Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

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March 9, 2012

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PUBLIC UTILITIES COMMISSION

The Honorable Chair and Members of the Hawaii
Public Utilities Commission
465 South King Street
Kekuanaoa Building, Room 103
Honolulu, Hawaii 96813

Dear Commissioners:

Subject: Adequacy of Supply
Hawaiian Electric Company, Inc. ("Hawaiian Electric" or "HECO")

The following information is respectfully submitted in accordance with paragraph 5.3a. of General Order No. 7[1] 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.*

1. Peak Demand and System Capability in 2011

Hawaiian Electric's 2011 system peak occurred on Thursday, February 17, 2011, and was 1,177,000 kW-gross or 1,141,000 kW-net based on net Hawaiian Electric generation, net purchased power generation, the peak reduction benefits of energy efficiency demand-side management programs, and with several cogenerators[2] operating at the time. Had these cogenerating units not been operating, the 2011 system peak would have been approximately 1,185,000 kW-gross or 1,149,000 kW-net.

[1] Hawaiian Electric's Adequacy of Supply ("AOS") Report is due within 30 days after the end of the year. On January 26, 2012, Hawaiian Electric requested an extension of time, to no later than March 9, 2012, to file its AOS Report to allow it to evaluate the recently issued Decision and Order No. 30089, filed January 3, 2012 in Docket No. 2010-037 (Proceeding to Investigate Energy Efficiency Portfolio Standards), and its potential impacts on the need for additional firm capacity and future generation system reliability.

[2] At the time of the peak, certain units at Tesoro, Chevron, and Pearl Harbor were generating about 8,000 kW of power for use at their sites.

Hawaiian Electric's 2011 total generating capability of 1,755,600 kW-net includes 434,000 kW-net of firm power purchased from (1) Kalaeloa Partners, L.P. ("Kalaeloa"), (2) AES Hawaii, Inc. ("AES"), and (3) H-POWER.

Oahu had a reserve margin of approximately 60% over the 2011 adjusted system net peak.[3]

Hawaiian Electric is also receiving energy from four as-available energy producers (i.e., Chevron, Tesoro, Kahuku Wind Power, Kapolei Sustainable Energy Park). Since these contracts are not for firm capacity, they are not reflected in Hawaiian Electric's total firm generating capability.

2. Estimated Reserve Margins

Appendix 1 shows the expected reserve margin over the next ten years, 2012-2021 based on Hawaiian Electric's May 2011 Sales and Peak Forecast, and includes estimated energy efficiency impacts and forecasted load management impacts.

3. Criteria to Evaluate Hawaiian Electric's Adequacy of Supply

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

The results of the annual analysis of the adequacy of supply on the Hawaiian Electric system are a function of a number of forecasts, such as:

- peak demand, including the forecasted peak reduction benefits of (a) energy efficiency demand-side management programs, (b) net energy metering, and (c) customer-site photovoltaic ("PV") installations; [§4.1]
- peak reduction benefits of load control programs; [§4.2]
- planned maintenance schedules for the generating units on the system; [§4.3]
- Equivalent Forced Outage Rates ("EFOR") on the generating units; [§4.3]
- additions of firm generating capacity; [§4.4] and
- reductions of firm generating capacity. [§4.5]

[3] The reserve margin calculation takes into account the approximately 41,000 kW of interruptible load at system peak served by Hawaiian Electric.

Each of the current assumptions for these factors is discussed in Section 4. As with all forecasts, these elements are subject to uncertainties. Therefore, a range of scenarios was considered in the analysis.

3.1 Hawaiian Electric's Capacity Planning Criteria

Hawaiian Electric's capacity planning criteria consist of two rules and one reliability guideline. The reserve capacity shortfalls calculated herein are determined by the application of the reliability guideline based on various key inputs such as the EFORs of each generating unit, the load to be served, the amount of capacity on the system and the availability of the generating units.

Rule 1:

The total capability of the system plus the total amount of interruptible loads 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;*

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.*

Rule 2:

There must be enough net generation running in economic dispatch so that the sum of the three second quick load pickup power available from all running units, not including the most heavily loaded unit, plus the net loads of all other running units must equal or exceed 95 percent of the hourly system net load (which excludes power plant auxiliary loads but includes T&D losses). This is based on a minimum allowable system frequency of 58.5 Hz and assumes a 2 percent reduction in load for each 1 percent reduction in frequency.

The two rules include load reduction benefits from interruptible load customers. Because Hawaiian Electric will not build reserve capacity to serve interruptible loads, interruptible load programs such as Hawaiian Electric's current Rider I and load management programs can have the effect of deferring the need for additional firm capacity generation.

Rules 1 and 2 are deterministic in nature, meaning that the adequacy of supply can be determined through simple additions or subtractions of capacity without regard to the probability that the capacity will be available at any given time. For example, to determine whether or not Rule 1 would be satisfied at a given point in time, one would take in MW, the total capacity of the system, add the total amount of interruptible loads that would be available for interruption at that time, subtract the capacity of the unit or units that are unavailable due to planned maintenance, subtract the capacity of the largest available unit, and determine whether the result is greater than or less than the system peak at that time. If the result is greater than the system peak, Rule 1 would be satisfied and no additional firm capacity would be needed. If the result is less than the system peak, Rule 1 would not be satisfied and additional firm capacity would be needed. The likelihood (or probability) that the largest unit will be lost from service during the peak is not a factor in the application of this rule.

Rule 2 takes into account the amount of quick load pickup that must be available at the time of the peak to avoid shedding load from the system in the event the largest loaded unit is unexpectedly lost from service. Rule 2 is also deterministic in nature. It does not take into account the probability that the largest unit could be lost from service during the peak.

3.2 Hawaiian Electric's Reliability Guideline: Loss of Load Probability ("LOLP")

The application of Hawaiian Electric's generating system reliability guideline does take into account the probabilities that generating units could be unexpectedly lost from service.

Reliability Guideline:

"Capacity planning analysis will include a calculation of risk (Loss of Load Probability) in years per day for each year of each plan of the long-range expansion study. In cases where risk is calculated to be less than 4.5 years per day, the plan will be reviewed by the Vice President of Power Supply and the President for approval of use of the plan in the study."

In order to determine whether there is enough capacity on the system to account for the probability that multiple units may be unexpectedly lost from service, the result of an LOLP calculation must be compared against Hawaiian Electric's generating system reliability guideline.

Hawaiian Electric has a reliability guideline threshold of 4.5 years per day. Hawaiian Electric plans to have sufficient generating capacity to maintain generating system reliability above 4.5 years per day. There should be enough generating capacity on the system such that the expectation of not being able to satisfy demand due to insufficient generation occurs no more than once every 4.5 years. Values less than 4.5 years per day indicate lower levels of reliability and an increased likelihood of generation-related customer outages.

One potential means to address the ever increasing planning uncertainty and complexity is to revise the capacity planning guideline. If the existing Loss of Load Probability of 4.5 years per day does not provide an adequate cushion to respond to quickly-changing parameters, such as changes in peak demand and individual unit availability factors, many of which may change rapidly from year to year, then the utility could plan for a higher reliability standard similar to that of many mainland utilities. Such an approach would not eliminate quickly-changing parameters, but it would add a measure of conservatism in recognition that the uncertainties undoubtedly exist.

In its direct testimony for the Campbell Industrial Park Generating Station and Transmission Additions Project (Docket No. 05-0145), filed on August 17, 2006, the Consumer Advocate stated:

> [*HECO's reliability guideline*] is less *stringent than the guidelines* used by mainland utilities. As will be addressed later in my testimony, this guideline should be re-evaluated to determine if it should be more stringent in the future (e.g., one day in 6 years) to ensure reliable service. However, this determination should be based on analyses that assess the tradeoff between electric service costs to the consumer and the increase in reliability to be gained. CA-T-1 at 32.

The typical reliability standard on the Mainland is 10 years per day, which is more stringent than the 6 years per day suggested by the Consumer Advocate and the 4.5 years per day in Hawaiian Electric's reliability guideline. A scenario analysis of the reserve capacity shortfall based on a higher reliability guideline threshold of 10 years per day is included in Section 5. The results of the analysis shows the additional amount of firm capacity that would be needed on the Oahu grid to meet a higher, 10 years per day, reliability standard based on the assumptions provided herein.

Please refer to Appendix 3 of the 2005 AOS for additional information related to Hawaiian Electric's reliability guideline.

4. Key Inputs to the 2012 AOS Analysis

4.1 May 2011 Sales and Peak Forecast

On March 8, 2010, the Commission initiated an investigation to examine establishing energy efficiency portfolio standards ("EEPS") for the State of Hawaii, pursuant to Act 155, Session Laws of Hawaii 2009 ("Act 155") and Hawaii Revised Statues §269-96. In May 2011, Hawaiian Electric developed a sales and peak forecast for planning purposes. Because the EEPS proceeding was still in progress and no energy efficiency targets had yet been formally established, Hawaiian Electric prepared its own internal estimates of the energy and sales reductions that might be achieved from implementation of EEPS. Hawaiian Electric's estimate of energy and peak reductions from energy efficiency programs is shown in Table 1. Hawaiian Electric's final May 2011 sales and peak forecast incorporated these energy and peak reductions into the forecast.

Table 1: Estimated Reductions from Energy Efficiency

Year	Forecasted Sales Reduction (GWH)	Forecasted Peak Reduction (MW)
2012	645	141
2013	672	152
2014	736	163
2015	788	174
2016	841	184
2017	893	192
2018	932	199
2019	967	206
2020	995	213
2021	1,015	218

On January 3, 2012, the Commission attached as an exhibit to Decision and Order No. 30089 ("D&O 30089") in Docket No. 2010-0037, a Framework for Energy Efficiency Portfolio Standards ("EEPS Framework"). The EEPS is designed to achieve 4,300 GWh of electricity use reductions statewide by 2030 or to achieve some other level of reduction as may be determined by the Commission. The EEPS Framework contained "Performance Period Goals" in Tables 2 and 3 therein in which specific targets of electricity use reductions were set from 2009 to 2030, in which the 4,300 GWh of electricity use reduction would be achieved by 2030. Goals may also be revised through evaluations, scheduled every five years based on the recommendations of the Technical Working Group ("TWG"). These energy reduction targets were significantly higher than those incorporated in Hawaiian Electric's May 2011 sales and peak forecast.

Notwithstanding the goals for electricity use reductions set forth in the EEPS Framework, there remains much uncertainty as to how the goals will be met and to what extent the goals will be allocated among Commission-regulated and non-regulated entities. Following the formation of the EEPS TWG, the Commission-regulated and non-regulated entities that contribute toward EEPS savings will be identified.[4] Then, the EEPS TWG will need to "allocate EEPS annual and interim goals to the Contributing Entities based on the information available to them, including the results of any energy

4 EEPS Framework at 10.

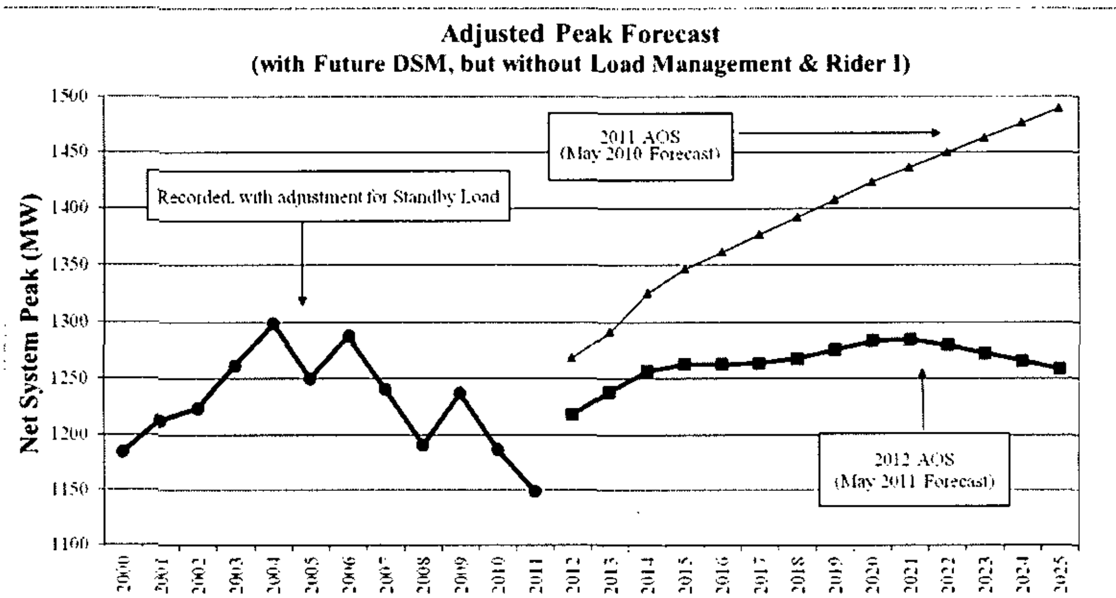
efficiency potential studies."[5] There is also uncertainty as to how the electrical use reduction targets (stated in terms of energy) given in the EEPS Framework will translate into peak use reductions. The extent of peak use reductions will depend on the type and mix of energy efficiency measures deployed. (The determination of Hawaiian Electric's adequacy of supply depends on a forecast of peak demand.)

Moreover, the energy reduction goals for 2009 and 2010 given in the EEPS Framework already exceed the estimated energy reductions actually achieved in those years. It is unclear whether or not the deficit can be made up over time.

Given the considerable uncertainties related to the electricity use reduction targets provided in the EEPS Framework, those targets were not incorporated into an updated sales and peak forecast. Rather, for the purposes of Hawaiian Electric's 2012 Adequacy of Supply report, the analysis was based on the May 2011 forecast, with Hawaiian Electric's lower estimates for energy efficiency impacts. Future Hawaiian Electric sales forecasts will examine sensitivities that incorporate the electricity use reduction targets given in the EEPS Framework.

Figure 1 illustrates Hawaiian Electric's historical system peaks and compares them to the forecast used in the 2011 and 2012 AOS analyses. The analyses contained in the 2011 AOS were based on a May 2010 sales and peak forecast.

Figure 1: Recorded Peaks and Future Year Projections



5 Ibid.

Table 2 below provides the recorded peaks from 2000 and compares the forecasts used in the 2011 AOS and this 2012 AOS. The comparison between forecasts indicate the degree to which key planning assumptions such as the peak forecast can quickly and unexpectedly change. For both the recorded and forecast data, figures reflect an upward (stand-by) adjustment to account for the potential need to serve certain large customer loads (i.e., Chevron, Tesoro and Pearl Harbor) that are frequently served by their own internal generation. Figure 1 includes the peak reduction benefits of energy efficiency programs and naturally occurring conservation. The forecast also includes the impact of customer sited photovoltaic ("PV") and other renewable generation system installations through the Net Energy Metering ("NEM") program, Standard Interconnection Agreements ("SIA"), and Feed-In Tariffs ("FIT") in the derivation of sales. Tables 3 shows the projected NEM, FIT and SIA installations, and MWh reduction, and are assumed to reduce sales and day peaks only.

Table 2: Recorded Peaks and Future Year Projections

Net System Peak (MW) (with Future DSM, but without Load Management & Rider I)					
Year	Actual	Actual Adj for Standby	2011 AOS May 2010 S&P	2012 AOS May 2011 S&P	Difference 2012-2011 AOS
2000	1164	1185			
2001	1191	1213			
2002	1204	1224			
2003	1242	1262			
2004	1281	1299			
2005	1230	1250			
2006	1265	1288			
2007	1216	1241			
2008	1186	1191			
2009	1213	1237			
2010	1162	1187			
2011	1141	1149			
2012			1,268	1,218	-50
2013			1,291	1,238	-53
2014			1,326	1,257	-69
2015			1,347	1,263	-84
2016			1,362	1,263	-99
2017			1,377	1,264	-113
2018			1,392	1,268	-124
2019			1,408	1,276	-132
2020			1,424	1,284	-140
2021			1,437	1,285	-152
2022			1,450	1,280	-170
2023			1,463	1,273	-190
2024			1,476	1,266	-210
2025			1,490	1,259	-231

Table 3: SIA, NEM & FIT Projections
May 2011 Sales Forecast

	Forecasted MW Installations		Annual (Ramped)
Year	MW	Cumulative	MWH Reduction
2012	35	56	46,600
2013	40	96	97,886
2014	29	125	145,314
2015	44	169	192,083
2016	36	205	247,609
2017	36	241	296,930
2018	36	277	346,777
2019	37	314	396,744
2020	37	351	446,842
2021	38	388	497,085

Note: Peak SIA, NEM, FIT impact is assumed to be limited to system day peaks. Assumed a day peak impact of 10% of the total rated array capacity. MWh reduction does not include energy sold to Hawaiian Electric.

4.2. Projected Peak Reduction Benefits of Load Control Programs

Hawaiian Electric continues to administer the Commercial & Industrial Load Control ("CIDLC") and Residential Direct Load Control ("RDLC") programs. However, in its Decision and Orders in Docket Nos. 2009-0073 and 2009-0097, dated December 29, 2009, for the CIDLC and RDLC Programs, respectively, the Commission extended the programs through December 31, 2012, but denied Hawaiian Electric's request, without prejudice, to expand the programs at that time. Hawaiian Electric intends to request Commission approval for expansion of these and other demand response programs in 2012.

Hawaiian Electric estimates it had approximately 20 MW (net generation level) of controlled load under its CIDLC program, and approximately 17 MW (net generation level) of controlled load under its RDLC program in 2011. Table 4 shows the forecast of the peak reduction benefits from its existing and future load management programs[6] predicated upon Commission approval of the expansion of these programs.

[6] Forecasted impacts available at system peak at the net-to-system level.

Table 4: Projected Commercial, Residential and Rider I Impacts (MW)[7]

Year	Residential	Commercial	Rider I	Total
2012	17	20	4	41
2013	20	21	4	45
2014	24	22	4	50
2015	28	23	4	55
2016	31	23	4	59
2017	34	23	4	61
2018	34	23	4	61
2019	34	23	4	61
2020	34	23	4	61

4.3. Hawaiian Electric Generating Unit Forced, Planned and Maintenance Outages

Forced outages and de-ratings reduce generating unit availability and are accounted for in the EFOR statistic. Planned outages and maintenance outages also 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 extensions to planned outages occur, or problems are discovered such that an outage is needed to address it, or if forced outages occur, the Planned Maintenance Schedule must be revised.

Table 5 provides recorded Hawaiian Electric EFOR data by unit for the period 2007-2011. These EFOR values are utilized in the 2012 AOS analysis, and are based on a combination of historical data, experience, and operational judgment. Table 5 also illustrates the EFOR projections for the Independent Power Producers used in the 2012 AOS analysis. The EFOR assumption generally reflects the 5-year average of the specific unit, or group of similar units. EFOR projections are uncertain, however, and actual experience may differ from the projections made. Refer to Appendix 2 for additional information on EFOR.

7 The values in Table 4 reflect, for planning purposes, the cumulative amount of load available for interruption at the net-to-system level. The CIDLC program has a limit of 300 cumulative hours that each contracted load can be interrupted in a year, which is taken into account in the loss of load probability calculations reflected in Table 9.

Table 5: Historical and Forward-looking EFOR

	Recorded					AOS EFOR Rates
	2007	**2008**	**2009**	**2010**	**2011**	**2012** Forward Looking
Honolulu 8	2.0%	17.8%	4.1%	33.1%	2.0%	15.2%
Honolulu 9	25.3%	11.1%	6.6%	21.9%	23.1%	15.2%
Waiau 3	19.6%	23.3%	1.4%	6.7%	37.3%	16.8%
Waiau 4	7.9%	13.7%	9.6%	1.4%	25.3%	11.5%
Waiau 5	4.3%	11.7%	4.1%	2.5%	0.8%	3.9%
Waiau 6	11.2%	1.2%	0.0%	0.3%	2.9%	3.9%
Waiau 7	4.2%	20.7%	2.4%	0.1%	6.9%	5.3%
Waiau 8	3.9%	2.9%	1.9%	1.3%	12.7%	5.3%
Waiau 9	11.7%	24.3%	6.2%	0.9%	56.6%	20.3%
Waiau 10	7.6%	14.3%	1.6%	1.6%	80.0%	20.3%
Kahe 1	0.4%	4.6%	2.3%	0.7%	3.0%	3.9%
Kahe 2	7.5%	1.6%	7.6%	8.8%	1.8%	3.9%
Kahe 3	7.7%	0.7%	3.8%	3.9%	2.4%	5.3%
Kahe 4	6.1%	4.7%	7.0%	10.3%	2.4%	5.3%
Kahe 5	2.5%	0.3%	9.0%	1.1%	6.5%	3.8%
Kahe 6	0.4%	2.1%	3.3%	1.9%	3.1%	2.1%
CIP CT-1			22.0%	16.0%	35.1%	24.6%
HECO	**5.1%**	**5.6%**	**5.0%**	**4.5%**	**6.4%**	**~4.7%**

H-POWER	10.0%
Kalaeloa	1.5%
AES	1.5%

4.4. Additions of Capacity

4.4.1 Firm Capacity Additions

The State of Hawaii Department of Transportation, Airports Division ("DOT"), plans to install approximately 8 MW of distributed standby generation ("Airport DSG") in October 2012. Under an agreement between Hawaiian Electric and DOT ("Airport DSG Agreement"), Hawaiian Electric will be able to use the Airport DSG to serve system needs under certain conditions. Nearly all of the generation provided by the Airport DSG will be dispatchable by Hawaiian Electric under the conditions given in the agreement. The Commission approved the Airport DSG Agreement on March 2, 2010 in Docket No. 2009-0317. This capacity was included in the adequacy of supply analysis.

On December 15, 2009 in Docket No. 2009-0291 (Hawaiian Electric's petition for a declaratory order regarding the exemption of the proposed H-Power project from the Framework for Competitive Bidding ("Framework")), the Commission issued an

Order that the project is exempt from the Framework. Hawaiian Electric is currently in discussions with the City & County of Honolulu to purchase up to an additional 27 MW of power from an expansion of the existing waste-to-energy facility, which is currently under construction and is forecasted to begin commercial operation in 2012. This capacity was included in the adequacy of supply analysis.

On December 27, 2011, Hawaiian Electric submitted to the Commission a request for approval of a waiver from the competitive bidding framework for an approximately 50 MW of utility owned and operated, firm, renewable, dispatchable, generation security project on federal land. It is estimated that the project could be in service in the 2017 timeframe, however, the timing of the project is subject to many uncertainties such as federal approval and funding. For the purposes of this analysis, due to the level of uncertainty surrounding the service date of this facility, this capacity was not included in the analysis.

4.4.2 Non-Firm Additions

In addition to firm generation power projects, Hawaiian Electric purchases energy on an as-available basis from four producers and anticipates adding additional renewable as-available energy projects to the Hawaiian Electric system in the near future as these facilities achieve commercial operation. Because as-available generating units cannot be dispatched to provide a specified level of power upon demand to serve the peak load, power from these units are not included in the planning criteria and reliability guideline calculations.

Several independent as-available producers have power purchase agreements with Hawaiian Electric and are in various stages of Commission approval, or under construction, for example:

On January 19, 2011, the Commission approved a power purchase contract with Honua Power, LLC, to purchase approximately 6.6 MW of as-available energy from a biomass gasification facility.

On September 21, 2011, the Commission approved the amended power purchase agreement with Kalaeloa Solar Two, LLC, for up to 5 MW of photovoltaic power.

On November 22, 2011, the Commission approved, subject to modification and clarifications, the Feed-In-Tariff Tier 3 Tariff.

On December 12, 2011, the Commission approved the power purchase agreement with Kawailoa Wind, LLC, for up to 69 MW of wind power.

On October 14, 2011, Hawaiian Electric submitted its Draft Request for Proposals for Renewable Energy and Undersea Cable System Projects Delivered to the Island of Oahu, for 200 MW or more of renewable energy.

On December 21, 2011, Hawaiian Electric submitted an application for Commission approval of a PPA with Kalaeloa Renewable Energy Park, LLC, for up to 5 MW of photovoltaic power.

On January 2, 2012, the Commission approved the power purchase agreement, as amended, with IC Sunshine, LLC, for up to 5 MW of photovoltaic power.

4.5. Reductions of Firm Generating Capacity

Waiau Units 3 and 4 (with a combined rating of 92.6 MW-net), and Honolulu Units 8 and 9 (with a combined rating of 107.3 MW-net) are candidates for retirement in the next 10 years.[8] The decision on whether to continue operating these units or retire them would depend largely on other factors, such as operation and maintenance costs, environmental regulations, replacement capacity, and transmission infrastructure improvements. For the purposes of the 2012 AOS analysis, the reference scenario forecasts Waiau units 3 and 4 to be removed from service at the end of 2017, and Honolulu Units 8 and 9 removed from service in 2020.

4.6 Capacity from Kalaeloa Partners, L.P., Combined Cycle Unit

The existing PPA with Kalaeloa Partners, L.P. ("Kalaeloa") expires on May 23, 2016. On November 10, 2011, Hawaiian Electric submitted to the Commission, a petition for Declaratory Order regarding the Exemption of Kalaeloa Partners, LP's project from the Framework for Competitive Bidding, or in the alternative, Approval of Application for Waiver from the Framework for Competitive Bidding. Hawaiian Electric is currently in discussions with Kalaeloa to renegotiate the existing PPA so that the Kalaeloa facility can continue to provide reliable firm capacity and heat rate efficient energy production through its existing facility.

For the purposes of the 2012 AOS analysis, it is assumed that the 208 MW of capacity provided by Kalaeloa remains in service beyond May 23, 2016.

8 See Section 6.2.2 below.

5. Scenario Analysis

5.1 Description of Scenarios

Forecasts of the inputs to the analysis are subject to uncertainties. Therefore, a range of forecasts was considered in the analysis. Descriptions of the various planning scenarios are provided below:

- Higher load forecast (60 MW increase in peak load);
- Waiau 3 and 4, and Honolulu 8 and 9 generating units remain in service
- Increased stringency of Hawaiian Electric's generating system reliability guideline from 4.5 years per day to 10 years per day.

5.1.1 Higher Load Forecast

The higher load scenario uses the assumption that the system peaks are higher by 60 MW. Such a scenario is possible, for example if, (1) customer acceptance and/or awareness is less than expected in the case of the load management programs, or energy efficiency programs; (2) electricity use is higher than that projected by the Hawaiian Electric sales and peak forecast due to a recovering economy; or (3) a combination of these or other factors occur in the future. A 60 MW higher peak load is roughly equivalent to one standard deviation over a 20 year period of historical peaks. Table 7 summarizes the higher load scenario.

Table 7: Higher Load Scenario

Year	2012 AOS May 2011 S&P Forecast (MW)	60 MW higher May 2011 S&P Forecast (MW)	Difference (MW)
2012	1,218	1,278	60
2013	1,238	1,298	60
2014	1,257	1,317	60
2015	1,263	1,323	60
2016	1,263	1,323	60
2017	1,264	1,324	60
2018	1,268	1,328	60
2019	1,276	1,336	60
2020	1,284	1,344	60
2021	1,285	1,345	60

5.1.2 Waiau 3 and 4; Honolulu 8 and 9

The scenario of Waiau Units 3 and 4 and Honolulu 8 and 9 remaining in service examines the generating system reliability if these units are not removed from service at the end of 2017, and 2019, respectively.

5.1.3 Revised System Reliability Guideline

Another potential means to address the ever increasing planning uncertainty and complexity is to revise the capacity planning guideline. As explained in Section 3.2, Hawaiian Electric currently uses a reliability guideline threshold of 4.5 years per day. If the existing Loss of Load Probability of 4.5 years per day does not provide an adequate cushion to respond to quickly-changing parameters, such as changes in peak demand and individual unit availability factors, many of which may change rapidly from year to year, then the utility could plan for a higher reliability standard similar to that many mainland utilities. Such an approach would not eliminate quickly-changing parameters, but it would add a measure of conservatism in recognition that the uncertainties undoubtedly exist.

Hawaiian Electric performed a high-level evaluation using a more stringent reliability guideline of 10 years per day. The purpose of this analysis was to determine the amount of firm capacity that would be required to meet this higher reliability guideline. The results of this high level evaluation are shown in Section 5.3.

5.2. Other Planning Considerations

In order to continue satisfying Hawaiian Electric's capacity planning criteria, replacement firm capacity must be installed if existing firm capacity will be removed from service. The replacement capacity must be installed prior to the removal of service of existing generation. The lead time to install new, firm generating capacity may be seven to 10 years, depending on the length of time needed to obtain permits, procure major equipment, and construct the facilities. Given the anticipated reserve capacity shortfalls in the timeframes described below, Hawaiian Electric plans to issue a Request for Proposals ("RFP") in 2012 to acquire additional firm capacity. The foundation for the firm capacity RFP was provided in Hawaiian Electric's 2011 AOS filed in February 2011.

The risks associated with action and inaction is not symmetrical. While Hawaiian Electric has the ability to delay the execution of its resource plans when circumstances, such as an economic slump resulting in reduced load growth, lead to a reduction in urgency, it has very limited ability or no ability to accelerate the addition of significant generation resources if unanticipated changes in key drivers require that firm capacity be added sooner than anticipated. This is because Hawaiian Electric has little control over the rate at which major equipment can be manufactured and the speed of the permitting and regulatory review process. This asymmetrical risk profile is considered when determining the date at which new capacity should be added for any of the reasons cited in Section 4 above.

5.3 Results of Analysis

Table 8 shows the capacity, in MW, in excess of the amount needed to satisfy Rule 1 and Rule 2 of the capacity planning criteria. The analysis shows that the Rule 1 and Rule 2 are satisfied for the Reference Scenario for each year through 2016 under a reference set of assumptions including, but not limited to: (1) continued residential and commercial load management impacts at the levels described in Table 4; and (2) continued acquisition of energy efficiency programs but by a third party. However, as previously explained, Rule 1 and Rule 2 results are deterministic and do not incorporate unit specific EFOR rates in their calculation.

Table 8: Rule 1 and Rule 2 Analysis

Year	Rule 1 Results (MW)	Rule 2 Results (MW)
2012	249	209
2013	214	174
2014	226	186
2015	236	196
2016	239	199

The LOLP for the Reference and Planning Scenarios were calculated using a production simulation model for each year through 2021 under reference and variable sets of assumptions described in Section 4.

For the years 2012 to 2016, the generating system's 4.5 years per day reliability guideline is projected to be met in the reference scenario, but will be less than the 4.5 years per day reliability guideline in the higher load scenario, and under the higher generating system reliability scenario of 10 years per day. A reserve capacity shortfall is shown under all scenarios in 2014 and 2015, due to the planned maintenance schedule used for the purposes of this analysis.

In 2010 and 2011, the Environmental Protection Agency established emission regulations with the associated estimated compliance dates as follows:

- Reciprocating Internal Combustion Engines National Emissions Standards for Hazardous Air Pollutants ("RICE NESHAP") – May 3, 2013

- Mercury and Air Toxics Standards ("MATS") – August 16, 2015
- 1-Hour SO_2 National Ambient Air Quality Standards ("NAAQS") – Attainment date of August 2017
- Regional Haze – September 2017 (estimated)

In order to comply with these standards, Hawaiian Electric may need to retrofit major post-combustion control equipment onto its existing generating units. This will require long outages times to install the equipment and to tie it into the existing equipment. In anticipation of this major work, Hawaiian Electric's planned maintenance schedules incorporated extended unit outages to allow for the installation of emission control equipment. Hawaiian Electric will also examine whether retirement of other units in addition to Waiau Units 3 and 4 and Honolulu Units 8 and 9 would be viable measures to comply with the new environmental regulations. Retirement of additional units would be predicated on acquiring replacement firm capacity. This replacement capacity would be acquired through a competitive bidding process, which is discussed in Section 6 below.

Table 9 shows the results of the Generation System Reliability analysis. The system reliability in the scenarios shown varies depending on the firm generating units available, and the planned maintenance schedules.

Table 9: Generation System Reliability Guideline (years/day)

Generation System Reliability (years/day)				
Year	Reference Scenario	Higher Load (Add 60 MW)	No Retirements	10 yrs/day reliability scenario
2012	8.0	2.2	8.0	8.0
2013	4.6	1.3	4.6	4.6
2014	3.2	0.9	3.2	3.2
2015	4.1	1.1	4.1	4.1
2016	5.6	1.5	5.6	5.6
2017	9.5	2.5	9.5	9.5
2018	1.6	0.5	7.0	1.6
2019	1.4	0.5	6.4	1.4
2020	0.3	0.1	5.2	0.3
2021	0.3	0.1	3.8	0.3

Table 10 shows the reserve capacity surpluses or shortfalls corresponding to the calculated reliability shown in Table 9. Reserve capacity shortfall is the approximate amount of additional firm capacity needed to restore the generating system LOLP to be greater than the 4.5 years per day reliability guideline. For example in the Higher Load scenario for 2012, the number -40 would indicate that about 40 MW of firm generating capacity would have to be added, in order for the expectation of not being able to satisfy demand due to insufficient generation occurs no more than once every 4.5 years. A positive number indicates the amount of capacity over and above that amount needed to satisfy the 4.5 years per day reliability guideline. A negative number indicates the amount of capacity below the amount needed to satisfy the 4.5 years per day reliability guideline.

Table 10: Reserve Capacity Shortfall for Reference and Planning Scenarios (MW)

Year	Reference Scenario	Alternate Scenarios		
		Higher Load (Add 60 MW)	No Retirements	10 yrs/day reliability scenario
2012	20	-40	20	-10
2013	0	-60	0	-40
2014	-20	-80	-20	-60
2015	-10	-70	-10	-40
2016	0	-60	0	-30
2017	30	-30	30	-10
2018	-50	-110	10	-90
2019	-60	-120	10	-100
2020	-150	-210	0	-190
2021	-130	-190	-10	-170

(Note: Negative values indicate a shortfall of generating capacity; positive values indicate a surplus of generating capacity)

The analysis shows that the reserve capacity shortfall is sensitive to the load forecast. In the case of the Higher Load Scenario, a nominal 60 MW increase in the forecasted load resulted in a 60 to 70 MW change to the results, indicating a reserve capacity shortfall in all years analyzed in contrast to limited capacity shortfall projected in the Reference Scenario in 2012-2017. Expectations regarding future loads can change quickly, and Hawaiian Electric may not be able to respond quickly to increases in demand. This illustrates the importance of using scenario analysis as a planning tool.

The analysis also shows that small reserve capacity shortfalls may occur in 2014 and 2015 in the Reference and No Retirements scenarios. These shortfalls are driven primarily by the long planned maintenance schedules that may be necessitated by the need to retrofit major equipment for environmental compliance. Mitigation measures such as promoting additional load management impacts or revising the maintenance schedules can benefit generation system reliability over this short-term.

Table 10 further projects that for the years 2012 to 2017, approximately 20 MW to 60 MW of firm capacity must be added to the Hawaiian Electric system to achieve a higher reliability guideline of 10 years/day in the near term. The approximately 30-40 MW difference between the 4.5 years/day Reference Scenario and the 10 years/day Scenario to achieve higher levels of reliability is a non-linear relationship between MW capacity added and improvement in LOLP.

6. Acquisition of Additional Firm Capacity

6.1 Competitive Bidding is the Required Acquisition Mechanism

On December 8, 2006, the Framework for Competitive Bidding ("CB Framework") was adopted by the Commission in Decision and Order No. 23121, in Docket No. 03-0372, pursuant to HRS §§ 269-7 and 269-15 and Hawaii Administrative Rules § 6-61-71. The Commission's CB Framework states that "[c]ompetitive bidding, unless the Commission finds it to be unsuitable, is established as the required mechanism for acquiring a future generation resource or a block of generation resources, whether or not such resource has been identified in a utility's IRP."[9]

As indicated above, Hawaiian Electric will need additional firm capacity beginning in the 2017 timeframe in anticipation of the potential retirement of Waiau Units 3 and 4 in 2018 and the potential retirement of Honolulu Units 8 and 9 in 2020. Hawaiian Electric will seek to acquire the additional firm capacity through a competitive bidding process.

6.2 Foundation for the RFP

6.2.1 Hawaiian Electric's 2011 Adequacy of Supply Report

The foundation for the RFP was described in greater detail in Hawaiian Electric's 2011 AOS report filed on February 17, 2011. The need for capacity in the 2017 timeframe was based on forecasted load growth at the time and the potential retirements of Waiau Units 3 and 4. The units would be retired after new firm capacity is added.

An additional 100 MW of firm capacity in the 2020 timeframe was identified to potentially replace the capacity of Honolulu Units 8 and 9. These units could be retired

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9 CB Framework, Section II.A.3. on page 3.

in the 2020 timeframe only after new firm capacity is installed, and the transmission and distribution system in the Honolulu area is reconfigured.

6.3 Scope of RFP

6.3.1 Size (in MW) of RFP

Hawaiian Electric plans to seek up to 300 MW in firm capacity to accommodate anticipated load growth and the retirement of up to four existing generating units. The RFP will be prepared in such a manner as to allow bidders to participate in two distinct bidding options aligned with the firm capacity needs for Hawaiian Electric. The first option will be related to the capacity needed in 2017 to accommodate load growth and the potential retirement of Waiau Units 3 and 4. The second option will be related to an additional increment of capacity needed to replace the capacity due to the potential retirement of Honolulu Units 8 and 9.

6.3.2 Timing of Firm Capacity Needs

The first 200 MW need to be in service by 2017 to accommodate the potential retirement of two generating units (Waiau Units 3 and 4) and to provide an option for additional firm capacity should other units need to be targeted for retirement as compliance measures for the new environmental regulations. The next 100 MW need to be in service in the 2020 timeframe to accommodate the possible retirement of the next two generating units (Honolulu Units 8 and 9).

6.3.3 Attributes of New Generation

The attributes of desired future firm generating capacity are described below. Definitions of the terminology are described in Appendix 3. The description of the attributes and the definitions of the terminology will be refined as needed in the draft and final RFPs.

- The capacity to be provided may come from multiple generating units.
- Each generating resource must provide firm capacity at rated power factor.
- Each generating resource must be fully dispatchable by Hawaiian Electric.
- The size, in MW, of any one generating resource shall not exceed 150 MW at unity power factor.
- The minimum size of any one generation resource shall be 5 MW at unity power factor.

- The input energy (such as the fuel supply) to the generating units must be renewable.
- Each generating resource must be able to deliver reactive power at output levels within, and up to the limit of the reactive capability curves of each generator while delivering the rated output. The generator capability should range from 0.85 lagging to 0.90 leading power factor.
- Each generating resource must be able to cycle on and off multiple times per day.
- Each generating resource must be able to help regulate and stabilize the system frequency.
- Each generating resource must be able to help regulate voltage.
- Each generating resource must be able to increase or decrease their power output at a rate equal to or greater than 5 MW per minute.
- Each generating resource must use commercially available and proven technology.
- Each generating resource site will be evaluated for its black-start capability (i.e., capable of starting up on a completely de-energized utility grid). Generating resources with black start capability must have the capability to operate in either isochronous or governor droop modes with the ability to transition from one mode to the other on the fly.
- Of the 200 MW needed in the 2017 timeframe, Hawaiian Electric requires that at least 50 MW should have quick starting capability.
- Of the 200 MW needed in the 2017 timeframe, at least 100 MW should be cycling capacity, but up to approximately 50 MW could be provided by base load capacity.
- The capacity to be provided may come from multiple generating units.
- For the capacity needed in the 2020 timeframe, at least 50 MW should have quick starting capability and up to approximately 50 MW may be base load capacity.

6.4 Competitive Bidding Process

6.4.1 Commission Opens Docket

On February 24, 2011, the Commission opened Docket No. 2011-0039 pursuant to the Framework for Competitive Bidding to receive filings, review approval requests, and resolve disputes, if necessary, related to Hawaiian Electric's proposal to proceed with a competitive bidding process to acquire new firm capacity generation.

6.4.2 Independent Observer Contract

On November 16, 2011, the Commission selected an Independent Observer ("IO") to monitor the competitive bidding process and report on the progress and results to the commission, review approval requests, and resolve disputes, if necessary. The IO is Boston Pacific Company, Inc.

6.4.3 Timeline

The proposed timeline for the competitive bidding process is anticipated to take between 12 and 18 months from the issuance of the Draft Request for Proposals to selection of the Final Award Group. The actual timeline will be influenced by the number of bids received and the complexity of any issues that may be raised by participants.

7. Conclusions

Under the Reference Scenario, Hawaiian Electric's generation capacity for the next five years (2012-2016) will be sufficient to meet reasonably expected demands for service and provide reasonable reserves for emergencies, with accommodations for environmental compliance options. Hawaiian Electric will need additional firm capacity in the 2017 timeframe, and will seek to acquire the additional capacity through a competitive bidding process.

The scenario analysis indicates that in 2012, Hawaiian Electric may experience anywhere from a 40 MW reserve capacity shortfall under the higher load scenario to a 20 MW reserve capacity surplus in the Reference Scenario. By 2016, Hawaiian Electric may experience anywhere from a 0 MW surplus to 60 MW capacity shortfall under various scenarios. The range of potential reserve capacity shortfalls may be addressed through mitigation measures such as the acquisition of additional energy efficiency and load management resources over the near-term (if approved by the Commission), or adjustments to Hawaiian Electric's planned maintenance schedules, depending on the circumstances.

Hawaiian Electric must therefore be proactive, anticipating the what-ifs, and cannot bank on the Reference Scenario occurring. Hawaiian Electric will continue its portfolio approach to meet its obligation to serve, which includes demand-side management programs and the pursuit of firm capacity renewable supply side options. Hawaiian Electric also recognizes that the environment for resource planning has increased in complexity and uncertainty.

Very truly yours,

Darcy L. Endo-Omoto
Vice President
Government & Community Affairs

Attachments

c: Division of Consumer Advocacy (with Attachments)

Table A1:
Projected Reserve Margins

Year	System Capability at Annual Peak Load (net kW) [A] (I)	System Peak (net kW) [D] (II)	Interruptible Load (net kW) [E] (III)	Reserve Margin (%) [A-(D-E)] (D-E)
2011	1,755,600	1,141,000	41,000	60%
2012	1,790,600	1,218,000	41,000	52%
2013	1,790,600	1,238,000	44,000	50%
2014	1,790,600	1,257,000	49,000	48%
2015	1,790,600	1,263,000	53,000	48%
2016	1,790,600	1,263,000	58,000	49%
2017	1,790,600	1,264,000	62,000	49%
2018	1,698,000	1,268,000	62,000	41%
2019	1,698,000	1,276,000	62,000	40%
2020	1,590,700	1,284,000	62,000	30%
2021	1,590,700	1,285,000	62,000	30%

Notes:

I. System Capability includes:
- Hawaiian Electric central station units at total normal capability is 1,321,600 kW-net or 1,383,000 kW-gross.
- Firm power purchase contracts with a combined net total of 434,000 kW from Kalaeloa (208,000 kW), AES Hawaii (180,000 kW), and H-POWER (46,000 kW).
- Expected expansion of H-POWER in 2012 (+27,000 kW)
- Airport DSG in 2012 (8,000 kW)
- Kalaeloa assumed to continue in service after 2016
- Waiau Units 3 and 4 are removed from service in 2017 (-92,600 kW)
- Honolulu Units 8 and 9 are removed from service in 2020 (-107,300 kW)
- When the system capability at the time of the system peak differs from the year-end system capability, an applicable note will indicate the year-end system capability.

II. System Peaks
- The 2012-2021 annual forecasted system peaks are based on Hawaiian Electric's May 2011 Sales and Peak Forecast.
- The forecasted System Peaks for 2012-2021 include the estimated peak reduction benefits of third-party energy efficiency DSM programs.

- The peak for 2012-2021 includes approximately 25,000 kW of stand-by load
- The Hawaiian Electric annual forecasted system peak is expected to occur in the month of October.

III. Interruptible Load:

- Interruptible Load impacts are at the net-to system level, and are approximate impacts at the system peak.

Hawaiian Electric Equivalent Forced Outage Rate ("EFOR") Discussion

It is extremely difficult to predict unit-specific EFOR rates, as indicated by the variation in historical data. Nonetheless, for planning purposes it is necessary to estimate forward-looking EFOR rates. This is accomplished using a blend of historical data, experience, and judgment. Accordingly, the estimated EFOR rates used in the 2012 AOS analysis and the rationale for them are described in the following paragraphs.

1. Honolulu Units 8 and 9

   In the 2011 AOS, the forward looking EFOR of 15.1% included the actual average of 5 years for both H8 and H9. The actual EFOR for 2011 for Honolulu Units 8 & 9 were 7.3% and 22.6%, respectively, and averaged 15.2% for the two units. For the 2012 AOS analysis, it was decided to continue to utilize the average of the actual EFOR for both units for the past 5 years. This approach recognizes that these units will be dispatched and operated similarly in 2011 as they were in recent years. As a result, an EFOR of 15.2%, 0.1% higher than that utilized for the 2011 AOS analysis, is recommended for the 2012 AOS forward looking EFOR for both Honolulu Units 8 and 9.

2. Waiau Units 3 and 4

   In the 2011 AOS, the forward looking EFOR for Waiau Unit 3 was 15.0%. The actual EFOR for 2011 for Waiau Unit 3 was 33.1%. The actual EFOR was significantly higher than the forecast. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rates for the past 5 years. This approach recognizes that Waiau Unit 3 will be dispatched and operated similarly in 2012 as it was in recent years. Thus, for Waiau Unit 3, an EFOR of 16.8%, 1.8% higher than that utilized for the 2011 AOS analysis, is recommended for the 2012 AOS forward looking EFOR.

   In the 2011 AOS, the forward looking EFOR for Waiau Unit 4 was 12.0%. The actual EFOR for 2011 for Waiau Unit 4 was 24.7%. The actual EFOR was higher than the forecast. For the 2012 AOS analysis, it was decided to continue and utilize the average of the actual EFOR of the unit for the recent 5 years. This approach recognizes that Waiau Unit 4 will be dispatched and operated similarly in 2012 as it was in recent years. Thus, for Waiau Unit 4, an EFOR of 11.5%, 0.5% lower than that utilized for the 2011 AOS analysis, is recommended for the 2012 AOS forward looking EFOR.

3. Waiau Units 5 and 6

In the 2011 AOS, the forward looking EFORs for Waiau Units 5 and 6 were 4.7% based on the average actual EFORs for both units for the recent 5 years. The actual EFOR for 2011 for Waiau Units 5 and 6 were 0.8% and 2.8%, respectively. For both units, actual EFORs were below forecast. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rates for the past 5 years. This approach also recognizes that the units will be dispatched and operated similarly in 2012 as they were in recent years. As a result, an EFOR of 3.9%, 0.8% lower than that utilized for the 2011 AOS analysis is recommended for the 2012 AOS forward looking EFOR for both Waiau 5 and 6.

4. Waiau Unit 7, Waiau Unit 8, Kahe Unit 3, and Kahe Unit 4

These four units are of similar size, design, and vintage, and are dispatched as baseloaded units with similar duty cycles. Accordingly, in the 2011 AOS, the forward looking EFOR rate of 5.2% was used for these four units. The actual EFOR for 2011 for Waiau 7, Waiau 8, Kahe 3, and Kahe 4 were 7.4%, 11.1%, 2.2%, 2.9%, respectively, with an average of 5.9%. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rates for the four units for the past 5 years. This approach also recognizes that these units will be dispatched and operated similarly in 2012 as they were in recent years. As a result, an EFOR of 5.3%, 0.1% higher than that utilized for the 2011 AOS analysis is recommended for the 2012 AOS forward looking EFOR for Waiau Units 7 and 8, and Kahe Units 3 and 4.

5. Waiau Units 9 and 10

In the 2011 AOS, the forward looking EFORs for Waiau Units 9 and 10 were 10.9% based on the average of the actual EFORs for both units for the recent 5 years. The actual EFOR in 2011 for Waiau Units 9 and 10 were 56.6% and 78.1%, respectively, and averaged 67.35% for the two units. The actual EFOR were significantly higher than the forecast. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rates for both units for the past 5 years. This approach also recognizes that these units will be dispatched and operated similarly in 2012 as they were in recent years. As a result, an EFOR of 20.3%, 9.4% higher than that utilized for the 2011 AOS analysis is recommended for the 2012 AOS forward looking EFOR for Waiau 9 and 10.

6. Kahe Units 1 and 2

In the 2011 AOS, the forward looking EFORs for Kahe Units 1 and 2 were 3.6% based on the average of the actual EFORs for both units for the recent 5 years. The actual EFOR in 2011 for Kahe Unit 1 and 2 were 2.7% and 2.4%, respectively, and averaged 2.6% for both units. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rates for both units for the past 5 years. This approach also recognizes that these units will be dispatched and operated similarly in 2012 as they were in recent years. As a result, an EFOR of 3.9%, 0.3% higher than that utilized for the 2011 AOS analysis is recommended for the 2012 AOS forward looking EFOR for Kahe 1 and 2.

7. Kahe Unit 5

In the 2011 AOS, the forward looking EFOR for Kahe Unit 5 was 3.2% based on the average of the actual EFOR for the recent 5 years. The actual EFOR of 5.9% was higher than the forecast. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rate for the past 5 years. This approach recognizes that this unit will be dispatched and operated similarly in 2012 as it was in recent years. As a result, an EFOR of 3.8%, 0.6% higher than that utilized for the 2011 AOS analysis is recommended for the 2012 AOS forward looking EFOR for Kahe 5.

8. Kahe Unit 6

In the 2011 AOS, the forward looking EFOR for Kahe Unit 6 was 2.1% based on the average of Kahe Unit 6 actual EFOR for the recent 5 years. The actual EFOR for 2011 for Kahe Unit 6 was 3.0%. For the 2012 AOS analysis, it was decided to continue to use the average of the actual EFOR rate for the past 5 years. This approach also recognizes that Kahe Unit 6 will be dispatched and operated similarly in 2012 as it was in recent years. As a result, an EFOR of 2.1%, the same EFOR rate from that utilized for the 2011 analysis is recommended for the 2012 AOS forward looking EFOR for Kahe Unit 6.

9. CIP CT-1

On August 3, 2009, CIP CT-1 was placed in service (e.g. tied into the electrical grid and producing power). The actual EFOR for 2009, 2010, and 2011 was 22.0%, 16.0%, and 35.8%, respectively, with an average of 24.6% over the three years. For the 2012 AOS analysis, it was decided to use the average of the actual EFOR rate for the past 3 years. This approach recognizes that this unit will be dispatched and operated similarly in 2012 as it was in recent years. As a result, an EFOR of 24.6%, 9.6% higher than that utilized for the 2011 AOS analysis is recommended for the 2012 AOS forward looking EFOR for CIP CT-1.

Terminology for New Generating Unit Attributes

Firm Capacity – The amount of energy producing capacity which can be guaranteed to be available at a given time.

Dispatchable – The ability to turn on or turn off a generating resource at the request of the utility's system operators, or the ability to increase or decrease the output of a generating resource from moment to moment in response to signals from a utility's Automatic Generation Control System, Energy Management System or similar control system, or at the request of the utility's system operators.

Renewable Energy – Energy generated or produced using the following sources:

1. Wind
2. The sun
3. Falling water
4. Biogas, including landfill and sewage-based digester gas
5. Geothermal
6. Ocean water, currents, and waves, including ocean thermal energy conversion
7. Biomass, including biomass crops, agricultural and animal residues and wastes, and municipal solid waste and other solid waste
8. Biofuels
9. Hydrogen produced from renewable sources

Sustainable Fuel Supply – Lasting and stable fuel supply, including transportation and fuel related services if applicable.

Commercially Available and Proven Technology – Technology that has been commercially operating for at least five years, with capacity factors within design and dispatch parameters, and at a scale of 100 KW or larger and be scalable to produce energy on a commercial level submitted.