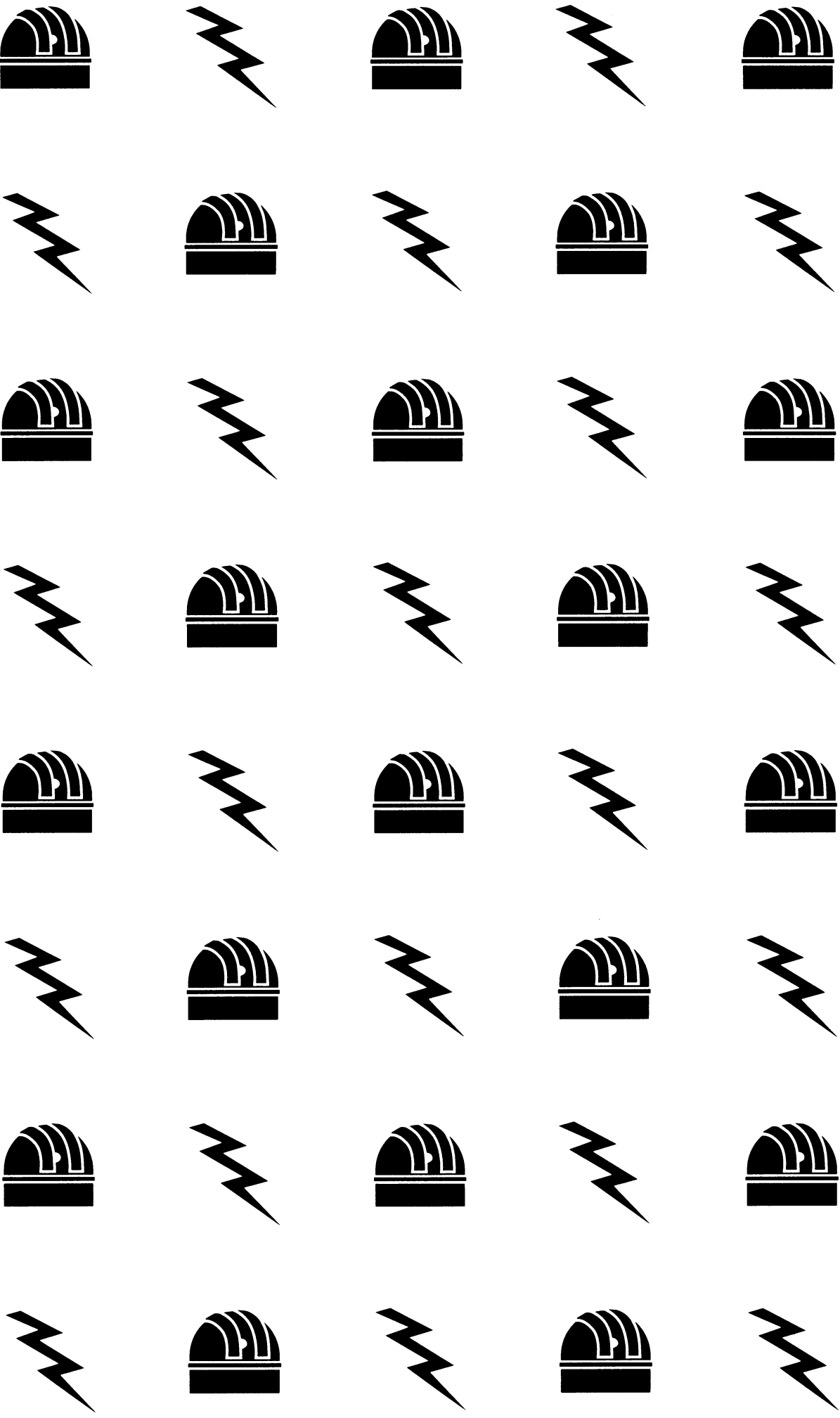


Energy & Science



Section 7

ENERGY & SCIENCE

The increase in Maui County's population has been reflected in the utilities. Consumption and use of electricity, gas, utilities, and water have all increased dramatically over the last decade. Statistics on electricity, gas, water production and consumption are covered. Almost 24% of the electric power used on the island is generated by the sugar companies.

Ongoing scientific endeavors include observation of astronomical and man-made space objects from the summit of Mt. Haleakala.

7.1.1

TELESCOPES AT THE SUMMITS OF MAUNA KEA AND HALEAKALA

Location and Facility	Mirror Size (meters)	Year Completed	Primary Use	Local Staff ¹
Mauna Kea				
UH 24-inch Telescope	0.6	1968	Optical	
UH 88-inch Telescope*	2.2	1970	Optical/infrared	8
NASA Infrared Telescope Facility	3.0	1979	Infrared	12
Canada-France-Hawaii Telescope	3.6	1979	Optical/infrared	50
United Kingdom Infrared Telescope	3.8	1979	Infrared	31
W. M. Keck Observatory (Keck I)	10	1992	Optical/infrared	
W. M. Keck Observatory (Keck II)	10	1996	Optical/infrared	85 (total)
Subaru	8	1999	Optical/infrared	30
Gemini Northern 8-meter Telescope	8	1999	Optical/infrared	30
Caltech Submillimeter Observatory	10.4	1986	mm/submm	10
James Clerk Maxwell Telescope	15	1986	mm/submm	43
Submillimeter Array	8 antennae @ 6 m	1999	submillimeter	26
Very Long Baseline Array	25	1992	centimeter	2
Haleakala (on University of Hawaii land)				
Mees Solar Observatory		1956	Measure solar emissions	2
Lunar Ranging Facility		1976/84	Laser ranging	7
Maui Space Surveillance Site				120
Tracking Telescope (compensated)	1.6	1968	Image near earth objects	
Dual Tracking Telescope	1.2	1968	Track satellites	
Coudé Beam Director	0.8	1987	Project laser beams	
Beam Director	0.6	1975	Project laser beams	
Advanced Electro-Optical System (AEOS)	3.7	1999	Track satellites	55
GEODSS			Track deep space objects	
Primary	1	1982		
Secondary	1	1982		
Auxiliary	0.4	1982		

¹ Based in same county as observatory.

* University of Hawaii

SOURCE: University of Hawai'i at Manoa, Institute for Astronomy, 1998 Fact Sheet.

7.1.2

ELECTRIC UTILITIES, MAUI COUNTY

	1997	1998	1999	2000	2001
CUSTOMERS, DEC. 31					
<i>Total</i>					
Maui Island	50,385	51,035	52,079	53,204	54,405
Molokai	2,858	2,870	2,911	2,903	2,926
Lanai	1,362	1,381	1,420	1,494	1,509
Maui County	54,605	55,286	56,410	57,601	58,840
<i>Residential¹</i>					
Maui Island	43,159	43,694	44,510	45,379	46,320
Molokai	2,339	2,338	2,364	2,351	2,381
Lanai	1,181	1,200	1,227	1,296	1,306
Maui County	46,679	47,232	48,101	49,026	50,007
<i>Other</i>					
Maui Island	7,226	7,341	7,569	7,825	8,085
Molokai	519	532	547	552	545
Lanai	181	181	193	198	203
Maui County	7,926	8,054	8,309	8,575	8,833
GENERATING AND FIRM PURCHASED CAPABILITY, DEC. 31 (MW)					
Maui Island	207.5	233.2	228.9	250.1	250.1
Molokai	12.1	12.1	12.1	12.1	12.1
Lanai	10.4	10.4	10.4	10.4	10.4
Maui County	230.0	255.7	251.4	272.6	272.6
PEAK DEMAND (MW)²					
Maui Island	174.7	176.0	180.1	185.1	191.0
Molokai	6.6	6.6	7.0	6.5	6.5
Lanai	5.0	5.2	5.0	5.0	5.2
POWER SOLD (1,000 kWh)					
<i>Total</i>					
Maui Island	969,170	967,760	1,002,594	1,042,006	1,071,486
Molokai	33,549	34,710	35,576	36,349	35,681
Lanai	26,050	26,085	26,569	27,108	26,905
Maui County	1,028,768	1,028,556	1,064,739	1,105,463	1,134,072
<i>Residential</i>					
Maui Island	328,582	328,598	340,071	354,689	360,025
Molokai	12,676	12,567	12,551	12,687	12,348
Lanai	6,442	6,577	6,620	6,855	7,068
Maui County	347,700	347,742	359,243	374,231	379,440
<i>Other</i>					
Maui Island	640,587	639,162	662,523	687,317	711,462
Molokai	20,873	22,144	23,025	23,661	23,333
Lanai	19,608	19,508	19,949	20,253	19,838
Maui County	681,068	680,814	705,496	731,232	754,633

7.1.2

CONTINUED

	1997	1998	1999	2000	2001
AVERAGE ANNUAL USE (kWh)³					
<i>Residential</i>					
Maui Island	7,613	7,520	7,640	7,816	7,773
Molokai	5,419	5,375	5,309	5,397	5,186
Lanai	5,455	5,481	5,396	5,289	5,412
Maui County	7,449	7,362	7,469	7,633	7,588
<i>Other</i>					
Maui Island	88,650	87,067	87,531	87,836	87,998
Molokai	40,218	41,623	42,093	42,865	42,814
Lanai	108,332	107,779	103,361	102,288	97,722
Maui County	85,928	84,531	84,907	85,275	85,433
AVERAGE RATE (dollars per kWh)					
<i>Residential</i>					
Maui Island	0.15549	0.13956	0.15549	0.18232	0.18656
Molokai	0.19844	0.18328	0.19547	0.22787	0.23631
Lanai	0.19033	0.17967	0.19478	0.22184	0.24415
Maui County	0.15770	0.14190	0.15761	0.18459	0.18925
<i>Other</i>					
Maui Island	0.13885	0.12488	0.13866	0.16582	0.17125
Molokai	0.19348	0.17440	0.19053	0.22376	0.22841
Lanai	0.19428	0.18451	0.19737	0.22112	0.24555
Maui County	0.14212	0.12820	0.14201	0.16922	0.17497
Revenues (\$1,000)					
<i>Total</i>					
Maui Island	140,035	125,677	144,741	178,638	189,003
Molokai	6,554	6,165	6,840	8,186	8,247
Lanai	5,036	4,781	5,227	5,999	6,597
Maui County	151,624	136,623	156,808	192,823	203,847
<i>Residential</i>					
Maui Island	51,092	45,860	52,878	64,668	67,166
Molokai	2,515	2,303	2,453	2,891	2,918
Lanai	1,226	1,182	1,290	1,521	1,726
Maui County	54,834	49,345	56,621	69,080	71,809
<i>Other</i>					
Maui Island	88,943	79,817	91,863	113,970	121,837
Molokai	4,039	3,862	4,387	5,294	5,330
Lanai	3,810	3,599	3,937	4,478	4,871
Maui County	96,791	87,278	100,187	123,743	132,038

¹ Residential refers to single-metered residential customers which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents, which are classified as commercial customers.

² Peak demand is the maximum amount of energy required from the electrical system. The islands' electrical systems are not interconnected, so no peaks are reported for Maui County as a whole.

³ Based on number of customers at end of year.

SOURCE: Hawaii State Department of Commerce and Consumer Affairs, Division of Consumer Advocacy, records; capacity and peak demand: Hawaiian Electric Industries, Inc., Securities and Exchange Commission 10-K filings, 1997-2001.

7.1.3

GAS UTILITIES, MAUI COUNTY

Excludes bottled gas

	1997	1998	1999	2000	2001
Island of Maui					
Customers (December 31)					
Residential ¹	325	319	326	333	329
Other	67	77	79	78	79
Total	392	396	405	411	408
Gas Sold (1,000 therms)					
Residential	70	71	74	78	77
Other	649	682	813	805	786
Total	720	752	887	883	863
Average Annual Use (therms)					
Residential	217	221	228	233	234
Other	9,691	8,852	10,285	10,320	9,947
Average Rate (\$ per therm)²					
Residential	2.22903	2.15527	1.98769	2.10372	2.43086
Other	1.25364	1.21693	1.14251	1.23916	1.45250
Revenues (\$1,000)					
Residential	157	152	148	163	187
Other	814	829	928	997	1,141
Total	971	982	1,076	1,161	1,329
Island of Molokai³					
Customers (December 31)					
Total/Residential	91	96	92	78	71
Gas Sold (1,000 therms)					
Total/Residential	20	20	19	17	15
Average Annual Use (therms)					
Total/Residential	221	205	206	220	205
Average Rate (\$ per therm)					
Total/Residential	2.42358	2.31461	2.23825	2.33821	2.62590
Revenues (\$1,000)					
Total/Residential	49	46	42	40	38

¹ Residential refers to single-metered residential customers which may include condominiums for visitor use but excludes master-metered apartment and condominium buildings used by residents which are classified as commercial customers.

² Based on number of customers at end of year.

³ All Molokai customers are residential.

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

7.1.4

HAWAII STATE ENERGY REPORT, ENERGY CONSUMPTION ESTIMATES BY SOURCE

In billion BTU

	1994	1995	1996	1997	1998	1999
Asphalt and road oil	2,699.3	2,906.9	2,663.4	2,629.6	2,138.0	2,340.3
Aviation gasoline	1,060.7	1,099.8	833.0	608.8	540.3	293.6
Distillate fuel	29,493.4	29,226.6	25,736.6	24,973.5	25,298.4	26,252.0
Kerosene-type jet fuel	53,653.6	56,283.6	57,171.9	57,921.6	56,643.3	53,720.0
Naphtha-type jet fuel	51.0	74.0	22.0	9.0	0.0	0.0
Kerosene	3.7	2.9	3.0	2.8	1.5	0.9
Liquified petroleum gasses	5,886.8	4,769.6	4,766.4	870.3	3,050.5	1,358.0
Lubricants	567.4	557.7	541.2	571.7	598.5	604.8
Motor gasoline	48,865.4	49,103.4	48,892.3	48,781.1	48,692.3	46,653.8
Residual fuel	81,299.3	77,631.9	65,253.6	62,112.4	69,319.4	69,910.5
Other petroleum products ¹	13,608.7	13,052.7	15,488.5	15,257.4	12,595.3	12,615.2
Subtotal petroleum products	237,189.2	234,709.2	221,371.8	213,738.2	218,877.5	213,749.1
Geothermal energy	4,144.7	4,992.4	5,120.0	4,683.3	4,983.0	4,437.1
Solar thermal and photovoltaic energy	1,151.3	1,205.2	1,255.0	1,273.0	1,317.7	1,349.5
Wind energy	70.4	91.2	123.7	206.2	199.5	170.6
Subtotal geothermal, solar thermal, photovoltaic and wind energy	5,366.4	6,288.8	6,498.6	6,162.4	6,500.2	5,957.2
Coal	1,849.0	4,119.4	3,637.5	3,262.3	3,847.7	3,064.3
Hydroelectric power	1,457.1	1,008.6	1,082.6	1,194.5	1,254.7	1,216.3
Natural gas	2,919.7	2,906.1	2,824.3	2,688.3	2,803.7	2,886.5
Wood and waste	6,872.0	8,008.9	15,996.8	14,779.2	13,301.8	14,571.1
Total energy consumption	255,653.4	257,041.0	251,411.7	241,824.9	246,585.5	241,444.5

NOTE: Totals may not equal sum of components due to independent rounding.

¹ Other petroleum products are aviation gasoline blending components, motor gasoline blending components, petroleum coke, still gas, unfinished oils, and petroleum waxes.

SOURCE: U.S. Department of Energy, Energy Information Administration, Combined State Energy Data System 1999.

