	13.2	10.8	0.9	0.3	100.0
1995	138,154	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	162,030	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	179,374	51.8	31.5	12.4	3.9	0.1	0.3	100.0
2006	181,639	47.9	32.7	10.9	8.2	0.1	0.2	100.0
2007	195,320	37.0	29.6	18.6	14.4	0.1	0.2	100.0
2008	138,468	43.8	39.3	12.0	4.6	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	97	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	74	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	82	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	76	21,334
1998	9,999	9,065	1,242	383	107	79	20,876
1999	9,474	8,786	2,071	1,708	58	79	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	71	23,704
2002	10,189	10,262	3,329	1,437	18	70	25,306
2003	12,708	10,448	5,033	914	15	75	29,194
2004	13,379	10,560	5,359	1,493	39	66	30,897
2005	16,372	10,833	3,827	1,121	44	80	32,278
2006	15,334	11,379	3,387	2,375	41	80	32,597
2007	12,756	11,092	6,246	4,465	41	78	34,678
2008	10,702	10,416	2,845	1,008	28	65	25,064

Source: Energy Information Administration, State Energy Data System

Table 5.3 shows that the transportation sector accounted for about 60 percent of total petroleum consumption in Hawaii in 2008. All jet fuel and aviation gasoline and almost all motor gasoline were consumed by the transportation sector. About half of the distillate fuel and 8 percent of residual fuel were also consumed by the transportation sector in 2008.

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
1986	100	98	66	11	100	4	59
1987	100	98	42	8	100	4	57
1988	100	98	55	10	100	3	55
1989	100	98	57	13	100	3	58
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	50	8	100	2	59

Source: Energy Information Administration, State Energy Data System

Table 5.4 provides selected motor vehicle fuel consumption intensity measures. From 1960 to 2009, Hawaii's average motor vehicle fuel consumption per vehicle decreased from 616 gallon per vehicle to 488 gallon per vehicle. The average miles per gallon of fuel increased from 14.0 miles/gallon in 1960 to 18.5 miles/gallon in 2009. The combination of higher fuel price (in constant dollar) and increased vehicle fuel efficiency let to increased fuel cost per mile from 18 cents per mile in 1970 to 21 cents per mile in 2008. However, due to substantial increases in vehicle miles traveled per capita, total land transportation fuel cost per capita increased from $774 in 1970 to $1,624 in 2008.

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	18	774
1975	506,434	296,160	585	4,146	8,187	4,679	14.0	21	991
1980	617,571	330,734	536	5,570	9,019	5,751	16.8	24	1,364
1985	749,034	345,672	461	6,762	9,027	6,503	19.6	16	1,064
1990	889,096	395,185	444	8,065	9,071	7,243	20.4	13	923
1991	897,193	406,819	453	8,142	9,075	7,163	20.0	11	772
1992	885,761	405,963	458	8,066	9,106	6,961	19.9	11	758
1993	880,152	409,940	466	7,945	9,027	6,774	19.4	11	742
1994	875,144	428,558	490	7,925	9,056	6,674	18.5	11	762
1995	877,756	422,884	482	7,944	9,050	6,637	18.8	11	740
1996	884,617	426,370	482	8,006	9,050	6,651	18.8	12	773
1997	884,267	421,499	477	8,003	9,050	6,605	19.0	12	761
1998	893,427	422,928	473	8,090	9,055	6,657	19.1	11	746
1999	906,935	417,374	460	8,215	9,058	6,788	19.7	10	691
2000	941,242	428,425	455	8,526	9,058	7,037	19.9	12	826
2001	967,146	445,558	461	8,754	9,052	7,186	19.6	13	914
2002	987,598	477,518	484	8,937	9,050	7,278	18.7	11	821
2003	1,030,845	483,232	469	9,325	9,046	7,524	19.3	13	984
2004	1,072,211	498,816	465	9,735	9,079	7,770	19.5	14	1,101
2005	1,119,838	505,418	451	10,129	9,045	8,000	20.0	16	1,277
2006	1,127,467	531,505	471	10,196	9,044	7,993	19.2	18	1,455
2007	1,134,542	541,956	478	10,260	9,043	8,035	18.9	18	1,438
2008	1,127,567	540,910	480	10,189	9,036	7,914	18.8	21	1,624
2009	1,117,790	545,413	488	10,095	9,031	7,794	18.5		

* Fuel cost in Constant 2009 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 2008.

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	13,416	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	11,385	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	9,533	7,708,206	5,088,781	2,619,425	6,741,037	4,255,621	2,485,416	1.2	1.4
2000	9,482	7,981,480	5,318,419	2,663,061	6,948,595	4,446,936	2,501,659	1.2	1.4
2001	8,944	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	12,724	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	16,417	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		7,709,202	5,748,379	1,960,823	6,420,448	4,672,001	1,748,447		

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

5.2. Residential Sector

The residential sector consumed about 37 trillion Btu or about 13 percent of Hawaii's total energy in 2008. Electricity (both retail electricity and allocated electric system losses) accounted for about 90 percent of total residential energy consumption, followed by solar energy (7.1%) and petroleum (mainly LPG) (2.6%).

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	7,148	0.0	1.5	0.0	24.5	74.0
1965	9,884	0.0	2.1	0.0	29.7	68.2
1970	15,448	0.0	4.9	0.0	28.4	66.7
1975	18,939	0.0	2.8	0.0	30.0	67.2
1980	20,989	0.0	3.4	0.0	29.9	66.7
1985	19,976	0.0	0.8	0.0	32.1	67.1
1990	30,732	0.0	0.7	2.9	25.8	70.6
1991	26,125	0.0	0.8	3.7	31.3	64.2
1992	29,649	0.0	2.2	3.5	28.1	66.2
1993	30,069	0.0	0.5	3.6	28.0	67.9
1994	31,095	0.0	0.5	3.7	28.1	67.7
1995	31,996	0.0	0.5	3.8	27.8	68.0
1996	32,815	0.0	0.5	3.8	27.8	67.8
1997	32,924	0.0	1.0	3.9	27.6	67.5
1998	33,075	0.0	2.7	4.0	27.2	66.0
1999	33,074	0.0	1.6	4.1	27.7	66.6
2000	33,840	0.0	2.1	4.0	27.9	66.0
2001	32,869	0.1	2.2	4.1	29.1	64.6
2002	34,850	0.1	2.0	3.9	28.4	65.6
2003	34,314	0.1	1.5	4.1	30.1	64.1
2004	35,373	0.1	1.5	4.1	30.5	63.7
2005	35,871	0.1	1.5	4.4	30.1	63.9
2006	36,402	0.1	1.6	4.9	29.8	63.6
2007	37,125	0.1	1.3	5.5	29.4	63.7
2008	36,738	0.1	2.6	7.1	28.7	61.5

Source: Energy Information Administration, State Energy Data System

In 2008, Hawaii's residential sector consumed about 500 million cubic feet (MCF) of natural gas, about 265 thousand barrels (TBBL) of petroleum products (mostly LPG), and about 3,085 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

Source: Energy Information Administration, State Energy Data System

Table 5.8 shows the residential energy consumption per household in Hawaii. From 1960 to 2008, residential energy consumption per household increased about 78 percent from 47 MBTU per household to 84 MBTU in 2008; residential electricity consumption per household increased about 108 percent from 3,382 kWh per household to 7,045 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	3,382	1	62	54	19
1965	174,998	56	4,920	1	75	78	32
1970	204,505	76	6,283	4	100	100	100
1975	251,986	75	6,599	2	99	105	57
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	130
1991	361,403	72	6,629	5	96	106	133
1992	367,095	81	6,642	6	107	106	168
1993	371,002	81	6,654	5	107	106	134
1994	375,478	83	6,810	5	110	108	138
1995	382,340	84	6,817	5	111	108	138
1996	388,840	84	6,882	5	112	110	139
1997	391,637	84	6,813	5	111	108	146
1998	395,139	84	6,683	7	111	106	190
1999	399,712	83	6,728	6	110	107	163
2000	404,391	84	6,837	6	111	109	175
2001	409,863	80	6,838	6	106	109	172
2002	415,228	84	6,980	6	111	111	173
2003	421,614	81	7,181	6	108	114	161
2004	427,125	83	7,403	6	110	118	162
2005	432,097	83	7,323	6	110	117	167
2006	435,287	84	7,311	7	111	116	179
2007	434,297	85	7,370	7	113	117	189
2008	437,919	84	7,045	9	111	112	253

Source: Energy Information Administration, State Energy Data System

The residential energy expenditure per household both in current dollars and in constant 2009 dollars are provided in Table 5.9. In 2008, average energy expenditures per household in constant 2009 dollar reached $2,468. From 1970 to 2008, Hawaii's average residential energy expenditures increased 133 percent in constant value; average residential electricity expenditures increased 136 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	$/HH	2009$/HH	2009$/HH	1970=100	1970=100
1970	41.50	191	176	1,061	977	100	100
1975	56.30	341	328	1,395	1,342	132	137
1980	83.00	591	502	1,639	1,390	155	142
1985	106.80	704	661	1,517	1,425	143	146
1990	138.10	706	669	1,175	1,115	111	114
1991	148.00	743	697	1,154	1,084	109	111
1992	155.10	782	724	1,160	1,074	109	110
1993	160.10	850	817	1,221	1,174	115	120
1994	164.50	882	848	1,234	1,186	116	121
1995	168.10	944	908	1,291	1,243	122	127
1996	170.70	1,020	981	1,374	1,322	130	135
1997	171.90	1,060	1,008	1,418	1,349	134	138
1998	171.50	1,017	924	1,364	1,239	129	127
1999	173.30	1,023	962	1,357	1,277	128	131
2000	176.30	1,202	1,122	1,568	1,464	148	150
2001	178.40	1,199	1,117	1,547	1,440	146	147
2002	180.30	1,172	1,091	1,496	1,392	141	143
2003	184.50	1,277	1,201	1,592	1,498	150	153
2004	190.60	1,413	1,337	1,706	1,614	161	165
2005	197.80	1,600	1,516	1,861	1,763	175	181
2006	209.35	1,802	1,707	1,980	1,876	187	192
2007	219.50	1,865	1,778	1,955	1,863	184	191
2008	228.86	2,455	2,289	2,468	2,301	233	236
2009	230.05						

Source: Energy Information Administration, State Energy Data System

5.3. Commercial Sector

In 2008, the commercial sector consumed about 44 trillion Btu or about 15.4 percent of Hawaii's total primary energy. Electricity accounted for 86.3 percent of total commercial energy consumption, followed by biomass (7.0%) and petroleum 6.5%). Natural gas consumed in the commercial sector is mainly supplemental gaseous fuels which is not a source 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	5,307	0.0	21.1	0.0	19.6	59.2
1965	7,039	0.0	20.9	0.0	24.0	55.1
1970	12,500	0.0	29.5	0.0	21.1	49.5
1975	14,505	0.0	15.4	0.0	26.1	58.5
1980	20,022	0.0	19.6	0.0	24.9	55.5
1985	18,425	0.0	7.7	0.0	29.9	62.4
1990	37,190	0.0	22.8	0.0	20.7	56.5
1991	28,786	0.0	14.8	0.0	27.9	57.2
1992	38,553	0.0	28.1	0.0	21.4	50.5
1993	31,171	0.0	9.4	0.0	26.5	64.1
1994	35,585	0.0	14.8	0.0	24.9	60.2
1995	35,347	0.0	7.6	0.0	26.8	65.6
1996	34,791	0.0	5.0	0.0	27.6	67.4
1997	36,272	0.0	8.1	0.0	26.7	65.2
1998	46,589	0.0	29.0	0.0	20.7	50.3
1999	36,626	0.0	6.7	0.0	27.4	65.9
2000	38,114	0.1	6.7	0.0	27.7	65.5
2001	37,221	0.2	5.5	0.0	29.3	65.0
2002	39,542	0.2	7.7	0.0	27.8	64.3
2003	40,194	0.2	6.3	0.0	29.9	63.6
2004	44,141	0.2	7.3	5.8	28.1	58.7
2005	42,484	0.3	7.6	5.3	27.8	59.0
2006	43,293	0.3	7.6	6.0	27.5	58.7
2007	42,983	0.3	5.8	5.4	27.9	60.6
2008	43,582	0.2	6.5	7.0	27.4	58.8

Source: Energy Information Administration, State Energy Data System

In 2008, Hawaii's commercial sector consumed about 1,769 MCF of natural gas, about 645 TBBL of petroleum products (mostly distillate fuels and LPG), and about 3,500 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	0	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	303	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	0	2,779
1996	2,132	326	224	11	13	78	0	2,819
1997	1,751	560	392	11	11	145	0	2,839
1998	1,747	2,338	211	11	1,704	413	0	2,833
1999	1,749	511	260	11	6	234	0	2,944
2000	1,771	558	218	11	8	320	0	3,092
2001	1,749	478	136	12	5	324	0	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	0	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	645	230	12	0	403	0	3,501

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 2008, commercial total energy consumption per million dollar real commercial GDP decreased almost 10 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 $M Real GDP					
	Commetial	Total		Other	Index		
	Real GDP	Energy	Electricity	Energy	Total Energy	Electricity	Others
Year	2000$M	MBTU/$M	kWh/$M	MBTU/$M	1990=100	1990=100	1990=100
1990	35,573	1,045	63,330	305	100	100	100
1991	35,742	805	65,900	184	77	104	60
1992	36,795	1,048	65,693	357	100	104	117
1993	36,674	850	65,973	141	81	104	46
1994	36,428	977	71,397	209	93	113	68
1995	36,031	981	77,117	138	94	122	45
1996	35,975	967	78,354	111	93	124	36
1997	36,348	998	78,095	130	95	123	43
1998	35,743	1,303	79,261	429	125	125	141
1999	35,962	1,018	81,873	120	97	129	39
2000	36,336	1,049	85,098	121	100	134	40
2001	36,892	1,009	86,528	105	97	137	34
2002	37,109	1,066	86,848	131	102	137	43
2003	38,517	1,044	91,314	113	100	144	37
2004	40,680	1,085	89,292	188	104	141	61
2005	42,775	993	80,962	172	95	128	56
2006	44,584	971	78,273	174	93	124	57
2007	45,480	945	77,402	148	90	122	49
2008	45,910	949	76,253	169	91	120	55

Source: Energy Information Administration, State Energy Data System

The commercial sector energy expenditures per dollar of real GDP (both in current dollars and constant 2009 dollars) are provided in Table 5.13. From 1990 to 2008, Hawaii's average commercial energy expenditures per dollar of real GDO increased 87 percent in constant value; average commercial electricity expenditures increased 113 percent in constant value.

[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.

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 2009$	Constant 2009$	Total Energy	Electricity
Year	CPI-U	Cents/$GDP	Cents/$GDP	Cents/$GDP	Cents/$GDP	1990=100	1990=100
1990	138.10	0.84	0.64	1.39	1.07	100	100
1991	148.00	0.83	0.68	1.29	1.06	93	99
1992	155.10	0.89	0.69	1.33	1.02	95	96
1993	160.10	0.89	0.77	1.28	1.11	92	103
1994	164.50	0.97	0.83	1.35	1.16	97	109
1995	168.10	1.06	0.94	1.45	1.28	104	120
1996	170.70	1.14	1.02	1.53	1.37	110	128
1997	171.90	1.17	1.04	1.56	1.39	112	129
1998	171.50	1.18	0.98	1.59	1.31	114	122
1999	173.30	1.16	1.04	1.54	1.38	111	129
2000	176.30	1.42	1.26	1.85	1.64	133	154
2001	178.40	1.43	1.29	1.85	1.66	133	155
2002	180.30	1.38	1.23	1.77	1.57	127	146
2003	184.50	1.52	1.37	1.90	1.71	137	160
2004	190.60	1.64	1.45	1.98	1.74	142	163
2005	197.80	1.78	1.54	2.07	1.79	148	167
2006	209.35	1.94	1.68	2.13	1.84	153	172
2007	219.50	1.93	1.70	2.02	1.78	145	166
2008	228.86	2.59	2.27	2.60	2.28	187	213
2009	230.05						

Source: Energy Information Administration, State Energy Data System

5.4. Industrial Sector

The industrial sector consumed about 65 trillion Btu or about 23 percent of Hawaii's total energy in 2008. Electricity accounted for about 63 percent of total industrial energy consumption, followed by petroleum (31%) and coal (4%).

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	20,627	-	-	69.10	7.70	23.21	-	-
1965	34,699	-	-	61.50	10.78	24.74	0.50	2.49
1970	43,673	-	-	52.50	13.44	31.59	0.39	2.07
1975	50,430	-	-	42.21	17.17	38.54	0.61	1.47
1980	74,694	-	-	38.47	13.83	30.83	15.95	0.93
1985	67,444	-	1.67	27.46	15.90	33.24	20.69	1.03
1990	98,941	-	0.70	32.25	12.88	35.22	18.35	0.60
1991	89,033	-	1.03	34.29	14.46	29.65	19.98	0.59
1992	93,661	-	1.25	32.67	13.88	32.76	18.87	0.57
1993	93,092	-	1.95	32.30	13.82	33.47	18.00	0.47
1994	94,716	-	1.95	35.63	13.66	32.97	14.95	0.83
1995	94,104	-	4.38	33.33	13.79	33.72	14.09	0.70
1996	96,729	-	3.76	33.81	13.70	33.41	14.62	0.69
1997	89,760	-	4.16	31.45	14.66	35.80	13.17	0.76
1998	81,732	-	4.12	27.19	15.81	38.33	13.61	0.94
1999	78,946	-	3.41	25.93	16.20	38.89	14.66	0.91
2000	79,084	0.02	2.71	28.33	16.54	39.15	12.48	0.78
2001	70,341	0.04	2.91	29.85	18.38	40.81	7.27	0.74
2002	71,086	0.03	0.92	31.12	18.10	41.81	7.15	0.86
2003	66,763	0.03	2.06	33.11	19.66	41.87	2.50	0.77
2004	67,020	0.04	1.87	32.92	20.04	41.88	2.70	0.55
2,005	71,065	0.04	1.99	36.46	18.78	39.84	2.41	0.48
2,006	69,899	0.04	2.34	35.82	19.02	40.56	1.67	0.55
2,007	67,807	0.04	2.65	33.50	19.45	42.13	1.67	0.55
2,008	64,996	0.04	3.56	31.08	19.97	42.88	1.88	0.60

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.15, Hawaii's industrial sector consumed about 99,000 short tons (ST) of coal, 431 MCF of natural gas, about 3,387 TBBL of petroleum products, and about 3,804 million kWh of electricity in 2008.

Table 5.15. Industrial Energy Consumption in Physical Units

	Industrial Energy Consumption By Source				Industrial Sector % in Total Consumption					
	Coal	Natural Gas	Petroleum	Electricity		Natural				Hydro &
Year	1000 ST	MCF	TBBL	Million kWh	Coal	Gas	Petroleum	Electricity	Biomass	Geothermal
1960	0	0	2,367	465			14.0	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	54.4	79.5
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	53.8
1986	16	0	4,173	3,239	100.0	0.0	10.7	46.1	100.0	58.5
1987	63	0	4,070	3,284	100.0	0.0	10.3	45.0	100.0	61.7
1988	50	0	4,961	3,495	100.0	0.0	10.8	45.3	100.0	58.5
1989	32	0	4,469	3,576	100.0	0.0	9.3	44.9	98.7	39.6
1990	28	0	5,231	3,734	95.0	0.0	10.5	44.9	70.0	71.4
1991	37	0	4,989	3,773	81.6	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	78.4
1993	73	0	5,250	3,770	10.6	0.0	12.7	43.5	68.7	11.6
1994	86	0	6,151	3,791	12.2	0.0	13.7	42.4	68.3	14.9
1995	192	0	5,643	3,803	21.4	0.0	12.9	41.4	66.9	11.1
1996	169	0	5,880	3,884	18.2	0.0	14.1	41.4	74.2	10.9
1997	166	342	4,672	3,856	17.8	13.1	11.7	41.2	67.8	10.8
1998	146	373	3,765	3,787	17.8	14.0	9.3	40.9	67.2	12.4
1999	117	463	3,380	3,748	14.6	16.9	8.5	39.9	68.1	12.8
2000	110	536	3,685	3,834	13.4	18.9	9.1	39.6	65.0	9.4
2001	113	532	3,513	3,790	13.6	18.9	8.5	38.7	64.4	9.7
2002	50	475	3,779	3,770	6.6	17.4	8.4	38.1	67.9	24.5
2003	52	444	3,721	3,846	6.2	16.3	8.0	37.0	18.0	11.0
2004	53	446	3,704	3,937	6.2	16.1	7.5	36.7	19.4	6.8
2005	59	439	4,298	3,912	7.3	15.7	8.4	37.1	18.2	6.0
2006	59	451	4,184	3,896	7.5	16.2	8.1	36.9	12.2	6.7
2007	72	502	3,836	3,864	8.5	17.6	7.3	36.5	12.1	6.5
2008	99	431	3,387	3,804	10.6	16.0	8.0	36.6	10.6	6.8

Source: Energy Information Administration, State Energy Data System

Table 5.16 shows that petroleum products consumed in 2008 include: 448 TBBL of residual fuel, 359 TBBL of distillate fuel, 247 TBBL of motor gasoline, and 2,332 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 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	1,452	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	2,227	5,135	29.0	26.7	0.9	43.4
1985	1,344	458	104	1,092	2,997	44.8	15.3	3.5	36.4
1986	1,952	549	101	1,571	4,173	46.8	13.1	2.4	37.6
1987	1,332	658	108	1,972	4,070	32.7	16.2	2.6	48.5
1988	1,768	715	110	2,367	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	53.6
1990	1,740	725	133	2,632	5,231	33.3	13.9	2.6	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	19.3	8.8	4.0	68.0
1995	1,024	548	245	3,826	5,643	18.2	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	2,609	3,765	8.1	15.5	7.1	69.3
1999	332	427	155	2,464	3,380	9.8	12.6	4.6	72.9
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	12.2	3.8	72.2
2003	364	426	137	2,793	3,721	9.8	11.5	3.7	75.1
2004	395	407	169	2,734	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	2,775	4,184	19.4	10.9	3.4	66.3
2007	428	451	244	2,713	3,836	11.2	11.7	6.4	70.7
2008	448	359	247	2,332	3,387	13.2	10.6	7.3	68.9

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 2008, industrial total energy consumption per million dollar real industrial GDP decreased about 9 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

	Energy Consumption per $M Real GDP			Index		
	Total Energy	Electricity	Other Energy	Total Energy	Electricity	Others
Year	MBTU/$M	kWh/$M	MBTU/$M	1990=100	1990=100	1990=100
1990	18,360	692,835	9,529	100	100	100
1991	15,908	674,167	8,892	87	97	93
1992	17,279	703,142	9,219	94	101	97
1993	17,891	724,525	9,431	97	105	99
1994	19,633	785,735	10,479	107	113	110
1995	20,111	812,683	10,557	110	117	111
1996	22,211	891,916	11,748	121	129	123
1997	22,087	948,931	10,943	120	137	115
1998	21,368	990,169	9,798	116	143	103
1999	20,858	990,143	9,367	114	143	98
2000	20,456	991,690	9,064	111	143	95
2001	18,838	1,014,969	7,687	103	146	81
2002	17,843	946,386	7,153	97	137	75
2003	16,432	946,613	6,321	90	137	66
2004	16,941	995,177	6,450	92	144	68
2005	17,103	941,444	7,076	93	136	74
2006	16,929	943,509	6,843	92	136	72
2007	17,192	979,802	6,605	94	141	69
2008	16,786	982,513	6,236	91	142	65

Source: Energy Information Administration, State Energy Data System

The industrial sector energy expenditures per dollar of real GDP (both in current dollars and constant 2009 dollars) are provided in Table 5.18. From 1990 to 2008, Hawaii's average industrial energy expenditures per dollar of real GDP increased 158 percent in constant value; average industrial electricity expenditures per dollar of real GDP increased 196 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	
	Current $	Current $	Constant 2009$	Constant 2009$	Total Energy	Electricity
Year	Cents/$GDP	Cents/$GDP	Cents/$GDP	Cents/$GDP	1990=100	1990=100
1990	6.35	4.93	10.58	8.21	100	100
1991	6.17	4.90	9.60	7.61	91	93
1992	6.45	5.21	9.56	7.73	90	94
1993	7.66	6.11	11.01	8.78	104	107
1994	8.53	6.54	11.93	9.15	113	111
1995	9.22	7.11	12.62	9.73	119	118
1996	10.73	8.55	14.46	11.52	137	140
1997	11.10	9.39	14.85	12.56	140	153
1998	10.41	8.91	13.97	11.95	132	145
1999	10.41	9.17	13.82	12.17	131	148
2000	12.87	11.11	16.80	14.50	159	177
2001	12.74	11.29	16.43	14.55	155	177
2002	11.14	9.81	14.22	12.51	134	152
2003	12.11	10.93	15.10	13.63	143	166
2004	14.04	12.53	16.94	15.12	160	184
2005	16.06	14.04	18.67	16.33	176	199
2006	18.15	16.02	19.94	17.61	188	214
2007	19.48	16.99	20.41	17.80	193	217
2008	27.17	24.15	27.31	24.28	258	296

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 2008, the share of waste in total electricity generation energy consumption decreased from 7.3 percent to 3.5 percent; the shares of coal and geothermal increased from both zero percent to 16.0 percent and 4.4 percent, respectively. In 2008, about 112 trillion Btu or 39 percent of Hawaii's total energy was used to generate electricity. Fossil fuel accounted for about 89.5 percent of total energy consumption; renewable energy accounted for 10.5 percent. Excluding waste, other renewable energy (geothermal, hydro, wind, and solar) accounted for only about 7.0 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	97.1	1.2	-	-	-	1.7	-	-
1965	27,568	97.9	1.3	-	-	-	0.8	-	-
1970	43,176	97.6	1.3	-	0.6	-	0.5	-	-
1975	58,778	95.0	4.2	-	0.4	-	0.3	-	-
1980	69,749	92.3	7.4	-	-	-	0.3	-	-
1985	69,962	92.5	6.3	-	0.4	0.6	0.3	-	-
1990	105,928	82.2	10.0	0.0	7.3	-	0.2	0.3	-
1991	88,716	79.3	11.2	0.2	8.6	-	0.2	0.4	-
1992	99,350	74.0	12.7	5.6	7.3	0.0	0.1	0.2	-
1993	101,095	62.8	12.5	13.6	7.5	3.1	0.1	0.2	-
1994	104,251	63.7	12.1	13.3	6.3	3.7	0.6	0.2	-
1995	108,017	62.3	11.9	14.6	6.1	4.5	0.3	0.2	-
1996	110,023	62.8	12.3	15.2	4.5	4.6	0.4	0.2	-
1997	109,955	62.2	12.2	15.3	5.1	4.7	0.5	0.1	-
1998	108,208	63.0	13.0	13.7	5.0	4.6	0.4	0.2	-
1999	108,867	62.9	13.7	13.8	5.0	4.1	0.4	0.2	-
2000	111,328	61.3	14.5	13.9	4.8	4.9	0.4	0.2	-
2001	107,498	62.1	16.1	14.6	2.6	4.0	0.5	0.0	-
2002	111,730	61.1	20.8	14.3	2.1	1.4	0.3	0.0	-
2003	110,983	61.2	12.1	16.1	6.9	3.4	0.4	0.0	-
2004	113,129	62.3	12.8	15.9	4.4	4.0	0.5	0.1	-
2005	112,246	63.3	13.4	14.7	3.8	4.1	0.6	0.1	-
2006	112,969	64.0	12.6	14.1	3.9	3.9	0.7	0.7	-
2007	114,378	62.8	11.8	15.0	3.6	4.2	0.5	2.1	-
2008	111,567	62.0	11.5	16.0	3.5	4.4	0.4	2.1	0.0

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, and then stabilized at about 11,000 TBBLs from 1991 to 2008. Distillate fuel oil used in electricity generation increased from 37 TBBLs in 1960 to 1,813 TBBLs in 1990, and then fluctuated between 2,000 and 4,000 TBBLs. 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					
	Residual Fuel	Distillate Fuel	Coal	% in Total Consumption		
				Residual	Distillate	
Year	T BBL	T BBL	T ST	Fuel	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	5
1991	11,193	1,710	8	72	24	18
1992	11,692	2,173	256	65	35	85
1993	10,102	2,170	618	73	37	89
1994	10,567	2,168	618	70	34	88
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	92
2007	11,426	2,313	778	70	25	92
2008	11,009	2,199	838	88	39	89

Source: Energy Information Administration, State Energy Data System

Table 5.21 shows electricity generated by selected renewable energy sources (excluding waste). From 1960 to 2008, total electricity generated from selected renewable energy sources increased from 27 million kWh to 559 million kWh; the share of electricity generated from selected renewable energy sources in total electricity consumption increased from 2.1 percent to 5.4 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	105	0	0	105	2,452	4.3
1970	0	108	0	0	108	3,776	2.9
1975	0	89	0	0	89	5,310	1.7
1980	0	86	0	0	86	6,331	1.4
1985	19	86	0	0	104	6,635	1.6
1990	0	80	29	0	108	8,311	1.3
1991	0	71	36	0	107	8,524	1.3
1992	2	61	23	0	86	8,667	1.0
1993	152	56	22	0	230	8,658	2.7
1994	185	139	20	0	345	8,948	3.9
1995	235	98	20	0	353	9,188	3.8
1996	242	104	23	0	369	9,379	3.9
1997	245	115	16	0	377	9,363	4.0
1998	237	121	19	0	378	9,261	4.1
1999	211	115	16	0	342	9,381	3.6
2000	262	103	17	0	383	9,691	3.9
2001	207	101	2	0	309	9,785	3.2
2002	73	95	2	0	169	9,892	1.7
2003	178	91	2	0	270	10,391	2.6
2004	213	94	7	0	315	10,732	2.9
2005	222	96	7	0	324	10,539	3.1
2006	212	120	80	0	412	10,568	3.9
2007	230	92	238	0	560	10,585	5.3
2008	234	84	240	0	559	10,390	5.4

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

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									
		Petroleum	Coal	Other Gases	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	-	-

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									
		Petroleum	Coal	Other Gases	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	-

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									
		Petroleum	Coal	Other Gases	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	542,290	84.4	0.2	-	15.3	-	-	-	-	-	-
1991	145,717	41.8	4.6	-	53.5	-	-	-	-	-	-
1992	1,760,037	67.0	29.9	-	3.1	-	-	-	-	-	-
1993	2,584,600	40.8	56.5	-	2.7	-	-	-	-	-	-
1994	2,713,003	50.7	47.9	-	1.5	-	-	-	-	-	-
1995	2,808,818	46.5	53.5	-	-	-	-	-	-	-	-
1996	2,931,878	46.0	54.0	-	0.0	-	-	-	-	-	-
1997	2,868,654	47.0	52.8	-	0.2	-	-	-	-	-	-
1998	2,789,931	49.0	50.8	-	0.3	-	-	-	-	-	-
1999	2,782,035	48.4	51.2	-	0.4	-	-	-	-	-	-
2000	2,859,573	46.3	53.7	-	-	-	-	-	-	-	-
2001	3,224,983	51.6	48.4	-	-	-	-	-	-	-	-
2002	3,288,683	53.5	46.2	-	-	-	-	-	-	-	0.4
2003	3,640,052	50.0	45.2	-	4.3	-	-	-	-	-	0.6
2004	3,568,387	50.4	44.9	-	3.9	-	-	-	-	-	0.7
2005	3,769,263	52.6	43.3	-	3.5	-	-	-	-	-	0.6
2006	3,566,361	52.2	43.4	-	3.6	-	-	-	-	-	0.8
2007	3,524,900	51.6	44.8	-	3.1	-	-	-	-	-	0.5
2008	3,190,375	44.4	51.6	-	3.5	-	-	-	-	-	0.5

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									
		Petroleum	Coal	Other Gases	Other Biomass	Wood	Geothermal	Hydro	Wind	Solar	Other
1990	778,856	38.1	0.2	2.1	52.4	-	-	7.3	-	-	-
1991	847,735	40.2	0.1	6.1	47.7	-	-	6.0	-	-	-
1992	814,750	34.9	3.6	7.7	47.5	0.0	-	6.3	-	-	-
1993	762,928	35.3	2.5	8.3	48.3	0.0	-	5.6	-	-	-
1994	718,119	32.1	3.9	9.2	44.2	0.0	-	10.7	-	-	-
1995	663,563	29.7	9.0	10.4	40.8	0.2	-	9.6	-	-	0.3
1996	669,415	31.6	8.9	9.0	40.7	0.1	-	9.7	-	-	-
1997	574,691	25.2	10.4	11.4	41.4	0.1	-	11.6	-	-	-
1998	489,879	39.9	3.9	12.3	28.5	-	-	15.4	-	-	-
1999	567,003	38.4	2.9	8.7	37.6	-	-	12.4	-	-	-
2000	542,835	38.6	7.8	7.8	34.7	-	-	11.1	-	-	-
2001	503,786	38.9	8.9	7.5	24.5	-	-	10.0	-	-	10.2
2002	461,082	44.6	5.9	8.9	27.6	-	-	13.1	-	-	-
2003	291,822	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	-	-	-

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									
		Petroleum	Coal	Other Gases	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

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

	Total Electricity Generation Units: MWH					Total Electricity Generation	Total Electricity Generation % in Total Electricity Generation				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	MWH	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	291,822	-	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	3,190,375	254,554	329,887	11,376,385	58.9	7.9	28.0	2.2	2.9

Source: Energy Information Administration, State Energy Data System

Table 5.29. Petroleum Generated Electricity by Producer

	Electricity Generation by Petroleum Units: MWH					Total Electricity Generation	Electricity Generation by Petroleum % in Total				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	MWH	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

Source: Energy Information Administration, State Energy Data System

Table 5.30. Coal Generated Electricity by Producer

	Electricity Generation by Petroleum Units: MWH					Total Electricity Generation	Electricity Generation by Petroleum % in Total				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	MWH	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	-	-

Source: Energy Information Administration, State Energy Data System

Table 5.31. Other Energy Generated Electricity by Producer

	Electricity Generation by Petroleum Units: MWH					Total Electricity Generation	Electricity Generation by Petroleum % in Total				
			CHP						CHP		
Year	Utility	IPP	Electric	Industry	Commercial	MWH	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	98,919	-	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	126,844	83,988	328,579	1,058,858	1.7	47.4	12.0	7.9	31.0

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				
			Other			Other			Other	MBTU/Unit	
	Petroleum	Coal	Gases	Petroleum	Coal	Gases	Petroleum	Coal	Gases	Petroleum	Coal
Year	BBL	ST	Billion BTU	BBL	ST	Billion BTU	BTU	BTU	BTU	BBL	ST
1990	16,033,262	2,013	211	1.84	0.85	0.01	11.45	14.85	13.05	6.24	17.57
1991	13,464,028	5,555	729	1.75	0.73	0.01	10.87	12.63	14.16	6.23	17.31
1992	14,220,256	265,043	1,027	1.71	0.48	0.02	10.61	10.37	16.46	6.22	21.77
1993	12,605,395	603,669	1,044	1.70	0.41	0.02	10.59	9.08	16.55	6.21	22.25
1994	12,933,103	596,431	913	1.69	0.45	0.01	10.52	10.11	13.89	6.21	22.49
1995	13,034,983	688,499	663	1.70	0.44	0.01	10.55	9.91	9.57	6.21	22.46
1996	13,451,479	742,026	1,027	1.69	0.45	0.02	10.49	9.93	17.01	6.21	21.99
1997	13,226,872	754,453	622	1.72	0.48	0.01	10.68	10.48	9.51	6.21	21.86
1998	13,262,910	638,057	811	1.69	0.44	0.01	10.49	9.78	13.42	6.21	21.99
1999	13,544,370	646,215	447	1.69	0.45	0.01	10.51	9.84	9.03	6.20	21.93
2000	13,754,387	691,513	388	1.71	0.44	0.01	10.59	9.62	9.20	6.20	21.96
2001	13,661,310	717,290	315	1.66	0.45	0.01	10.29	9.82	8.32	6.19	21.96
2002	15,661,770	706,734	325	1.65	0.46	0.01	10.21	10.45	7.96	6.17	22.86
2003	13,133,452	751,987	361	1.54	0.46	0.01	9.59	10.42	8.97	6.21	22.78
2004	13,995,473	702,545	269	1.56	0.44	0.01	9.71	9.80	5.62	6.21	22.38
2005	14,131,327	703,865	231	1.56	0.43	0.01	9.67	9.57	5.62	6.21	22.18
2006	14,211,287	674,909	240	1.57	0.44	0.01	9.75	9.62	5.62	6.21	22.08
2007	13,943,232	689,627	254	1.56	0.44	0.01	9.72	9.66	5.62	6.21	22.12
2008	13,407,277	746,642	213	1.55	0.45	0.01	9.61	9.66	5.51	6.21	21.31

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		
	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases
Year	BBL	ST	Billion BTU	BBL	ST	Billion BTU	BTU	BTU	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		

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		
	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases
Year	BBL	ST	Billion BTU	BBL	ST	Billion BTU	BTU	BTU	BTU
1990	1,629,135	839		3.56	0.71		22.19	12.44	
1991	123,869	4,975		2.03	0.73		12.66	12.72	
1992	1,631,993	242,989		1.38	0.46		8.61	10.04	
1993	1,423,808	588,420		1.35	0.40		8.39	8.97	
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	10.32	
1998	2,133,250	628,405		1.56	0.44		9.70	9.76	
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	9.61	
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	9.80	
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	9.66	

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		
	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases
Year	BBL	ST	Billion BTU	BBL	ST	Billion BTU	BTU	BTU	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		

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		
	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases
Year	BBL	ST	Billion BTU	BBL	ST	Billion BTU	BTU	BTU	BTU
1990	599,999	1,174	211	2.02	0.98	0.01	12.61	17.24	13.05
1991	644,253	580	729	1.89	0.69	0.01	11.78	11.94	14.16
1992	564,861	22,054	1,027	1.99	0.75	0.02	12.36	16.25	16.46
1993	525,486	15,249	1,044	1.95	0.79	0.02	12.10	17.62	16.55
1994	403,651	18,066	913	1.75	0.65	0.01	10.89	14.50	13.89
1995	320,452	39,004	663	1.63	0.65	0.01	10.10	14.68	9.57
1996	336,327	39,004	1,027	1.59	0.65	0.02	9.88	14.38	17.01
1997	261,014	39,004	622	1.80	0.65	0.01	11.20	14.29	9.51
1998	257,595	9,652	811	1.32	0.51	0.01	8.18	11.24	13.42
1999	331,424	7,403	447	1.52	0.45	0.01	9.44	9.89	9.03
2000	252,286	19,183	388	1.20	0.45	0.01	7.47	9.90	9.20
2001	248,120	19,960	315	1.27	0.45	0.01	7.84	9.78	8.32
2002	270,516	22,611	325	1.31	0.84	0.01	8.11	19.09	7.96
2003	190,522		361	0.99		0.01	6.13		8.97
2004	159,838		269	0.92		0.01	5.74		5.62
2005	164,246		231	0.92		0.01	5.73		5.62
2006	163,225		240	0.93		0.01	5.76		5.62
2007	155,832		254	0.87		0.01	5.41		5.62
2008	140,804		213	0.83		0.01	5.13		5.51

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		
	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases	Petroleum	Coal	Other Gases
Year	BBL	ST	Billion BTU	BBL	ST	Billion BTU	BTU	BTU	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		

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		2,556
2001	2,093	227	9	151	35	26	11		2,552
2002	2,093	227	9	110	35	25	11		2,509
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		2,648
2007	2,224	203	9	114	35	25	64		2,674
2008	2,224	203	9	114	35	25	64	1	2,675

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		1,711
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		1,840
2007	1,838					4	2		1,845
2008	1,838					4	2		1,845

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					615
2003	365	227		46					638
2004	365	203		46					615
2005	365	203		46					615
2006	365	203		46					615
2007	299	203		46					549
2008	299	203		46					549

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

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

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

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	99	1,796	3,981		4,418	1,253		4,910
1991	4,039	317	5,720	4,035		3,944	1,549		3,980
1992	4,281	2,441	6,933	3,500	71	3,396	986		3,963
1993	3,742	6,487	7,008	3,500	5,075	3,125	954		3,970
1994	3,867	5,819	7,302	3,544	6,177	4,980	885		4,047
1995	3,886	6,847	7,701	3,308	6,701	3,373	925		4,136
1996	4,014	7,207	6,707	3,066	6,914	3,587	1,024		4,251
1997	3,899	6,907	7,265	3,403	7,011	3,977	802		4,173
1998	3,931	6,293	6,716	3,074	6,774	4,182	964		4,121
1999	3,984	6,317	5,501	3,696	6,024	4,104	1,833		4,207
2000	3,851	6,924	4,686	3,473	7,487	3,832	1,417		4,145
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		4,648
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		4,365
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

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					7,581			5,186
1991	4,646					6,800			4,650
1992	4,237					3,274			4,233
1993	3,668					4,584			3,667
1994	3,647					6,268			3,650
1995	3,731					5,319			3,732
1996	3,848					5,955			3,851
1997	3,749					6,264			3,754
1998	3,749					4,583			3,751
1999	3,811					6,281			3,818
2000	3,822					5,038	1,325		3,819
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		3,826
2007	3,761					3,682	219		3,755
2008	3,636					4,468	86		3,632

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	3,848	49							3,792
1991	204	282							451
1992	3,943	2,312							3,340
1993	3,526	6,403							4,904
1994	4,596	5,696							5,148
1995	4,372	6,586							5,330
1996	4,507	6,945							5,563
1997	4,511	6,645							5,443
1998	4,568	6,210							5,294
1999	4,501	6,245							5,279
2000	3,636	6,737							4,830
2001	4,562	7,684		0					5,111
2002	4,817	7,481		0					5,347
2003	4,984	7,243		3,368					5,705
2004	4,930	7,900		3,056					5,802
2005	5,435	8,034		2,909					6,129
2006	5,100	7,629		2,806					5,799
2007	6,089	7,778		2,375					6,421
2008	4,736	8,116		2,441					5,811

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	4,611			5,117			1,253		4,145
1991				5,328			1,549		4,379
1992	4,880			5,434	71		986		3,320
1993				5,047	5,075		954		4,305
1994				5,566	6,177	4,408	885		4,790
1995				5,494	6,701	1,805	925		4,784
1996				4,756	6,914	2,125	1,024		4,525
1997				5,422	7,011	2,976	802		4,972
1998				5,318	6,774	3,219	948		4,902
1999				5,240	6,024	2,590	1,411		4,982
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

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	9,273		1,796	2,833		3,785			3,914
1991	9,208		5,720	2,887		3,372			4,218
1992	10,929		6,933	2,375		3,420			3,825
1993	12,840		7,008	2,377		2,833			3,815
1994	10,968		7,302	2,282		5,467			3,946
1995	9,385		7,701	2,146		4,254			3,880
1996	10,064		6,707	2,160		4,328			3,915
1997	6,891		7,265	2,142		4,452			3,660
1998	9,307		6,716	1,441		5,022			3,450
1999	10,370		5,501	2,395		4,677			4,231
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

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

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

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 MWH	Commercial MWH	Industrial MWH	Total MWH	Residential %	Commercial %	Industrial %
1990	2,323,950	2,194,416	3,733,752	8,310,537	28.0	26.4	44.9
1991	2,395,661	2,297,841	3,773,038	8,524,087	28.1	27.0	44.3
1992	2,438,376	2,356,265	3,811,320	8,666,889	28.1	27.2	44.0
1993	2,468,578	2,363,224	3,769,876	8,657,911	28.5	27.3	43.5
1994	2,556,879	2,542,915	3,790,665	8,948,422	28.6	28.4	42.4
1995	2,606,284	2,721,151	3,802,683	9,187,608	28.4	29.6	41.4
1996	2,675,881	2,761,274	3,884,280	9,378,961	28.5	29.4	41.4
1997	2,668,050	2,781,653	3,856,455	9,363,099	28.5	29.7	41.2
1998	2,640,645	2,776,068	3,787,397	9,261,071	28.5	30.0	40.9
1999	2,689,147	2,887,393	3,747,690	9,381,139	28.7	30.8	39.9
2000	2,764,618	3,035,747	3,833,873	9,690,596	28.5	31.3	39.6
2001	2,802,470	3,129,441	3,789,894	9,784,563	28.6	32.0	38.7
2002	2,898,380	3,167,933	3,770,401	9,891,638	29.3	32.0	38.1
2003	3,027,624	3,517,123	3,846,089	10,390,836	29.1	33.8	37.0
2004	3,162,192	3,632,408	3,936,920	10,731,520	29.5	33.8	36.7
2005	3,164,065	3,463,147	3,911,698	10,538,910	30.0	32.9	37.1
2006	3,182,432	3,489,733	3,895,747	10,567,912	30.1	33.0	36.9
2007	3,200,725	3,520,234	3,864,340	10,585,299	30.2	33.3	36.5
2008	3,085,237	3,500,753	3,804,289	10,390,279	29.7	33.7	36.6

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 $1,000	Commercial $1,000	Industrial $1,000	Total $1,000	Residential %	Commercial %	Industrial %
1990	238,404	223,319	282,629	749,844	31.8	29.8	37.7
1991	251,999	237,453	290,943	785,897	32.1	30.2	37.0
1992	265,831	248,185	298,595	818,525	32.5	30.3	36.5
1993	303,167	276,058	337,238	922,797	32.9	29.9	36.5
1994	318,369	296,882	334,157	955,908	33.3	31.1	35.0
1995	347,281	330,986	352,472	1,037,701	33.5	31.9	34.0
1996	381,535	358,572	389,510	1,137,044	33.6	31.5	34.3
1997	394,850	368,823	397,999	1,169,187	33.8	31.5	34.0
1998	364,931	341,787	356,513	1,070,224	34.1	31.9	33.3
1999	384,432	367,807	363,684	1,123,125	34.2	32.7	32.4
2000	453,649	449,707	448,082	1,359,755	33.4	33.1	33.0
2001	457,800	463,606	442,536	1,374,490	33.3	33.7	32.2
2002	453,157	446,998	415,429	1,324,838	34.2	33.7	31.4
2003	506,552	528,299	469,075	1,503,926	33.7	35.1	31.2
2004	571,200	588,079	525,600	1,684,879	33.9	34.9	31.2
2005	655,008	659,278	617,583	1,931,869	33.9	34.1	32.0
2006	742,993	747,603	699,556	2,190,152	33.9	34.1	31.9
2007	772,068	771,204	710,171	2,253,443	34.3	34.2	31.5
2008	1,002,587	1,040,495	990,936	3,034,018	33.0	34.3	32.7

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

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	753	4,653	400,892	2,045
1991	774	4,790	400,197	2,082
1992	802	4,988	401,337	2,133
1993	899	5,455	447,859	2,364
1994	921	5,798	469,982	2,379
1995	990	6,332	515,310	2,544
1996	1,077	6,840	562,063	2,762
1997	1,105	7,043	581,020	2,820
1998	1,014	6,518	521,981	2,564
1999	1,057	6,942	550,203	2,664
2000	1,232	8,362	677,885	3,184
2001	1,221	8,459	676,661	3,161
2002	1,206	8,191	646,079	3,047
2003	1,313	8,648	701,158	3,360
2004	1,467	9,469	780,981	3,726
2005	1,658	10,961	902,899	4,237
2006	1,850	12,189	1,015,321	4,724
2007	1,896	12,439	1,041,306	4,796
2008	2,447	16,868	1,472,415	6,428

Source: Energy Information Administration, State Energy Data System

Table 5.55 provides selected major operating indicators of electric utilities in Hawaii from 2005 to 2009.

Table 5.55. State of Hawaii Electric Utility Major Operating Indicators

	Units	2005 Annual	2006 Annual	2007 Annual	2008 Annual	2009 Annual	Average 05 to 09
Total Operating Revenues	$M	1,934	2,196	2,260	3,043	2,156	2,318
Total Operating Expenses	$M	1,800	2,061	2,139	2,895	2,028	2,185
Operating Income	$M	134	135	121	148	129	133
Operating Income as % of Revenue	%	7	6	5	5	6	6
% in Total Operating Expenses							
Fuel Cost	%	39	41	40	46	36	40
Purchased Power	%	26	25	25	24	25	25
Fuel and Purchased Power	%	64	66	65	70	61	65
Operation and Maintenance	%	6	6	6	5	7	6
Transmission Expenses	%	1	1	1	1	1	1
Distribution Expenses	%	2	2	2	2	2	2
Customer Accounts Expenses	%	1	1	1	1	1	1
Customer Service Expenses	%	1	1	1	1	2	1
Admin & Gen Expenses	%	5	5	5	4	6	5
Sub-Total Utility Operating Expense	%	80	81	81	83	80	81
Depreciation and Amortization	%	8	7	7	5	8	7
Taxes	%	12	12	11	11	12	12
Other Expense	%	0	0	0	0	0	0
Total Electricity Sold	GWh	10,539	10,568	10,585	10,390	10,126	10,441
Generated by Utility	GWh	6,336	6,439	6,330	6,113	5,972	6,238
Electricity Purchased	GWh	4,202	4,129	4,255	4,277	4,154	4,203
% of Electricity Purchased	%	40	39	40	41	41	40
Average Revenue per kWh Sold	$/kWh	0.184	0.208	0.214	0.293	0.213	0.222
Fuel	$/kWh	0.103	0.121	0.123	0.186	0.112	0.129
Operation and Maintenance	$/kWh	0.016	0.018	0.021	0.022	0.023	0.020
Transmission Expenses	$/kWh	0.001	0.001	0.002	0.002	0.002	0.001
Distribution Expenses	$/kWh	0.004	0.004	0.004	0.004	0.005	0.004
Customer Accounts Expenses	$/kWh	0.002	0.002	0.002	0.003	0.003	0.002
Customer Service Expenses	$/kWh	0.002	0.002	0.003	0.004	0.003	0.003
Admin & Gen Expenses	$/kWh	0.008	0.009	0.011	0.011	0.012	0.010
Depreciation and Amortization	$/kWh	0.013	0.014	0.014	0.015	0.016	0.014
Taxes	$/kWh	0.021	0.023	0.023	0.032	0.025	0.025
Other Expense	$/kWh	0.001	0.001	0.000	0.000	0.000	0.000
Net Income	$/kWh	0.013	0.013	0.011	0.014	0.013	0.013
Average Cost of Purchased KWH	$/kWh	0.110	0.124	0.127	0.163	0.121	0.129
Average Fuel Cost of Net Generated KWH	$/kWh	0.109	0.131	0.134	0.217	0.121	0.143
Cost of Fuel Oil / KWH Generated	$/kWh	0.089	0.108	0.110	0.188	0.104	0.120
Cost of Diesel Oil / KWH Generated	$/kWh	0.137	0.163	0.172	0.232	0.140	0.169
Fuel Oil Consumed	TBBL	9,121	9,442	9,358	8,971	8,618	9,102
Diesel Oil Consumed	TBBL	2,926	2,795	2,687	2,546	2,627	2,716
Total Oil Consumed	TBBL	12,047	12,237	12,045	11,517	11,245	11,818
Total Cost of Oil	$M	694	845	850	1,327	724	888
Total Cost of Fuel Oil	$M	467	588	592	979	519	629
Total Cost of Diesel Oil	$M	226	258	258	348	205	259
Average Cost of Fuel Oil	$/BBL	51	62	63	109	60	69
Average Cost of Diesel Oil	$/BBL	77	92	96	137	78	96

Tables 5.56 to 5.60 provide selected major operating indicators of electric utilities by county in Hawaii from 2005 to 2009.

Table 5.56. 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	0.140	0.268	0.176	0.120	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 5.57. 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
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	0.232	0.333	0.290	0.220	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	111	100	97	-
Average Cost of Diesel Oil	$/BBL	137	122	137	143	125

Table 5.58. 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	0.129	0.130	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.172	0.411	0.205	0.150	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	64	60	60	-
Average Cost of Diesel Oil	$/BBL	96	96	98	98	93

Table 5.59. 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	0.163	0.330	0.203	0.152	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

Table 5.60. County Electric Power Sector Annual Data - 2005

	Units	Major Electricity Indicators				
		State	Honolulu County	Hawaii County	Maui County	Kauai County
Total Operating Revenues	$M	1,934	1,204	294	303	132
Total Operating Expenses	$M	1,800	1,139	273	276	112
Operating Income	$M	134	65	22	27	21
Operating Income as % of Revenue	%	7	5	7	9	16
% in Total Operating Expenses						
Fuel Cost (Utility Only)	%	39	37	24	56	48
Purchased Power	%	26	30	38	6	4
Fuel and Purchased Power	%	64	67	62	62	53
Operation and Maintenance	%	6	5	7	7	9
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	1	1	1	1
Admin & Gen Expenses	%	5	5	4	4	8
Sub-Total Utility Operating Expense	%	80	82	77	77	76
Depreciation and Amortization	%	8	6	10	9	15
Taxes	%	12	12	12	14	10
Other Expense	%	0	0	1	0	-
Total Electricity Sold	GWH	10,539	7,721	1,116	1,252	449
Generated by Utility	GWH	6,336	4,338	429	1,155	414
Electricity Purchased	GWH	4,202	3,383	688	97	35
% of Electricity Purchased	%	40	44	62	8	8
Average Revenue per kWh Sold	$/kWh	0.184	0.156	0.264	0.242	0.295
Fuel (All)	$/kWh	0.103	0.093	0.124	0.135	0.129
Operation and Maintenance	$/kWh	0.016	0.013	0.042	0.016	0.024
Transmission Expenses	$/kWh	0.001	0.001	0.002	0.001	0.002
Distribution Expenses	$/kWh	0.004	0.003	0.006	0.004	0.006
Customer Accounts Expenses	$/kWh	0.002	0.001	0.003	0.002	0.004
Customer Service Expenses	$/kWh	0.002	0.002	0.002	0.002	0.001
Admin & Gen Expenses	$/kWh	0.008	0.008	0.009	0.008	0.021
Depreciation and Amortization	$/kWh	0.013	0.009	0.024	0.020	0.037
Taxes	$/kWh	0.021	0.018	0.030	0.031	0.024
Other Expense	$/kWh	0.001	0.000	0.002	0.000	-
Net Income	$/kWh	0.013	0.008	0.019	0.021	0.046
Average Cost of Purchased KWH	$/kWh	0.110	0.100	0.149	0.167	0.144
Average Fuel Cost of Utility	$/kWh	0.109	0.089	0.123	0.125	0.124
Cost of Fuel Oil / KWH Generated	$/kWh	0.089	0.088	0.095	0.095	-
Cost of Diesel Oil / KWH Generated	$/kWh	0.137	0.275	0.161	0.126	0.126
Fuel Oil Consumed	TBBL	9,121	7,875	727	519	-
Diesel Oil Consumed	TBBL	2,926	118	409	1,651	747
Total Cost of Fuel Oil	$M	467	412	33	22	-
Total Cost of Diesel Oil	$M	226	9	32	132	54
Average Cost of Fuel Oil	$/BBL	51.2	52	46	43	-
Average Cost of Diesel Oil	$/BBL	77.4	76	78	80	72

6. ENERGY-RELATED EMISSIONS

From 1990 to 1999, Hawaii's energy-related carbon dioxide (CO_2) emissions decreased gradually from 21.7 million metric tons to 18.3 million metric tons; from 1999 to 2007, however, CO_2 emissions increased from 18.3 million metric tons to 24.2 million metric tons. Table 6.1 shows that the relationship between total energy-related CO_2 emissions and total conventional (petroleum, coal, and natural gas) energy consumptions (the CO_2/Energy Ratio) remained rather stable from 1990 to 2007.

Table 6.1. Energy-Related Carbon Dioxide Emissions

Year	Total CO2 Emissions Million Tons	Conventional Energy Consumption Billion Btu	CO2 Energy Ratio Ton/Bbtu	Energy/CO2 Ratio Index 1990=100
1990	21.7	293,450	74.0	100.0
1991	19.7	267,604	73.6	99.4
1992	20.7	279,139	74.0	100.0
1993	18.8	255,262	73.8	99.7
1994	20.2	274,018	73.6	99.4
1995	20.0	272,470	73.4	99.2
1996	19.0	259,224	73.4	99.1
1997	18.6	251,027	74.1	100.1
1998	18.6	251,721	73.8	99.7
1999	18.3	247,612	73.9	99.9
2000	18.6	252,924	73.7	99.6
2001	19.1	257,742	74.1	100.2
2002	20.5	274,267	74.6	100.8
2003	21.4	287,879	74.4	100.5
2004	22.5	302,359	74.4	100.5
2005	23.1	312,121	74.0	99.9
2006	23.3	313,438	74.3	100.4
2007	24.2	323,726	74.7	100.9

Source: Energy Information Administration, State Energy Data System

The estimated emissions of Hawaii's electric power industry from 1990 to 2008 are provided in Table 6.2. Total CO_2 and NOX emissions from the electric power sector increased over time, while SO_2 emissions decreased over time.

Table 6.2. Emissions of Electric Power Industry

	Total Electric Power Industry In Metric Tons			% of Petroleum Fired % of Total Emission			% of Coal Fired % of Total Emission		
Year	CO2	SO2	NOX	CO2	SO2	NOX	CO2	SO2	NOX
1990	7,982,851	35,214	14,888	97	100	95	0	0	0
1991	6,819,092	26,532	11,073	96	99	94	0	1	1
1992	7,755,941	28,221	13,521	89	93	77	8	7	18
1993	7,690,653	21,849	14,734	80	86	61	17	13	35
1994	7,885,871	20,765	15,166	80	84	60	17	16	35
1995	8,264,486	39,358	26,981	77	89	76	19	10	16
1996	8,444,543	43,843	27,556	78	89	77	20	10	16
1997	8,458,097	43,533	27,245	77	89	76	20	10	17
1998	8,360,943	46,326	27,688	79	91	77	18	8	14
1999	8,383,920	44,417	27,968	80	92	80	17	7	14
2000	8,668,841	50,882	26,116	79	76	83	19	22	11
2001	8,795,838	25,596	26,706	77	95	90	19	5	6
2002	9,336,578	22,535	32,157	81	91	87	17	9	8
2003	8,739,132	22,593	28,030	78	94	89	20	6	5
2004	9,191,644	23,871	29,446	79	94	90	19	6	5
2005	9,121,863	21,440	29,647	80	94	91	17	5	4
2006	9,127,629	21,887	28,781	81	95	92	17	4	4
2007	9,024,179	21,982	23,063	80	95	90	18	4	5
2008	9,045,661	21,284	21,618	79	92	86	18	7	7

Source: Energy Information Administration, State Energy Data System