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JAY IGNACIO, P. E.
President

January 30, 2017
2017 JAN 30 P 4:00

The Honorable Chairman and Members of the
Hawai'i Public Utilities Commission
465 South King Street
Kekuanaoa Building, Room 103
Honolulu, Hawai'i 96813

PUBLIC UTILITIES
COMMISSION

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C: DP, MLT

Dear Commissioners:

Subject: Adequacy of Supply
Hawai'i Electric Light Company, Inc. ("Hawai'i Electric Light" or "Company")

The following information is respectfully submitted in accordance with paragraph 5.3a of General Order No. 7, which states:

The generation capacity of the utility's plant, supplemented by electric power regularly available from other sources, must be sufficiently large to meet all reasonably expectable demands for service and provide a reasonable reserve for emergencies. A Statement shall be filed annually with the Commission within 30 days after the close of the year indicating the adequacy of such capacity and the method used to determine the required reserve capacity which forms the basis for future requirements in generation, transmission, and distribution plant expansion programs required under Rule 2.3h.1.

2017 Adequacy of Supply Report Summary

- Hawai'i Electric Light's generation capacity for the next three years (2017 – 2019) will be sufficient to meet reasonably expected demands for service and provide reasonable reserves for emergencies.
- The peak load experienced on the Big Island in 2016 was 188.5 MW net, and was served by Hawai'i Electric Light's total capability of 273.55 MW net, including firm power purchases. This represents a reserve margin of approximately 45% over the 2016 system net peak.

1. Peak Demand and System Capability in 2016

Hawai'i Electric Light's 2016 system peak occurred on December 7,¹ at approximately 6:43 pm and was 188.5 MW-net based on net generation exclusive of unmeasured distributed generation.

Hawai'i Electric Light's 2016 total firm generating capability of 273.55 MW-net includes 34.6 MW from Puna Geothermal Venture ("PGV")² and 60 MW from Hamakua Energy Partners, L.P. ("HEP")³.

The Hawai'i Electric Light system had a reserve margin of approximately 45% over the 2016 system peak net demand.⁴

At times during 2016, Hawai'i Electric Light received energy from several utility and independent power producer variable generation energy providers (i.e., Tawhiri Wind, Wailuku River Hydroelectric, Hawi Renewable Development, and several Feed-in-tariff solar projects). Since these contracts are for variable, as-available energy, they are not reflected in Hawai'i Electric Light's total firm generating capacity.

2. Estimated Reserve Margins

Table 1 in Appendix 1 shows the expected reserve margins over the next three years, 2017-2019, based on Hawai'i Electric Light's November 2016 Sales and Peak Forecast ("November 2016 Forecast"), and includes estimated self-generation, customer battery and energy efficiency impacts. Reserve margin values are calculated with and without both the peak reduction benefits of Demand Response ("DR") and an estimated capacity credit for variable generation.

3. Criteria to Evaluate Hawai'i Electric Light's Adequacy of Supply

Hawai'i Electric Light's capacity planning criteria are applied to determine the adequacy

¹ Hawai'i Electric Light's system peak in 2016 occurred in the month of December. Typically, Hawai'i Electric Light's system peaks have occurred in the month of December. For the purposes of this report, it is assumed that Hawai'i Electric Light's future annual system peak will occur in December.

² The PGV additional 8 MW facility was placed in-service on March 19, 2012. PGV's total capacity subsequently increased from 30 MW to 34.6 MW based on completed acceptance testing. This value is expected to increase, as PGV has since achieved 38 MW or greater, pending completion of a contractually defined performance test. According to Article 5 of the PPA for the expansion, PGV may use commercially reasonable efforts to increase the facility's capacity to the committed value of 38 MW. For the purposes of this report, a capacity of 34.6 MW was assumed for PGV in the reserve margin calculations for 2016 and 2017, and 38 MW for 2018 and 2019.

³ On December 22, 2015, Hawaii Electric Light entered into an agreement, subject to PUC approval, to acquire the assets of HEP for approximately \$84.5 million.

⁴ The total capability value used in the calculation of this reserve margin does not account for units not available due to maintenance outages, forced outages, or derates in unit capacities.

of supply - whether or not there is enough generating capacity on the system. Hawai'i Electric Light's capacity planning criteria take into account that the Company must provide for its own backup generation since, as an island utility, it cannot import emergency power from a neighboring utility. Hawai'i Electric Light's capacity planning criteria are described in Section 3.1.

3.1. Hawai'i Electric Light's Capacity Planning Criteria

The following capacity planning criteria is used to determine the need for additional generation:

Rule 1:

The total capability of the system must at all times be equal to or greater than the summation of the following:

- a. the capacity needed to serve the estimated system peak load, less the total amount of interruptible loads;*
- b. the capacity of the unit scheduled for maintenance; and*
- c. the capacity that would be lost by the forced outage of the largest unit in service.*

Reserve Margin:

Consideration will be given to maintaining a reserve margin of approximately 20% based on Net Top Load ratings.

Reserve Margin Sensitivity:

In the Hawaiian Electric Companies' Revised and Supplemented Power Supply Improvement Plans ("PSIPs"), also referred to as the PSIP Update Report, filed on December 23, 2016,⁵ a proposed reserve margin planning standard of 30% was used for capacity planning analysis.⁶

3.2. Other Considerations in Determining the Timing of Unit Additions

The need for new generation is not based solely on the application of the criteria previously mentioned. As capacity needs become imminent, it is essential that Hawai'i Electric

⁵ Order No. 32290 issued on September 12, 2014, transferred Hawai'i Electric Light's Power Supply-Improvement Plan report from Docket No. 2012-0212 into Docket No. 2014-0183.

⁶ Refer to Appendix J of Hawaiian Electric Companies' PSIP Update Report for reference.

Light broaden its consideration to ensure timely installation of generation capacity necessary to meet its customers' energy needs.

Other near-term considerations may include:

1. the current condition and rated capacity of existing units;
2. required power purchase obligations and contract terminations;
3. the uncertainties surrounding non-utility generation resources;
4. the uncertainties surrounding new energy and generation resources;
5. transmission system considerations;
6. meeting environmental compliance standards; and
7. stability considerations for Hawai'i Electric Light's isolated electrical system.

The 2015 adequacy of supply identified risks due to transmission line outages from trees which required lengthy repairs and potential for impacts from the Kilauea lava flow. The lessons learned from these events drove plans for:

- a) evaluating designs to allow operation of the Hawai'i Electric Light grid in two or more "islands",
- b) increasing expenditures on line hardening and tree trimming projects,
- c) projects to synchronize breakers to connect two live "islands" during restoration, and
- d) retaining sufficient capacity to recover from multiple transmission line outages and consequential isolation of large resources such as PGV and/or HEP.

Based on these conditions, increased capacity margin for the known potential for capacity loss during storms and lava impacts could be considered in the future. Hawai'i Electric Light took extensive measures for vegetation management which resulted in fewer transmission line outages, thereby mitigating transmission line risks. Currently, there is no lava flow that is threatening populated areas or generation. Should these risks increase again in the future, this would be a consideration in unit operational decisions, including the potential seasonal cycling and deactivation of generating unit assets.

While meeting the planning criteria indicates a reasonable adequacy of supply, it is not equivalent to guaranteed supply. Despite adequate supply, Hawai'i Electric Light experienced a generation shortfall on February 20, 2016. Both Keahole CTs experienced forced outages while HEP was out of service for maintenance. There was insufficient time to bring online Puna Steam

(which at the time required 24-hour notice) to meet the evening peak, resulting in outages to certain customers for a 2-hour period. In the application of Hawai'i Electric Light's capacity planning criteria that are used to determine its adequacy of supply, the inputs drive the results. Two of the key inputs in the application of the capacity planning criteria are (1) projected peak demand (including the anticipated peak reduction benefits of energy efficiency programs) and (2) the total firm capacity on the system. These key inputs are described in the following sections.

4. Key Inputs to the 2017 Adequacy of Supply Analysis

4.1. Period Under Review

This adequacy of supply review covers the period 2017 to 2019. As indicated in Hawai'i Electric Light's January 29, 2016 Adequacy of Supply letter, its reserve margin was sufficiently high such that its generating capacity for the period 2016 to 2018 would be adequate to meet reasonably expected demands for service and provide reasonable reserves for emergencies. The Hawaiian Electric Companies' PSIP Update Report, indicates that Hawai'i Electric Light may remove the Puna Steam and Hill 5 and 6 Units from service as soon as 2020. This is dependent upon fuel costs and relative economic benefit of the steam units at the time of the decision, and requires that they are not needed for system reliability.⁷ Should the steam units be removed it would be equivalent to approximately 49 MW of capacity or about 18% of the total system firm capacity. While the units may be removed from service, they will still be available for capacity, if needed, to maintain generating system reliability. When counted toward firm capacity, no reserve capacity shortfall is anticipated until and unless these units are decommissioned.

4.2. November 2016 Forecast

Hawai'i Electric Light developed its sales and peak forecast in November 2016, which was subsequently approved by the Company for future planning purposes and used for this analysis.⁸

Hawai'i Electric Light November 2016 Forecast	
Year	Peak, Net MW
2017	192.9
2018	194.9
2019	197.0

The November 2016 peak forecast update is higher than the May 2015 forecast (used in

⁷ Refer to Appendix M of Hawaiian Electric Companies' PSIP Update Report.

⁸ The November 2016 forecast was developed after PSIP inputs were set and analyses in the PSIP Update Report were near completion. Hence, the analyses contained in the PSIP Update Report were not able to use this forecast, and the short term reserve margin analysis performed herein is more current than that provided in the PSIP.

the PSIP Update Report) because it took into consideration lower forecasted electricity prices, improved economic conditions, and additional air conditioning load following the record breaking temperatures in 2015.

4.3. Projected Peak Reduction Benefits of DR Programs

Hawai'i Electric Light is committed to pursuing DR programs designed to provide cost-effective resource options to meet the capacity needs and support the reliable operation of the system, as identified in the Hawaiian Electric Companies⁹ Integrated Demand Response Portfolio Plan ("IDRPP") filed on July 28, 2014, Update filed March 31, 2015, and Supplement filed November 20, 2015, in Docket No. 2007-0341.

On December 30, 2015, the Hawaiian Electric Companies submitted to the Commission for approval a DR Portfolio Application (Docket 2015-0412) requesting:

- Approval of proposed tariff structure for DR programs;
- Approval of cost recovery mechanism;
- Approval of a 2-year program and budget approval cycle; and,
- Approval of the Companies' proposed reporting structure.

There is no Hawai'i Electric Light DR Portfolio in the DR Portfolio Application and for the purposes of the analysis in this report; reserve margin was calculated with and without an estimate of the peak reduction benefits from DR. A Revised DR Portfolio filing, to be filed on February 10, 2017, will publish finalized DR program design and targets (MW) following the PSIP Update Report filing December 23, 2016. Pending Commission approval of the program application, the next Adequacy of Supply filing will be updated with the revised DR program load amounts within the final Application. Hawai'i Electric Light will continue to implement DR in accordance with these targets in future years.

4.4. Planned Maintenance Schedules For The Generating Units On The System

Planned outages and maintenance outages reduce generating unit availabilities. The schedules for planned overhaul and maintenance outages change frequently due to unforeseeable findings during outage inspections or to changes in priorities due to unforeseeable problems. When major revisions to planned and/or maintenance outages occur, or unplanned outages impact the available margins, the Planned Maintenance Schedule is revised with outages deferred or reduced to the extent possible to minimize impacts on customers.

4.5. Other Inputs

The plan evaluated was consistent with Hawai'i Electric Light's five-year resource plan

⁹ Hawaiian Electric Company, Inc., Maui Electric Company, Limited., and Hawai'i Electric Light Company Inc., collectively referred to as the Hawaiian Electric Companies.

shown in the Hawaiian Electric Companies' PSIP Update Report.¹⁰ For the purposes of the reserve margin sensitivity analysis, DG-PV additions and DR impacts were included. No future firm or variable resource additions were included so that capacity needs could be examined without the addition of future resources.

4.6. Additions of Capacity

4.6.1. Firm Capacity Additions

On December 20, 2013, the Commission issued Decision and Order No. 31758 in Docket No. 2012-0212, approving the Power Purchase Agreement ("PPA") between Hawai'i Electric Light and Hu Honua Bioenergy, LLC ("Hu Honua"). On March 1, 2016, this PPA was terminated due to Hu Honua's failure to achieve Guaranteed Milestones, including the Commercial Operations Date. There are no other firm capacity additions contemplated for Hawai'i Electric Light through 2019.

4.6.2. Non-Firm Capacity Additions

On January 1, 2017, Hawai'i Electric Light filed a letter with the Commission requesting to open a docket and appointment of an Independent Observer to seek proposals for new renewable energy generation with a target installation of 2020.

In the Hawaiian Electric Light Companies' PSIP Update Report the resource plans show Community Based Renewable Energy (CBRE) additions of 1 MW of PV and 2 MW of Wind by the end of 2018. However, none of this capacity was assumed in the calculation of reserve margin.

4.7. Changes to Existing Generating Capacity

Two 1.25 MW dispersed diesels (D24 & D27) currently at Kapoho Substation and permitted only for emergency use (such as due to lava flow) are expected to be relocated back to their original locations at Panaewa and Kapua by the end of 2017, at which point their capacities will count toward reserve margin. For the purposes of this report these two diesels' additional capacity is included in the reserve margin calculation.

¹⁰ Refer to Table 6-5, on page 6-20, of the Companies' PSIP Update Report.

4.8. Table of Generating Unit Capacities

NTL Ratings in Net MW are used for reserve margin calculation.

Hawai'i Electric Light Adequacy of Supply				
2016 Unit Ratings (Firm Capacity at ACTUAL System Peak in December 2016)				
	(in Gross MW)		(in Net MW)	
Unit ID	Reserve Rating (MW)	NTL Rating (MW)	Reserve Rating (MW)	NTL Rating (MW)
Hill 5	14.10	14.10	13.50	13.50
Hill 6	21.40	21.40	20.20	20.20
Puna	17.00	17.00	15.70	15.70
Kanoelehua D11	2.00	2.00	2.00	2.00
Waimea D12	2.75	2.50	2.75	2.50
Waimea D13	2.75	2.50	2.75	2.50
Waimea D14	2.75	2.50	2.75	2.50
Kanoelehua D15	2.75	2.50	2.75	2.50
Kanoelehua D16	2.75	2.50	2.75	2.50
Kanoelehua D17	2.75	2.50	2.75	2.50
Keahole D21	2.75	2.50	2.75	2.50
Keahole D22	2.75	2.50	2.75	2.50
Keahole D23	2.75	2.50	2.75	2.50
Kanoelehua CT1	11.50	11.50	11.50	11.50
Keahole CT2	13.80	13.80	13.80	13.80
Puna CT3	21.00	21.00	21.00	21.00
Keahole CT4/CT-5/ST-7	58.50	58.50	56.25	56.25
Panaewa D24	0.00	0.00	0.00	0.00
Ouli D25	1.25	1.25	1.25	1.25
Punaluu D26	1.25	1.25	1.25	1.25
Kapua D27	0.00	0.00	0.00	0.00
HELCO total	186.55	184.30	181.20	178.95
PGV	34.60	34.60	34.60	34.60
HEP	60.00	60.00	60.00	60.00
IPP Total	94.60	94.60	94.60	94.60
System total	281.15	278.90	275.80	273.55

5. Reserve Margin Sensitivity

Reserve margins (see Table 1 in Appendix 1) for Hawai'i Electric Light are still well above the PSIP Update Report's proposed 30% guideline. The methods for assigning a contribution of variable generation to capacity margin are under review and may change in future capacity margin assessments.

6. Conclusion

Hawai'i Electric Light's generation capacity for the next three years (2017 – 2019) will be sufficient to meet reasonably expected demands for service and provide reasonable reserves for unplanned generation outages.

Very truly yours,

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke extending to the right.

Jay Ignacio
President

Attachment – Appendix 1

cc: Division of Consumer Advocacy (with Attachment)

Table 1
Adequacy of Supply

Year	System Capability at Annual Peak Load (net MW) [A] ^{iii, iv, v, vi}	System Peak (net MW) [B] ^{i, ii}	Reserve Margin w/o DR or Var. Gen. (%) [A-B] [B]	Demand Response (DR) (net MW) [C]	Variable Generation (net MW) [D]	Reserve Margin w/DR & Var. Gen. (%) [A+D-(B-C)] (B-C)
2016	273.6	188.5	45.1%	0.0	4.97	47.8%
2017	276.1	192.9	43.1%	0.9	4.97	46.3%
2018	279.5	194.9	43.4%	2.6	4.97	47.9%
2019	279.5	197.0	41.9%	4.4	4.97	47.7%

Notes:

- (I) System Peaks - The 2017-2019 annual forecasted system peaks are based on:
- Hawai'i Electric Light's November 2016 Forecast. The annual forecasted system peak is expected to occur in the month of December.
 - The forecasted system peak values for the years 2017-2019 include estimated peak reduction benefits acquired through 2019 implemented by Hawai'i Energy, as well as the benefits of future energy efficiency programs, Rider M, and Schedule U contracts.
- (II) System Peaks (Recorded):
- The recorded system peak for 2016 includes the actual peak reduction benefit of the acquired energy efficiency programs and the Rider M and Schedule U contracts.
- (III) System Capability for 2016 included:
- Hawai'i Electric Light units at a total of 178.95 MW net.
 - Firm independent power purchase contracts with a combined net total of 94.6 MW, from PGV (34.6 MW) and HEP (60 MW).
- (IV) System Capability for 2017 includes:
- Hawai'i Electric Light units at a total of 181.45 MW net.
 - Firm independent power purchase contracts with a combined net total of 94.6 MW, from PGV (34.6 MW) and HEP (60 MW).

(V) System Capability for 2018 includes:

- Hawai'i Electric Light units at a total of 181.45 MW net.
- Firm independent power purchase contracts with a combined net total of 98.0 MW from PGV (38.0 MW), HEP (60 MW).

(VI) System Capability for 2019 includes:

- Hawai'i Electric Light units at a total of 181.45 MW net.
- Firm independent power purchase contracts with a combined net total of 98.0 MW from PGV (38.0 MW) and HEP (60 MW)