

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	6	1970
Canada-France-Hawai'i 3.6-m (Optical/Infrared)	30	7.4	45	1979
NASA IRTF 3.0-m (Infrared)	10	5.1	19	1979
United Kingdom 3.8-m (Infrared)	5	2.2	6	1979
James Clerk Maxwell 15-m Submillimeter	32	4.7	35	1986
Caltech 10.4-m Submillimeter	10	0.6	5	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	13.5	120	1992/1996
Subaru (Japan National Large Telescope)				
8-m (Optical/Infrared)	170	17.0	101	1999
Fredrick C. Gillett Gemini 8m (Optical/Infrared)	92	13.7	83	1999
Submillimeter Array 8x6-m	80	5.5	23	2003
Mauna Kea Observatories Support Services	X	5.4 ²	44	1980
Total	601	72.4	484	
Haleakalā Observatories:				
Mees Solar Observatory	0.5	0.2	1	1963
Haleakalā Observatories Projects	NA	0.5	4	NA
Maui Space Surveillance Site (MSSS)	250.0	26.3	117	1965
Ground-Based Electro-Optical Deep Space				
Surveillance (GEODSS)	25.0	6.1	16	1983
Faulkes 2-m Telescope	10.0	0.6	2	2003
Transportable Laser Ranging System (TLRS4)	0.6	0.5	5	2005
Panoramic Survey Telescope And Rapid Re-				
sponse				
System (Pan-STARRS)	55.0	5.6	11	2009
Haleakalā Support Facilities	8.6	0.6	11	1962/2008
Total	349.7	40.4	167	

NA Not available. X Not applicable.

Note: Data as of March 2016 for Mauna Kea and 2014 for Haleakalā.

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.

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

7.1.2
**ELECTRIC UTILITIES
 MAUI COUNTY**

	2010	2011	2012	2013	2014
Customers, Dec 31					
Total					
Maui Island	62,992	63,433	64,047	64,657	65,124
Moloka'i	3,127	3,164	3,198	3,211	3,186
Lāna'i	1,620	1,633	1,677	1,709	1,732
Maui County	67,739	68,230	68,922	69,577	70,042
Residential					
Maui Island	53,848	54,305	54,785	55,301	55,670
Moloka'i	2,596	2,611	2,643	2,649	2,648
Lāna'i	1,391	1,410	1,451	1,469	1,484
Maui County	57,835	58,326	58,879	59,419	59,802
Other					
Maui Island	9,144	9,128	9,262	9,356	9,454
Moloka'i	531	553	555	562	538
Lāna'i	229	223	226	240	248
Maui County	9,904	9,904	10,043	10,158	10,240
Peak Demand (mW)¹					
Maui Island	203.8	194.1	194.8	194.8	190.3
Moloka'i	5.7	5.8	5.5	5.5	5.4
Lāna'i	4.8	4.7	4.6	4.6	5.0
Power Sold (1,000 kWh)					
Total					
Maui Island	1,135,141	1,125,556	1,090,179	1,079,935	1,076,321
Moloka'i	31,451	30,685	29,942	29,380	29,207
Lāna'i	24,967	24,785	24,712	25,558	26,529
Maui County	1,191,559	1,181,026	1,144,833	1,134,873	1,132,056
Residential					
Maui Island	408,068	403,908	398,869	377,209	369,877
Moloka'i	12,261	12,041	11,700	10,951	10,459
Lāna'i	7,614	7,377	7,358	7,186	7,572
Maui County	427,943	423,326	417,927	395,346	387,908
Other					
Maui Island	726,245	731,233	726,687	712,970	710,058
Moloka'i	19,573	19,410	18,985	18,991	18,921
Lāna'i	18,483	17,590	17,427	17,526	17,985
Maui County	764,301	768,233	763,099	749,487	746,964

7.1.2

CONTINUED

	2010	2011	2012	2013	2014
Average Annual Use, Dec 31 (kWh)					
Residential					
Maui Island	7,501	7,345	6,885	6,688	6,542
Moloka'i	4,638	4,481	4,143	3,948	3,744
Lāna'i	5,303	5,218	4,952	5,155	5,317
Other					
Maui Island	79,969	79,611	76,978	75,893	75,327
Moloka'i	36,554	34,332	34,217	33,667	35,858
Lāna'i	76,812	78,149	77,549	74,938	75,156
Average Rate (dollars per kWh)					
Residential					
Maui Island	0.29453	0.35774	0.38709	0.37824	0.37827
Moloka'i	0.35778	0.43025	0.46129	0.46435	0.47062
Lāna'i	0.37102	0.44049	0.46612	0.46344	0.45848
Other					
Maui Island	0.27890	0.34497	0.37238	0.36193	0.36142
Moloka'i	0.36182	0.43526	0.45633	0.45530	0.45366
Lāna'i	0.37470	0.44506	0.47129	0.46317	0.45907
Revenues (\$1,000)					
Total					
Maui Island	322,903	393,156	411,509	396,894	395,142
Moloka'i	11,331	13,298	13,718	13,471	13,418
Lāna'i	9,328	10,997	11,609	11,840	12,174
Maui County	343,562	417,451	436,836	422,205	420,734
Residential					
Maui Island	118,962	142,692	146,013	139,902	137,757
Moloka'i	4,308	5,034	5,052	4,856	4,666
Lāna'i	2,737	3,241	3,349	3,509	3,617
Maui County	126,007	150,967	154,414	148,267	146,040
Other					
Maui Island	203,941	250,464	265,496	256,991	257,385
Moloka'i	7,023	8,264	8,666	8,615	8,752
Lāna'i	6,591	7,756	8,260	8,330	8,557
Maui County	217,555	266,484	282,422	273,936	274,694

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 UTILITY COMPANIES (HAWAIIAN ELECTRIC COMPANY, MAUI ELECTRIC COMPANY, HAWAII ELECTRIC LIGHT COMPANY AND KAUA'I ISLAND UTILITY COOPERATIVE),
CALCULATIONS BY DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM.

7.1.3
GAS UTILITIES
MAUI COUNTY

Excludes bottled gas

	2010	2011	2012	2013	2014
Island of Maui					
Customers, Dec. 31					
Residential	427	431	428	420	423
Other	86	86	88	90	88
Total	513	517	516	510	511
Gas Sold (1,000 therms)					
Residential	108	109	111	107	104
Other	769	749	777	770	798
Total	877	858	888	876	902
Average Annual Use (therms)					
Residential	252	252	259	254	246
Other	8,941	8,711	8,825	8,551	9,065
Average Rate (dollar per therm)					
Residential	3.91045	4.30770	4.12958	3.90245	4.26276
Other	2.53368	2.91648	2.78814	2.54380	2.86278
Revenues (\$1,000)					
Residential	421	468	458	417	443
Other	1,948	2,185	2,165	1,958	2,284
Total	2,369	2,653	2,624	2,374	2,727
Islands of Moloka'i and Lāna'i¹					
Customers, Dec. 31					
Moloka'i	78	83	85	91	84
Lāna'i	17	22	20	21	22
Gas Sold (1,000 therms)					
Moloka'i	13	12	16	15	15
Lāna'i	1	1	2	3	3
Average Annual Use (therms)					
Moloka'i	163	145	184	165	181
Lāna'i	75	65	115	136	129
Average Rate (dollar per therm)					
Moloka'i	4.57941	4.94771	4.74503	4.52344	4.85508
Lāna'i	6.14759	6.70154	5.66075	5.17527	5.54700
Revenues (\$1,000)					
Moloka'i	58	60	74	68	74
Lāna'i	8	10	13	15	16

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

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

7.1.4

ENERGY CONSUMPTION ESTIMATES BY SOURCE HAWAI'I STATE ENERGY REPORT

In trillion BTU

	2009	2010	2011	2012	2013
Coal	19.0	17.1	16.1	16.6	15.3
Natural Gas	0.2	0.2	0.2	0.2	0.2
Petroleum					
Distillate fuel oil	35.0	39.6	36.5	35.2	33.0
Jet fuel	52.7	55.8	62.1	64.1	64.2
Liquefied petroleum gas	3.1	3.2	3.4	3.4	3.2
Motor gasoline	51.6	48.0	53.3	50.7	51.0
Residual fuel oil	77.9	74.7	73.6	67.4	65.2
Other	15.3	16.2	16.7	17.0	16.3
Total Petroleum	235.7	237.5	245.5	237.9	233.0
Renewable Energy					
Hydroelectric	1.1	0.7	0.9	1.1	0.7
Biomass	12.2	10.4	10.6	9.6	11.2
Wood and waste	8.6	7.7	7.3	6.7	8.2
Ethanol fuel	3.6	2.8	3.2	2.9	3.0
Geothermal	1.6	2.0	2.2	2.5	2.6
Solar / Photovoltaic	2.6	3.4	4.6	6.7	9.3
Wind	2.5	2.5	3.3	3.6	4.8
Total Renewable Energy	20.1	19.0	21.6	23.5	28.6
Total Energy Consumption	274.9	273.8	283.4	278.2	277.1

Note: Revised data from 2009 to 2013. Totals may not equal sum of components due to independent rounding.

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

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Number of Services									
Maui County	33,123	33,675	34,682	35,444	35,540	35,611	35,698*	35,753	35,866	36,040
Maui	31,510	32,045	33,032	33,789	33,876	33,947	34,038*	34,090	34,200	34,373
Moloka'i	1,613	1,630	1,650	1,655	1,664	1,664	1,660*	1,663	1,666	1,667
	Consumption (million gallons)									
Maui County	12,961	13,186	13,258	12,797	12,074	12,214	12,371	12,675	13,253	11,851
Maui	12,644	12,883	12,961	12,510	11,794	11,916	12,089	12,410	12,958	11,592
Moloka'i	317	303	297	287	280	298	282	265	295	259

* Revised data.

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

7.1.6

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

In thousands of gallons

Area	01/15	02/15	03/15	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	Previous 12 Months
Central Maui													
Groundwater-Īao	13,519	12,091	12,729	14,007	13,763	13,804	15,192	14,272	14,078	14,094	13,298	14,887	13,811
Īao Tunnel	3,105	3,421	3,478	4,821	4,787	4,838	4,856	4,917	5,028	4,988	4,914	3,196	4,362
Groundwater-Waihe'e	711	722	727	727	727	727	727	727	720	720	718	719	723
Kepaniwai	1,524	1,530	1,543	1,545	1,468	1,462	1,473	1,501	1,509	1,505	1,452	1,498	1,501
Maui Lani	867	737	915	1,069	1,109	1,106	1,042	1,069	1,091	1,101	1,061	1,092	1,022
Surface water	1,023	981	308	621	588	1,201	653	1,007	1,007	539	1,209	1,418	880
Upcountry Maui													
Surface water	5,217	4,848	5,019	5,670	5,739	6,090	6,546	5,924	4,707	5,199	5,597	5,309	5,489
Groundwater	925	1,117	966	872	842	925	992	947	905	850	831	850	919
West Maui													
Surface water	2,858	2,997	2,886	3,132	3,412	3,580	3,659	3,443	2,971	3,173	3,364	3,432	3,242
Groundwater	2,451	2,104	2,125	2,339	2,038	2,519	2,445	2,449	2,586	2,544	1,985	2,007	2,299
East Maui													
Groundwater	560	537	524	536	514	540	550	546	569	568	564	607	551
Moloka'i													
Groundwater	746	762	781	942	939	987	1,029	967	802	812	662	802	853
Total Water Production	33,506	31,847	32,001	36,281	35,926	37,779	39,165	37,769	35,972	36,093	35,656	35,816	35,651

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 2016)

Schedule A		Schedule B (meter size)	Per meter/ per month
Family Dwellings, 5/8" meters			
0 - 5,000 gal	\$1.90	5/8 inch	\$17.50
5,001 - 15,000	\$3.60	3/4 inch	\$28.00
15,001 - 35,000	\$5.40	1 inch	\$42.00
Over 35,000	\$6.05	1 1/2 inch	\$80.00
Rates (all others)			
0 - 5,000 gal	\$1.90	2 inch	\$125.00
5,001 - 15,000	\$3.60	3 inch	\$220.00
Over 15,000	\$5.40	4 inch	\$380.00
Agricultural Rates			
Over 15,000	\$1.00	6 inch	\$700.00
Non-potable Agricultural Rates			
All usage	\$0.75	8 inch	\$1,100.00

**Water System
Development Fee Schedule**

Meter Size	Fee
5/8 inch	\$6,030
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

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY.

7.1.8

WATER SERVICE BY METER SIZE MAUI COUNTY

Fiscal year ending June 30, 2014

District	5/8"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	Total
Regular Rates										
Wailuku	17,338	1,514	559	419	415	60	30	6	1	20,342
Makawao	8,714	317	175	70	27	14	3	1	0	9,321
Lahaina	2,675	249	134	126	122	25	9	2	0	3,342
Hāna	512	12	9	5	4	0	0	0	0	542
Moloka'i	1,541	44	32	16	18	2	0	1	0	1,654
Subtotal	30,780	2,136	909	636	586	101	42	10	1	35,201
Agricultural Meters										
Wailuku	34	11	9	5	3	2	1	0	0	65
Makawao	433	72	93	98	36	0	3	0	0	735
Lahaina	8	3	5	0	1	0	1	0	0	18
Hāna	7	0	1	0	0	0	0	0	0	8
Moloka'i	7	4	2	0	0	0	0	0	0	13
Subtotal	489	90	110	103	40	2	5	0	0	839
Total	31,269	2,226	1,019	739	626	103	47	10	1	36,040

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2014.

7.1.9

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

Fiscal year ending June 30, 2014

	1,000 Gallons	Amount	Cost per 1,000 Gallons
Purchased from			
East Maui Irrigation	2,210,925	133,319	0.060
Wailuku Water Co.	543,921	279,441	0.514
Kapalua Land Co.	597,747	165,659	0.277
Hawaiian Home Lands	9,865	63,738	6.461
Total	3,362,458	642,156	0.191
District			
Wailuku	543,921	279,441	0.514
Kula	249,178	15,025	0.060
Makawao	1,957,323	118,027	0.060
Lahaina	595,747	165,659	0.277
Hāna	4,425	267	0.060
Moloka'i	9,865	63,738	6.461
Total	3,362,458	642,156	0.191

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2014.

7.1.10

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

Fiscal year ending June 30, 2014

System	Services	Change from FY 2013	Consumption (1,000 gal)	Change from FY 2013 (1,000 gal)
Wailuku District				
Wailuku	5,871	76	1,251,915	(299,960)
Waihe'e	193	0	25,472	(6,758)
Waikapū	915	0	113,772	(21,820)
Wailuku Heights	491	0	76,716	(15,429)
Kahului	4,754	32	1,466,479	(68,263)
Pu'unēnē	14	0	57,818	3,656
Kīhei	6,812	35	3,804,616	(333,416)
Mā'alaea	46	0	102,703	(24,759)
Mākena	201	0	239,751	(21,357)
Pā'ia-Kū'au	907	0	154,913	(16,453)
Spreckelsville	203	0	66,889	(8,754)
Subtotal	20,407	143	7,361,044	(813,313)
Makawao District				
Kokomo-Kaupakalua	1,125	3	148,349	(3,785)
Kuiaha	301	0	47,840	2,187
Ha'ikū-Pa'uwela	851	4	120,003	5,728
Makawao	1,990	4	313,891	(13,837)
Pukalani	2,066	3	351,028	(36,329)
Hāli'imaile	200	0	33,479	6,881
Upper Kula	2,298	9	606,814	(127,536)
Lower Kula	1,105	6	984,228	(290,234)
'Ulupalakua-Kanaio	81	0	70,121	(19,284)
Kula Ag. Park	39	0	211,388	(60,622)
Subtotal	10,056	29	2,887,141	(536,831)
Lahaina District				
Lahaina	2,101	0	760,987	(36,115)
Honokōwai	451	1	491,154	(10,035)
'Alaelo	795	0	561,244	21,250
Honokōhau	13	0	1,071	326
Subtotal	3,360	1	1,814,456	(24,574)
Moloka'i District				
Kawela-Kaunakakai	1,176	1	185,815	31,319
'Ualapu'e	1	0	64,797	3,877
Kala'e	379	0	8,415	630
Hālawa	111	0	0	0
Subtotal	1,667	1	259,027	35,826
Hāna District				
Hāna	402	0	54,809	9,979
Nāhiku	40	0	2,837	(468)
Ke'anae	87	0	7,230	(501)
Kaupō	21	0	2,114	708
Subtotal	550	0	66,990	9,718

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2014.

7.1.11

**WATER CONSUMPTION BY DISTRICT
MAUI COUNTY**

Fiscal year ending June 30, 2014; In 1,000 gallons

Months	Total	Wailuku	Makawao	Kula	Lahaina	Moloka'i	Hāna
General							
July	941,023	614,915	81,041	48,576	156,619	27,655	12,217
August	1,019,053	657,095	92,486	58,563	181,628	26,673	2,608
September	1,037,016	682,296	95,341	62,524	168,211	23,582	5,062
October	928,637	607,425	82,982	52,844	161,064	19,800	4,522
November	985,338	669,143	87,917	51,769	156,596	15,291	4,622
December	859,179	572,226	73,291	41,374	145,494	21,930	4,864
January	886,692	595,039	77,246	40,673	152,065	17,063	4,606
February	755,268	503,397	64,883	31,228	138,381	13,218	4,161
March	703,077	486,395	62,155	28,115	106,471	15,826	4,115
April	768,341	517,032	59,617	41,577	126,457	19,382	4,276
May	855,280	580,412	62,539	39,303	149,586	18,606	4,834
June	924,476	642,361	60,632	47,689	146,755	22,481	4,559
Total	10,663,380	7,127,736	900,130	544,235	1,789,327	241,507	60,446
Agricultural							
July	102,708	17,564	7,439	73,247	2,102	1,411	945
August	121,451	25,186	8,529	83,242	2,256	1,850	478
September	156,081	25,878	9,384	116,824	2,015	962	1,018
October	120,940	21,229	7,182	86,812	2,859	2,438	420
November	109,523	17,378	8,841	77,714	3,305	1,803	482
December	83,171	14,217	6,469	57,559	2,098	2,377	451
January	76,654	12,241	6,127	54,120	2,108	1,804	254
February	55,342	15,302	4,525	32,667	1,412	969	467
March	63,051	10,262	4,207	44,339	2,084	1,775	384
April	87,869	32,625	3,476	48,947	1,538	856	427
May	105,126	20,484	3,734	77,598	1,904	700	706
June	106,443	20,943	5,393	77,572	1,448	575	512
Total	1,188,359	233,309	75,306	830,641	25,129	17,520	6,544
Grand Total	11,851,739	7,361,045	975,436	1,374,876	1,814,456	259,027	66,990

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2014.