

## Section 17

# ENERGY AND SCIENCE

This section presents statistics on energy production and consumption, the electric and gas utility industries, and research and development and scientific resources.

Total energy consumption in 1979 amounted to 271 trillion British thermal units, compared with 204 trillion BTU a decade earlier. Transportation accounted for 58 percent of the 1979 total.

Electricity sales exceeded 6.4 billion kilowatt-hours in 1981, a total that has doubled since 1968. Manufactured gas sales reached 32.4 million therms in 1981, nine percent below the figure five years earlier. Residential rates in 1981 averaged 11.6 cents per kilowatt-hour and \$1.73 per therm, both well above the corresponding rates only a few years earlier. Average residential use (7,002 kWh and 227 therms in 1981) has declined significantly in recent years. By 1981, almost seven percent of the housing units in the State had solar heating devices.

The liquid fuel tax base for 1981 was approximately 918 million gallons, compared with 825 million in 1974 and 755 million in 1970. The 1981 total included 306 million gallons of gasoline, 490 million of aviation fuel, and 117 million of diesel oil. The average price for unleaded gasoline rose from 69.6 cents per gallon in January 1976 to \$1.633 six years later, then fell to \$1.544 by May 1982.

The State is well served with scientific resources. A 1976 inventory reported 384 companies and agencies with research or scientific capabilities. Employment in these organizations was more than 34,000. Federal research and development obligations in Hawaii exceeded \$42 million in 1980. Forty-nine patents were granted to Hawaii residents in 1981.

Information on energy and science can be obtained from reports and records of the U.S. Department of Energy, U.S. Patent and Trademark Office, National Science Foundation, Hawaii State Department of Taxation, Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy (formerly the Department of Regulatory Agencies, Public Utilities Division), and individual utility companies. Detailed statistics on energy consumption appear in Hawaii Integrated Energy Assessment, Vol. IV, Energy Data Handbook, published by the State Energy Office of the Department of Planning and Economic Development in 1980. Hawaii's Scientific Resources, 1977 Directory, issued by the DPED in 1977, contains information on scientific organizations and facilities in the Islands. Historical Statistics of Hawaii, Section 19, presents data for earlier years. Data for the nation as a whole can be found in the Statistical Abstract of the United States: 1981, Sections 20 and 21.

Table 371.-- CONSUMPTION OF ENERGY, BY TYPE (PHYSICAL UNITS):  
1960 TO 1979

Year	Petroleum (1,000 barrels)	Hydro- electric power <u>1/</u> (million kWh)	Geo- thermal power <u>2/</u> (million kWh)	Wood and waste <u>2/</u> (million kWh)	Other types <u>3/</u>
1960 ....	20,754	0	0	0	0
1961 ....	24,351	0	0	0	0
1962 ....	21,990	0	0	0	0
1963 ....	22,777	23	0	0	0
1964 ....	24,328	115	0	0	0
1965 ....	25,432	105	0	0	0
1966 ....	27,100	112	0	2	0
1967 ....	30,792	108	0	0	0
1968 ....	33,793	94	0	30	0
1969 ....	35,142	100	0	29	0
1970 ....	36,124	108	0	24	0
1971 ....	38,507	89	0	15	0
1972 ....	39,535	91	0	18	0
1973 ....	40,504	95	0	22	0
1974 ....	38,366	92	0	30	0
1975 ....	38,710	89	0	25	0
1976 ....	39,169	93	0	29	0
1977 ....	42,015	86	0	26	0
1978 ....	42,015	84	0	0	0
1979 ....	45,203	90	0	0	0

1/ Includes industrial and utility production, and net imports of electricity.

2/ Consumed at utilities to produce electricity.

3/ Coal, natural gas (dry), and nuclear power.

Source: U.S. Department of Energy, Statistics Branch, State Energy Data Report, Statistical Tables and Technical Documentation, 1960 Through 1979 (September 1981), p. 111.

Table 372.-- CONSUMPTION OF ENERGY, BY TYPE (TRILLION BTU): 1960 TO 1979

Year	Total energy consumed <u>1/</u>	Petroleum	Hydro-electric power <u>2/</u>	Geo-thermal power <u>3/</u>	Wood and waste <u>3/</u>	Other types <u>4/</u>
1960	118.3	116.7	0.0	0.0	0.0	0.0
1961	137.9	137.8	0.0	0.0	0.0	0.0
1962	123.8	125.4	0.0	0.0	0.0	0.0
1963	126.9	130.2	0.2	0.0	0.0	0.0
1964	137.1	139.7	1.2	0.0	0.0	0.0
1965	144.6	146.7	1.1	0.0	0.0	0.0
1966	157.5	156.1	1.2	0.0	0.0	0.0
1967	178.7	178.0	1.1	0.0	0.0	0.0
1968	197.8	195.2	1.0	0.0	0.3	0.0
1969	204.3	201.7	1.0	0.0	0.3	0.0
1970	209.9	207.6	1.1	0.0	0.3	0.0
1971	223.6	221.1	0.9	0.0	0.2	0.0
1972	229.3	227.8	0.9	0.0	0.2	0.0
1973	236.0	233.4	1.0	0.0	0.2	0.0
1974	225.0	220.7	1.0	0.0	0.3	0.0
1975	227.9	222.8	0.9	0.0	0.3	0.0
1976	230.8	225.6	1.0	0.0	0.3	0.0
1977	244.5	242.7	0.9	0.0	0.3	0.0
1978	249.1	243.2	0.9	0.0	0.0	0.0
1979	271.3	265.2	0.9	0.0	0.0	0.0

1/ Detail may not add to indicated totals because of statistical adjustment, not shown separately.

2/ Includes industrial and utility production, and net imports of electricity.

3/ Consumed at utilities to produce electricity.

4/ Coal, natural gas (dry), and nuclear power.

Source: U.S. Department of Energy, Statistics Branch, State Energy Data Report, Statistical Tables and Technical Documentation, 1960 Through 1979 (September 1981), p. 111.

Table 373.-- CONSUMPTION OF ENERGY BY END-USE SECTOR: 1960 TO 1979

[Trillion Btu.]

Year	Total energy consumed <u>1/</u>	Residential <u>2/</u>	Commercial <u>2/</u>	Industrial <u>2/</u>	Transportation <u>2/</u>	Electric utilities <u>3/</u>
1960 ....	118.3	9.1	17.2	26.2	65.7	23.2
1961 ....	137.9	9.2	21.0	30.4	77.4	24.4
1962 ....	123.8	9.2	13.4	29.9	71.4	25.8
1963 ....	126.9	9.1	11.5	29.4	76.9	27.6
1964 ....	137.1	9.8	10.0	33.6	83.7	30.2
1965 ....	144.6	10.7	10.9	36.8	86.2	31.6
1966 ....	157.5	11.3	9.7	38.8	97.7	30.4
1967 ....	178.7	12.4	10.1	44.2	112.0	31.9
1968 ....	197.8	13.6	12.0	42.3	129.9	34.9
1969 ....	204.3	15.5	13.2	43.9	131.7	38.7
1970 ....	209.9	17.2	15.1	46.7	130.9	43.3
1971 ....	223.6	18.6	14.2	46.8	144.1	47.7
1972 ....	229.3	19.6	14.9	53.3	141.5	53.0
1973 ....	236.0	20.7	16.0	54.0	145.2	55.7
1974 ....	225.0	21.6	16.5	53.3	133.7	57.8
1975 ....	227.9	21.1	17.4	55.3	134.1	58.8
1976 ....	230.8	22.8	18.0	55.9	134.1	61.6
1977 ....	244.5	23.5	18.6	58.8	143.7	67.9
1978 ....	249.1	23.3	19.3	58.5	148.0	65.0
1979 ....	271.3	23.1	20.5	69.4	158.3	67.3

1/ Totals do not include small quantities of energy sources for which consistent historical data are not available, such as solar energy obtained by the use of thermal and photovoltaic collectors; wind energy; and geothermal, biomass, and waste energy other than that consumed at the electric utilities.

2/ Data include power from electric utilities, including electrical energy losses incurred in the generation and transmission of electricity.

3/ Energy input at electric utilities. Distributed among the other four sectors.

Source: U.S. Department of Energy, Statistics Branch, State Energy Data Report, Statistical Tables and Technical Documentation, 1960 Through 1979 (September 1981), p. 112.

Table 374.-- ELECTRIC UTILITIES: 1970 TO 1981

Year	Customers, Dec. 31			Installed capacity, Dec. 31 (kW)	Power sold (1,000 kWh)		
	Total	Residential	Other		Total	Residential	Other
1970 ..	219,003	186,282	32,721	1,007,021	3,758,094	1,270,732	2,487,362
1971 ..	226,514	193,043	33,471	1,016,350	4,167,127	1,375,308	2,791,819
1972 ..	236,309	201,903	34,406	1,135,055	4,562,568	1,493,840	3,068,728
1973 ..	246,255	210,740	35,515	1,266,600	4,867,850	1,581,855	3,285,995
1974 ..	255,901	219,633	36,268	1,419,892	5,113,906	1,635,928	3,477,928
1975 ..	263,816	226,836	36,980	1,454,359	5,334,755	1,676,438	3,658,317
1976 ..	270,035	232,070	37,965	1,454,359	5,615,209	1,750,618	3,864,592
1977 ..	275,616	237,557	38,059	1,481,680	5,831,610	1,779,314	4,052,296
1978 ..	284,064	244,863	39,201	1,487,490	6,004,891	1,799,024	4,205,867
1979 ..	293,061	252,898	40,163	1,502,840	6,197,426	1,851,457	4,345,969
1980 ..	301,544	260,358	41,186	1,514,180	6,345,531	1,852,984	4,492,547
1981 ..	305,927	265,042	40,885	1,652,380	6,424,016	1,855,837	4,568,179

  

Year	Average annual use (kWh) <u>1/</u>		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
1970 ..	6,822	76,017	.026810	.020113	84,097	34,068	50,029
1971 ..	7,124	83,410	.028229	.021493	98,849	38,823	60,026
1972 ..	7,399	89,192	.02849	.02172	109,217	42,557	66,660
1973 ..	7,506	92,524	.03077	.02367	126,449	48,680	77,769
1974 ..	7,449	95,895	.03493	.02704	151,177	57,149	94,028
1975 ..	7,391	98,927	.04586	.03794	215,677	76,885	138,792
1976 ..	7,543	101,794	.04796	.03934	235,999	83,957	152,042
1977 ..	7,490	106,474	.05222	.04408	271,553	92,917	178,636
1978 ..	7,347	107,290	.05883	.04943	313,722	105,846	207,876
1979 ..	7,321	108,208	.06420	.05424	354,595	118,862	235,733
1980 ..	7,117	109,079	.07901	.06964	459,251	146,397	312,854
1981 ..	7,002	111,732	.11563	.10605	699,031	214,584	484,447

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

Source: Hawaii State Department of Regulatory Agencies, Public Utilities Division, records.

Table 375.-- ELECTRIC UTILITIES, BY ISLANDS: 1981

County or island	Customers, Dec. 31			Installed capacity, Dec. 31 (kW)	Power sold (1,000 kWh)		
	Total	Residential	Other		Total	Residential	Other
State total	305,927	265,042	40,885	1,652,380	6,424,016	1,855,837	4,568,179
Oahu .....	218,162	191,283	26,879	1,347,000	5,276,227	1,429,139	3,847,088
Hawaii .....	36,799	30,570	6,229	124,300	447,054	183,476	263,578
Kauai .....	17,597	14,959	2,638	62,080	199,452	73,147	126,305
Maui County .....	33,369	28,230	5,139	119,000	501,283	170,075	331,208
Lanai .....	838	709	129	-	6,048	3,555	2,493
Maui .....	30,245	25,655	4,590	110,300	471,916	156,288	315,628
Molokai .....	2,286	1,866	420	8,700	23,319	10,232	13,087
County or island	Average annual use (kWh) <u>1/</u>		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
State total	7,002	111,732	0.11563	0.10605	699,031	214,584	484,447
Oahu .....	7,471	143,126	0.11364	0.10329	559,790	162,412	397,378
Hawaii .....	6,002	42,315	0.11552	0.11191	50,692	21,195	29,497
Kauai .....	4,890	47,879	0.15094	0.15096	30,107	11,040	19,067
Maui County .....	6,025	64,450	0.11722	0.11626	58,442	19,937	38,505
Lanai .....	5,015	19,325	0.12941	0.13699	802	461	341
Maui .....	6,092	68,764	0.11303	0.11252	53,178	17,664	35,514
Molokai .....	5,484	31,160	0.17708	0.20245	4,462	1,812	2,650

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

Source: Hawaii State Department of Regulatory Agencies, Public Utilities Division, records.

Table 376.-- GAS UTILITIES: 1970 TO 1981

[Excludes bottled gas.]

Year	Customers, Dec. 31			Gas sold (1,000 therms)		
	Total	Residential	Other	Total	Residential	Other
1970 ...	36,142	32,163	3,979	27,831	10,891	16,940
1971 ...	36,153	32,072	4,081	30,445	9,279	21,167
1972 ...	36,083	31,806	4,277	33,322	9,321	24,000
1973 ...	35,781	31,142	4,639	34,540	8,931	25,609
1974 ...	35,228	30,620	4,608	34,363	8,096	26,267
1975 ...	34,685	30,236	4,449	35,594	8,230	27,364
1976 ...	34,264	29,873	4,391	35,568	8,121	27,447
1977 ...	33,722	29,408	4,314	34,844	7,612	27,232
1978 ...	33,413	29,091	4,322	34,919	7,388	27,532
1979 ...	33,309	29,014	4,295	35,264	7,326	27,937
1980 ...	33,019	28,825	4,194	34,705	7,030	27,675
1981 ...	32,421	28,343	4,078	32,396	6,422	25,975

  

Year	Average annual use (therms) <u>1/</u>		Average rate (dollars per therm)		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
1970 ...	339	4,257	.3619	.2227	7,714	3,941	3,773
1971 ...	289	5,187	.3699	.2308	8,317	3,432	4,885
1972 ...	293	5,612	.36843	.22681	8,878	3,434	5,444
1973 ...	287	5,520	.37518	.23121	9,272	3,351	5,921
1974 ...	264	5,700	.68361	.52267	19,264	5,535	13,729
1975 ...	272	6,151	.81723	.63583	24,125	6,726	17,399
1976 ...	272	6,251	.82767	.63369	24,115	6,722	17,393
1977 ...	259	6,313	.85883	.65821	24,462	6,537	17,925
1978 ...	254	6,370	.91647	.71792	26,536	6,770	19,766
1979 ...	253	6,505	1.09260	.89221	32,931	8,006	24,925
1980 ...	244	6,599	1.46583	1.25951	45,162	10,305	34,857
1981 ...	227	6,369	1.72585	1.50091	50,069	11,083	38,986

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

Source: Hawaii State Department of Regulatory Agencies, Public Utilities Division, records.

Table 377.-- GAS UTILITIES, BY ISLANDS: 1981

[Excludes bottled gas.]

Island	Customers, Dec. 31			Gas sold (therms)			
	Total	Residen- tial	Other	Total	Residen- tial	Other	
State total	32,421	28,343	4,078	32,396,391	6,421,742	25,974,649	
Oahu .....	29,731	26,021	3,710	29,542,909	5,893,917	23,648,992	
Hawaii .....	2,026	1,713	313	2,138,736	386,969	1,751,767	
Kauai .....	279	279	-	67,876	67,876	-	
Maui .....	385	330	55	646,870	72,980	573,890	
Molokai .....	-	-	-	-	-	-	
Lanai .....	-	-	-	-	-	-	
Island	Average annual use (therms) <u>1/</u>		Average rate (dollars per (therm)		Revenues (\$1,000)		
	Resi- dential	Other	Resi- dential	Other	Total	Resi- dential	Other
State total	227	6,369	1.72585	1.50091	50,069	11,083	38,986
Oahu .....	227	6,374	1.75875	1.53333	46,628	10,366	36,262
Hawaii .....	226	5,597	1.38178	1.19153	2,622	535	2,087
Kauai .....	243	-	1.39359	-	95	95	-
Maui .....	221	10,434	1.20247	1.10943	724	87	637
Molokai .....	-	-	-	-	-	-	-
Lanai .....	-	-	-	-	-	-	-

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

Source: Hawaii State Department of Regulatory Agencies, Public Utilities Division, records.



Table 378.-- SERVICE PROVIDED BY HAWAIIAN ELECTRIC CO., INC., ON OAHU:  
1970 TO 1981

Year	Number of customers, Dec. 31		Net input <sup>1/</sup> (1,000 kWh)	Power sold (1,000 kWh)	Average annual residential use <sup>2/</sup> (kWh)	Average residential rate (dollars per kWh)	Installed capacity <sup>3/</sup> (kW) Dec. 31
	Total	Residential only					
1970 ..	168,531	144,854	3,494,059	3,275,673	7,478	0.02438	811,700
1971 ..	174,300	150,285	3,844,325	3,600,728	7,776	0.02555	811,700
1972 ..	180,794	156,249	4,175,342	3,942,679	8,108	0.02584	902,600
1973 ..	187,321	162,180	4,407,460	4,189,397	8,191	0.02812	1,005,200
1974 ..	194,043	168,525	4,641,204	4,393,616	8,110	0.03063	1,140,180
1975 ..	198,598	172,839	4,793,015	4,555,118	7,999	0.04313	1,140,180
1976 ..	201,974	175,581	5,038,978	4,761,592	8,102	0.04385	1,140,180
1977 ..	205,225	179,139	5,209,990	4,911,435	8,035	0.04810	1,140,180
1978 ..	209,907	183,519	5,331,724	5,025,540	7,875	0.05485	1,140,180
1979 ..	213,781	186,875	5,466,677	5,163,786	7,846	0.05813	1,140,180
1980 ..	217,142	189,771	5,525,998	5,266,522	7,661	0.07126	1,140,180
1981 ..	218,162	191,283	5,507,151	5,276,227	7,474	0.11364	1,211,410

<sup>1/</sup> Net generated plus purchased power.

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

<sup>3/</sup> Maximum generator nameplate.

Source: Hawaiian Electric Co., Inc., records.

Table 379.-- RESIDENTIAL CUSTOMERS, VACANT UNITS, AND TURN-ONS, FOR HOUSING UNITS SERVED BY THE HAWAIIAN ELECTRIC COMPANY ON OAHU: 1976 TO 1981

Year	Residential customers, December	Vacant units, Dec.		Turn-ons, annual	
		Number	Ratio <u>1/</u>	Number	Ratio <u>1/</u>
1976 ....	184,350	2,653	1.4	20,339	11.0
1977 ....	188,456	2,352	1.2	22,673	12.0
1978 ....	192,280	2,362	1.2	32,779	17.0
1979 ....	201,013	1,297	0.6	32,419	16.1
1980 ....	222,745	2,662	1.2	20,499	9.2
1981 ....	241,509	1,526	0.6	33,917	14.0

1/ Per 100 residential customers, December.  
Source: Hawaiian Electric Co., Inc., records.

Table 380.-- GAS UTILITY SERVICE BY GASCO, INC., FOR OAHU: 1971 TO 1981

Calendar year	Customers, Dec. 31		Gas sold <u>1/</u> (1,000 therms)		Average annual residential usage <u>1/</u> (therms)
	Total	Residential	Total	Residential	
1971 ...	33,691	29,621	29,082	8,290	280
1972 ...	33,479	29,256	31,643	8,258	282
1973 ...	33,142	28,813	32,610	8,041	279
1974 ...	32,455	28,200	32,166	7,522	267
1975 ...	31,856	27,778	32,885	7,600	274
1976 ...	31,443	27,429	32,649	7,490	276
1977 ...	30,926	26,993	31,831	7,007	260
1978 ...	30,659	26,722	31,842	6,797	254
1979 ...	30,582	26,686	32,135	6,736	252
1980 ...	30,471	26,625	31,636	6,455	242
1981 ...	30,019	26,201	29,543	5,893	225

1/ Includes liquefied petroleum gas.  
Source: Gasco, Inc., records.

Table 381.-- TYPICAL RESIDENTIAL UTILITY MONTHLY RATES, BY ISLANDS:  
JANUARY 1982

[In dollars.]

Utility and monthly use	Oahu	Hawaii <sup>1/</sup>	Kauai	Maui	Molokai	Lanai
<b>Water:</b>						
5/8-inch meter, 5,000 gal. ....	6.70	7.25	4.50	7.95	7.95	3.45
5/8-inch meter, 10,000 gal. ...	10.90	10.80	7.00	11.90	11.90	5.65
1-inch meter, 20,000 gal. ....	19.30	21.40	15.00	28.05	28.05	11.30
1-1/2-inch meter, 50,000 gal. .	44.50	48.20	35.00	65.25	65.25	27.00
<b>Electricity: <sup>2/</sup></b>						
250 kilowatt-hours .....	33.57	33.54	43.18	33.48	49.90	36.98
500 kilowatt-hours .....	62.13	59.09	81.36	59.76	93.33	66.75
750 kilowatt-hours .....	90.70	84.63	119.54	86.09	136.78	96.58
1,000 kilowatt-hours .....	119.26	110.17	157.71	112.91	180.22	126.90
<b>Gas: <sup>2/</sup></b>						
10 therms .....	19.20	16.75	17.11	14.50	...	...
25 therms .....	39.00	34.38	35.28	28.75	...	...
50 therms .....	72.00	63.75	65.55	52.50	...	...
100 therms .....	138.00	122.50	126.10	100.00	...	...
<b>Telephone: <sup>3/</sup></b>						
Individual line .....	11.40	10.20	9.70	9.70	8.30	7.50
Two-party line .....	9.35	8.55	8.20	8.20	7.05	6.40

<sup>1/</sup> Water rates are those for all districts except Kaloko Mauka Subdivision System.

<sup>2/</sup> Includes fuel adjustment surcharge.

<sup>3/</sup> Excludes federal excise tax (1 percent for 1982).

Source: Hawaii State Department of Regulatory Agencies, Public Utilities Division; Honolulu Board of Water Supply; Hawaii County Department of Water Supply; Kauai County Department of Water; Maui County Department of Water Supply; Dole Company, Lanai City.

Table 382.-- LIQUID FUEL TAX BASE: 1971 TO 1981

[In thousands of gallons.]

Year reported <u>1/</u>	All types	Gasoline	Diesel oil	
			Non-hwy.	Hwy. use
1971 .....	809,628	250,191	57,405	8,852
1972 .....	827,825	261,452	65,163	9,523
1973 .....	882,932	281,122	74,608	11,159
1974 .....	824,653	270,267	75,124	11,539
1975 .....	839,289	284,552	75,120	12,710
1976 .....	850,261	295,704	79,884	13,561
1977 .....	888,136	311,409	85,484	13,817
1978 .....	917,380	324,702	99,755	15,233
1979 .....	960,837	324,337	108,460	16,596
1980 .....	939,766	312,896	101,719	17,765
1981 .....	918,437	305,886	101,212	15,771

  

Year reported <u>1/</u>	Liq. pet. gas		Aviation fuel	Small boats	
	Off-hwy.	Hwy. use		Gasoline	Diesel oil
1971 .....	1,044	579	489,767	231	1,559
1972 .....	1,231	702	487,743	264	1,747
1973 .....	1,909	453	511,502	280	1,899
1974 .....	2,093	789	463,728	312	801
1975 .....	1,823	1,380	462,384	411	908
1976 .....	1,858	1,054	456,819	464	917
1977 .....	2,036	1,280	472,654	558	899
1978 .....	1,821	1,216	473,270	445	938
1979 .....	2,213	1,140	506,825	410	856
1980 .....	2,448	1,140	502,544	338	917
1981 .....	2,378	1,136	489,551	424	2,079

1/ Liquid fuel sold in a given month is usually reported the following month. Annual totals accordingly refer to fuel sold during a 12-month period ended November 30.

Source: Hawaii State Department of Taxation, "Liquid Fuel Tax Base, Collections & Distribution" (annual report).

Table 383.-- FUEL OIL AND KEROSENE DELIVERIES: 1979 AND 1980

[Thousands of barrels.]

Use	Distillate fuel oil		Residual fuel oil		Kerosene	
	1979	1980	1979	1980	1979 <u>1/</u>	1980
Total .....	5,957	5,962	12,599	13,234	40	9
Heating and industrial ...	750	876	335	338	12	-
Residential .....	2	1	-	-	-	-
Commercial .....	259	396	16	25	6	-
Industrial .....	170	106	319	313	-	-
Farm .....	319	373	-	-	6	-
Oil company .....	581	196	379	929	-	-
Electric utility .....	278	886	10,407	10,271	-	-
Military .....	3,385	2,840	25	49	-	-
Railroad .....	2	22	-	-	-	-
Vessel bunkering .....	38	26	1,237	1,395	-	-
On-highway .....	399	428	-	-	-	-
Off-highway .....	182	237	-	-	-	-
Other .....	342	451	216	252	28	9

1/ Revised from 1981 edition, table 374.

Source: U.S. Department of Energy, Energy Information Administration, "Deliveries of Fuel Oil and Kerosene in 1980," Energy Data Reports, DOE/EIA-0113(80), February 11, 1982.

Table 384.-- GASOLINE AVERAGE PRICES PER GALLON, FOR OAHU:  
1973 TO 1982

[In dollars. Average prices include all applicable federal, state,  
and county taxes.]

Date	All types <u>1/</u>	Leaded regular <u>2/</u>	Unleaded regular <u>3/</u>	Leaded premium <u>2/</u>
1973: Oct. ....	...	0.452	...	0.487
Dec. ....	...	.477	...	.512
1974: June ....	...	.599	...	.632
Dec. ....	...	.599	...	.629
1975: June ....	...	.673	...	.710
Dec. ....	...	.691	...	.733
1976: Jan. ....	...	.685	0.696	.727
June ....	...	.684	.692	.720
Dec. ....	...	.702	.714	.743
1977: June ....	...	.723	.738	.764
Dec. ....	...	.722	.743	.768
1978: June ....	...	.741	.772	.798
Revised series <u>4/</u>				
1978: June ....	0.778	.761	.765	.793
Dec. ....	.804	.778	.791	.821
1979: June ....	.957	.922	.956	.970
Dec. ....	1.150	1.087	1.164	1.175
1980: June ....	1.352	1.310	1.350	1.383
Dec. ....	1.407	1.348	1.413	1.441
1981: June ....	1.580	1.508	1.588	1.619
Dec. ....	1.584	1.520	1.586	1.621
1982: June ....	1.512	1.454	1.511	1.556

1/ Includes types not shown separately. Not calculated before June 1978.

2/ Survey initiated October 1973.

3/ Survey initiated January 1976.

4/ Not directly comparable to earlier data.

Source: U.S. Bureau of Labor Statistics, Retail Prices and Indexes of Fuels and Utilities (monthly, 1973-1978), Consumer Prices: Energy (monthly, 1979-forward), and printouts for 1978-1979; Hawaii State Department of Planning and Economic Development, Gasoline Prices in Hawaii, 1920-1980 (Statistical Report 140, August 7, 1980), table 2.

Table 385.-- GASOLINE SERVICE STATIONS: 1977

[Data are shown only for establishments with payroll.]

Subject	State total	Oahu only
Number of establishments .....	381	276
Offering self-service sale of gasoline ....	55	47
Offering sale of diesel fuel .....	23	(NT)
Sales (\$1,000) .....	172,799	131,285
Gallon sales (1,000):		
Gasoline, total .....	191,781	146,086
Through self-service .....	18,578	16,308
Other automotive fuels .....	3,734	3,548
Pumps, Dec. 31:		
Gasoline, total .....	2,006	1,595
Self-service .....	166	147
Other automotive fuel .....	40	23

NT Not tabulated.

Source: U.S. Bureau of the Census, 1977 Census of Retail Trade, RC77-S-2, Miscellaneous Subjects (October 1980), tables 2, 3, 4, 5, and 6.

Table 386.-- BUNKER OIL LADEN IN HONOLULU CUSTOMS DISTRICT ON VESSELS  
ENGAGED IN FOREIGN TRADE: 1977 TO 1981

[In barrels of 42 gallons.]

Year	Total	American vessels		Foreign vessels	
		Fuel oil	Diesel oil	Fuel oil	Diesel oil
1977 ....	1,728,413	241,964	35,068	376,207	1,075,174
1978 ....	2,049,939	261,467	18,943	632,127	1,137,402
1979 ....	1,550,905	111,171	66,414	464,493	908,827
1980 <u>1/</u> .	1,248,161	77,410	59,117	483,817	627,817
1981 <u>1/</u> .	1,076,215	39,249	43,170	199,938	793,858

1/ Includes fuel oil laden aboard lighters for transfer to supertankers anchored outside U.S. ports limits for use as tankers.

Source: U.S. Bureau of the Census, United States Foreign Trade, Bunker Fuels, Annual 1977 (FT810-77-13, May 1978), Annual 1978 (FT810-78-13, July 1979), Annual 1979 (FT810-79-13, May 1980), Annual 1980 (FT810-80-13, May 1981), and Annual 1981 (FT810-81-13, March 1982).

Table 387.-- BOILERS AND PRESSURE VESSELS: DECEMBER 31, 1980

Island	Power boilers	Heating boilers	Pressure vessels <u>1/</u>
State total .....	674	2,657	4,746
Hawaii .....	73	237	729
Maui .....	63	208	450
Lanai .....	3	2	26
Molokai .....	4	30	22
Oahu .....	478	2,063	3,262
Kauai .....	53	117	257

1/ Five cubic feet or more.

Source: Hawaii State Department of Labor and Industrial Relations, Division of Occupation Safety and Health, records.



Table 388.-- ENERGY GENERATED, PURCHASED, SOLD AND USED BY  
RAW SUGAR FACTORIES, BY ISLANDS: 1980

Subject	State total	Hawaii	Kauai	Maui	Oahu
Electricity (millions of kilowatt-hours)					
Generated .....	693.62	285.03	122.95	191.15	94.49
Purchased .....	72.49	5.29	3.33	5.02	58.85
Sold .....	247.55	165.07	26.77	54.36	1.35
Used <u>1/</u> .....	518.56	125.25	99.51	141.81	151.99
Gross heat values of boiler fuels (billions of Btu's)					
All fuels .....	26,390	10,942	4,885	6,415	4,148
Bagasse .....	23,731	9,911	4,767	5,604	3,449
Fuel oil .....	2,128	985	118	782	243
Other fuels .....	531	46	-	29	456

1/ Includes transmission losses and electricity used to operate power plant auxiliaries.

Source: Hawaiian Sugar Planters' Association, Energy Inventory for Hawaiian Sugar Factories--1980 (Hawaiian Planters' Record, Vol. 59, No. 10, 1981), pp. 224-227.

Table 389.-- PURCHASED FUELS AND ELECTRIC ENERGY USED FOR HEAT AND POWER  
BY MANUFACTURING ESTABLISHMENTS: 1978 AND 1979

Industry group	British thermal units (trillions)		Cost (million dollars)	
	1979	1978	1979	1978
All manufacturing .....	12.9	9.7	52.9	36.4
Food and kindred products .....	5.2	5.8	20.6	18.4
Preserved fruits and vegetables ...	.9	.9	4.0	3.1
Sugar, confectionery products .....	3.1	4.0	11.4	11.5
Printing and publishing .....	.2	(D)	1.1	(D)

D Withheld to avoid disclosure of information pertaining to a specific organization.

Source: U.S. Bureau of the Census, 1979 Annual Survey of Manufactures, Fuels and Electric Energy Consumed, M79(AS)-4.2 (February 1982), pp. 40-41.

Table 390.-- OCCUPIED HOUSING UNITS WITH SOLAR HEATING  
DEVICES, BY COUNTIES: 1981

[Based on a sample survey of 6,654 occupied units.]

County	Number	Percent
State total .....	19,292	6.8
Honolulu .....	12,197	5.4
Hawaii .....	1,848	6.3
Kauai .....	1,847	17.8
Maui .....	3,400	16.9

Source: Unpublished data from Hawaii State Department of Health, Hawaii Health Surveillance Program, compiled for Hawaii State Department of Planning and Economic Development, Division of Energy.

Table 391.-- FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT  
IN HAWAII: 1969 TO 1980

[Millions of dollars. For fiscal years ended June 30 through  
1976 and September 30 thereafter.]

Fiscal year	Total federal R&D obligations	Federal obligations for R&D plant
1969 .....	37.7	0.8
1970 .....	43.8	.5
1971 .....	38.3	2.2
1972 .....	47.4	.9
1973 .....	47.9	.4
1974 .....	53.1	.4
1975 .....	43.0	6.2
1976 .....	45.5	2.8
1977 .....	36.9	.5
1978 .....	44.6	.7
1979 .....	40.8	.5
1980 .....	42.6	.2

Source: National Science Foundation, Federal Funds for  
Research and Development: Fiscal Years 1980, 1981, and 1982,  
Vol. XXX, NSF 81-325, pp. 178-179.

Table 392.-- R&D EXPENDITURES AT UNIVERSITIES  
AND COLLEGES: 1972 TO 1980

[Thousands of dollars.]

Fiscal year	Total R&D expenditures	Federally financed R&D expenditures
1972 .....	23,520	13,725
1973 .....	24,846	15,382
1974 .....	21,143	14,065
1975 .....	24,596	15,540
1976 .....	28,049	17,578
1977 .....	28,900	17,945
1978 <sup>1/</sup> .....	31,971	19,781
1979 .....	35,703	22,500
1980 .....	40,593	25,833

<sup>1/</sup> Data were collected only from doctorate-granting institutions.

Source: National Science Foundation, Academic Science, R&D Funds, Fiscal Year 1980, NSF 82-300, pp. 13-14.

Table 393.-- PATENTS ISSUED TO HAWAII  
RESIDENTS: 1973 TO 1981

[Unless otherwise indicated, data include design, plant, and reissue patents.]

Year ended --	Patents
1973: Dec. 31 <sup>1/</sup> .....	50
1974: June 30 .....	55
1975: June 30 .....	61
1976: June 30 .....	51
1977: Sept. 30 .....	43
1978: Sept. 30 .....	41
1979: Sept. 30 .....	32
1980: Sept. 30 .....	32
1981: Sept. 30 .....	49

<sup>1/</sup> Excludes reissue patents.

Source: U.S. Department of Commerce, Patent and Trademark Office, Commissioner of Patents and Trademarks Annual Report, Fiscal Year 1979, p. 31, and Fiscal Year 1981, p. 41.