

Table 495.-- EXPENDITURES FOR FUELS AND ELECTRICITY, BY SOURCE:
1970 TO 1986

[Millions of dollars]

Year	Total energy expend.	Fuel expenditures			Less: electric utility fuel expend.	Plus: electric purch. by end-user
		Total	Electric utility	Other		
1970	282.7	215.9	17.3	198.6	17.3	84.1
1971	320.8	246.8	24.8	222	24.8	98.8
1972	332.4	250.4	27.3	223.1	27.3	109.3
1973	391.1	300.9	36.3	264.6	36.3	126.5
1974	534.5	433.2	49.8	383.4	49.8	151.1
1975	669.9	546.1	91.9	454.2	91.9	215.7
1976	735.6	600	100.4	499.6	100.4	236
1977	844.5	696.5	123.5	573	123.5	271.5
1978	932.2	767.8	149.3	618.5	149.3	313.7
1979	1,261.3	1,083.7	177	906.7	177	354.6
1980	1,721.3	1,529.8	267.8	1,262	267.8	459.3
1981	2,195.2	1,947.7	451.5	1,496.2	451.5	699
1982	2,153.8	1,869.6	439.4	1,430.2	439.4	723.6
1983	2,019.9	1,730.1	369.3	1,360.8	369.3	659.1
1984	2,048.4	1,724.8	379.3	1,345.5	379.3	702.9
1985	1,921.6	1,586.6	337.6	1,249.0	337.6	672.6
1986 <u>1/</u> .	1,564.0	1,147.3	224.6	922.7	224.6	641.3

1/ Provisional.

Source: Hawaii State Department of Business and Economic Development, Division of Energy, unpublished estimates.

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. Related series are cited in Sections 12 (on utility employment), 14 (prices), and 18 (gasoline consumption).

Total energy consumption in 1985 amounted to 231 trillion British thermal units, compared with 219 trillion BTU a decade earlier. Transportation, including aviation fuels, accounted for 56 percent of the 1986 total. Total expenditures for fuels and electricity in 1986 were \$1.56 billion.

Electricity sales amounted to 7.3 billion kilowatt-hours in 1987, a total that has increased 25 percent since 1977. Manufactured gas sales reached 32 million therms in 1987, 7 percent below the figure ten years earlier. Residential rates in 1987 averaged 9.4 cents per kilowatt-hour and \$1.57 per therm, both almost double the corresponding rates a decade earlier. Average residential use (6,905 kWh and 195 therms in 1987) has declined since the early 1970s. By 1986, almost 11 percent of the housing units in the State had solar heating devices.

The liquid fuel tax base for 1987 was approximately 1.2 billion gallons, compared with 888 million in 1977. The 1987 total included 348 million gallons of gasoline, 694 million of aviation fuel, and 159 million of diesel oil. The average price for automotive gasoline was \$1.28 per gallon during the first half of 1988.

The State is well served with scientific resources. Especially noteworthy is the cluster of large telescopes used for astronomical observations at the summits of Mauna Kea and Haleakala--twelve major facilities, including those under construction. Federal research and development obligations in Hawaii totaled \$55 million in 1986. Fifty-two patents were granted to Hawaii residents in 1987.

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, U.S. Bureau of Labor Statistics, National Science Foundation, Hawaii State Department of Taxation, Hawaii State Department of Commerce and Consumer Affairs and its Division of Consumer Advocacy, the DBED Energy Division, UH Institute for Astronomy, and individual utility companies. 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: 1988, Sections 19 and 20.

Table 490.-- CONSUMPTION OF ENERGY, BY SOURCE (PHYSICAL UNITS):
1960 TO 1986

Year	Petroleum ^{1/} (1,000 barrels)	Hydro- electric power ^{2/} (million kWh)	Geothermal energy (million kWh)	Coal (1,000 short tons)	Other ^{3/} (million kWh)
1960	17,497	27	0	0	0
1961	20,721	24	0	0	0
1962	19,733	20	0	0	0
1963	20,705	23	0	0	0
1964	22,117	115	0	0	0
1965	23,177	105	0	0	0
1966	25,804	112	0	0	2
1967	29,081	108	0	0	0
1968	32,363	94	0	0	30
1969	33,815	100	0		29
1970	34,768	108	0	0	24
1971	37,416	89	0	0	15
1972	38,372	91	0	0	18
1973	39,339	95	0	0	22
1974	37,265	92	0	0	30
1975	37,588	89	0	0	25
1976	37,990	93	0	0	29
1977	40,249	86	0	0	26
1978	40,851	84	0	0	0
1979	44,594	90	0	0	0
1980	43,505	86	0	0	0
1981	38,721	80	0	0	15
1982	35,637	90	0	47	26
1983	36,297	84	0	42	28
1984	36,932	82	21	38	28
1985	39,351	86	19	46	25
1986	38,905	78	18	16	0

^{1/} For data by type of petroleum, see source. Series revised from Data Book 1987, table 490.

^{2/} Includes industrial and electric utility production.

^{3/} Wood, waste, wind, photovoltaic, and solar thermal energy sources consumed at electric utilities to produce electricity. Excludes natural gas and nuclear electric power.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data Report, Consumption Estimates, 1960-1986 (April 1988), p. 93.

Table 491.-- CONSUMPTION OF ENERGY, BY SOURCE (TRILLION BTU):
1960 TO 1986

[Revised from Data Book 1987, table 491]

Year	Total energy consumed <u>1/</u>	Petroleum <u>2/</u>	Hydro-electric power <u>3/</u>	Geo-thermal energy	Coal	Natural gas	Other types <u>4/</u>
1960	98.4	98.1	0.3	0.0	0.0	0.0	0.0
1961	117.3	117.0	0.3	0.0	0.0	0.0	0.0
1962	112.2	112.0	0.2	0.0	0.0	0.0	0.0
1963	118.3	118.0	0.2	0.0	0.0	0.0	0.0
1964	127.9	126.7	1.2	0.0	0.0	0.0	0.0
1965	134.2	133.1	1.1	0.0	0.0	0.0	0.0
1966	149.1	147.9	1.2	0.0	0.0	0.0	(Z)
1967	168.1	167.0	1.1	0.0	0.0	0.0	0.0
1968	187.3	186.0	1.0	0.0	0.0	0.0	0.3
1969	194.8	193.5	1.0	0.0	0.0	0.0	0.3
1970	200.4	199.0	1.1	0.0	0.0	0.0	0.3
1971	215.1	214.0	0.9	0.0	0.0	0.0	0.2
1972	221.0	219.9	0.9	0.0	0.0	0.0	0.2
1973	226.7	225.5	1.0	0.0	0.0	0.0	0.2
1974	214.6	213.3	1.0	0.0	0.0	0.0	0.3
1975	216.7	215.5	0.9	0.0	0.0	0.0	0.3
1976	219.3	218.0	1.0	0.0	0.0	0.0	0.3
1977	232.6	231.5	0.9	0.0	0.0	0.0	0.3
1978	236.0	235.2	0.9	0.0	0.0	0.0	0.0
1979	255.9	255.0	0.9	0.0	0.0	0.0	0.0
1980	253.2	249.3	0.9	0.0	0.0	3.0	0.0
1981	226.4	222.6	0.8	0.0	0.0	2.8	0.2
1982	208.5	203.3	0.9	0.0	1.1	2.8	0.3
1983	210.3	205.4	0.9	0.0	1.0	2.7	0.3
1984	218.7	213.8	0.8	0.4	0.9	2.4	0.3
1985	233.3	227.9	0.9	0.4	1.1	2.7	0.3
1986	230.9	226.7	0.8	0.4	0.4	2.7	0.0

Z Less than 0.05.

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

2/ For data by type of petroleum, see source.

3/ Includes industrial and electric utility production.

4/ Wood, waste, wind, photovoltaic, and solar thermal energy sources consumed at electric utilities to produce electricity.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data Report, Consumption Estimates, 1960-1986 (April 1988), p. 93.

Table 492.-- CONSUMPTION OF ENERGY BY END-USE SECTOR: 1960 TO 1986

[Trillion Btu. Revised from Data Book 1987, table 492]

Year	Consumption ^{1/}				Input at electric utilities
	Residential	Commercial	Industrial	Transportation	
1960	7.3	5.2	20.7	65.2	17.6
1961	7.5	5.4	26.9	77.4	19.4
1962	8.0	5.5	28.9	69.8	21.4
1963	8.9	6.0	29.8	73.5	24.2
1964	9.6	6.6	32.4	79.2	26.7
1965	10.1	6.8	34.7	82.6	27.6
1966	10.8	7.4	35.8	95.1	29.7
1967	12.1	8.0	38.9	109.1	31.3
1968	13.1	8.8	38.7	126.7	35.0
1969	14.9	9.8	40.9	129.2	38.7
1970	16.4	11.6	43.7	128.7	43.2
1971	17.8	11.4	43.6	142.3	47.7
1972	19.6	12.7	48.9	139.7	54.1
1973	20.0	13.5	49.4	143.8	55.6
1974	20.3	13.3	49.4	131.7	57.5
1975	19.6	13.8	49.9	133.4	58.8
1976	21.3	15.3	57.0	131.7	62.5
1977	21.8	16.8	52.7	141.3	65.2
1978	21.8	17.4	52.3	144.6	66.8
1979	22.9	18.1	58.5	156.3	67.7
1980	23.2	20.8	62.4	146.7	69.7
1981	23.0	18.8	60.7	124.0	69.9
1982	21.5	17.6	67.2	102.2	66.9
1983	22.1	17.8	52.6	117.9	68.6
1984	21.0	18.6	47.5	131.7	70.6
1985	20.8	19.3	48.3	144.8	70.0
1986	20.7	23.1	57.7	129.4	72.9

^{1/} Excludes 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.

Source: U.S. Department of Energy, Energy Information Administration, State Energy Data Report, Consumption Estimates, 1960-1986 (April 1988), pp. 94-98.

Table 493.-- PRIMARY ENERGY USE, BY SOURCE: 1981 TO 1987

[Thousands of barrels of oil equivalent. Revised from
Data Book 1987, table 493]

Year	All sources	Petroleum	Biomass	Solar water heating	Hydro electricity	Coal	Geothermal	Wind
1981	46,262	42,879	2,791	178	117	297	-	-
1982	46,107	42,510	2,980	216	174	202	25	-
1983	47,250	43,616	3,069	243	141	151	30	-
1984	46,925	43,233	3,119	281	124	135	33	-
1985	45,417	41,786	3,021	339	156	58	30	27
1986	46,869	42,341	3,812	344	168	79	29	96
1987	49,023	44,837	3,529	349	154	-	23	131

Source: Hawaii State Department of Commerce and Consumer Affairs, records; Hawaii State Department of Business and Economic Development, records; Hawaiian Sugar Planters' Association, records.

Table 494.-- ELECTRICITY GENERATION BY SOURCE: 1981 TO 1987

[Millions of kWh generated]

Year	Total	Petroleum	Biomass	Hydro-electric	Geothermal	Wind	Coal
1981	7,615	6,913	628	74	-	-	-
1982	7,467	6,729	612	110	16	-	-
1983	7,689	6,914	667	89	19	-	-
1984	7,841	7,073	669	78	21	-	-
1985	7,821	7,001	670	98	19	17	16
1986 1/ .	8,251	7,412	646	100	18	58	17
1987 2/ .	8,368	7,577	605	93	14	79	-

1/ Revised.

2/ Preliminary.

Source: Hawaii State Department of Commerce and Consumer Affairs, records; Hawaii State Department of Business and Economic Development, records; Hawaiian Sugar Planters' Association, records.

Table 496.-- EXPENDITURES FOR FUELS AND ELECTRICITY, BY SECTORS:
1970 TO 1986

[Millions of dollars]

Year	Total fuel	Residential		Commercial and industrial		Transport: fuel	Electric utilities: fuel
		Fuel	Elect.	Fuel	Elect.		
1970	215.9	5.5	34.1	18.9	50	174.2	17.3
1971	246.8	8.7	38.8	17.9	60	195.4	24.8
1972	250.4	6.1	42.6	20.5	66.7	196.5	27.3
1973	300.9	10.5	48.7	24.4	77.8	229.7	36.3
1974	443.2	10.4	57.1	44.7	94	328.3	49.8
1975	546.1	7.4	76.9	45.8	138.8	401	91.9
1976	600	12.7	84	45.9	152	441	100.4
1977	696.5	13.9	92.9	55	178.6	504.1	123.5
1978	767.8	13.3	105.8	52.6	207.9	552.6	149.3
1979	1,083.7	26.2	118.9	102.4	235.7	778.1	177
1980	1,529.8	19.5	146.4	135.4	312.9	1,107.1	267.8
1981	1,947.7	20.6	214.6	232.4	484.4	1,243.2	451.5
1982	1,869.6	26.2	222.4	283.6	501.2	1,120.4	439.4
1983	1,730.1	22.9	205.9	288.1	453.2	1,049.8	369.3
1984	1,724.8	20.6	217.4	192.1	485.5	1,132.8	379.3
1985 1/ ..	1,586.6	20.6	213.5	100.8	459.1	1,127.6	337.6
1986 2/ ..	1,147.3	13.8	195.8	65.8	445.6	843.1	224.6

1/ Revised from Data Book 1986, table 471.

2/ Preliminary.

Source: Hawaii State Department of Business and Economic Development, Division of Energy, unpublished estimates.

Table 497.-- ELECTRIC UTILITIES: 1977 TO 1987

Year	Customers, Dec. 31			Installed capacity, Dec. 31 (kW)	Power sold (1,000 kWh)		
	Total	Residential	Other		Total	Residential	Other
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
1983 ..	319,449	276,194	43,255	1,578,780	6,425,578	1,814,336	4,611,242
1984 ..	324,384	280,518	43,866	1,578,780	6,606,255	1,837,954	4,768,301
1985 ..	330,407	285,117	45,290	1,567,230	6,635,158	1,879,027	4,756,131
1986 ..	337,563	291,222	46,341	1,553,580	7,025,739	1,959,447	5,066,292
1987 ..	347,085	299,758	47,327	1,535,700	7,297,905	2,069,859	5,228,046
Year	Average annual use (kWh) <u>1/</u>		Average rate (dollars per kWh)		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
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	723,622	222,423	501,199
1983 ..	6,569	106,606	.11348	.09828	659,089	205,889	453,200
1984 ..	6,552	108,702	.11831	.10181	702,899	217,447	485,452
1985 ..	6,590	105,015	.11361	.09653	672,600	213,478	459,122
1986 ..	6,728	109,326	.09294	.07505	562,345	182,110	380,234
1987 ..	6,905	110,466	.09431	.07792	602,553	195,198	407,355

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 498.-- ELECTRIC UTILITIES, BY ISLANDS: 1987

County or island	Customers, Dec. 31			Installed capacity, Dec. 31 (kW)	Power sold (1,000 kWh)		
	Total	Residential	Other		Total	Residential	Other
State total	347,085	299,758	47,327	1,535,700	7,297,905	2,069,859	5,228,046
Oahu	241,426	211,277	30,149	1,255,000	5,804,298	1,526,611	4,277,687
Hawaii	44,137	36,685	7,452	101,000	572,628	229,716	342,912
Kauai	20,945	17,604	3,341	59,800	270,164	96,795	173,369
Maui County	40,577	34,192	6,385	119,900	650,815	216,737	434,078
Lanai	884	765	119	-	5,662	3,439	2,223
Maui	37,088	31,291	5,797	108,700	619,763	202,704	417,059
Molokai	2,605	2,136	469	11,200	25,390	10,594	14,796
	Average annual use (kWh) <u>1/</u>		Average rate (dollars per kWh)		Revenues (\$1,000)		
County or island	Residential	Other	Residential	Other	Total	Residential	Other
State total	6,905	110,466	0.09431	0.07792	602,553	195,198	407,355
Oahu	7,226	141,885	0.08591	0.07077	433,891	131,158	302,733
Hawaii	6,262	46,016	0.11871	0.10905	64,664	27,269	37,395
Kauai	5,498	51,891	0.12630	0.12681	34,211	12,226	21,985
Maui County	6,339	67,984	0.11325	0.10422	69,787	24,546	45,241
Lanai	4,495	18,686	0.17121	0.16664	959	589	370
Maui	6,478	71,944	0.10819	0.10058	63,878	21,931	41,948
Molokai	4,960	31,547	0.19127	0.19758	4,950	2,026	2,923

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 499.-- GAS UTILITIES: 1977 TO 1987

[Excludes bottled gas]

Year	Customers, Dec. 31			Gas sold (1,000 therms)		
	Total	Residential	Other	Total	Residential	Other
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
1983 ...	32,880	28,933	3,947	31,307	6,338	24,970
1984 ...	32,643	28,859	3,784	30,928	5,853	25,075
1985 ...	32,988	29,253	3,735	31,203	5,911	25,292
1986 ...	33,369	29,678	3,691	31,122	5,762	25,360
1987 ...	33,895	30,198	3,697	32,408	5,880	26,528

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
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
1983 ...	219	6,326	1.79719	1.44022	47,352	11,390	35,962
1984 ...	203	6,627	1.78958	1.37488	44,949	10,474	34,475
1985 ...	202	6,772	1.76934	1.33821	44,305	10,459	33,846
1986 ...	194	6,871	1.57151	1.12027	37,465	9,055	28,410
1987 ...	195	7,176	1.57204	1.10494	38,556	9,244	29,312

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 500.-- GAS UTILITIES, BY ISLANDS: 1987

[Excludes bottled gas]

Island	Customers, Dec. 31			Gas sold (therms)		
	Total	Residential	Other	Total	Residential	Other
State total	33,895	30,198	3,697	32,408,238	5,880,067	26,528,171
Oahu	31,398	28,069	3,329	29,344,841	5,435,022	23,909,819
Hawaii	1,860	1,553	307	2,184,803	333,038	1,851,765
Kauai	273	273	-	56,852	56,852	-
Maui	364	303	61	821,742	55,155	766,587
Molokai	-	-	-	-	-	-
Lanai	-	-	-	-	-	-

Island	Average annual use (therms) <u>1/</u>		Average rate (dollars per (therm))		Revenues (\$1,000)		
	Residential	Other	Residential	Other	Total	Residential	Other
State total	195	7,176	1.57204	1.10494	38,556	9,244	29,312
Oahu	194	7,182	1.59606	1.12312	35,528	8,675	26,854
Hawaii	214	6,032	1.27110	0.95426	2,190	423	1,767
Kauai	208	-	1.31893	-	75	75	-
Maui	182	12,567	1.28333	0.90161	762	71	691
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 501.-- SERVICE PROVIDED BY HAWAIIAN ELECTRIC CO., INC., ON OAHU:
1982 TO 1987

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					
1982 ..	222,636	194,468	5,441,941	5,164,332	7,068	0.12066	1,255,600
1983 ..	226,070	197,400	5,546,600	5,230,658	7,030	0.10631	1,200,000
1984 ..	228,606	199,722	5,633,940	5,330,931	6,960	0.11032	1,188,600
1985 ..	231,912	202,222	5,637,678	5,336,262	6,997	0.10417	1,188,600
1986 ..	235,742	205,636	5,933,569	5,625,398	7,113	0.08328	1,188,600
1987 ..	241,426	211,277	6,135,382	5,804,298	7,322	0.08591	1,188,600

1/ Net generated plus purchased power.

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

3/ Maximum generator nameplate. 1984 and 1985 data are revisions.

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

Table 502.-- GAS UTILITY SERVICE BY GASCO, INC., FOR OAHU: 1982 TO 1987

Calendar year	Customers, Dec. 31		Gas sold 1/ (1,000 therms)		Average annual residential usage 1/ (therms)
	Total	Residential	Total	Residential	
1982 ...	30,221	26,665	29,307	5,765	216
1983 ...	30,305	26,674	28,795	5,849	219
1984 ...	30,041	26,636	28,190	5,389	202
1985 ...	30,442	27,085	28,255	5,436	201
1986 ...	30,831	27,516	28,137	5,318	193
1987 ...	31,398	28,069	29,345	5,435	194

1/ Includes liquefied petroleum gas.

Source: Gasco, Inc., records.

Table 503.-- LIQUID FUEL TAX BASE: 1977 TO 1987

[In thousands of gallons]

Year reported ^{1/}	All types		Gasoline	Diesel oil	
	Total	Excluding aviation		Non-hwy.	Hwy. use
1977	888,136	415,482	311,409	85,484	13,817
1978	917,380	444,110	324,702	99,755	15,233
1979	960,837	454,012	324,337	108,460	16,596
1980	939,766	437,222	312,896	101,719	17,765
1981	918,437	428,886	305,886	101,212	15,771
1982	893,288	418,811	308,600	88,312	17,303
1983	919,865	418,217	310,085	86,790	16,440
1984	925,871	440,061	322,410	95,956	17,892
1985	970,555	432,500	327,021	83,147	17,636
1986	1,059,180	456,013	336,559	95,022	19,354
1987	1,206,716	512,974	348,474	137,806	21,207
Year reported ^{1/}	Liquefied petroleum gas		Aviation fuel	Small boats	
	Off-hwy.	Hwy. use		Gasoline	Diesel oil
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
1983	3,013	1,052	501,648	213	624
1984	2,600	873	485,810	114	215
1985	2,804	1,028	538,055	187	676
1986	2,969	1,031	603,167	163	916
1987	3,135	1,142	693,742	123	1,089

^{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 504.-- LIQUID FUEL TAX BASE, BY COUNTIES: 1987

[In thousands of gallons]

Type of fuel	State total	City and Co. of Honolulu	County of Maui	County of Hawaii	County of Kauai
Total	1,206,716	993,073	93,989	76,647	43,007
Gasoline	348,474	240,716	39,883	46,498	21,378
Diesel oil, non-hwy. ...	137,806	67,788	33,812	15,696	20,509
Diesel oil, hwy. use ...	21,207	15,643	1,777	3,195	592
Liq. pet. gas, off hwy.	3,135	1,901	432	652	149
Liq. pet. gas, hwy. use	1,142	949	75	88	30
Small boats, gasoline ..	123	66	-	57	-
Small boats, diesel oil	1,089	186	-	903	-
Aviation fuel	693,742	665,825	18,010	9,557	350

Source: Hawaii State Department of Taxation, "Liquid Fuel Tax Base, Collections and Distribution, Calendar Year Ending December 31, 1987" (annual release).

Table 505.-- GASOLINE SERVICE STATIONS (SIC 554)
WITH PAYROLL, BY COUNTIES: 1982 TO 1986

Year	State total	City and Co. of Honolulu	Hawaii County	Kauai County	Maui County
1982	365	252	59	21	33
1983	379	267	59	25	28
1984	359	251	51	26	31
1985	349	244	50	26	29
1986	345	243	49	25	28

Source: U.S. Bureau of the Census, County Business Patterns, Hawaii (annual).

Table 506.-- GASOLINE AVERAGE PRICES PER GALLON, FOR OAHU:
1985 TO 1988

[In dollars. Average prices include all applicable federal, state, and county taxes. For earlier years, 1903-1984, see Data Book 1984, tables 497 and 498, and Data Book 1987, table 507]

Period	All types <u>1/</u>	Leaded regular	Unleaded regular	Leaded premium
1985: First half ...	1.366	1.246	1.366	(NA)
Second half ..	1.418	1.302	1.426	(NA)
1986: First half ...	1.293	1.160	1.308	<u>2/</u> 1.409
Second half ..	1.120	0.993	1.134	1.282
1987: First half ...	1.168	1.041	1.187	1.312
Second half ..	1.297	1.158	1.320	1.435
1988: First half ...	<u>3/</u> 1.278	1.143	1.302	1.410

NA Not available.

1/ Includes types not shown separately.

2/ Includes DBED estimate for January 1986.

3/ The U.S. city average for the first half of 1988 was \$0.947.

Source: 1985 and 1986 (and 1988 U.S. average) from U.S. Bureau of Labor Statistics, CPI Detailed Report (monthly). Honolulu data after 1986 based on changes in CPI-U for gasoline applied to absolute values for the last half of 1986.

Table 507.-- BOILERS AND PRESSURE VESSELS: 1986 AND 1987

Date	Total	Power boilers	Heating boilers	Pressure vessels
1986: Dec. 31 ...	8,561	588	2,533	5,440
1987: Dec. 31 ...	8,517	585	2,479	5,453

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

Table 508.-- ENERGY GENERATED, PURCHASED, SOLD, AND USED BY
SUGAR PLANTATIONS, BY ISLANDS: 1986

Subject	State total	Hawaii	Kauai	Maui	Oahu
Electricity (millions of kilowatt-hours)					
Generated ^{1/}	878.32	241.47	218.75	272.99	145.11
Purchased	24.11	1.77	2.08	7.4	12.86
Sold	434.65	158.52	100.23	124.76	51.14
Used ^{2/}	467.72	84.72	120.60	155.62	106.78
Gross heat values of boiler fuels (billions of Btu's)					
All fuels	27,948	9,187	5,876	8,318	4,567
Bagasse	23,679	8,077	5,358	6,460	3,784
Fuel oil	3,980	1,105	498	1,785	592
Other fuels	289	5	20	73	191

^{1/} Includes electricity generated by steam and by hydroelectric or diesel engine generators.

^{2/} Includes transmission losses and electricity used to operate power plant auxiliaries.

Source: Hawaiian Sugar Planters' Association, Energy Inventory of Hawaiian Sugar Plantations - 1986 (Energy Report 24, December 18, 1987), pp. 6-9.

Table 509.-- TAX CREDITS FOR RESIDENTIAL SOLAR AND HEAT PUMP WATER HEATING SYSTEMS: 1975 TO 1986

[The State allows a 10-percent State individual income tax credit for solar energy devices installed 1975-1985 and heat pump systems installed 1981-1985, and a 15-percent credit for solar and heat pump systems installed after 1985. Data exclude commercial, military, and government systems, those installed previously, and those for which no State tax credit was made. Devices in condominiums may be claimed on a pro-rata basis for each housing unit. Federal solar tax credit was discontinued in 1986]

Year installed	Number of claims		Cumulative number of claims		Average solar device cost (dollars)	Total tax credit allowed (\$1,000)	
	Solar devices	Heat pumps	Solar devices	Heat pumps		Solar devices	Heat pumps
1975-77	1,101	...	1,101	...	2,135	230	...
1978	4,061	...	5,162	...	2,907	1,120	...
1979	4,375	...	9,537	...	3,031	1,250	...
1980	4,704	...	14,241	...	3,346	1,493	...
1981	6,445	2,013	20,686	2,013	3,500	2,107	164
1982	4,407	3,122	25,093	5,135	3,695	1,512	154
1983	3,148	665	28,241	5,800	3,601	1,076	40
1984	4,464	257	32,705	6,057	3,519	1,482	13
1985	6,740	12	39,445	6,069	3,897	2,616	1
1986	592	22	40,037	6,091	2,230	198	4

Source: Hawaii State Department of Taxation, Tax Credits Claimed by Hawaii Residents for 1977-1986.

Table 510.-- PERCENT OF HOUSING UNITS WITH SOLAR OR HEAT PUMP WATER HEATING SYSTEMS: 1977 TO 1986

System	1977	1979	1981	1983	1984	1985	1986
Solar	0.3	2.9	5.9	7.9	9.0	10.6	10.6
Heat pump	(NA)	(NA)	0.6	1.6	1.7	1.6	1.6

NA Not available.

Source: Calculated from cumulative totals (as of Dec. 31) in table 509 and DBED estimates of total housing stock on following April 1 in table 627.

Table 511.-- FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT
IN HAWAII: 1981 TO 1986

[Millions of dollars. For fiscal years ended September 30. The data include the obligations of 10 or 11 major R and D support agencies and represent 97 percent or more of the Federal R and D obligation]

Type of obligation	1981	1982	1983	1984	1985	1986
Total obligations for R&D	49.9	44.5	71.4	53.4	57.9	55.2
Obligations for R&D plant	0.7	0.1	0.1	0.6	0.9	0.6

Source: National Science Foundation, Federal Funds for Research and Development: Fiscal Years 1974 to 1985, Vol. XXXV, diskettes, tables C-162 and C-163; and Federal Funds for Research and Development: Fiscal Years 1986, 1987, and 1988, Vol. XXXVI, Detailed Statistical Tables, NSF87-314 (1987), p. 167.

Table 512.-- RESEARCH AND DEVELOPMENT EXPENDITURES AT
DOCTORATE-GRANTING INSTITUTIONS: 1981 TO 1985

[Thousands of dollars. For fiscal years ended September 30]

Type of expenditure	1981	1982	1983	1984	1985
Total R&D expenditures	42,997	43,439	45,401	51,051	54,025
Federally financed	25,153	26,616	27,633	32,701	34,886

Source: National Science Foundation, Academic Science/Engineering: R and D Funds, Fiscal Years 1978 to 1985, diskettes, table B-21 and table B-22.

Table 513.-- RESEARCH AND NON-RESEARCH EXTRAMURAL FUNDING,
FOR THE UNIVERSITY OF HAWAII: 1983-84 TO 1987-88

[Research and non-research awards received through the Office
of Research Administration, University of Hawaii]

Fiscal year	Total		Research		Non-research	
	Awards	Amount (dollars)	Awards	Amount (dollars)	Awards	Amount (dollars)
1983-84 ...	584	47,993,935	358	30,203,140	226	17,790,795
1984-85 ...	628	53,270,256	385	36,699,412	243	16,570,844
1985-86 ...	643	53,976,468	354	35,750,696	289	18,225,772
1986-87 ...	643	52,360,382	378	35,787,240	265	16,573,142
1987-88 ...	678	61,476,926	417	39,410,637	261	22,066,289

Source: Office of Research Administration, University of Hawaii,
1987-1988 Extramural Awards (1988), p. 2.

Table 514.-- PATENTS ISSUED TO HAWAII
RESIDENTS: 1980 TO 1987

[Fiscal years ended September 30. Data include
design, plant, and reissue patents]

Fiscal year	Patents	Fiscal year	Patents
1980	32	1984	43
1981	49	1985	33
1982	31	1986	37
1983	30	1987	52

Source: U.S. Department of Commerce, Patent and
Trademark Office, Commissioner of Patents and
Trademarks Annual Report, Fiscal Year '87, p. 57.

Table 515.-- TELESCOPES AT THE SUMMITS OF MAUNA KEA AND
HALEAKALA: 1988

Location and telescope (diameter in meters)	Year com- pleted	Capital costs (millions of 1986 dollars)	Operating costs, 1988 (million dollars)	Local staff (persons)
Mauna Kea:				
UH 0.61-m.	1969	0.3	}	}
UH 0.61-m.	1969	0.3		
UH 2.24-m.	1970	8.0	1.2	13
Canada-France-Hawaii (CFHT) ..	1979	45.0	3.5	43
NASA IRTF 3.0-m.	1979	15.0	1.8	10
UK (UKIRT) 3.8-m.	1979	15.0	1.5	29
James Clerk Maxwell (JCMT) ...	1986	20.0	1.0	20
Caltech Submillimeter (CSO)				
10.4-m.	1986	10.0	1.5	11
W.M. Keck Observatory				
Optical/IR 10.0-m. <u>1/</u>	1991	85.0	2.3	35
Haleakala (on UH land):				
Mees Solar Observatory	1956	0.5	0.3	6
Lunar Ranging Facility	1976/84	3.25	0.7	9
Gamma Ray Facility	1985	2.0	0.2	1

1/ Under construction. Figures are projected.

Source: University of Hawaii at Manoa, Institute for Astronomy, data provided July 18, 1988.

Table 516.-- COMPUTER USE BY OAHU RESIDENTS EMPLOYED OUTSIDE
THEIR HOMES: MARCH 1988

Subject	Percent
Use of personal computer at place of work	100
Always	22
Frequently	14
Occasionally	14
Never	50
Facsimile machine (FAX) at place of work	100
Yes	41
No	46
Don't know	13
Own a personal computer for use at home	100
Yes	25
No	75

Source: Omnitrak/Hawaii Inc. Poll (400 telephone interviews)
reported in Honolulu Star-Bulletin, April 19, 1988, p. C-1.