

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 scheduled to be operational by 2020.

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

	2013	2014	2015	2016	2017
Customers, Dec 31					
Total					
Maui Island	64,657	65,124	65,603	65,922	66,394
Moloka'i	3,211	3,186	3,212	3,212	3,226
Lāna'i	1,709	1,732	1,718	1,738	1,732
Maui County	69,577	70,042	70,533	70,872	71,352
Residential					
Maui Island	55,301	55,670	56,085	56,318	56,728
Moloka'i	2,649	2,648	2,672	2,671	2,689
Lāna'i	1,469	1,484	1,474	1,486	1,485
Maui County	59,419	59,802	60,231	60,475	60,902
Other					
Maui Island	9,356	9,454	9,518	9,604	9,666
Moloka'i	562	538	540	541	537
Lāna'i	240	248	244	252	247
Maui County	10,158	10,240	10,302	10,397	10,450
Peak Demand (mW)¹					
Maui Island	194.8	190.3	194.7	222.0	202.9
Moloka'i	5.5	5.4	5.3	6.0	5.9
Lāna'i	4.6	5.0	4.8	5.0	6.0
Power Sold (1,000 kWh)					
Total					
Maui Island	1,079,935	1,076,321	1,083,129	1,059,576	1,036,638
Moloka'i	29,380	29,207	28,685	28,169	28,199
Lāna'i	25,558	26,529	25,817	29,997	29,947
Maui County	1,134,873	1,132,056	1,137,630	1,117,742	1,094,784
Residential					
Maui Island	369,877	364,174	363,863	348,787	345,906
Moloka'i	10,459	9,915	9,811	10,000	10,379
Lāna'i	7,572	7,890	7,492	7,569	7,407
Maui County	387,908	381,979	381,167	366,356	363,692
Other					
Maui Island	710,058	712,146	719,265	710,789	690,732
Moloka'i	18,921	19,292	18,873	18,169	17,820
Lāna'i	17,985	18,639	18,325	22,428	22,540
Maui County	746,964	750,077	756,464	751,386	731,093

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7.1.2

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	2013	2014	2015	2016	2017
Average Annual Use, Dec 31 (kWh)					
Residential					
Maui Island	6,688	6,542	6,488	6,193	6,098
Moloka'i	3,948	3,744	3,672	3,744	3,860
Lāna'i	5,155	5,317	5,083	5,094	4,988
Other					
Maui Island	75,893	75,327	75,569	74,010	71,460
Moloka'i	33,667	35,858	34,951	33,584	33,184
Lāna'i	74,938	75,156	75,103	89,000	91,257
Average Rate (dollars per kWh)					
Residential					
Maui Island	0.37824	0.37827	0.31048	0.28485	0.30644
Moloka'i	0.46435	0.47062	0.37597	0.32700	0.35574
Lāna'i	0.46344	0.45848	0.37630	0.33518	0.35872
Other					
Maui Island	0.36193	0.36142	0.29260	0.26509	0.28580
Moloka'i	0.45530	0.45366	0.35837	0.31042	0.33900
Lāna'i	0.46317	0.45907	0.38325	0.33645	0.35839
Revenues (\$1,000)					
Total					
Maui Island	396,894	395,142	323,427	287,774	303,413
Moloka'i	13,471	13,418	10,452	8,910	9,733
Lāna'i	11,840	12,174	9,842	10,083	10,735
Maui County	422,205	420,734	343,722	306,767	323,882
Residential					
Maui Island	139,902	137,757	112,973	99,352	105,999
Moloka'i	4,856	4,666	3,689	3,270	3,692
Lāna'i	3,509	3,617	2,819	2,537	2,657
Maui County	148,267	146,040	119,481	105,159	112,348
Other					
Maui Island	256,991	257,385	210,455	188,422	197,414
Moloka'i	8,615	8,752	6,764	5,640	6,041
Lāna'i	8,330	8,557	7,023	7,546	8,078
Maui County	273,936	274,694	224,241	201,608	211,533

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

	2013	2014	2015	2016	2017
Island of Maui					
Customers, Dec. 31					
Residential	420	423	423	417	448
Other	90	88	89	89	89
Total	510	511	512	506	535
Gas Sold (1,000 therms)					
Residential	107	104	100	98	102
Other	770	798	740	710	736
Total	876	902	840	809	838
Average Annual Use (therms)					
Residential	254	246	237	236	229
Other	8,551	9,065	8,314	7,982	8,269
Average Rate (dollar per therm)					
Residential	3.90245	4.26276	3.88384	3.47193	3.30761
Other	2.54380	2.86278	2.43153	2.03090	1.90937
Revenues (\$1,000)					
Residential	417	443	390	341	339
Other	1,958	2,284	1,799	1,443	1,405
Total	2,374	2,727	2,189	1,784	1,744
Islands of Moloka'i and Lāna'i¹					
Customers, Dec. 31					
Moloka'i	91	84	82	84	82
Lāna'i	21	22	22	22	22
Gas Sold (1,000 therms)					
Moloka'i	15	15	14	16	15
Lāna'i	3	3	3	4	4
Average Annual Use (therms)					
Moloka'i	165	181	175	192	180
Lāna'i	136	129	136	169	176
Average Rate (dollar per therm)					
Moloka'i	4.52344	4.85508	4.37824	3.87047	3.84605
Lāna'i	5.17527	5.54700	5.07402	4.48074	4.41766
Revenues (\$1,000)					
Moloka'i	68	74	63	62	57
Lāna'i	15	16	15	17	17

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

	2012	2013	2014	2015	2016
Coal	16.6	15.3	17.2	15.6	16.4
Natural Gas	0.2	0.2	0.2	0.2	0.2
Petroleum					
Distillate fuel oil	35.2	33.0	25.2	27.3	26.2
Jet fuel	64.1	64.2	73.3	76.1	74.3
Liquefied petroleum gas	3.4	3.2	3.2	2.7	3.1
Motor gasoline	50.7	51.0	51.5	51.5	52.7
Residual fuel oil	67.4	65.2	62.1	61.3	60.9
Other	17.0	16.3	0.0	0.0	17.8
Total Petroleum	237.9	233.0	234.2	218.9	234.9
Renewable Energy					
Hydroelectric	1.1	0.7	0.9	1.1	0.8
Biomass	9.6	11.2	11.4	11.5	12.5
Wood and waste	6.7	8.2	7.5	7.5	8.5
Ethanol fuel	2.9	3.0	3.9	3.9	4
Geothermal	2.5	2.6	2.2	2.2	2.4
Solar / Photovoltaic	6.7	9.3	8.4	8.4	9.8
Wind	3.6	4.8	5.7	5.7	5.9
Total Renewable Energy	23.5	28.6	28.6	28.8	31.4
Total Energy Consumption	278.2	277.1	280.2	263.5	282.9

Note: 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

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Number of Services									
Maui County	35,540	35,611	35,698	35,753	35,866	36,040	36,104	36,211	36,365	36,615
Maui	33,876	33,947	34,038	34,090	34,200	34,373	34,439	34,552	34,692	34,931
Moloka'i	1,664	1,664	1,660	1,663	1,666	1,667	1,665	1,659	1,673	1,684
	Consumption (million gallons)									
Maui County	12,074	12,214	12,371	12,675	13,253	11,851	11,684	11,785	11,624	11,750
Maui	11,794	11,916	12,089	12,410	12,958	11,592	11,427	11,523	11,376	11,509
Moloka'i	280	298	282	265	295	259	257	262	248	241

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, 2018**

In thousands of gallons

Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Previous 12 Months
Central Maui													
Groundwater-Īao	15,939	13,743	14,703	13,400	15,639	17,828	18,368	16,612	15,965	16,214	15,218	15,292	15,743
Īao Tunnel	1,477	1,483	1,548	1,555	1,542	1,581	1,567	1,638	1,579	1,576	1,590	1,589	1,560
Groundwater-Waihe'e	3,475	3,500	3,811	3,983	3,962	4,176	4,273	4,398	4,340	3,972	3,942	4,205	4,003
Kepaniwai	715	718	720	720	720	715	714	711	716	720	720	717	717
Maui Lani	1,088	1,097	1,100	1,099	1,078	1,098	1,097	1,095	1,125	1,095	1,098	1,100	1,098
Surface water	472	208	573	398	0	182	39	20	0	128	1,333	679	336
Upcountry Maui													
Surface water	6,004	4,647	4,817	4,538	5,057	6,680	6,937	6,233	5,678	5,430	5,326	5,603	5,579
Groundwater	836	708	796	774	757	567	579	617	785	762	804	987	748
West Maui													
Surface water	3,540	3,621	3,866	3,730	3,849	3,783	3,896	3,959	3,598	3,362	3,632	3,545	3,698
Groundwater	1,908	1,218	1,306	1,142	1,438	2,209	2,318	1,772	1,619	1,900	1,533	1,584	1,662
East Maui													
Groundwater	303	309	321	356	305	372	323	340	341	341	267	291	322
Moloka'i													
Groundwater	810	715	818	781	885	1,020	1,018	955	829	825	883	794	861
Total Water Production	36,566	31,967	34,379	32,476	35,232	40,211	41,129	38,349	36,575	36,325	36,346	36,387	36,329

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 2018)

Schedule A		Schedule B (Meter Size)	Per meter/ per month
Family Dwellings, 5/8" meters			
0 - 5,000 gal	\$2.00	5/8 inch	\$19.25
5,001 - 15,000	\$3.80	3/4 inch	\$31.00
15,001 - 35,000	\$5.70	1 inch	\$46.00
Over 35,000	\$6.35	1 1/2 inch	\$88.00
Rates (All Others)			
0 - 5,000 gal	\$2.00	2 inch	\$137.00
5,001 - 15,000	\$3.80	3 inch	\$242.00
Over 15,000	\$5.70	4 inch	\$420.00
Agricultural Rates			
Over 15,000	\$1.10	6 inch	\$770.00
Non-Potable Agricultural Rates			
All usage	\$1.00	8 inch	\$1,215.00

**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, 2018

District	5/8"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	Total
Regular Rates										
Wailuku	17,449	1,704	591	436	426	58	35	6	1	20,706
Makawao	8,999	351	187	81	35	9	1	2	0	9,665
Lahaina	2,704	279	141	128	124	30	10	2	0	3,418
Hāna	462	42	9	6	4	0	0	0	0	523
Moloka'i	1,564	44	33	15	17	2	0	1	0	1,676
Subtotal	31,178	2,420	961	666	606	99	46	11	1	35,988
Agricultural Meters										
Wailuku	28	15	7	3	1	2	1	0	0	57
Makawao	286	52	68	82	31	0	0	0	0	519
Lahaina	4	3	5	0	1	0	1	0	0	14
Hāna	27	0	2	0	0	0	0	0	0	29
Moloka'i	5	1	2	0	0	0	0	0	0	8
Subtotal	350	71	84	85	33	2	2	0	0	627
Total	31,528	2,491	1,045	751	639	101	48	11	1	36,615

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2018.

7.1.9

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

Fiscal year ending June 30, 2018

	1,000 Gallons	Amount	Cost per 1,000 Gallons
Purchased from			
East Maui Irrigation	2,234,467	134,738	0.060
Wailuku Water Co.	220,769	118,001	0.535
Maui Land & Pine	659,657	181,963	0.276
Hawaiian Home Lands*	7,372	48,115	6.527
Total	3,122,266	482,818	0.155
District			
Wailuku	220,769	118,001	0.535
Kula	190,572	11,492	0.060
Makawao	2,036,563	122,805	0.060
Lahaina	659,657	181,963	0.276
Hāna	7,332	442	0.060
Moloka'i	7,372	48,115	6.527
Total	3,122,266	482,818	0.155

* Billed bi-monthly.

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2018.

7.1.10

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

Fiscal year ending June 30, 2018

District	Services	Change from FY 2017	Consumption (1,000 gal)	Change from FY 2017 (1,000 gal)
Wailuku District				
Wailuku	6,370	81	1,305,111	32,058
Waihe'e	196	1	25,226	3,466
Waikapū	970	1	124,417	2,990
Wailuku Heights	497	1	68,386	1,753
Kahului	5,336	32	1,503,536	64,277
Pu'unēnē	11	0	16,378	(6,345)
Kīhei	6,017	9	3,908,780	15,320
Mā'alaea	45	0	107,242	19,372
Mākena	203	0	212,718	(3,966)
Pā'ia-Kū'au	912	4	151,581	7,352
Spreckelsville	206	1	60,138	(2,035)
Subtotal	20,763	130	7,483,513	134,242
Makawao District				
Kokomo-Kaupakalua	1,147	2	148,680	7,010
Kuiaha	302	0	43,626	(665)
Ha'ikū-Pa'uwela	853	4	119,911	12,117
Makawao	2,016	1	268,910	6,592
Pukalani	2,122	48	310,006	16,812
Hāli'imaile	200	1	34,753	539
Upper Kula	2,312	3	420,368	(21,863)
Lower Kula	1,112	7	611,233	5,591
'Ulupalakua-Kanaio	81	(1)	45,746	(927)
Kula Ag. Park	39	0	140,512	(3,867)
Subtotal	10,184	65	2,143,745	21,339
Lahaina District				
Lahaina	2,166	39	800,722	4,190
Honokōwai	450	1	507,708	872
'Alaeloa	803	1	513,282	(25,727)
Honokōhau	13	0	1,048	(177)
Subtotal	3,432	41	1,822,760	(20,842)
Moloka'i District				
Kawela-Kaunakakai	1,169	7	178,135	(11,054)
'Ualapu'e	396	4	55,254	4,251
Kala'e	113	0	7,264	(594)
Hālawa	6	0	0	(1,006)
Subtotal	1,684	11	240,653	(8,403)
Hāna District				
Hāna	407	4	48,172	155
Nāhiku	38	(1)	3,046	(285)
Ke'anae	86	0	6,179	(1,169)
Kaupō	21	0	1,516	(163)
Subtotal	552	3	58,913	(1,462)

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2018.

7.1.11

**WATER CONSUMPTION BY DISTRICT
MAUI COUNTY**

Fiscal year ending June 30, 2018; In 1,000 gallons

Months	Total	Wailuku	Makawao	Kula	Lahaina	Moloka'i	Hāna
General							
July	994,024	678,566	87,668	52,980	169,530	794	4,486
August	960,931	624,709	74,766	48,266	158,905	49,497	4,788
September	1,088,432	727,213	92,870	54,327	189,707	21,604	2,711
October	935,756	625,240	80,035	45,805	155,950	22,917	5,809
November	924,539	625,042	74,183	48,769	153,928	17,754	4,863
December	820,999	555,509	66,109	32,595	145,738	17,161	3,887
January	843,751	580,049	66,467	41,597	131,962	18,760	4,916
February	827,217	562,517	69,751	36,541	154,043	1,231	3,134
March	715,974	482,109	60,240	33,489	119,260	15,267	5,609
April	826,669	550,970	69,295	33,482	137,398	31,592	3,932
May	797,369	554,548	60,526	32,965	124,231	21,457	3,642
June	975,031	665,732	74,250	50,591	161,731	17,627	5,100
Total	10,710,692	7,232,204	876,160	511,407	1,802,383	235,661	52,877
Agricultural							
July	111,223	25,510	5,848	77,284	2,047	0	534
August	98,391	20,559	4,611	69,681	1,979	951	610
September	121,223	28,820	5,517	83,630	2,559	491	206
October	103,528	24,775	5,382	69,715	2,176	356	1,124
November	83,613	21,452	4,633	54,996	1,791	243	498
December	73,816	20,986	3,262	47,069	1,792	368	339
January	77,664	18,622	3,495	53,457	1,276	373	441
February	68,187	18,052	4,282	43,902	1,467	27	457
March	61,140	14,999	2,796	41,401	1,075	351	518
April	66,305	16,260	3,567	43,985	1,457	711	325
May	65,460	17,324	2,506	43,704	1,030	455	441
June	108,342	23,950	3,827	77,628	1,728	666	543
Total	1,038,892	251,309	49,726	706,452	20,377	4,992	6,036
Grand Total	11,749,584	7,483,513	925,886	1,217,859	1,822,760	240,653	58,913

SOURCE: COUNTY OF MAUI, DEPARTMENT OF WATER SUPPLY, ANNUAL REPORT FY 2018.