Hawaii's Petroleum Consumption and Expenditures by Product and by Sector

Department of Business, Economic Development and Tourism

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Executive Summary

This report provides data and analysis on petroleum consumptions and expenditures by type of petroleum product and by sector of usage. Consumptions are measured by two units: heat content in British thermal unit (BTU) and physical unit in barrels. Expenditures are measured in U.S. dollars.

Hawaii has been heavily dependent on imported petroleum to meet its energy needs. During the 1960's and 1970's, Hawaii's primary energy consumption was almost entirely dependent on imported petroleum. In 2018, petroleum consumption, in terms of British thermal unit (BTU), accounted for 84.4% of the total primary energy consumption. The remaining 15.6% were consumption of non-petroleum sources such as coal, natural gas, and renewable sources.

Hawaii's petroleum consumption increased from 1960 to 1990; but decreased from 1990 to 2018. From 1990 to 2018, Hawaii's total primary energy consumption decreased 0.3% per year on average, and total petroleum consumption decreased 0.6% per year on average. During this period, total primary energy consumption per capita decreased 1.2% per year; and petroleum consumption per capita decreased 1.4% per year.

In 2018, Hawaii consumed about 252,569 billion BTUs (BBTUs) or 44.6 million barrels (MBBLs) of petroleum products. Measured by barrels, jet fuel consumption accounted for 33.8% of total petroleum consumption; followed by motor gasoline (24.6%), residual fuel oil (22.1%), distillate fuel oil (11.8%), and other petroleum products (7.7%). Other petroleum products mainly include still gas (4.5%), LPG/HGL (2.2%), and asphalt and road oil (0.7%).

From 1960 to 1990, the consumption of all four major petroleum products increased. From 1990 to 2018, residual fuel oil and distillate fuel oil consumption decreased, while the consumption of other products increased. About 81% of the reduced petroleum consumption during this period was due to reduced consumption in the electricity sector.

In terms of physical units (measured by barrels), the transportation sector accounted for 65.3% of total petroleum consumption in Hawaii in 2018, followed by the electricity sector (23.7%), the industrial sector (7.9%), the commercial sector (2.9%), and the residential sector (0.3%). From 1990 to 2018, petroleum used for electricity generation decreased from 15.7 million barrels in 1990 to 10.6 million barrels in 2018, registered an average annual decrease of 1.4%. During the same

period, petroleum used in the transportation sector increased from 27.6 million barrels in 1990 to 29.1 million barrels in 2018, representing an annual average increase of 0.2%.

Reduced petroleum consumption in the electricity sector, from 1990 to 2018, was due to increased efficiency in electricity generation and substitution of non-petroleum sources of energy. Between 1990 and 2018, total electricity generation increased 109 GWh or 1.1%. However, total energy consumed in electricity generation decreased 16,181 BBTUs or 15.3%. Increased electricity generation with less energy represents efficiency gains. During this period, total electricity generated from non-petroleum sources of energy increased 2,096 GWh or 216.7%. As a result, total petroleum generated electricity decreased 1,987 GWh or 22.7%, and total petroleum consumption in the electricity sector decreased 32,403 BBTUs or 33.2%.

Petroleum expenditures, between 1990 and 2018, were mainly affected by petroleum prices. Hawaii's total petroleum expenditures increased from $1.8 billion in 1990 to $4.7 billion in 2018, an increase of 3.6% per year on average. As a price indicator, the average petroleum expenditure per barrel increased from $35.29 in 1990 to $105.52 in 2018, an increase of 4.0% per year. The volume of petroleum (in barrels) consumed decreased 0.4% per year during this period.

Among the four major petroleum products, the average annual growth for expenditure on both motor gasoline and jet fuel increased 4.2% per year; followed by distillate fuel oil at 3.2%, and residual fuel oil at 1.9% during the past 28 years (1990-2018).

In 2018, among the four major petroleum products consumed in Hawaii, the average expenditure of motor gasoline was the highest at $155.4/BBL, followed by distillate fuel oil at $136.3/BBL, jet fuel at $89.5/BBL, and residual fuel oil at $80.2/BBL.

Of the $4.7 billion total petroleum expenditures in 2018, motor gasoline accounted for the most at 36.2% followed by jet fuel at 28.7%, residual fuel oil at 16.8%, distillate fuel oil at 15.2%, and other petroleum products at 3.1%. Expenditures on other petroleum products mainly include expenditures on LPG/HGL (1.6%), lubricants (0.8%), asphalt and road oil (0.6%), and aviation gasoline (0.1%).

Among the five usage sectors in 2018, transportation sector accounted for the most at 74.7% of the total petroleum expenditures, followed by the electricity sector at

19.4%, industrial sector at 2.8%, commercial sector at 2.7%, and the residential sector at 0.5%.

The data indicate that Hawaii energy efficiency, in terms of gross domestic product (GDP) generated per million BTU of primary energy consumed, increased from $97.6 in 1990 to $317.9 in 2018, a 225.8% improvement.

1. 1. Introduction

Petroleum plays an important role in Hawaii's economy. Before 1980, Hawaii's primary energy consumption was almost entirely dependent on imported petroleum. Renewable energy accounted for less than 1% of total primary energy consumption, and there were no other types of fossil energy in Hawaii.

Diversification away from petroleum has been an important energy strategy for Hawaii. This report provides data and analysis on the historical trend of Hawaii's petroleum consumption by type of product and by usage sector. Using the data in the report, readers can make assessments regarding the progress of Hawaii's energy diversification and see how the energy efficiency has been changing over time.

This study attempts to answer the following questions:

- What kind of petroleum products are consumed in Hawaii?
- Who are the main consumers of petroleum products in Hawaii?
- How the consumption of petroleum products changes over time?
- What kind of petroleum products can be substituted by other types of energy?
- What are the costs of petroleum consumed in Hawaii?
- How the cost of petroleum changes over time?
- How energy efficiency, measured by GDP produced per million BTU of primary energy consumed, changed over time?

This report updates the previous report by including the most recent data available.

The major data source for this report is the U.S. Energy Information Administration (EIA). The EIA data include two parts, data from the State Energy Data System (SEDS) and data from Detailed State Data in the Electricity (DSDE) section.

2. An Overview of Hawaii's Total Energy and Petroleum Consumption

Over the past 58 years from 1960 to 2018, Hawaii's total primary energy consumption increased 2.0% per year on average; total petroleum consumption increased 1.7% per year on average. Increased primary energy consumption was mainly due to population and tourism growth. On a per capita basis, total primary energy consumption per capita increased only 0.4% per year; and petroleum consumption per capita was almost unchanged.

As shown in Table 2.1, increased total primary energy and petroleum consumption over the past 58 years was mainly due to increases from 1960 to 1990. From 1960 to 1990, Hawaii's total primary energy consumption increased 4.2% per year on average; total petroleum consumption increased 3.8% per year on average. During this period, total primary energy consumption per capita increased 1.9% per year; and petroleum consumption per capita increased 1.6% per year.

From 1990 to 2018, Hawaii's total primary energy consumption decreased 0.3% per year on average; from 1990 to 2001 when Hawaii's economy was stagnant, total primary energy consumption decreased 1.6% per year; from 2001 to 2007 when the economy was booming, total primary energy consumption increased 3.8% per year; and since 2008, total primary energy consumption was stable with 0.6% increase per year. Total petroleum consumption followed a similar pattern during this period. From 1990 to 2018, Hawaii's petroleum consumption decreased 0.6% per year on average; from 1990 to 2001, it decreased 1.8% per year; from 2001 to 2007, it increased 4.0% per year; and from 2008 to 2018, it increased 0.3% per year. From 1990 to 2018, total primary energy consumption per capita decreased 1.2% per year; and petroleum consumption per capita decreased 1.4% per year.

In 2018, Hawaii consumed about 293 trillion BTUs of total primary energy, of which 247 trillion BTUs were from petroleum. Petroleum consumption accounted for about 84.4% of total primary energy consumption in 2018. Total primary energy consumption per capita was about 184 million BTUs, and total petroleum consumption per capita was about 155 million BTUs.

As shown in Table 2.2, from 1960 to 1990, the consumption of all major types of petroleum products increased. Distillate fuel oil increased the most at 6.9% per year; followed by residual fuel oil at 4.7%, jet fuel at 3.8%, motor gasoline at 3.1%, and other petroleum products at 0.1%. From 1990 to 2018, the consumption of residual fuel oil and distillate fuel oil decreased 2.3% and 0.8% per year, respectively; the consumption of other major petroleum products increased slightly.

Table 2.1. Hawaii Total Primary Energy and Petroleum Consumption

Year	Total Primary Energy BBTUs	Petroleum Consumption Total* BBTUs	% of Petroleum Consumption %	De facto Population Person	Primary Energy Per Capita MBTUs/Capita	Petroleum Consumption Per Capita MBTUs/Capita
1960	94,839	94,547	99.7%	651,200	146	145
1970	196,947	195,388	99.2%	798,600	247	245
1980	262,347	249,539	95.1%	1,054,218	249	237
1985	248,554	232,123	93.4%	1,136,160	219	204
1990	321,420	292,762	91.1%	1,257,319	256	233
1995	296,774	252,252	85.0%	1,298,096	229	194
2000	273,307	235,191	86.1%	1,336,005	205	176
2005	324,736	293,847	90.5%	1,412,500	230	208
2006	327,285	295,474	90.3%	1,430,516	229	207
2007	337,822	303,540	89.9%	1,433,461	236	212
2008	276,640	239,055	86.4%	1,432,620	193	167
2009	275,905	238,944	86.6%	1,442,556	191	166
2010	277,125	241,637	87.2%	1,468,695	189	165
2011	285,580	248,886	87.2%	1,491,290	191	167
2012	277,993	239,694	86.2%	1,520,086	183	158
2013	278,471	237,013	85.1%	1,542,173	181	154
2014	279,324	233,915	83.7%	1,555,857	180	150
2015	282,848	237,587	84.0%	1,573,597	180	151
2016	283,215	234,242	82.7%	1,582,141	179	148
2017	284,004	236,918	83.4%	1,590,764	179	149
2018	292,895	247,227	84.4%	1,595,288	184	155
			Annual Average Growth Rate (%)			
1960-1970	7.6%	7.5%	0.0%	2.1%	5.4%	5.4%
1970-1980	2.9%	2.5%	-0.4%	2.8%	0.1%	-0.3%
1980-1990	2.1%	1.6%	-0.4%	1.8%	0.3%	-0.2%
1990-2000	-1.6%	-2.2%	-0.6%	0.6%	-2.2%	-2.8%
2000-2010	0.1%	0.3%	0.1%	1.0%	-0.8%	-0.7%
2010-2018	0.7%	0.3%	-0.4%	1.0%	-0.3%	-0.7%
1960-1990	4.2%	3.8%	-0.3%	2.2%	1.9%	1.6%
1990-2018	-0.3%	-0.6%	-0.3%	0.9%	-1.2%	-1.4%
1960-2018	2.0%	1.7%	-0.3%	1.6%	0.4%	0.1%

Source: Energy Information Administration, State Energy Data System
*Does not include fuel ethanol

Table 2.2. Hawaii Petroleum Consumption by Product in Heat Content

	Petroleum Consumption in Billion Btus						Share of Petroleum				
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total*	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	23,519	29,962	18,011	5,161	17,894	94,547	24.9%	31.7%	19.0%	5.5%	18.9%
1965	42,262	45,455	21,444	9,391	10,743	129,295	32.7%	35.2%	16.6%	7.3%	8.3%
1970	80,060	63,841	29,892	9,871	11,724	195,388	41.0%	32.7%	15.3%	5.1%	6.0%
1975	83,464	70,758	35,542	11,346	11,770	212,880	39.2%	33.2%	16.7%	5.3%	5.5%
1980	79,244	82,963	37,985	34,875	14,472	249,539	31.8%	33.2%	15.2%	14.0%	5.8%
1985	74,436	82,895	39,890	26,361	8,541	232,123	32.1%	35.7%	17.2%	11.4%	3.7%
1990	71,051	119,871	45,543	37,796	18,501	292,762	24.3%	40.9%	15.6%	12.9%	6.3%
1995	56,358	90,994	49,000	33,682	22,218	252,252	22.3%	36.1%	19.4%	13.4%	8.8%
2000	53,511	85,001	48,314	29,642	18,723	235,191	22.8%	36.1%	20.5%	12.6%	8.0%
2005	92,831	83,048	56,998	42,513	19,649	295,039	31.5%	28.1%	19.3%	14.4%	6.7%
2006	86,945	92,336	59,797	38,830	18,927	296,835	29.3%	31.1%	20.1%	13.1%	6.4%
2007	72,329	102,594	58,350	53,756	18,249	305,278	23.7%	33.6%	19.1%	17.6%	6.0%
2008	60,679	78,093	54,509	31,794	17,204	242,279	25.0%	32.2%	22.5%	13.1%	7.1%
2009	52,748	77,860	55,144	34,966	22,122	242,840	21.7%	32.1%	22.7%	14.4%	9.1%
2010	55,775	74,747	50,633	39,593	23,845	244,593	22.8%	30.6%	20.7%	16.2%	9.7%
2011	62,077	73,623	56,427	36,432	24,136	252,695	24.6%	29.1%	22.3%	14.4%	9.6%
2012	64,135	67,437	53,588	35,175	22,693	243,028	26.4%	27.7%	22.1%	14.5%	9.3%
2013	64,201	65,250	54,372	32,957	23,792	240,572	26.7%	27.1%	22.6%	13.7%	9.9%
2014	73,270	62,060	54,793	25,139	22,564	237,826	30.8%	26.1%	23.0%	10.6%	9.5%
2015	76,095	61,257	55,895	27,255	21,934	242,436	31.4%	25.3%	23.1%	11.2%	9.0%
2016	74,301	60,853	56,718	26,113	21,484	239,469	31.0%	25.4%	23.7%	10.9%	9.0%
2017	73,155	63,225	56,404	27,390	22,267	242,441	30.2%	26.1%	23.3%	11.3%	9.2%
2018	85,492	62,030	55,370	30,307	19,370	252,569	33.8%	24.6%	21.9%	12.0%	7.7%
	Annual Average Growth Rate (%)										
1960-1970	13.0%	7.9%	5.2%	6.7%	-4.1%	7.5%	5.1%	0.3%	-2.2%	-0.8%	-10.9%
1970-1980	-0.1%	2.7%	2.4%	13.5%	2.1%	2.5%	-2.5%	0.2%	-0.1%	10.7%	-0.3%
1980-1990	-1.1%	3.7%	1.8%	0.8%	2.5%	1.6%	-2.7%	2.1%	0.2%	-0.8%	0.9%
1990-2000	-2.8%	-3.4%	0.6%	-2.4%	0.1%	-2.2%	-0.6%	-1.2%	2.8%	-0.2%	2.3%
2000-2010	0.4%	-1.3%	0.5%	2.9%	2.4%	0.4%	0.0%	-1.7%	0.1%	2.5%	2.0%
2010-2018	5.5%	-2.3%	1.1%	-3.3%	-2.6%	0.4%	5.1%	-2.7%	0.7%	-3.7%	-3.0%
1960-1990	3.8%	4.7%	3.1%	6.9%	0.1%	3.8%	-0.1%	0.9%	-0.7%	2.9%	-3.6%
1990-2018	0.7%	-2.3%	0.7%	-0.8%	0.2%	-0.5%	1.2%	-1.8%	1.2%	-0.3%	0.7%
1960-2018	2.3%	1.3%	2.0%	3.1%	0.1%	1.7%	0.5%	-0.4%	0.2%	1.4%	-1.5%

*Include fuel ethanol.

Source: Energy Information Administration, State Energy Data System

As shown in Table 2.3, from 1960 to 2018, Hawaii's total petroleum consumption increased from about 16.8 million barrels (MBBLs) to 44.6 MBBLs. The share of jet fuel increased the most at 8.1 percentage points from 25.7% to 33.8%; followed by distillate fuel oil at 6.5 percentage points, and motor gasoline at 4.2 percentage points. The shares of residual fuel oil and other petroleum products decreased 6.2 percentage points and 12.7 percentage points, respectively.

Table 2.3. Hawaii Petroleum Consumption by Product in Physical Unit

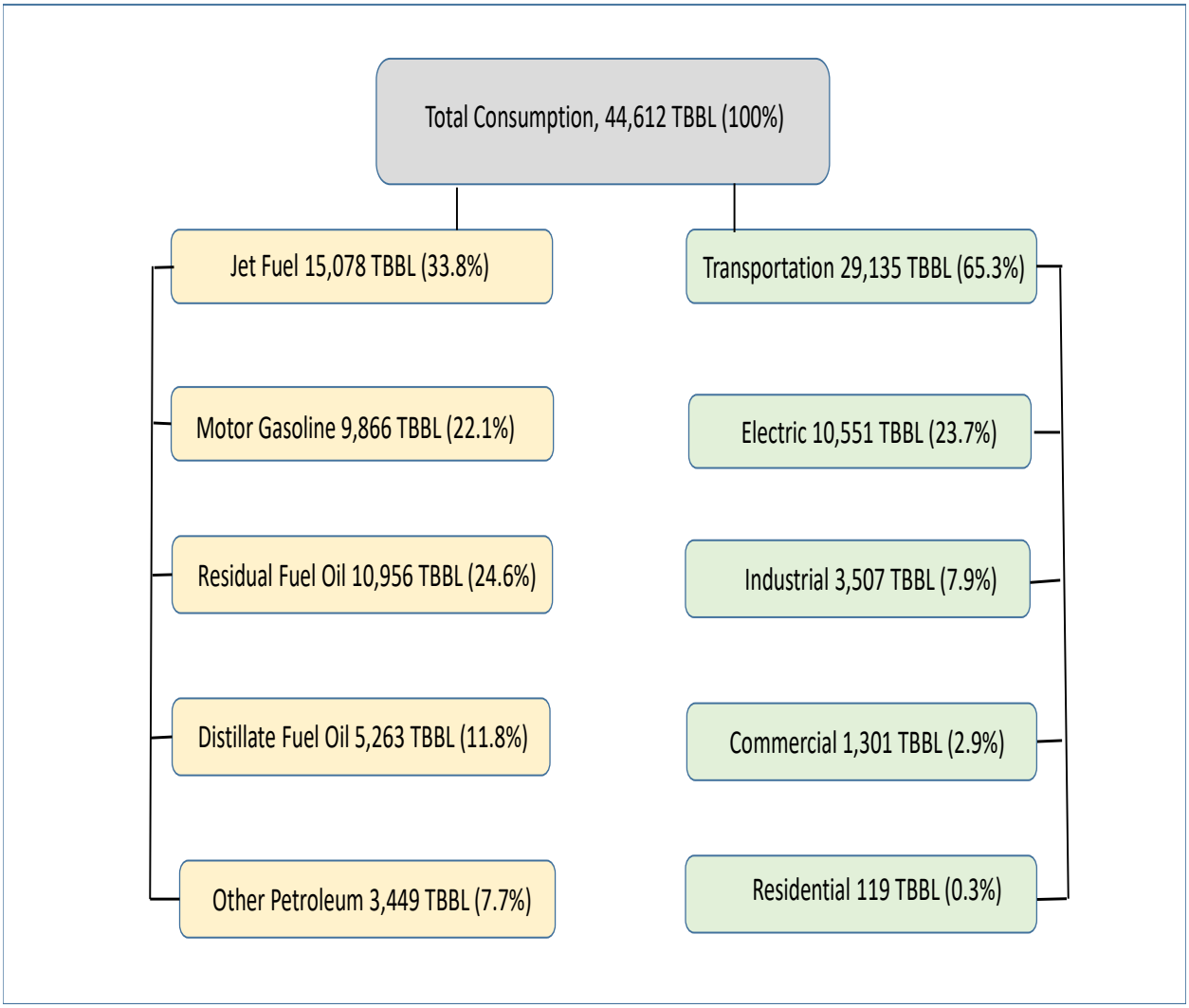
	Petroleum Consumption in Thousand Barrels						Share of Petroleum				
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	4,321	4,766	3,429	886	3,442	16,844	25.7%	28.3%	20.4%	5.3%	20.4%
1965	7,618	7,230	4,082	1,612	1,936	22,478	33.9%	32.2%	18.2%	7.2%	8.6%
1970	14,273	10,154	5,691	1,695	2,292	34,105	41.9%	29.8%	16.7%	5.0%	6.7%
1975	14,849	11,255	6,766	1,948	2,279	37,097	40.0%	30.3%	18.2%	5.3%	6.1%
1980	14,116	13,196	7,231	5,987	3,032	43,562	32.4%	30.3%	16.6%	13.7%	7.0%
1985	13,260	13,185	7,594	4,526	1,441	40,006	33.1%	33.0%	19.0%	11.3%	3.6%
1990	12,646	19,067	8,670	6,489	3,143	50,015	25.3%	38.1%	17.3%	13.0%	6.3%
1995	9,940	14,473	9,416	5,787	4,226	43,842	22.7%	33.0%	21.5%	13.2%	9.6%
2000	9,438	13,520	9,289	5,094	3,250	40,591	23.3%	33.3%	22.9%	12.5%	8.0%
2005	16,372	13,210	10,978	7,307	3,400	51,267	31.9%	25.8%	21.4%	14.3%	6.6%
2006	15,334	14,687	11,533	6,691	3,319	51,564	29.7%	28.5%	22.4%	13.0%	6.4%
2007	12,756	16,318	11,348	9,294	3,189	52,905	24.1%	30.8%	21.4%	17.6%	6.0%
2008	10,702	12,421	10,675	5,501	3,098	42,397	25.2%	29.3%	25.2%	13.0%	7.3%
2009	9,303	12,384	10,834	6,053	3,898	42,472	21.9%	29.2%	25.5%	14.3%	9.2%
2010	9,837	11,889	9,993	6,856	4,183	42,758	23.0%	27.8%	23.4%	16.0%	9.8%
2011	10,948	11,710	11,145	6,314	4,266	44,383	24.7%	26.4%	25.1%	14.2%	9.6%
2012	11,311	10,726	10,586	6,099	4,048	42,770	26.4%	25.1%	24.8%	14.3%	9.5%
2013	11,323	10,378	10,746	5,719	4,172	42,338	26.7%	24.5%	25.4%	13.5%	9.9%
2014	12,922	9,871	10,831	4,362	3,990	41,976	30.8%	23.5%	25.8%	10.4%	9.5%
2015	13,421	9,744	11,053	4,730	3,839	42,787	31.4%	22.8%	25.8%	11.1%	9.0%
2016	13,104	9,679	11,220	4,536	3,711	42,250	31.0%	22.9%	26.6%	10.7%	8.8%
2017	12,902	10,056	11,162	4,758	3,921	42,799	30.1%	23.5%	26.1%	11.1%	9.2%
2018	15,078	9,866	10,956	5,263	3,449	44,612	33.8%	22.1%	24.6%	11.8%	7.7%
Annual Average Growth Rate (%)											
1960-1970	12.7%	7.9%	5.2%	6.7%	-4.0%	7.3%	5.0%	0.5%	-2.0%	-0.6%	-10.5%
1970-1980	-0.1%	2.7%	2.4%	13.4%	2.8%	2.5%	-2.5%	0.2%	-0.1%	10.7%	0.4%
1980-1990	-1.1%	3.7%	1.8%	0.8%	0.4%	1.4%	-2.5%	2.3%	0.4%	-0.6%	-1.0%
1990-2000	-2.9%	-3.4%	0.7%	-2.4%	0.3%	-2.1%	-0.8%	-1.3%	2.8%	-0.3%	2.5%
2000-2010	0.4%	-1.3%	0.7%	3.0%	2.6%	0.5%	-0.1%	-1.8%	0.2%	2.5%	2.0%
2010-2018	5.5%	-2.3%	1.2%	-3.3%	-2.4%	0.5%	4.9%	-2.8%	0.6%	-3.8%	-2.9%
1960-1990	3.6%	4.7%	3.1%	6.9%	-0.3%	3.7%	0.0%	1.0%	-0.5%	3.1%	-3.9%
1990-2018	0.6%	-2.3%	0.8%	-0.7%	0.3%	-0.4%	1.0%	-1.9%	1.3%	-0.3%	0.7%
1960-2018	2.2%	1.3%	2.0%	3.1%	0.0%	1.7%	0.5%	-0.4%	0.3%	1.4%	-1.7%

Source: Energy Information Administration, State Energy Data System

As shown in Figure 2.1, in 2018, Hawaii consumed about 44.6 MBBLs of petroleum products. Jet fuel accounted for about 33.8% of total petroleum consumption; followed by motor gasoline (24.6%), residual fuel oil (22.1%), distillate fuel oil (11.8%), and other petroleum products (7.7%). Other petroleum products mainly include: still gas (5.1%), LPG/HGL (1.5%), asphalt and road oil (0.8%), and lubricants (0.2%).

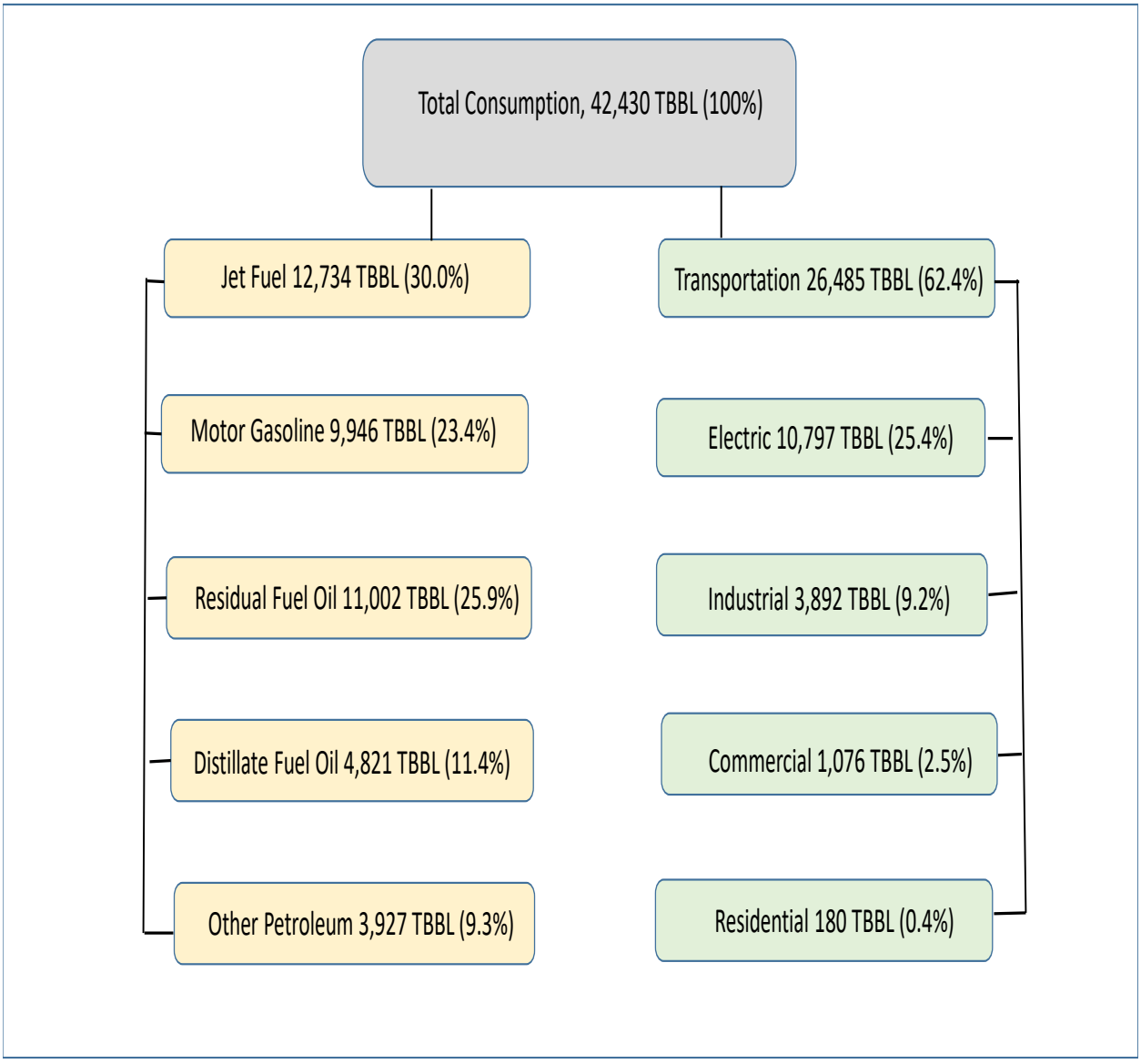
Hawaii's petroleum products were mainly consumed in the transportation and electric power sectors. In 2018, the two sectors accounted for 65.3% and 23.7% of total petroleum consumption, respectively. The three other sectors together only accounted for 11.1% of total petroleum consumption.

Figure 2.1. Hawaii Petroleum Consumption (TBBL): 2018



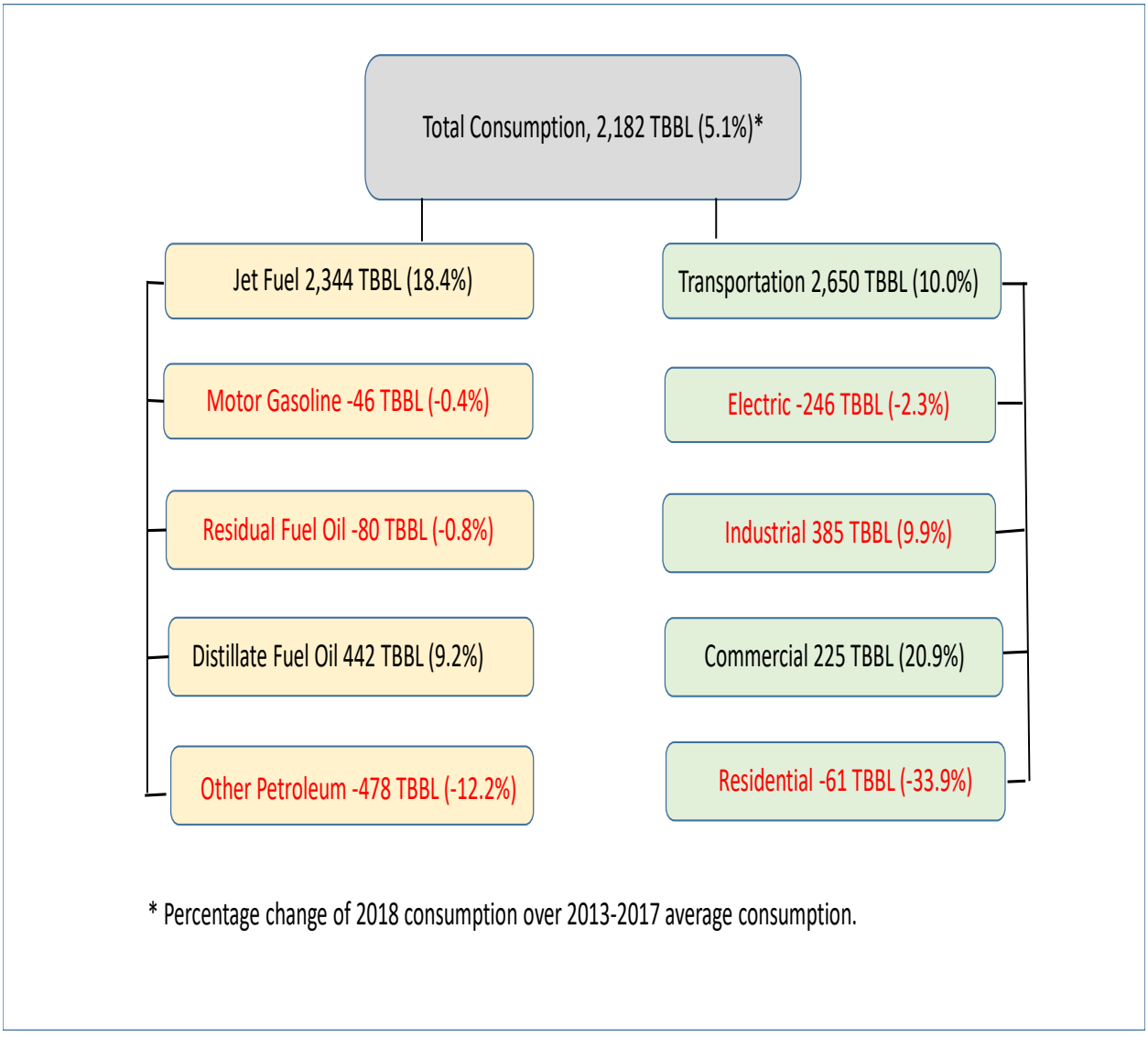
In recent years, total petroleum consumption was relatively stable. Reduced consumption of residual fuel oil, motor gasoline, and other petroleum products were offset by increased consumption of jet fuel and distillate fuel oil. As shown in Figure 2, from 2013 to 2017, the average total petroleum consumption in Hawaii was about 42.4 MBBLs. Jet fuel accounted for about 30.0% of total petroleum consumption; followed by motor gasoline (25.9%), residual fuel oil (23.4%), distillate fuel oil (11.4%), and other petroleum products (9.3%).

Figure 2.2. Average 2013-2017 Hawaii Petroleum Consumption (TBBL)



As shown in Figure 2.3, Hawaii's total petroleum consumption in 2018 increased 5.1% from the average consumption of the previous five years. Compared with the 2013-2017 five-year average, the 2018 consumption increased the most for jet fuel (18.4%); followed by distillate fuel (9.2%). The consumption of other petroleum products decreased the most at 12.2%; followed by residual fuel oil (0.8%), and motor gasoline (0.4%).

Figure 2.3. Changes of Hawaii Petroleum Consumption: 2018 over 2013-2017 Average



3. Hawaii's Total Petroleum Consumption by Sector

Petroleum products are consumed in five sectors: residential, commercial, industrial, transportation, and electric power sector. The transportation sector accounted for majority of the petroleum consumption in Hawaii. The electric power sector is the second largest petroleum consumer.

Tables 3.1-3.2 show Hawaii's total petroleum consumption measured in heat content by sectors. In 2018, the transportation sector accounted for about 63.2% of total petroleum consumption; followed by the electric power sector (25.8%), the industrial sector (8.5%), the commercial sector (2.3%), and the residential sector (0.2%).

From 1960 to 2018, the share of the electric power sector increased the most at 7.5 percentage points; followed by the commercial sector at 1.1 percentage point, and the residential sector at 0.1 of a percentage point. The shares of the transportation sector and the industrial sector decreased 2.1 percentage points and 6.6 percentage points, respectively. Increased share of the electric power sector from 1960 to 2018 was due to increases before 1990. From 1990 to 2018, the share of the electricity sector decreased 7.5 percentage points; while the share of the transportation sector increased 10.4 percentage points.

Tables 3.3-3.4 show Hawaii's total petroleum consumption measured in physical units by sectors. In 2018, the transportation sector consumed about 29.1 MBBLs of total petroleum products; followed by the electric power sector (10.6 MBBLs), the industrial sector (3.5 MBBLs), the commercial sector (1.3 MBBLs), and the residential sector (0.1 MBBLs).

From 1960 to 2018, total petroleum consumption in Hawaii increased about 27.8 MBBLs; consumption in the transportation sector increased the most at 17.6 MBBLs; consumption in the electric power sector increased 7.8 MBBLs; consumption in the industrial sector increased 1.1 MBBLs; consumption in the commercial sector increased 1.1 MBBLs; and consumption in the residential sector increased 0.1 MBBLs.

The increased petroleum consumption in the transportation and the electric power sector from 1960 to 2018 was mainly due to the increases in the period from 1960 to 1990. During this period, petroleum consumption in the transportation sector increased 16.2 MBBLs; and petroleum consumption in the electric power sector increased 12.9 MBBLs. From 1990 to 2018, petroleum consumption in the

electric power sector decreased 5.1 MBBLs, and petroleum consumption in the transportation sector increased only 1.5 MBBLs.

Table 3.1. Hawaii Petroleum Consumption by Sector in Heat Content

Units: Billion Btu						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	100	1,115	14,243	61,778	17,311	94,547
1970	770	3,702	22,879	125,344	42,693	195,388
1975	550	2,258	21,202	130,543	58,328	212,880
1980	738	3,967	28,577	146,713	69,543	249,539
1985	173	1,439	18,521	142,888	69,102	232,123
1990	219	8,495	31,902	154,545	97,601	292,762
1995	157	2,691	31,163	138,041	80,199	252,252
2000	745	2,611	22,388	125,096	84,350	235,191
2001	756	2,133	20,979	131,913	84,037	239,817
2002	759	3,117	22,071	140,049	91,446	257,441
2003	563	2,632	22,155	162,790	81,275	269,414
2004	574	3,254	22,148	171,896	84,992	282,864
2005	585	3,282	26,000	179,067	86,104	295,039
2006	617	3,329	25,166	181,191	86,531	296,835
2007	499	2,551	22,808	194,211	85,210	305,278
2008	1,037	2,888	20,118	136,308	81,928	242,279
2009	936	3,711	25,070	132,827	80,296	242,840
2010	919	3,629	25,654	136,263	78,128	244,593
2011	855	4,213	25,723	144,371	77,533	252,695
2012	1,254	3,727	23,609	142,160	72,278	243,028
2013	839	3,837	24,374	141,603	69,920	240,572
2014	847	4,426	23,375	142,217	66,960	237,826
2015	507	5,180	23,762	145,704	67,284	242,436
2016	691	4,816	22,926	146,114	64,923	239,469
2017	581	5,816	24,675	146,539	64,830	242,441
2018	455	5,842	21,375	159,701	65,197	252,569
Annual Average Growth Rate (%)						
1960-1970	22.6%	12.7%	4.9%	7.3%	9.4%	7.5%
1970-1980	-0.4%	0.7%	2.2%	1.6%	5.0%	2.5%
1980-1990	-11.4%	7.9%	1.1%	0.5%	3.4%	1.6%
1990-2000	13.0%	-11.1%	-3.5%	-2.1%	-1.4%	-2.2%
2000-2010	2.1%	3.3%	1.4%	0.9%	-0.8%	0.4%
2010-2018	-8.4%	6.1%	-2.3%	2.0%	-2.2%	0.4%
1960-2018	2.6%	2.9%	0.7%	1.7%	2.3%	1.7%

Source: Energy Information Administration, State Energy Data System

Table 3.2. Percent of Hawaii Petroleum Consumption by Sector in Heat Content

Units: % of Total Consumption							
Year	Residential	Commercial	Industrial	Transportation	Electric	Total	Ethanol
1960	0.1%	1.2%	15.1%	65.3%	18.3%	100.0%	0.0%
1965	0.2%	1.1%	16.5%	61.1%	21.1%	100.0%	0.0%
1970	0.4%	1.9%	11.7%	64.2%	21.9%	100.0%	0.0%
1975	0.3%	1.1%	10.0%	61.3%	27.4%	100.0%	0.0%
1980	0.3%	1.6%	11.5%	58.8%	27.9%	100.0%	0.0%
1985	0.1%	0.6%	8.0%	61.6%	29.8%	100.0%	0.0%
1990	0.1%	2.9%	10.9%	52.8%	33.3%	100.0%	0.0%
1995	0.1%	1.1%	12.4%	54.7%	31.8%	100.0%	0.0%
2000	0.3%	1.1%	9.5%	53.2%	35.9%	100.0%	0.0%
2001	0.3%	0.9%	8.7%	55.0%	35.0%	100.0%	0.0%
2002	0.3%	1.2%	8.6%	54.4%	35.5%	100.0%	0.0%
2003	0.2%	1.0%	8.2%	60.4%	30.2%	100.0%	0.0%
2004	0.2%	1.2%	7.8%	60.8%	30.0%	100.0%	0.0%
2005	0.2%	1.1%	8.8%	60.7%	29.2%	100.0%	0.4%
2006	0.2%	1.1%	8.5%	61.0%	29.2%	100.0%	0.5%
2007	0.2%	0.8%	7.5%	63.6%	27.9%	100.0%	0.6%
2008	0.4%	1.2%	8.3%	56.3%	33.8%	100.0%	1.3%
2009	0.4%	1.5%	10.3%	54.7%	33.1%	100.0%	1.5%
2010	0.4%	1.5%	10.5%	55.7%	31.9%	100.0%	1.1%
2011	0.3%	1.7%	10.2%	57.1%	30.7%	100.0%	1.3%
2012	0.5%	1.5%	9.7%	58.5%	29.7%	100.0%	1.2%
2013	0.3%	1.6%	10.1%	58.9%	29.1%	100.0%	1.3%
2014	0.4%	1.9%	9.8%	59.8%	28.2%	100.0%	1.4%
2015	0.2%	2.1%	9.8%	60.1%	27.8%	100.0%	1.6%
2016	0.3%	2.0%	9.6%	61.0%	27.1%	100.0%	1.7%
2017	0.2%	2.4%	10.2%	60.4%	26.7%	100.0%	1.7%
2018	0.2%	2.3%	8.5%	63.2%	25.8%	100.0%	1.6%

Source: Energy Information Administration, State Energy Data System

Table 3.3. Hawaii Petroleum Consumption by Sector in Physical Unit

Units: Thousand Barrels						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	26	209	2,367	11,487	2,756	16,844
1970	200	760	3,874	22,473	6,798	34,105
1975	143	477	3,648	23,520	9,309	37,097
1980	192	792	5,135	26,317	11,127	43,562
1985	45	275	2,997	25,641	11,047	40,006
1990	57	1,430	5,231	27,639	15,657	50,015
1995	40	480	5,643	24,759	12,921	43,842
2000	194	558	3,685	22,532	13,623	40,591
2001	197	478	3,513	23,704	13,588	41,479
2002	197	648	3,779	25,306	14,842	44,772
2003	146	536	3,733	29,347	13,098	46,861
2004	149	644	3,704	30,897	13,704	49,098
2005	152	651	4,298	32,278	13,888	51,267
2006	159	662	4,194	32,597	13,952	51,564
2007	128	517	3,844	34,678	13,738	52,905
2008	267	636	3,367	24,917	13,209	42,397
2009	242	825	4,131	24,320	12,954	42,472
2010	239	808	4,214	24,888	12,610	42,758
2011	222	943	4,231	26,469	12,518	44,383
2012	326	833	3,897	26,036	11,677	42,770
2013	218	867	3,991	25,967	11,295	42,338
2014	220	987	3,836	26,111	10,822	41,976
2015	132	1,138	3,921	26,716	10,880	42,787
2016	180	1,076	3,698	26,797	10,498	42,250
2017	151	1,311	4,016	26,833	10,488	42,799
2018	119	1,301	3,507	29,135	10,551	44,612
Annual Average Growth Rate (%)						
1960-1970	22.6%	13.8%	5.1%	6.9%	9.4%	7.3%
1970-1980	-0.4%	0.4%	2.9%	1.6%	5.1%	2.5%
1980-1990	-11.4%	6.1%	0.2%	0.5%	3.5%	1.4%
1990-2000	13.0%	-9.0%	-3.4%	-2.0%	-1.4%	-2.1%
2000-2010	2.1%	3.8%	1.4%	1.0%	-0.8%	0.5%
2010-2018	-8.3%	6.1%	-2.3%	2.0%	-2.2%	0.5%
1960-2018	2.7%	3.2%	0.7%	1.6%	2.3%	1.7%

Source: Energy Information Administration, State Energy Data System

Table 3.4. Percent of Hawaii Petroleum Consumption by Sector in Physical Unit

Units: % of Total Consumption						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.2%	1.2%	14.1%	68.2%	16.4%	100.0%
1965	0.2%	1.3%	15.6%	63.6%	19.4%	100.0%
1970	0.6%	2.2%	11.4%	65.9%	19.9%	100.0%
1975	0.4%	1.3%	9.8%	63.4%	25.1%	100.0%
1980	0.4%	1.8%	11.8%	60.4%	25.5%	100.0%
1985	0.1%	0.7%	7.5%	64.1%	27.6%	100.0%
1990	0.1%	2.9%	10.5%	55.3%	31.3%	100.0%
1995	0.1%	1.1%	12.9%	56.5%	29.5%	100.0%
2000	0.5%	1.4%	9.1%	55.5%	33.6%	100.0%
2001	0.5%	1.2%	8.5%	57.1%	32.8%	100.0%
2002	0.4%	1.4%	8.4%	56.5%	33.2%	100.0%
2003	0.3%	1.1%	8.0%	62.6%	28.0%	100.0%
2004	0.3%	1.3%	7.5%	62.9%	27.9%	100.0%
2005	0.3%	1.3%	8.4%	63.0%	27.1%	100.0%
2006	0.3%	1.3%	8.1%	63.2%	27.1%	100.0%
2007	0.2%	1.0%	7.3%	65.5%	26.0%	100.0%
2008	0.6%	1.5%	7.9%	58.8%	31.2%	100.0%
2009	0.6%	1.9%	9.7%	57.3%	30.5%	100.0%
2010	0.6%	1.9%	9.9%	58.2%	29.5%	100.0%
2011	0.5%	2.1%	9.5%	59.6%	28.2%	100.0%
2012	0.8%	1.9%	9.1%	60.9%	27.3%	100.0%
2013	0.5%	2.0%	9.4%	61.3%	26.7%	100.0%
2014	0.5%	2.4%	9.1%	62.2%	25.8%	100.0%
2015	0.3%	2.7%	9.2%	62.4%	25.4%	100.0%
2016	0.4%	2.5%	8.8%	63.4%	24.8%	100.0%
2017	0.4%	3.1%	9.4%	62.7%	24.5%	100.0%
2018	0.3%	2.9%	7.9%	65.3%	23.7%	100.0%

Source: Energy Information Administration, State Energy Data System

The reduced petroleum consumption in the electric power sector, from 1990 to 2018, was due to both increased efficiency in electricity generation and increased electricity generation from non-petroleum sources of energy. As shown in Table 3.5, from 1990 to 2018, total electricity generation in Hawaii increased 109 GWh or 1.1%. However, total energy consumed in electricity generation decreased 16,181 BBTUs or 15.3%. Increased electricity generation with less energy represents efficiency gains. During this period, total electricity generated from non-petroleum sources of energy increased 2,096 GWh or 216.7%. As a result, total petroleum generated electricity decreased 1,987 GWh or 22.7%; and total petroleum consumption in the electricity sector decreased 32,403 BBTUs or 33.2%.

Table 3.5. Petroleum Consumption and Electricity Generation in the Electricity Sector

		1990	2018	Change	% Change
Fuel for Electricity Generation					
Residual Fuel Oil	Billion BTUs	87,038	52,790	(34,248)	-39.3%
Distillate Fuel Oil	Billion BTUs	10,562	12,407	1,845	17.5%
Total Petroleum	Billion BTUs	97,600	65,197	(32,403)	-33.2%
Total Energy for Electricity Generation	Billion BTUs	105,928	89,747	(16,181)	-15.3%
All Other Energy Sources	Billion BTUs	8,328	24,550	16,222	194.8%
% of Reduced Petroleum Due to Efficiency Gain	%			49.9%	
% of Reduced Petroleum Due to Increased Others	%			50.1%	
Total Electricity Generation	GWH	9,703	9,812	109	1.1%
Petroleum Generated Electricity	GWH	8,736	6,749	(1,987)	-22.7%
Other Sources Generated Electricity	GWH	967	3,063	2,096	216.7%

Source: Energy Information Administration, State Energy Data System

4. Petroleum Product Analysis

Petroleum consumed in Hawaii can be classified into five major groups based on the EIA data: (1) jet fuel, (2) residual fuel oil, (3) motor gasoline, (4) distillate fuel oil, and (5) other petroleum products. Other petroleum products consumed in Hawaii include still gas, asphalt and road oil, LPG/HGL, petroleum coke, lubricants, and aviation gasoline. This section examines the petroleum consumption by sector for each petroleum product.

All jet fuel in Hawaii was consumed by the transportation sector. From 1960 to 2018, jet fuel consumption increased 61,973 BBTUs or 2.3% per year on average. Most of the increase was in the 1960s. From 1960 to 1970, jet fuel consumption increased 56,541 BBTUs or 13.0% per year. From 1970 to 2018, jet fuel consumption increased only 5,432 BBTUs. Slow jet fuel consumption growth was mainly due to improved energy efficiency in air transportation. As shown in Table 4.1, from 1960 to 2018, total passengers to Hawaii increased 5.4% per year, while jet fuel consumption increased only 2.3% per year. However, improved energy efficiency mainly occurred before 2000. From 1960 to 2000, jet fuel consumption per passenger decreased from 44.2 MBTUs to 6.6 MBTUs. From 2000 to 2018, jet fuel consumption per passenger was relatively stable.

Table 4.1. Hawaii Jet Fuel Consumption

Year	Transportation Sector Jet Fuel Consumption BBTUs	Transportation Sector Jet Fuel Consumption TBBLs	Total Passengers Arriving	Jet Fuel Per Passenger MBTUs
1960	23,519	4,321	532,547	44.2
1965	42,262	7,618	1,064,657	39.7
1970	80,060	14,273	2,219,559	36.1
1975	83,464	14,849	3,849,525	21.7
1980	79,244	14,116	5,380,383	14.7
1985	74,436	13,260	6,314,290	11.8
1990	71,051	12,646	8,507,330	8.4
1995	56,358	9,940	7,957,220	7.1
2000	53,511	9,438	8,105,368	6.6
2001	50,437	8,895	7,447,521	6.8
2002	57,774	10,189	7,628,983	7.6
2003	72,056	12,708	7,557,861	9.5
2004	75,861	13,379	8,225,648	9.2
2005	92,831	16,372	8,840,063	10.5
2006	86,945	15,334	9,049,713	9.6
2007	72,329	12,756	9,011,455	8.0
2008	60,679	10,702	8,034,872	7.6
2009	52,748	9,303	7,718,206	6.8
2010	55,775	9,837	8,258,740	6.8
2011	62,077	10,948	8,556,041	7.3
2012	64,135	11,311	9,232,172	6.9
2013	64,201	11,323	9,513,611	6.7
2014	73,270	12,922	9,691,996	7.6
2015	76,095	13,421	10,132,074	7.5
2016	74,301	13,104	10,462,968	7.1
2017	73,155	12,902	10,811,431	6.8
2018	85,492	15,078	11,403,884	7.5
	Annual Average Growth Rate			
1960-1970	13.0%	12.7%	15.3%	-2.0%
1970-1980	-0.1%	-0.1%	9.3%	-8.6%
1980-1990	-1.1%	-1.1%	4.7%	-5.5%
1990-2000	-2.8%	-2.9%	-0.5%	-2.3%
2000-2010	0.4%	0.4%	0.2%	0.2%
2010-2018	5.5%	5.5%	4.1%	1.3%
1960-2018	2.3%	2.2%	5.4%	-3.0%

Source: Energy Information Administration, State Energy Data System

Residual fuel oil is mainly used to generate electricity and supply heat. In 2018, 60,853 BBTUs of residual fuel oil was consumed in Hawaii; about 87.4% was consumed in the electric power sector; transportation and industrial sector consumed about 10.4% and 4.5%, respectively. From 1960 to 2018, the share of the electric power sector increased 28.1 percentage points; the share of the industrial sector decreased 17.3 percentage points; and the share of the transportation sector decreased 9.9 percentage points.

Table 4.2. Hawaii Residual Fuel Oil Consumption by Sector in Heat Content

Units: Billion Btu						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	-	255	6,525	6,087	17,094	29,962
1970	-	236	10,506	10,963	42,136	63,841
1980	-	157	9,374	9,060	64,372	82,963
1990	-	5,189	10,942	16,703	87,038	119,871
2000	-	52	2,751	13,995	68,202	85,001
2005	-	18	4,912	7,049	71,070	83,048
2006	-	5	5,102	14,933	72,295	92,336
2007	-	3	2,690	28,069	71,832	102,594
2008	-	-	2,730	6,146	69,217	78,093
2009	-	-	2,930	7,633	67,297	77,860
2010	-	-	2,834	6,756	65,157	74,747
2011	-	-	2,852	6,300	64,471	73,623
2012	-	-	2,051	5,699	59,686	67,437
2013	-	-	1,780	5,530	57,940	65,250
2014	-	-	1,614	5,330	55,115	62,060
2015	-	-	1,876	4,394	54,987	61,257
2016	-	-	2,565	5,091	53,197	60,853
2017	-	-	3,233	7,215	52,777	63,225
2018	-	-	2,797	6,443	52,790	62,030
Annual Average Growth Rate (%)						
1960-1970	NA	-0.8%	4.9%	6.1%	9.4%	7.9%
1970-1980	NA	-4.0%	-1.1%	-1.9%	4.3%	2.7%
1980-1990	NA	41.9%	1.6%	6.3%	3.1%	3.7%
1990-2000	NA	-36.9%	-12.9%	-1.8%	-2.4%	-3.4%
2000-2010	NA	-100.0%	0.3%	-7.0%	-0.5%	-1.3%
2010-2018	NA	NA	-0.2%	-0.6%	-2.6%	-2.3%
1960-2018	NA	-100.0%	-1.4%	0.1%	2.0%	1.3%

Source: Energy Information Administration, State Energy Data System

Table 4.3. Percent of Hawaii Residual Fuel Oil Consumption by Sector in Heat Content

Units: % of Total Residual Fuel Oil						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.0%	0.9%	21.8%	20.3%	57.1%	100.0%
1970	0.0%	0.4%	16.5%	17.2%	66.0%	100.0%
1980	0.0%	0.2%	11.3%	10.9%	77.6%	100.0%
1990	0.0%	4.3%	9.1%	13.9%	72.6%	100.0%
2000	0.0%	0.1%	3.2%	16.5%	80.2%	100.0%
2001	0.0%	0.0%	0.1%	20.0%	79.9%	100.0%
2002	0.0%	0.0%	3.5%	11.3%	85.2%	100.0%
2003	0.0%	0.0%	3.0%	7.6%	89.4%	100.0%
2004	0.0%	0.0%	3.0%	11.4%	85.6%	100.0%
2005	0.0%	0.0%	5.9%	8.5%	85.6%	100.0%
2006	0.0%	0.0%	5.5%	16.2%	78.3%	100.0%
2007	0.0%	0.0%	2.6%	27.4%	70.0%	100.0%
2008	0.0%	0.0%	3.5%	7.9%	88.6%	100.0%
2009	0.0%	0.0%	3.8%	9.8%	86.4%	100.0%
2010	0.0%	0.0%	3.8%	9.0%	87.2%	100.0%
2011	0.0%	0.0%	3.9%	8.6%	87.6%	100.0%
2012	0.0%	0.0%	3.0%	8.5%	88.5%	100.0%
2013	0.0%	0.0%	2.7%	8.5%	88.8%	100.0%
2014	0.0%	0.0%	2.6%	8.6%	88.8%	100.0%
2015	0.0%	0.0%	3.1%	7.2%	89.8%	100.0%
2016	0.0%	0.0%	4.2%	8.4%	87.4%	100.0%
2017	0.0%	0.0%	5.1%	11.4%	83.5%	100.0%
2018	0.0%	0.0%	4.5%	10.4%	85.1%	100.0%

Source: Energy Information Administration, State Energy Data System

As shown in Table 4.4, from 1960 to 2018, total residual fuel oil consumption in Hawaii increased about 5.1 MBBLs; the electric power sector increased about 5.7 MBBLs; the industrial sector decreased about 0.6 MBBLs. Increased residual fuel oil consumption occurred before 1990. From 1960 to 1990, total residual fuel oil consumption increased 14.3 MBBLs; the electric power sector increased 11.1 MBBLs; the transportation sector increased 1.7 MBBLs, and the industrial sector increased 0.7 MBBLs. From 1990 to 2018, total residual fuel oil consumption decreased 9.2 MBBLs; the electric power sector decreased 5.4 MBBLs; the transportation sector decreased 1.6 MBBLs, the industrial sector decreased 1.3 MBBLs, and the commercial sector decreased 0.8 MBBLs.

Table 4.4. Hawaii Residual Fuel Oil Consumption by Sector in Physical Unit

Units: Thousand Barrels						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	-	41	1,038	968	2,719	4,766
1970	-	38	1,671	1,744	6,702	10,154
1980	-	25	1,491	1,441	10,239	13,196
1990	-	825	1,740	2,657	13,844	19,067
2000	-	8	438	2,226	10,848	13,520
2005	-	3	781	1,121	11,304	13,210
2006	-	1	811	2,375	11,499	14,687
2007	-	-	428	4,465	11,426	16,318
2008	-	-	434	978	11,009	12,421
2009	-	-	466	1,214	10,704	12,384
2010	-	-	451	1,075	10,364	11,889
2011	-	-	454	1,002	10,255	11,710
2012	-	-	326	906	9,494	10,726
2013	-	-	283	880	9,216	10,378
2014	-	-	257	848	8,767	9,871
2015	-	-	298	699	8,746	9,744
2016	-	-	408	810	8,461	9,679
2017	-	-	514	1,148	8,395	10,056
2018	-	-	445	1,025	8,397	9,866
Annual Average Growth Rate (%)						
1960-1970	NA	-0.8%	4.9%	6.1%	9.4%	7.9%
1970-1980	NA	-4.1%	-1.1%	-1.9%	4.3%	2.7%
1980-1990	NA	41.9%	1.6%	6.3%	3.1%	3.7%
1990-2000	NA	-37.1%	-12.9%	-1.8%	-2.4%	-3.4%
2000-2010	NA	-100.0%	0.3%	-7.0%	-0.5%	-1.3%
2010-2018	NA	NA	-0.2%	-0.6%	-2.6%	-2.3%
1960-2018	NA	-100.0%	-1.4%	0.1%	2.0%	1.3%

Source: Energy Information Administration, State Energy Data System

Table 4.5. Percent of Hawaii Residual Fuel Oil Consumption by Sector in Physical Unit

Units: % of Total Residual Fuel Oil						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.0%	0.9%	21.8%	20.3%	57.0%	100.0%
1970	0.0%	0.4%	16.5%	17.2%	66.0%	100.0%
1980	0.0%	0.2%	11.3%	10.9%	77.6%	100.0%
1990	0.0%	4.3%	9.1%	13.9%	72.6%	100.0%
2000	0.0%	0.1%	3.2%	16.5%	80.2%	100.0%
2001	0.0%	0.0%	0.1%	20.0%	79.9%	100.0%
2002	0.0%	0.0%	3.5%	11.3%	85.2%	100.0%
2003	0.0%	0.0%	3.0%	7.6%	89.4%	100.0%
2004	0.0%	0.0%	3.0%	11.4%	85.6%	100.0%
2005	0.0%	0.0%	5.9%	8.5%	85.6%	100.0%
2006	0.0%	0.0%	5.5%	16.2%	78.3%	100.0%
2007	0.0%	0.0%	2.6%	27.4%	70.0%	100.0%
2008	0.0%	0.0%	3.5%	7.9%	88.6%	100.0%
2009	0.0%	0.0%	3.8%	9.8%	86.4%	100.0%
2010	0.0%	0.0%	3.8%	9.0%	87.2%	100.0%
2011	0.0%	0.0%	3.9%	8.6%	87.6%	100.0%
2012	0.0%	0.0%	3.0%	8.4%	88.5%	100.0%
2013	0.0%	0.0%	2.7%	8.5%	88.8%	100.0%
2014	0.0%	0.0%	2.6%	8.6%	88.8%	100.0%
2015	0.0%	0.0%	3.1%	7.2%	89.8%	100.0%
2016	0.0%	0.0%	4.2%	8.4%	87.4%	100.0%
2017	0.0%	0.0%	5.1%	11.4%	83.5%	100.0%
2018	0.0%	0.0%	4.5%	10.4%	85.1%	100.0%

Source: Energy Information Administration, State Energy Data System

Distillate fuel oil (including diesel oil) is mainly used to generate electricity and drive diesel engine. As shown in Tables 4.6-4.7, in 2018, Hawaii consumed 30,307 BBTUs of distillate fuel oil; about 49.6% of distillate fuel oil was consumed in the transportation sector; followed by the electric power sector (40.9%), industrial sector (5.0%), and commercial sector (4.5%). From 1960 to 2018, the share of the electric power sector increased 36.7 percentage points; the share of the transportation sector increased 21.7 percentage points; the share of the industrial sector decreased 57.5 percentage points; and the share of the commercial sector decreased 0.9 of a percentage point.

Table 4.6. Hawaii Distillate Fuel Oil Consumption by Sector in Heat Content

Units: Billion Btu						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	2	277	3,225	1,439	218	5,161
1965	3	416	3,697	4,919	355	9,391
1970	8	1,012	4,086	4,208	557	9,871
1975	4	491	3,512	4,842	2,498	11,346
1980	6	2,317	7,976	19,405	5,171	34,875
1985	2	768	2,665	18,548	4,378	26,361
1990	2	2,636	4,222	20,374	10,562	37,796
1995	10	1,998	3,191	15,613	12,870	33,682
2000	2	1,271	2,751	9,470	16,148	29,642
2001	2	793	2,751	14,287	17,312	35,144
2002	2	1,805	2,673	19,372	23,199	47,051
2003	2	1,644	2,557	30,179	13,367	47,748
2004	2	2,220	2,367	31,181	14,464	50,233
2005	1	2,237	2,977	22,263	15,035	42,513
2006	19	2,274	2,648	19,653	14,236	38,830
2007	19	1,629	2,606	36,125	13,377	53,756
2008	30	1,277	2,003	15,772	12,712	31,794
2009	16	1,573	2,332	18,045	12,999	34,966
2010	1	1,528	1,882	23,211	12,971	39,593
2011	1	1,728	1,972	19,670	13,062	36,432
2012	-	1,537	2,166	18,880	12,592	35,175
2013	-	1,471	1,873	17,632	11,980	32,957
2014	-	1,862	2,261	9,171	11,845	25,139
2015	2	1,298	1,851	11,808	12,297	27,255
2016	-	904	939	12,544	11,726	26,113
2017	1	1,181	1,789	12,365	12,053	27,390
2018	-	1,361	1,515	15,024	12,407	30,307
Annual Average Growth Rate (%)						
1960-1970	14.9%	13.8%	2.4%	11.3%	9.8%	6.7%
1970-1980	-2.8%	8.6%	6.9%	16.5%	25.0%	13.5%
1980-1990	-10.4%	1.3%	-6.2%	0.5%	7.4%	0.8%
1990-2000	0.0%	-7.0%	-4.2%	-7.4%	4.3%	-2.4%
2000-2010	-6.7%	1.9%	-3.7%	9.4%	-2.2%	2.9%
2010-2018	NA	-1.4%	-2.7%	-5.3%	-0.6%	-3.3%
1960-2018	-100.0%	2.8%	-1.3%	4.1%	7.2%	3.1%

Source: Energy Information Administration, State Energy Data System

Table 4.7. Percent of Hawaii Distillate Fuel Oil Consumption by Sector in Heat Content

Units: % of Total Distillate Fuel Oil						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.0%	5.4%	62.5%	27.9%	4.2%	100.0%
1965	0.0%	4.4%	39.4%	52.4%	3.8%	100.0%
1970	0.1%	10.3%	41.4%	42.6%	5.6%	100.0%
1975	0.0%	4.3%	31.0%	42.7%	22.0%	100.0%
1980	0.0%	6.6%	22.9%	55.6%	14.8%	100.0%
1985	0.0%	2.9%	10.1%	70.4%	16.6%	100.0%
1990	0.0%	7.0%	11.2%	53.9%	27.9%	100.0%
1995	0.0%	5.9%	9.5%	46.4%	38.2%	100.0%
2000	0.0%	4.3%	9.3%	31.9%	54.5%	100.0%
2001	0.0%	2.3%	7.8%	40.7%	49.3%	100.0%
2002	0.0%	3.8%	5.7%	41.2%	49.3%	100.0%
2003	0.0%	3.4%	5.4%	63.2%	28.0%	100.0%
2004	0.0%	4.4%	4.7%	62.1%	28.8%	100.0%
2005	0.0%	5.3%	7.0%	52.4%	35.4%	100.0%
2006	0.0%	5.9%	6.8%	50.6%	36.7%	100.0%
2007	0.0%	3.0%	4.8%	67.2%	24.9%	100.0%
2008	0.1%	4.0%	6.3%	49.6%	40.0%	100.0%
2009	0.0%	4.5%	6.7%	51.6%	37.2%	100.0%
2010	0.0%	3.9%	4.8%	58.6%	32.8%	100.0%
2011	0.0%	4.7%	5.4%	54.0%	35.9%	100.0%
2012	0.0%	4.4%	6.2%	53.7%	35.8%	100.0%
2013	0.0%	4.5%	5.7%	53.5%	36.4%	100.0%
2014	0.0%	7.4%	9.0%	36.5%	47.1%	100.0%
2015	0.0%	4.8%	6.8%	43.3%	45.1%	100.0%
2016	0.0%	3.5%	3.6%	48.0%	44.9%	100.0%
2017	0.0%	4.3%	6.5%	45.1%	44.0%	100.0%
2018	0.0%	4.5%	5.0%	49.6%	40.9%	100.0%

Source: Energy Information Administration, State Energy Data System

As shown in Table 4.8, from 1960 to 2018, total distillate fuel oil consumption in Hawaii increased about 4.4 MBBLs; the electric power sector increased about 2.1 MBBLs; and the transportation sector increased about 2.4 MBBLs. Increased distillate fuel oil consumption occurred before 1990. From 1960 to 1990, total distillate fuel oil consumption increased 5.6 MBBLs; the electric power sector increased 1.8 MBBLs; and the transportation sector increased 3.3 MBBLs. From 1990 to 2018, total distillate fuel oil consumption decreased 1.2 MBBLs, mainly decreased in the transportation sector.

Table 4.8. Hawaii Distillate Fuel Oil Consumption by Sector in Physical Unit

Units: Thousand Barrels						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	-	48	554	247	37	886
1965	1	71	635	844	61	1,612
1970	1	174	701	722	96	1,695
1975	1	84	603	831	429	1,948
1980	1	398	1,369	3,331	888	5,987
1985	-	132	458	3,184	752	4,526
1990	-	453	725	3,498	1,813	6,489
1995	2	343	548	2,683	2,211	5,787
2000	-	218	473	1,627	2,775	5,094
2001	-	136	473	2,455	2,975	6,040
2002	-	310	459	3,329	3,987	8,086
2003	-	282	439	5,186	2,297	8,206
2004	-	382	407	5,359	2,486	8,634
2005	-	384	512	3,827	2,584	7,307
2006	3	392	456	3,387	2,453	6,691
2007	3	282	451	6,246	2,313	9,294
2008	5	221	347	2,729	2,199	5,501
2009	3	272	404	3,124	2,250	6,053
2010	-	265	326	4,019	2,246	6,856
2011	-	299	342	3,409	2,264	6,314
2012	-	266	376	3,274	2,183	6,099
2013	-	255	325	3,060	2,079	5,719
2014	-	323	392	1,591	2,055	4,362
2015	-	225	321	2,049	2,134	4,730
2016	-	157	163	2,179	2,037	4,536
2017	-	205	311	2,148	2,094	4,758
2018	-	236	263	2,609	2,154	5,263
Annual Average Growth Rate (%)						
1960-1970	NA	13.7%	2.4%	11.3%	10.0%	6.7%
1970-1980	NA	8.6%	6.9%	16.5%	24.9%	13.4%
1980-1990	NA	1.3%	-6.2%	0.5%	7.4%	0.8%
1990-2000	NA	-7.1%	-4.2%	-7.4%	4.3%	-2.4%
2000-2010	NA	2.0%	-3.7%	9.5%	-2.1%	3.0%
2010-2018	NA	-1.4%	-2.6%	-5.3%	-0.5%	-3.3%
1960-2018	NA	2.8%	-1.3%	4.1%	7.3%	3.1%

Source: Energy Information Administration, State Energy Data System

Table 4.9. Percent of Hawaii Distillate Fuel Oil Consumption by Sector in Physical Unit

Units: % of Total Distillate Fuel Oil						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.0%	5.4%	62.5%	27.9%	4.2%	100.0%
1965	0.1%	4.4%	39.4%	52.4%	3.8%	100.0%
1970	0.1%	10.3%	41.4%	42.6%	5.7%	100.0%
1975	0.1%	4.3%	31.0%	42.7%	22.0%	100.0%
1980	0.0%	6.6%	22.9%	55.6%	14.8%	100.0%
1985	0.0%	2.9%	10.1%	70.3%	16.6%	100.0%
1990	0.0%	7.0%	11.2%	53.9%	27.9%	100.0%
1995	0.0%	5.9%	9.5%	46.4%	38.2%	100.0%
2000	0.0%	4.3%	9.3%	31.9%	54.5%	100.0%
2001	0.0%	2.3%	7.8%	40.6%	49.3%	100.0%
2002	0.0%	3.8%	5.7%	41.2%	49.3%	100.0%
2003	0.0%	3.4%	5.3%	63.2%	28.0%	100.0%
2004	0.0%	4.4%	4.7%	62.1%	28.8%	100.0%
2005	0.0%	5.3%	7.0%	52.4%	35.4%	100.0%
2006	0.0%	5.9%	6.8%	50.6%	36.7%	100.0%
2007	0.0%	3.0%	4.9%	67.2%	24.9%	100.0%
2008	0.1%	4.0%	6.3%	49.6%	40.0%	100.0%
2009	0.0%	4.5%	6.7%	51.6%	37.2%	100.0%
2010	0.0%	3.9%	4.8%	58.6%	32.8%	100.0%
2011	0.0%	4.7%	5.4%	54.0%	35.9%	100.0%
2012	0.0%	4.4%	6.2%	53.7%	35.8%	100.0%
2013	0.0%	4.5%	5.7%	53.5%	36.4%	100.0%
2014	0.0%	7.4%	9.0%	36.5%	47.1%	100.0%
2015	0.0%	4.8%	6.8%	43.3%	45.1%	100.0%
2016	0.0%	3.5%	3.6%	48.0%	44.9%	100.0%
2017	0.0%	4.3%	6.5%	45.1%	44.0%	100.0%
2018	0.0%	4.5%	5.0%	49.6%	40.9%	100.0%

Source: Energy Information Administration, State Energy Data System

Motor gasoline is mainly consumed in the transportation sector. As shown in Tables 4.10-4.11, in 2018, Hawaii consumed 55,370 BBTUs of motor gasoline; about 94.4% of motor gasoline was consumed in the transportation sector; the commercial and industrial sector together accounted for about 5.6% of motor gasoline consumption in Hawaii. From 1960 to 2018, the transportation sector's share decreased only 1.6 percentage point. Motor gasoline consumption was relatively stable since 2002.

Table 4.10. Hawaii Motor Gasoline Consumption by Sector in Heat Content

Units: Billion Btu						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	-	290	438	17,283	-	18,011
1965	-	309	401	20,734	-	21,444
1970	-	701	260	28,932	-	29,892
1975	-	517	278	34,747	-	35,542
1980	-	282	255	37,448	-	37,985
1985	-	249	546	39,096	-	39,890
1990	-	310	701	44,531	-	45,543
1995	-	58	1,274	47,668	-	49,000
2000	-	59	832	47,423	-	48,314
2001	-	60	635	49,805	-	50,500
2002	-	60	754	53,353	-	54,167
2003	-	61	714	54,296	-	55,071
2004	-	62	878	54,870	-	55,810
2005	-	63	690	56,245	-	56,998
2006	-	62	733	59,001	-	59,797
2007	-	62	1,253	57,035	-	58,350
2008	-	62	1,262	53,185	-	54,509
2009	-	62	1,189	53,894	-	55,144
2010	-	61	724	49,847	-	50,633
2011	-	61	746	55,619	-	56,427
2012	-	61	710	52,816	-	53,588
2013	-	63	699	53,610	-	54,372
2014	-	60	865	53,868	-	54,793
2015	-	1,563	1,437	52,895	-	55,895
2016	-	1,585	1,420	53,713	-	56,718
2017	-	1,610	1,432	53,362	-	56,404
2018	-	1,638	1,478	52,254	-	55,370
Annual Average Growth Rate (%)						
1960-1970	NA	9.2%	-5.1%	5.3%	NA	5.2%
1970-1980	NA	-8.7%	-0.2%	2.6%	NA	2.4%
1980-1990	NA	1.0%	10.6%	1.7%	NA	1.8%
1990-2000	NA	-15.3%	1.7%	0.6%	NA	0.6%
2000-2010	NA	0.3%	-1.4%	0.5%	NA	0.5%
2010-2018	NA	50.9%	9.3%	0.6%	NA	1.1%
1960-2018	NA	3.0%	2.1%	1.9%	NA	2.0%

Source: Energy Information Administration, State Energy Data System

Table 4.11. Percent of Hawaii Motor Gasoline Consumption by Sector in Heat Content

Units: % of Total Motor Gasoline						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.0%	1.6%	2.4%	96.0%	0.0%	100.0%
1965	0.0%	1.4%	1.9%	96.7%	0.0%	100.0%
1970	0.0%	2.3%	0.9%	96.8%	0.0%	100.0%
1975	0.0%	1.5%	0.8%	97.8%	0.0%	100.0%
1980	0.0%	0.7%	0.7%	98.6%	0.0%	100.0%
1985	0.0%	0.6%	1.4%	98.0%	0.0%	100.0%
1990	0.0%	0.7%	1.5%	97.8%	0.0%	100.0%
1995	0.0%	0.1%	2.6%	97.3%	0.0%	100.0%
2000	0.0%	0.1%	1.7%	98.2%	0.0%	100.0%
2001	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2002	0.0%	0.1%	1.4%	98.5%	0.0%	100.0%
2003	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2004	0.0%	0.1%	1.6%	98.3%	0.0%	100.0%
2005	0.0%	0.1%	1.2%	98.7%	0.0%	100.0%
2006	0.0%	0.1%	1.2%	98.7%	0.0%	100.0%
2007	0.0%	0.1%	2.1%	97.7%	0.0%	100.0%
2008	0.0%	0.1%	2.3%	97.6%	0.0%	100.0%
2009	0.0%	0.1%	2.2%	97.7%	0.0%	100.0%
2010	0.0%	0.1%	1.4%	98.4%	0.0%	100.0%
2011	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2012	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2013	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2014	0.0%	0.1%	1.6%	98.3%	0.0%	100.0%
2015	0.0%	2.8%	2.6%	94.6%	0.0%	100.0%
2016	0.0%	2.8%	2.5%	94.7%	0.0%	100.0%
2017	0.0%	2.9%	2.5%	94.6%	0.0%	100.0%
2018	0.0%	3.0%	2.7%	94.4%	0.0%	100.0%

Source: Energy Information Administration, State Energy Data System

As shown in Table 4.12, from 1960 to 2018, total motor gasoline consumption in Hawaii increased about 7.5 MBBLs. Increased motor gasoline consumption was mainly before 2002. From 1960 to 2002, total motor gasoline consumption increased 7.0 MBBLs. Motor gasoline consumption after 2002 was rather stable.

Table 4.12. Hawaii Motor Gasoline Consumption by Sector in Physical Unit

Units: Thousand Barrels						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	-	55	83	3,290	-	3,429
1965	-	59	76	3,947	-	4,082
1970	-	133	49	5,508	-	5,691
1975	-	98	53	6,615	-	6,766
1980	-	54	49	7,129	-	7,231
1985	-	47	104	7,443	-	7,594
1990	-	59	133	8,477	-	8,670
1995	-	11	245	9,160	-	9,416
2000	-	11	160	9,118	-	9,289
2001	-	12	122	9,576	-	9,710
2002	-	12	145	10,262	-	10,419
2003	-	12	137	10,448	-	10,597
2004	-	12	169	10,560	-	10,741
2005	-	12	133	10,833	-	10,978
2006	-	12	141	11,379	-	11,533
2007	-	12	244	11,092	-	11,348
2008	-	12	247	10,416	-	10,675
2009	-	12	234	10,588	-	10,834
2010	-	12	143	9,838	-	9,993
2011	-	12	147	10,985	-	11,145
2012	-	12	140	10,434	-	10,586
2013	-	13	138	10,595	-	10,746
2014	-	12	171	10,648	-	10,831
2015	-	309	284	10,460	-	11,053
2016	-	314	281	10,626	-	11,220
2017	-	319	283	10,560	-	11,162
2018	-	324	292	10,339	-	10,956
Annual Average Growth Rate (%)						
1960-1970	NA	9.2%	-5.1%	5.3%	NA	5.2%
1970-1980	NA	-8.6%	0.0%	2.6%	NA	2.4%
1980-1990	NA	0.9%	10.5%	1.7%	NA	1.8%
1990-2000	NA	-15.5%	1.9%	0.7%	NA	0.7%
2000-2010	NA	0.9%	-1.1%	0.8%	NA	0.7%
2010-2018	NA	51.0%	9.3%	0.6%	NA	1.2%
1960-2018	NA	3.1%	2.2%	2.0%	NA	2.0%

Source: Energy Information Administration, State Energy Data System

Table 4.13. Percent of Hawaii Motor Gasoline Consumption by Sector in Physical Unit

Units: % of Total Motor Gasoline						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	0.0%	1.6%	2.4%	95.9%	0.0%	100.0%
1965	0.0%	1.4%	1.9%	96.7%	0.0%	100.0%
1970	0.0%	2.3%	0.9%	96.8%	0.0%	100.0%
1975	0.0%	1.4%	0.8%	97.8%	0.0%	100.0%
1980	0.0%	0.7%	0.7%	98.6%	0.0%	100.0%
1985	0.0%	0.6%	1.4%	98.0%	0.0%	100.0%
1990	0.0%	0.7%	1.5%	97.8%	0.0%	100.0%
1995	0.0%	0.1%	2.6%	97.3%	0.0%	100.0%
2000	0.0%	0.1%	1.7%	98.2%	0.0%	100.0%
2001	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2002	0.0%	0.1%	1.4%	98.5%	0.0%	100.0%
2003	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2004	0.0%	0.1%	1.6%	98.3%	0.0%	100.0%
2005	0.0%	0.1%	1.2%	98.7%	0.0%	100.0%
2006	0.0%	0.1%	1.2%	98.7%	0.0%	100.0%
2007	0.0%	0.1%	2.2%	97.7%	0.0%	100.0%
2008	0.0%	0.1%	2.3%	97.6%	0.0%	100.0%
2009	0.0%	0.1%	2.2%	97.7%	0.0%	100.0%
2010	0.0%	0.1%	1.4%	98.4%	0.0%	100.0%
2011	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2012	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2013	0.0%	0.1%	1.3%	98.6%	0.0%	100.0%
2014	0.0%	0.1%	1.6%	98.3%	0.0%	100.0%
2015	0.0%	2.8%	2.6%	94.6%	0.0%	100.0%
2016	0.0%	2.8%	2.5%	94.7%	0.0%	100.0%
2017	0.0%	2.9%	2.5%	94.6%	0.0%	100.0%
2018	0.0%	3.0%	2.7%	94.4%	0.0%	100.0%

Source: Energy Information Administration, State Energy Data System

As shown in Table 4.14, from 1960 to 2018, Hawaii's total motor gasoline consumption increased 2.0% per year on average; while total vehicle registration increased 3.0% per year, and total vehicle miles increased 3.1% per year. The slower growth of motor gasoline consumption, relative to vehicle registration and vehicle miles, was due to improved energy efficiency of vehicles. However, more than 80% of the efficiency gain occurred before 1990. Efficiency gains after 1990 were relatively small.

Table 4.14. Hawaii Motor Gasoline Consumption and Energy Efficiency

	Total Motor Gasoline Consumption		Motor Vehicle Registration	Vehical Miles	Motor Gasoline Per Vehicle	Motor Gasoline Per 100 Mile
Year	BBTUs	TBBLs	Total	Millions	MBTUs	Gal
1960	18,011	3,429	230,709	1,990	78.1	7.2
1970	29,892	5,691	412,930	3,409	72.4	7.0
1980	37,985	7,231	617,571	5,570	61.5	5.5
1985	39,890	7,594	749,034	6,762	53.3	4.7
1990	45,543	8,670	889,096	8,065	51.2	4.5
1995	49,000	9,416	877,756	7,944	55.8	5.0
2000	48,314	9,289	941,242	8,526	51.3	4.6
2001	50,500	9,710	967,146	8,754	52.2	4.7
2002	54,167	10,419	987,598	8,937	54.8	4.9
2003	55,071	10,597	1,030,845	9,325	53.4	4.8
2004	55,810	10,741	1,072,211	9,735	52.1	4.6
2005	56,998	10,978	1,119,838	10,129	50.9	4.6
2006	59,797	11,533	1,127,467	10,196	53.0	4.8
2007	58,350	11,348	1,134,542	10,260	51.4	4.6
2008	54,509	10,675	1,127,567	10,189	48.3	4.4
2009	55,144	10,834	1,117,790	10,095	49.3	4.5
2010	50,633	9,993	1,120,080	10,111	45.2	4.2
2011	56,427	11,145	1,181,148	10,654	47.8	4.4
2012	53,588	10,586	1,278,233	11,518	41.9	3.9
2013	54,372	10,746	1,341,152	12,078	40.5	3.7
2014	54,793	10,831	1,284,193	10,173	42.7	4.5
2015	55,895	11,053	1,233,523	11,130	45.3	4.2
2016	56,718	11,220	1,232,731	11,132	46.0	4.2
2017	56,404	11,162	1,259,544	11,351	44.8	4.1
2018	55,370	10,956	1,267,136	11,418	43.7	4.0
	Annual Average Growth Rate					
1960-1970	5.2%	5.2%	6.0%	5.5%	-0.8%	-0.3%
1970-1980	2.4%	2.4%	4.1%	5.0%	-1.6%	-2.5%
1980-1990	1.8%	1.8%	3.7%	3.8%	-1.8%	-1.9%
1990-2000	0.6%	0.7%	0.6%	0.6%	0.0%	0.1%
2000-2010	0.5%	0.7%	1.8%	1.7%	-1.3%	-1.0%
2010-2018	1.1%	1.2%	1.6%	1.5%	-0.4%	-0.4%
1960-2018	2.0%	2.0%	3.0%	3.1%	-1.0%	-1.0%

Source: Energy Information Administration, State Energy Data System

Other petroleum products consumed in Hawaii mainly include still gas, LPG/HGL, asphalt and road oil, petroleum coke, lubricants, and aviation gasoline. In 2018, Hawaii consumed 19,370 BBTUs or 3.5 MBBLs of other petroleum products, accounting for about 7.7% of total petroleum consumption.

In 2018, still gas accounted for 4.5% of total petroleum consumption based on physical units. All of the still gas was consumed in the industrial sector in Hawaii without charges. From 1960 to 2018, still gas consumption increased 10,361 BBTUs (1,592 TBBLs) or about 2.8% per year on average.

In 2018, asphalt and road oil accounted 0.7% of total petroleum consumption based on physical units. All asphalt and road oil was consumed in the industrial sector. From 1960 to 2018, total asphalt and road oil consumption increased about 1,881 BBTUs (284 TBBLs) or 4.2% per year.

Hawaii did not consume any petroleum coke in 2018. All petroleum coke was consumed in the industrial sector without charges. From 1960 to 2018, total petroleum coke consumption decreased about 621 BBTUs (103 TBBLs).

In 2018, LPG/HGL accounted for 2.2% of total petroleum consumption based on physical units. As shown in Tables 4.15-4.18, in 2018, about 76.7% of LPG/HGL was consumed in the commercial sector; followed by the residential sector (12.3%), and the industrial sector (11.0%). From 1960 to 2018, total LPG/HGL consumption increased about 3,278 BBTUs (853 TBBLs) or 3.8% per year. During this period, the share of the commercial sector increased 38.9 percentage points; while the share of the industrial sector decreased 26.6 percentage points.

Other petroleum products consumed in Hawaii also include a small amount of lubricants and aviation gasoline. From 1960 to 2018, the consumption of lubricants increased from 228 BBTUs (38 TBBLs) to 538 BBTUs (89 TBBLs); while the consumption of aviation gasoline decreased from 13,326 BBTUs (2,640 TBBLs) to only 109 BBTUs (22 TBBLs). All of the aviation gasoline was consumed in the transportation sector. In 2018, 70.4% of lubricants were consumed in the transportation sector and 29.6% consumed in the industrial sector.

Table 4.15. Hawaii LPG/HGL Consumption by Sector in Heat Content

Year	Residential	Commercial	Industrial	Transportation	Electric	Total
			Units: Billion Btu			
1960	98	162	161	7	-	428
1965	193	319	309	13	-	835
1970	762	1,259	1,409	99	-	3,529
1975	546	902	1,669	86	-	3,203
1980	733	1,211	3,669	100	-	5,713
1985	172	284	30	23	-	508
1990	217	359	53	49	-	678
1995	147	243	4,179	30	-	4,599
2000	743	1,228	167	-	-	2,138
2001	754	1,246	209	-	-	2,209
2002	757	1,251	848	-	-	2,856
2003	561	927	322	43	-	1,854
2004	572	946	231	-	-	1,749
2005	584	965	48	57	-	1,653
2006	598	988	141	64	-	1,790
2007	480	857	198	48	-	1,582
2008	1,007	1,549	16	15	-	2,586
2009	920	2,076	107	25	-	3,127
2010	919	2,041	191	21	-	3,171
2011	854	2,424	161	19	-	3,458
2012	1,254	2,129	-	21	-	3,404
2013	838	2,302	6	17	-	3,163
2014	847	2,504	20	13	-	3,383
2015	505	2,319	33	11	-	2,868
2016	691	2,327	39	10	-	3,068
2017	580	3,025	217	-	-	3,821
2018	455	2,843	408	-	-	3,706
			Annual Average Growth Rate (%)			
1960-1970	22.8%	22.8%	24.2%	30.3%	NA	23.5%
1970-1980	-0.4%	-0.4%	10.0%	0.1%	NA	4.9%
1980-1990	-11.5%	-11.4%	-34.5%	-6.9%	NA	-19.2%
1990-2000	13.1%	13.1%	12.2%	-100.0%	NA	12.2%
2000-2010	2.1%	5.2%	1.4%	NA	NA	4.0%
2010-2018	-8.4%	4.2%	10.0%	-100.0%	NA	2.0%
1960-2018	2.7%	5.1%	1.6%	-100.0%	NA	3.8%

Source: Energy Information Administration, State Energy Data System

Table 4.16. Percent of Hawaii LPG/HGL Consumption by Sector in Heat Content

Units: % of Total LPG/HGL						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	22.9%	37.9%	37.6%	1.6%	0.0%	100.0%
1965	23.1%	38.2%	37.0%	1.6%	0.0%	100.0%
1970	21.6%	35.7%	39.9%	2.8%	0.0%	100.0%
1975	17.0%	28.2%	52.1%	2.7%	0.0%	100.0%
1980	12.8%	21.2%	64.2%	1.8%	0.0%	100.0%
1985	33.9%	55.9%	5.9%	4.5%	0.0%	100.0%
1990	32.0%	52.9%	7.8%	7.2%	0.0%	100.0%
1995	3.2%	5.3%	90.9%	0.7%	0.0%	100.0%
2000	34.8%	57.4%	7.8%	0.0%	0.0%	100.0%
2001	34.1%	56.4%	9.5%	0.0%	0.0%	100.0%
2002	26.5%	43.8%	29.7%	0.0%	0.0%	100.0%
2003	30.3%	50.0%	17.4%	2.3%	0.0%	100.0%
2004	32.7%	54.1%	13.2%	0.0%	0.0%	100.0%
2005	35.3%	58.4%	2.9%	3.4%	0.0%	100.0%
2006	33.4%	55.2%	7.9%	3.6%	0.0%	100.0%
2007	30.3%	54.2%	12.5%	3.0%	0.0%	100.0%
2008	38.9%	59.9%	0.6%	0.6%	0.0%	100.0%
2009	29.4%	66.4%	3.4%	0.8%	0.0%	100.0%
2010	29.0%	64.4%	6.0%	0.7%	0.0%	100.0%
2011	24.7%	70.1%	4.7%	0.5%	0.0%	100.0%
2012	36.8%	62.5%	0.0%	0.6%	0.0%	100.0%
2013	26.5%	72.8%	0.2%	0.5%	0.0%	100.0%
2014	25.0%	74.0%	0.6%	0.4%	0.0%	100.0%
2015	17.6%	80.9%	1.2%	0.4%	0.0%	100.0%
2016	22.5%	75.8%	1.3%	0.3%	0.0%	100.0%
2017	15.2%	79.2%	5.7%	0.0%	0.0%	100.0%
2018	12.3%	76.7%	11.0%	0.0%	0.0%	100.0%

Source: Energy Information Administration, State Energy Data System

Table 4.17. Hawaii LPG/HGL Consumption by Sector in Physical Unit

Units: Thousand Barrels						
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	25	42	43	2	-	112
1965	50	83	82	4	-	219
1970	198	328	386	26	-	938
1975	142	235	472	22	-	872
1980	191	315	1,041	26	-	1,573
1985	45	74	9	6	-	133
1990	57	93	15	13	-	178
1995	38	63	1,207	8	-	1,316
2000	194	320	49	-	-	562
2001	196	324	61	-	-	582
2002	197	326	247	-	-	770
2003	146	241	94	11	-	492
2004	149	246	67	-	-	462
2005	152	251	14	15	-	432
2006	156	257	41	17	-	471
2007	125	223	58	12	-	419
2008	262	403	5	4	-	674
2009	239	540	32	6	-	819
2010	239	531	50	5	-	826
2011	222	631	42	5	-	900
2012	326	554	-	5	-	886
2013	218	599	2	5	-	824
2014	220	652	5	3	-	881
2015	131	604	9	3	-	747
2016	180	606	10	3	-	799
2017	151	787	56	0	-	995
2018	119	740	106	0	-	965
Annual Average Growth Rate (%)						
1960-1970	NA	22.8%	24.5%	29.2%	NA	23.7%
1970-1980	NA	-0.4%	10.4%	0.0%	NA	5.3%
1980-1990	NA	-11.5%	-34.6%	-6.7%	NA	-19.6%
1990-2000	NA	13.2%	12.6%	-100.0%	NA	12.2%
2000-2010	NA	5.2%	0.2%	NA	NA	3.9%
2010-2018	-8.3%	4.2%	9.8%	-100.0%	NA	2.0%
1960-2018	2.7%	5.1%	1.6%	-100.0%	NA	3.8%

Source: Energy Information Administration, State Energy Data System

Table 4.18. Percent of Hawaii LPG/HGL Consumption by Sector in Physical Unit

	Units: % of Total LPG/HGL					
Year	Residential	Commercial	Industrial	Transportation	Electric	Total
1960	22.3%	37.5%	38.4%	1.8%	0.0%	100.0%
1965	22.8%	37.9%	37.4%	1.8%	0.0%	100.0%
1970	21.1%	35.0%	41.2%	2.8%	0.0%	100.0%
1975	16.3%	26.9%	54.1%	2.5%	0.0%	100.0%
1980	12.1%	20.0%	66.2%	1.7%	0.0%	100.0%
1985	33.8%	55.6%	6.8%	4.5%	0.0%	100.0%
1990	32.0%	52.2%	8.4%	7.3%	0.0%	100.0%
1995	2.9%	4.8%	91.7%	0.6%	0.0%	100.0%
2000	34.5%	56.9%	8.7%	0.0%	0.0%	100.0%
2001	33.7%	55.7%	10.5%	0.0%	0.0%	100.0%
2002	25.6%	42.3%	32.1%	0.0%	0.0%	100.0%
2003	29.7%	49.0%	19.1%	2.2%	0.0%	100.0%
2004	32.3%	53.2%	14.5%	0.0%	0.0%	100.0%
2005	35.2%	58.1%	3.2%	3.5%	0.0%	100.0%
2006	33.1%	54.6%	8.7%	3.6%	0.0%	100.0%
2007	29.8%	53.2%	13.8%	2.9%	0.0%	100.0%
2008	38.9%	59.8%	0.7%	0.6%	0.0%	100.0%
2009	29.2%	65.9%	3.9%	0.7%	0.0%	100.0%
2010	28.9%	64.3%	6.1%	0.6%	0.0%	100.0%
2011	24.7%	70.1%	4.7%	0.6%	0.0%	100.0%
2012	36.8%	62.5%	0.0%	0.6%	0.0%	100.0%
2013	26.5%	72.7%	0.2%	0.6%	0.0%	100.0%
2014	25.0%	74.0%	0.6%	0.3%	0.0%	100.0%
2015	17.5%	80.9%	1.2%	0.4%	0.0%	100.0%
2016	22.5%	75.8%	1.3%	0.4%	0.0%	100.0%
2017	15.2%	79.1%	5.6%	0.0%	0.0%	100.0%
2018	12.3%	76.7%	11.0%	0.0%	0.0%	100.0%

Source: Energy Information Administration, State Energy Data System

5. Consumption Sector Analysis

Tables 5.1 through 5.10 summarize the types of petroleum products consumed by each sector by heat content (BBTUs) and in physical unit (TBBLs).

As shown in Table 5.1, in 2018, the transportation sector consumed 159,701 BBTUs of petroleum products. Based on heat content, petroleum consumed in the transportation sector was mainly jet fuel (53.5%) in 2018; followed by motor gasoline (32.7%), distillate fuel oil (9.4%), residual fuel oil (4.0%), and other petroleum products (0.3%). From 1960 to 2018, total petroleum consumption in the transportation sector increased 97,923 BBTUs or 1.7% per year. During this period, the share of jet fuel increased 15.5 percentage points; the share of motor gasoline increased 4.7 percentage points; the share of distillate fuel oil increased 7.1 percentage points; the share of residual fuel oil decreased 5.8 percentage points; and the share of other petroleum products (mainly aviation gasoline) decreased 21.5 percentage points.

Increased petroleum consumption in the transportation sector, from 1960 to 2018, was mainly due to the increase from 1960 to 1990. From 1990 to 2018, total petroleum consumption in the transportation sector increased only 5,156 BBTUs or 3.3%. The increased jet fuel and motor gasoline consumption were mostly offset by the decreased consumption of residual fuel oil, distillate fuel oil, and other petroleum products. From 1990 to 2018, jet fuel consumption increased 14,441 BBTUs or about 20.3%; motor gasoline consumption increased 7,723 BBTUs or 17.3%. On the other hand, residual fuel oil consumption in the transportation sector decreased 10,260 BBTUs or 61.4%; distillate fuel oil consumption decreased 5,350 BBTUs or 26.3%; and other petroleum products consumption decreased 1,398 BBTUs or 74.1%.

Table 5.1. Petroleum Consumption by the Transportation Sector in Heat Content

	Consumption in Billion Btu						% of Transportation Secotr Petroleum Consumption				
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	23,519	6,087	17,283	1,439	13,450	61,778	38.1%	9.9%	28.0%	2.3%	21.8%
1970	80,060	10,963	28,932	4,208	1,181	125,344	63.9%	8.7%	23.1%	3.4%	0.9%
1980	79,244	9,060	37,448	19,405	1,556	146,713	54.0%	6.2%	25.5%	13.2%	1.1%
1985	74,436	9,591	39,096	18,548	1,217	142,888	52.1%	6.7%	27.4%	13.0%	0.9%
1990	71,051	16,703	44,531	20,374	1,886	154,545	46.0%	10.8%	28.8%	13.2%	1.2%
1991	62,557	16,309	46,076	24,473	1,786	151,201	41.4%	10.8%	30.5%	16.2%	1.2%
1992	56,501	23,616	45,562	16,661	1,787	144,127	39.2%	16.4%	31.6%	11.6%	1.2%
1993	50,409	16,683	45,949	15,579	1,466	130,086	38.8%	12.8%	35.3%	12.0%	1.1%
1994	53,705	18,457	47,384	18,755	1,564	139,865	38.4%	13.2%	33.9%	13.4%	1.1%
1995	56,358	16,832	47,668	15,613	1,570	138,041	40.8%	12.2%	34.5%	11.3%	1.1%
1996	57,194	4,413	47,439	11,218	1,269	121,533	47.1%	3.6%	39.0%	9.2%	1.0%
1997	57,955	3,077	47,387	7,695	1,067	117,181	49.5%	2.6%	40.4%	6.6%	0.9%
1998	56,695	2,410	47,167	7,229	1,017	114,518	49.5%	2.1%	41.2%	6.3%	0.9%
1999	53,720	10,739	45,707	12,051	772	122,989	43.7%	8.7%	37.2%	9.8%	0.6%
2000	53,511	13,995	47,423	9,470	697	125,096	42.8%	11.2%	37.9%	7.6%	0.6%
2001	50,437	16,709	49,805	14,287	675	131,913	38.2%	12.7%	37.8%	10.8%	0.5%
2002	57,774	9,035	53,353	19,372	515	140,049	41.3%	6.5%	38.1%	13.8%	0.4%
2003	72,056	5,745	54,296	30,179	514	162,790	44.3%	3.5%	33.4%	18.5%	0.3%
2004	75,861	9,388	54,870	31,181	596	171,896	44.1%	5.5%	31.9%	18.1%	0.3%
2005	92,831	7,049	56,245	22,263	679	179,067	51.8%	3.9%	31.4%	12.4%	0.4%
2006	86,945	14,933	59,001	19,653	659	181,191	48.0%	8.2%	32.6%	10.8%	0.4%
2007	72,329	28,069	57,035	36,125	653	194,211	37.2%	14.5%	29.4%	18.6%	0.3%
2008	60,679	6,146	53,185	15,772	526	136,308	44.5%	4.5%	39.0%	11.6%	0.4%
2009	52,748	7,633	53,894	18,045	507	132,827	39.7%	5.7%	40.6%	13.6%	0.4%
2010	55,775	6,756	49,847	23,211	674	136,263	40.9%	5.0%	36.6%	17.0%	0.5%
2011	62,077	6,300	55,619	19,670	705	144,371	43.0%	4.4%	38.5%	13.6%	0.5%
2012	64,135	5,699	52,816	18,880	630	142,160	45.1%	4.0%	37.2%	13.3%	0.4%
2013	64,201	5,530	53,610	17,632	630	141,603	45.3%	3.9%	37.9%	12.5%	0.4%
2014	73,270	5,330	53,868	9,171	578	142,217	51.5%	3.7%	37.9%	6.4%	0.4%
2015	76,095	4,394	52,895	11,808	512	145,704	52.2%	3.0%	36.3%	8.1%	0.4%
2016	74,301	5,091	53,713	12,544	465	146,114	50.9%	3.5%	36.8%	8.6%	0.3%
2017	73,155	7,215	53,362	12,365	442	146,539	49.9%	4.9%	36.4%	8.4%	0.3%
2018	85,492	6,443	52,254	15,024	488	159,701	53.5%	4.0%	32.7%	9.4%	0.3%

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.2, in 2018, the transportation sector consumed about 29,135 TBBLs of petroleum products, about 15,078 TBBLs of jet fuel, 10,339 TBBLs motor gasoline, 2,609 TBBLs of distillate fuel oil, 1,025 TBBLs of residual fuel oil, and 84 TBBLs of other petroleum products (mainly lubricants). From 1990 to 2018, total petroleum consumed in the transportation sector increased 1,496 TBBLs; jet fuel consumption increased 2,432 TBBLs; motor gasoline consumption increased 1,862 TBBLs; residual fuel oil consumption decreased 1,632 TBBLs; distillate fuel oil consumption decreased 889 TBBLs; and other petroleum products (mainly aviation gasoline) consumption decreased 277 TBBLs.

Table 5.2. Petroleum Consumption by the Transportation Sector in Physical Unit

	Consumption in Thousand Barrels						% of Transportation Sector Consumption				
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	4,321	968	3,290	247	2,661	11,487	37.6%	8.4%	28.6%	2.2%	23.2%
1970	14,273	1,744	5,508	722	226	22,473	63.5%	7.8%	24.5%	3.2%	1.0%
1980	14,116	1,441	7,129	3,331	300	26,317	53.6%	5.5%	27.1%	12.7%	1.1%
1985	13,260	1,526	7,443	3,184	228	25,641	51.7%	6.0%	29.0%	12.4%	0.9%
1990	12,646	2,657	8,477	3,498	361	27,639	45.8%	9.6%	30.7%	12.7%	1.3%
1991	11,123	2,594	8,771	4,201	345	27,034	41.1%	9.6%	32.4%	15.5%	1.3%
1992	9,993	3,756	8,674	2,860	348	25,631	39.0%	14.7%	33.8%	11.2%	1.4%
1993	8,891	2,654	8,808	2,674	278	23,305	38.2%	11.4%	37.8%	11.5%	1.2%
1994	9,472	2,936	9,088	3,223	298	25,017	37.9%	11.7%	36.3%	12.9%	1.2%
1995	9,940	2,677	9,160	2,683	299	24,759	40.1%	10.8%	37.0%	10.8%	1.2%
1996	10,087	702	9,104	1,928	237	22,058	45.7%	3.2%	41.3%	8.7%	1.1%
1997	10,221	489	9,104	1,322	198	21,334	47.9%	2.3%	42.7%	6.2%	0.9%
1998	9,999	383	9,065	1,242	187	20,876	47.9%	1.8%	43.4%	5.9%	0.9%
1999	9,474	1,708	8,786	2,071	138	22,177	42.7%	7.7%	39.6%	9.3%	0.6%
2000	9,438	2,226	9,118	1,627	123	22,532	41.9%	9.9%	40.5%	7.2%	0.5%
2001	8,895	2,658	9,576	2,455	120	23,704	37.5%	11.2%	40.4%	10.4%	0.5%
2002	10,189	1,437	10,262	3,329	89	25,306	40.3%	5.7%	40.6%	13.2%	0.4%
2003	12,708	914	10,448	5,186	91	29,347	43.3%	3.1%	35.6%	17.7%	0.3%
2004	13,379	1,493	10,560	5,359	106	30,897	43.3%	4.8%	34.2%	17.3%	0.3%
2005	16,372	1,121	10,833	3,827	125	32,278	50.7%	3.5%	33.6%	11.9%	0.4%
2006	15,334	2,375	11,379	3,387	122	32,597	47.0%	7.3%	34.9%	10.4%	0.4%
2007	12,756	4,465	11,092	6,246	119	34,678	36.8%	12.9%	32.0%	18.0%	0.3%
2008	10,702	978	10,416	2,729	92	24,917	43.0%	3.9%	41.8%	11.0%	0.4%
2009	9,303	1,214	10,588	3,124	91	24,320	38.3%	5.0%	43.5%	12.8%	0.4%
2010	9,837	1,075	9,838	4,019	119	24,888	39.5%	4.3%	39.5%	16.1%	0.5%
2011	10,948	1,002	10,985	3,409	125	26,469	41.4%	3.8%	41.5%	12.9%	0.5%
2012	11,311	906	10,434	3,274	111	26,036	43.4%	3.5%	40.1%	12.6%	0.4%
2013	11,323	880	10,595	3,060	109	25,967	43.6%	3.4%	40.8%	11.8%	0.4%
2014	12,922	848	10,648	1,591	102	26,111	49.5%	3.2%	40.8%	6.1%	0.4%
2015	13,421	699	10,460	2,049	87	26,716	50.2%	2.6%	39.2%	7.7%	0.3%
2016	13,104	810	10,626	2,179	78	26,797	48.9%	3.0%	39.7%	8.1%	0.3%
2017	12,902	1,148	10,560	2,148	75	26,833	48.1%	4.3%	39.4%	8.0%	0.3%
2018	15,078	1,025	10,339	2,609	84	29,135	51.8%	3.5%	35.5%	9.0%	0.3%

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.3, in 2018, the electric power sector consumed 65,197 BBTUs of petroleum products. Petroleum consumed in the electric power sector only includes residual fuel oil and distillate fuel oil. Based on heat content, residual fuel oil accounted for 81.0% of total petroleum consumption in the electric power sector in 2018; distillate fuel oil accounted for 19.0%. From 1960 to 2018, total petroleum consumption in the electric power sector increased 47,886 BBTUs or 2.3% per year. During this period, the share of residual fuel oil decreased 17.8 percentage points.

Increased petroleum consumption in the electric power sector, from 1960 to 2018, was due to the increase from 1960 to 1990. From 1990 to 2018, total petroleum consumption in the electricity sector decreased 32,404 BBTUs; consumption of residual fuel oil decreased 34,248 BBTUs; and consumption of distillate fuel oil increased 1,845 BBTUs.

Table 5.3. Petroleum Consumption by the Electricity Sector in Heat Content

	Consumption in Billion Btus						% of Electric	
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Residual Fuel Oil	Distillate Fuel Oil
1960	-	17,094	-	218	-	17,311	98.7%	1.3%
1965	-	26,984	-	355	-	27,339	98.7%	1.3%
1970	-	42,136	-	557	-	42,693	98.7%	1.3%
1975	-	55,830	-	2,498	-	58,328	95.7%	4.3%
1980	-	64,372	-	5,171	-	69,543	92.6%	7.4%
1985	-	64,724	-	4,378	-	69,102	93.7%	6.3%
1990	-	87,038	-	10,562	-	97,601	89.2%	10.8%
1991	-	70,373	-	9,958	-	80,332	87.6%	12.4%
1992	-	73,505	-	12,657	-	86,163	85.3%	14.7%
1993	-	63,509	-	12,640	-	76,149	83.4%	16.6%
1994	-	66,437	-	12,618	-	79,055	84.0%	16.0%
1995	-	67,329	-	12,870	-	80,199	84.0%	16.0%
1996	-	69,130	-	13,520	-	82,650	83.6%	16.4%
1997	-	68,356	-	13,398	-	81,754	83.6%	16.4%
1998	-	68,222	-	14,042	-	82,264	82.9%	17.1%
1999	-	68,518	-	14,867	-	83,385	82.2%	17.8%
2000	-	68,202	-	16,148	-	84,350	80.9%	19.1%
2001	-	66,725	-	17,312	-	84,037	79.4%	20.6%
2002	-	68,247	-	23,199	-	91,446	74.6%	25.4%
2003	-	67,907	-	13,367	-	81,275	83.6%	16.4%
2004	-	70,527	-	14,464	-	84,992	83.0%	17.0%
2005	-	71,070	-	15,035	-	86,104	82.5%	17.5%
2006	-	72,295	-	14,236	-	86,531	83.5%	16.5%
2007	-	71,832	-	13,377	-	85,210	84.3%	15.7%
2008	-	69,217	-	12,712	-	81,928	84.5%	15.5%
2009	-	67,297	-	12,999	-	80,296	83.8%	16.2%
2010	-	65,157	-	12,971	-	78,128	83.4%	16.6%
2011	-	64,471	-	13,062	-	77,533	83.2%	16.8%
2012	-	59,686	-	12,592	-	72,278	82.6%	17.4%
2013	-	57,940	-	11,980	-	69,920	82.9%	17.1%
2014	-	55,115	-	11,845	-	66,960	82.3%	17.7%
2015	-	54,987	-	12,297	-	67,284	81.7%	18.3%
2016	-	53,197	-	11,726	-	64,923	81.9%	18.1%
2017	-	52,777	-	12,053	-	64,830	81.4%	18.6%
2018	-	52,790	-	12,407	-	65,197	81.0%	19.0%

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.4, in 2018, the electric power sector consumed about 10,551 TBBLs of petroleum products, about 8,397 TBBLs of residual fuel oil, and 2,154 TBBLs of distillate fuel oil. From 1990 to 2018, total petroleum consumed in the electric power sector decreased 5,106 TBBLs; residual fuel oil consumption decreased 5,447 TBBLs; and distillate fuel oil consumption increased 341 TBBLs.

Table 5.4. Petroleum Consumption by the Electric Power Sector in Physical Unit

	Consumption in Thousand Barrels						% of Electric	
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Residual Fuel Oil	Distillate Fuel Oil
1960	-	2,719	-	37	-	2,756	98.7%	1.3%
1965	-	4,292	-	61	-	4,353	98.6%	1.4%
1970	-	6,702	-	96	-	6,798	98.6%	1.4%
1975	-	8,880	-	429	-	9,309	95.4%	4.6%
1980	-	10,239	-	888	-	11,127	92.0%	8.0%
1985	-	10,295	-	752	-	11,047	93.2%	6.8%
1990	-	13,844	-	1,813	-	15,657	88.4%	11.6%
1991	-	11,193	-	1,710	-	12,903	86.7%	13.3%
1992	-	11,692	-	2,173	-	13,865	84.3%	15.7%
1993	-	10,102	-	2,170	-	12,272	82.3%	17.7%
1994	-	10,567	-	2,168	-	12,735	83.0%	17.0%
1995	-	10,709	-	2,211	-	12,921	82.9%	17.1%
1996	-	10,996	-	2,323	-	13,319	82.6%	17.4%
1997	-	10,873	-	2,302	-	13,175	82.5%	17.5%
1998	-	10,851	-	2,413	-	13,264	81.8%	18.2%
1999	-	10,898	-	2,555	-	13,453	81.0%	19.0%
2000	-	10,848	-	2,775	-	13,623	79.6%	20.4%
2001	-	10,613	-	2,975	-	13,588	78.1%	21.9%
2002	-	10,855	-	3,987	-	14,842	73.1%	26.9%
2003	-	10,801	-	2,297	-	13,098	82.5%	17.5%
2004	-	11,218	-	2,486	-	13,704	81.9%	18.1%
2005	-	11,304	-	2,584	-	13,888	81.4%	18.6%
2006	-	11,499	-	2,453	-	13,952	82.4%	17.6%
2007	-	11,426	-	2,313	-	13,738	83.2%	16.8%
2008	-	11,009	-	2,199	-	13,209	83.3%	16.6%
2009	-	10,704	-	2,250	-	12,954	82.6%	17.4%
2010	-	10,364	-	2,246	-	12,610	82.2%	17.8%
2011	-	10,255	-	2,264	-	12,518	81.9%	18.1%
2012	-	9,494	-	2,183	-	11,677	81.3%	18.7%
2013	-	9,216	-	2,079	-	11,295	81.6%	18.4%
2014	-	8,767	-	2,055	-	10,822	81.0%	19.0%
2015	-	8,746	-	2,134	-	10,880	80.4%	19.6%
2016	-	8,461	-	2,037	-	10,498	80.6%	19.4%
2017	-	8,395	-	2,094	-	10,488	80.0%	20.0%
2018	-	8,397	-	2,154	-	10,551	79.6%	20.4%

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.5, in 2018, the industrial sector consumed 21,375 BBTUs of petroleum products. Based on heat content, petroleum consumed in the industrial sector was mainly other petroleum products (72.9%) in 2018; followed by residual fuel oil (13.1%), distillate fuel oil (7.1%), and motor gasoline (6.9%). Other petroleum products consumed by the industrial sector mainly include still gas, asphalt and road oil, and petroleum coke. From 1960 to 2018, total petroleum consumption of the industrial sector increased 7,132 BBTUs or 0.7% per year. During this period, the share of other petroleum products increased 44.4 percentage points; the share of motor gasoline increased 3.8 percentage points; the share of distillate fuel oil decreased 15.6 percentage points; and the share of residual fuel oil decreased 32.7 percentage points.

Increased petroleum consumption in the industrial sector, from 1960 to 2018, was due to the increase from 1960 to 1990. From 1990 to 2018, total petroleum consumption in the industrial sector decreased 10,527 BBTUs. Increased motor gasoline consumptions were more than offset by decreased consumptions of residual fuel oil, distillate fuel oil, and other petroleum and. From 1990 to 2018, motor gasoline consumption increased 777 BBTUs. On the other hand, residual fuel oil consumption decreased 8,145 BBTUs, distillate fuel oil consumption decreased 2,707 BBTUs, and other petroleum products consumption decreased 452 BBTUs.

Table 5.5. Petroleum Consumption by the Industrial Sector in Heat Content

	Consumption in Billion Btus						% of Industrial Sector			
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	-	6,525	438	3,225	4,055	14,243	45.8%	3.1%	22.6%	28.5%
1965	-	10,763	401	3,697	6,459	21,320	50.5%	1.9%	17.3%	30.3%
1970	-	10,506	260	4,086	8,027	22,879	45.9%	1.1%	17.9%	35.1%
1975	-	8,463	278	3,512	8,949	21,202	39.9%	1.3%	16.6%	42.2%
1980	-	9,374	255	7,976	10,972	28,577	32.8%	0.9%	27.9%	38.4%
1985	-	8,449	546	2,665	6,861	18,521	45.6%	2.9%	14.4%	37.0%
1990	-	10,942	701	4,222	16,037	31,902	34.3%	2.2%	13.2%	50.3%
1991	-	11,274	788	4,014	14,443	30,519	36.9%	2.6%	13.2%	47.3%
1992	-	8,528	796	4,002	17,248	30,574	27.9%	2.6%	13.1%	56.4%
1993	-	6,640	1,258	3,895	18,123	29,916	22.2%	4.2%	13.0%	60.6%
1994	-	7,447	1,275	3,142	21,647	33,511	22.2%	3.8%	9.4%	64.6%
1995	-	6,441	1,274	3,191	20,257	31,163	20.7%	4.1%	10.2%	65.0%
1996	-	6,016	1,348	2,766	22,363	32,493	18.5%	4.1%	8.5%	68.8%
1997	-	5,310	1,261	3,624	18,030	28,225	18.8%	4.5%	12.8%	63.9%
1998	-	1,918	1,383	3,400	15,484	22,185	8.6%	6.2%	15.3%	69.8%
1999	-	2,090	808	2,487	15,083	20,468	10.2%	3.9%	12.2%	73.7%
2000	-	2,751	832	2,751	16,054	22,388	12.3%	3.7%	12.3%	71.7%
2001	-	50	635	2,751	17,543	20,979	0.2%	3.0%	13.1%	83.6%
2002	-	2,805	754	2,673	15,839	22,071	12.7%	3.4%	12.1%	71.8%
2003	-	2,287	714	2,557	16,597	22,155	10.3%	3.2%	11.5%	74.9%
2004	-	2,481	878	2,367	16,422	22,148	11.2%	4.0%	10.7%	74.1%
2005	-	4,912	690	2,977	17,421	26,000	18.9%	2.7%	11.5%	67.0%
2006	-	5,102	733	2,648	16,683	25,166	20.3%	2.9%	10.5%	66.3%
2007	-	2,690	1,253	2,606	16,259	22,808	11.8%	5.5%	11.4%	71.3%
2008	-	2,730	1,262	2,003	14,123	20,118	13.6%	6.3%	10.0%	70.2%
2009	-	2,930	1,189	2,332	18,619	25,070	11.7%	4.7%	9.3%	74.3%
2010	-	2,834	724	1,882	20,214	25,654	11.0%	2.8%	7.3%	78.8%
2011	-	2,852	746	1,972	20,153	25,723	11.1%	2.9%	7.7%	78.3%
2012	-	2,051	710	2,166	18,682	23,609	8.7%	3.0%	9.2%	79.1%
2013	-	1,780	699	1,873	20,022	24,374	7.3%	2.9%	7.7%	82.1%
2014	-	1,614	865	2,261	18,635	23,375	6.9%	3.7%	9.7%	79.7%
2015	-	1,876	1,437	1,851	18,598	23,762	7.9%	6.0%	7.8%	78.3%
2016	-	2,565	1,420	939	18,002	22,926	11.2%	6.2%	4.1%	78.5%
2017	-	3,233	1,432	1,789	18,221	24,675	13.1%	5.8%	7.3%	73.8%
2018	-	2,797	1,478	1,515	15,585	21,375	13.1%	6.9%	7.1%	72.9%

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.6, in 2018, the industrial sector consumed about 3,507 TBBLs of petroleum products, about 2,507 TBBLs of other petroleum products, 445 TBBLs of residual fuel oil, 263 TBBLs of distillate fuel oil, and 292 TBBLs of motor gasoline. From 1990 to 2018, total petroleum consumed in the industrial sector decreased 1,724 TBBLs; residual fuel oil consumption decreased 1,295 TBBLs; distillate fuel oil consumption decreased 462 TBBLs; motor gasoline consumption increased 159 TBBLs; and other petroleum products decreased 126 TBBLs.

Table 5.6. Petroleum Consumption by the Industrial Sector in Physical Unit

	Consumption in Thousand Barrels						% of Industrial Sector			
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	-	1,038	83	554	692	2,367	43.9%	3.5%	23.4%	29.2%
1965	-	1,712	76	635	1,074	3,497	49.0%	2.2%	18.2%	30.7%
1970	-	1,671	49	701	1,453	3,874	43.1%	1.3%	18.1%	37.5%
1975	-	1,346	53	603	1,646	3,648	36.9%	1.5%	16.5%	45.1%
1980	-	1,491	49	1,369	2,226	5,135	29.0%	1.0%	26.7%	43.3%
1985	-	1,344	104	458	1,091	2,997	44.8%	3.5%	15.3%	36.4%
1990	-	1,740	133	725	2,633	5,231	33.3%	2.5%	13.9%	50.3%
1991	-	1,793	150	689	2,357	4,989	35.9%	3.0%	13.8%	47.2%
1992	-	1,356	152	687	2,883	5,078	26.7%	3.0%	13.5%	56.8%
1993	-	1,056	241	669	3,284	5,250	20.1%	4.6%	12.7%	62.6%
1994	-	1,184	245	540	4,182	6,151	19.2%	4.0%	8.8%	68.0%
1995	-	1,024	245	548	3,826	5,643	18.1%	4.3%	9.7%	67.8%
1996	-	957	259	475	4,189	5,880	16.3%	4.4%	8.1%	71.2%
1997	-	845	242	623	2,962	4,672	18.1%	5.2%	13.3%	63.4%
1998	-	305	266	584	2,610	3,765	8.1%	7.1%	15.5%	69.3%
1999	-	332	155	427	2,466	3,380	9.8%	4.6%	12.6%	73.0%
2000	-	438	160	473	2,614	3,685	11.9%	4.3%	12.8%	70.9%
2001	-	8	122	473	2,910	3,513	0.2%	3.5%	13.5%	82.8%
2002	-	446	145	459	2,729	3,779	11.8%	3.8%	12.1%	72.2%
2003	-	364	137	439	2,793	3,733	9.8%	3.7%	11.8%	74.8%
2004	-	395	169	407	2,733	3,704	10.7%	4.6%	11.0%	73.8%
2005	-	781	133	512	2,872	4,298	18.2%	3.1%	11.9%	66.8%
2006	-	811	141	456	2,786	4,194	19.3%	3.4%	10.9%	66.4%
2007	-	428	244	451	2,721	3,844	11.1%	6.3%	11.7%	70.8%
2008	-	434	247	347	2,339	3,367	12.9%	7.3%	10.3%	69.5%
2009	-	466	234	404	3,027	4,131	11.3%	5.7%	9.8%	73.3%
2010	-	451	143	326	3,294	4,214	10.7%	3.4%	7.7%	78.2%
2011	-	454	147	342	3,288	4,231	10.7%	3.5%	8.1%	77.7%
2012	-	326	140	376	3,055	3,897	8.4%	3.6%	9.6%	78.4%
2013	-	283	138	325	3,245	3,991	7.1%	3.5%	8.1%	81.3%
2014	-	257	171	392	3,016	3,836	6.7%	4.5%	10.2%	78.6%
2015	-	298	284	321	3,018	3,921	7.6%	7.2%	8.2%	77.0%
2016	-	408	281	163	2,846	3,698	11.0%	7.6%	4.4%	77.0%
2017	-	514	283	311	2,908	4,016	12.8%	7.0%	7.7%	72.4%
2018	-	445	292	263	2,507	3,507	12.7%	8.3%	7.5%	71.5%

Source: Energy Information Administration, State Energy Data System

Petroleum products consumption in the commercial sector was more volatile. As shown in Table 5.7, in 2018, the commercial sector consumed 5,842 BBTUs of petroleum products. Based on heat content, petroleum consumed in the commercial sector was mainly other petroleum products (48.7%); followed by motor gasoline (28.0%), and distillate fuel oil (23.3%). Other petroleum products consumed by the industrial sector mainly include LPG/HGL. From 1960 to 2018, total petroleum consumption of the commercial sector increased 4,727 BBTUs or 2.9% per year. During this period, the share of other petroleum products increased 22.4 percentage points; the share of motor gasoline increased 2.0 percentage points; the share of distillate fuel oil decreased 1.5 percentage point; and the share of residual fuel oil decreased 22.9 percentage points. Since 2008, the commercial sector did not consume any residual fuel oil. Motor gasoline consumption in the commercial sector from 1993 to 2014 was very limited. Since 2015, motor gasoline consumption increased substantially in the commercial sector.

Increased petroleum consumption in the commercial sector, from 1960 to 2018, was due to the increase from 1960 to 1990. From 1990 to 2018, total petroleum consumption in the commercial sector decreased 2,653 BBTUs. Increased other petroleum and motor gasoline consumptions were more than offset by decreased consumption of residual fuel oil and distillate fuel oil. From 1990 to 2018, other petroleum products consumption increased 2,483 BBTUs; motor gasoline consumption increased 1,328 BBTUs. On the other hand, residual fuel oil consumption decreased 5,189 BBTUs; and distillate fuel oil consumption decreased 1,275 BBTUs.

Table 5.7. Petroleum Consumption by the Commercial Sector in Heat Content

	Consumption in Billion Btus						% of Commercial Sector			
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	-	255	290	277	293	1,115	22.9%	26.0%	24.8%	26.3%
1965	-	195	309	416	540	1,460	13.4%	21.2%	28.5%	37.0%
1970	-	236	701	1,012	1,753	3,702	6.4%	18.9%	27.3%	47.4%
1975	-	95	517	491	1,155	2,258	4.2%	22.9%	21.7%	51.2%
1980	-	157	282	2,317	1,211	3,967	4.0%	7.1%	58.4%	30.5%
1985	-	131	249	768	291	1,439	9.1%	17.3%	53.4%	20.2%
1990	-	5,189	310	2,636	360	8,495	61.1%	3.6%	31.0%	4.2%
1991	-	116	256	3,552	370	4,294	2.7%	6.0%	82.7%	8.6%
1992	-	6,612	234	2,901	1,163	10,910	60.6%	2.1%	26.6%	10.7%
1993	-	214	57	2,414	250	2,935	7.3%	1.9%	82.2%	8.5%
1994	-	2,719	57	2,265	254	5,295	51.4%	1.1%	42.8%	4.8%
1995	-	392	58	1,998	243	2,691	14.6%	2.2%	74.2%	9.0%
1996	-	79	58	1,302	302	1,741	4.5%	3.3%	74.8%	17.3%
1997	-	69	58	2,282	558	2,967	2.3%	2.0%	76.9%	18.8%
1998	-	10,711	58	1,225	1,586	13,580	78.9%	0.4%	9.0%	11.7%
1999	-	36	58	1,512	899	2,505	1.4%	2.3%	60.4%	35.9%
2000	-	52	59	1,271	1,229	2,611	2.0%	2.3%	48.7%	47.1%
2001	-	34	60	793	1,246	2,133	1.6%	2.8%	37.2%	58.4%
2002	-	-	60	1,805	1,252	3,117	0.0%	1.9%	57.9%	40.2%
2003	-	-	61	1,644	927	2,632	0.0%	2.3%	62.5%	35.2%
2004	-	27	62	2,220	945	3,254	0.8%	1.9%	68.2%	29.0%
2005	-	18	63	2,237	964	3,282	0.5%	1.9%	68.2%	29.4%
2006	-	5	62	2,274	988	3,329	0.2%	1.9%	68.3%	29.7%
2007	-	3	62	1,629	857	2,551	0.1%	2.4%	63.9%	33.6%
2008	-	-	62	1,277	1,549	2,888	0.0%	2.1%	44.2%	53.6%
2009	-	-	62	1,573	2,076	3,711	0.0%	1.7%	42.4%	55.9%
2010	-	-	61	1,528	2,040	3,629	0.0%	1.7%	42.1%	56.2%
2011	-	-	61	1,728	2,424	4,213	0.0%	1.4%	41.0%	57.5%
2012	-	-	61	1,537	2,129	3,727	0.0%	1.6%	41.2%	57.1%
2013	-	-	63	1,471	2,303	3,837	0.0%	1.6%	38.3%	60.0%
2014	-	-	60	1,862	2,504	4,426	0.0%	1.4%	42.1%	56.6%
2015	-	-	1,563	1,298	2,319	5,180	0.0%	30.2%	25.1%	44.8%
2016	-	-	1,585	904	2,327	4,816	0.0%	32.9%	18.8%	48.3%
2017	-	-	1,610	1,181	3,025	5,816	0.0%	27.7%	20.3%	52.0%
2018	-	-	1,638	1,361	2,843	5,842	0.0%	28.0%	23.3%	48.7%

Source: Energy Information Administration, State Energy Data System

As shown in Table 5.8, in 2018, the commercial sector consumed about 1,301 TBBLs of petroleum products, about 741 TBBLs of other petroleum products (LPG/HGL), 236 TBBLs of distillate fuel oil, and 324 TBBLs of motor gasoline. From 1990 to 2018, total petroleum consumed in the commercial sector decreased 129 TBBLs; residual fuel oil consumption decreased 825 TBBLs; distillate fuel oil consumption decreased 217 TBBLs; motor gasoline consumption increased 265 TBBLs; and other petroleum products increased 648 TBBLs.

Table 5.8. Petroleum Consumption by the Commercial Sector in Physical Unit

	Consumption in Thousand Barrels						% of Commercial Sector			
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1960	-	41	55	48	65	209	19.6%	26.3%	23.0%	31.1%
1965	-	31	59	71	122	283	11.0%	20.8%	25.1%	43.1%
1970	-	38	133	174	415	760	5.0%	17.5%	22.9%	54.6%
1975	-	15	98	84	280	477	3.1%	20.5%	17.6%	58.7%
1980	-	25	54	398	315	792	3.2%	6.8%	50.3%	39.8%
1985	-	21	47	132	75	275	7.6%	17.1%	48.0%	27.3%
1990	-	825	59	453	93	1,430	57.7%	4.1%	31.7%	6.5%
1991	-	18	49	610	96	773	2.3%	6.3%	78.9%	12.4%
1992	-	1,052	45	498	302	1,897	55.5%	2.4%	26.3%	15.9%
1993	-	34	11	414	65	524	6.5%	2.1%	79.0%	12.4%
1994	-	433	11	389	66	899	48.2%	1.2%	43.3%	7.3%
1995	-	62	11	343	64	480	12.9%	2.3%	71.5%	13.3%
1996	-	13	11	224	78	326	4.0%	3.4%	68.7%	23.9%
1997	-	11	11	392	146	560	2.0%	2.0%	70.0%	26.1%
1998	-	1,704	11	211	412	2,338	72.9%	0.5%	9.0%	17.6%
1999	-	6	11	260	234	511	1.2%	2.2%	50.9%	45.8%
2000	-	8	11	218	321	558	1.4%	2.0%	39.1%	57.5%
2001	-	5	12	136	325	478	1.0%	2.5%	28.5%	68.0%
2002	-	-	12	310	326	648	0.0%	1.9%	47.8%	50.3%
2003	-	-	12	282	242	536	0.0%	2.2%	52.6%	45.1%
2004	-	4	12	382	246	644	0.6%	1.9%	59.3%	38.2%
2005	-	3	12	384	252	651	0.5%	1.8%	59.0%	38.7%
2006	-	1	12	392	257	662	0.2%	1.8%	59.2%	38.8%
2007	-	-	12	282	223	517	0.0%	2.3%	54.5%	43.1%
2008	-	-	12	221	403	636	0.0%	1.9%	34.7%	63.4%
2009	-	-	12	272	541	825	0.0%	1.5%	33.0%	65.6%
2010	-	-	12	265	531	808	0.0%	1.5%	32.8%	65.7%
2011	-	-	12	299	632	943	0.0%	1.3%	31.7%	67.0%
2012	-	-	12	266	555	833	0.0%	1.4%	31.9%	66.6%
2013	-	-	13	255	599	867	0.0%	1.5%	29.4%	69.1%
2014	-	-	12	323	652	987	0.0%	1.2%	32.7%	66.1%
2015	-	-	309	225	604	1,138	0.0%	27.2%	19.8%	53.1%
2016	-	-	314	157	605	1,076	0.0%	29.2%	14.6%	56.2%
2017	-	-	319	205	787	1,311	0.0%	24.3%	15.6%	60.0%
2018	-	-	324	236	741	1,301	0.0%	24.9%	18.1%	57.0%

Source: Energy Information Administration, State Energy Data System

Petroleum products consumed in the residential sector include mainly other petroleum products (LPG/HGL). In 2018, about 455 BBTUs (119 TBBLs) of LPG/HGL was consumed in the residential sector. Consumption of LPG/HGL was volatile over time.

Table 5.9. Petroleum Consumption by the Residential Sector in Heat Content

	Consumption in Billion Btus						% of Residential	
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Distillate Fuel Oil	Other Petroleum
1960	-	-	-	2	98	100	2.0%	98.0%
1965	-	-	-	3	193	196	1.5%	98.5%
1970	-	-	-	8	762	770	1.0%	99.0%
1975	-	-	-	4	546	550	0.7%	99.3%
1980	-	-	-	6	732	738	0.8%	99.2%
1985	-	-	-	2	171	173	1.2%	98.8%
1990	-	-	-	2	217	219	0.9%	99.1%
1991	-	-	-	2	223	225	0.9%	99.1%
1992	-	-	-	2	704	706	0.3%	99.7%
1993	-	-	-	11	150	161	6.8%	93.2%
1994	-	-	-	10	153	163	6.1%	93.9%
1995	-	-	-	10	147	157	6.4%	93.6%
1996	-	-	-	1	183	184	0.5%	99.5%
1997	-	-	-	3	337	340	0.9%	99.1%
1998	-	-	-	2	959	961	0.2%	99.8%
1999	-	-	-	2	543	545	0.4%	99.6%
2000	-	-	-	2	743	745	0.3%	99.7%
2001	-	-	-	2	754	756	0.3%	99.7%
2002	-	-	-	2	757	759	0.3%	99.7%
2003	-	-	-	2	561	563	0.4%	99.6%
2004	-	-	-	2	572	574	0.3%	99.7%
2005	-	-	-	1	584	585	0.2%	99.8%
2006	-	-	-	19	598	617	3.1%	96.9%
2007	-	-	-	19	480	499	3.8%	96.2%
2008	-	-	-	30	1,007	1,037	2.9%	97.1%
2009	-	-	-	16	920	936	1.7%	98.3%
2010	-	-	-	1	918	919	0.1%	99.9%
2011	-	-	-	1	854	855	0.1%	99.9%
2012	-	-	-	-	1,254	1,254	0.0%	100.0%
2013	-	-	-	-	839	839	0.0%	100.0%
2014	-	-	-	-	847	847	0.0%	100.0%
2015	-	-	-	2	505	507	0.4%	99.6%
2016	-	-	-	-	691	691	0.0%	100.0%
2017	-	-	-	1	580	581	0.2%	99.8%
2018	-	-	-	-	455	455	0.0%	100.0%

Source: Energy Information Administration, State Energy Data System

Table 5.10. Petroleum Consumption by the Residential Sector in Physical Unit

	Consumption in Thousand Barrels							
Year	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Petroleum Total	Distillate Fuel Oil	Other Petroleum
1960	-	-	-	-	26	26	0.0%	100.0%
1965	-	-	-	1	50	51	2.0%	100.0%
1970	-	-	-	1	199	200	0.5%	100.0%
1975	-	-	-	1	142	143	0.7%	100.0%
1980	-	-	-	1	191	192	0.5%	100.0%
1985	-	-	-	-	45	45	0.0%	100.0%
1990	-	-	-	-	57	57	0.0%	100.0%
1991	-	-	-	-	58	58	0.0%	100.0%
1992	-	-	-	-	184	184	0.0%	100.0%
1993	-	-	-	2	39	41	5.1%	100.0%
1994	-	-	-	2	40	42	5.0%	100.0%
1995	-	-	-	2	38	40	5.3%	100.0%
1996	-	-	-	-	48	48	0.0%	100.0%
1997	-	-	-	-	88	88	0.0%	100.0%
1998	-	-	-	-	250	250	0.0%	100.0%
1999	-	-	-	-	142	142	0.0%	100.0%
2000	-	-	-	-	194	194	0.0%	100.0%
2001	-	-	-	-	197	197	0.0%	100.0%
2002	-	-	-	-	197	197	0.0%	100.0%
2003	-	-	-	-	146	146	0.0%	100.0%
2004	-	-	-	-	149	149	0.0%	100.0%
2005	-	-	-	-	152	152	0.0%	100.0%
2006	-	-	-	3	156	159	1.9%	100.0%
2007	-	-	-	3	125	128	2.4%	100.0%
2008	-	-	-	5	262	267	1.9%	100.0%
2009	-	-	-	3	239	242	1.3%	100.0%
2010	-	-	-	-	239	239	0.0%	100.0%
2011	-	-	-	-	222	222	0.0%	100.0%
2012	-	-	-	-	326	326	0.0%	100.0%
2013	-	-	-	-	218	218	0.0%	100.0%
2014	-	-	-	-	220	220	0.0%	100.0%
2015	-	-	-	-	132	132	0.0%	100.0%
2016	-	-	-	-	180	180	0.0%	100.0%
2017	-	-	-	-	151	151	0.0%	100.0%
2018	-	-	-	-	119	119	0.0%	100.0%

Source: Energy Information Administration, State Energy Data System

6. Hawaii's Petroleum Expenditures

As shown in Table 6.1, petroleum accounted for 96.7% of Hawaii's primary energy expenditures and about 71.1% of total energy expenditures (including electricity addition) in 2018. Due to fluctuations of petroleum price, petroleum's share of total energy expenditures increased from 74.3% in 1970 to 86.6% in 1980; the share decreased to 58.6% in 1998, increased to 78.9% in 2007, and then decreased to 71.1% in 2018.

Table 6.1. Hawaii's Total Energy, Primary Energy, and Petroleum Expenditures

	Total Energy	Primary Energy	Petroleum	Petroleum as % of	
	Expenditures	Expenditures	Expenditures	Total Energy	Primary Energy
Year	$ Million	$ Million	$ Million	%	%
1970	273.9	203.8	203.5	74.3	99.9
1975	651.5	518.6	518.1	79.5	99.9
1980	1,720.7	1,539.7	1,490.3	86.6	96.8
1981	2,060.7	1,785.0	1,730.3	84.0	96.9
1985	1,906.9	1,594.7	1,542.0	80.9	96.7
1986	1,461.9	1,139.2	1,100.7	75.3	96.6
1987	1,480.5	1,179.4	1,137.6	76.8	96.5
1988	1,592.9	1,267.9	1,227.4	77.1	96.8
1989	1,809.4	1,463.4	1,422.9	78.6	97.2
1990	2,117.9	1,807.6	1,764.9	83.3	97.6
1991	2,029.2	1,540.2	1,488.4	73.3	96.6
1992	1,984.3	1,472.8	1,416.7	71.4	96.2
1993	2,017.3	1,398.4	1,332.0	66.0	95.3
1994	2,122.1	1,441.7	1,375.7	64.8	95.4
1995	2,202.7	1,470.2	1,392.8	63.2	94.7
1996	2,305.8	1,532.5	1,453.4	63.0	94.8
1997	2,272.6	1,455.8	1,375.7	60.5	94.5
1998	2,092.5	1,296.7	1,226.6	58.6	94.6
1999	2,163.2	1,379.8	1,309.6	60.5	94.9
2000	2,705.1	1,863.0	1,783.7	65.9	95.7
2001	2,779.2	1,891.1	1,813.3	65.2	95.9
2002	2,688.2	1,882.7	1,798.8	66.9	95.5
2003	3,335.9	2,341.4	2,223.1	66.6	94.9
2004	4,024.6	2,886.3	2,782.3	69.1	96.4
2005	4,996.9	3,892.2	3,785.4	75.8	97.3
2006	5,729.1	4,535.9	4,418.7	77.1	97.4
2007	6,177.1	4,994.8	4,871.1	78.9	97.5
2008	6,828.5	5,297.3	5,138.9	75.3	97.0
2009	4,804.8	3,540.0	3,413.0	71.0	96.4
2010	5,865.6	4,532.6	4,386.8	74.8	96.8
2011	7,684.5	6,186.1	6,026.9	78.4	97.4
2012	7,846.8	6,247.6	6,080.4	77.5	97.3
2013	7,685.5	6,014.3	5,849.9	76.1	97.3
2014	7,434.9	5,648.7	5,472.1	73.6	96.9
2015	5,707.5	4,008.7	3,855.0	67.5	96.2
2016	5,038.1	3,403.3	3,262.9	64.8	95.9
2017	5,549.1	3,900.3	3,757.0	67.7	96.3
2018	6,617.5	4,868.9	4,707.6	71.1	96.7

Source: Energy Information Administration, State Energy Data System

From 1970 to 1981, petroleum expenditures as percent of nominal GDP increased from 4.4% to 12.3%; it decreased to 3.3% in 1998, increased to 8.5% in 2011, and then decreased to 5.1% in 2018.

Table 6.2. Petroleum Expenditures and Gross Domestic Product (GDP)

Year	Nominal GDP $ Million	Petroleum Expenditures $ Million	Petroleum Expenditures As Percent of GDP %
1970	4,639.4	203.5	4.4
1975	7,878.2	518.1	6.6
1980	12,897.4	1,490.3	11.6
1981	14,111.9	1,730.3	12.3
1985	19,974.6	1,542.0	7.7
1986	21,627.7	1,100.7	5.1
1987	23,397.5	1,137.6	4.9
1988	25,832.4	1,227.4	4.8
1989	28,365.6	1,422.9	5.0
1990	31,360.5	1,764.9	5.6
1991	33,117.8	1,488.4	4.5
1992	34,825.9	1,416.7	4.1
1993	35,407.1	1,332.0	3.8
1994	36,046.2	1,375.7	3.8
1995	36,400.9	1,392.8	3.8
1996	36,749.9	1,453.4	4.0
1997	37,700.7	1,375.7	3.6
1998	37,621.7	1,226.6	3.3
1999	39,246.9	1,309.6	3.3
2000	41,519.9	1,783.7	4.3
2001	42,982.8	1,813.3	4.2
2002	45,449.9	1,798.8	4.0
2003	48,922.8	2,223.1	4.5
2004	53,761.1	2,782.3	5.2
2005	58,658.7	3,785.4	6.5
2006	62,349.9	4,418.7	7.1
2007	65,223.8	4,871.1	7.5
2008	66,857.7	5,138.9	7.7
2009	65,711.3	3,413.0	5.2
2010	68,260.2	4,386.8	6.4
2011	70,630.1	6,026.9	8.5
2012	73,676.7	6,080.4	8.3
2013	75,807.8	5,849.9	7.7
2014	77,819.3	5,472.1	7.0
2015	82,644.0	3,855.0	4.7
2016	85,899.9	3,262.9	3.8
2017	89,618.6	3,757.0	4.2
2018	93,100.5	4,707.6	5.1

Source: Energy Information Administration, State Energy Data System

Petroleum expenditures are affected by the petroleum price and consumption. Since petroleum consumption is less volatile than the petroleum price, the fluctuation of Hawaii's petroleum expenditures is mainly affected by the fluctuation of petroleum prices or the average expenditure of petroleum.

From 1970 to 2018, Hawaii's total petroleum expenditures increased $4,504.1 million or 6.8% per year on average; the average petroleum expenditure increased $17.60/MBTUs ($99.56/BBL) or 6.2% per year; and petroleum consumption increased 0.5% per year.

Petroleum expenditures are very volatile over time mainly due to petroleum price fluctuations. As shown in Table 6.3, from 1970 to 1981, the average petroleum expenditure in dollars per million BTUs ($/MBTUs) increased about 20.0% per year. As a result, petroleum expenditures in Hawaii increased $1,526.8 million or 21.5% per year. During this period, the consumption of petroleum only increased 1.2% per year.

From 1981 to 1998, the average petroleum expenditure in $/MBTUs decreased about 2.3% per year, as a result, petroleum expenditures in Hawaii decreased $503.7 million or 2.0% per year. During this period, the consumption of petroleum only increased 0.3% per year.

From 1998 to 2008, the average petroleum expenditure in $/MBTUs increased about 15.0% per year, as a result, petroleum expenditures in Hawaii increased $3,912.3 million or 15.4% per year. During this period, the consumption of petroleum only increased 0.4% per year.

From 2008 to 2009, the average petroleum expenditure decreased about 33.7% per year, and petroleum expenditures in Hawaii decreased $1,725.9 million or 33.6% per year.

From 2009 to 2012, the average petroleum expenditure increased about 21.2% per year, and petroleum expenditures in Hawaii increased $2,667.4 million or 21.2% per year.

From 2012 to 2018, the average petroleum expenditure decreased by about 4.8% per year, and petroleum expenditures in Hawaii decreased by $1,372.8 million or 4.2% per year.

Table 6.3. Hawaii's Average Petroleum Expenditure

Year	Petroleum Expenditures $ Million	Petroleum Consumption BBTUs	Petroleum Consumption TBBLs	Average Petroleum Expenditures $/MBTUs	Average Petroleum Expenditures $/BBL
1970	203.5	195,388	34,105	1.04	5.97
1975	518.1	212,880	37,097	2.43	13.97
1980	1,490.3	249,539	43,562	5.97	34.21
1981	1,730.3	223,133	38,811	7.75	44.58
1985	1,542.0	232,123	40,006	6.64	38.54
1986	1,100.7	227,619	39,044	4.84	28.19
1987	1,137.6	228,894	39,389	4.97	28.88
1988	1,227.4	268,023	45,902	4.58	26.74
1989	1,422.9	280,097	48,021	5.08	29.63
1990	1,764.9	292,762	50,015	6.03	35.29
1991	1,488.4	266,571	45,758	5.58	32.53
1992	1,416.7	272,480	46,655	5.20	30.37
1993	1,332.0	239,247	41,392	5.57	32.18
1994	1,375.7	257,889	44,843	5.33	30.68
1995	1,392.8	252,252	43,842	5.52	31.77
1996	1,453.4	238,601	41,631	6.09	34.91
1997	1,375.7	230,468	39,829	5.97	34.54
1998	1,226.6	233,508	40,493	5.25	30.29
1999	1,309.6	229,893	39,662	5.70	33.02
2000	1,783.7	235,191	40,591	7.58	43.94
2001	1,813.3	239,817	41,479	7.56	43.72
2002	1,798.8	257,441	44,772	6.99	40.18
2003	2,223.1	269,414	46,861	8.25	47.44
2004	2,782.3	282,864	49,098	9.84	56.67
2005	3,785.4	295,039	51,267	12.83	73.84
2006	4,418.7	296,835	51,564	14.89	85.69
2007	4,871.1	305,278	52,905	15.96	92.07
2008	5,138.9	242,279	42,397	21.21	121.21
2009	3,413.0	242,840	42,472	14.05	80.36
2010	4,386.8	244,593	42,758	17.94	102.60
2011	6,026.9	252,695	44,383	23.85	135.79
2012	6,080.4	243,028	42,770	25.02	142.17
2013	5,849.9	240,572	42,338	24.32	138.17
2014	5,472.1	237,826	41,976	23.01	130.36
2015	3,855.0	242,436	42,787	15.90	90.10
2016	3,262.9	239,469	42,250	13.63	77.23
2017	3,757.0	242,441	42,799	15.50	87.78
2018	4,707.6	252,569	44,612	18.64	105.52
			Annual Average Growth Rate (%)		
1970-1981	21.5%	1.2%	1.2%	20.0%	20.1%
1981-1998	-2.0%	0.3%	0.2%	-2.3%	-2.2%
1998-2008	15.4%	0.4%	0.5%	15.0%	14.9%
2008-2009	-33.6%	0.2%	0.2%	-33.7%	-33.7%
2009-2012	21.2%	0.0%	0.2%	21.2%	20.9%
2012-2018	-4.2%	0.6%	0.7%	-4.8%	-4.8%
1970-2018	6.8%	0.5%	0.6%	6.2%	6.2%

Source: Energy Information Administration, State Energy Data System

From 1970 to 2018, the average petroleum expenditure increased 6.2% per year, among the four major petroleum products, the average expenditure of residual fuel oil increased the most at 7.6% per year; followed by distillate fuel oil at 6.8%, jet fuel at 6.6%, and motor gasoline at 4.7% (Table 6.4).

Table 6.4. Hawaii's Average Petroleum Expenditure by Product in Heat Content

Year	Total Petroleum $/MBTU	Jet Fuel $/MBTU	Residual Fuel $/MBTU	Motor Gasoline $/MBTU	Distillate Fuel $/MBTU	HGL/LPG $/MBTU	Asphalt Road Oil $/MBTU	Lubricants $/MBTU	Aviation Gasoline $/MBTU
1970	1.0	0.7	0.4	3.3	1.0	1.6	0.6	5.1	2.2
1975	2.4	2.0	1.5	5.4	2.3	2.4	1.8	7.4	3.4
1980	6.0	6.2	3.7	10.8	6.6	4.3	3.6	14.4	9.1
1981	7.8	7.6	6.1	12.5	8.1	3.9	4.6	18.1	10.9
1985	6.6	6.2	4.8	11.1	7.9	11.2	4.4	18.1	9.9
1990	6.0	6.0	3.9	11.7	7.9	11.7	3.2	20.5	9.3
1995	5.5	4.4	2.9	11.5	7.3	7.3	3.2	21.7	8.4
2000	7.6	7.0	4.9	13.5	9.3	17.9	3.4	23.2	11.1
2001	7.6	5.9	4.8	14.6	9.0	18.7	3.7	24.5	11.1
2002	7.0	5.5	4.7	12.4	7.9	16.0	3.8	26.7	10.1
2003	8.3	6.6	4.7	15.2	10.5	17.6	4.2	28.9	13.0
2004	9.8	9.4	4.9	17.2	12.8	19.8	4.8	30.1	15.2
2005	12.8	12.9	8.1	20.7	15.7	23.0	5.0	35.2	18.8
2006	14.9	15.1	9.3	24.0	19.1	25.5	4.8	43.9	22.1
2007	16.0	16.2	10.7	24.6	20.2	26.6	5.3	47.0	23.8
2008	21.2	22.4	15.7	29.5	26.1	34.6	6.3	55.2	27.1
2009	14.1	12.7	9.1	22.9	16.8	27.2	16.1	56.2	20.1
2010	17.9	16.4	12.9	28.0	21.9	31.1	16.3	58.8	25.0
2011	23.9	22.7	18.5	34.4	29.2	32.2	18.4	69.5	31.8
2012	25.0	22.9	20.4	36.2	30.7	29.9	20.8	72.1	32.9
2013	24.3	22.6	19.5	34.8	30.2	27.4	21.7	69.4	32.4
2014	23.0	21.0	18.5	33.7	27.5	29.3	21.8	69.4	32.9
2015	15.9	12.3	9.7	27.7	22.2	18.3	18.0	67.2	25.5
2016	13.6	10.3	7.6	24.1	20.3	19.5	13.0	65.7	20.0
2017	15.5	12.1	10.0	26.8	20.9	21.4	11.7	67.3	24.0
2018	18.6	15.8	12.8	30.7	23.7	20.9	13.7	72.3	26.6
Annual Average Growth Rate (%)									
1970-1981	20.0%	23.7%	28.5%	12.8%	20.9%	8.6%	21.1%	12.2%	15.5%
1981-1998	-2.3%	-4.2%	-5.0%	-0.2%	-2.0%	8.2%	-1.4%	1.0%	-1.7%
1998-2008	15.0%	19.8%	19.9%	9.4%	16.2%	8.9%	5.7%	10.0%	12.8%
2008-2009	-33.7%	-43.5%	-41.9%	-22.3%	-35.5%	-21.4%	157.7%	1.7%	-25.8%
2009-2012	21.2%	21.9%	31.0%	16.5%	22.1%	3.2%	8.9%	8.7%	17.8%
2012-2018	-4.8%	-6.0%	-7.6%	-2.7%	-4.2%	-5.8%	-6.7%	0.0%	-3.5%
1970-2018	6.2%	6.6%	7.6%	4.7%	6.8%	5.6%	6.9%	5.7%	5.3%

Source: Energy Information Administration, State Energy Data System

From 1970 to 2018, the average petroleum expenditure in Hawaii increased from $6.0/BBL to $105.5/BBL. The average petroleum expenditures reached a peak of $142.2/BBL in 2012. In 2018, among the four major petroleum products consumed in Hawaii, the average expenditure of motor gasoline was the highest at $155.4/BBL; followed by distillate fuel oil at $136.3/BBL, jet fuel at $89.5/BBL, and residual fuel oil at $80.2/BBL.

Table 6.5. Hawaii's Average Petroleum Expenditure by Product in Physical Unit

Year	Total Petroleum $/BBL	Jet Fuel $/BBL	Residual Fuel $/BBL	Motor Gasoline $/BBL	Distillate Fuel $/BBL	HGL/LPG $/BBL	Asphalt Road Oil $/BBL	Lubricants $/BBL	Aviation Gasoline $/BBL
1970	6.0	4.1	2.4	17.4	5.8	5.9	3.7	31.0	11.3
1975	14.0	11.5	9.6	28.6	13.1	8.7	11.6	45.2	17.2
1980	34.2	34.9	23.4	56.8	38.2	15.6	23.9	87.2	45.7
1981	44.6	42.3	38.4	65.5	47.3	14.0	30.5	110.0	54.6
1985	38.5	34.8	30.0	58.5	45.8	42.9	29.5	109.3	50.3
1990	35.3	33.6	24.6	61.5	45.8	44.4	21.0	125.0	47.1
1991	32.5	29.1	19.4	54.6	45.8	42.1	21.9	137.2	44.1
1992	30.4	27.7	17.4	57.5	42.0	40.9	18.6	136.4	43.2
1993	32.2	27.1	18.4	58.2	43.8	21.0	19.6	134.4	41.9
1994	30.7	24.4	16.4	59.2	43.1	24.4	20.6	130.9	40.0
1995	31.8	25.2	18.4	59.9	42.5	25.5	21.2	131.5	42.2
1996	34.9	29.7	21.2	63.4	45.0	28.4	22.4	131.5	46.7
1997	34.5	28.5	22.0	63.9	37.4	64.7	23.0	133.0	47.1
1998	30.3	20.8	16.0	62.5	33.8	55.3	23.9	129.3	41.1
1999	33.0	27.1	19.9	59.0	41.0	62.8	23.5	139.0	44.8
2000	43.9	39.6	30.7	70.0	54.1	68.0	22.8	140.8	55.6
2001	43.7	33.3	30.1	75.7	52.3	71.1	24.6	148.9	56.3
2002	40.2	30.9	29.5	64.6	45.9	59.4	25.2	161.8	50.0
2003	47.4	37.3	29.7	79.0	61.1	66.5	28.2	175.6	66.7
2004	56.7	53.4	30.9	89.6	74.6	74.9	31.7	183.1	76.9
2005	73.8	73.3	50.7	107.6	91.4	88.2	33.2	213.3	95.5
2006	85.7	85.6	58.4	124.4	110.6	96.8	33.3	265.4	112.2
2007	92.1	92.0	67.5	126.5	117.1	100.5	33.3	286.7	119.5
2008	121.2	127.0	98.4	150.5	150.9	132.8	50.0	336.4	135.7
2009	80.4	71.8	57.1	116.6	97.2	103.9	106.9	338.6	100.0
2010	102.6	92.9	80.9	141.8	126.6	119.5	107.9	355.6	127.0
2011	135.8	128.5	116.4	174.4	168.2	123.8	122.1	422.5	160.0
2012	142.2	130.1	128.5	183.2	176.8	114.9	138.1	438.4	164.5
2013	138.2	128.1	122.5	176.2	174.1	105.1	144.0	421.2	163.0
2014	130.4	119.3	116.5	170.4	158.6	112.6	144.6	418.6	164.3
2015	90.1	69.9	60.8	139.9	128.0	70.1	119.1	408.7	133.3
2016	77.2	58.7	47.7	121.7	117.1	75.0	86.2	397.0	100.0
2017	87.8	68.6	63.2	135.6	120.6	82.3	77.4	409.9	120.0
2018	105.5	89.5	80.2	155.4	136.3	80.3	90.7	437.1	131.8

Source: Energy Information Administration, State Energy Data System

Hawaii's petroleum expenditures by major product category are provided in Table 6.6. From 1970 to 2018, the share of distillate fuel oil increased 10.4 percentage points, the share of residual fuel oil increased 4.7 percentage points, the share of motor gasoline decreased 12.6 percentage points, the share of jet fuel remained about the same, and the share of other petroleum products decreased 2.4 percentage point.

Table 6.6. Hawaii's Petroleum Expenditures by Product

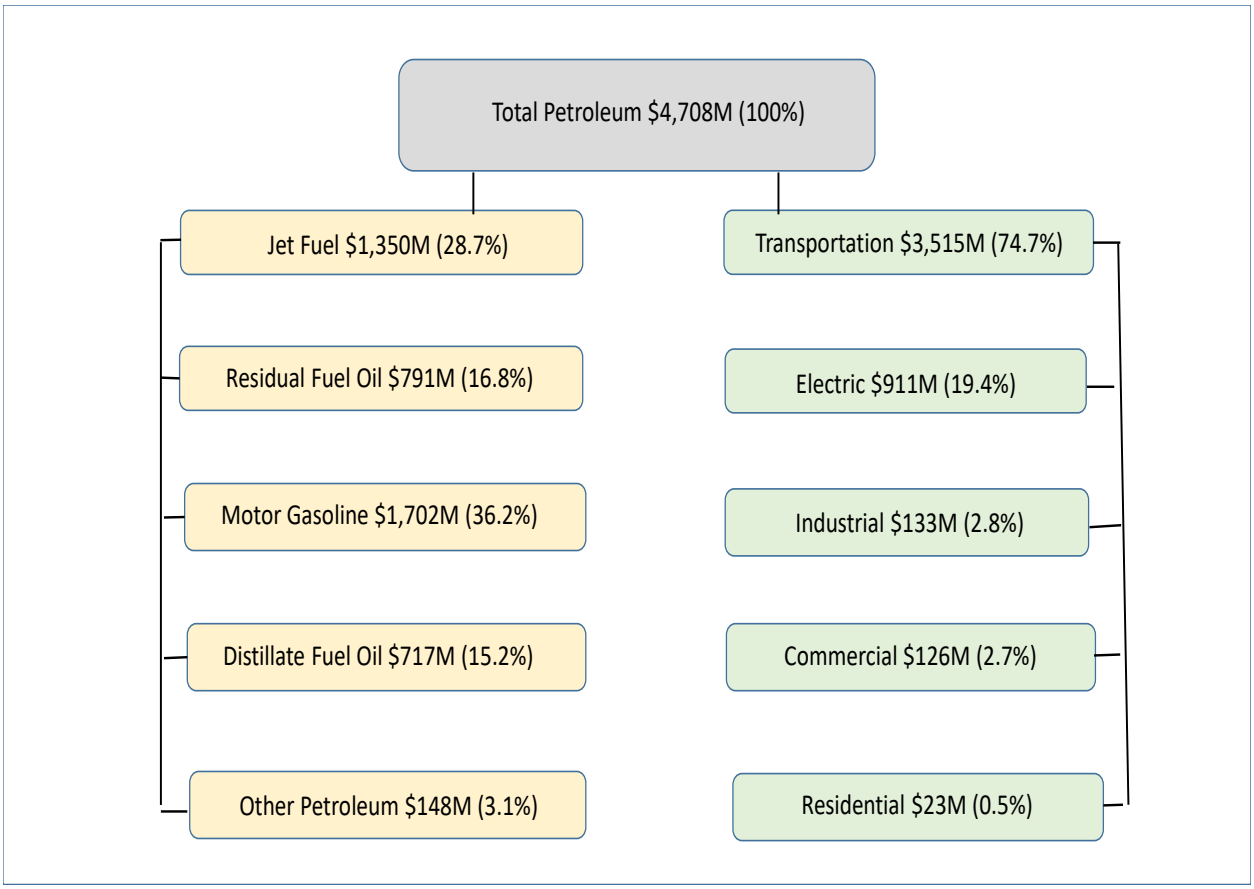
	Petroleum Expenditures: $ Million						% of Petroleum Expenditures				
Year	Total Petroleum	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum	Jet Fuel	Residual Fuel Oil	Motor Gasoline	Distillate Fuel Oil	Other Petroleum
1970	203.5	58.4	24.7	99.2	9.9	11.3	28.7%	12.1%	48.7%	4.9%	5.6%
1975	518.1	170.3	108.5	193.5	25.6	20.2	32.9%	20.9%	37.3%	4.9%	3.9%
1980	1,490.3	492.4	308.6	410.7	228.7	49.9	33.0%	20.7%	27.6%	15.3%	3.3%
1981	1,730.3	424.4	505.3	470.9	285.0	44.7	24.5%	29.2%	27.2%	16.5%	2.6%
1985	1,542.0	462.1	395.4	444.4	207.1	33.0	30.0%	25.6%	28.8%	13.4%	2.1%
1990	1,764.9	425.3	468.5	533.4	297.0	40.7	24.1%	26.5%	30.2%	16.8%	2.3%
1995	1,392.8	250.5	266.8	563.9	246.0	65.6	18.0%	19.2%	40.5%	17.7%	4.7%
2000	1,783.7	373.4	415.5	650.0	275.5	69.3	20.9%	23.3%	36.4%	15.4%	3.9%
2001	1,813.3	295.9	400.1	735.3	316.0	66.0	16.3%	22.1%	40.6%	17.4%	3.6%
2002	1,798.8	315.0	375.6	673.4	371.0	63.8	17.5%	20.9%	37.4%	20.6%	3.5%
2003	2,223.1	474.0	359.0	837.6	501.4	51.1	21.3%	16.1%	37.7%	22.6%	2.3%
2004	2,782.3	714.2	404.7	962.2	644.5	56.7	25.7%	14.5%	34.6%	23.2%	2.0%
2005	3,785.4	1,199.9	669.5	1,181.7	667.7	66.6	31.7%	17.7%	31.2%	17.6%	1.8%
2006	4,418.7	1,313.2	858.4	1,434.2	739.8	73.1	29.7%	19.4%	32.5%	16.7%	1.7%
2007	4,871.1	1,173.3	1,102.0	1,435.5	1,088.1	72.2	24.1%	22.6%	29.5%	22.3%	1.5%
2008	5,138.9	1,359.2	1,222.2	1,607.0	830.0	120.5	26.4%	23.8%	31.3%	16.2%	2.3%
2009	3,413.0	667.7	707.5	1,263.6	588.6	185.6	19.6%	20.7%	37.0%	17.2%	5.4%
2010	4,386.8	913.9	961.4	1,416.9	868.3	226.3	20.8%	21.9%	32.3%	19.8%	5.2%
2011	6,026.9	1,407.1	1,363.3	1,943.7	1,062.2	250.6	23.3%	22.6%	32.3%	17.6%	4.2%
2012	6,080.4	1,471.3	1,378.6	1,939.7	1,078.5	212.3	24.2%	22.7%	31.9%	17.7%	3.5%
2013	5,849.9	1,450.9	1,271.5	1,893.3	995.6	238.6	24.8%	21.7%	32.4%	17.0%	4.1%
2014	5,472.1	1,541.9	1,150.0	1,846.1	691.7	242.4	28.2%	21.0%	33.7%	12.6%	4.4%
2015	3,855.0	938.5	592.7	1,546.4	605.3	172.1	24.3%	15.4%	40.1%	15.7%	4.5%
2016	3,262.9	768.9	461.3	1,365.4	531.2	136.1	23.6%	14.1%	41.8%	16.3%	4.2%
2017	3,757.0	884.9	635.1	1,513.4	573.7	149.9	23.6%	16.9%	40.3%	15.3%	4.0%
2018	4,707.6	1,349.5	791.2	1,702.1	717.1	147.7	28.7%	16.8%	36.2%	15.2%	3.1%
Annual Average Growth Rate (%)											
1970-1981	21.5%	19.8%	31.6%	15.2%	35.7%	13.3%	-1.4%	8.3%	-5.2%	11.7%	-6.7%
1981-1998	-2.0%	-4.1%	-5.0%	1.3%	-3.7%	2.9%	-2.2%	-3.0%	3.3%	-1.7%	5.0%
1998-2008	15.4%	20.7%	19.2%	10.7%	18.6%	5.2%	4.6%	3.2%	-4.1%	2.8%	-8.9%
2008-2009	-33.6%	-50.9%	-42.1%	-21.4%	-29.1%	54.0%	-26.0%	-12.8%	18.4%	6.8%	131.9%
2009-2012	21.2%	30.1%	24.9%	15.4%	22.4%	4.6%	7.3%	3.0%	-4.8%	0.9%	-13.7%
2012-2018	-4.2%	-1.4%	-8.8%	-2.2%	-6.6%	-5.9%	2.9%	-4.9%	2.1%	-2.5%	-1.8%
1970-2018	6.8%	6.8%	7.5%	6.1%	9.3%	5.5%	0.0%	0.7%	-0.6%	2.4%	-1.2%

Source: Energy Information Administration, State Energy Data System

In 2018, the total petroleum expenditures in Hawaii was about $4,708 million. Motor gasoline accounted for the most at 36.2%; followed by jet fuel at 28.7%, residual fuel oil at 16.8%, distillate fuel oil at 15.2%, and other petroleum products at 3.1% (Figure 6.1). Among the six types of petroleum products included in other petroleum consumed in 2018, still gas and petroleum coke were the two groups consumed by the industrial sector without charge, therefore, their expenditures were zero. Expenditures on other petroleum products mainly include expenditures on LPG/HGL ($77.5 million or 1.6% of total petroleum expenditures), lubricants ($38.9 million or 0.8%), and asphalt and road oil ($28.4 million or 0.6%). Expenditures on aviation gasoline was only $2.9 million in 2018.

Among the five sectors, petroleum expenditures of the transportation sector accounted for the most at 74.7%; followed by the electricity sector at 19.4%, industrial sector at 2.8%, commercial sector at 2.7%, and the residential sector at 0.5%.

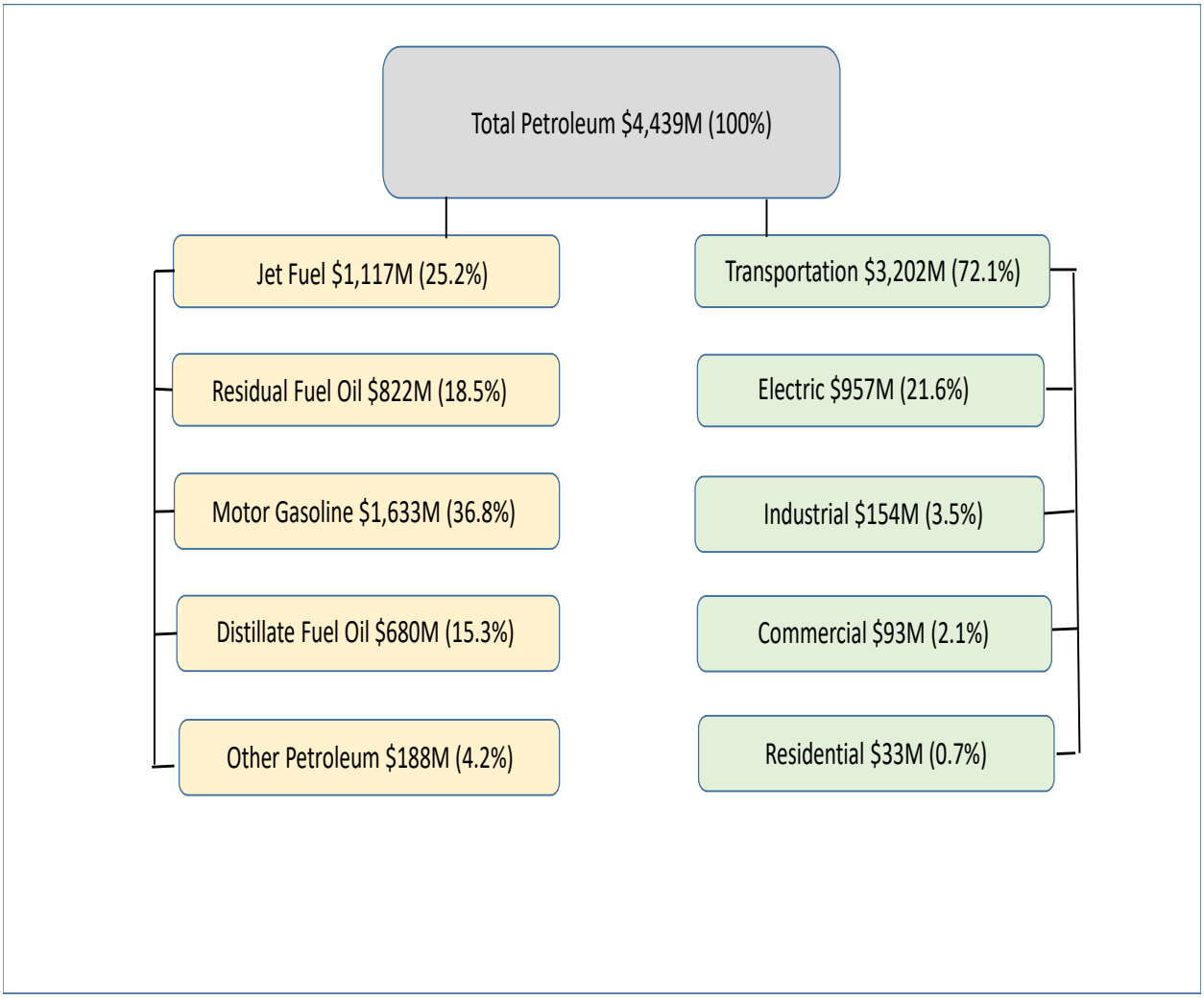
Figure 6.1. 2018 Hawaii Petroleum Expenditures ($M)



The average petroleum expenditures in the previous five years, from 2013 to 2017, are provided in Figure 6.2. The average total petroleum expenditure in Hawaii was about $4,439 million. Motor gasoline accounted for the most at 36.8%; followed by jet fuel at 25.2%, residual fuel oil at 18.5%, distillate fuel oil at 15.3%, and other petroleum products at 4.2%.

Among the five sectors, petroleum expenditures of the transportation sector accounted for the most at 72.1%; followed by the electricity sector at 21.6%, industrial sector at 3.5%, commercial sector at 2.1%, and the residential sector at 0.7%.

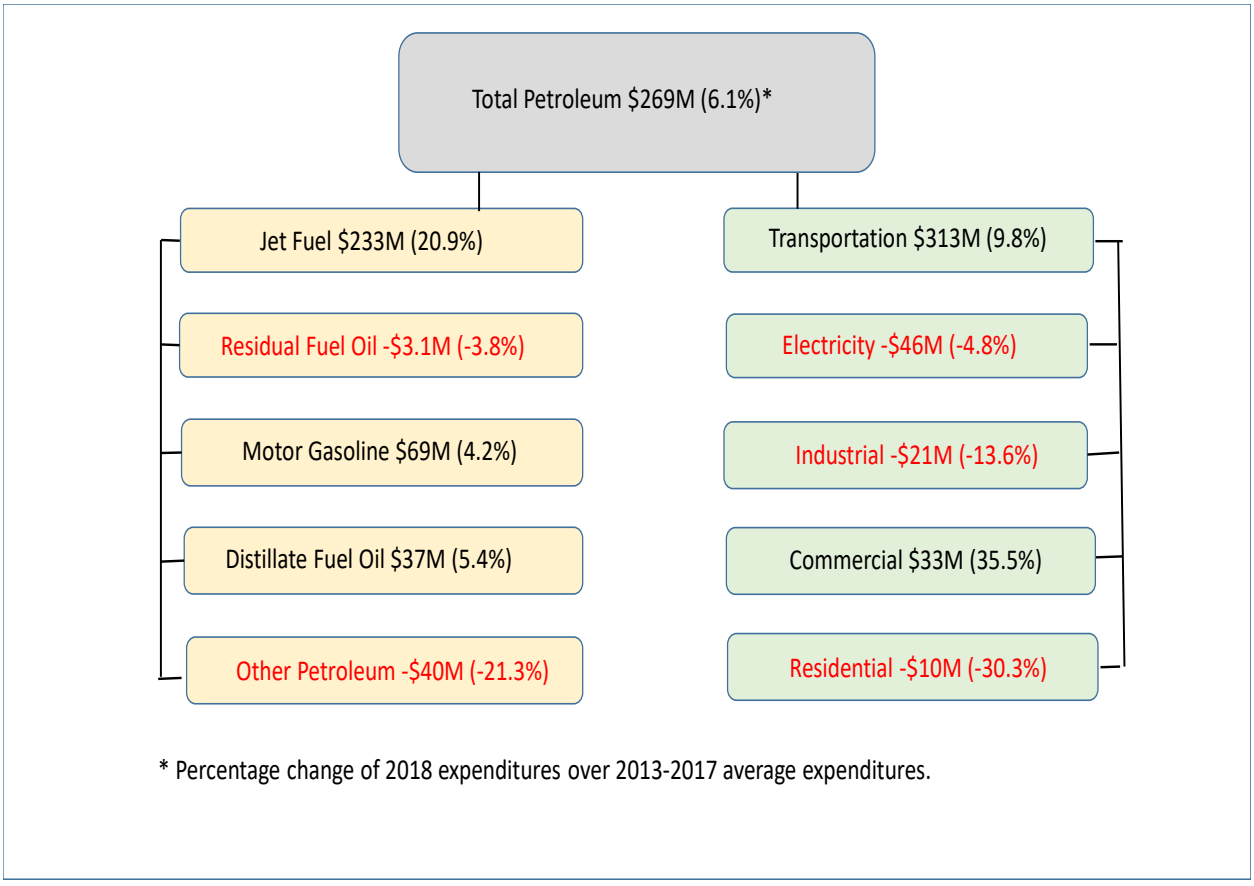
Table 6.2. Average 2013-2017 Hawaii's Petroleum Expenditures ($M)



The changes of petroleum expenditures in 2018, over the average of the previous five years, are provided in Figure 6.3. In 2018, the total petroleum expenditures in Hawaii increased $269 million or 6.1% from the average expenditures of the previous five years. The expenditures of jet fuel increased the most at $233 million or 20.9%; followed by motor gasoline at $69 million or 4.2%, and distillate fuel oil at $37 million or 5.4%. The expenditures of other petroleum decreased $40 million or 21.3%, and the expenditures of residual fuel oil decreased $3.1 million or 3.8%.

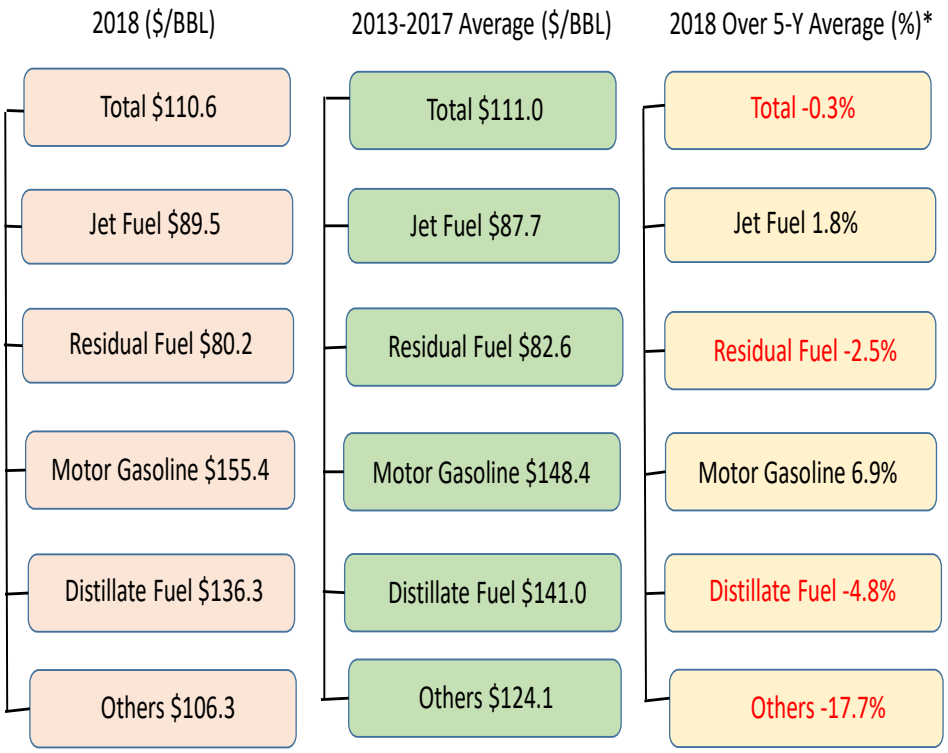
Among the five sectors, the transportation sector increased the most at $313 million or 9.8%; followed by the commercial sector at $33 million or 35.5%. The electric power sector decreased the most at $46 million or 4.8%; followed by the industrial sector at $21 million or 13.6%, and the residential sector at $10 million or 30.3%.

Table 6.3. Changes of Hawaii's Petroleum Expenditures 2018 over 2013-2017 Average



The changes of average petroleum expenditures in 2018, over the average of the previous five years, are provided in Figure 6.4. In 2018, the average total petroleum expenditure in Hawaii decreased 0.3% compared with the average of the previous five years from $111.0/BBL to $110.6/BBL. The average expenditure of other petroleum decreased the most at 17.7%; followed by distillate fuel oil at 4.8%, and residual fuel oil at 2.5%. The average expenditure of motor gasoline increased 6.9%, and the average expenditure of jet fuel increased 1.8%.

Table 6.4. Average Petroleum Expenditures in Hawaii



* Percentage change of 2018 average expenditures over 2013-2017 average expenditures.

The average petroleum expenditure by product and sector in 2018 are provided in Table 6.7. For residual fuel oil, the average expenditures in the electric power sector was the highest; followed by the transportation sector, and the industrial sector. For distillate fuel oil, the average expenditures in the transportation sector was the highest; followed by the commercial sector, industrial sector, and the electric power sector.

Table 6.7. 2018 Hawaii's Average Petroleum Expenditures by Product and Sector

			Units: $/BBL			
Product	Residential	Commercial	Industrial	Transportation	Electric	Total
Total Petroleum	189.9	96.6	92.1	120.6	86.4	110.6
Jet Fuel	NA	NA	NA	89.5	NA	89.5
Residual Fuel Oil	NA	NA	37.1	72.3	83.4	80.2
Motor Gasoline	NA	155.6	155.5	155.4	NA	155.4
Distillate Fuel Oil	NA	105.5	101.5	174.4	97.8	136.3
Other Petroleum	189.9	68.0	100.0	356.5	NA	106.3
LPG/HGL	189.9	68.0	43.4	NA	NA	80.3
Asphalt and Road Oil	NA	NA	90.7	NA	NA	90.7
Lubricants	NA	NA	442.3	434.9	NA	437.1
Aviation Gasoline	NA	NA	NA	131.8	NA	131.8

Source: Energy Information Administration, State Energy Data System