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PUBLIC UTILITIES
COMMISSION

SHARON M. SUZUKI
President

April 11, 2014

The Honorable Chair and Members of the
Hawai'i Public Utilities Commission
465 South King Street
Kekuanaoa Building, 1st Floor
Honolulu, Hawai'i 96813

Dear Commissioners:

Subject: Adequacy of Supply
Maui Electric Company, Limited ("Maui Electric")

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.*

2014 Adequacy of Supply Report Summary

- Maui Electric's resource planning is challenging because of the complexity and uncertainty in forecasting both system needs and the impacts of future actions the Company can take, together with the long lead time and costs associated with implementing some of those actions. Under the planning assumptions described herein, Maui Electric anticipates needing additional firm capacity on Maui in the 2016 timeframe, with greater capacity needs in 2019.
- The capacity shortfall forecasts on Maui appear to be relatively small (less than 3.0 MW for years 2016, 2017, and 2018.
- Larger capacity shortfall conditions (greater than 35 MW) on Maui are forecasted to occur following the retirement of the Kahului Power Plant ("KPP") in 2019.

- Maui Electric will seek to acquire the needed additional firm capacity for Maui through a Competitive Bidding Process for the larger capacity violations forecasted to start in 2019. Given the timetable of the Competitive Bidding Process and subsequent time required for permits, procurement and construction, a request to open a docket to initiate the process will follow this filing.
- Maui Electric plans to issue one or more Requests For Proposals ("RFP") for energy storage, demand response, and firm generating capacity. The detailed RFP content will be determined at a later date.
- Maui Electric will continue to perform contingency planning for the implementation of mitigating measures, given future uncertainties.

The assumptions used to determine the results in Section 1.6 are based on information available that includes system load forecasts, existing generating units' firm capacity contribution, demand response program contributions toward peak reduction, independent power producer ("IPP") firm generation contribution, and Energy Efficiency Portfolio Standards ("EEPS") load reduction programs. Other resources that have yet to be confirmed, but potentially could provide firm capacity benefit (i.e., capacity value of wind) will be considered in future capacity shortfall analyses.

Electrical systems and the resources within the supply-side and demand-side are evolving and can change from one year to the next. The planning assumptions used in determining the capacity shortfall as shown in Section 1.6 and the resulting plan to open a docket for a RFP for a 40MW firm capacity generating unit (Section 1.10), known as the "Base Case," were based on the following:

- System Peak forecast that includes future Energy Efficiency Demand Side Management projections acquired through the Energy Efficiency Portfolio Standards ("EEPS") (Section 1.3)
- Demand Response (Section 1.4)
- Hawaiian Commercial and Sugar Company ("HC&S") does not contribute to firm generating capacity after 2014 (Section 1.5.2)
- Maui generating unit firm capacity (Attachment 2)
- Retirement of the Kahului Power Plant in 2019 (Section 1.5.3.2

The size of the firm generating resource needed could change if the planning assumptions are different from the Base Case. To illustrate this, the matrix below identifies the amount of firm generating capacity that could be requested through an RFP incorporating different combinations of the planning assumptions mentioned above and resources such as a 10MW:40MWh Battery Energy Storage System ("BESS") and 5% capacity value of wind. A description of the scenarios contained within the matrix is located in Attachment 4 of this letter. Firm capacity RFP quantities are rounded in 10MW increments.

	KPP Retire	Demand Response (4.3 MW Capacity Value in 2019)	Future EEPS (15.4 MW Peak Reduction in 2019)	HC&S Capacity Contribution (16MW)	BESS (10 MW: 40 MWh)	Capacity Value of Wind (3.6 MW)	Firm Capacity RFP
Base Case	X	X	X				40 MW
Case 1	X	X	X	X		X	20 MW
Case 2	X	X	X	X			30 MW
Case 3	X		X	X		X	30 MW
Case 4	X		X	X			30 MW
Case 5	X	X	X		X	X	30 MW
Case 6	X	X	X		X		30 MW
Case 7	X		X		X	X	30 MW
Case 8	X		X		X		40 MW
Case 9	X	X				X	60 MW
Case 10	X	X					60 MW
Case 11	X					X	70 MW
Case 12	X						70 MW
Case 13	X	X	X	X	X	X	10 MW
Case 14	X	X	X	X	X		20 MW
Case 15	X		X	X	X	X	20 MW
Case 16	X		X	X	X		20 MW

1.0 Maui Division

1.1 Peak Demand and System Capability in 2013

Maui's 2013 system peak occurred on December 9, 2013, (6:42 pm) and was 190.3 MW (net) or 194.5 MW (gross). The total system capability of Maui was 262.3 MW (net) at the time of the system peak, resulting in a reserve margin of approximately 38% over the 2013 system peak, as shown in Attachment 1.

1.2 Determination of Maui Division's Adequacy of Supply

1.2.1 Maui Division Capacity Planning Criteria

The following capacity planning criteria are used to determine the timing of an additional generating unit for the Maui Division:

> *New generation will be added to prevent the violation of the rule listed below where "units" mean all units and firm capacity suppliers physically connected to the system, and "available unit" means an operable unit not on scheduled maintenance.*
>
> *The sum of the reserve ratings of all units minus the reserve rating of the largest available unit minus the reserve ratings of any units on maintenance must be equal to or greater than the system peak load to be supplied.*
>
> *In addition, consideration will be given to maintaining a reserve margin of approximately 20 percent based on Reserve Ratings.*

1.2.2 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 Maui Electric broaden its consideration to ensure timely installation of generation capacity necessary to meet its customers' energy needs. As stated in the Capacity Planning Criteria:

> *The preceding rules apply to capacity planning in long-range generation expansion studies. The actual commercial operation date for the next unit to be added shall also be determined using these rules as guides, with due consideration given to short-term operating conditions, equipment procurement, construction, regulatory approvals, financial and other constraints, etc.*

Other near-term considerations may include:

- the current condition and rated capacity of existing units; the preferred mix of generation resources to meet varying daily and seasonal demand patterns at the lowest reasonable capital and operating costs;
- the forecasted minimum demand;
- required power purchase obligations and contract terminations;
- the unpredictable output of supplemental resources;
- the uncertainties surrounding Non-Utility Generation ("NUG") resources;
- transmission system considerations;
- meeting environmental compliance standards; and
- system stability considerations for Maui Electric's isolated system.

In the application of Maui Electric's capacity planning criteria that are used to determine its adequacy of supply, the inputs drive the results. 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 DSM programs and demand response programs) and (2) the total firm capacity on the system. These key inputs are described in the following sections.

1.3 Peak Demand

1.3.1 Recorded Peak Demand

Maui's 2013 system peak of 194.5 MW (gross) or 190.3 MW (net) occurred on December 9, 2013. The 2013 annual gross peak was 4.6 MW lower than the 2012 gross system recorded peak of 199.1 MW (gross) (or 194.8 MW (net)) set on December 31, 2012. In addition, the 2013 recorded peak (190.3 MW (net)) was 5.8 MW lower than the forecasted peak of 196.1 MW (net) per the Maui Electric August 2013 Adjusted Peak Forecast; see Table 1.10-1 of this letter. The following table shows the Maui historical system peak demand.

Table 1.3.1-1: Recorded System Peak Demand

Year	Recorded System Peak, MW-Net
2005	202.1
2006	206.4
2007	204.4
2008	194.4
2009	199.9
2010	199.4
2011	189.9
2012	194.8
2013	190.3

In 2013, peak load declined despite moderate economic recovery supported by performance in the visitor industry at levels similar to 2012 and increased construction activity in the commercial sector. Maui's lower system peak in 2013 compared to 2012 appears to have been due to less humid weather in the 2013 fourth quarter together with continued energy conservation and efficiency efforts.

1.3.2 Projected Peak Demand

Maui Electric utilized a sales forecast identified as the "August 2013 Adjusted Sales Forecast" in its Maui System Improvement and Curtailment Reduction Plan ("MSICRP"), in Docket No. 2011-0092, filed on September 3, 2013, which analyzed operational alternatives to reduce the curtailment of wind energy. The August 2013 Adjusted Sales Forecast incorporates adjustments to the distributed photovoltaic ("PV") forecast earlier incorporated in the Company's sales and peak forecast adopted on June 5, 2013.[1] For consistency with the MSICRP, this 2014 AOS filing will reference the Maui peak forecast as the "August 2013 Adjusted Peak Forecast". The following table shows the projected peak demand for Maui over the next nine years:

[1] Photovoltaic resources are not forecasted to impact the evening/system peak.

Table 1.3.2-1: Maui Forecast Peak Demand (2014-2022)

Year	Forecast System Peak Demand with Peak Reduction Benefits of DSM (MW-Net)
2014	198.7
2015	201.5
2016	204.0
2017	206.3
2018	208.6
2019	209.9
2020	210.4
2021	210.3
2022	209.8

The August 2013 Adjusted Peak Forecast was developed based on the June 2013 Sales Forecast with adjustments to the assumptions for distributed PV systems. The sales and peak forecasts incorporated University of Hawai'i Economic Research Organization's ("UHERO") Maui County economic forecast published in May 2013 as well as recognized 2012 recorded sales and peak demand, which included a slight increase in peak load compared to the prior year. While cautious economic recovery continues, the energy efficiency projections included in the June 2013 forecast temper the growth in peak projections. Adjustments to the long-term projection will be made as forward-looking projections become available.

The June 2013 Sales and Peak Forecasts also recognized a few large commercial projects, such as the Andaz Wailea (formerly Renaissance Wailea Beach Resort), Hyatt Timeshare, Safeway, Foodland, Advanced Technology Solar ("ATS") Telescope, and an airport car rental facility, that are forecasted to contribute to the load growth over the next six to seven years. The increased demand from future economic growth and these large projects is forecasted to be substantially offset by customers' energy conservation and efficiency efforts and installations of renewable energy generation such as PV systems. However, since the system peak continues to be in the evening, PV systems are not projected to reduce the system peak. The net result is slow positive growth in forecasted peak demand.

However, Maui Electric needs to continue to evaluate and plan for the implementation of several different resource options that could serve as contingencies in the short and long term should load growth occur at a higher rate than forecasted. These contingencies are discussed in more detail in Section 1.10.6 of this letter.

1.4 Reductions in Peak Demand

1.4.1 Maui Electric's Energy Efficiency Demand Side Management ("DSM") Programs (Maui Division)

At the time of the system peak, Maui had in place nine load management contracts totaling approximately 4.8 MW under Rider M, which reduced the evening peak by approximately 3.1 MW. In addition, Maui has had residential and commercial & industrial energy efficiency DSM programs from 1996, which reduced the system peak by an estimated 21.1 MW-net (net of free riders).[2] The estimated system peak reduction is based on Maui Electric and Hawai'i Energy, Hawai'i Public Benefits Fee (PBF) Administrator, records.

Energy efficiency impact projections reflected in the AOS analyses are based on the expectation that DSM impacts would continue at the same rate as Hawai'i Energy's average annual performance from 2011-2012 in the near term. Adjustments to the long-term projection will be made as further information becomes available.

[2] In addition to Maui Electric implemented energy efficiency programs, Hawai'i Energy, Public Benefits Fee Administrator, reported system level MW impacts, net of free-riders, of 1.488 MW for Program Year (PY) 2009, July 1, 2009 – June 30, 2010, 1.819 MW for PY2010, July 1, 2010 – June 30, 2011, 1.684 MW for PY 2011, July 1, 2011 – June 30, 2012, and 1.946 MW for PY 2012, July 1, 2012 – June 30, 2013 as reported in the Leidos Engineering Annual Report to the Hawai'i Public Utilities Commission, dated September 10, 2010, November 22, 2011, December 3, 2012, and November 7, 2013 respectively.

Table 1.4.1-1: Maui Estimated Reductions from DSM

Year	Forecasted Sales Reduction (MWH)	Forecast Peak Reduction (MW)
2014	124,856	21.9
2015	138,217	24.3
2016	151,578	26.6
2017	164,939	29.0
2018	178,300	31.3
2019	191,661	33.7
2020	205,022	36.0
2021	218,383	38.4
2022	232,689	40.9

1.4.2 Maui Demand Response Program

Table 1.4.2-1: Maui Estimated Reductions from Demand Response Program

Year	Forecast Impacts of Load Management DSM (MW-Net)
2014	0.1
2015	0.0
2016	0.6
2017	1.7
2018	2.9
2019	4.3
2020	5.0
2021	5.7
2022	6.4

Maui Electric is committed to pursuing Demand Response ("DR") programs designed to provide cost-effective resource options to support the reliable operations of the system. Maui Electric's forecast of DR impacts reflects

the alignment of the various DR Action Plan initiatives presented in the MSICRP[3] with the planned implementation of the Companies Smart Grid roadmap.[4] Thus, in 2014, Maui Electric will:

- complete the Fast DR Pilot,[5]
- complete phase 1 of the DR feasibility study for County of Maui water and wastewater facilities,
- expand the Maui Smart Grid demonstration projects,[6]
- leverage operational experience with the DR Management System deployed in the Smart Grid Initial Phase project with Silver Spring Networks on Oahu, and
- pursue the community based partnership with Kanu Hawai'i for the implementation of Grid Interactive Water Heater, programmable controllable thermostat, and plug load control technologies.

The Hawaiian Electric Companies have retained the consulting services of PA Consulting Group ("PACG") to assist in the development and implementation of a company-wide strategy that will take full advantage of the economic DR opportunities available on Oahu, Maui and the island of Hawai'i. This company-wide DR strategy will be aligned with the company-wide smart grid plans, and will differentiate DR initiative potential, scope, timing and pricing in order to maximize the use of cost-effective DR resources on each island (DR action plans may be different for each island due to differing operational needs and timing).

The collective results of these initiatives will allow Maui Electric to further validate the DR planning assumptions:

- Validate the market potential for DR programs, which include testing key program designs for full-scale program.

[3] In the MSICRP, Maui Electric's DR Action Plan (Exhibit H) was proposed to aggressively implement and evaluate through a combination of near-term (2014-2018) initiatives including pilot programs, participation in research, development and demonstration ("RD&D") projects, and market studies.
[4] A letter to the Commission has been filed by the Hawaiian Electric on February 28, 2014 presenting a smart grid roadmap that would cover all 5 islands operated by the Hawaiian Electric Companies.
[5] On October 21, 2013, in Docket 2007-0341, the Commission approved the Hawaiian Electric Companies' request to extend the DR Pilot Program for one year until December 31, 2014.
[6] On October 31, 2013, an Implementation Contract was executed by the Hawaiian Electric, Maui Electric, and AEC USA to demonstrate in the field of smart community-related technology on the island of Maui. This demonstration will also expand into demand response integration for peak reduction, ancillary services, and storage.

- Identify customer barriers with the adoption of newer smart grid technologies that will enable DR.
- Provide operational experience in using DR to improve operational efficiency, system reliability and support for the reduction in curtailment of renewable energy.
- Validate the customer and utility costs and benefits of DR programs that will lower customer bills and increase customer value proposition.

To determine the amount of DR potential the market can actually produce, Maui Electric plans to issue an RFP that would include demand response impacts. *This is described further in Section 1.8 below.*

1.4.3 Firm Capacity Distributed Generation ("DG")

Firm capacity DG resources can provide generating capacity if they can be reliably dispatched by the utility, or can provide reliable load reductions if operated by customers. Maui Electric is also evaluating the potential for firm capacity DG resources to provide additional quick start generating capacity to further reduce curtailment of wind energy in the near term. See Section 1.10.7 for a discussion of the quick starting generating capacity to accept greater amounts of as-available energy.

Firm capacity DG resources, if large enough, optimally located, and permitted accordingly, may also have the ability to support the Maui transmission system. More specifically, DG resources, located in the South Maui area, may have the technical ability to provide the transmission system support as an alternative to the Maalaea to Kamalii 69kV Transmission Line upgrade. Several factors, such as economics, site availability, permittability, and community acceptance, will determine if firm capacity DG would be a suitable alternative to the transmission line.

DG resources also provide firm capacity to the system that can mitigate capacity shortfall conditions that are forecasted to occur in the near term, as shown in Table 1.6-2. These DG resources will provide the necessary capacity to the Maui system until greater amounts of firm capacity resources can be installed on the Maui system in conjunction with the larger forecasted capacity shortfall conditions in 2019, associated with the retirement of the Kahului Power Plant (see Section 1.5.3.2).

Maui Electric, with Hawaiian Electric's assistance, will continue to evaluate its options with DG, including potential utility-sited DG projects and dispatchable standby generation ("DSG") projects similar to Hawaiian Electric's Honolulu Airport DSG Project.

1.5 Total Firm Capacity

1.5.1 Total Maui Division Firm Capacity

The Maui Division has a total of 262.3 MW-net of firm capacity. A summary of Maui Electric's firm capacity, as of December 31, 2013, is shown in Attachment 2.

1.5.2 HC&S Power Purchase Agreement ("PPA")

On July 25, 2007, Maui Electric filed a letter with the Commission in Docket No. 6616 (Hawaiian Commercial & Sugar Company), which informed the Commission that Maui Electric and HC&S agreed on July 2, 2007 not to issue a notice of termination of the PPA resulting in termination of the PPA prior to the end of the day on December 31, 2014.[7] This agreement was reached so that HC&S would have more certainty as to the future revenue sources supporting its sugar business, Maui Electric would be able to rely on the continued availability of power from HC&S (a firm, non-fossil fuel power producer) beyond the end of 2011 in planning Maui Electric's generating system and in meeting its Renewable Portfolio Standards, and both parties would have additional time in which to consider HC&S' future plans before negotiating a new, long-term PPA.

On September 30, 2011, Maui Electric sent a letter to HC&S that proposed to amend the agreement in the July 2, 2007 letter and replace it with an agreement that neither party would give written notice of termination resulting in the termination of the PPA prior to the end of the day on December 31, 2017.[8] This letter also outlines the possibility that HC&S may give, not less than thirty (30) days, notice to Maui Electric to terminate the PPA, if HC&S is unable to meet the U.S. Environmental Protection Agency ("EPA") rule for Major Source Boiler MACT.[9] HC&S is currently evaluating the final rule for Major Source Boiler MACT and assessing its compliance options.[10]

[7] In a previous letter agreement between Maui Electric and HC&S dated (June 28, 2005) the parties agreed not to issue a notice of termination of the PPA resulting in the termination of the PPA prior to the end of the day on December 31, 2011. Maui Electric filed the June 28, 2005 letter with the Commission on July 27, 2005 in Docket No. 6616. At the time, the resulting need date for new firm capacity was deferred from 2009 to 2011.

[8] Maui Electric and HC&S did not execute the proposed letter agreement dated September 30, 2011.

[9] On March 21, 2011, the EPA issued a final rule to regulate emissions of hazardous air pollutants (HAP) from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP emissions (the "Major Source Boiler MACT"). On May 18, 2011, the EPA published notice in the Federal Register postponing the effective date of the Major Source Boiler MACT rule, as well as a rule concerning commercial and industrial solid waste incineration units. The notice provided, in pertinent part, "This delay of effectiveness will remain in place

In a letter agreement dated March 26, 2014, Maui Electric and HC&S agreed to allow the parties to continue discussions to resolve the future of the PPA. A copy of such letter was filed as an informational filing in Docket No. 2014-0011 on April 4, 2014.

HC&S and Maui Electric are currently engaged in discussions to renegotiate the PPA in anticipation of its expiration and extend the term of the existing PPA on more favorable terms and conditions so that HC&S can provide, and Maui Electric can purchase, at its option, scheduled energy ("Proposed Extension"). The parties anticipate that the Proposed Extension would extend the term of the PPA to December 31, 2017.

On January 15, 2014, Maui Electric filed a Petition for Declaratory Order or Application for Waiver and Memorandum in Support of Petition for

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until the proceedings for judicial review are completed or the EPA completes its reconsideration of the rules, whichever is earlier, and the Agency publishes a notice in the Federal Register announcing that the rules are in effect." 76 Fed Reg 28662 (May 18, 2011). On December 23, 2011 EPA published proposed revisions to the Major Source Boiler MACT rule. On January 9, 2012, the U.S. District Court for the District of Columbia vacated the EPA rule that delayed implementation of the EPA's final Major Source Boiler MACT rule. The vacatur may be interpreted as reinstating the effective and compliance dates. On December 21, 2012, EPA finalized amendments to the Major Source Boiler MACT rule. The final rule for the Major Source Boiler MACT was published in the Federal Register on January 31, 2013, with an effective date of April 1, 2013 and a compliance date of January 31, 2016.

[10] In A&B's Form 10-Q quarterly report for the period ending September 30, 2013, the impact of the Boiler MACT ruling is summarized as follows: *In March 2011, the Environmental Protection Agency ("EPA") published nationwide standards for controlling hazardous air pollutant emissions from industrial, commercial, institutional boilers and process heaters (the "Boiler MACT" rule), which would apply to Hawaiian Commercial & Sugar Company's three boilers at the Puunene Sugar Mill. The EPA subsequently reconsidered the March 2011 rule, and on December 21, 2012, EPA announced that it had finalized a revised Boiler MACT rule; the final rule was published in the Federal Register on January 31, 2013. The effective date of the rule was April 1, 2013, with compliance required by January 31, 2016. The Company is currently evaluating the final rule and assessing its compliance options. Based on our review, the EPA has made significant revisions from the March 2011 final rule addressing industry concerns. The Company, along with the Florida Sugar Industry, has submitted a petition for reconsideration of certain issues in the final Boiler MACT rule. The EPA has indicated that it will be granting petitions for reconsideration of certain issues, including correcting an error that led to a final limit on carbon monoxide emissions from sugar mill boilers that was lower than it should have been. The Puunene Mill boilers are capable of meeting most of the emissions limits specified in the final rule and the Company does not expect to incur material costs associated with upgrades to the existing particulate matter controls. While initial testing indicates that the boilers are able to meet new limits on carbon monoxide emissions during bagasse firing, it is not yet clear whether this limit can be met on a consistent basis. This is largely due to the highly variable nature of bagasse fuel. As a result, at a minimum, improvements to combustion controls and monitoring will be required on all three boilers. The Company has begun the process of assessing current carbon monoxide emissions during bagasse firing, and will need to complete an engineering evaluation in order to develop a plan for compliance with the new rule. The compliance deadline for this rule will be three years from the date of publication of the final rule in the Federal Register (i.e., January 31, 2016), with the option for states to grant a one -year extension. A preliminary estimate of anticipated compliance costs is less than $5 million based on currently available information. This estimate will be refined as the engineering evaluation proceeds.*

Declaratory Order or Application for Waiver ("Petition and Memorandum") with the Commission in Docket No. 2014-0011. Maui Electric, in the Petition and Memorandum, requests a declaratory order regarding the applicability of the Competitive Bidding Framework to the Proposed Extension, or in the alternative, for approval of the application of waiver of the Proposed Extension from the Competitive Bidding Framework.

As of April 11, 2014, Maui Electric and HC&S continue to be in communication about this matter.

For planning purposes, Maui Electric assumes that HC&S is no longer contributing toward total system firm capacity on the Maui system beyond 2014. The need for future increments of firm capacity will be re-evaluated once it is determined how much capacity HC&S will provide to Maui Electric under an extended or new PPA.

1.5.3 Unit Deactivation and Retirement

Units at the Kahului Power Plant are planned for deactivation and retirement. Maui Electric's commitment toward the reduction in the generation from the Kahului Power Plant is a proactive decision to lower generation costs, while increasing renewable energy integration on the Maui system.

1.5.3.1 Deactivation of Kahului 1 and Kahului 2 in 2014

As stated in both the Maui Electric Integrated Resource Plan ("IRP"), filed on June 28, 2013 in Docket No. 2012-0036 and the MSICRP, Maui Electric had committed to deactivate generating units Kahului 1 ("K1") and Kahului 2 ("K2") in 2014.[11] Deactivating units in lieu of decommissioning units allows for the potential reactivation for emergencies and/or generation shortfalls (based on reserve planning criteria). If, as a result of HC&S no longer contributing toward total system firm capacity on the Maui system beyond 2014, load growth, uncertainties in the forecasted peak reduction of DSM and the market potential for demand response programs, natural disaster, or other force majeure events involving HC&S or Maui Electric, it is determined that the generating capacity of K1 and/or K2 is needed, then K1 and/or K2 will be reactivated and made available for duty in order to maintain system reliability and avoid violation of Maui Electric's capacity planning criteria and the risk of load shedding.

[11] Docket No. 2011-0092, Maui Electric 2012 Test Year Rate Case, Maui Electric System Improvement and Curtailment Reduction Plan, Exhibit E.

1.5.3.2 Retirement of the Kahului Power Plant by 2019

Maui Electric is committed to retiring the generating units at the KPP in 2019, but must take steps to maintain generating system reliability on a continuing basis by addressing adequacy of supply requirements under General Order ("G.O.") No. 7[12] and potential voltage and transformer overload contingencies on the 23 kV transmission system.[13] The Company is evaluating the environmental considerations and determining the appropriate next actions and the implications to its plans for KPP (see section 1.7.1).

1.5.3.3 Load Service Capability; K1 and K2 Not Counted Toward Total System Capability

The potential reserve capacity shortfalls shown in the table below are forecasted to start in 2016, based on the forecast provided in Section 1.3.2 above (including the peak reduction benefits of energy efficiency DSM), the projected peak reduction benefits of demand response programs, the current planning assumption that HC&S is no longer contributing toward total system firm capacity on the Maui system beyond 2014, the total existing firm capacity on the Maui Electric system, deactivation of K1 and K2 without reactivation in 2014, retirement of the Kahului generating units in 2019, Maui Division's planned maintenance schedule as of June 2013, and the application of Maui Electric's capacity planning criteria, with the assumption that no new firm capacity is added to the system. If K1 and K2 are not counted toward system capability, then the total firm capacity decreases to 250.9 MW in 2014. The total firm capacity decreases by 16 MW on January 1, 2015 due to the planning assumption that the HC&S facility is no longer contributing toward the total firm capacity. With the planned retirement of KPP in 2019, the total firm capacity on the Maui system is further reduced to 210.4 MW.

[12] G.O. No. 7, paragraph 5.3a, states in relevant part, "(t)he generation capacity of the utility's plant, supplemented by electric power regularly available from other sources, must be sufficiently large to meet all reasonable expectable demands for service and provide a reasonable reserve for emergencies."
[13] Explanation of the transmission system is provided in Exhibit G of the Maui Electric System Improvement and Curtailment Reduction Plan (Docket No. 2011-0092)

Table 1.5.3.3-1: Load Service Capability Margin Shortfall and Reserve Capacity Deficit Based on 20% Reserve Margin

(K1 and K2 Not Counted Toward System Capability)

Year	Forecast Peak Demand (MW-Net)	Total Firm Capacity on MECO System (MW-Net)	Largest Load Service Capability Margin Shortfall (Rule 1) (MW-Net)	Largest Reserve Capacity Deficit by 20% Minimum Reserve Margin (MW-Net)
2014	198.6	250.9	0.0	0.0
2015	201.5	234.9	-10.1	-3.4
2016	203.4	234.9	-11.8	-5.6
2017	204.6	234.9	-12.9	-7.0
2018	205.7	234.9	-13.8	-8.3
2019	205.6	210.4	-38.2	-32.8
2020	205.4	210.4	-38.0	-32.6
2021	204.7	210.4	-37.2	-31.7
2022	203.4	210.4	-36.0	-30.2

1.5.4 Total Firm Capacity on Maui

The total firm generating capacity on Maui is 262.3 MW-net, including Maui Electric generation, and HC&S generation. The Maui Division's total system capacity would be reduced by 16 MW if HC&S does not continue its operations beyond December 31, 2014

In addition, the Company is evaluating the potential to assign capacity value for wind resources. Adoption is predicated on the assessment of actual data acquired over a four (4) year time frame and the earliest that such an assessment could be completed is after 2016. If it is determined that a capacity value can be established for the wind resources on the Maui system, then the capacity shortfall conditions explained in this document will be lower than forecasted.

1.6 Load Service Capability

Based on the forecast provided in Section 1.3.2 above (including the peak reduction benefits of energy efficiency DSM), the projected peak reduction benefits of demand response programs, the current planning assumption that HC&S is no longer contributing toward total system firm capacity on the Maui system beyond 2014, the total existing firm capacity on the Maui Electric system, retirement of the Kahului generating units in 2019, Maui Division's planned maintenance schedule as of June 2013, and the application of Maui Electric's capacity planning criteria, there are projected reserve capacity shortfalls starting in 2016, as shown in the following tables below, with the assumption that no new firm capacity is added to the system.

Table 1.6-1: Projected Reserve Margins

(K1 and K2 Counted Toward System Capability)

Year	Forecast Peak Demand (MW-Net)	Total Firm Capacity on MECO System (MW-Net) (Retire KPP Jan 2019)	Forecast Impacts of Load Management DSM (MW-Net)	Reserve Margin (%)
	[A]	[B]	[C]	[B-(A-C)]/(A-C)
2014	198.7	262.3	0.1	32%
2015	201.5	246.3	0.0	22%
2016	204.0	246.3	0.6	21%
2017	206.3	246.3	1.7	20%
2018	208.6	246.3	2.9	20%
2019	209.9	210.4	4.3	2%
2020	210.4	210.4	5.0	2%
2021	210.3	210.4	5.7	3%
2022	209.8	210.4	6.4	3%

Table 1.6-2: Load Service Capability Margin Shortfall
and Reserve Capacity Deficit Based on 20% Reserve Margin

(K1 and K2 Counted Toward System Capability)

Year	Forecast Peak Demand (MW-Net)	Total Firm Capacity on MECO System (MW-Net) (Retire KPP Jan 2019)	Largest Load Service Capability Margin Shortfall (Rule 1) (MW-Net)	Largest Reserve Capacity Deficit by 20% Minimum Reserve Margin (MW-Net)
2014	198.6	262.3	0.0	0.0
2015	201.5	246.3	0.0	0.0
2016	203.4	246.3	-0.4	0.0
2017	204.6	246.3	-1.5	0.0
2018	205.7	246.3	-2.4	-0.6
2019	205.6	210.4	-38.2	-36.4
2020	205.4	210.4	-38.0	-36.2
2021	204.7	210.4	-37.2	-35.3
2022	203.4	210.4	-36.0	-33.8

These load service capability estimates include the potential peak reduction benefits from future DR programs, but do not include (a) the potential capacity value of wind; or (b) the potential capacity contribution from an energy storage resource.

The potential peak reduction benefits from future DR programs are shown in Table 1.4.2-1 above. The potential capacity value of wind is currently estimated at 3.6 MW based on the analysis performed and provided in the 2013 IRP.[14] The potential capacity value from energy storage will depend on its size and the duration over which it can discharge its energy.

The impact of these variables on the need for firm capacity is summarized in the matrix provided in the summary section on page 3 above.

[14] See Section Chapter 15 of the 2013 IRP report.

1.7 Other Considerations in Determining the Timing of Unit Additions

The determination of the timing of the need for additional firm capacity is not based solely on Maui Electric's capacity planning criteria. For example, Section 1.2.2 identified other factors that are considered. In addition, consideration is given to the uncertainty of the inputs used in the application of Maui Electric's capacity planning criteria. For example, there may be an increasing need for firm capacity in the future if:

- The system peak is higher than forecasted. This could be due to hotter weather, lower rainfall resulting in higher irrigation and drinking water pumping loads or more rapid than forecasted economic growth that result in greater than forecasted peak demand. Consideration may be given to a higher peak forecast scenario as a representation of non-normal weather or more rapid economic growth.

- DSM programs (energy efficiency and demand response) provide peak reduction benefits that are less than currently projected.

- Recently promulgated environmental standards for air emissions cause a change in normal operation of existing units, such as lower normal top load capacity operation. In 2010 and 2011, the Environmental Protection Agency established emission regulations for Maui Electric and the other Hawai'i an Electric Companies. The applicable regulations with the associated estimated compliance dates are as follows:

    - As of May 3, 2013, Maui Electric was compliant with the Reciprocating Internal Combustion Engines National Emissions Standards for Hazardous Air Pollutants ("RICE NESHAP")

    - 1-Hour SO_2 National Ambient Air Quality Standards ("NAAQS") – no later than December 2022, subject to regulatory determinations regarding statewide compliance requirements and schedules.

Maui Electric is currently evaluating various means, such as using lower sulfur fuels as a potential compliance measure for NAAQS. Maui Electric is also considering whether or not the retirement of certain existing units would be viable compliance measures. The retirement of existing generating units would result in the need to add replacement firm capacity. This was a consideration in establishing the size of the firm capacity RFP, which is discussed in Section 1.10.4.1 below.

Conversely, if, individually or cumulatively, DSM programs, third party Combined Heat and Power ("CHP") projects, and demand response programs or energy storage technology provide greater impacts than currently forecasted, if system peak

demand is lower than currently forecast, if HC&S and Maui Electric are successful in contract extension negotiations and a renegotiated PPA is approved by the Commission, and/or if planned or unplanned firm projects on Maui enter the system prior to 2016, then the timing of the need for additional firm capacity could be deferred beyond 2016. In summary, Maui Electric considers a number of potential scenarios with different inputs, or different levels of inputs, to determine when new firm generating capacity should be installed.[15]

1.8 Acquisition of Demand Response Resource

To determine what the market will produce in terms of demand response impacts, Maui Electric plans to issue an RFP for demand response programs either separately or combined with energy storage resources and/or firm capacity. The precise content of the DR RFP has not yet been developed, but the DR RFP will generally seek DR resources that provide capacity value and/or ancillary services to the system and will be consistent with the Companies' DR strategy. The provision of ancillary services by DR resources could help Maui Electric reduce online regulating reserve, thereby potentially reducing the amount of curtailment of as-available renewable resources. Depending on the size and characteristics of the DR program, the resource may be able provide both capacity value and ancillary services.

1.9 Acquisition of Energy Storage Resource

To assess the acquisition of energy storage resources, Maui Electric plans to issue an RFP for energy storage resources either separately or combined with energy storage resources and/or firm capacity. The precise content of the energy storage RFP has not yet been developed, but the energy storage RFP will be consistent with an energy storage strategy developed by the Companies and generally seek energy storage resources that provide three system needs:

(1) Operational flexibility – to allow existing must-run generation to operate at lower output levels

(2) Grid stability – to assist with the stability and survivability of the electrical grid in the event of the loss of significant generation on the system,

(3) Alternative generation capacity – to reduce online reserves

[15] On June 30, 2010, Maui Electric submitted an update to the January 28, 2010 AOS letter to the Commission. Sensitivity analyses (high peak, low peak, HC&S extension scenario) were provided in the AOS update letter.

The provision of these services by energy storage resources could help Maui Electric reduce system generation costs, lower fuel consumption, integrate additional renewable generation and improve system reliability. Depending on the size and duration of the power output, the energy storage resource may also provide capacity value.

1.10 Acquisition of Additional Firm Generating Capacity

1.10.1 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 ("D&O 23121") in Docket No. 03-0372, pursuant to HRS §§ 269-7 and 269-15, and Hawai'i 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 Integrated Resource Plan ("IRP")."[16]

As stated above, Maui Electric will need additional firm capacity in the 2016 timeframe. However, it is very unrealistic that firm capacity through a Competitive Bidding Process would be achievable by 2016. Therefore, Maui Electric will seek to acquire the additional firm capacity through a Competitive Bidding Process for the larger capacity violations starting in 2019. For the forecasted capacity shortfall conditions shown for years 2016, 2017, and 2018, Maui Electric will implement the mitigation measures described in Section 1.10.6.

1.10.2 Exemptions to the CB Framework

In D&O 23121, the Commission adopted "exemptions based on size" as proposed by the HECO Utilities. One exemption given in Section II.A.3.f. on page 5 of the CB Framework states in relevant part:

> This Framework also does not apply to: (i) generating units with a net output available to the utility of 1% or less of a utility's total firm capacity, including that of independent power producers, or with a net output of 5 MW or less, whichever is lower. For systems that cover more than one island (i.e., Maui Electric's system, which has generation on Maui, Molokai and Lanai), the system firm capacity will be determined on a consolidated basis.

[16] CB Framework, Section II.A.3. on page 3.

Maui Electric's total firm capacity (gross reserve MW) as of December 31, 2013 is 290.11 MW, which is based on the following:

Maui:	267.7 MW
Lanai:	10.4 MW
Molokai:	12.01 MW

One percent of Maui Electric's total firm capacity is 2.90 MW. As a result, for Maui Electric, the CB Framework would not apply to proposed generating units with a net output available to the utility of 2.90 MW (i.e., the lower of 2.90 MW and 5 MW) or less.

1.10.3 Foundation for the Request For Proposals ("RFP")

On March 1, 2012, the Commission issued Order No. 30233 in Docket No. 2012-0036 that commenced the IRP cycle for the Hawaiian Electric Companies. The Hawaiian Electric Companies filed their IRP Report and Action Plans with the Commission on June 28, 2013 ("IRP Report"). The Commission is currently reviewing: 1) Whether the IRP process and IRP Report, including Scenarios, Resource Plans, and Action Plans, are consistent with the IRP Framework; 2) Whether the IRP Report meaningfully addresses the Principal Issues identified in the IRP process, including the questions and issues identified by the commission by Order No. 30534; and 3) Whether the commission should approve, reject, either in whole or in part, or require modifications of the submitted IRP Report, including Scenarios, Resource Plans, or Action Plans.

Chapter 18 of the IRP Report, *Competitive Bidding and Resource Acquisition*, discusses the relationship between the IRP and the Competitive Bidding Framework along with the status of competitive bidding processes and specific exempt projects. The specific Maui Electric system discussion can be found on pages 18-43 through 18-51 and is continued in Maui Electric's Action Plan beginning on page 22-3 of the IRP Report. The IRP considered a variety of resources to meet future demand and satisfy the capacity planning criteria. In its evaluation of alternative resources to conventional firm generation, the IRP analyzed the expansion of demand response programs, installation of battery energy storage systems, and the effect of assigning a firm capacity value to wind. The analysis of demand response programs can be found on page 8-42, battery storage on page 8-48, and capacity value of wind on page 15-1. A portfolio of resources, including firm capacity acquired through an RFP, will provide Maui Electric the flexibility to meet future demand identified in the IRP scenarios.

1.10.4 Scope of the Firm Capacity RFP

1.10.4.1 Size (in MW)

Maui Electric currently plans to seek up to 40 MW of firm capacity to accommodate anticipated load growth and to maintain generating system reliability in the event that HC&S does not contribute to the total system at the end of 2014, and to allow Maui Electric to possibly replace existing oil-fired generating capacity. In addition, Maui Electric is currently working on environmental compliance plans for its generating units, and this may have an impact on the total system capability. The firm capacity RFP will be prepared in such a manner as to allow bidders to participate in bidding options aligned with the firm capacity needs for Maui Electric.

The firm capacity RFP will be structured to be flexible to enable Maui Electric to acquire the amount of firm capacity that will take into account the potential capacity value of wind resources, DR resources and energy storage resources, with the latter two being assessed and acquired through separate or a combined RFP as described in Sections 1.8 and 1.9 above.

1.10.4.2 Timing of Firm Capacity Needs

Based on the load service capability described in Section 1.6, above, a small amount of capacity will need to be in service by 2016 to accommodate the potential loss of HC&S capacity and anticipated load growth, with greater firm capacity needed in 2019 when the units at KPP are planned to be retired.

However, provisions in the firm capacity RFP will be included to indicate that the capacity need dates may change due to unforeseen conditions and that bidders should provide adjustment mechanisms in their proposals should Maui Electric's need for capacity change.

Should HC&S be able to continue with certainty beyond 2014 (extent of time frame pending discussions and agreements between Maui Electric and HC&S, and Commission approval), and be included in capacity calculations, Maui Electric may still have a need for capacity in 2018 depending on the measures implemented to meet the environmental compliance standards, forecasted system load, and, if applicable, Part II.A.3.g.(iii) of the Competitive Bidding Framework relative to contract extension of existing Power Purchase Agreements.

1.10.4.3 Attributes of New Generation

The firm capacity RFP may or may not specify the type of generating technology bidders should propose. The MSICRP indicated that fast-starting internal combustion engines ("ICE") as a future supply-side firm resource could result in very small amounts of future curtailment of existing as-available resources, was one of the more cost effective plans analyzed, and was one of the plans with the lowest projected fuel costs. As a result, ICEs are identified in the preferred plan as a recommended future resource to be incorporated on the Maui system. Subsequent filings and documents in Docket No. 2011-0092, further indicate ICEs as a future resource with favorable characteristics with respect to operational flexibility, reduction of existing base load thermal generating unit operation, and reduction in on-line regulating reserves. Maui Electric does recognize that there may be other firm supply-side resources that have similar or the same operational characteristics as an ICE that were not analyzed in the MSICRP. These, yet to be identified, resources could be considered in the firm capacity RFP. Therefore, the firm capacity RFP will specify the attributes that proposed resources should possess. The attributes of desired future firm generating capacity are described below. Definitions of the terminology are described in Attachment 3. The description of the attributes and the definitions of the terminology will be refined as needed in the draft and final RFPs.

- Firm Capacity – Each generator must provide firm capacity at rated power factor;[17]
- Dispatchable – Each generator must be fully dispatchable between its minimum and maximum range by Maui Electric;
- Each generator must be able to cycle on and off multiple times per day;
- The size of any one generator shall not exceed 15 MW at unity power factor;
- Each generator must be able to help regulate (via AGC) and stabilize (via droop) the system frequency. The unit should be

[17] Firm Capacity means the amount of energy producing capacity which can be guaranteed to be available at a given time.

capable of setting and operating with a 4% droop characteristic;

- Each generator must be able to help regulate voltage;
- Each generator 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 rated (MW) output. The generator capability (MVA rating) should range from 0.85 lagging to 0.90 leading power factor;
- Each generator will be evaluated on the range of output of the unit as a fraction of its rated full output (larger is better);
- Each generator must be able to increase or decrease its power output at a rate equal to or greater than approximately 20% of full load capability per minute;
- A "renewable" input energy (such as the fuel supply) would be favorable under the RPS, but other considerations (such as cost, environmental regulations, operational restrictions, etc.) will also be factored;
- Each generator must be able to operate on multiple fuel types to switch when the lowest priced fuel type changes;
- Each generator must use commercially available and proven technology;[18]
- Each generator will be evaluated for its black-start capability (i.e., capability of starting up on a completely de-energized utility grid);
- Generators 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;

[18] Commercially available and proven technology means technology that has been in commercial operations at the size consistent with the Bidder's offering (at full output) for at least one (1) year when the draft RFP is released for technical input in the United States and where the owner is receiving revenues for the output (i.e., not a technology supplier demonstrating its own technology).

- For the 40 MW required by 2019, all 40 MW of new capacity shall be able to start up and run up to full load within 30 minutes or less from the time a start-up signal is received. In addition, 20 MW of the 40 MW block will be reserved for 5-minute quick-starting capacity. This 20 MW of new capacity is the output that can be provided within 5 minutes (i.e., the time between the start signal and synchronizing the generator to the system, closing the breaker and reaching 20 MW load shall be 5 minutes or less). Quick-start units, after having attained minimum load, must be immediately available to be ramped up to full load operation and meet all environmental requirements for operation. For any generation resource(s) less than 20 MW (at unity power factor), the new capacity will be required to provide full output within 5 minutes. For resources greater than 20 MW (at unity power factor), the new capacity will be required to provide 20 MW within 5 minutes from the time the start-up signal is received, with the remaining capacity beyond 20 MW to be provided within 30 minutes or less from the time a start-up signal is received.

- The capacity to be provided may come from multiple Generators.

- Facility scheduled maintenance outage to result in no more than 15 MW of unavailable capacity.

1.10.4.4 Other Considerations

The design of the firm capacity RFP will also take into consideration other matters, such as reducing curtailment of as-available generation from both existing and future resources, meeting environmental compliance requirements, supporting the recommendations of Reliability Standards Working Group,[19] and Maui County's reclaim water-to-energy project. On March 13, 2014 in Decision and Order No. 31980, in Docket No. 2013-0114, the Commission approved Maui Electric's application for waiver from the framework for competitive bidding to negotiate a PPA within six months with Anageria Service's Maui Energy Park LLC (formerly known as Mahinahina Energy Park, LLC).

[19] In Docket No. 2011-0206.

1.10.5 Competitive Bidding Process

1.10.5.1 Request Commission Open a Docket and Approval of Independent Observer

On January 31, 2011, Maui Electric submitted to the Commission a Request to Open New Docket and Approval of Independent Observer Contract. On February 24, 2011 the Commission opened Docket No. 2011-0038 (Instituting a Proceeding Related to a Competitive Bidding Process for Firm Generating Capacity on Maui) to receive filings, review approval requests, and resolve disputes, if necessary, in connection with Maui Electric's plan to proceed with a competitive bidding process to acquire up to approximately 50 megawatts of new, renewable firm dispatchable capacity generation resources on the island of Maui, with the initial increment coming on line in the 2015 time frame. On November 16, 2011, the Commission selected Boston Pacific Company, Inc. as the Independent Observer to monitor the competitive bidding process and report on the progress and results to the commission. On July 11, 2013, the Commission closed the competitive bidding proceeding and informed Maui Electric that they will consider future requests to open another proceeding to conduct an RFP for generation upon a demonstration of need and a plan focused on customer needs.

Subsequent to the Maui Electric August 2013 Adjusted Peak Forecast, Maui Electric plans to seek up to 40 MW of firm capacity with an anticipated in-service date of 2019.

1.10.5.2 Timeline

With respect to the 2019 capacity need date, the proposed timeline for the competitive bidding process will have to be accelerated so that the entire process (RFP, PPA Application and Commission approval of the PPA, permitting, procurement, and construction) can be completed prior to forecasted capacity shortfall conditions. The actual timeline will be influenced by the number of bids received and the complexity of any issues that may be raised by participants.

1.10.6 Contingency Planning for Capacity Needed in 2019

Based on the currently forecasted 2019 need date for the next large increment of firm capacity on Maui, Maui Electric plans to solicit proposals after receiving the Commission's approval, pursuant to the CB Framework, for new

generating capacity via a competitive bidding process. Maui Electric may have a limited ability to accelerate the installation schedule given the lead-time required in connection with a competitive bidding process and for the successful bidder to acquire the necessary permits, procure major equipment and construct the facility by 2019. However, with Maui Electric targeting installation of new capacity by 2019, Maui Electric will continue to perform contingency planning for the implementation of mitigating measures, given the uncertainties described above, the forecasted smaller capacity shortfall conditions (years 2016, 2017, 2018 as shown in Table 1.6-2), and to allow more time for the proper procedures involved with adding firm capacity to the Maui system.

As Table 1.10-1 illustrates, forecasted peaks can change dramatically from one forecast to the next for various reasons. While forecasted peaks showed an increase from the June 2012 peak forecast to the Adjusted August 2013 Peak Forecast, a continued increase or decrease in forecasted peaks can also occur from one forecast to the next, as Maui Electric has experienced in the past.

Table 1.10-1: Comparison of Forecast Peaks

Year	Peak (MW-Net) Reduced by Energy Efficiency DSM			
	Recorded	June 2012 Forecast	August 2013 Adjusted Peak Forecast	Difference (August 2013 minus June 2012)
2005	202.1			
2006	206.4			
2007	204.4			
2008	194.4			
2009	199.9			
2010	199.4			
2011	189.9			
2012	194.8	190.3		
2013	190.3	192.9	196.1	3.2
2014		195.8	198.7	2.8
2015		196.9	201.5	4.7
2016		198.2	204.0	5.8
2017		199.8	206.3	6.5
2018		202.7	208.6	5.9
2019		204.9	209.9	5.1
2020		206.6	210.4	3.8
2021		208.5	210.3	1.9
2022		209.6	209.8	0.2

Higher demand could advance the need for additional firm capacity by one year or more and increase the quantity of firm capacity needed. Should Maui Electric need additional firm capacity before 2016 or require greater amounts of firm capacity, Maui Electric could implement one or more of the following mitigation measures (but would not be limited to these):

- Pursuing utility-owned or customer-owned and utility dispatched firm distributed generation. Substation sites currently under consideration include transmission and distribution substation sites that have sufficient space, access, land use and zoning classifications, and compatibility with adjacent properties. Maui Electric is also examining

the viability of installing DG on a temporary or permanent basis at Maui Electric's Waena property. This mitigation measure would provide a firm resource that would have potentially unlimited use to ensure system reliability.

- Re-scheduling unit overhaul schedules. This mitigation measure would be limited by the number of run hours accumulated on a unit with respect to the manufacturer's recommended overhaul interval/schedule.
- Increase utilization of existing units (i.e. run the units longer and/or up to their maximum/emergency capacities). This mitigation measure has a limited number of uses, as the units are not recommended to operate at these levels for sustained periods of time or frequency. Increased implementation of this measure will result in increased "wear and tear" on the unit.
- Coordinating with HC&S for the delivery of supplemental power (pending possible contract extension). This mitigation measure is subject to HC&S's ability to provide the supplemental power based on their industrial operations and their business model going forward. Because HC&S is not obligated to provide supplemental power, reliability risks exist.
- Pursuing demand response programs as a means to reduce the system load when implemented. With DR programs still in its pilot and technical demonstration phases on Maui island, it is unknown if the peak reduction levels forecasted are achievable. If DR levels are less than forecasted, then the need for firm capacity will be greater.
- Accelerate the installation of the next generating unit.
- Requesting voluntary customer curtailment of demand during load service capability shortfall periods. This mitigation measure is subject to customer voluntary participation. If the level of participation is lower than anticipated, then reliability risks exist.
- Relying on the as-available wind resources to provide generation when the system needs it. As-available resources may not be available when the system requires capacity.

The forecasted load service capability margin shortfall increases with the retirement of the units at KPP, as shown in Table 1.6-2. With smaller amounts of capacity need starting in 2016 and the unit addition need date for firm capacity obtained through a Competitive Bidding Process forecasted for 2019, Maui Electric will continue to explore and evaluate appropriate supply-side and demand-side resources for the Maui Division system.

Maui Electric will work toward and monitor the progress of acquiring needed new resources by 2019. If any material delays are seen in developing the

resources such that Maui Electric's ability to serve customers in 2019 is at risk, then Maui Electric will inform the Commission to address further contingency measures that the Company could undertake to maintain reliability and service to its customers. Maui Electric will reassess in subsequent AOS filings whether the KPP retirement date needs to be deferred until the replacement resources are developed and available for service.

1.10.7 Additional Capacity May be Installed to Reduce Online Regulating Reserve

Maui Electric's MSICRP identified the use of new, quick-starting firm energy generating units to provide offline reserve capacity such that less online regulating reserve would need to be carried. This will enable Maui Electric to integrate increased amounts of renewable energy and potentially reduce fuel costs to customers. Reliability will be further improved through the mitigation of risk to the extent that the replacement generation is located at Maui Electric's Waena property, which unlike the location of the Kahului and Maalaea Power Plants, is outside of tsunami inundation zones. Fast-start diesel generators would provide the following advantages:

- Reduce the need to supply regulating reserve from units that are actually operating or "spinning"
- Increase ability to accept renewable as-available energy
- Lower system heat rate
- Reduce fossil fuel consumption
- Add firm generation to the system to reduce or eliminate the possible load service capability margin shortfall.

Maui Electric plans to further investigate the possibility of installing a 2.9 MW distributed generating engine at the Waena site ("Waena DG"). It is anticipated that the Waena DG would burn biofuel, but Maui Electric would consider other fuels that are more cost effective. The Waena DG could provide the foundation for installing additional quick-starting units that may improve system heat rate efficiency and increase renewable energy. Also, with the infrastructure in place at the Waena site, this would provide Maui Electric with the means to install the mitigation measures, as explained in Section 1.10.6, should capacity shortfall conditions occur prior to the installation of the firm generating resource in 2019, through the Competitive Bidding process.

1.11 Coordination of RFPs

DR, energy storage and firm capacity resources can all provide some amount of firm capacity and ancillary services, depending on their characteristics. All of these resources can be acquired through a competitive RFP process. The firm capacity RFP would require a Commission approved/granted docket proceeding for the Company to solicit proposals in accordance with the Commission's CB Framework. (See Section 1.10.1 above.) The DR and Energy Storage RFP would not require Commission approval to solicit proposals.

Maui Electric is exploring various ways of acquiring these resources through RFP processes and through coordinated activities. Performance requirements for DR, energy storage, and firm generation will be developed as the RFP is developed. It is envisioned that this coordinated competitive solicitation process will provide Maui Electric with a portfolio of resource options from which to evaluate and implement. The portfolio that best meets the needs of Maui Electric and its customers will be pursued.

2.0 Lanai Division

2.1 Peak Demand and System Capability in 2013 - 2016

Lanai's 2013 system peak of 5,050 kW (gross) occurred on December 31, 2013. Lanai had a 2013 reserve margin of approximately 103%.

On June 5, 2013, Maui Electric adopted a new sales forecast and peak forecast ("June 2013 Peak Forecast") that was used in this analysis for Lanai.

Attachment 1, Table 2, also shows the expected reserve margins over the next three years, based on the Maui Electric 2013-2024 Peak Forecast dated June 2013.

2.2 Reductions in Peak Demand: Lanai's Energy Efficiency DSM Programs

Lanai has had residential and commercial & industrial demand side management programs in place since 1996, which reduced the system peak by an estimated 215.6 kW-net (net of free riders).[20] Energy efficiency impact projections reflected in the AOS analyses are based on the expectation that DSM impacts would continue at the same rate as Hawai'i Energy's average annual performance from 2010-2012 in the near term.

[20] In addition to Maui Electric implemented energy efficiency programs, Hawai'i Energy, PBF Administrator, reported system level kW impacts, net of free-riders, of 10 kW for the PY 2009, July 1, 2009 – June 30, 2010 and 2.0 kW for the PY2010, July 1, 2010 – June 30, 2011, 1.0 kW for the PY2011, July 1, 2011 – June 30, 2012, and 54.0 kW for the PY2012, July 1, 2012 – June 30, 2013 as reported in the Leidos Engineering Annual Report to the Hawai'i Public Utilities Commission, dated September 10, 2010, November 22, 2011 R2, December 3, 2012, and November 7, 2013 respectively.

Adjustments to the long-term projection will be made as further information becomes available.

2.3 Lanai Division Capacity Planning Criteria

The following criterion is used to determine the timing of an additional generating unit for the Lanai Division and the Molokai Division:

New generation will be added to prevent the violation of any one of the rules listed below where "units" mean all units and firm capacity suppliers physically connected to the system, and "available unit" means an operable unit not on scheduled maintenance.

1. *The sum of the normal top load ratings of all units must be equal to or greater than the system peak load to be supplied.*

2. *With no unit on maintenance, the sum of the reserve ratings of all units minus the reserve rating of the largest available unit must be equal to or greater than the system peak to be supplied.*

3. *With a unit on maintenance:*

   a) *The sum of the reserve ratings of all units minus the reserve rating of the largest available unit must be equal to or greater than the daytime peak load to be supplied.*

   b) *The sum of the reserve ratings of all units must be equal to or greater than the evening peak load to be supplied.*

2.4 Lanai Combined Heat and Power Project

The Commission approved the CHP agreement between Maui Electric and Castle & Cooke in Decision & Order No. 24058, filed February 28, 2008, in Docket No. 2006-0186. The project was completed and placed in-service on September 30, 2009.

2.5 Lanai Sustainability Research ("LSR") Project

The Lanai Sustainability Research project on the island of Lanai is a 1.2 MW PV facility. The PV facility was first placed into service on December 19, 2008. Under the current PPA between Maui Electric and LSR, the output of the facility was to be integrated into the Lanai system in phases. In April 2011, LSR began the integration of the battery energy storage system ("BESS") into its facility, with operations of the BESS commencing upon completion of the installation in August 2011. The facility has been operating on a conditional basis at its rated output of 1.2 MW since June 27, 2012. The

PV facility does not affect the Lanai system capability because it is an as-available resource.

Although, the addition of the Manele Bay CHP unit and the 1.2 MW as-available photovoltaic facility on Lanai presents operational challenges on existing units at Miki Basin, these installations also present a unique opportunity to integrate an as-available resource and a heat recovery resource into the Lanai grid. These projects allow Maui Electric the opportunity to learn from these installations and to look at this as a stepping stone toward a greater amount of renewable energy resources into the utility grids. Interconnection and protection studies have been performed to identify the design and operational considerations for the integration of these projects into the Lanai system. In addition, the changes to the system are continually monitored.

3.0 Molokai Division

3.1 Peak Demand and System Capability in 2013 - 2016

Molokai's 2013 system peak of 5,500 kW (gross) occurred on December 19, 2013. Molokai had a 2013 reserve margin of approximately 118%.

On June 5, 2013, Maui Electric adopted a new sales forecast and peak forecast ("June 2013 Peak Forecast") that was used in this analysis for Molokai.

Attachment 1, Table 2, also shows the expected reserve margins over the next three years, based on the Maui Electric 2013-2024 Peak Forecast dated June 2013.

3.2 Reductions in Peak Demand: Molokai's Energy Efficiency DSM Programs

At the time of the system peak, Molokai had in place one load management contract totaling 370 kW under Rider M, which reduced the evening peak by approximately 360 kW. In addition, Molokai has had residential and commercial & industrial DSM programs in place since 1996, which reduced the system peak by an estimated 594.8 kW-net (net of free riders).[21] Energy efficiency impact projections reflected in the AOS analyses are based on the expectation that DSM impacts would continue at the same rate as Hawai'i Energy's average annual performance from 2003-2012 in the near term. Adjustments to the long-term projection will be made as further information becomes available.

[21] In addition to Maui Electric implemented energy efficiency programs, Hawai'i Energy, PBF Administrator, reported system level kW impacts, net of free-riders, of 13 kW for PY 2009, July 1, 2009 – June 30, 2010, 28.0 kW for PY2010, July 1, 2010 – June 30, 2011, 11.0 kW for PY2011, July 1, 2011 – June 30, 2012, and 54.0 kW for the PY2012, July 1, 2012 – June 30, 2013 as reported in the Leidos Engineering Annual Report to the Hawai'iPublic Utilities Commission, dated September 10, 2010, November 22, 2011 R2, December 3, 2012, and November 7, 2013 respectively.

3.3 Molokai Division Capacity Planning Criteria

Molokai Division's capacity planning criteria are identical to those of the Lanai Division. See Section 2.3 above, Lanai Division Capacity Planning Criteria.

4.0 Conclusion

Maui Electric's generation capacity for the islands of Lanai and Molokai for the next three years (2014, 2015, and 2016) is sufficiently large to meet all reasonably expected demands for service and provide reasonable reserves for emergencies. Maui Electric expects to have an adequate amount of firm capacity for Maui island to meet all reasonably expected demands for service and provide reasonable reserves for emergencies for the period 2014 to 2015 under the Adjusted August 2013 Peak Forecast. Maui Electric anticipates needing additional firm capacity in the 2016 timeframe, with greater capacity needs in 2019. Maui Electric plans to implement mitigation measures for the forecasted capacity shortfall conditions in 2016, 2017, and 2018 to ensure system reliability. Maui Electric will also give consideration to mitigation measures should future forecasts project higher than currently forecasted peak demand. Maui Electric's activities, such as those related to a Competitive Bidding Process and any parallel or contingency plans, will be based on the 2019 capacity need date.

Very truly yours,

Sharon M. Suzuki
President

Attachments

c: Division of Consumer Advocacy (with Attachments)

Table 1
Maui Adequacy of Supply

			With Future DSM (Includes Acquired DSM)[I]		
Year	System Capability at Annual Peak Load[II] (kW) [A]		System Peak[III] (kW) [B]		Reserve Margin (%) [[A-B] / B]
Maui Division (Net Generation)					
Recorded					
2013	262.3	[IV]	190.3	[V]	38%
Future					
2014	262.3	[VI]	198.6		32%
2015	246.3		201.5		22%
2016	246.3		203.4		21%
2017	246.3		204.6		20%
2018	246.3		205.7		20%
2019	210.4	[VII]	205.6		2%
2020	210.4		205.4		2%
2021	210.4		204.7		3%
2022	210.4		203.4		3%
Maui Division (Gross Generation) [VIII]					
Recorded					
2013	267.7	[IV]	194.5	[V]	38%
Future					
2014	267.7	[VI]	203.0		32%
2015	251.7		205.9		22%
2016	251.7		207.9		21%
2017	251.7		209.1		20%
2018	251.7		210.2		20%
2019	214.1	[VII]	210.1		2%
2020	214.1		209.9		2%
2021	214.1		209.2		2%
2022	214.1		207.9		3%

Notes – Table 1:

(I) System Peaks (With Future Peak Reduction Benefits of DSM Programs):
Implementation of full-scale energy efficiency DSM programs began in the second half of 1996 following Commission approval of the programs. The forecasted system peak values for the years 2014-2022 include the actual peak reduction benefits acquired in 1996-2009 and also include the estimated peak reduction benefits acquired in 2010 - 2012, as well as peak reduction benefits of Rider M and T customer contracts. Forecasted energy efficiency DSM programs for 2014-2022 (future DSM) are based on the expectation that impacts would continue at the same rate as Hawai'i Energy's average annual performance in 2011 and 2012.

(II) The net reserve ratings of the units are used in the determination of the Maui system capability. In addition, the Maui Division system capability includes 16.0MW (which includes 4.0 MW of system protection capacity) from HC&S. 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.

(III) The 2014-2022 annual forecasted system peaks for Maui are based on the August Adjusted Forecast used in the Maui System Improvement and Curtailment Reduction Plan and includes reductions for existing 3rd Party CHP impacts. The Maui annual forecasted system peak is expected to occur in the month of December.

(IV) Includes the Hana generating units as firm capacity. Hana communications and control project was completed in 2008, enabling the Hana units to be dispatchable distributed generation.

The following independent power producer ("IPP") wind facilities were added to Maui system:

- 30 MW Kaheawa Wind Power, LLC (June 9, 2006)
- 21 MW Kaheawa Wind Power II, LLC (July 2, 2012)
- 21 MW Auwahi Wind Energy, LLC (December 28, 2012)

The installation of these wind resources will not affect the system capability because the wind resources are as-available resources, which is not dispatchable and cannot provide given amounts of power at scheduled times.

On September 22, 2006, Makila Hydro, LCC, an IPP, completed construction of a 500 kW hydro-electric facility and commenced providing energy to the Maui system. The installation of this hydro resource does not affect the system capability because the hydro resource is an as-available resource, which is not dispatchable and cannot provide given amounts of power at scheduled times.

(V) The actual 2013 recorded system peak was 194.5 kW (gross) which is equivalent to 190.3 kW (net).

(VI) Capacity planning assumption that HC&S is no longer contributing toward total system firm capacity on the Maui system beyond December 31, 2014.

(VII) Planned retirement of the Maui Electric generating units at the Kahului Power Plant.

(VIII) The Maui Division Gross Generation data is provided here for comparative purposes.

Table 2
Lanai and Molokai Adequacy of Supply

		With Acquired DSM [I]	
Year	System Capability at Annual Peak Load[II] (kW) [A]	System Peak[III] (kW) [B]	Reserve Margin (%) [[A-B] / B]
Lanai Division (Gross Generation)			
Recorded			
2013	10,230 [IV]	5,050	103%
Future			
2014	10,230	4,800	113%
2015	10,230	4,800	113%
2016	10,230	4,800	113%
Molokai Division (Gross Generation)			
Recorded			
2013	12,010 [V]	5,500	118%
Future			
2014	12,010	5,500	118%
2015	12,010	5,500	118%
2016	12,010	5,500	118%

Notes – Table 2:

(I) System Peaks (Includes Acquired DSM):
Implementation of full-scale DSM programs began in the second half of 1996 following Commission approval of the programs. The forecasted system peak values for the years 2014-2016 include the actual peak reduction benefits acquired in 1996-2009 and also

include the estimated peak reduction benefits acquired in 2010 - 2012. Forecasted energy efficiency DSM programs for 2014-2016 (future DSM) are based on the expectation that impacts would continue at the same rate as Hawai'i Energy's average annual performance in 2010-2012 for Lanai and 2003-2012 for Molokai.

(II) The gross reserve ratings of the units are used in the determination of the Lanai and Molokai system capabilities. 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.

(III) The 2014 - 2016 annual forecasted system peaks are based on Maui Electric's June 2013 Peak Forecast. The Lanai and Molokai annual forecasted system peaks are expected to occur in the month of December.

(IV) Miki Basin Units LL-1 to LL-6 (six 1,000 kW diesel engine-generator units totaling 6,000 kW) were converted to peaking status at the end of 2006, and as such, can be relied on for 5,000 kW of capacity to the Lanai system.

Maui Electric signed an agreement with Castle & Cooke Resorts for the installation of an 884 kW (net including electric chiller offset and auxiliary loads) CHP system at the Manele Bay Hotel. The CHP system was installed and placed in-service as of September 30, 2009.

Maui Electric signed an agreement with Lanai Sustainability Research, LLC for the installation of a 1.2 MW photovoltaic system on the island of Lanai. In December 2008, partial facility completion and operation of this as-available resource was added to the Lanai system. The entire facility was completed in August 2011. Refer to Section 2.5 for further details. The installation of this PV resource does not affect the system capability because the PV resource is an as-available resource, which is not dispatchable and cannot provide given amounts of power at scheduled times.

(V) Palaau Units 1 and 2 (two 1,250 kW Caterpillar units), and Palaau Units 3, 4, 5 and 6 (four 970 kW Cummins units) operate in peaking service. Because of the age and operating history of these units, Maui Electric includes one Caterpillar unit and two Cummins units (1,250 + 970 + 970 = 3,190 kW) towards firm capacity for the Molokai system.

Maui Unit Ratings

As of December 31, 2013

Units	Gross (MW)		Net (MW)	
	Reserve	NTL[I]	Reserve	NTL[I]
M1	2.50	2.50	2.50	2.50
M2	2.50	2.50	2.50	2.50
M3	2.50	2.50	2.50	2.50
X1	2.50	2.50	2.50	2.50
X2	2.50	2.50	2.50	2.50
M4	5.60	5.60	5.51	5.51
M5	5.60	5.60	5.51	5.51
M6	5.60	5.60	5.51	5.51
M7	5.60	5.60	5.51	5.51
M8	5.60	5.60	5.48	5.48
M9	5.60	5.60	5.48	5.48
M10	12.50	12.50	12.34	12.34
M11	12.50	12.50	12.34	12.34
M12	12.50	12.50	12.34	12.34
M13	12.50	12.50	12.34	12.34
M14/15/16[II]	58.00	58.00	56.78	56.78
M17/18/19[II]	58.00	58.00	56.78	56.78
Maalaea GS	212.10	212.10	208.42	208.42
K1	5.90	5.00	5.62	4.71
K2	6.00	5.00	5.77	4.76
K3	12.70	11.50	12.15	10.98
K4	13.00	12.50	12.38	11.88
Kahului GS	37.60	34.00	35.92	32.33
HC&S[III]	16.00	12.00	16.00	12.00
Hana 1[IV]	1.00	1.00	0.97	0.97
Hana 2[IV]	1.00	1.00	0.97	0.97
Maui System	267.70	260.10	262.28	254.69

Notes:

(I) NTL = Normal Top Load

(II) The NTL rating for long-term capacity planning purposes for each of the two Maalaea Dual Train Combined Cycle units, Maalaea Unit 14/15/16 and Maalaea Unit 17/18/19, is 56.78 MW (net). In the first and second quarters of 2008, Maui Electric performed

capability tests on Maalaea Unit 14/15/16 and Maalaea Unit 17/18/19, respectively. Maalaea Unit 14/15/16 resulted in a net NTL rating of 56.27 MW (0.51 MW lower than the rated NTL) and M17/18/19 resulted in a net NTL of 56.20 MW (0.58 MW lower than the rated NTL). With consideration that the capabilities of these units can vary depending on ambient weather conditions, it was determined that the rated NTL of 56.78 MW (net) is acceptable.

(III) All values for HC&S are net to the system. The reserve ratings include an additional 4.0 MWs of system protection capacity.

(IV) Units located at Hana Substation No. 41. In December 2008, a communication and controls project was completed. This project provides Maui Electric with the means to operate the Hana generators in parallel to the system and as emergency units. These units also have the capability to be indirectly, remotely controlled and automatically brought on line. With the completion of the project, the Hana units have been designated as firm capacity and are included in the total reserve rating of the Maui system capability.

Lanai Unit Ratings

As of December 31, 2013

Units	Gross (kW)	
	Reserve	NTL(1)
LL-1 (V)	1,000	1,000
LL-2 (V)	1,000	1,000
LL-3 (V)	1,000	1,000
LL-4 (V)	1,000	1,000
LL-5 (V)	1,000	1,000
LL-6 (V)	1,000	1,000
LL-7	2,200	2,200
LL-8	2,200	2,200
Miki Basin GS	9,400	9,400
Manele Bay CHP (VI)	1,000	830
Lanai System	10,400	10,230

(V) Miki Basin Units LL-1 to LL-6 (six,1,000 kW diesel engine-generator units totaling 6,000 kW) were converted to peaking status at the end of 2006, and as such, can be relied on for 5,000 kW of capacity to the Lanai system.

(VI) Manele Bay CHP in-service date of September 30, 2009.

Molokai Unit Ratings

As of December 31, 2013

Units	Gross (kW)	
	Reserve	NTL[I]
P-1[VII]	1,250	1,250
P-2[VII]	1,250	1,250
P-3[VII]	970	970
P-4[VII]	970	970
P-5[VII]	970	970
P-6[VII]	970	970
Solar CT	2,220	2,220
P-7	2,200	2,200
P-8	2,200	2,200
P-9	2,200	2,200
Palaau GS	12,010	12,010

(VII) Palaau Units 1 and 2 (two 1,250 kW Caterpillar units), and Palaau Units 3, 4, 5 and 6 (four 970 kW Cummins units) operate in peaking service. Because of the age and operating history of these units, Maui Electric includes one Caterpillar unit and two Cummins units (1,250 + 970 + 970 = 3,190 kW) towards firm capacity for the Molokai system.

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.

Capacity Resource Matrix - Case Descriptions

The following are the assumptions for each Case represented in the matrix.

Case 1

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- Demand Response programs are implemented
- Wind resources are allotted 5% capacity value based on name plate rating

Case 2

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- Demand Response programs are implemented

Case 3

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- Wind resources are allotted 5% capacity value based on name plate rating

Case 4

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system

Year	Forecast Peak Demand (MW-Net)	Total Firm Capacity on MECO System w 5% Wind Cap (MW-Net)	Total Firm Capacity on MECO System wo 5% Wind Cap (MW-Net)	Case 1 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response With 5% Wind Cap Value (MW-Net)	Case 2 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response No 5% Wind Cap Value (MW-Net)	Case 3 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response With 5% Wind Cap Value (MW-Net)	Case 4 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response NO 5% Wind Cap Value (MW-Net)
2014	198.6	265.9	262.3	0.0	0.0	0.0	0.0
2015	201.5	265.9	262.3	0.0	0.0	0.0	0.0
2016	203.4	265.9	262.3	0.0	0.0	0.0	0.0
2017	204.6	265.9	262.3	0.0	0.0	0.0	0.0
2018	205.7	265.9	262.3	0.0	0.0	0.0	0.0
2019	205.6	230.0	226.4	-18.6	-22.2	-22.9	-26.5
2020	205.4	230.0	226.4	-18.4	-22.0	-23.3	-26.9
2021	204.7	230.0	226.4	-17.6	-21.2	-23.3	-26.9
2022	203.4	230.0	226.4	-16.4	-20.0	-22.8	-26.4

Case 5

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Demand Response programs are implemented
- Wind resources are allotted 5% capacity value based on name plate rating

Case 6

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Demand Response programs are implemented
- Demand Response programs are implemented

Case 7

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Demand Response programs are implemented
- Wind resources are allotted 5% capacity value based on name plate rating

Case 8

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Demand Response programs are implemented

Year	Forecast Peak Demand (MW-Net)	Total Firm Capacity on MECO System w 5% Wind Cap (MW-Net)	Total Firm Capacity on MECO System wo 5% Wind Cap (MW-Net)	Case 5 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response With 5% Wind Cap Value (MW-Net)	Case 6 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response No 5% Wind Cap Value (MW-Net)	Case 7 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response With 5% Wind Cap Value (MW-Net)	Case 8 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response NO 5% Wind Cap Value (MW-Net)
2014	198.6	265.9	262.3	0.0	0.0	0.0	0.0
2015	201.5	249.9	246.3	0.0	0.0	0.0	0.0
2016	203.4	249.9	246.3	0.0	-0.4	0.0	-1.0
2017	204.6	259.9	256.3	0.0	0.0	0.0	0.0
2018	205.7	259.9	256.3	0.0	0.0	0.0	0.0
2019	205.6	224.0	220.4	-24.6	-28.2	-28.9	-32.5
2020	205.4	224.0	220.4	-24.4	-28.0	-29.3	-32.9
2021	204.7	224.0	220.4	-23.6	-27.2	-29.3	-32.9
2022	203.4	224.0	220.4	-22.4	-26.0	-28.8	-32.4

Case 9

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- Future Energy Efficiency Demand Side Management peak reduction impacts obtained through the EEPS are removed from the peak forecast. This is to illustrate the importance of meeting EEPS goals as it has an impact on the Maui system firm generation capacity needs.
- Demand Response programs are implemented
- Wind resources are allotted 5% capacity value based on name plate rating

Case 10

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- Future Energy Efficiency Demand Side Management peak reduction impacts obtained through the EEPS are removed from the peak forecast. This is to illustrate the importance of meeting EEPS goals as it has an impact on the Maui system firm generation capacity needs.
- Demand Response programs are implemented

Case 11

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- Future Energy Efficiency Demand Side Management peak reduction impacts obtained through the EEPS are removed from the peak forecast. This is to illustrate the importance of meeting EEPS goals as it has an impact on the Maui system firm generation capacity needs.
- Wind resources are allotted 5% capacity value based on name plate rating

Case 12

- KPP retirement in 2019
- HC&S operation beyond 2014 does not contribute to firm capacity
- Future Energy Efficiency Demand Side Management peak reduction impacts obtained through the EEPS are removed from the peak forecast. This is to illustrate the importance of meeting EEPS goals as it has an impact on the Maui system firm generation capacity needs.

Year	Forecast Peak Demand No Future EEPS (MW-Net)	Total Firm Capacity on MECO System w 5% Wind Cap (MW-Net)	Total Firm Capacity on MECO System wo 5% Wind Cap (MW-Net)	Case 9 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response With 5% Wind Cap Value (MW-Net)	Case 10 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response No 5% Wind Cap Value (MW-Net)	Case 11 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response With 5% Wind Cap Value (MW-Net)	Case 12 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response NO 5% Wind Cap Value (MW-Net)
2014	202.3	265.9	262.3	0.0	0.0	0.0	0.0
2015	207.5	249.9	246.3	-1.1	-4.7	-1.1	-4.7
2016	211.7	249.9	246.3	-5.2	-8.8	-5.8	-9.4
2017	215.3	249.9	246.3	-8.6	-12.2	-10.3	-13.9
2018	218.7	249.9	246.3	-11.9	-15.5	-14.8	-18.4
2019	221.0	214.0	210.4	-50.0	-53.6	-54.3	-57.9
2020	223.2	214.0	210.4	-52.1	-55.7	-57.1	-60.7
2021	224.7	214.0	210.4	-53.7	-57.3	-59.4	-63.0
2022	226.0	214.0	210.4	-55.0	-58.6	-61.4	-65.0

Case 13

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Demand Response programs are implemented
- Wind resources are allotted 5% capacity value based on name plate rating

Case 14

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Demand Response programs are implemented

Case 15

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.
- Wind resources are allotted 5% capacity value based on name plate rating

Case 16

- KPP retirement in 2019
- HC&S continued operation beyond 2014 with a firm capacity contribution of 16MW to the Maui system
- The operating assumption for the BESS is 4 hours of continuous operation at 10MW (10MW:40MWh) to ensure the ability to provide firm capacity during the daily Maui system priority peak period.

Year	Forecast Peak Demand (MW-Net)	Total Firm Capacity on MECO System w 5% Wind Cap (MW-Net)	Total Firm Capacity on MECO System wo 5% Wind Cap (MW-Net)	Case 13 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response With 5% Wind Cap Value (MW-Net)	Case 14 Largest Load Service Capability Margin Shortfall (Rule 1) With Demand Response No 5% Wind Cap Value (MW-Net)	Case 15 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response With 5% Wind Cap Value (MW-Net)	Case 16 Largest Load Service Capability Margin Shortfall (Rule 1) NO Demand Response NO 5% Wind Cap Value (MW-Net)
2014	198.6	265.9	262.3	0.0	0.0	0.0	0.0
2015	201.5	265.9	262.3	0.0	0.0	0.0	0.0
2016	203.4	265.9	262.3	0.0	0.0	0.0	0.0
2017	204.6	275.9	272.3	0.0	0.0	0.0	0.0
2018	205.7	275.9	272.3	0.0	0.0	0.0	0.0
2019	205.6	240.0	236.4	-8.6	-12.2	-12.9	-16.5
2020	205.4	240.0	236.4	-8.4	-12.0	-13.3	-16.9
2021	204.7	240.0	236.4	-7.6	-11.2	-13.3	-16.9
2022	203.4	240.0	236.4	-6.4	-10.0	-12.8	-16.4