



January 30, 2023

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

Dear Commissioners:

Subject: Adequacy of Supply Report  
Hawaiian Electric Company, Inc.

The following information is respectfully submitted in accordance with paragraph 5.3.a. 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.*

#### 2023 Adequacy of Supply Report Summary

- Hawaiian Electric Company, Inc.'s ("Hawaiian Electric" or the "Company") 2023 Adequacy of Supply employs an Energy Reserve Margin criteria, developed to review adequacy of supply in all hours of the year vs. during the peak hour of the day or peak day of the year and incorporates the reliability contribution of variable and energy-limited resources, such as energy storage, and duration limited grid services, such as demand response resources. To the extent necessary, the Company respectfully requests Commission approval to use the Energy Reserve Margin criteria for purposes of the Adequacy of Supply Report pursuant to Order No. 38482 in Docket No. 2018-0165.<sup>1</sup>

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<sup>1</sup> See Order No. 38482 issued June 30, 2022, in Docket No. 2018-0165, at 27, which states: "If Hawaiian Electric wishes to employ this methodology outside of IGP, it must seek Commission approval to do so."

- Hawaiian Electric's Energy Reserve Margin target is satisfied from 2023 through 2027 with the addition of Hawaiian Electric's planned generation and storage resource additions.
- The adjusted peak load experienced on O'ahu in 2022 was 1,102 MW-net and was served by Hawaiian Electric's total capability of 1,564 MW-net, including firm power purchases.

#### 1.0 Peak Demand and System Capability in 2022

The adjusted peak load experienced on O'ahu in 2022 was 1,102 MW-net and was served by Hawaiian Electric's total capability of 1,564 MW-net, including firm power purchases.

The system peak occurred on Wednesday, October 10, 2022 at approximately 5:52 p.m., and was 1,074 MW-net based on net Hawaiian Electric generation, net purchased power generation, the peak reduction benefits of energy efficiency programs, and with several co-generators<sup>2</sup> operating at the time. Had these cogenerating units not been operating, the 2022 system peak would have been approximately 1,102 MW-net.

Hawaiian Electric's 2022 total generating capability of 1,564 MW-net includes 276.5 MW net of firm power purchased from (1) Kalaeloa Partners, L.P. ("KPLP") and (2) H-POWER.

At times during 2022, Hawaiian Electric received energy from eighteen variable generation energy producers.

#### 2.0 Criteria to Evaluate Hawaiian Electric's Adequacy of Supply

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

The function of a planning criteria is to establish guidelines to manage the risk of insufficient generation capability from a diverse mix of generating resources available to the system in long-range generation expansion studies. Resource plan development is evaluated based on a consistent guideline or criteria to provide adequate generation to meet customer demand, with reasonable reserves to account for routine maintenance or

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<sup>2</sup> At the time of the peak, certain units at Par Hawaii, Sheraton and Pearl Harbor were generating about 28 MW of power for use at their sites.

overhauls of units, unexpected outages of generating units, growth in customer demand over time, and possibilities of higher than forecasted instantaneous peak demand.

With the increasing quantities of variable renewable wind and solar resources, and future energy storage additions to the system, an Energy Reserve Margin criteria was developed considering the dynamic nature of variable resources and limited duration storage.<sup>3</sup> For the purposes of this adequacy of supply report, Hawaiian Electric used this planning criteria.

## 2.1. Energy Reserve Margin

The Energy Reserve Margin is the percentage which the system capacity must exceed the system load in each hour for planning objectives. With the increasing quantities of variable renewable wind and solar resources, this capacity planning criteria is intended to account for current and future variable generation resources considering the dynamic nature of energy provided by wind, PV and implications of limited duration storage. The hourly evaluation of available energy allows for statistical representation of the impact of variable and finite resources at all hours of the day in the assessment of energy margin. The Energy Reserve Margin for O'ahu is 30%, to provide reasonable reliability reserve to address some level of contingencies, forecast errors, and uncertainties inherent in the assumptions and methodology.

## 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 Hawaiian Electric consider additional factors to ensure timely installation of generation capacity necessary to meet its customers' energy needs.

Other near-term considerations may include:

1. The current condition and rated capacity of existing units;
2. Required power purchase obligations and contract terminations;
3. The uncertainties surrounding non-utility generation resources;
4. The uncertainties surrounding new energy and generation resources;

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<sup>3</sup> Refer to Appendix C (page 102) of Hawaiian Electric's Integrated Grid Planning Grid Needs Assessment & Solution Evaluation Methodology filed November 5, 2021:  
[https://www.hawaiianelectric.com/documents/clean\\_energy\\_hawaii/integrated\\_grid\\_planning/20211105\\_grid\\_needs\\_assessment\\_methodology\\_review\\_point\\_book\\_1.pdf](https://www.hawaiianelectric.com/documents/clean_energy_hawaii/integrated_grid_planning/20211105_grid_needs_assessment_methodology_review_point_book_1.pdf)



5. Transmission system considerations;
6. Meeting environmental compliance standards; and
7. System stability considerations for Hawaiian Electric's isolated electrical system.

While meeting the planning criteria implies a reasonable adequacy of supply, it is not equivalent to a guaranteed supply. As firm capacity resources are displaced to accommodate variable renewable energy, resource planning may need to include resource characteristics to mitigate adequacy of supply risks by having large amounts of offline reserves. This may include consideration of minimum fast-start capability and/or means to curtail demand on short notice.

### 3.0 Key Inputs to the 2023 Adequacy of Supply Analysis

In the application of Hawaiian Electric's capacity planning criteria that are used to determine its adequacy of supply, the inputs drive the results. Key inputs are described in the following sections.

#### 3.1. Period Under Review

This report review covers the period 2023 to 2027.

#### 3.2. June 2022 Sales and Peak Forecast

In June 2022, a sales and peak forecast ("June 2022 S&P Forecast")<sup>4</sup> was developed which was subsequently approved by the Company for future planning purposes and used for this analysis.

The June 2022 S&P Forecast began with the development of the energy forecast (i.e., sales forecast) by rate class (residential, small, medium and large commercial and street lighting) and by layer (underlying load forecast and adjusting layers – energy efficiency, distributed energy resources, and electrification of transportation). The underlying load forecast is driven primarily by the economy, weather, electricity price, and known adjustments to large customer loads and is informed by historical data, structural changes, and historical and future disruptions. The impacts of energy efficiency ("EE"), distributed energy resources ("DER"), primarily photovoltaic systems with and without storage (i.e., batteries), and electrification of transportation (light duty electric vehicles ("EV") and electric buses ("eBus"), collectively "EoT")

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<sup>4</sup> The June 2022 S&P Forecast was adjusted in January 2023 for updates to the Battery Bonus Program forecast for O'ahu and Maui. Update assumes 15 MW of Battery Bonus enrollment on O'ahu by the end of 2023.



were layered onto the underlying sales outlook to develop the sales forecast at the customer level.

The sales and peak forecasts used for the analysis herein is the result of the methodology described above.

In addition, the forecast includes the impact of the Battery Bonus Program from customer-sited energy storage systems during the peak period.

Figure 1 below illustrates Hawaiian Electric's historical system peaks and compares them to the forecasts used in the 2022 and 2023 Adequacy of Supply analyses.

Figure 1: Recorded Peaks and Future Year Projections

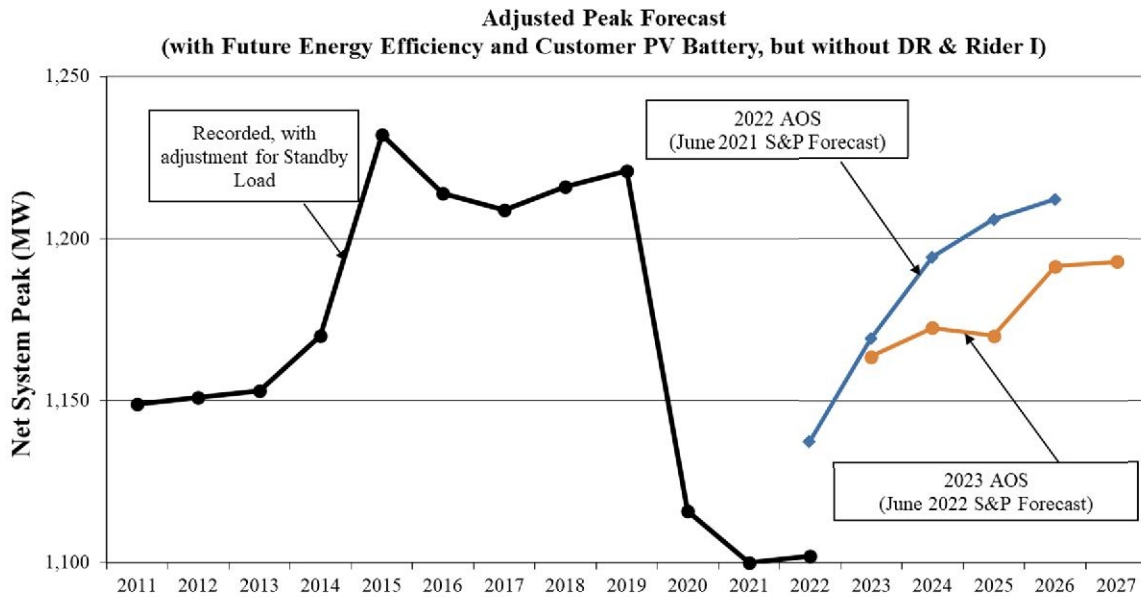


Table 1 below provides the recorded peaks from 2011 and the forecast used in Hawaiian Electric's 2023 Adequacy of Supply analysis.

Table 1: Recorded Peaks and Future Year Projections

<b>Net System Peak (MW) (with Future Energy Efficiency and Customer PV Battery, but without DR &amp; Rider I)</b>			
<b>Year</b>	<b>Actual</b>	<b>Actual Adj for Standby Load</b>	<b>2023 AOS June 2022 S&amp;P Forecast</b>
2011	1,141	1,149	
2012	1,141	1,151	
2013	1,144	1,153	
2014	1,165	1,170	
2015	1,206	1,232	
2016	1,192	1,214	
2017	1,184	1,209	
2018	1,190	1,216	
2019	1,193	1,221	
2020	1,087	1,116	
2021	1,072	1,100	
2022	1,074	1,102	
2023			1,164
2024			1,173
2025			1,170
2026			1,191
2027			1,193

For both the recorded and forecast data (from the June 2022 S&P Forecast), figures reflect an upward (standby) adjustment to account for the potential need to serve certain large customer loads (i.e., Par Hawaii, Sheraton and Pearl Harbor) that are frequently served by their own internal generation. Figure 1 also includes estimated peak reduction benefits of energy efficiency programs and naturally occurring conservation. With the advent of storage technology (i.e., battery energy storage systems (“BESS”)) for the consumer market, impacts of customer-sited PV paired with batteries were included in the peak forecast. As solar capacity continues to grow year over year, daytime loads are projected to be reduced and, all else being equal, the average daily load profile is expected to have a more pronounced difference between daytime and evening peak. With an

operating assumption of BESS charging during the daytime hours, coincident with PV generation, and discharging the stored energy during the system priority peak period, the system peak has been reduced for this type of energy storage operation.

### 3.3. Projected Peak Reduction Benefits of Demand Response Programs

Hawaiian Electric is committed to pursuing demand response (“DR”) programs and grid services procurements designed to provide cost-effective resource options.

On January 25, 2018, the Commission issued Decision and Order No. 35238, approving the Companies’ Revised DR Portfolio tariff structure framework. Currently, the Companies are implementing two Grid Services Purchase Agreement (“GSPA”) contracts that were approved by the Commission on August 9, 2019 and December 31, 2020. Customer enrollment under these GSPA contracts have been delayed by the COVID-19 pandemic, the Company worked with the aggregators to catch up in 2022 but was unable to achieve the target. The Companies will continue to diligently work with the aggregators to now catch up in 2023. The target values of this Adequacy of Supply have similar target values from the aggregator as the previous filing.

On June 9, 2021, the Commission issued an order providing guidance to the third Grid Services RFP filed on February 23, 2021. The proposed Grid Services RFP focused only on O‘ahu and sought 60 MW of grid services with focus on capacity reduction in response to the AES coal plant retirement in September 2022. The Company filed the executed GSPA contract on March 16, 2022 under a new Docket No. 2022-0041. The Company completed the necessary procedural schedule on August 11, 2022 and the docket is currently pending Commission approval of the contract. The kW from this contract is not included in this Adequacy of Supply filing.

For the purposes of this analysis, Hawaiian Electric’s adequacy of supply was calculated using estimated DR impacts, including legacy DR, capacity reduction grid service, Emergency Demand Response Program and customer interruptible load under Rider I as presented in Table 2 below.



Table 2: DR Impacts for Capacity Planning Purposes (MW)

Year	DR	Rider I	Total
2023	31.8	4.3	36.1
2024	33.7	4.3	38.0
2025	33.7	4.3	38.0
2026	33.7	4.3	38.0
2027	33.7	4.3	38.0

On June 8, 2021, the Commission approved the Emergency Demand Response Program (“EDRP”), also known as Battery Bonus Program a battery storage incentive program to dispatch electricity between 6 p.m. to 8 p.m. daily from participating residential and commercial customers. For the purposes of this analysis, Hawaiian Electric’s adequacy of supply was calculated using 15.0 MW for 2023 – 2027 based on forecasted enrollment.

### 3.4. Planned Maintenance Schedules for the Generating Units on the System

Planned outages and maintenance outages reduce generating unit availabilities. The schedules for planned overhaul and maintenance outages change frequently due to unforeseeable findings during outage inspections or to changes in priorities due to unforeseeable problems. When major revisions to planned and/or maintenance outages occur, the Planned Maintenance Schedule is revised. The uncertainty of future maintenance schedules contributes to future planning uncertainty and may influence the magnitude of reserve capacity surplus or shortfalls. A five-year planned maintenance schedule most recently updated in January 2023 was used in this analysis and includes planned maintenance schedules for independent power producers.

### 3.5. Resource Additions

#### 3.5.1. Firm Capacity Additions

No new firm capacity additions are anticipated from 2023 to 2027.

#### 3.5.2. Non-Firm Additions

In January 2017, Hawaiian Electric filed a letter with the Commission requesting to open a docket to solicit proposals for new renewable dispatchable generation. The Commission subsequently issued Order No. 34856 and opened Docket No. 2017-0352 to receive filings, review approval requests, and resolve disputes, if necessary, related to the plan to proceed with competitive procurement of this

generation. Request for Proposals (“RFP”) for the above docket were separated into 3 stages, Stage 1, Stage 2 and Stage 3.

Several variable renewable generation and storage projects from Stages 1 and 2 have been approved, are under review by the Commission, are in various stages of completion or have reached commercial operation. These are Ho‘ohana Solar 1 (Docket No. 2018-0431) assumed in-service in December 2024, AES West O‘ahu (Docket No. 2019-0050) assumed in-service in July 2023, Kapolei Energy Storage (Docket No. 2020-0136) assumed in-service in July 2023, Mountain View Solar (Docket No. 2020-0139) assumed in-service in December 2024, Waiawa Phase 2 Solar (Docket No. 2020-0137) assumed in-service in June 2024, and Kupono Solar (Docket No. 2022-0007) assumed in-service in April 2024. Mililani I Solar (Docket No. 2018-0434) reached commercial operation in July 2022 and Waiawa Solar (Docket No. 2018-0435) reached commercial operation in January 2023. Note that planning assumptions herein are based on in-service assumptions at the time the Company’s analysis was prepared. Due to continuously evolving circumstances related to project completion, certain projects may have different in-service dates shown in other reports and analyses.

On February 18, 2022, the Commission provided guidance to develop a Stage 3 RFP for Oahu. Pursuant to Order No. 38735 filed on December 1, 2022, Hawaiian Electric filed its proposed final Stage 3 Oahu RFP on December 22, 2022. The Stage 3 RFP for Oahu was issued on January 20, 2023.

The Company’s analysis includes 10.99 MW of Community Based Renewable Energy (“CBRE”) from CBRE PV Phase I (0.27 MW existing, 3 MW assumed in-service in May 2023, and 1.72 MW assumed in-service in September 2023) and CBRE PV Phase II LMI (6 MW assumed in-service in December 2025) projects.

### 3.6. Reductions of Firm Generating Capacity

#### 3.6.1. Capacity from AES Hawaii, Inc.

The existing Power Purchase Agreement (“PPA”) with AES expired on September 1, 2022.

#### 3.6.2. Capacity from Kalaeloa Partners, L.P., Combined Cycle Unit

On November 24, 2021, the Company submitted an application for approval of an Amended and Restated PPA (“A&R PPA”) with Kalaeloa Partners (“KPLP”) in Docket No. 2021-0188. On November 23, 2022, the Commission issued Decision and Order No. 38721 approving the A&R PPA for 10 years.

For the purposes of the 2023 Adequacy of Supply analysis, the 208 MW of capacity provided by KPLP is available for the duration of the analysis period.

### 3.6.3. Waiau Units 3 and 4 Deactivation

Waiau Units 3 and 4 (with a combined rating of 92.6 MW-net), are slated for deactivation or retirement in the 2024 timeframe as referenced in the O'ahu Near-Term Grid Needs Assessment.<sup>5</sup> The decision on whether to continue operating or deactivating these units would depend largely on factors such as operation and maintenance costs, environmental regulations, new and replacement capacity, timing available to install replacement capacity, and transmission infrastructure improvements. For the purposes of the 2023 analysis, Waiau Units 3 and 4 are forecasted to be deactivated from service at the end of 2023.

### 3.6.4. Reactivation

Deactivated units may be reactivated in the event of an emergency and/or to mitigate reserve capacity shortfalls. In the event existing PPAs with IPPs for firm capacity are terminated or are not renegotiated and extended, deactivated units may be reactivated to mitigate potential reserve capacity shortfalls.

## 4.0 Analysis

### 4.1. Energy Reserve Margin

The results of the Energy Reserve Margin criteria analysis are shown in Table 4. A 30% Energy Reserve Margin target was used for O'ahu. The results indicate that the Energy Reserve Margin target is satisfied from 2023 through 2027 with the addition of Hawaiian Electric's planned generation and storage projects.

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<sup>5</sup> On July 29, 2022, Hawaiian Electric filed its O'ahu Near-Term Grid Needs Assessment in Docket No. 2018-0165 in accordance with Order No. 38479.



Table 4: Estimated Energy Reserve Margin Shortfall Hours

Number of Hours Below Energy Reserve Margin Target	
Year	Pass/Fail 30% Criteria
2023	0 (PASS)
2024	0 (PASS)
2025	0 (PASS)
2026	0 (PASS)
2027	0 (PASS)

Table 5: Estimated Energy Reserve Margin Percentage

Lowest Estimated Energy Reserve Margin	
Year	Percentage
2023	34%
2024	40%
2025	44%
2026	44%
2027	38%

5.0 Mitigation Measures for Near-Term Reserves

The Company continues to review mitigation measures in light of declining performance of certain generating units delays of project additions. Contingency plans and mitigation measures include: working with developers to ensure renewable projects are brought online as anticipated, executing grid service purchase agreements for load reduction grid services, increasing customer participation in the Battery Bonus program, evaluating adjustments to the maintenance schedule, expansion of direct load control programs, expanded communication, education and calls to action on energy conservation, among others.

6.0 Conclusion

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Energy Reserve Margin criteria results indicate that the Energy Reserve Margin target is satisfied from 2023 through 2027 with the addition of Hawaiian Electric's planned generation and storage project additions.

Hawaiian Electric recognizes that the environment for resource planning has increased in complexity and uncertainty. Nonetheless, Hawaiian Electric will continue its portfolio approach to meet its obligation to serve, which includes increased renewable energy contributions, energy storage resources, the pursuit of supply side options, and customer program options, as well as continuing to consider other potential options.

Sincerely,

/s/ Kevin M. Katsura

Kevin M. Katsura  
Director  
Regulatory Non-Rate Proceedings

c: Division of Consumer Advocacy

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