

Energy & Science



Section 7

ENERGY & SCIENCE

The growth in Maui County's population is reflected in the utilities. Consumption and use of electricity, gas, utilities, and water have all increased dramatically over the last decade. This section details those statistics on electricity, gas, water production and consumption.

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

7.1.1

TELESCOPES AT THE SUMMITS OF MAUNA KEA AND HALEAKALĀ

Facility (mirror diameter in meters)	Capital Cost (\$ mil) ¹	Annual Operating Cost (\$ mil)	County Based Staff	Operational
Mauna Kea Observatories:				
UH 2.2-m (Optical/Infrared)	5	1.0	6	1970
Canada-France-Hawai'i 3.6-m (Optical/Infrared)	30	7.4	49	1979
NASA IRTF 3.0-m (Infrared)	10	5.1	19	1979
UKIRT 3.8-m (Infrared)	5	2.2	6	1979
James Clerk Maxwell 15-m Submillimeter	32	4.7	36	1986
VLBA Antenna 25-m (Radio)	7	0.4	2	1992
W.M. Keck Observatory (Keck I & II)				
10-m x 2 (Optical/Infrared)	170	14.2	125	1992/1996
Subaru (Japan National Large Telescope)				
8-m (Optical/Infrared)	170	17.0	101	1999
Fredrick C. Gillett Gemini 8m (Optical/Infrared)	92	15.0	83	1999
Submillimeter Array 8x6-m	80	5.5	23	2003
Mauna Kea Observatories Support Services	X	5.4 ²	51	1980
Total	601	72.4	501	
Haleakalā Observatories:				
Mees Solar Observatory	1	0.2	1	1963
Haleakalā Observatories Projects	X	0.2	2	NA
Maui Space Surveillance Site (MSSS)	250	26.3	117	1965
Ground-Based Electro-Optical Deep Space				
Surveillance (GEODSS)	25	6.1	16	1983
Faulkes 2-m Telescope	10	0.6	2	2003
Transportable Laser Ranging System (TLRS4)	1	0.5	5	2005
Panoramic Survey Telescope And Rapid				
Response System (Pan-STARRS)	110	5.6	11	2009
Haleakalā Support Facilities	9	1.2	15	1962/2008
Daniel K. Inouye Solar Telescope (DKIST) ³	344	18.0 ⁴	35	
Total	749	40.7	202	

X Not applicable. Note: 2016 data for Mauna Kea and 2017 data for Haleakala.

1. Historical cost, not adjusted for inflation, and not including subsequent capital improvements for Mauna Kea Observation.

2. Only \$1.9 million of this included in total as the other \$3.5 million are part of facility operating costs.

3. Daniel K. Inouye Solar Telescope was scheduled to be operational by 2020. However, data are not yet available.

4. Operational cost of \$18 million not included in the total.

SOURCE: UNIVERSITY OF HAWAII'Ī AT MANOA, INSTITUTE FOR ASTRONOMY.

7.1.2

ELECTRIC UTILITIES MAUI COUNTY

	2017	2018	2019	2020	2021
Customers, Dec 31					
Total					
Maui Island	66,394	66,902	67,526	68,286	68,757
Moloka'i	3,226	3,236	3,248	3,269	3,273
Lāna'i	1,732	1,737	1,748	1,749	1,758
Maui County	71,352	71,875	72,522	73,304	73,788
Residential					
Maui Island	56,728	57,232	57,758	58,533	58,907
Moloka'i	2,689	2,693	2,706	2,721	2,723
Lāna'i	1,485	1,485	1,493	1,495	1,500
Maui County	60,902	61,410	61,957	62,749	63,130
Other					
Maui Island	9,666	9,670	9,768	9,753	9,850
Moloka'i	537	543	542	548	550
Lāna'i	247	252	255	254	258
Maui County	10,450	10,465	10,565	10,555	10,658
Peak Demand (mW)¹					
Maui Island	202.9	195.7	207.1	184.0	188.9
Moloka'i	5.9	5.6	6.0	5.9	5.8
Lāna'i	6.0	5.3	6.1	6.1	6.1
Power Sold (1,000 kWh)					
Total					
Maui Island	1,036,638	1,040,743	1,064,751	898,268	983,972
Moloka'i	28,199	29,014	29,612	29,053	28,995
Lāna'i	29,947	29,263	32,975	31,367	34,699
Maui County	1,094,784	1,099,020	1,127,338	958,688	1,047,666
Residential					
Maui Island	345,906	364,501	376,193	358,351	378,983
Moloka'i	10,379	10,542	10,666	11,429	11,548
Lāna'i	7,407	7,979	8,321	8,460	8,815
Maui County	363,692	383,022	395,180	378,240	399,347
Other					
Maui Island	690,732	676,241	688,559	539,917	604,989
Moloka'i	17,820	18,472	18,945	17,624	17,448
Lāna'i	22,540	21,284	24,654	22,907	25,883
Maui County	731,093	715,997	732,158	580,448	648,320

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7.1.2

CONTINUED

	2017	2018	2019	2020	2021
Average Annual Use, Dec 31 (kWh)					
Residential					
Maui Island	6,098	6,369	6,513	6,122	6,434
Moloka'i	3,860	3,915	3,942	4,200	4,241
Lāna'i	4,988	5,373	5,574	5,659	5,877
Other					
Maui Island	71,460	69,932	70,491	55,359	61,420
Moloka'i	33,184	34,018	34,955	32,160	31,723
Lāna'i	91,257	84,462	96,682	90,185	100,324
Average Rate (dollars per kWh)					
Residential					
Maui Island	0.30644	0.33907	0.33646	0.33318	0.34849
Moloka'i	0.35574	0.40156	0.40515	0.35430	0.38836
Lāna'i	0.35872	0.40137	0.42015	0.36410	0.41753
Other					
Maui Island	0.28580	0.32257	0.31500	0.32741	0.33395
Moloka'i	0.33900	0.38917	0.38856	0.34056	0.37406
Lāna'i	0.35839	0.40499	0.42115	0.37416	0.41901
Revenues (\$1,000)					
Total					
Maui Island	303,413	341,723	343,472	296,169	334,111
Moloka'i	9,733	11,422	11,683	10,051	11,011
Lāna'i	10,735	11,822	13,879	11,651	14,526
Maui County	323,882	364,967	369,034	317,871	359,648
Residential					
Maui Island	105,999	123,590	126,573	119,395	132,073
Moloka'i	3,692	4,233	4,321	4,049	4,485
Lāna'i	2,657	3,202	3,496	3,080	3,681
Maui County	112,348	131,025	134,390	126,524	140,238
Other					
Maui Island	197,414	218,133	216,899	176,774	202,038
Moloka'i	6,041	7,189	7,361	6,002	6,526
Lāna'i	8,078	8,620	10,383	8,571	10,845
Maui County	211,533	233,942	234,643	191,347	219,410

mW: Megawatts

kWh: Kilowatt hours

1. 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.

SOURCE: MONTHLY FINANCIAL REPORTS ISSUED BY MAUI ELECTRIC COMPANY, CALCULATIONS BY HAWAII STATE DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM.

7.1.3
GAS UTILITIES
MAUI COUNTY

Excludes bottled gas

	2017	2018	2019	2020	2021
Island of Maui					
Customers, Dec. 31					
Residential	448	600	668	709	713
Other	89	95	100	101	101
Total	535	695	768	810	814
Gas Sold (1,000 therms)					
Residential	102	104	108	110	129
Other	736	788	831	545	821
Total	838	892	939	655	950
Average Annual Use (therms)					
Residential	229	173	162	155	181
Other	8,269	8,292	8,309	5,393	8,129
Average Rate (dollar per therm)					
Residential	3.31	3.76	4.51	4.48	4.60
Other	1.91	2.07	2.40	2.56	2.52
Revenues (\$1,000)					
Residential	339	390	489	494	593
Other	1,405	1,628	1,994	1,393	2,071
Total	1,744	2,018	2,483	1,887	2,664
Islands of Moloka'i and Lāna'i¹					
Customers, Dec. 31					
Moloka'i	82	73	67	69	83
Lāna'i	22	22	22	22	25
Gas Sold (1,000 therms)					
Moloka'i	15	13	11	11	11
Lāna'i	4	3	4	4	5
Average Annual Use (therms)					
Moloka'i	180	184	169	166	138
Lāna'i	176	153	167	192	200
Average Rate (dollar per therm)					
Moloka'i	3.85	4.05	4.47	4.43	4.43
Lāna'i	4.42	4.49	4.50	4.48	4.00
Revenues (\$1,000)					
Moloka'i	57	54	51	51	51
Lāna'i	17	15	17	19	20

1. All Moloka'i and Lāna'i customers are residential.

SOURCE: HAWAII GAS THE CLEAN ENERGY COMPANY, HAWAII GAS UTILITY MONTHLY FINANCIAL REPORTS,
CALCULATIONS BY HAWAII STATE DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM.

7.1.4

ENERGY CONSUMPTION ESTIMATES BY SOURCE HAWAI'I STATE ENERGY REPORT

In trillion BTU

	2017	2018	2019	2020	2021
Coal	14.9	14.4	14.2	13.3	12.6
Natural Gas	0.2	0.2	0.2	0.2	0.1
Petroleum					
Distillate fuel oil	26.9	29.7	28.9	27.6	27.0
Jet fuel	97.5	98.9	101.0	51.3	76.4
Liquefied petroleum gas	3.8	3.7	3.7	3.4	4.2
Motor gasoline	52.4	51.4	51.7	40.3	45.7
Residual fuel oil	63.2	62.0	63.5	53.6	58.9
Other	18.4	15.7	15.6	11.7	11.3
Total Petroleum	262.2	261.5	264.3	187.9	223.0
Renewable Energy					
Hydroelectric	0.6	0.9	0.8	0.9	1.0
Biomass	10.9	10.7	10.0	8.4	9.0
Wood and waste	5.4	5.4	4.9	4.4	4.6
Ethanol fuel	4.0	3.9	4.0	3.2	3.6
Geothermal	3.0	1.0	s	0.1	0.6
Solar / Photovoltaic	12.6	13.1	14.3	16.9	17.6
Wind	4.9	5.5	4.7	5.2	5.8
Total Renewable Energy	32.0	31.1	29.8	31.5	35.1
Total Energy Consumption	309.3	307.2	308.6	232.8	270.8

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

"s": Value less than +0.05 and greater than -0.05 trillion Btu.

SOURCE: U.S. DEPARTMENT OF ENERGY, ENERGY INFORMATION ADMINISTRATION, STATE ENERGY DATA SYSTEM.

7.1.5

WATER SERVICES AND CONSUMPTION MAUI COUNTY

Years ending June 30

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	Number of Services									
Maui County	35,866	36,040	36,104	36,211	36,365	36,615	36,719	37,069	37,178	37,342
Maui	34,200	34,373	34,439	34,552	34,692	34,931	35,028	35,374	35,476	35,641
Moloka'i	1,666	1,667	1,665	1,659	1,673	1,684	1,691	1,695	1,702	1,701
	Consumption (million gallons)									
Maui County	13,253	11,851	11,684	11,785	11,624	11,750	11,675	12,114	11,971	12,459
Maui	12,958	11,592	11,427	11,523	11,376	11,509	11,450	11,849	11,703	12,177
Moloka'i	295	259	257	262	248	241	225	265	268	282

SOURCE: HAWAII STATE DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM, DATA COMPILED FROM COUNTY OF MAUI DEPARTMENT OF WATER SUPPLY.

7.1.6

**DAILY AVERAGES FOR WATER PRODUCTION
BY AREA, MAUI COUNTY, 2022**

In thousands of gallons

Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Previous 12 Months
Central Maui													
Groundwater-Īao	12,861	13,974	14,782	16,393	14,886	15,542	16,910	17,095	15,948	15,170	14,717	13,879	15,615
Groundwater-Waihe'e	4,365	4,407	4,459	4,349	4,509	4,505	4,598	3,947	3,385	3,637	4,137	4,049	4,505
Kepaniwai	197	323	720	720	718	718	714	717	720	690	713	161	593
Īao Tunnel	1,062	1,526	1,596	1,590	1,600	1,616	1,610	1,627	1,621	1,435	1,259	1,622	1,435
Maui Lani	962	989	995	1,000	989	989	992	987	947	991	959	991	983
Surface water	2,824	2,521	2,242	962	2,345	3,012	1,872	2,226	2,654	2,597	2,682	1,849	2,382
Upcountry Maui													
Surface water	5,565	6,643	6,677	6,312	6,729	7,506	6,994	7,503	6,107	5,541	5,144	4,580	6,207
Groundwater	1,216	2,234	2,457	626	807	822	781	1,578	2,414	1,839	1,957	1,484	1,518
West Maui													
Surface water	3,212	3,109	2,003	3,296	3,097	3,352	3,460	3,056	2,726	2,184	2,580	2,735	3,212
Groundwater	1,694	2,306	3,624	2,149	2,395	2,513	2,191	2,632	2,735	3,272	2,588	1,985	2,447
East Maui													
Groundwater	385	465	410	396	388	385	407	405	369	380	399	407	385
Moloka'i													
Groundwater	731	824	868	888	941	994	986	1,083	1,003	890	784	673	731
Total Water Production	35,075	39,321	40,833	38,681	39,404	41,954	41,515	42,856	40,629	38,626	37,919	34,415	39,544

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, MONTHLY WATER PRODUCTION.

7.1.7

WATER SYSTEM SERVICE CHARGES AND DEVELOPMENT FEE SCHEDULES

In \$ per 1,000 gallons

Water Service Charges (Fiscal Year 2022)

Schedule A		Schedule B (Meter Size)	Per meter/ per month
Family Dwellings, 5/8" meters		5/8 inch	\$19.80
0 - 5,000 gal	\$2.05	3/4 inch	\$32.00
5,001 - 15,000	\$3.90	1 inch	\$47.50
15,001 - 35,000	\$5.85	1 1/2 inch	\$91.00
Over 35,000	\$6.55	2 inch	\$141.00
Rates (All Others)		3 inch	\$249.00
0 - 5,000 gal	\$2.05	4 inch	\$432.00
5,001 - 15,000	\$3.90	6 inch	\$793.00
Over 15,000	\$5.85	8 inch	\$1,251.00
Agricultural Rates			
0 - 5,000 gal	\$2.05		
5,001 - 15,000	\$3.90		
Over 15,000	\$1.10		
Non-Potable Agricultural Rates			
All usage	\$1.00		

**Water System
Development Fee Schedule**

Meter Size	Fee*
5/8 inch	\$12,060
3/4 inch	\$18,884
1 inch	\$33,356
1 1/2 inch	\$71,948
2 inch	\$125,012
3 inch	\$279,380
4 inch	\$496,460
6 inch	\$1,113,932
8 inch	\$1,977,428
10 inch	\$3,089,360
12 inch	\$4,447,436

* Plus installation charges.

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY.

7.1.8

**WATER SERVICE BY METER SIZE
MAUI COUNTY**

Fiscal year ending June 30, 2022

District	5/8"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	Total
Regular Rates										
Wailuku	17,730	2,048	537	417	409	55	37	6	1	21,240
Makawao	9,039	523	165	73	39	10	1	2	0	9,852
Lahaina	2,637	429	106	123	118	22	14	2	0	3,451
Hāna	465	44	11	6	4	1	0	0	0	531
Moloka'i	1,457	172	30	14	14	2	0	1	0	1,690
Subtotal	31,328	3,216	849	633	584	90	52	11	1	36,764
Agricultural Meters										
Wailuku	14	16	5	3	1	2	1	0	0	42
Makawao	268	47	69	80	28	1	0	0	0	493
Lahaina	2	1	5	0	1	0	1	0	0	10
Hāna	22	0	0	0	0	0	0	0	0	22
Moloka'i	7	2	2	0	0	0	0	0	0	11
Subtotal	313	66	81	83	30	3	2	0	0	578
Total	31,641	3,282	930	716	614	93	54	11	1	37,342

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2022.

7.1.9

**OUTSIDE WATER DELIVERIES TO
DEPARTMENT OF WATER SUPPLY
MAUI COUNTY**

Fiscal year ending June 30, 2022

	1,000 Gallons	Amount	Cost per 1,000 Gallons
Purchased from			
East Maui Irrigation	2,373,564	\$143,126	0.060
Wailuku Water Co.	1,052,988	\$524,677	0.498
Maui Land & Pine	458,455	\$131,214	0.286
Hawaiian Home Lands*	7,579	\$84,850	11.195
Total	3,892,586	\$883,867	0.227
District			
Wailuku	1,052,988	\$524,677	0.498
Kula	198,260	\$11,955	0.06
Makawao	2,166,780	\$130,657	0.06
Lahaina	458,455	\$131,214	0.286
Hāna	8,524.000	\$514	0.060
Moloka'i	7,579	\$84,850	11.195
Total	3,892,586	\$883,867	0.227

* Billed bi-monthly.

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2022.

7.1.10

WATER SALES TO GENERAL AND AGRICULTURAL CONSUMERS BY DISTRICT, MAUI COUNTY

Fiscal year ending June 30, 2022

District	Services	Change from FY 2021	Consumption (1,000 gal)	Change from FY 2021 (1,000 gal)
Wailuku District				
Wailuku	6,809	171	1,505,540	35,380
Waihe'e	202	1	25,955	2,329
Waikapū	973	(2)	145,157	7,352
Wailuku Heights	499	0	72,966	1,088
Kahului	5,350	(2)	1,526,710	34,240
Pu'unēnē	11	(1)	3,506	141
Kīhei	6,063	(3)	4,007,493	301,651
Mā'alaea	45	(1)	85,322	10,281
Mākena	211	(2)	256,807	9,853
Pā'ia-Kū'au	914	1	152,798	12,031
Spreckelsville	205	(1)	81,680	2,295
Subtotal	21,282	161	7,863,934	416,641
Makawao District				
Kokomo-Kaupakalua	1,170	3	176,239	(8,637)
Kuiaha	306	0	50,466	(3,415)
Ha'ikū-Pa'uwela	868	4	123,736	(8,731)
Makawao	2,031	0	290,534	(11,385)
Pukalani	2,149	2	321,370	(11,680)
Hāli'imaile	201	1	33,781	1,519
Upper Kula	2,363	6	487,079	4,943
Lower Kula	1,137	6	632,750	(121,359)
'Ulupalakua-Kanaio	81	(1)	53,451	758
Kula Ag. Park	39	0	157,263	11,442
Subtotal	10,345	21	2,326,669	(146,545)
Lahaina District				
Lahaina	2,189	(9)	862,185	60,044
Honokōwai	450	(8)	501,260	71,577
'Alaeloa	809	0	545,612	67,649
Honokōhau	13	0	934	(275)
Subtotal	3,461	(17)	1,909,991	198,995
Moloka'i District				
Kawela-Kaunakakai	1,183	0	201,032	5,426
'Ualapu'e	398	(1)	73,101	8,688
Kala'e	114	0	8,123	22
Hālawa	6	0	0	0
Subtotal	1,701	(1)	282,256	14,136
Hāna District				
Hāna	408	0	62,563	3,582
Nāhiku	38	0	3,308	245
Ke'anae	86	0	8,069	1,703
Kaupō	21	0	2,574	(104)
Subtotal	553	0	76,514	5,426
Total All Districts	37,342	164	12,459,364	488,653

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2022.

7.1.11

**WATER CONSUMPTION BY DISTRICT
MAUI COUNTY**

Fiscal year ending June 30, 2022; In 1,000 gallons

Months	Total	Wailuku	Makawao	Kula	Lahaina	Moloka‘i	Hāna
General							
July	1,085,532	713,332	94,178	56,613	188,885	26,240	6,284
August	1,084,216	738,165	81,735	55,760	173,042	29,994	5,520
September	997,093	677,319	73,677	49,659	171,404	19,507	5,527
October	963,654	646,924	73,470	53,890	162,377	22,050	4,943
November	959,397	646,219	72,445	59,578	153,538	23,147	4,470
December	871,282	576,490	78,758	35,257	155,812	18,421	6,544
January	847,993	575,388	69,509	40,297	138,472	18,718	5,609
February	817,776	560,983	72,218	46,475	130,716	2,844	4,540
March	870,753	565,938	73,968	44,472	139,642	39,630	7,103
April	1,013,318	683,173	84,615	53,253	167,732	18,602	5,943
May	903,496	607,512	72,546	46,598	147,279	23,997	5,564
June	1,032,841	692,873	91,191	56,772	160,371	24,855	6,829
Total	11,447,351	7,684,316	938,310	598,574	1,889,270	268,005	68,876
Agricultural							
July	97,109	14,963	6,967	71,013	2,308	1,391	467
August	37,275	18,333	5,181	10,329	1,566	1,287	579
September	98,109	17,124	5,261	72,349	1,589	1,058	728
October	95,955	16,683	5,443	70,095	1,616	1,295	823
November	95,042	20,500	4,285	66,241	2,006	1,227	783
December	78,686	16,887	4,007	55,150	1,877	422	343
January	69,208	13,873	3,531	49,196	1,703	563	342
February	74,430	11,313	4,116	56,991	1,343	-	667
March	85,289	14,957	4,411	60,509	1,598	2,319	1,495
April	102,236	14,793	5,239	78,695	1,655	1,377	477
May	78,498	10,818	3,779	60,250	1,649	1,577	425
June	100,176	9,374	5,596	81,151	1,811	1,735	509
Total	1,012,013	179,618	57,816	731,969	20,721	14,251	7,638
Grand Total	12,459,364	7,863,934	996,126	1,330,543	1,909,991	282,256	76,514

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2022.