

February 14, 2020

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PUBLIC UTILITIES  
COMMISSION

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

Dear Commissioners:

Subject: Docket No. 2018-0163 – Instituting a Proceeding to Investigate  
Establishment of a Microgrid Services Tariff  
Working Group Report

The Microgrid Services Tariff Working Group hereby submits its Report in accordance with Order No. 36514, filed on September 12, 2019 in the subject proceeding.


Exhibit 1 to the Report is the proposed Microgrid Services Tariff.

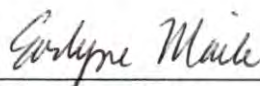
Exhibit 2 is proposed language to be inserted as a new Section 4 (Operating Requirements), Subsection S (Microgrid Operation) of Rule 14H Appendix 1 (Distributed Generating Facility Interconnection Standards Technical Requirements). No other changes were made to this Rule.

Exhibit 3 is proposed language to be inserted as a new Section F of Rule 24 (Customer Grid Supply Plus). The current Section F of Rule 24 (Application Charge) will become Section G with the proposed change. No other changes were made to this Rule.

Sincerely,

  
MARCEY CHANG  
Co-Chair

  
KEN ARAMAKI  
Co-Chair

  
for MARC ASANO  
Co-Chair

Enclosure

c: Service List

Microgrid Services Tariff (Docket No. 2018-0163)  
Working Group Report  
February 14, 2020

**I. Background**

By Order No. 35566, filed on July 20, 2018, the Hawaii Public Utilities Commission (“Commission”) opened Docket No. 2018-0163, to investigate the establishment of a microgrid services tariff for the Companies pursuant to Act 200.

By Order No. 35884, filed November 21, 2018, the Commission put forth certain preliminary questions that the parties addressed during a January 9, 2019 technical conference and in their Opening and Reply Briefs filed on February 8, 2019 and March 11, 2019, respectively.

In its Order No. 36481 (1) Prioritizing Items for Resolution in This Docket and (2) Making Determinations on Issues Raised by the Preliminary Questions on Order No. 35884 (“Order 36481”), filed on August 20, 2019, the Commission, among other things, requested that the Parties create two working groups; a Market Facilitation Working Group and an Interconnection Standards Working Group, to address the issues identified in the order. As identified in Order 36481, the Commission asked that the Market Facilitation Working Group produce, at a minimum:

- Draft tariff language for a Microgrid Services (“MGS”) Tariff that, as an initial step of development, supports resiliency of energy services during emergency events and grid outages;
  - This draft tariff language should include how the participating customers would opt-in to a microgrid, island from the grid, operate as a single controllable entity during islanded condition, and reconnect with the grid;
- Recommendations for determining compensation, if any, to the electric utility for use of the utility's distribution system during an outage, if necessary;
- Actionable recommendations on how to modify existing programs to support microgrid development, where appropriate;
- Actionable recommendations for new programs and services where applicable and deemed necessary; and
- Recommendations on appropriate compensation for clearly identified grid services, consistent with guidance above (i.e., microgrids that offer broad-based benefits for non-participants).<sup>1</sup>

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<sup>1</sup> Order 36481 at 55-56.



The Commission identified the primary expected end products of the Market Facilitation Working Group as follows: actionable recommendations for the MGS Tariff language, proposed actions for existing DER programs, and potential new programs that would facilitate microgrid development.<sup>2</sup>

With regard to the Interconnection Standards Working Group, the Commission requested that the Parties “develop a new section of Rule 14H specific to interconnection and islanding/reconnection of microgrids. The proposed interconnection changes should support microgrid and backup power applications under existing tariffs and the MGS Tariff.”<sup>3</sup> The Commission stated that:

Consistent with Act 200, the new section of Rule 14H should standardize and streamline interconnection requirements and processes for existing and new microgrids. The commission understands that this is an emerging area for commercial applications, but some early examples are available (e.g., ConEdison and Puerto Rico). The Interconnection Standards Working Group should examine these examples and incorporate aspects that are relevant to Hawaii's market.<sup>4</sup>

By Order No. 36514 (“Order 36514”), issued September 12, 2019, the Commission issued a formal procedural schedule for this docket. In Order 36514, the Commission requested that each Working Group determine two co-chairs and charged the co-chairs with responsibility for coordinating Working Group activities and managing the Working Group meetings.<sup>5</sup> Order 36514 set forth the following schedule:

<b>Procedural Steps</b>	<b>Date/Timing</b>
Parties self-organize into Working Groups	August 2019 through September 2019
Technical Conference	Thursday, September 19, 2019
Status Conference with Commission	Thursday, November 14, 2019
Status Conference with Commission	Thursday, January 19, 2019
Working Groups’ Reports	Friday, February 14, 2020
Technical Conference to discuss Working Groups’ Reports	Thursday, February 27, 2020
HECO Companies file Draft Microgrid Services Tariff and Rule 14H Updates	Monday, March 30, 2020
Parties file comments on and proposed revisions to Draft Microgrid Services tariff and Rule 14H Updates	Monday, April 27, 2020

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<sup>2</sup> *Id.* at 57.

<sup>3</sup> Order 36481, at 56-57.

<sup>4</sup> Order 36481, at 57-58.

<sup>5</sup> Order 36514 at 5.



Commission Decision and Order	Subsequent to receiving comments on Draft Microgrid Services Tariff and Rule 14H Updates
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The Commission also noted that Working Group reports should include “a summary of the Working Group’s efforts and recommendations, including identified areas of consensus, the Parties’ individual perspectives on areas of disagreement, and explanations supporting the Working Group’s recommendations.”<sup>6</sup>

This Working Group Report addresses Commission guidance, and as discussed in more detail below, includes as exhibits current drafts of the following Working Group documents:

- Exhibit 1: A draft of the proposed MGS Tariff.
- Exhibit 2: The proposed language to be inserted as a new Section 4 (Operating Requirements), Subsection S (Microgrid Operations) of Rule 14H Appendix 1 (Distributed Generating Facility Interconnection Standards Technical Requirements).
- Exhibit 3: The proposed language to be inserted as a new Section F of Rule 24 (Customer Grid Supply Plus). The current Section F of Rule 24 (Application Charge) will become Section G with the proposed change. The draft language may also be included in other tariffs for distributed resources (i.e., Rule Nos. 18, 22, 23, 25).

## **II. Working Group Efforts**

### **A. Working Group Meetings**

In accordance with Order 36514, as discussed below, during the first workshop, all docket participants were asked if any individuals would be willing to volunteer to serve as chairs for each working group. Three individuals responded that they would be willing to do so, Marcey Chang of the Division of Consumer Advocacy’s office and Ken Aramaki from Hawaiian Electric Company, Inc. (“Hawaiian Electric”) volunteered to serve as co-chairs for the Market Facilitation Working Group. Marcey Chang and Marc Asano from Hawaiian Electric volunteered to serve as Co-Chairs for the Interconnection Working Group. The work of the two Working Groups were ultimately combined due to the overlap of identified topics that needed to be addressed and the individuals involved in the Working Groups. The remainder of this Section summarizes the significant time and effort expended by the Working Groups to meet the aggressive objectives and schedule set forth in this docket.

Working Group meetings and sessions were open to all docket parties and participants and were held to meet the objectives of Order 36481. A brief summary of the Working Group

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<sup>6</sup> *Id.* at 6.



meetings is listed below. Presentations and meeting minutes are accessible to the Working Group and the public on Hawaiian Electric's website.<sup>7</sup>

- October 3, 2019 (Webinar Kickoff):
  - Working Group established leads (M. Asano, K. Aramaki, M. Chang) to facilitate Working Group meetings and lead the development of deliverables.
  - Working Group revisited guidance provided by the Commission during a Technical Conference held on September 19, 2019. Included was a timeline of status updates to the Commission and due date of deliverables.
  - Working Group provided initial thoughts and feedback, including the Microgrid Services Tariff acting as a portal tariff.
- October 14, 2019 (WG Symposium):
  - Discussed scope and framework for the Working Group to focus on.
  - Gained insight on on-going work and challenges in the Illinois and Washington DC jurisdictions. Presentations provided by Andrew Barbeau (The Accelerate Group) and Jared Leader (Smart Electric Power Alliance).
- November 5, 2019 (Webinar):
  - Continued scoping discussions regarding microgrid archetypes, tariff structure, and topics to address within each microgrid archetype.
- November 21, 2019
  - Received clarification on the Commission's order as it relates to resiliency. Priority was to enable microgrids that can disconnect from the grid to operate in island mode during emergency events or grid outages.
  - Reviewed Commission guidance from November 14, 2019 status update meeting, including revisiting whether a tariff is needed for customer microgrids and Working Group to prioritize the development of hybrid microgrids.
  - Working Group discussed microgrid archetypes in and out of scope for the Working Group.
  - Presentations by organizations external to the Working Group were given regarding microgrid IEEE standards (by Annabelle Pratt, National Renewable Energy Laboratory) and Princeton University's microgrid (Ted Borer, Princeton/Microgrid Resource Coalition ("MRC")).
- December 3, 2019
  - Working Group confirmed Customer Microgrid and Hybrid Microgrid definitions.
  - Received an update on Puerto Rico's microgrid developments from Jorge Camacho, consultant to the Puerto Rico Public Utilities Commission.
  - Simplified Hybrid Microgrid concept presented to the Working Group.
  - Working Group suggested that leads provide drafts for review.

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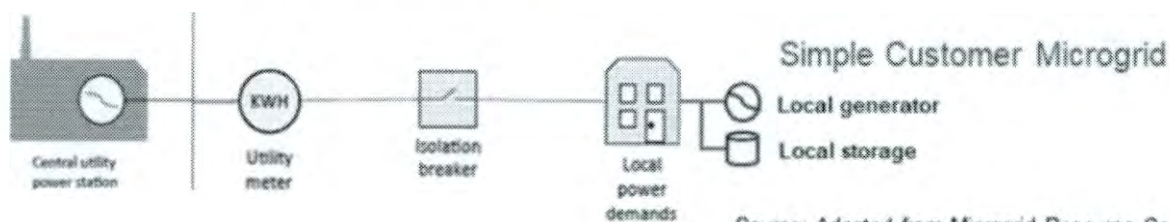
<sup>7</sup> See website: <https://www.hawaiianelectric.com/about-us/our-vision-and-commitment/resilience/microgrid-services-tariff>

- Drafts of Microgrid Services Tariff, Rule 14H and 24 modifications sent December 13, 2019 to Working Group members.
- January 17, 2020
  - Working Group Member (Baird Brown, MRC) presented topics and concepts from an alternate tariff proposal.
  - Working Group discussed the MRC proposal and proposed simplified hybrid concept.
- February 6, 2020
  - Working Group discussed contents of the draft MGS tariff, and Rule 14H and 24 modifications.
  - Suggestion was to meet with a smaller team focused on working through the edits. Working Group asked for volunteers to participate in the follow up sessions.
- February 10-11, 2020
  - Subset of Working Group members convened and worked on the draft Microgrid Services Tariff, Rule 14H, and Rule 24. Documents developed in these meetings are included in this report.

#### **B. Key Decisions Made by the Working Group**

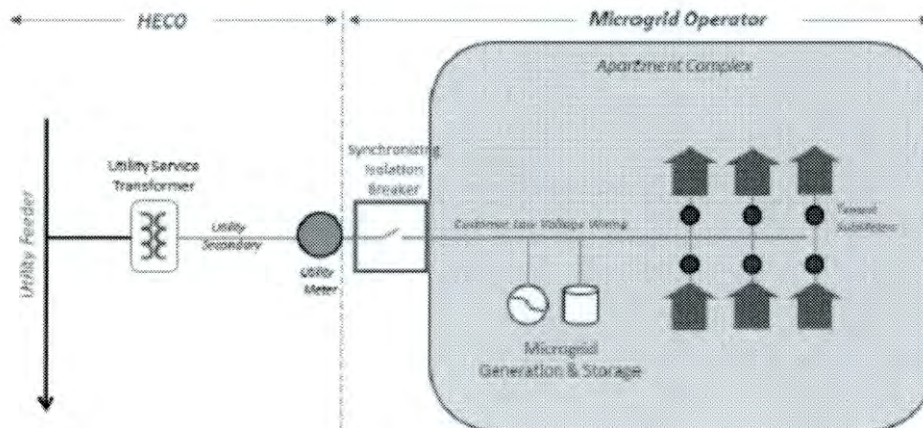
During the course of the Working Group meetings, as noted above, many decisions were made that were foundational to the proposed draft Microgrid Services Tariff. Among these, certain key decisions fundamental to the tariff are summarized below:

1. Microgrids considered within the scope of the Microgrid Services Tariff
  - a. Customer Microgrid - Microgrid that uses non-utility infrastructure beyond the Point of Common Coupling ("PCC"), including distribution lines and related equipment, to meet its interconnected loads. The Microgrid itself is a customer of the utility. Examples of a simple and a multiple customer microgrid are shown below.

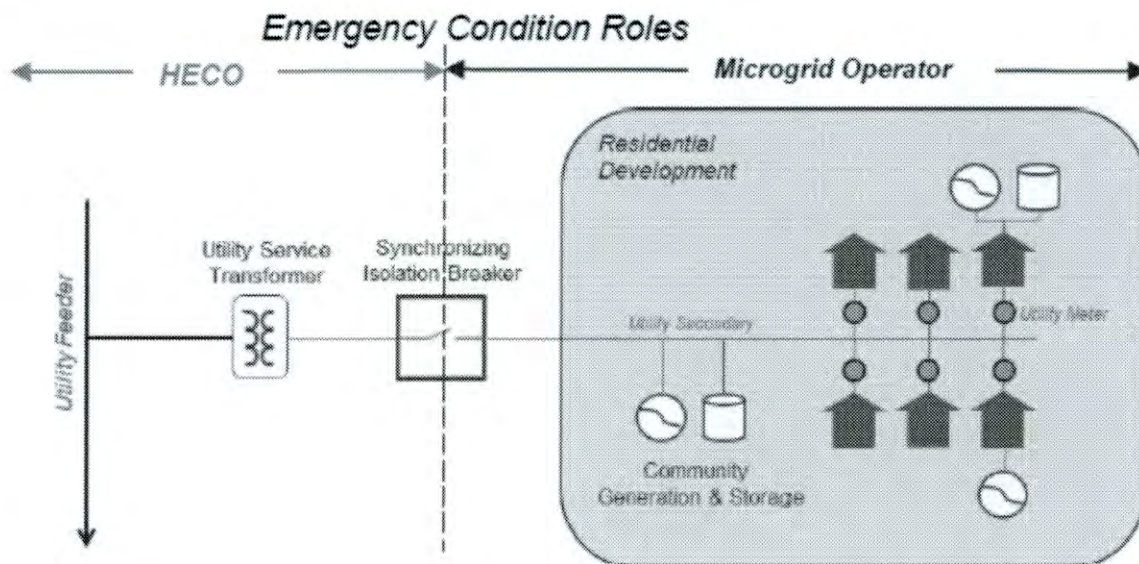




## Multiple Customer Microgrid (w/synchronizing)



- b. Hybrid Microgrid - Microgrid that uses utility and non-utility infrastructure beyond the PCC, including distribution lines and related equipment, to meet its interconnected loads.
  - i. Due to the complexity of such arrangements, Hybrid Microgrids above 3MW are not eligible to apply under this tariff. Similar to other utility-scale projects, a Power Purchase Agreement for Hybrid Microgrids above 3 MW can be used. An example of a "simple" hybrid microgrid covered under the Microgrid Services Tariff is shown below.



## 2. Hybrid Microgrid Services Tariff Compensation for Hybrid Microgrids



- a. In normal/emergency mode, transactions between Hawaiian Electric, Hawaiian Electric Customer ("Customer"), Microgrid Operator remain the same.
    - i. Customers pay Hawaiian Electric for electricity, get compensated for production under existing tariffs.
    - ii. Hawaiian Electric is paid for electricity used, compensates Microgrid operator and Customers for electricity produced under applicable tariffs.
    - iii. Microgrid Operator compensated for electricity produced under tariff/program.
  - b. Potential Resilience or Service fees
    - i. By Microgrid participants – Agreements between Microgrid Operator and participants of the Microgrid.
    - ii. By Hawaiian Electric – Pursuant to a future resiliency tariff or other means approved by the Commission (showing of broad-based benefits for non-participants).
    - iii. By Other Entity – For defined resilience or service benefit.
3. Microgrid Services Tariff should serve as a "portal" tariff that achieves the following:
  - a. Defines Customer Microgrids and Hybrid Microgrids;
  - b. Guides applicants for Customer Microgrids to existing tariffs, as necessary;
  - c. Provides requirements for Hybrid Microgrid applicants, as necessary;
  - d. Guides Hybrid Microgrid applicants to existing tariffs, as necessary.
    - i. This was done, in part, in recognition that there are existing Customer Microgrids that have been developed under the existing tariffs. To mitigate setting addition requirements on those Customer Microgrids, as well as future microgrids, proposed tariff language was developed to refer to the existing tariffs.
4. Microgrids considered out of scope of the Microgrid Services Tariff
  - a. Mini-Grid Hybrid Microgrid - Mini-grid configuration involves linking various customer and 3rd party resources across utility primary distribution grid with a PCC at the distribution feeder breaker or other point on the primary distribution feeder to form multi-user MG during an emergency.
  - b. Utility Microgrid - Microgrid developed by utility on distribution system that may involve both utility resources (own or contracted) and customer resources providing services.
  - c. Utility-Private Partnership Microgrid - Microgrid jointly developed through utility - private partnerships which may involve customer or hybrid microgrid architectures.
  - d. Remote Microgrid - Customer microgrid that is off-grid, not connected to the utility grid in normal mode and unable to connect to the utility grid.



- e. Virtual Microgrid - Virtual microgrids also known as Virtual Power Plants ("VPP") are a set of aggregated resources that can provide grid services under normal operating conditions. Resources are not able to support load within clearly defined electrical boundaries.

### C. Commission Guidance

On January 16, 2020, the Commission issued a letter providing guidance to the Working Group in response to Working Group request for guidance on various matters during the January 9, 2020 Commission Status Conference ("Guidance Letter"). Specifically, the Commission provided guidance in the areas of (1) compensation while grid connected, (2) third-party retail energy services, (3) renewable energy requirement while grid connected, and (4) additional issues for consideration.

With respect to whether the Microgrid Services Tariff should establish compensation to microgrids while grid connected, the Commission provided guidance that it did not believe it was necessary for the Microgrid Services Tariff to address this issue (with the assumption that the question related to additional grid services provided in the future), and noted that it may be more appropriate to explore the issue in Docket No. 2019-0323, Distributed Energy Resources.<sup>8</sup>

Regarding whether the Microgrid Services Tariff should address compensation for retail energy sales (i.e., competitive energy services over the grid) provided by microgrids during normal conditions, the Commission stated:

The Commission reiterates that the intent for the initial phase of this proceeding is to establish a tariff that reduces regulatory barriers that may prevent microgrids from providing energy to consumers during an outage or emergency event.

\* \* \*

To this end, if the Working Group does not believe that retail energy sales should be addressed under the current scope, the Working Group should submit the proposed tariff without the retail sales component. However, if the Working Group believes that retail energy sales is a pressing issue for the current scope, then the Working Group should provide proposed tariff language for retail energy sales.

If the Working Group is unable to come to a consensus on this issue, then consistent with Order No. 36514, Parties should share

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<sup>8</sup> See Guidance Letter at 1.



their individual perspectives on the areas of disagreement and propose alternative tariff language.

The Commission recognizes the HECO Companies' simplified hybrid microgrid proposal may result in a more expedited offering, as their proposal does not require retail wheeling. As a general matter, the Commission believes retail wheeling will likely require additional discussion after the filing deadline of March 30, 2020. As such, this issue should be addressed at a later time.<sup>9</sup>

With respect to whether microgrid generation is required to come from renewable energy resources while grid connected, the Commission noted that it was the Companies' responsibility to ensure compliance with State RPS if the microgrid is a customer grid connected through any tariff, and also noted that it expected the Microgrid Services Tariff would set a renewable energy requirement for microgrid generation, but that the established threshold could be a placeholder subject to later adjustment.<sup>10</sup>

Finally, the Commission stated it was supportive of the Working Group addressing complex issues at a later date or in a separate proceeding as determined by the Commission.<sup>11</sup> Such complex issues include, but are not limited to: "(1) 'Mini-grids' and/or Hybrid Microgrids, (2) Point of Common Coupling on the primary distribution system, (3) customer opt-out, (4) retail wheeling coordination, (5) pricing during emergency conditions, and (6) consumer protection issues."<sup>12</sup>

**D. Parking Lot Items / Not Included in this Phase**

Throughout this process, the Working Group kept a list of parking lot items that were not addressed within these current proceedings and were intended to be considered for future phases of this Docket or in other proceedings. The parking lot items include the following:

1. Change of ownership of Microgrid
2. Standby Charges or Exit Fees
3. Customer protection-related considerations
4. Microgrid/Integrated Grid Planning procurement considerations
5. Considerations of gaming between utility-owned and 3rd-party microgrids
6. Army/Military microgrid issues, such as nested microgrids, if appropriate
7. Interactions with other dockets
  - a. Distributed Energy Resources Tariff/Programs
  - b. IGP Resiliency

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<sup>9</sup> *Id.* at 2 – 3.

<sup>10</sup> *See id.* at 3.

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*



8. Consideration of societal, environmental value
9. Development of Power Purchase Agreement model for Hybrid Microgrids
10. Other types of microgrids that do not fit Act 200 definition
11. Gap in tariff for customers greater than 100kW participation & compensation in non-normal, non-island scenarios. (e.g., SIA)
12. Harmonize compensation with other grid service mechanisms
  - a. Expanded functionality from microgrid service and whether it should be included in MS Tariff.
13. Contractual obligations for other grid services – Customers with existing DER/DR obligations still need to meet performance if included in a microgrid.
14. Customer approvals – Does a Hybrid Microgrid need a full customer subscription?
15. Resiliency Tariff

#### **E. NELHA Update**

The Commission's Order 36481 stated "Requests by NELHA and/or the HECO Companies for regulatory flexibility to support demonstration project(s) consistent with the intent of Act 200 may be made in the instant docket." Working Group leads were in contact with NELHA and invited NELHA to present updates at the Working Group meetings. However, NELHA was in an active procurement stage during the span of the Working Group (October 2019 – February 2020) and unable to provide updates on their plans and/or projects. NELHA has not requested regulatory flexibility within this docket.

It is the Working Group's understanding that in its current plan, the NELHA project scope has been revised and reduced to electrify pumps within its campus. NELHA will be requesting an interconnection with Hawaiian Electric via a Standard Interconnection Agreement, which is a non-export arrangement.

### **III. Working Group Recommendations Under Development**

#### **A. Market Facilitation Outcomes and Recommendations Under Development**

As noted above, the Commission requested that the Market Facilitation Working Group produce the following outputs (in **bold**). Included within are outcomes to these objectives.

1. **Draft tariff language for an MGS Tariff that, as an initial step of development, supports resiliency of energy services during emergency events and grid outages;**
  - a. **This draft tariff language should include how the participating customers would opt-in to a microgrid, island from the grid, operate as a single controllable entity during islanded condition, and reconnect with the grid;**
  - b. Outcome: An initial draft Microgrid Services Tariff is attached as Exhibit 1. Working Group recommends the Commission provide guidance on the proposed draft for Hawaiian Electric to continue to develop and finalize.



**2. Recommendations for determining compensation, if any, to the electric utility for use of the utility's distribution system during an outage, if necessary;**

- a. Outcome: The utility's distribution system is used to form what is defined as Hybrid Microgrids. The draft tariff proposes language that maintains existing tariffs for the buying and selling of energy during islanded mode.

During the course of the Working Group meetings, the possibility of non-renewable generators providing energy during islanded mode was not covered. The Working Group proposes compensation (Section D.2 in Exhibit 1) for this energy to be fixed with Rule 24 (CGS Plus program), which is the average 12-month avoided energy cost and is recalculated every five years.

**3. Actionable recommendations on how to modify existing programs to support microgrid development, where appropriate;**

- a. Outcome: Draft modifications to Hawaiian Electric Rule No. 24 are attached as Exhibit 3. If deemed appropriate by the Commission, Hawaiian Electric may transfer the modifications to other existing tariffs (i.e., Rule No. 22, 23, 25, 26, 27).

**4. Actionable recommendations for new programs and services where applicable and deemed necessary; and**

- a. Outcome: Draft modifications to Hawaiian Electric Rule No. 24 are attached as Exhibit 3. If deemed appropriate by the Commission, Hawaiian Electric may transfer the modifications to other existing tariffs (i.e., Rule No. 22, 23, 25, 26, 27).

**5. Recommendations on appropriate compensation for clearly identified grid services, consistent with guidance above (i.e., microgrids that offer broad-based benefits for non-participants).**

- a. Outcome: The Working Group recommends a separate tariff be established to define compensation for resiliency services (Section D.2 in Exhibit 1). The Working Group discussed such compensation, but was unable to develop criteria for this tariff, while developing the tariff itself. Note that the tariff does not preclude others from compensating developers that implement Microgrids (e.g., State and Customers).

**B. Interconnection Standards Outcomes and Recommendations Under Development**

As discussed above, the Commission requested that the Interconnection Standards Working Group develop a new section of Rule 14H specific to interconnection and islanding/reconnection of microgrids.

Outcome: Attached as Exhibit 2 are proposed changes to Rule 14H meeting the above objective.



### C. Unresolved Topics

The Working Group was provided the latest draft of the Microgrid Services Tariff (Exhibit 1), proposed changes to Rule 14H (Exhibit 2), and Rule 24 (Exhibit 3), with a request to provide written comments by close of business on February 12, 2020. One comment remained unresolved as of the writing of this report and is summarized below.

#### 1. Unresolved Comment 1: Submitted by B. Brown (MRC) on 2/12/20

Current Language (Exhibit 2, Section 4s):

- A scheduled Island Mode operation can be initiated through a manual action by the Microgrid Operator or the Company or other operating dispatch means (e.g., energy management system) that trigger the transition from operating in parallel and synchronized ("Grid-Connected Mode") with the Company's transmission and distribution system ("Company System") to operating as an islanded system.

Microgrid Resources Coalition's Issue is with the inclusion of "the Company" in the current language (underlined language above):

- "As a general rule the Company cannot require a scheduled islanding unless that is a service it has purchased. And while we don't object to coordinating with the Company, that should generally be a courtesy notification, not a question of Company discretion. As we have discussed previously, a sophisticated microgrid should be able to exit or enter parallel operation at neutral load, so as to not cause or exacerbate any problem on the grid. If a microgrid is not equipped to do that then you may need special rules, or more coordination."  
\*\*\*
- "It follows that if the microgrid has no contractual service obligation to the grid, it can Island if it wishes to. I don't know why they would want to, but I don't see what the basis would be for stopping them. Any customer any time can turn out all their lights and appliances if they choose to. It would just be unlikely."

Working Group Lead's Response:

- "What you describe as the microgrid having unilateral right to disconnect from the grid at any time for non-emergency reasons does not appear consistent with the Commission's initial order on MGS Tariff or the discussion in the working group. Your proposal below could also be viewed in its logical extension as enabling grid defection, with the microgrid only using the utility system as back-up. In this context, as was discussed early on, the MGS Tariff was intended to focus on enable resilience during emergencies (also incl. testing), not microgrids islanding unilaterally for economics, for example. Appreciate that on the mainland, microgrid economics involve optimizing utility/supplier bill charges including demand charges which may involve related



microgrid islanding. Also understand that a customer can turn off load, but this seems a little more involved given the original policy intent of the MGS Tariff.”

#### **IV. Next Steps**

On February 27, 2020, the Commission will hold a technical conference to discuss this Working Group Report. Thereafter, on March 30, 2020, after consideration of the technical conference discussion and the Working Group Report, the Companies will file a draft Microgrid Services Tariff and proposed rule modifications, which may include the following:

1. Draft revised Microgrid Services Tariff, Rule 14H, and Rule 24.
2. Development of Hybrid Microgrid forms (e.g., Application, Interconnection Agreement, Operating Agreement, Disclosure Checklist, Participant Agreement, etc.).
3. Draft revisions to other Rules as necessary to maintain consistency with modifications to Rule 24.

On April 27, 2020, the Parties will then have opportunity to file comments on and proposed revisions to the Companies’ Draft Microgrid Services Tariff and Rule 14H Updates.



SHEET NO. XX  
Effective XX  
Draft Dated: 2/12/20

RULE NO. XX

Microgrid Services

Highlights denote forms to be developed by Hawaiian Electric

A. GENERAL

The Microgrid Services tariff is intended to encourage and facilitate the development and use of new microgrids throughout Hawaii to improve energy resiliency, in light of extreme weather events or other disasters as identified in Act 200 of the 2018 Legislative Session. The Microgrid Service Tariff is not intended to affect existing microgrids and other facilities with microgrid capabilities (e.g., Distributed Generation Facilities, generators), which are interconnected to the Company's systems by means of a Standard Interconnection Agreement or other agreements with the Company, subject to the terms and conditions set forth in the Company's Rule 14, Section H and other applicable Company rules, at the time of the initial effective date of this tariff, [insert date].

The tariff shall be reviewed five years from the effective date.

1. Definitions

- a. "Customer" or "Customers" used herein is as defined in Hawaiian Electric Rule No. 1.
- b. "Customer Microgrid" is a Microgrid that uses non-utility infrastructure beyond the PCC, including distribution lines and related equipment, to meet its interconnected loads.
- c. "Distributed Generation Facility" as defined in Rule No. 14.
- d. "Emergency Events" or "Grid Outages" [To be defined by Company]
- e. "Grid-Connected Mode" means a mode of operation when the microgrid is operating in parallel with the Company's transmission and distribution system and is not operating in island mode.
- f. "Hybrid Microgrid" is a Microgrid that uses utility and non-utility infrastructure beyond the PCC, including distribution lines and related equipment, to meet its interconnected loads.
- g. "Interconnect" or "Interconnected" or "Interconnection" means the physical connection(s) between the utility electric grid and the microgrid at a designated Point of Common Coupling ("PCC").

HAWAIIAN ELECTRIC COMPANY, INC.

Transmittal No. \_\_\_\_ Dated \_\_\_\_.



- h. "Island Mode" means a mode of operation when the microgrid is disconnected from the utility grid at PCC, and is generating or producing energy to provide electric service within the microgrid.
- i. "Microgrid," means a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single self-governing controllable entity with respect to the utility's electrical grid and is connected to a public utility's electrical grid at the PCC to operate in grid-connected mode and can disconnect from the grid to operate in island mode during Emergency Events or Grid Outages, and that: (1) is subject to this microgrid services tariff; and (2) generates or produces energy.
- j. "Microgrid Participant" means the Customer within a Hybrid Microgrid boundary.
- k. "Microgrid Operator" means the operator of a Customer Microgrid or Hybrid Microgrid.
- l. "Point of Common Coupling" ("PCC") is a point in the electrical system where the microgrid is connected to the utility. Consistent with IEEE-519, this should be a point which is accessible to both the utility and the customer or Microgrid Operator for direct measurement.
- m. "Point of Interconnection" ("POI") is the point at which the utility and the Customer interface occurs.

B. AVAILABILITY

- 1. The Microgrid Services Tariff is available to a Microgrid that meets the following criteria:
  - a. For a Customer Microgrid, existing tariffs and programs shall be applicable.
  - b. For a Hybrid Microgrid, this tariff is available to a Hybrid Microgrid Operator who establishes an account with the Company. Each participating Customer within the defined electrical boundary of a Hybrid Microgrid must be interconnected to the Company's system and have a current electricity account with the Company.
  - c. Microgrids not interconnected to the Company's electric system in Grid-Connected Mode are not eligible for this tariff.
  - d. If the Microgrid Operator is a foreign entity, confirmation from the State of Hawai'i Department of Commerce and Consumer Affairs that the Applicant is currently authorized to do business in the State of Hawai'i as of the date of submittal.
  - e. A Microgrid Operator or Microgrid Participant with existing or future agreements to provide grid services to the Utility are obligated to meet such requirements (e.g., availability, capacity, etc.) when such services are called. Participation in a microgrid service whereby the operation of that microgrid precludes the customer from delivering services (e.g., Island Mode) in accordance with said contract or tariff shall not absolve Microgrid

HAWAIIAN ELECTRIC COMPANY, INC.



Operator or Microgrid Participant from such contractual or tariff obligations and inability to deliver services.

C. INTERCONNECTION

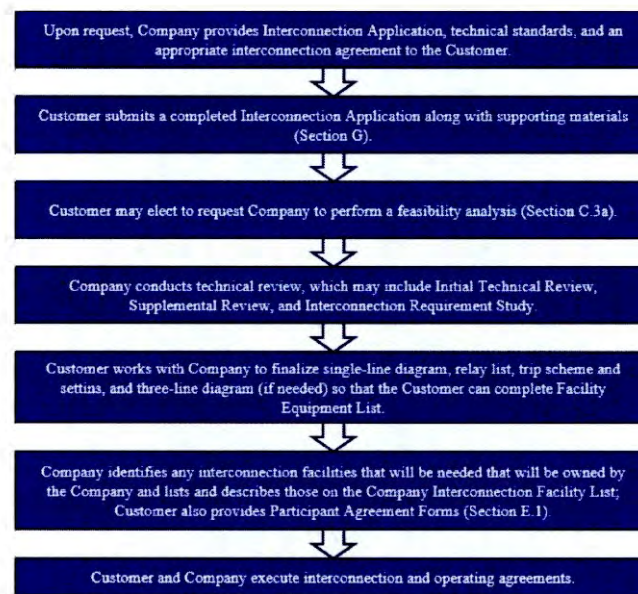
1. Each Microgrid shall be designed to interconnect and operate in Grid-Connected and Island Mode with the Company's system without adversely affecting the operations of its Microgrid Participants and without presenting safety hazards to the Company's or other customers' personnel. Such Facilities and the interconnection systems shall be in compliance with all applicable safety and performance standards of the National Electric Code (NEC), the Institute of Electrical and Electronics Engineers (IEEE), the Company's interconnection standards and procedures provided in Rule No. 14H, and Rule No. 19, as amended from time to time, and also subject to any other requirements as may be specified in the applicable Interconnection Agreement. The foregoing requirements shall apply to each of the following:
  - a. Customer Microgrids are subject to the applicable program or Rule, for which it is seeking interconnection.
  - b. Hybrid Microgrids will require an interconnection agreement with the Company, subject to the terms and conditions set forth in the Company's Rule 14, Section H and other applicable Company rules.
  - c. A Microgrid interconnected at the Distribution Level<sup>1</sup> shall follow the applicable Rule No. 14H interconnection process at the time of interconnection.
  - d. A Microgrid interconnecting at the Sub-Transmission and Transmission levels shall follow the interconnection process applicable to their Facilities at the time of interconnection.
2. The aggregate Generating Facility size of the Hybrid Microgrid cannot exceed 3 MW (AC). A Microgrid with Generation Facilities greater than 3 MW are not eligible under this tariff.
3. Hybrid Microgrid Interconnection Process (adapted from Rule 14H sht. 34D-2)

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<sup>1</sup> Distribution system (Level) is defined as interconnection to electrical wires, equipment, and other facilities at the distribution voltage levels (such as 25kV (Hawaiian Electric only), 12kV, or 4kV) owned or provided by the Company, through which the utility provides electrical service to its customers.

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- Upon submittal of the Hybrid Microgrid **Application**, the applicant may choose to request the Company perform a feasibility analysis for each Hybrid Microgrid submitted, taking into account any design considerations described by the Microgrid Operator that impact the feasibility or classification of the Microgrid. The feasibility analysis will include a preliminary assessment of the required electrical facility additions or upgrades to enable the Microgrid based on the proposed configuration.
- If the Applicant chooses to undertake a feasibility analysis, the Applicant shall agree to pay the cost estimate for the feasibility analysis provided by the Company. The Company shall make best efforts to complete the feasibility analysis within one hundred twenty (120) calendar days of the Applicant's agreement to move forward with the feasibility analysis, complete data submittal to Company's satisfaction needed to conduct the feasibility analysis, and payment of the feasibility analysis cost is received.
- The completion of the feasibility analysis shall include the Company's proposal to the Customer of the following: (a) interconnection requirements and a non-binding, good faith estimate of the Company's portion of the costs to perform the interconnection requirements; and (b) protection and synchronizing relays and settings, protection, synchronizing and control schemes, and any other equipment and/or performance requirements necessary to meet the IRS requirements.
- The feasibility analysis is intended to inform the Applicant regarding potential interconnection facilities and costs required to interconnect the Hybrid Microgrid prior to development of the Microgrid and submittal of the Microgrid Agreement application. The feasibility analysis may be used to inform the scope of the Interconnection Requirements Study should one be required pursuant to Rule No. 14, Appendix III.
- Additional interconnection facilities required to enable microgrids shall be borne by the applicant.

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D. COMPENSATION.

1. Compensation for Customer Microgrids.

- a. For a Customer Microgrid, the Eligible Microgrid Operator is the Company Customer, and all applicable energy credit rates and compensation will apply to the Eligible Microgrid Operator during Grid-Connected Mode.

2. Compensation for Hybrid Microgrid Operators and Customers within the Microgrid

- For a Hybrid Microgrid Operator and all Customers within a Hybrid Microgrid, all applicable energy credit rates and compensation will apply during Grid-Connected Mode and Island Mode. While operating in Island Mode all existing customer tariffs and programs shall remain in effect and all energy delivered and sold within the Microgrid during the period will be deemed transacted with the Company pursuant to the tariffs.
- Hybrid Microgrid Operators supplying energy with its generating resources during islanded mode, and without an existing means for compensation by the utility (e.g., PPA, tariff), shall be compensated by Energy Credit Rates outlined in Rule No. 24.

3. Compensation for Resilience Grid Service shall be compensated under a resiliency tariff.

E. HYBRID MICROGRID CUSTOMER PARTICIPATION

1. A Customer in a proposed Hybrid Microgrid shall submit a Hybrid Microgrid **Participant Agreement Form** ("Agreement Form") to the Microgrid Operator, who will include the Agreement Form as part of the application to the Company.

2. The Agreement Form shall contain standard information and provisions that ensure transparency and proper consumer protections ("Disclosures"), including or be supplemented by, at minimum, the following elements:

- a. The entity name, business address, website URL, phone number, and email address of the Microgrid Operator
- b. The Customer name, address, phone number, and email address (if available)
- c. The Customer's account number
- d. The electrical boundaries of the Microgrid
- e. The expected activation date of the Microgrid
- f. Nothing in the Agreement Form shall be deemed to alter or modify any rate schedule, charge, or condition of service established from time to time by the Commission for electric service provided by the Company. All such rates and charges from the Customer's applicable rate schedule shall apply and remain, subject to change in accordance with Commission rules.
- g. The method for the Customer to discontinue or transfer Authorization
- h. Any financial penalties or impacts of a Customer's decision to discontinue or transfer Authorization.

3. The standard form **Disclosure Checklist** is attached hereto as Appendix XX, which each Microgrid Operator shall complete with each participating Customer within the electric boundaries of the Microgrid.

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4. The Disclosures provided in this section, or in the Disclosure Checklist, are supplemental, and do not replace, the disclosure and consumer protection requirements required of any other tariff or program.

F. CREDIT RATE AND FEES.

1. Customers within a Hybrid Microgrid shall be billed monthly for the energy supplied by the Company, in accordance with the Company's Rule No. 8, the applicable rate schedule, and Company's rules filed with the Commission.
2. Customer Microgrid Customers are subject to their applicable tariff(s) and rate schedule.

G. HYBRID MICROGRID OPERATOR PARTICIPATION

1. For a Hybrid Microgrid, A Microgrid Operator shall submit a Hybrid Microgrid Application to the Company, which shall include the following in order to be considered a complete application:
  - a. Microgrid Operator company name, contact information, and address;
  - b. Microgrid Operator contact person name, contact information, and address;
  - c. Proposed electrical boundaries of the Microgrid
  - d. Estimated activation date of the Microgrid
  - e. Microgrid system nameplate direct current (DC) capacity, AC output (inverter nameplate), mount location, tracker type, azimuth, and tilt of all solar photovoltaic generating resources within the electrical boundary and expected to be used during islanding operations;
  - f. Microgrid system nameplate direct current (DC) capacity, AC output (inverter nameplate), energy capacity (kWH) of any energy storage resources within the electrical boundary and expected to be used during islanding operations;
  - g. Microgrid nameplate capacity (AC) and generating characteristics of all generation resources located within the electrical boundaries of the Microgrid.
  - h. Microgrid nameplate capacity (AC) of all backup generation resources located behind a customer's meter within the electric boundaries of the Microgrid that will not export power during Grid-Connected Mode, and may be used during islanding operations;
  - i. Microgrid proposed load reduction or load shifting capability during islanding operations;
  - j. A list of customers names, addresses, and account numbers, along with completed Hybrid Microgrid Participant Agreement Forms, where applicable, within the electric boundaries of the Microgrid;
  - k. Any known additional electrical facilities requested by the Microgrid Operator to be located on the Company distribution system;
  - l. Any Microgrid design considerations that impact the Company's evaluation or classification of the Microgrid;

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- m. If the Applicant is a foreign entity, confirmation from the State of Hawai'i Department of Commerce and Consumer Affairs that the Applicant is currently authorized to do business in the State of Hawai'i as of the date of submittal.
  - n. A Certificate of Good Standing for the Microgrid Operator obtained from the State of Hawai'i Department of Commerce and Consumer Affairs dated no earlier than thirty (3) days prior to submittal by the Microgrid Operator;
- 2. The Company shall review each Microgrid Operator's Hybrid Microgrid Application and determine whether the Microgrid and Microgrid Operator have met the requirements to be eligible under this tariff. The Company shall communicate to the Microgrid Operator any deficiencies in its Application for remedy.
  - 3. Hybrid Microgrid Applications shall be accepted beginning on the effective date of the tariff. Applications deemed complete (providing all information required under this Section) shall receive a timestamp which shall serve as the date of the Applicant's application for queue purposes, to the extent more than one applicant is seeking to establish the same or partially overlapping microgrid boundaries. Microgrid boundaries will be established on a first come first served basis.

H. HYBRID MICROGRID SERVICES OPERATING AGREEMENTS

- 1. The Company shall enter into a Hybrid Microgrid Services Operating Agreement ("Operating Agreement") with the Microgrid Operator of a Hybrid Microgrid for the duration of the Microgrid. The Operating Agreement shall include information to govern the expected operation of the Microgrid during, and leading into, islanding events and include, at a minimum, the following:
  - a. Processes for entering into and out of island mode, including manual and automated processes;
  - b. Communication equipment and protocols between the Company and the Microgrid Operator;
  - c. Any limitations or restrictions on load, generation resources, or other system protection requirements during island mode;
  - d. Any requirements regarding reconnecting to the grid and returning to Grid-Connected Mode;
  - e. The terms and conditions, including the terms and schedule of any payments to or from the Microgrid Operator and the method for the Microgrid Operator to exit the terms of the Operating Agreement;

I. CAPACITY ALLOCATION

- 1. This capacity allocation applies to Hybrid Microgrids.
- 2. The Company shall accept applications for Hybrid Microgrids up to 6 MW on Oahu; 1 MW on Big Island; 1 MW on Maui or three years from the effective date of this tariff, whichever comes first, or as required by Commission Order.

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Microgrid Services Tariff Working Group  
Proposed Edits to Rule 14H Appendix 1 Section 4

- s. Microgrid Operation: A Customer Microgrid or Hybrid Microgrid [drafting note: add defined terms to definition section – Microgrid Operator Island Mode, Grid-Connected Mode] may intentionally form an island (“Island Mode”) on a scheduled or unscheduled basis. A scheduled Island Mode operation can be initiated through a manual action by the Microgrid Operator or the Company or other operating dispatch means (e.g., energy management system) that trigger the transition from operating in parallel and synchronized (“Grid-Connected Mode”) with the Company’s transmission and distribution system (“Company System”) to operating as an islanded system. Scheduled Island Mode Operation shall be coordinated with the Company.

Scheduled Island Mode operation is normally initiated to test Island Mode operation, or as a pre-emptive action ahead of impending weather events.

An Unscheduled Island Mode operation is initiated autonomously in response to abnormal conditions present on the Company System. An automatic action will trigger the microgrid to transition from Grid-Connected Mode to Island Mode.

The Microgrid may disconnect from the Company System and transition from Grid-Connected Mode to Island Mode, (1) under any of the Trip or Cease to Energize conditions as required by this Rule (e.g., Table 4A-1, Table-4A-4, and Table 4A-5) or (2) where anti-islanding conditions are present where the Generating Facility is required to Cease to Energize and Trip within two seconds where an island may be detected on the Company System. In either of these cases, the Microgrid may transition to Island Mode provided that the Microgrid does not energize any part of the Company System that is outside the defined electrical boundaries of the Microgrid.

- (i) Transition from Grid-Connected Mode to Island Mode  
If the Microgrid transitions from Grid-Connected Mode to Island Mode while the Company System is operating within the Continuous Operating region defined in Table 4A-1 (Voltage Ride-Through), Table 4A-4 (Frequency Ride-Through for Oahu, Hawaii Island, Maui), and Table 4A-5 (Frequency Ride-Through for Molokai and Lanai), the act of transitioning shall not cause step or ramp changes in the voltage measured at the PCC exceeding 5% of nominal and exceeding 5% per second averaged over a period of one second. This Frequency Ride-Through requirement (regardless of whether the Company System has a disturbance) also ensures that the act of transitioning does not cause a frequency disturbance on the Company System. These limits also apply to frequent switching of capacitors, frequent tripping or misoperation of the Generating Facility, or frequent energization of transformers.



- (a) During a Scheduled Island Mode event, the Microgrid additionally, shall ramp down such that the power export across the PCC to the utility is less than zero kW at the ramp rate defined in accordance with the Soft-Start Ramp Rate defined in Section 4A of this Rule.
- (ii) Reconnection of a Microgrid with the Company System  
A Microgrid operating in Island Mode may reconnect and transition back to Grid-Connected Mode, when the voltage at the PCC satisfies the Return to Service requirements defined in Section 4A.g, and the system frequency satisfies the enter service criteria found in UL-1741 Supplement SA Standard for Grid Support Utility Interactive Inverters and Converters using the applicable utility Source Requirements Document. Upon reconnecting with the Company System, the requirements for Synchronization defined in Section 4.c shall be met, and shall not cause step or ramp changes in voltage defined in Section 4(s)(i), above.
  - (a) Reconnection shall be coordinated with the Company to ensure safe and reliable operation.



Microgrid Services Tariff Working Group  
Proposed Edits to Rule 24

F. CUSTOMER MICROGRIDS [Other DER tariffs to be modified similarly]

1. Capitalized terms used in this section are as defined in Rule No. XX, Microgrid Services Tariff, and Rule No. 14, Appendix I.
2. During Grid-Connected Mode, the Microgrid will be operated in parallel with the Company's transmission and distribution facilities.
3. A Generating Facility that intends to operate as a Microgrid shall indicate such operation in Section X of the Interconnection Agreement and comply with Rule 14, Paragraph H, Section 4, Operating Requirements for Microgrid Operation. [drafting note: modify Interconnection Agreement]
4. During the transition from Grid-Connected Mode to Island Mode, the Microgrid shall not at any time energize the Company's transmission or distribution system for a duration of more than 100 milliseconds.
5. If a Microgrid intends to operate in parallel with the Company for more than 100 milliseconds, the Microgrid Operator must indicate such operation in Section X of the Interconnection Agreement. [drafting note: modify Interconnection Agreement]
6. Upon Technical Review of the Interconnection Agreement, the Company may require an Operating Agreement between the Microgrid Operator and the Company to facilitate the operation of the Microgrid in parallel with the Company's system for a duration exceeding 100 milliseconds.
7. The Operating Agreement is intended to enable the Microgrid to operate as a Customer Microgrid during electrical power disturbances and to reconnect to the Company system when normal operating conditions are restored. The scope of the Operating Agreement is intended to establish mandatory operating procedures in connection with the operation of the Customer Microgrid to ensure it does not adversely affect the safety and reliability of, or otherwise interfere with, the Company's operations.



Service List

DEAN NISHINA  
Executive Director  
Division of Consumer Advocacy  
Dept. of Commerce & Consumer Affairs  
P.O. Box 541  
Honolulu, HI 96809

KEVIN M. KATSURA  
Director  
Regulatory Non-Rate Proceedings  
Hawaiian Electric  
P.O. Box 2750  
Honolulu, HI 96840-0001

CHRIS DEBONE  
President  
Distributed Energy Resources Council  
99-1350 Koaha Place  
Aiea, HI 96701

WILLIAM J. ROLSTON  
Director – Energy Island  
73-4101 Lapaau Place  
Kailua Kona, HI 96740-8424

HENRY CURTIS  
Vice President for Consumer Issues  
Life of the Land  
P.O. Box 37158  
Honolulu, HI 96837-0158

CHRISTOPHER B. BERENDT  
Co-Counsel  
Drinker Biddle & Reath LLP  
1500 K Street, N.W.  
Washington, DC 20005-1209

Counsel for the Microgrid Resources  
Coalition

GERALD A. SUMIDA  
ARISMA A. MULLER  
Carlsmith Ball LLP  
ASB Tower, Suite 2100  
1001 Bishop Street  
Honolulu, HI 96813

Attorneys for Ulupono Initiative