

Section 17

ENERGY AND SCIENCE

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

Total energy consumption in 1981 amounted to 237 trillion British thermal units, compared with 219 trillion BTU a decade earlier. Transportation accounted for 52 percent of the 1981 total.

Electricity sales exceeded 6.3 billion kilowatt-hours in 1982, a total that has doubled since 1968. Manufactured gas sales reached 32.2 million therms in 1982, eight percent below the figure five years earlier. Residential rates in 1982 averaged 12.3 cents per kilowatt-hour and \$1.73 per therm, both well above the corresponding rates only a few years earlier. Average residential use (6,654 kWh and 218 therms in 1982) 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 1982 was approximately 893 million gallons, compared with 825 million in 1974 and 755 million in 1970. The 1982 total included 309 million gallons of gasoline, 474 million of aviation fuel, and 106 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 \$1.450 by June 1983.

The State is well served with scientific resources. A 1976 inventory by DPED 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 approached \$50 million in 1981. Thirty-one patents were granted to Hawaii residents in 1982.

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 and its 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: 1982-83, Sections 20 and 21.

Table 413.-- CONSUMPTION OF ENERGY, BY SOURCE (PHYSICAL UNITS):
1960 TO 1981

[Revised from Data Book 1982, table 371.]

Year	Petroleum (1,000 barrels)	Hydro- electric power 1/ (million kWh)	Geo- thermal power 2/ (million kWh)	Wood and waste 2/ (million kWh)	Natural gas (dry) (billion cubic feet)	Other types 3/
1960	14,495	27	0	0	0	0
1961	17,595	24	0	0	0	0
1962	16,250	20	0	0	0	0
1963	20,953	23	0	0	0	0
1964	22,689	115	0	0	0	0
1965	23,731	105	0	0	0	0
1966	26,235	112	0	2	0	0
1967	29,938	108	0	0	0	0
1968	33,194	94	0	30	0	0
1969	34,644	100	0	29	0	0
1970	35,591	108	0	24	0	0
1971	38,077	89	0	15	0	0
1972	39,140	91	0	18	0	0
1973	39,974	95	0	22	0	0
1974	37,937	92	0	30	0	0
1975	38,231	89	0	25	0	0
1976	38,879	93	0	29	0	0
1977	40,755	86	0	26	0	0
1978	41,260	84	0	0	0	0
1979	45,476	90	0	0	0	0
1980	45,249	86	0	0	0	0
1981	40,519	80	0	15	3	0

1/ Includes only utility production for 1960-1963 and industrial and utility production for 1964 and thereafter.

2/ Consumed at utilities to produce electricity.

3/ Coal and nuclear power.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data Report, 1960 Through 1981 (June 1983), p. 111.

Table 414.-- CONSUMPTION OF ENERGY, BY SOURCE (TRILLION BTU):
1960 TO 1981

[Revised from Data Book 1982, table 372.]

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	80.0	79.7	0.3	0.0	0.0	0.0
1961	98.2	98.0	0.3	0.0	0.0	0.0
1962	91.0	90.8	0.2	0.0	0.0	0.0
1963	120.0	119.8	0.2	0.0	0.0	0.0
1964	131.3	130.1	1.2	0.0	0.0	0.0
1965	137.7	136.6	1.1	0.0	0.0	0.0
1966	152.0	150.8	1.2	0.0	(Z)	0.0
1967	173.5	172.4	1.1	0.0	0.0	0.0
1968	192.5	191.2	1.0	0.0	0.3	0.0
1969	199.8	198.4	1.0	0.0	0.3	0.0
1970	205.4	204.0	1.1	0.0	0.3	0.0
1971	219.2	218.1	0.9	0.0	0.2	0.0
1972	225.9	224.7	0.9	0.0	0.2	0.0
1973	230.8	229.6	1.0	0.0	0.2	0.0
1974	218.9	217.6	1.0	0.0	0.3	0.0
1975	220.8	219.6	0.9	0.0	0.3	0.0
1976	224.7	223.4	1.0	0.0	0.3	0.0
1977	236.1	235.0	0.9	0.0	0.3	0.0
1978	239.0	238.2	0.9	0.0	0.0	0.0
1979	261.3	260.4	0.9	0.0	0.0	0.0
1980	260.8	259.9	0.9	0.0	0.0	0.0
1981	237.2	233.2	0.8	0.0	0.2	3.0

Z Represents small, non-zero value.

1/ Totals may not equal sum of components due to independent rounding.

2/ Includes industrial and utility production.

3/ Consumed at utilities to produce electricity.

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

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data Report, 1960 Through 1981 (June 1983), p. 111.

Table 415.-- CONSUMPTION OF ENERGY BY END-USE SECTOR: 1960 TO 1981

[Trillion Btu. Revised from Data Book 1982, table 373.]

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	80.0	0.3	1.1	14.3	64.2	0.3
1961	98.2	0.4	1.2	20.4	76.2	0.3
1962	91.0	0.5	1.2	20.9	68.4	0.2
1963	120.0	8.9	6.0	31.2	73.9	24.2
1964	131.3	9.6	6.6	34.2	80.9	26.7
1965	137.7	10.1	6.7	37.0	83.8	27.6
1966	152.0	10.8	7.3	38.4	95.4	29.7
1967	173.5	12.1	8.0	43.2	110.3	31.3
1968	192.5	13.1	8.8	42.4	128.3	35.0
1969	199.8	14.9	9.8	44.5	130.6	38.7
1970	205.4	16.4	11.5	47.7	129.8	43.2
1971	219.2	17.8	11.4	46.7	143.3	47.7
1972	225.9	19.6	12.7	52.9	140.6	54.1
1973	230.8	20.0	13.4	52.7	144.6	55.6
1974	218.9	20.3	13.3	52.9	132.4	57.5
1975	220.8	19.6	13.8	53.9	133.6	58.8
1976	224.7	21.3	15.3	54.4	133.7	62.5
1977	236.1	21.8	16.8	56.3	141.3	65.2
1978	239.0	21.8	17.4	55.3	144.6	66.8
1979	261.3	22.9	18.1	63.9	156.4	67.7
1980	260.8	21.9	19.1	73.2	146.7	69.7
1981	237.2	23.0	18.8	71.4	123.9	69.9

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, Energy Information Administration, State Energy Data Report, 1960 Through 1981 (June 1983), p. 112.

Table 416.-- SOURCES OF ENERGY CONSUMPTION, BY COUNTIES:
1981

Subject	State total	City and County of Honolulu	Hawaii County	Kauai County	Maui County
Trillion BTU ...	263.9	213.7	21.2	9.7	19.3
Percent	100.0	100.0	100.0	100.0	100.0
Aviation fuel	33.6	41.0	2.6	0.7	1.5
Biomass <u>1/</u> ...	4.6	0.7	24.2	25.8	14.7
Gasoline	14.2	12.5	22.3	20.7	20.6
Gas <u>2/</u>	2.0	2.3	1.3	0.1	0.5
Diesel	9.2	9.2	7.4	4.1	12.9
Residual	6.0	6.5	3.3	3.7	4.7
Electricity <u>3/</u>	30.4	27.8	38.9	44.9	45.1

1/ Biomass is used for process steam, primarily on sugar plantations.

2/ Includes liquid petroleum gas (LPG).

3/ Includes primarily residual/diesel oils, biomass, hydropower resources used for electric generation.

Source: Hawaii State Department of Planning and Economic Development, State Energy Plan Technical Reference Document (October 1982), p. III-25.

Table 417.-- ELECTRIC UTILITIES: 1972 TO 1982

Year	Customers, Dec. 31			Installed capacity, Dec. 31 (kW)	Power sold (1,000 kWh)		
	Total	Residential	Other		Total	Residential	Other
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
1982 ..	313,009	270,712	42,297	1,644,980	6,332,707	1,801,297	4,531,410

Year	Average annual use (kWh) ^{1/}		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
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
1982 ..	6,654	107,133	.12348	.11061	732,622	222,423	501,199

^{1/} Based on number of customers at end of year.

Source: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy, records.

Table 418.-- ELECTRIC UTILITIES, BY ISLANDS: 1982

County or island	Customers, Dec. 31			Installed capacity, Dec. 31 (kW)	Power sold (1,000 kWh)		
	Total	Residential	Other		Total	Residential	Other
State total	313,009	270,712	42,297	1,644,980	6,332,707	1,801,297	4,531,410
Oahu	222,636	194,468	28,168	1,347,000	5,173,535	1,371,293	3,802,243
Hawaii	37,868	31,648	6,220	116,900	452,233	183,946	268,287
Kauai	18,106	15,445	2,661	62,080	200,865	73,845	127,019
Mauai County	34,399	29,151	5,248	119,000	506,074	172,213	333,861
Lanai	881	718	163	-	5,948	3,503	2,445
Maui	31,177	26,512	4,665	110,300	476,873	158,700	318,173
Molokai	2,341	1,921	420	8,700	23,253	10,010	13,243
County or island	Average annual use (kWh) ^{1/}		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
State total	6,654	107,133	0.12348	0.11061	723,622	222,423	501,199
Oahu	7,052	134,984	0.12063	0.10697	572,136	165,415	406,722
Hawaii	5,812	43,133	0.11823	0.11427	52,406	21,749	30,657
Kauai	4,781	47,734	0.15204	0.15286	30,643	11,227	19,416
Mauai County	5,908	63,617	0.13955	0.13300	68,437	24,032	44,404
Lanai	4,878	14,998	0.15593	0.16035	938	546	392
Maui	5,986	68,204	0.13447	0.12850	62,224	21,340	40,884
Molokai	5,211	31,531	0.21437	0.23624	5,275	2,146	3,128

^{1/} Based on number of customers at end of year.

Source: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy, records.

Table 419.-- GAS UTILITIES: 1972 TO 1982

[Excludes bottled gas.]

Year	Customers, Dec. 31			Gas sold (1,000 therms)			
	Total	Residential	Other	Total	Residential	Other	
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	
1982 ...	32,905	28,979	3,926	32,224	6,329	25,895	
Year	Average annual use (therms) <u>1/</u>		Average rate (dollars per therm)		Revenues (\$1,000)		
	Residen- tial	Other	Residen- tial	Other	Total	Residen- tial	Other
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
1982 ...	218	6,596	1.73311	1.43891	48,229	10,969	37,260

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

Source: Hawaii State Department of Commerce and Consumer Affairs,
Division of Consumer Advocacy, records.

Table 420.— GAS UTILITIES, BY ISLANDS: 1982

[Excludes bottled gas.]

Island	Customers, Dec. 31			Gas sold (therms)			
	Total	Residen- tial	Other	Total	Residen- tial	Other	
State total	32,905	28,979	3,926	32,223,724	6,328,871	25,894,853	
Oahu	30,221	26,665	3,556	29,306,759	5,765,046	23,541,713	
Hawaii	2,020	1,703	317	2,169,675	427,308	1,742,367	
Kauai	276	276	-	64,946	64,946	-	
Maui	388	335	53	682,344	71,571	610,773	
Molokai	-	-	-	-	-	-	
Lanai	-	-	-	-	-	-	
Island	Average annual use (therms) ^{1/}		Average rate (dollars per therm)		Revenues (\$1,000)		
	Resi- dential	Other	Resi- dential	Other	Total	Resi- dential	Other
State total	218	6,596	1.73311	1.43891	48,229	10,969	37,260
Oahu	216	6,620	1.76622	1.45999	44,553	10,183	34,371
Hawaii	251	5,496	1.38997	1.24846	2,769	594	2,175
Kauai	235	-	1.49573	-	97	97	-
Maui	214	11,524	1.33004	1.16971	810	95	714
Molokai	-	-	-	-	-	-	-
Lanai	-	-	-	-	-	-	-

^{1/} Based on number of customers at end of year.

Source: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy, records.

Table 421.-- SERVICE PROVIDED BY HAWAIIAN ELECTRIC CO., INC., ON OAHU:
1972 TO 1982

Year	Number of customers, Dec. 31		Net input 1/ (1,000 kWh)	Power sold (1,000 kWh)	Average annual residential use 2/ (kWh)	Average residential rate (dollars per kWh)	Installed capacity 3/ (kW) Dec. 31
	Total	Residential only					
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	1,275,160
1982 ..	222,636	194,468	5,441,941	5,164,332	7,068	0.12066	1,275,160

1/ Net generated plus purchased power.

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

3/ Maximum generator nameplate. Figure for 1981 revised from Data Book 1982, table 378.

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

Table 422.-- RESIDENTIAL CUSTOMERS, VACANT UNITS, AND TURN-ONS, FOR HOUSING UNITS SERVED BY THE HAWAIIAN ELECTRIC COMPANY ON OAHU: 1977 TO 1982

Year	Residential customers, December	Vacant units, Dec.		Turn-ons, annual	
		Number	Ratio <u>1/</u>	Number	Ratio <u>1/</u>
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 <u>2/</u> .	232,745	2,662	1.1	20,499	8.8
1981	241,509	1,526	0.6	33,917	14.0
1982 <u>3/</u> .	227,506	1,366	0.6	20,581	9.0

1/ Per 100 residential customers, December.

2/ Revised from Data Book 1982, table 379.

3/ Data not directly comparable to earlier years.

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

Table 423.-- GAS UTILITY SERVICE BY GASCO, INC., FOR OAHU: 1972 TO 1982

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	
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
1982 ...	30,221	26,665	29,307	5,765	216

1/ Includes liquefied petroleum gas.

Source: Gasco, Inc., records.

Table 424.-- TYPICAL RESIDENTIAL UTILITY MONTHLY RATES, BY ISLANDS:
JANUARY 1, 1983

[In dollars.]

Utility and monthly use	Oahu	Hawaii ^{1/}	Kauai	Maui	Molokai	Lanai
Water: ^{2/}						
5/8-inch meter, 5,000 gal.	5.45	8.20	7.60	7.95	7.95	4.00
5/8-inch meter, 10,000 gal. ...	9.65	12.35	11.20	11.90	11.90	6.75
1-inch meter, 20,000 gal.	18.05	24.65	20.40	27.30	27.30	13.50
1-1/2-inch meter, 50,000 gal. .	43.25	55.80	48.00	64.00	64.00	32.50
Electricity: ^{3/}						
250 kilowatt-hours	28.54	33.48	41.91	36.33	66.37	43.43
500 kilowatt-hours	52.08	58.96	78.81	67.66	124.25	81.83
750 kilowatt-hours	75.62	84.44	115.72	98.99	182.12	120.25
1,000 kilowatt-hours	99.16	109.92	152.62	130.32	240.00	158.66
Gas: ^{3/}						
10 therms	21.95	18.76	19.13	18.87	...	...
25 therms	45.88	39.40	40.33	39.68	...	...
50 therms	85.75	73.80	75.65	74.35	...	...
100 therms	165.50	142.60	146.30	143.70	...	...
Telephone: ^{4/}						
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

^{1/} Water rates are those for all districts except Kaloko Mauka Subdivision System, gas rates are for district of South Hilo.

^{2/} Oahu data shown here are not comparable to the 1982 Oahu rates in the Data Book 1982, table 381, which were bimonthly rather than monthly.

^{3/} Includes fuel adjustment and customer charge.

^{4/} Excludes federal excise tax (3 percent for 1983).

Source: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy; 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 425.-- LIQUID FUEL TAX BASE: 1972 TO 1982

[In thousands of gallons.]

Year reported <u>1/</u>	All types	Gasoline	Diesel oil	
			Non-hwy.	Hwy. use
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
1982	893,288	308,600	88,312	17,303

Year reported <u>1/</u>	Liq. pet. gas		Aviation fuel	Small boats	
	Off-hwy.	Hwy. use		Gasoline	Diesel oil
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
1982	2,628	960	474,477	207	802

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 and Distribution" (annual report).

Table 426.-- LIQUID FUEL TAX BASE, BY COUNTIES: 1982

[In thousands of gallons.]

Type of fuel	State total	City and Co. of Honolulu	County of Maui	County of Hawaii	County of Kauai
Total	893,288	745,996	64,898	56,740	25,653
Gasoline	308,600	224,862	29,899	38,212	15,627
Diesel oil, non-hwy.	88,312	39,705	28,518	11,164	8,924
Diesel oil, hwy. use	17,303	11,362	2,947	2,354	640
Liq. pet. gas, off hwy. ..	2,628	2,033	219	309	66
Liq. pet. gas, hwy. use ..	960	744	65	117	33
Small boats, gasoline	207	157	1	48	1
Small boats, diesel oil ..	802	718	2	78	3
Aviation fuel	474,477	466,416	3,248	4,457	357

Source: Hawaii State Department of Taxation, "Liquid Fuel Tax Base, Collections and Distribution, Year Ending December 31, 1982" (annual release).

Table 427.-- FUEL OIL AND KEROSENE DELIVERIES: 1982 AND 1981

[Thousands of barrels.]

Use	Distillate fuel oil		Residual fuel oil		Kerosene	
	1982	1981	1982	1981	1982	1981
Total	4,570	6,043	13,323	13,311	-	-
Residential	-	1	-	-	-	-
Commercial	55	178	110	55	-	-
Industrial	83	107	254	290	-	-
Farm	408	450	-	-	-	-
Oil company	219	163	1,627	782	-	-
Electric utility	618	789	9,897	10,471	-	-
Military	2,102	3,193	240	127	-	-
Railroad	15	10	-	-	-	-
Vessel bunkering	65	66	860	1,116	-	-
On-highway	415	423	-	-	-	-
Off-highway	154	235	-	-	-	-
Other	436	428	335	470	-	-

Source: Energy Information Administration, Petroleum Supply Annual 1982, DOE/EIA-0340(82)/1, Vol. 1 (June 1983), pp. 135-140.

Table 428.-- GASOLINE PRICES PER GALLON CHARGED BY REPRESENTATIVE SERVICE STATIONS, FOR HONOLULU: 1909 TO 1965

[Cents per gallon, including taxes.]

Date	Regular	Premium	Date	Regular	Premium
1909: June 1	37.5	...	1944: Dec. 1/ ...	21.3	...
1913: Apr. 1	25.0	...	1945: Dec. T/ ...	21.3	...
1915: Apr. 3	25.0	...	1947: Jan. 21 ...	22.0	24.0
1918: May	20-25	...	Jan. 22 ...	22.5	24.5
1920: Aug.	28.5	...	Dec. 29 ...	25.7	27.7
1930: June 13	21.5	24.5	Dec. 30 ...	27.5	29.5
June 14	18.5	21.5	1953: Feb. 16 ...	29.3	31.9
1931: Dec. 3	18.0	...	Feb. 17 ...	32.5	34.6
1935: Sept. 5	20.0	24.0	1955: Feb. 24 ...	32.5	36.1
Sept. 6	17.5	19.5	Feb. 25 ...	33.5	37.1
1943: June 3 1/ ...	20.5	...	1956: Mar. 9	36.0	39.3
June 4 T/ ...	21.3	...	1960: Jan.	41.9	45.9
Dec. 1/.....	21.3	...	1965: Feb. 28 ...	41.9	45.9

1/ Office of Price Administration maximum.

Source: Hawaii Promotion Committee, Hawaii, A Primer, editions of 1909, 1913, and 1918; Honolulu Star-Bulletin, April 3, 1915, p. 11; Hawaii State Department of Planning and Economic Development, Gasoline Prices in Hawaii, 1920-1980 (Statistical Report 140, August 8, 1980), table 1.

Table 429.-- GASOLINE AVERAGE PRICES PER GALLON, FOR OAHU:
1973 TO 1983

[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
Dec.	1.518	1.446	1.522	1.566
1983: June	1.455	1.391	1.450	1.506

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 and Food (monthly, 1979-forward), and printouts for 1978-1979.

Table 430.-- 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 431.-- BUNKER OIL LADEN IN HONOLULU CUSTOMS DISTRICT ON VESSELS
ENGAGED IN FOREIGN TRADE: 1981 AND 1982

[In barrels of 42 gallons.]

Year	Total	American vessels		Foreign vessels	
		Fuel oil	Diesel oil	Fuel oil	Diesel oil
1981	1,076,215	39,249	43,170	199,938	793,858
1982	1,072,715	45,995	33,366	504,811	488,543

Source: U.S. Bureau of the Census, United States Foreign Trade, Bunker Fuels, Annual 1981 (FT810-81-13, March 1982) and Annual 1982 (FT810-82-13, March 1983).

Table 432.-- BOILERS AND PRESSURE VESSELS: DECEMBER 31, 1982

Island	Power boilers	Heating boilers	Pressure vessels ^{1/}
State total	663	2,678	4,992
Hawaii	81	233	770
Maui	64	219	484
Lanai	3	2	29
Molokai	7	29	28
Oahu	460	2,078	3,407
Kauai	48	117	274

^{1/} Five cubic feet or more.

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

Table 433.-- ENERGY GENERATED, PURCHASED, SOLD AND USED BY
RAW SUGAR PLANTATIONS, BY ISLANDS: 1981

Subject	State total	Hawaii	Kauai	Maui	Oahu
Electricity (millions of kilowatt-hours)					
Generated	775.50	257.03	205.79	190.73	121.95
Purchased	74.93	3.37	3.26	15.85	52.45
Sold	269.89	156.86	93.99	17.26	1.78
Used ^{1/}	580.54	103.54	115.06	189.32	172.62
Gross heat values of boiler fuels (billions of Btu's)					
All fuels	26,704	10,321	5,744	6,482	4,157
Bagasse	23,825	9,432	5,436	5,289	3,668
Fuel oil	2,612	875	240	1,160	337
Other fuels	267	14	68	33	152

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

Source: Hawaiian Sugar Planters' Association, Energy Inventory of Hawaiian Sugar Plantations--1981, pp. 8-11.

Table 434.-- PURCHASED FUELS AND ELECTRIC ENERGY USED FOR HEAT AND POWER BY MANUFACTURING ESTABLISHMENTS, BY TYPE OF FUEL OR ENERGY: 1980

Subject	Amount
Purchased fuels and electric energy:	
British thermal units (trillions)	13.2
Cost (million dollars)	76.3
Electric energy:	
Purchased:	
Quantity (million kWh)	556.1
Cost (million dollars)	29.6
Generated less sold (million kWh)	227.7
Purchased fuels:	
British thermal units (trillions)	11.3
Cost (million dollars)	46.7
Distillate fuel oil:	
Quantity (1,000 barrels)	(D)
Cost (million dollars)	(D)
Residual fuel oil:	
Quantity (1,000 barrels)	507.5
Cost (million dollars)	12.2
Natural gas:	
Quantity (billion cubic feet) .....	.3
Cost (million dollars) .....	.6
Liquefied petroleum gases:	
Quantity (million pounds)	2.7
Cost (million dollars) .....	.2
Other fuels (million dollars)	2.5
Fuels not specified by kind (million dollars)	(D)

Footnote and source follow next table.

Table 435.-- PURCHASED FUELS AND ELECTRIC ENERGY USED FOR HEAT AND POWER
BY MANUFACTURING ESTABLISHMENTS: 1979 AND 1980

Industry group	British thermal units (trillions)		Cost (million dollars)	
	1979	1980	1979	1980
All manufacturing	12.9	13.2	52.9	76.3
Food and kindred products	5.2	5.2	20.6	30.5
Preserved fruits and vegetables ...	.9	.9	4.0	4.9
Sugar, confectionery products	3.1	3.2	11.4	19.4
Printing and publishing .....	.2	.2	1.1	1.6

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

Source: U.S. Bureau of the Census, 1980 Annual Survey of Manufactures, Fuels and Electric Energy Consumed, M80(AS)-4.2 (October 1982), pp. 42-43.

Table 436.-- 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 437.-- FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT
IN HAWAII: 1970 TO 1981

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

Fiscal year	Total federal R and D obligations	Federal obligations for R and D plant
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
1981	49.9	.7

Source: National Science Foundation, Federal Funds for Research and Development: Fiscal Years 1981, 1982, and 1983, Vol. XXXI, NSF 82-326, pp. 187-188.

Table 438.-- RESEARCH AND DEVELOPMENT EXPENDITURES
AT UNIVERSITIES AND COLLEGES: 1974 TO 1981

[Thousands of dollars.]

Fiscal year	Total R and D expenditures	Federally financed R and D expenditures
1974	21,143	14,065
1975	24,596	15,540
1976	28,049	17,578
1977	28,900	17,945
1978 ^{1/}	31,971	19,781
1979	35,703	22,500
1980	40,593	25,833
1981	42,997	25,153

^{1/} Data were collected only from doctorate-granting institutions.

Source: National Science Foundation, Academic Science/Engineering, R and D Funds, Fiscal Year 1981, NSF 83-308, pp. 26-27.

Table 439.-- PATENTS ISSUED TO HAWAII
RESIDENTS: 1973 TO 1982

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

Year ended --	Patents
1973: Dec. 31 ^{1/}	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
1982: Sept. 30	31

^{1/} 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 1982, p. 49.