

Energy & Science



Section 7

ENERGY & SCIENCE

The increase in Hawai'i 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.

The cumulative number of photovoltaic systems has almost tripled from 3,392 in 2012 to 9,664 in 2015.

Ongoing scientific endeavors include observation of astronomical and man-made space objects from the summits of Mauna Kea and 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 AT MANOA, INSTITUTE FOR ASTRONOMY.

7.1.2

ELECTRIC UTILITIES HAWAI'I COUNTY

	2010	2011	2012	2013	2014
Customers, Dec 31					
Total	80,695	81,199	81,792	82,637	83,421
Residential	67,837	68,423	69,099	69,719	70,398
Other	12,858	12,776	12,693	12,918	13,023
Peak Demand (mW)					
Total	190.6	189.2	189.3	189.3	190.2¹
Power Sold (1,000 kWh)					
Total	1,109,783	1,103,572	1,085,171	1,076,104	1,062,521
Residential	430,942	426,793	409,840	395,701	386,585
Other	678,841	676,779	675,331	680,402	675,936
Average Annual Use, Dec 31 (kWh)					
Residential	6,353	6,238	5,931	5,676	5,491
Other	52,795	52,973	53,205	52,671	51,903
Average Rate (dollars per kWh)					
Residential	0.35308	0.41918	0.42470	0.42170	0.41889
Other	0.32348	0.39050	0.39268	0.38713	0.38274
Revenues (\$1,000)					
Total	371,746	443,189	439,249	430,272	420,647
Residential	152,157	178,904	174,061	166,865	161,938
Other	219,589	264,285	265,188	263,407	258,709

mW: MEGAWATTS

kWh: KILOWATT HOURS

1. NET PEAK DEMAND IN 2013.

SOURCE: MONTHLY FINANCIAL REPORTS ISSUED BY UTILITY COMPANIES (HAWAIIAN ELECTRIC COMPANY, MAUI ELECTRIC COMPANY, HAWAI'I ELECTRIC LIGHT COMPANY AND KAUA'I ISLAND UTILITY COOPERATIVE), CALCULATIONS BY DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM.

7.1.3

GAS UTILITIES HAWAI'I COUNTY

Excludes bottled gas

	2010	2011	2012	2013	2014
Customers, Dec. 31					
Residential	1,486	1,458	1,488	1,524	1,538
Other	299	303	313	315	322
Total	1,785	1,761	1,801	1,839	1,860
Gas Sold (1,000 therms)					
Residential	305	288	296	301	299
Other	1,969	1,993	2,067	2,052	2,050
Total	2,274	2,281	2,363	2,353	2,349
Average Annual Use (therms)					
Residential	205	197	199	197	194
Other	6,586	6,577	6,604	6,514	6,368
Average rate (dollar per therm)					
Residential	4.72953	5.23093	5.00541	4.80329	5.14649
Other	2.58894	2.99073	2.85185	2.65501	2.97662
Revenues (\$1,000)					
Residential	1,442	1,506	1,483	1,445	1,539
Other	5,098	5,960	5,895	5,448	6,103
Total	2,344	1,830	2,369	2,653	2,624

SOURCE: HAWAI'I GAS THE CLEAN ENERGY COMPANY, HAWAI'I GAS UTILITY MONTHLY FINANCIAL REPORTS,
CALCULATIONS BY HAWAI'I 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	2.7	0.2	0.2	0.2
Petroleum					
Distillate fuel oil	35.6	27.5	36.8	35.2	33.0
Jet fuel	47.0	51.0	62.1	64.1	64.2
Liquefied petroleum gas	2.9	3.2	3.5	3.4	3.2
Motor gasoline	52.5	51.8	53.8	50.4	51.0
Residual fuel oil	78.2	76.7	73.6	67.4	65.3
Other	14.4	14.6	16.6	16.9	16.3
Total petroleum	230.7	238.6	246.2	237.4	233.0
Renewable Energy					
Hydroelectric	1.1	0.7	0.9	1.1	0.7
Wood and waste	8.4	7.5	NA	NA	NA
Ethanol fuel	3.6	4.3	NA	NA	NA
Geothermal	1.6	2.0	NA	NA	NA
Solar / Photovoltaic	2.8	3.5	NA	NA	NA
Wind	2.5	2.5	NA	NA	NA
Biomass	NA	NA	NA	10.2	11.2
Other Renewables	NA	NA	NA	12.9	16.7
Total renewable energy	20.0	20.6	23.5	24.2	28.6
Total Energy Consumption	269.8	272.1	286.0	278.4	277.1

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

7.1.5

PHOTOVOLTAIC SYSTEMS

As of December 31st

	2012		2013		2014		2015	
	Number of PV Systems	Capacity (MW)	Number of PV Systems	Capacity (MW)	Number of PV Systems	Capacity (MW)	Number of PV Systems	Capacity (MW)
Hawaiian Electric	15,486	119.0	29,558	221.0	36,396	283.0	41,568	343.0
Hawai'i Electric Light	3,392	24.3	5,355	38.2	7,439	51.7	9,664	69.8
Maui Electric	3,672	28.4	5,246	40.9	7,150	54.5	9,320	73.6
Kaua'i Island Utility Cooperative	1,077	NA	1,811	NA	2,376	48.5	2,911 ¹	NA
Total	23,627	171.7	41,970	300.1	53,361	437.7	63,463	486.4

1. AS OF JUNE 30, 2015.
NA: NOT AVAILABLE

SOURCE: HAWAIIAN ELECTRIC COMPANY, QUARTERLY INSTALLED PV DATA; KAUAI ISLAND UTILITY COOPERATIVE, ANNUAL MEETING, JULY 2015; KAUAI ISLAND UTILITY COOPERATIVE, ANNUAL REPORT 2014.

7.1.6

**WATER SERVICES AND CONSUMPTION
BY COUNTY**

Years ending June 30

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Number of Services										
Hawai'i County	38,844	39,585	40,681	41,089	41,209	41,409	41,528	41,786	42,022	42,378	42,759
City and County of Honolulu	166,445	168,272	170,055	171,281	173,377	174,046	174,269	175,281	175,921	176,518	NA
Kaua'i County	19,390	19,564	19,825	19,957	20,100	19,600	19,737	21,148	21,263	21,590	NA
Maui County	33,123	33,675	34,682	35,444	35,540	35,611	35,698	35,753	35,866	36,040	NA
State Total	257,802	261,096	265,243	267,771	270,226	270,666	271,232	273,968	275,072	276,526	NA

Consumption (million gallons)

Hawai'i County	9,134	9,567	9,914	9,530	9,171	9,505	8,806	9,073	9,230	9,080	9,196
City and County of Honolulu	51,044	52,887	49,027	53,297	50,396	52,060	50,238	49,128	47,734	51,794	NA
Kaua'i County	4,032	4,466	4,490	4,663	4,407	4,249	4,263	4,085	4,505	3,997	NA
Maui County	12,961	13,186	13,258	12,797	12,074	12,214	12,371	12,675	13,253	11,851	NA
State Total	77,171	80,106	76,689	80,287	76,048	78,028	75,678	74,961	74,722	76,722	NA

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

7.1.7

WATER SYSTEM SERVICE CHARGES AND DEVELOPMENT FEE SCHEDULES

Meter Size	Standby Charge ²	Consumption Charge (gallons per month) ³			
		1st Block \$0.89	2nd Block \$1.80	3rd Block \$3.03	4th Block \$3.95
5/8 inch	\$16.00	1 to 5,000	5,001 to 15,000	15,001 to 40,000	More than 40,000
1 inch	\$32.00	1 to 5,000	5,001 to 100,000	100,001 to 300,000	More than 300,000
1-1/2 inch	\$59.00	1 to 5,000	5,001 to 400,000	400,001 to 1,000,000	More than 1,000,000
2 inch	\$92.00	1 to 5,000	5,001 to 900,000	900,001 to 2,000,000	More than 2,000,000
3 inch	\$167.00	1 to 5,000	5,001 to 2,000,000	2,000,001 to 5,000,000	More than 5,000,000
4 inch	\$275.00	1 to 5,000	5,001 to 4,700,000	4,700,001 to 10,000,000	More than 10,000,000
6 inch	\$545.00	1 to 5,000	5,001 to 10,000,000	10,000,001 to 25,000,000	More than 25,000,000
8 inch	\$869.00	1 to 5,000	5,001 to 20,000,000	20,000,001 to 50,000,000	More than 50,000,000
10 inch	\$1,250.00	1 to 5,000	5,001 to 40,000,000	40,000,001 to 100,000,000	More than 100,000,000
12 inch	\$2,420.00	1 to 5,000	5,001 to 60,000,000	60,000,001 to 150,000,000	More than 150,000,000

Power Cost Charge (per 1,000 gallons)¹ \$2.32 to \$2.35

Total water sales

2014	\$47,590,318
2015	\$48,457,620

NOTE: MONTHLY WATER SERVICE CHARGES FOR FISCAL YEAR 2015.

1. THE WATER BILL CONSISTS OF THREE COMPONENTS: STANDBY CHARGE, CONSUMPTION CHARGE AND POWER COST CHARGE.

2. STANDBY CHARGE IS A MINIMUM MONTHLY SERVICE CHARGE BASED ON METER SIZE.

3. GENERAL USE RATES.

SOURCE: COUNTY OF HAWAII¹, DEPARTMENT OF WATER SUPPLY.

7.1.8

WATER SERVICE BY METER SIZE, HAWAI'I COUNTY

Year ending June 30, 2015

	5/8"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	Total
Reg	39,840	NA	1278	566	434	114	39	69	40	1	42,381
Fire	NA	NA	NA	NA	9	NA	56	155	158	NA	378

SOURCE: COUNTY OF HAWAI'I, DEPARTMENT OF WATER SUPPLY.

7.1.9

WATER CONSUMPTION BY DISTRICT, HAWAI'I COUNTY

Year ending June 30, 2015; in 1,000 gallons

Month	Total	South Hilo	North Hilo	Hāmākua	South Kohala	North Kohala	Ka'ū	Puna	Kona
July	896,562	151,250	7,085	854	339,750	416	31,884	18,726	346,597
Aug	629,542	167,444	233	33,881	44,836	39,254	1,025	53,531	289,338
Sept	927,159	149,769	7,574	809	339,933	583	27,618	20,353	380,520
Oct	633,891	171,235	342	30,070	35,210	38,541	1,482	59,217	297,794
Nov	889,642	148,636	8,253	846	330,655	657	26,082	19,757	354,756
Dec	626,402	169,793	176	30,772	29,188	37,072	1,124	48,542	309,735
Jan	909,876	149,635	7,171	979	296,926	542	28,802	19,860	405,961
Feb	681,055	182,679	166	32,776	28,450	34,755	1,232	72,495	328,502
Mar	834,726	145,619	5,613	881	266,604	565	28,633	20,382	366,429
Apr	637,191	171,204	199	30,021	38,622	33,848	1,322	55,250	306,725
May	905,186	143,127	6,169	1,133	326,875	562	33,050	18,985	375,285
June	624,694	164,118	192	31,977	40,668	38,154	871	52,577	296,137
Total	9,195,926	1,914,509	43,173	194,999	2,117,717	224,949	183,125	459,675	4,057,779
Services	42,759	16,127	579	2,123	4,152	1,888	1,480	3,352	13,058

SOURCE: COUNTY OF HAWAI'I, DEPARTMENT OF WATER SUPPLY.