

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of the Application of)
PUBLIC UTILITIES COMMISSION)
Instituting a Proceeding to)
Investigate Distributed Energy)
Resource Policies.)
_____)

DOCKET NO. 2014-0192

DECISION AND ORDER NO. 34924

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DECISION AND ORDER

By this Decision and Order,¹ the Public Utilities Commission ("commission") addresses Phase 2 Issue Nos. 3 and 4, as

¹The Parties to this proceeding are HAWAIIAN ELECTRIC COMPANY, INC. ("HECO"), HAWAII ELECTRIC LIGHT COMPANY, INC. ("HELCO"), MAUI ELECTRIC COMPANY, LIMITED ("MECO") (collectively, HECO, HELCO and MECO are referred to as "the HECO Companies"), KAUAI ISLAND UTILITY COOPERATIVE ("KIUC"), and the DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS, DIVISION OF CONSUMER ADVOCACY (the "Consumer Advocate"), an ex officio party, pursuant to Hawaii Revised Statutes ("HRS") § 269-51 and Hawaii Administrative Rules ("HAR") § 6-61-62(a).

Additionally, the commission has granted intervenor status to the DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM ("DBEDT"), HAWAII SOLAR ENERGY ASSOCIATION ("HSEA"), RENEWABLE ENERGY ACTION COALITION OF HAWAII ("REACH"), HAWAII RENEWABLE ENERGY ALLIANCE ("HREA"), HAWAII PV COALITION ("HPVC"), BLUE PLANET FOUNDATION ("Blue Planet"), THE ALLIANCE FOR SOLAR CHOICE ("TASC"), SUNPOWER CORPORATION ("SunPower"), LIFE OF THE LAND ("LOL"), RON HOOSON ("Ron Hooson"), the DISTRIBUTED ENERGY RESOURCE COUNCIL OF HAWAII ("DERC"), APOLLO ENERGY CORPORATION ("Apollo"), PUNA PONO ALLIANCE ("PPA"), ULUPONO INITIATIVE LLC ("Ulupono"), and the ENERGY FREEDOM COALITION OF AMERICA, LLC ("EFCA").

During the Technical Track of Phase 2 of this proceeding, Blue Planet, HPVC, HSEA, LOL, PPA, Ron Hooson, TASC, and Ulupono

established in Order No. 34206 (the "Technical Track Issues"),² as well as the components of Phase 2 Issue Nos. 1 and 2 deferred in Decision and Order No. 34534,³ by:

(1) Approving the "Stipulation for Proposed Revisions to Tariff Rules 14H and 22," filed August 7, 2017 (the "Deferred Issues Stipulation");⁴

(2) Approving the "Stipulation for Proposed Revisions to Appendix I, Paragraph 4A of Tariff Rule 14H Advanced Inverter Generating Facility Operating Requirements," filed September 18, 2017 (the "Self-Certification Stipulation");⁵

have chosen to submit joint filings, and are collectively referred to as the "Joint Parties" throughout this Decision and Order. Where members of the Joint Parties have opted to submit filings in their own name, rather than as part of the Joint Parties, the individual name will be used.

On July 28, 2017, HREA moved to withdraw from this proceeding, which the commission granted on August 11, 2017. See, Order No. 34751, "Granting Hawaii Renewable Energy Alliance's Motion to Withdraw," filed August 11, 2017.

²See Order No. 34206, "Establishing Statement of Issues and Procedural Schedule for Phase 2," filed December 9, 2016 ("Order No. 34206"), at 7-8.

³See Decision and Order No. 34534, filed May 3, 2017 ("Decision and Order No. 34534"), at 34-42 and 44-47.

⁴"Stipulation for Proposed Revisions to Tariff Rules 14H and 22; Exhibits A and B; and Certificate of Service," filed August 7, 2017.

⁵"Stipulation for Proposed Revisions to Appendix I, Paragraph 4A of Tariff Rule 14H Advanced Inverter Generating Facility Operating Requirements; Exhibit A; and Certificate of Service," filed September 18, 2017.

(3) Denying the "Stipulation for Proposed Interim Smart Export Tariff," filed August 7, 2017 (the "Smart Export Stipulation")⁶ and instead instructing the HECO Companies to file a tariff for an interim Smart Export program consistent with the commission's findings discussed herein;

(4) Denying the "Stipulation for Proposed Revisions to Tariff Rule 14H Advanced Inverter Functions," filed August 7, 2017 (the "Advanced Inverter Stipulation")⁷ and instead instructing the HECO Companies to revise their Rule 14H to:

(A) activate the Volt-VAR and Frequency-Watt Advanced Inverter Functions ("AIFs"),

(B) deactivate Fixed Power Factor, and

(C) implement modifications to Rule 14H's definitions;

(5) Providing clarification regarding the Net Energy Metering ("NEM") program to permit the addition of non-export systems;

(6) Providing clarification and approving modifications to the Customer-Grid Supply ("CGS") program;

⁶"Stipulation for Proposed Interim Smart Export Tariff; Exhibits A, B, C, D, and E; and Certificate of Service," filed August 7, 2017.

⁷"Stipulation for Proposed Revisions to Tariff Rule 14H Advanced Inverter Functions; Exhibits A-B; and Certificate of Service," filed August 7, 2017.

(7) Establishing a controllable, direct-to-grid successor program to the CGS program ("Controlled CGS" or "CGS+");

(8) Providing guidance and reporting requirements for the HECO Companies regarding proposed improvements to their hosting capacity analyses; and

(9) Determining that KIUC's Proposal⁸ is not ripe for decision making and deferring resolution pending further briefing and development of the record.

I.

INTRODUCTION

On numerous occasions, the commission has observed that Hawaii's electric grids are in a state of rapid and, at times, dramatic transition. Each of Hawaii's electric utilities has made substantial progress integrating renewable energy into the electricity resource mix, including significant quantities of distributed generation, specifically customer-sited resources. This trend toward more dynamic and distributed power systems has

⁸See "Kauai Island Utility Cooperative's Initial Statement of Position on Deferred Issues and Technical Track Issues and in Support of its Comprehensive Proposal; Attachments A and B; Exhibits 1 Through 3; and Certificate of Service," filed August 14, 2017 ("KIUC ISOP"), at Exhibits 1-3. Throughout this Decision and Order, "KIUC's Proposal" shall refer to Exhibits 1-3, while "KIUC ISOP" refers to the entire filing submitted by KIUC on August 14, 2017.

not diminished, and is expected to continue, given underlying economics, customer preferences, and the State's energy and policy goals. This is evidenced, in part, by the HECO Companies' Power Supply Improvement Plans ("PSIPs") wherein, over the long-term, distributed solar photovoltaics ("PV") within the HECO Companies' service territories is assumed to grow from approximately 600 megawatts ("MW") today to more than 3,000 MW in 2045.

Given the substantial amounts of distributed energy resources ("DER") in Hawaii, it is increasingly clear that the public interest is not served by a DER market structure that exclusively facilitates the uncontrolled export of electrical energy onto the grid, irrespective of whether the power system can physically accommodate such exports, or whether such market structures are economically beneficial, particularly if such growth comes at the expense of future opportunities to acquire even lower-cost, controllable renewable energy from other sources.

Stated simply, there is a need to move away from conventional, direct-to-grid solar PV toward more sophisticated DER systems that can help support, and ideally enhance, grid reliability and lay the foundation for DER to play a more integral role in the operation of the electric utility network. Moreover, these sophisticated, "smart" DER systems should be encouraged through programs that accurately value the provision of energy and grid services and compensate customers based on the relative value

these DER systems provide to the electrical grid at the time of delivery.

This Decision and Order supports the continued DER market transition underway in Hawaii. In October 2015, the commission determined that the NEM program, which obligates the electric utility to accept energy exported by a customer's system and compensate the customer at the retail rate, was not designed for DER adoption at scale. Accordingly, the commission capped enrollment in the NEM program and established two new interim DER options: CGS and CSS. The CGS and CSS options were created with the intent to provide customer choice, enable continued interconnection of DER systems, and offer value to the electric systems of the State. Challenges remain, however, and the interim CGS and CSS programs alone do not adequately address the technical and economic issues of uncontrolled exports to the grid. DER programmatic options must be balanced so as to encourage cost-effective DER adoption while avoiding unnecessary risks to grid reliability and safety.

To that end, the commission, as part of this Decision and Order, directs the HECO Companies to establish two successor DER program options: (1) Smart Export, featuring zero compensation during mid-day, but enhanced compensation otherwise, to reflect the exported energy's relative time-based value to the grid; and (2) CGS+, a controllable, direct-to-grid DER option, expected to

deliver energy as-available, except when system-wide technical conditions require reduction of output. In addition, consistent with the evolution toward more sophisticated, grid-supportive DER, Smart Export and CGS+ customers will be required to enable advanced inverter functions, to help mitigate any impacts said DER systems will have on grid reliability.

In sum, the commission's rulings in this Decision and Order represent the next evolutionary step toward reaching the long-term vision of a robust DER market, offering customers a variety of options to manage electricity use and provide support to the grid. The Smart Export and CGS+ programs are established as complements to the existing CSS program. These three DER programs are anticipated to serve as foundational building blocks, upon which additional grid service options can be layered. Taken together, the current spectrum of options, ranging from CGS+ to Smart Export to CSS, supplemented by emergent grid services, provides a modular and extensible structure that gives customers choice and flexibility regarding their respective level of technology investment, while offering granular compensation tied to each DER system's relative contribution to the safe and reliable operation of the utility network.

Building on the progress made in the Technical Track, as reflected in this Decision and Order, the commission will continue to explore additional refinements to the DER market structure in

the Market Track phase of this proceeding. The commission intends to solicit feedback from the Parties and will provide additional guidance regarding the issues and process for the Market Track of this proceeding by subsequent order.

II.

RELEVANT PROCEDURAL HISTORY

A.

Phase 1

On August 21, 2014, the commission issued Order No. 32269, which opened this proceeding to investigate the technical, economic, and policy issues associated with DER as they pertain to Hawaii's electric utilities (HECO, HELCO, MECO, and KIUC).⁹

On March 31, 2015, the commission issued Order No. 32737, which, in relevant part, established a preliminary statement of issues.¹⁰ In doing so, the commission determined that certain issues should be prioritized in an initial phase of this

⁹See Order No. 32269 "Instituting a Proceeding to Investigate Distributed Energy Resource Policies," filed August 21, 2014 ("Order No. 32269").

¹⁰See Order No. 32737 "Granting Motions to Intervene, Consolidating and Incorporating Related Dockets, and Establishing Statement of Issues and Procedural Schedule," filed March 31, 2015 ("Order No. 32737").

proceeding, referred to as "Phase 1."¹¹ Thereafter, on October 12, 2015, the commission issued Decision and Order No. 33258, which, among other things: (1) approved revised interconnection standards to be applied by the HECO Companies (located in the HECO Companies' Rule 14H); (2) grandfathered existing NEM customers and closed the HECO Companies' NEM program to new participants; and (3) approved two interim programs for customers to interconnect DER into the HECO Companies' electric grids: the CSS option and the CGS option.¹² In doing so, the commission resolved many of the Phase 1 issues established in Order No. 32737.¹³

The HECO Companies proceeded to submit: the CSS, CGS, and Rule 14H tariffs on October 19, 2015;¹⁴ a proposed TOU tariff

¹¹See Order No. 32737 at 35-36.

¹²See Decision and Order No. 33258 "Decision and Order Resolving Phase 1 Issues," filed October 12, 2015 ("Decision and Order No. 33258" or the "October Order").

¹³See Decision and Order No. 33258 at 61-165 for the commission's findings and conclusions regarding the Phase 1 issues.

¹⁴See "The Hawaiian Electric Companies' Self Supply, Grid Supply, and Rule 14H Tariffs; Books 1 and 2," filed October 19, 2015. A stipulation to the proposed revisions to Rule No. 14H was later reached among the Parties and filed with the commission on May 2, 2016, and approved by the commission on July 11, 2016. See Decision and Order No. 33791, filed July 11, 2016.

on November 12, 2015;¹⁵ supplemental support for deviating from the Institute of Electric and Electronics Engineers ("IEEE") standards and updating the HECO Companies' "Advanced Inverter Interconnection Requirements for Inverter-Based Distributed Energy Resources" on November 12, 2015;¹⁶ proposed system-level and circuit-level hosting capacity analyses, including proposed methodology, on December 11, 2015;¹⁷ and an Advanced Inverter Test Plan on December 15, 2015.¹⁸

¹⁵See "Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies; Proposed Time-of-Use Rates and Tariff Sheets," filed November 12, 2015. The commission subsequently approved an interim TOU program in Order No. 33923. See Order No. 33923, "Instructing the Hawaiian Electric Companies to Submit Tariffs for an Interim Time-Of-Use Program," filed September 16, 2016.

¹⁶See "Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies; Decision and Order No. 33258 Compliance Filing," filed November 12, 2015.

¹⁷See "Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies; Decision and Order No. 33258; Compliance Filing - System-Level Hosting Capacity" and "Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies; Decision and Order No. 33258, Compliance Filing - Circuit-Level Hosting Capacity Analysis," both filed on December 11, 2015.

¹⁸See Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies, Decision and Order No. 33258; Compliance Filing - Advanced Inverter Test Plan," filed December 15, 2015. The HECO Companies' Advanced Inverter Test Plan was later approved by the commission on June 15, 2016.

Thereafter, the commission issued Order No. 33958, in which it determined that "all the major issues raised in Phase [1] of this proceeding have been resolved," and established a preliminary statement of issues for Phase 2.¹⁹

B.

Phase 2 Priority Issues

The commission established a statement of issues and procedural schedule for Phase 2 on December 9, 2016, in Order No. 34206.²⁰ In doing so, the commission subdivided Phase 2 into three procedural segments. The first segment was focused on resolving priority issues that the commission deemed ripe for near-term resolution (the "Priority Issues"). Following the Priority Issues was a focus on various technical issues related to the integration and interconnection of DERs (the "Technical Track"). Finally, the commission envisioned Phase 2 concluding with a focus on discussing issues that would lay

See Order No. 33760 "Approving the Hawaiian Electric Companies' Advanced Inverter Test Plan with Conditions," filed June 15, 2016.

¹⁹See Order No. 33958 "Granting Intervention and Establishing a Preliminary Statement of Issues for Phase II," filed October 3, 2016 ("Order No. 33958"), at 2-5 and 16-17.

²⁰See Order No. 34206.

the foundation for a long-term DER market in Hawaii (the "Market Track").²¹

Consistent with the procedural schedule established in Order No. 34206, the commission issued Decision and Order No. 34534 on May 3, 2017, in which the commission addressed the Priority Issues by: (1) approving stipulations for revisions to the HECO Companies' tariff Rule Nos. 3, 14H (Appendix I and II.B), and 22; (2) instructing the Parties to collaborate on developing joint proposals for a smart export program and revisions to the CSS tariff; and (3) instructing the Parties to form Working Groups to continue addressing Phase 2 issues.²²

In addition, the commission deferred resolution on the following issues: (1) proposed modifications to the HECO Companies' CSS program to allow the CSS participants to obtain expedited approval to interconnect their CSS systems, as well as allow CSS customers to provide grid-supportive functions;²³ (2) proposed revisions to the HECO Companies' interconnection standards to clarify that "maximum aggregated gross rating of all Generating Facilities" only refers to the aggregate of

²¹See Order No. 34206 at 7-12.

²²See Decision and Order No. 34534.

²³See Decision and Order No. 34534 at 37-38 and 40.

non-qualified CSS systems;²⁴ and (3) proposed revisions to the HECO Companies' CSS program to clarify that the limit of inadvertent export is defined as either the system's total size or its inverter rating, whichever is less²⁵ (collectively, these are referred to as the "Deferred Issues"). While the commission noted that these proposals did not appear contested, it encouraged the Parties to work towards achieving a stipulation on the Deferred Issues.²⁶

In response to Priority Issue No. 1, which asked what changes, if any, should be made to the existing interim DER options (i.e., CSS, CGS, and TOU) pending resolution of the other Phase 2 issues, a number of the Parties proposed modifying the CGS tariff into a "smart" export program, in which compensation for exported electrical energy to the grid would be based on specific time periods ("Smart Export").²⁷ While expressing support for the Parties' interest in developing this new market design, the commission stated that it would like to see more collaboration among the Parties in developing a Smart Export program.²⁸

²⁴See Decision and Order No. 34534 at 40-41.

²⁵See Decision and Order No. 34534 at 41-42.

²⁶See Decision and Order No. 34534 at 37-42.

²⁷See Decision and Order No. 34534 at 15-17.

²⁸See Decision and Order No. 34524 at 34-35.

Accordingly, the commission instructed the HECO Companies and KIUC to work with the other Parties to develop a Smart Export program proposal(s) for submission to the commission by August 7, 2017.²⁹ In order to facilitate collaboration, the commission directed the Parties to form a specific Smart Export Working Group; in addition, the commission also directed the Parties to form Working Groups to discuss AIFs, DER Integration Analysis, and KIUC-specific issues.³⁰

C.

Phase 2 Technical Track

Thereafter, the Parties self-organized into the four established Working Groups and continued to collaborate on those respective issues.

On July 28, 2017, the commission issued Order No. 34725, which modified the Phase 2 procedural schedule by: (1) establishing August 7, 2017, as the deadline to submit partial or complete stipulations on any of the Deferred Issues and/or the Technical Track issues; (2) moving the deadline to submit initial statements of position ("ISOPs") from August 7, 2017, to August 14, 2017; (3) clarifying that the Parties could submit information requests

²⁹See Decision and Order No. 34524 at 37-38.

³⁰See Decision and Order No. 34524 at 44-45.

("IRs") on both the Technical Track Issues and Deferred Issues by August 21, 2017; and (4) affirming that the deadline to submit final statements of positions ("FSOPs") would remain September 18, 2017.³¹

On August 7, 2017, consistent with Order No. 34206, as modified by Order No. 34725, some of the Parties submitted the following stipulations:

The Deferred Issues Stipulation. Signed by the HECO Companies, the Consumer Advocate, HSEA, LOL, REACH, HPVC, TASC, SunPower, DBEDT, Blue Planet, Ron Hooson, DERC, Ulupono, and EFCA, this Stipulation: (A) proposes revisions to the HECO Companies' Rule 14H, Appendix III, Screen 7, to clarify that the "maximum aggregated gross ratings of all Generating Facilities" only refers to the aggregate of non-CSS systems;³² and (B) proposes revisions to the HECO Companies' Rule 22 intended to facilitate the provision of grid-supportive functions by CSS customers at the discretion of the utility, without complicating or delaying the interconnection process for CSS systems, as well as clarifying that the limit of inadvertent export is defined as

³¹See Order No. 34725 "Modifying the Procedural Schedule," filed July 28, 2017 ("Order No. 34725"), at 6-7.

³²Deferred Issues Stipulation at 6-7.

"either the system's total direct current ("DC") size or its total alternating current ("AC") inverter rating, whichever is less[.]"³³

The Advanced Inverter Stipulation. Signed by the HECO Companies, the Consumer Advocate, HSEA, REACH, HPVC, TASC, SunPower, DBEDT, Blue Planet, Ron Hooson, and Uluono, this Stipulation proposes revisions to the HECO Companies' Rule 14 in order to activate various AIFs. However, the reliability of the Stipulation is unclear, as it appears that a number of signatories, despite signing the Stipulation, oppose the activation of certain AIFs covered by the Stipulation.³⁴ The Stipulation itself discusses the following revisions: (1) combined activation of Volt-VAR and Volt-Watt, with concurrent deactivation of Fixed Power Factor;³⁵ (2) activation of Frequency-Watt;³⁶ (3) approving return-to-service settings;³⁷ and (4) additional definitions, as well as modifications to existing definitions, to conform and harmonize the Rule 14H definitions with the HECO Companies' Source

³³Deferred Issues Stipulation at 10.

³⁴See Advanced Inverter Stipulation at 18. Specifically, HSEA, TASC, HPVC, Blue Planet, Uluono, REACH, Ron Hooson, DBEDT, and SunPower state that they do not support the activation of the Volt-Watt function at this time.

³⁵See Advanced Inverter Stipulation at 6-12.

³⁶See Advanced Inverter Stipulation at 12-17.

³⁷See Advanced Inverter Stipulation at 17-18.

Requirement Document ("SRD") and Underwriters Laboratory 1741 Supplement A ("UL 1741 SA").³⁸

The Smart Export Stipulation. Signed by HSEA, LOL, REACH, HPVC, TASC, SunPower, Blue Planet, Ron Hooson, DERC, PPA, Ulupono, and EFCA, this Stipulation proposes an interim Smart Export tariff option, with associated Rule 14H modifications.

On August 14, 2017, consistent with the procedural schedule as modified by Order No. 34725, the Parties filed their ISOPs.³⁹

³⁸Advanced Inverter Stipulation at 18-19.

³⁹See "Hawaiian Electric Companies' Initial Statement of Position on Deferred Issues and Technical Track Issues; Exhibits A-C; and Certificate of Service," filed August 14, 2017 ("HECO Cos. ISOP"); KIUC ISOP; "Division of Consumer Advocacy's Initial Statement of Position on Deferred Issues and Technical Track Issues," filed August 14, 2017 ("CA ISOP"); "Department of Business, Economic Development, and Tourism Initial Statement of Position; and Certificate of Service," filed August 14, 2017 ("DBEDT ISOP"); "Ulupono Initiative LLC and Blue Planet Foundation's Initial Statement of Position; and Certificate of Service," filed August 14, 2017 ("Ulupono/Blue Planet ISOP"); "Energy Freedom Coalition of America, LLC's Initial Statement of Position on Deferred Issues and Technical Track Issues; and Certificate of Service," filed August 14, 2017 ("EFCA ISOP"); "Renewable Energy Action Coalition of Hawaii, Inc.'s Initial Statement of Position on Deferred Issues and Technical Track Issues," filed August 14, 2017 ("REACH ISOP"); "Apollo Energy Corporation's Initial Statement of Position on Deferred and Technical Track Issues; and Certificate of Service," filed August 14, 2017 ("Apollo ISOP"); "Blue Planet Foundation's, Hawaii PV Coalition's, Hawaii Solar Energy Association's, Life of the Land's, Puna Pono Alliance's Ron Hooson's, The Alliance of Solar Choice's, and Ulupono Initiative, LLC's Initial Statement of Position on Deferred Issues and Technical Track Issues;

On August 21, 2017, the Parties issued IRs to each other, to which responses were filed on September 5, 2017, in the following manner:

Responding Party	Party(ies) seeking IRs from Responding Party
HECO Companies ⁴⁰	Consumer Advocate ("HECO Cos. Response to CA/HECO-IRs") DBEDT ("HECO Cos. Response to DBEDT-HECO-IRs") DERC ("HECO Cos. Response to DERC-HECO-IRs") EFCA ("HECO Cos. Response to EFCA-HECO Companies-IRs") HPVC/HSEA/TASC ("HECO Cos. Response to SP-IRs") Ulupono ("HECO Cos. Response to UL-IRs")
KIUC ⁴¹	Consumer Advocate ("KIUC Response to CA/KIUC-IRs")

Exhibits A, B, and C; Declaration of Bradford Copithorne; and Certificate of Service," filed August 14, 2017 ("Joint Parties ISOP"); and "Partial Joinder and Additional Comments of the Distributed Energy Resources Council of Hawaii on the Initial Statement of Position on Technical Track Issues No. 3 & 4 and Deferred Issues; and Certificate of Service," filed August 14, 2017 ("DERC Joinder to Joint Parties ISOP").

The commission did not receive an ISOP from SunPower.

⁴⁰See, Letter From: D. Brown To: commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies - Companies' Responses to Parties' Information Requests, filed September 5, 2017.

⁴¹"Kauai Island Utility Cooperative's Responses to: (1) The Division of Consumer Advocacy's Information Requests on the Parties Initial Statements of Position on Deferred Issues and Technical Track Issues; (2) The Department of Business, Economic Development, and Tourism's First Set of Information Requests;

	DBEDT ("KIUC Response to DBEDT-IRs") EFCA ("KIUC Response to EFCA-KIUC-IRs") HPVC/HSEA/TASC ("KIUC Response to SP-IRs")
Joint Parties ⁴²	HECO Cos. ("Joint Parties Response to Companies-Joint Parties-IRs") Consumer Advocate ("Joint Parties Response to CA/JOINT-IRs")
DBEDT ⁴³	Consumer Advocate ("DBEDT Response to CA/DBEDT-IRs") HECO Companies ("DBEDT Response to Companies-DBEDT-IRs")
DERC ⁴⁴	HECO Companies ("DERC Response to Companies-DERC-IRs")

(3) Energy Freedom Coalition of America, LLC's Submission of Information Requests; and (4) Hawaii PV Coalition's, Hawaii Solar Energy Association's, and The Alliance for Solar Choice's Information Requests; and Certificate of Service," filed September 5, 2017.

⁴²"Blue Planet Foundation's, Hawaii PV Coalition's, Hawaii Solar Energy Association's, Life of the Land's, Puna Pono Alliance's, Ron Hooson's, The Alliance for Solar Choice's and Ulupono Initiative LLC's Responses to Information Requests; and Certificate of Service," filed September 5, 2017.

⁴³"The Department of Business, Economic Development, and Tourism's Responses to the Division of Consumer Advocacy's Information Requests; and Certificate of Service," filed September 5, 2017; and "The Department of Business, Economic Development, and Tourism's Responses to Hawaiian Electric Companies' Information Requests; and Certificate of Service," filed September 5, 2017.

⁴⁴"Distributed Energy Resources Council of Hawaii's Responses to the Companies' and the Division of Consumer Advocacy's

	Consumer Advocate ("DERC Response to CA/DERC-IRs")
Blue Planet and Ulupono ⁴⁵	HECO Companies ("Blue Planet/Ulupono Response to Companies-BP/UL-IRs")
Apollo Energy ⁴⁶	HECO Companies ("Apollo Response to Companies-Apollo-IRs")

On September 18, 2017, the Parties filed their FSOPs.⁴⁷

Information Requests; and Certificate of Service," filed September 5, 2017.

⁴⁵Joint Letter From: G. Sumida and M. Miyashiro To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resources Policies - Blue Planet Foundation and Ulupono Initiative LLC's Responses to Information Requests," filed September 5, 2017.

⁴⁶"Apollo Energy Corporation's Responses to Information Requests From the Hawaiian Electric Companies Filed On August 21, 2017; and Certificate of Service," filed September 5, 2017.

⁴⁷See "Hawaiian Electric Companies' Final Statement of Position; Exhibit A; and Certificate of Service," filed September 18, 2017 ("HECO Cos. FSOP"); "Kauai Island Utility Cooperative's Final Statement of Position on Deferred Issues and Technical Track Issues and In Support of Its Comprehensive Proposal; and Certificate of Service," filed September 18, 2017 ("KIUC FSOP"); "Division of Consumer Advocacy's Final Statement of Position on Deferred Issues [sic] and Technical Track Issue [sic]," filed September 18, 2017 ("CA FSOP"); "Department of Business, Economic Development, and Tourism's Final Statement of Position; and Certificate of Service," filed September 18, 2017 ("DBEDT FSOP"); "Blue Planet Foundation's, Hawaii PV Coalition's, Hawaii Solar Energy Association's, Life of the Land's, Puna Pono Alliance's, Ron Hooson's, The Alliance for Solar Choice's, and Ulupono Initiative LLC's Final Statement of Position on Deferred Issues and Technical Track Issues; Exhibits D-G; and Certificate of Service," filed September 18, 2017 ("Joint Parties FSOP"); "Distributed Energy Resources Council of Hawaii's Statement of Position on Technical Track Issues No. 3 & 4 and Deferred Issues;

Also on September 18, 2017, the HECO Companies, the Consumer Advocate, HSEA, LOL, REACH, HPVC, TASC, SunPower, DBEDT, Blue Planet, Ron Hooson, DERC, PPA, and Ulupono filed the Self-Certification Stipulation, the purpose of which is to revise Rule 14H to clarify that the existing self-certification procedures for Qualified Advanced Inverters will continue from September 7, 2017, to March 10, 2018.⁴⁸

Pursuant to the procedural schedule set forth in Order No. 34206, as modified by Order No. 34725, briefing on the Deferred Issues and Technical Track issues is complete and these issues are ready for decision making.

and Certificate of Service," filed September 18, 2017 ("DERC FSOP"); "Energy Freedom Coalition of America, LLC's Final Statement of Position on Deferred Issues and Technical Track Issues; and Certificate of Service," filed September 18, 2017 ("EFCA FSOP"); and "Renewable Energy Action Coalition of Hawaii, Inc.'s Final Statement of Position on Technical Track Issues and Deferred Issues," filed September 18, 2017 ("REACH FSOP").

Apollo Energy filed a letter stating that it would not be filing an FSOP. See Letter From: S. Wong To: Commission Re: Docket No. 2014-0192: In the Matter of the Public Utilities Commission Instituting a Proceeding to Investigate Distributed Energy Resources Policies," filed September 18, 2017. Similarly, the commission did not receive an FSOP from SunPower.

⁴⁸See Self-Certification Stipulation at 3.

III.

STIPULATIONS

A.

The August 7, 2017 Stipulations

1.

The Deferred Issues Stipulation

In response to Decision and Order No. 34534, the Deferred Issues Stipulation seeks to resolve the Deferred Issues as follows:

Rule 14H, Appendix III, Screen 7. The Deferred Issues Stipulation proposes revising the HECO Companies' Rule 14H to clarify that "maximum aggregated gross ratings of all Generating Facilities" only refers to the aggregate of non-CSS systems.⁴⁹

Rule 22. The Deferred Issues Stipulation proposes revisions to the HECO Companies' Rule 22 that will: (1) facilitate the provision of grid-supportive functions by CSS customers, at the discretion of the utility, without complicating or delaying the interconnection process for CSS systems; and (2) clarify that the limit of inadvertent export for a CSS system is defined as either the system's total DC size or its total AC inverter rating, whichever is less.⁵⁰

⁴⁹Deferred Issues Stipulation at 5-6.

⁵⁰Deferred Issues Stipulation at 10-12.

The Deferred Stipulation is signed by all but three of the Parties (PPA, Apollo Energy, and KIUC), and the non-signatories have not voiced any specific opposition to the Deferred Stipulation in their briefings.⁵¹

2.

The Advanced Inverter Stipulation

The Advanced Inverter Stipulation is submitted by the HECO Companies, the Consumer Advocate, DBEDT, HSEA, REACH, HPVC, TASC, SunPower, Blue Planet, Ron Hooson, and Ulupono. This Stipulation proposes revisions to the HECO Companies' Rule 14H (Interconnection of Distributed Generation Facilities With the Company's Distribution System) which would address activation dates for specific AIFs, default settings, and priority of functions.⁵² Specifically, this Stipulation proposes: (1) combined activation of Volt-VAR and Volt-Watt and deactivation of the Fixed Power Factor; (2) activation of Frequency-Watt; (3) establishing a return-to-service range of 59.9 Hertz ("Hz") to 60.1 Hz; and

⁵¹PPA is a member of the Joint Parties, and its ISOP and FSOP supports the Deferred Issues Stipulation; Apollo Energy submits a generalized opposition to any rulings on the Deferred Issues or Technical Track issues at this time (see Apollo ISOP at 2); and KIUC is not affected by the Deferred Issues Stipulation, as the Stipulation only seeks to modify the HECO Companies' rules.

⁵²See Advanced Inverter Stipulation at 5.

(4) revisions to Rule 14H intended to harmonize it with the HECO Companies' SRD, UL 1741 SA, and the pending update to IEEE 1547 (Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces).⁵³

The Advanced Inverter Stipulation relies heavily on the study conducted by the U.S. Department of Energy's National Renewable Energy Laboratory ("NREL") to research the implementation of advanced inverter voltage regulation grid support functions.⁵⁴ Specifically, in July 2017, NREL published a technical report, "Simulation of Hawaiian Electric Companies' Feeder Operations with Advanced Inverters and Analysis of Annual Photovoltaic Energy Curtailment" (the "VROS Report"), which forms the technical basis for the revisions to the HECO Companies' Rule 14H proposed in the Advanced Inverter Stipulation.⁵⁵

Regarding AIFs, pertinent findings of the VROS Report include:

⁵³See Advanced Inverter Stipulation at 6-19.

⁵⁴See Advanced Inverter Stipulation at 6-7 and 10.

⁵⁵Advanced Inverter Stipulation at 7. The VROS Report (Publication TP-5D00-68681) was filed by the HECO Companies in this docket on July 31, 2017. See Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies - Advanced Inverter Working Group, NREL Technical Report TP-5D00-68681, filed July 31, 2017.

Combined activation of Volt-VAR and Volt-Watt.

Volt-VAR is an autonomous AIF; when enabled, the inverter measures voltage at the terminal and responds by reducing not-in-phase and otherwise reactive power production in response to rising voltage in an attempt to bring voltage in range.

Similarly, Volt-Watt is also an autonomous AIF; when enabled, the inverter measures voltage at the terminal and responds by lowering power in response to rising voltage in an attempt to bring voltage in range.

The VROS Report concluded that the combined activation of Volt-VAR and Volt-Watt resulted in less total energy reduction than Fixed Power Factor and Volt-Watt.⁵⁶

However, the VROS Report also found that activation of Volt-Watt in combination with Volt-VAR could result in reductions in customer PV energy production (i.e., curtailment) of approximately 0.3-1.1% annually in the near-term (of which 0.06-0.2% is attributed to Volt-Watt) and approximately 0.4-3.5% annually in the long-term (of which 0.4-1.6% is attributed to Volt-Watt).⁵⁷ The VROS Report found that this would translate into annual curtailment of less than 1% per customer for 97% of customers and less than 5% curtailment of the remaining 3% of

⁵⁶Advanced Inverter Stipulation at 10.

⁵⁷Advanced Inverter Stipulation at 8-9.

customers. In the long-term, annual curtailment is estimated at 2% or less for 85% of customers, between 2-5% for 10% of customers, and between 5-15% for the remaining 5% of customers.⁵⁸

Ultimately, the VROS Report concluded that "[e]nabling Volt-Watt could cause small reductions in PV energy production for some customers, but it will result in more total customers being able to interconnect PV systems, so the net effect will allow for more cumulative renewable energy production."⁵⁹ Nonetheless, given the unpredictable and potentially disparate effects of curtailment caused by combined activation of Volt-VAR and Volt-Watt, a number of the signatories to the Advanced Inverter Stipulation object to the activation of Volt-Watt at this time.⁶⁰

Activation of Frequency-Watt. Frequency-Watt is an autonomous AIF. With this function enabled the inverter measures AC grid frequency at the terminal and responds by adjusting power output such that frequency is brought back to normal range.

The Advanced Inverter Stipulation states that activating the Frequency-Watt function will yield long-term customer benefits; in particular, the Stipulation's proposed revisions "are intended to harmonize both the timing and technical standards of

⁵⁸Advanced Inverter Stipulation at 10.

⁵⁹Advanced Inverter Stipulation at 10.

⁶⁰See Advanced Inverter Stipulation at 12.

the frequency droop (frequency/power) operation with the IEEE [proposed P1547 draft, dated May 2018).]"⁶¹

That being said, the Advanced Inverter Stipulation acknowledges that activation of Frequency-Watt may involve challenges, as "Hawaii would be the first utility in the United States to propose mandatory activation of Frequency-Watt," and inverter manufacturers currently do not implement Frequency-Watt consistently.⁶² However, the Stipulation concludes that these challenges should not delay activation of Frequency-Watt, as "it takes time to build up a base of frequency-responsive PV systems[.]"⁶³ Instead, the Stipulation proposes revisions to the HECO Companies' Rule 14H that will harmonize timing and alignment of the technical standards for Frequency-Watt activation with the formal adoption of IEEE standards: first, the deadline requiring formal certification for Qualified Advanced Inverters would be extended from September 7, 2017, to March 10, 2018, thereby allowing inverter manufactures additional time to meet the implementation and grid service function requirements for Hawaii; second, until March 10, 2018, Rule 14H would continue to allow inverter

⁶¹Advanced Inverter Stipulation at 14.

⁶²Advanced Inverter Stipulation at 15.

⁶³Advanced Inverter Stipulation at 14.

manufacturers to self-certify their inverters, giving them reasonable flexibility in meeting the HECO Companies' technical requirements pending the revisions to IEEE 1547 (following publication of the revised IEEE 1547, the HECO Companies will determine what changes, if any, may be warranted to the self-certification process); and third, recognizing that some of the recommended technical implementation requirements may not be supported by inverter manufacturers at this time, inverter manufacturers would be allowed to activate Frequency-Watt based on the technical capabilities they currently possess.⁶⁴

Modifications to return-to-service settings. On November 12, 2015, pursuant to Order No. 33258, the HECO Companies submitted supplemental support for their request to deviate from IEEE standards for return-to-service settings.⁶⁵ The May 2017 draft update to IEEE 1547 ("IEEE P1547") proposes a default setting for frequency return-to-service range of 59.5 Hz to 60.1 Hz with a range of adjustability between 59.0 Hz and 61.0 Hz.⁶⁶ The Advanced Inverter Stipulation recommends adopting this May 2017 draft of the IEEE P1547, but with a narrower under-frequency

⁶⁴Advanced Inverter Stipulation at 15-17.

⁶⁵See Advanced Inverter Stipulation at 17.

⁶⁶Advanced Inverter Stipulation at 17.

setpoint, such that the return-to-service range would be set at 59.9 Hz to 60.1 Hz.⁶⁷

Revisions to harmonize Rule 14H with the HECO Companies' SRD, UL 1741 SA, and the Pending IEEE 1547 Update. According to the Advanced Inverter Stipulation, Rule 14H currently lacks certain details regarding requirements for advanced inverters. In collaboration with inverter manufacturers, the HECO Companies have published an SRD that contains the required operational functions and operating parameters established by the recently approved UL 1741 SA; the intent of this Stipulation provision is to incorporate the detailed testing requirements and protocols in UL 1741 SA into the HECO Companies' formal certification process.⁶⁸ The Advanced Inverter Stipulation proposes revisions that would add new definitions and modify existing definitions to harmonize Rule 14H with the SRD and UL 1741 SA, as well as the pending update to IEEE 1547, to avoid any potential conflicts with these documents.⁶⁹

⁶⁷Advanced Inverter Stipulation at 17-18.

⁶⁸See Advanced Inverter Stipulation at 18-19.

⁶⁹See Advanced Inverter Stipulation at 18.

The Smart Export Stipulation

The Smart Export Stipulation is submitted by the Joint Parties,⁷⁰ accompanied by REACH, SunPower, DERC, and EFCA, and proposes tariff language for a new, interim Smart Export program which contains the following pertinent features:

Export windows. The Smart Export Stipulation proposes controlled export of electrical energy to the grid, with no export of power across the customer's point of interconnection between 9 a.m. to 4 p.m. and 10 p.m. to 6 a.m.⁷¹ The Smart Export Stipulation states that it will prevent export of electrical energy during these times by using an "internal transfer relay, Energy Management System, or other [HECO] Company approved Customer Facility hardware or software system(s) [.]"⁷²

Compensation. The Smart Export Stipulation proposes a time-varying export rate "that reflects a higher value for exports during peak periods" (i.e., when customer demand for load is high).⁷³ According to the Smart Export Stipulation, "[i]n addition to more accurately reflecting DER benefits and system needs, such

⁷⁰As noted, supra, the Joint Parties refers collectively to Blue Planet, HSEA, HPVC, LOL, PPA, Ron Hooson, TASC, and Ulupono.

⁷¹Smart Export Stipulation at 9-10.

⁷²Smart Export Stipulation at 11.

⁷³Smart Export Stipulation at 11.

time-based rates will promote consistency in rates and market signals across various customer options, which are increasingly moving toward time-based approaches.”⁷⁴ The Smart Export Stipulation recommends setting a time-based rate of 18.00 cents per kilowatt-hour (“c/kWh”) for 4 p.m. to 10 p.m. and 16.50 c/kWh for 6 a.m. to 9 a.m.⁷⁵ The Smart Export Stipulation states that this time-based rate is based at the same level as the proposed rates in the commission’s Community Based Renewable Energy (“CBRE”) Docket, Docket No. 2015-0389.⁷⁶

The Smart Export Stipulation states that this rate structure is “reasonable for an interim tariff,” and can be adjusted during the Market Track to reflect more accurate valuation of on-peak and off-peak exports of energy.⁷⁷ However, the Stipulation maintains that: (1) the rate structure should remain fixed for two years (similar to the structure of the CGS program); and (2) upon modification of the rate after two years, existing interim Smart Export customers should have the option to keep their existing time-based export rate (i.e., 18.00 c/kWh for evening exports and 16.50 c/kWh for morning exports), rather than adopt

⁷⁴Smart Export Stipulation at 11.

⁷⁵Smart Export Stipulation at 12.

⁷⁶Smart Export Stipulation at 12.

⁷⁷Smart Export Stipulation at 13.

whatever new export rate may be developed.⁷⁸ Furthermore, the Smart Export Stipulation clarifies that this proposed rate is only intended to compensate interim Smart Export customers for the export of electrical energy, and that "[a]dditional compensation should be offered to customers for more specific or customized services, such as those being developed in the Demand Response Docket, 2015-0412, especially if such services forego the customer's ability to otherwise offset onsite load or earn credits for exported energy."⁷⁹

Program size. The Smart Export Stipulation proposes an interim program size of 25 MW for the HECO service territory, 5 MW for the MECO service territory, and 5 MW for the HELCO service territory.⁸⁰ The Smart Export Stipulation notes that this reflects the same capacity amounts that were originally allocated to the CGS program, and recommends calculating this program cap based on the kW measure of projects actually installed, rather than submitted applications, citing recent difficulties in administering the CGS program.⁸¹ The Stipulation states that while the rate of adoption for the interim Smart Export program is

⁷⁸Smart Export Stipulation at 13.

⁷⁹Smart Export Stipulation at 13-14.

⁸⁰Smart Export Stipulation at 14.

⁸¹Smart Export Stipulation at 15-16.

expected to be less than CGS, due to the increased costs of a Smart Export system, "the rapid depletion of the CGS capacity demonstrates that capacity blocks of similar size will garner sufficient interest from both DER companies and their customers to ensure the program's success."⁸²

That being said, the Smart Export Stipulation maintains that the program's exports are unlikely to contribute to concerns raised by the NEM and CGS programs, as interim Smart Export customers will likely use their stored energy to serve their own load first before exporting (due to the difference between the program's rates and the higher cost of purchasing electricity at retail rates) and that the non-export windows should avoid concerns about curtailment and other circuit and system-level issues raised in the HECO Companies' PSIP modeling.⁸³

⁸²Smart Export Stipulation at 14.

⁸³Smart Export Stipulation at 15.

Below is a table illustrating the Smart Export Stipulation's proposed export windows, compensation rate, and program size:

Smart Export Stipulation	
Export Window	Credit Rate
4pm - 10pm	18.00 c/kWh
6am - 9am	16.50 c/kWh
9am - 4pm; 10pm - 6am	Export of power prevented and no compensation
Program Size: HECO - 25 MW MECO & HELCO - 5 MW each	

Program renewal and off-ramps. The Smart Export Stipulation states that the interim Smart Export program should continue until one of the following occurs: (1) the commission approves an alternative Smart Export program in the Market Track; (2) the commission adopts a motion to close the interim Smart Export program for a particular utility; or (3) the program's capacity limits are reached.⁸⁴ The Stipulation proposes that the HECO Companies provide public notice when program capacity reaches 50%, 75%, and 90%, respectively.⁸⁵ In addition, the Stipulation recommends that the commission convene a technical conference

⁸⁴Smart Export Stipulation at 16.

⁸⁵Smart Export Stipulation at 17.

within two weeks after the 75% capacity notice, and that a Party may move at any time to modify the interim Smart Export program if unintended negative impacts to customers arise from the program.⁸⁶

Metering and data collection. In order to enforce and regulate the interim Smart Export program, the Smart Export Stipulation calls for the installation of "smart net meters" to record the amount and timing of the flow of electric power in each direction.⁸⁷ The Stipulation recommends that smart net meter installation costs be borne by the utility, but that customers bear the costs of interconnecting the smart meters.⁸⁸

Controllability. The Smart Export Stipulation is adamantly opposed to incorporating any feature that would allow for mandatory remote controllability of individual DER systems by the utility.⁸⁹ The Stipulation anticipates this feature being proposed as either: "(1) turning off the entire DER system via an additional curtailment meter, or (2) utilizing back-office infrastructure to respond to a signal in real time to remotely switch off an inverter from export to non-export mode."⁹⁰

⁸⁶Smart Export Stipulation at 17.

⁸⁷Smart Export Stipulation at 18.

⁸⁸Smart Export Stipulation at 18.

⁸⁹See Smart Export Stipulation at 19.

⁹⁰Smart Export Stipulation at 19.

The Smart Export Stipulation maintains that the first option raises "significant policy and legal implications," as it "would go beyond control of energy exports and disallow customers from serving their own load[.]"⁹¹ Regarding the second option, the Stipulation states that while it is less onerous, it should only be considered in the near term, on an opt-in basis.⁹² Ultimately, the Stipulation argues that controllability implicates a number of policy considerations and that controllability should be viewed as a grid service to the utility for which the customer receives compensation.⁹³

Credit reconciliation and facility size. The Smart Export Stipulation proposes that reconciliation of interim Smart Export credits (informally known as a "true-up") occur on an annual, rather than monthly, basis.⁹⁴ The Stipulation argues that an annual true-up will provide a stronger economic incentive for Smart Export customers to right-size their DER systems than under a monthly true-up.⁹⁵ Under this proposal, export credits would

⁹¹Smart Export Stipulation at 20.

⁹²Smart Export Stipulation at 21.

⁹³See Smart Export Stipulation at 20-21.

⁹⁴Smart Export Stipulation at 22.

⁹⁵Smart Export Stipulation at 22. Many of the signatories to the Smart Export Stipulation put forward a similar proposition for the CGS program earlier during briefing on the Phase 2 Priority Issues of this proceeding, which the commission acknowledged, but did not rule upon at that time. See also, Decision and Order No. 34534 at 43 n. 121.

reduce an interim Smart Export customer's monthly electric bill down to the minimum charge of that customer's applicable rate schedule, and any excess credit would roll over to the next month; any export credits remaining after twelve (12) monthly billing cycles would be forfeited.⁹⁶

Similarly, the Stipulation maintains that Smart Export customers should have the right to decide the appropriate size for their DER system, and that no facility size limitations should be implemented.⁹⁷

Interconnection requirements. The Smart Export Stipulation also proposes related revisions to Rule 14H to facilitate the expedited interconnection of the proposed interim Smart Export program.⁹⁸

B.

The September 8, 2017 Self-Certification Stipulation

The signatories⁹⁹ to the Self-Certification Stipulation seek to revise the HECO Companies' Rule 14H, Appendix I,

⁹⁶Smart Export Stipulation at 22.

⁹⁷See Smart Export Stipulation at 22-23.

⁹⁸See Smart Export Stipulation at 24.

⁹⁹The Self-Certification Stipulation is signed by the HECO Companies, the Consumer Advocate, HSEA, LOL, REACH, HPVC, TASC, SunPower, DBEDT, Blue Planet, Ron Hooson, DERC, PPA, and Ulupono. While EFCA did not sign the Stipulation, it clarified in its FSOP that "it does not oppose HECO's limited request 'to extend

Subparagraph 4A to extend the Rule 14H requirement for formal certification of Qualified Advanced Inverters, and allow existing self-certification procedures to continue from September 7, 2017, to March 10, 2018.¹⁰⁰ This issue was initially raised as part of the Advanced Inverter Functions Stipulation.¹⁰¹

On this matter, some brief context is necessary. On September 1, 2017, the HECO Companies filed Transmittal No. 17-05 with the commission, requesting approval on short notice, of similar revisions to Rule 14H, Appendix I, Subparagraph 4A that would extend the formal certification requirement date from September 7, 2017, to March 10, 2018.¹⁰² As explained by the HECO Companies, "the additional time is needed by the inverter manufacturers, who have largely achieved formal certification of their equipment for the California market, to meet the

the formal certification deadline for listing Qualified Advanced Inverters from September 7, 2017, . . . to March 10, 2018." EFCF FSOP at 17-18 (emphasis in the original).

Although KIUC is not a signatory to this Stipulation, the commission does not consider this dispositive, as the Stipulation does not affect KIUC.

¹⁰⁰See Self-Certification Stipulation at 3.

¹⁰¹See Advanced Inverter Stipulation at 16.

¹⁰²See Transmittal No. 17-05, filed by the HECO Companies on September 1, 2017 ("Transmittal No. 17-05"), at 3-4.

implementation and grid service functions requirements for Hawaii."¹⁰³

On September 8, 2017, the commission approved Transmittal No. 17-05 on short notice for good cause shown, but noted that "the commission-approved tariff language attached to Transmittal No. 17-05 (i.e., Attachments 1 and 2 thereto) may not fully provide for or clearly articulate this stated intent [to extend the self-certification deadline to March 10, 2018]."¹⁰⁴ Accordingly, the commission instructed the HECO Companies to "consider whether further revisions are necessary to effectuate the stated intent; and . . . [to] propose any such revisions pursuant to the briefing schedule in Docket No. 2014-0192."¹⁰⁵

Subsequently, the Self-Certification Stipulation was filed with the commission on September 18, 2017. The Stipulation noted the commission's comments in Order No. 34794 and stated that the proposed revisions are intended to "clearly articulate the fact that the stated intent of [Transmittal No. 17-05] was to extend the Rule 14H requirement for formal certification of

¹⁰³Transmittal No. 17-05 at 4.

¹⁰⁴Order No. 34794 "Approving on Short Notice Transmittal No. 17-05, Filed By Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., and Maui Electric Company, Limited," filed September 8, 2017 ("Order No. 34794").

¹⁰⁵Order No. 34794 at 7.

Qualified Advanced Inverters, and allow existing self-certification procedures to continue from September 7, 2017 to March 10, 2018[.]”¹⁰⁶

IV.

PARTIES AND POSITIONS

A.

Proposals For An Interim Smart Export Program

1.

The HECO Companies

The HECO Companies propose an interim Smart Export Program that is more conservative than the proposal in the Smart Export Stipulation. While incorporating identical export/non-export windows (export prohibited from 9 a.m. to 4 p.m. and 10 p.m. to 6 a.m.), the HECO Companies disagree with the Smart Export Stipulation on many other salient features.

Compensation. The HECO Companies propose using updated CGS program tariff rates, which would be a fixed rate equal to the twelve (12) month average on-peak avoided cost ending in the month the commission approves the Smart Export program, for each island grid.¹⁰⁷ The HECO Companies further propose that this rate be

¹⁰⁶Self-Certification Stipulation at 3.

¹⁰⁷HECO Cos. ISOP at 11.

locked in for two years, similar to when the CGS program was introduced.¹⁰⁸ The HECO Companies state that this compensation methodology is consistent with the commission's desire to align DER compensation rates with low-cost renewable energy alternatives to mitigate the increases in costs borne by non-participants and to ensure cost-effective renewable energy procurement.¹⁰⁹

Accordingly, the HECO Companies oppose the Smart Export Stipulation's proposed export compensation rates as "significantly higher than the 12-month average on-peak avoided cost rate for Oahu" and inconsistent with the commission's long-term objectives for the utility to procure resources that will continue to drive down customer costs.¹¹⁰

Program size. Although agreeing to 25 MW for a Smart Export program in HECO service territories, the HECO Companies state that MECO and HELCO service territories should limit their program sizes to 1 MW each.¹¹¹ In support, the HECO Companies argue that a more cautious approach is warranted, given the impacts from existing legacy, unseen and uncontrolled DER (i.e., NEM and CGS) and the untested, unknown nature of the

¹⁰⁸HECO Cos. ISOP at 11.

¹⁰⁹See HECO Cos. FSOP at 9 (referring to Decision and Order No. 33258 at 129).

¹¹⁰See HECO Cos. FSOP at 11.

¹¹¹HECO Cos. ISOP at 9.

interim Smart Export program.¹¹² It appears that the HECO Companies' primary concern is that Smart Export customers will contribute to curtailment of cost-effective renewable resources, i.e., grid-scale renewable energy projects.¹¹³

Below is a table illustrating the HECO Companies' proposed export windows, compensation rate, and program size:

HECO Companies	
Export Window	Credit Rate
4pm - 10pm	Updated CGS Program Export Credit Rate (estimated 10.08 c/kWh for Oahu ¹¹⁴)
6am - 9am	Updated CGS Program Export Credit Rate (estimated 10.08 c/kWh for Oahu)
9am - 4pm; 10pm - 6am	Export of power prevented and no compensation
Program Size: HECO - 25 MW MECO & HELCO - 1 MW each	

¹¹²See HECO Cos. ISOP at 10.

¹¹³See HECO Cos. ISOP at 10 and Exhibit A; see also, HECO Cos. FSOP at 14.

¹¹⁴See https://www.hawaiianelectric.com/Documents/my_account/rates/avoided_energy_cost/avoid_energy_cost_table.pdf (this figure incorporates the HECO Companies' most recent avoided energy cost data from October 2017. For purposes of the HECO Companies' Avoided Energy Cost calculations, the on-peak period is from 7 a.m. to 9 p.m. and the off-peak period is from 9 p.m. to 7 a.m. See CA FSOP at 14 n.26.

Program renewal and off-ramps. The HECO Companies propose reviewing the interim Smart Export program within six months of 75% of the capacity being installed or within two years of program initiation, whichever occurs first.¹¹⁵ The HECO Companies maintain this is necessary to evaluate the "real-world effects of the program," and oppose the Smart Export Stipulation's program renewal proposal as too indefinite, as it could result in a situation where the Smart Export program is effectively unlimited, in the event the commission is unable to timely conclude the Market Track and replace the interim Smart Export program with a longer-term option.¹¹⁶

Metering and data collection. While the HECO Companies agree with the Smart Export Stipulation that a smart net meter is necessary to collect data, the HECO Companies argue that: (1) a second "smart production meter" is required; and (2) customers should bear the cost. In general, the HECO Companies maintain that a smart production meter is necessary to "transmit generating facility data to the [HECO] Companies for the purposes of evaluation, monitoring, and verification of technical compliance, generating facility performance, and power quality[.]"¹¹⁷

¹¹⁵HECO Cos. ISOP at 18; see also, HECO Cos. FSOP at 15.

¹¹⁶See HECO Cos. FSOP at 15.

¹¹⁷HECO Cos. ISOP at 13.

The HECO Companies subsequently clarified that this smart production meter is distinct from the smart net meters referred to in the Smart Export Stipulation.¹¹⁸ According to the HECO Companies, "[w]hile a single meter may enforce whether an [interim Smart Export program] system exports or not in accordance with the tariff, a single meter cannot measure compliance with the proposed advanced inverter functions, which are critical to ensuring safety and reliability of the system A single net meter will not provide the [HECO] Companies and stakeholders the granularity needed to successfully integrate and assess the efficacy of the [interim Smart Export program] because the single meter cannot distinguish between load and DER operations."¹¹⁹

In short, it appears that the HECO Companies' position is that two meters are required to successfully implement a Smart Export program.¹²⁰ However, in the alternative, the HECO Companies state that they would be willing to accept data from a third-party aggregator, in lieu of installing a smart

¹¹⁸See HECO Cos. FSOP at 17; and Smart Export Stipulation at 18.

¹¹⁹HECO Cos. FSOP at 17.

¹²⁰See HECO Cos. FSOP at 17 (separate meters are required to enforce the interim Smart Export system exports in accordance with the tariff and to measure compliance with advanced inverter functions); see also, HECO Cos. ISOP at 13-14 (a smart production meter is required to transmit data from the DER generating facility to the utility, but a "smart net meter" may also be required for "billing purposes.").

production meter, provided that the aggregator can meet the technical requirements for reliability of data collection and provision to the HECO Companies.¹²¹

Similarly, the HECO Companies argue that the interim Smart Export customer should bear the cost of the smart net meter and smart production meter and/or system aggregator, rather than the utility.¹²² The HECO Companies maintain that this is consistent with the commission's directives that all participating customers need to support the grid, and to avoid increasing costs to non-participating customers.¹²³

Controllability. The HECO Companies' desire for a second, smart production meter, is also related to their position on "controllability" of the Smart Export system. In contrast to the Smart Export Stipulation, the HECO Companies propose a condition that will allow the utility to address emergency situations by utilizing a disconnect/reconnect feature and/or access the DER customer's energy management system to initiate curtailment on/off commands.¹²⁴ The HECO Companies state that such a controllability feature is necessary "not only for system

¹²¹HECO Cos. ISOP at 14; see also, HECO Cos. FSOP at 16.

¹²²HECO Cos. ISOP at 14; see also, HECO Cos. FSOP at 16.

¹²³HECO Cos. ISOP at 14; and HECO Cos. FSOP at 16.

¹²⁴HECO Cos. ISOP at 16; see also, HECO Cos. FSOP at 21.

reliability . . . but also as a part of the critical process of restoring the electric system from a severe widespread or island wide outage."¹²⁵

Credit reconciliation and facility size. The HECO Companies do not appear to oppose the Smart Export Stipulation's proposal to incorporate an annual, rather than monthly, true-up.¹²⁶ However, the HECO Companies propose offering an improved, expedited interconnection process for Smart Export customers who agree to limit the amount of their generating facility's export to the grid during export hours to 3 kW.¹²⁷ The HECO Companies state that they arrived at this export limit by studying data collected from one hundred random distribution transformer monitors, and noting that the average coincidental peak kW per customer was 2.99 kW.¹²⁸

Interconnection requirements. Additionally, the HECO Companies state that their interim Smart Export proposal requires the activation of certain AIFs, including Volt-Watt, Volt-VAR, Frequency-Watt, and ramp rate up and down during

¹²⁵HECO Cos. FSOP at 21.

¹²⁶See HECO Cos. FSOP at 24-25.

¹²⁷HECO Cos. ISOP at 18; and FSOP at 24.

¹²⁸See HECO Cos. Response to CA/HECO-IR-6.

export windows at approximately 10% per minute of storage system capacity.¹²⁹

2.

The Consumer Advocate

The Consumer Advocate does not offer an interim Smart Export proposal itself, but rather, expresses varying levels of support and opposition to a number of the proposed programmatic features proposed by other Parties.

Export windows. The Consumer Advocate states that it would prefer using time-varying export and usage prices to incent customer behavior, but recognizes that most customers do not have near-term access to the necessary technology that would provide such visibility.¹³⁰ Accordingly, the Consumer Advocate does not object to the export windows proposed in the Smart Export Stipulation and by the HECO Companies, but states that it intends to seek load curve data from the HECO Companies to confirm their reasonableness.¹³¹

Compensation. The Consumer Advocate objects to the Smart Export Stipulation's proposed export credit rates that are

¹²⁹HECO Cos. ISOP at 15.

¹³⁰CA ISOP at 17.

¹³¹CA ISOP at 17; see also, CA FSOP at 10.

based on the CBRE docket. The Consumer Advocate states that such rates "are based on a premium over the costs the utilities would otherwise incur," and "[e]xport rates set above a utility's near term avoided costs or marginal cost would appear, absent any additional data, to create a subsidy for DER program participants [at the expense of non-participating ratepayers]."¹³² The Consumer Advocate "underscores its concerns that credit rates should reflect the value of energy to the system at the time of delivery . . . rather than being set strictly to provide incentives for customers to participate."¹³³ Ideally, according to the Consumer Advocate, export credit rates should be based on near-term forecasts of avoided cost or marginal cost for respective time periods; however, the Consumer Advocate does not oppose basing an interim Smart Export rate on a 12-month average avoided cost, given the information that is currently available.¹³⁴

Furthermore, the Consumer Advocate emphasizes that any interim Smart Export credit rate must retain flexibility until the Market Track issues have been more fully analyzed, and opposes the

¹³²CA ISOP at 18.

¹³³CA ISOP at 19; see also, CA FSOP at 17.

¹³⁴CA FSOP at 15-16.

Smart Export Stipulation's proposal to "grandfather" interim export rates.¹³⁵

Program size. "The Consumer Advocate believes that program caps are critical until more is known regarding how the proposed credit rates compare to measures of utility avoided and marginal costs."¹³⁶ Accordingly, "the Consumer Advocate believes more limited caps are appropriate until the impacts of the Smart Export systems on system curtailment is better understood," and does not object to the program capacity proposed by the HECO Companies.¹³⁷ In contrast, the Consumer Advocate opposes the method for implementing the program capacity caps proposed in the Smart Export Stipulation; i.e., by installed projects, rather than applications.¹³⁸ Rather, "the Consumer Advocate recommends that the utilities accept applications until the capacity associated with the accepted applications has reached the cap[;]" however, "the utilities may continue to accept applications but should issue a letter to the applicant that their application has been accepted conditional on space being available in the program."¹³⁹

¹³⁵CA ISOP at 19; see also, CA FSOP at 16.

¹³⁶CA ISOP at 20.

¹³⁷CA FSOP at 12.

¹³⁸CA ISOP at 21; and CA FSOP at 13.

¹³⁹CA ISOP at 21.

Program renewal and off-ramps. The Consumer Advocate supports the Smart Export Stipulation's proposal for the utility to provide notice as specified capacity tiers are reached, with the Parties meeting to review the interim program when 75% program capacity is reached.¹⁴⁰ However, the Consumer Advocate also supports establishing quarterly reviews, so that the Parties can review information regarding DER export and consumption patterns on a more frequent basis.¹⁴¹

Metering and data collection. The Consumer Advocate does not appear to oppose the implementation of both a smart net meter (as provided in the Smart Export Stipulation) as well as a smart production meter (an additional requirement proposed by the HECO Companies). Rather, the Consumer Advocate's primary concern is adherence to the regulatory principle of "costs following the causer;" i.e., individual Smart Export customers being responsible for metering costs.¹⁴² Regarding the data collected by the meters, the Consumer Advocate encourages collaboration among the signatories to the Smart Export Stipulation to provide the utilities and commission with the data

¹⁴⁰CA FSOP at 21.

¹⁴¹CA FSOP at 21.

¹⁴²See CA ISOP at 24; and CA FSOP at 19.

necessary to monitor the compliance of Smart Export systems during this interim stage.¹⁴³

Controllability. The Consumer Advocate supports the requirement of disconnect/reconnect feature, by which a utility may curtail a DER system, if necessary, and "believes that controllability will become essential if utilities are to incorporate greater amounts of DER."¹⁴⁴

Credit reconciliation and facility size. The Consumer Advocate does not oppose an annual true-up mechanism for the interim Smart Export program.¹⁴⁵ The Consumer Advocate also does not oppose the HECO Companies' proposal to allow for expedited review for systems with export capacity limited to 3 kW, but states that more accurate monitoring and data collection are needed to better understand the issues of right-sizing and export threshold.¹⁴⁶

¹⁴³CA ISOP at 24; and CA FSOP at 20; see also, CA ISOP at 15 n.26 (defining "Joint ISET Parties" as the Parties who filed the Smart Export Stipulation).

¹⁴⁴CA ISOP at 26; and CA FSOP at 21.

¹⁴⁵CA ISOP at 22; and CA FSOP at 17.

¹⁴⁶CA FSOP at 18.

DBEDT

Similar to the Consumer Advocate, DBEDT does not provide an interim Smart Export proposal of its own, but instead expresses support and opposition to various proposed programmatic elements.

Program size. DBEDT supports the HECO Companies' proposed interim Smart Export program size.¹⁴⁷ However, DBEDT suggests requiring the HECO Companies to prove why the interim Smart Export program should not be expanded later (i.e., due to issues related to system security and/or material adverse impact on customers).¹⁴⁸ It appears that DBEDT is concerned that a premature closure of the interim Smart Export program, without a holistic solution, would disrupt the DER market, and that the utilities, who have access to the information necessary to determine the material impacts of the program, are in the best position to explain why such market disruption is warranted.¹⁴⁹

Compensation. At this time, DBEDT supports a Smart Export credit rate based on an avoided cost construct, similar to what has been proposed by the HECO Companies.¹⁵⁰

¹⁴⁷DBEDT ISOP at 18.

¹⁴⁸DBEDT FSOP at 18.

¹⁴⁹See DBEDT FSOP at 18.

¹⁵⁰See DBEDT FSOP at 21.

However, DBEDT expresses a preference for the export credit rate methodology proposed by KIUC, which bases Smart Export credit rates on the next long-term, cost-effective resource addition to the utility's system.¹⁵¹ That being said, DBEDT also opines that if the commission also approves the HECO Companies' request for centralized control of DER systems (i.e., controllability) and for individual customers to bear their own metering costs, that the "economics [of the interim Smart Export program] would not be attractive and participants would instead opt for CSS."¹⁵² DBEDT also appears to support the concept of time-varying credit rates that go beyond avoided cost and peaking capacity, but does not propose a specific mechanism, aside from referencing a 10% peak adder.¹⁵³ Ultimately, it appears that DBEDT does not believe significant export will occur under the proposed interim Smart Export program.¹⁵⁴

Metering and data collection. DBEDT notes that assigning metering costs to customers will likely diminish enrollment in the interim Smart Export program.¹⁵⁵ However, DBEDT

¹⁵¹DBEDT FSOP at 21; see also, KIUC ISOP, Exhibit 1 at 9.

¹⁵²DBEDT FSOP at 21.

¹⁵³See DBEDT FSOP at 21-22.

¹⁵⁴See DBEDT FSOP at 22.

¹⁵⁵See DBEDT FSOP at 21.

expresses interest in the data collected by meters, and requests that the HECO Companies share (or if necessary, be ordered by the commission to provide) such information, subject to the appropriate confidentiality and/or non-disclosure agreements.¹⁵⁶

Controllability. DBEDT states that it is premature to introduce centralized control as a component for an interim Smart Export program.¹⁵⁷ As noted earlier in its FSOP, DBEDT maintains that centralized control will contribute to a lack of participation in the Smart Export program.¹⁵⁸

4.

The Joint Parties

The Joint Parties are signatories to the Smart Export Stipulation; accordingly, their interim Smart Export program proposal is contained in the Smart Export Stipulation.¹⁵⁹

In response to the HECO Companies' position, the Joint Parties strongly oppose any controllability feature. The Joint Parties argue that the HECO Companies concede that the smart net meters, alone (i.e., without smart production meters), can

¹⁵⁶DBEDT FSOP at 23.

¹⁵⁷DBEDT FSOP at 22.

¹⁵⁸DBEDT FSOP at 22-23.

¹⁵⁹See Joint Parties ISOP at 34.

collect all the necessary data.¹⁶⁰ Accordingly, the Joint Parties argue that requiring an additional smart production meter will only require customers to incur additional costs with no discernable benefit.¹⁶¹

Moreover, the Joint Parties argue that the HECO Companies should not possess the ability to remotely curtail a customer's DER system as it: (1) prevents customers from serving their onsite load; (2) will likely require substantial investment and testing; (3) lack safeguards to protect DER customers from the potential risk of unlimited, uncompensated curtailment; (4) is redundant under the circumstances, given the Smart Export Stipulation's non-export window during low load hours; and (5) implicates vague and unclearly defined concepts, such as what a "system emergency" justifying curtailment is, and how often the HECO Companies anticipate such "emergencies" occurring.¹⁶²

Ultimately, the Joint Parties conclude that the interim Smart Export program proposed in the Smart Export Stipulation remains the superior option and recommends commission approval.¹⁶³

¹⁶⁰See Joint Parties FSOP at 16.

¹⁶¹See Joint Parties FSOP at 21-22.

¹⁶²Joint Parties FSOP at 22-23.

¹⁶³See Joint Parties FSOP at 24-25.

DERC

As a signatory to the Smart Export Stipulation, DERC's interim Smart Export program proposal is contained in the Smart Export Stipulation.

In response to the HECO Companies' position, DERC states that DER policies should be market-based and incentivize customers to stay connected to the grid.¹⁶⁴ Accordingly, DERC argues that an interim Smart Export program should offer generous terms in order to encourage early adopters and measure the success of the Smart Export program concept.¹⁶⁵ DERC predicts that the HECO Companies' Smart Export proposal "will have little or slow adoption," and that potential customers are more likely to enroll in the CSS program instead, with its less complicated installation, lower costs, and lack of curtailment risk, or go completely off-grid.¹⁶⁶

DERC states that it understands the interim Smart Export program to be both a replacement to the CGS program and alternative to the CSS program, as well as a first step toward "smart"

¹⁶⁴See DERC FSOP at 4.

¹⁶⁵See DERC FSOP at 5.

¹⁶⁶See DERC FSOP at 5.

interactive DER.¹⁶⁷ Given these expectations, DERC reiterates that an interim Smart Export program should feature generous rates and be relatively free of extra costs and restrictions, and affirms its support for the Smart Export Stipulation.¹⁶⁸

6.

EFCA

As a signatory to the Smart Export Stipulation, EFCA's interim Smart Export program proposal is contained in the Smart Export Stipulation.

In response to the opposing arguments raised by the Consumer Advocate in support of a fluctuating export rate tied to annual average avoided cost, EFCA argues that "[i]t is unreasonable to expect that retail customers, whose core business is not, generally, the production of energy, will be willing to subscribe to this program if they have to assume the risk of changing compensation rates."¹⁶⁹

Similarly, EFCA disagrees with the Consumer Advocate regarding the administration of the program cap (based on applications, not installed projects), arguing that "certainty for

¹⁶⁷DERC FSOP at 5-6.

¹⁶⁸DERC FSOP at 6.

¹⁶⁹EFCA FSOP at 6.

project developers is . . . important," and "[a]llowing projects that have been negotiated in good faith to whither[sic] on the vine adds needless risk to the decision for project developers to invest in pursuing market opportunities in Hawaii."¹⁷⁰

7.

REACH

As a signatory to the Smart Export Stipulation, REACH's interim Smart Export program proposal is contained in the Smart Export Stipulation.

REACH does not elaborate on its position regarding the Smart Export Stipulation in its briefing, but rather, encourages the HECO Companies to come to a consensus on a planning process to better understand, accept, and prioritize renewable energy options to deliver optimal benefits to their customers.¹⁷¹ In its FSOP, REACH elaborates on this proposal by describing an "Option Evaluation Process" which could lead the HECO Companies into an "Implementation Accelerator," which would result in a virtuous cycle of using knowledge to re-evaluate and inform future decision-making.¹⁷²

¹⁷⁰EFCA FSOP at 6.

¹⁷¹See generally, REACH ISOP.

¹⁷²See generally, REACH FSOP.

8.

SunPower

SunPower did not submit an ISOP or FSOP to the commission, but it is a signatory to the Smart Export Stipulation. Accordingly, the commission concludes that SunPower's position on an interim Smart Export program is contained in the Smart Export Stipulation.

9.

Apollo Energy

Apollo Energy does not offer any specific comments regarding an interim Smart Export program, but instead appears to oppose any decisions on the Deferred and Technical Track issues at this time.¹⁷³

B.

Proposals For Activation Of Advanced Inverter Functions

1.

The HECO Companies

As signatories to the Advanced Inverter Stipulation, the HECO Companies' proposal for AIFs is contained in the Advanced Inverter Stipulation. Unlike other signatories to the

¹⁷³Apollo ISOP at 2.

Advanced Inverter Stipulation, the HECO Companies appear to support all elements of the Stipulation, including combined activation of Volt-VAR and Volt-Watt, activation of Frequency-Watt, modifying the return-to-service range to reflect a narrower range than the May 2017 IEEE P1547 draft, and revising Rule 14H definitions to harmonize it with the HECO Companies' SRD, UL 1741 SA, and the pending update to IEEE 1547.¹⁷⁴

In response to opposition to activating the Volt-Watt function, the HECO Companies argue that voltage constraints continue to delay interconnection of DER, and activation of Volt-Watt may help expedite interconnection, as well as avoid the need to implement traditional wire-based mitigation measures, such as upgrading cable and conductors to larger sizes and replacing distribution transformers to larger kilovolt-amp ("kVa") ratings.¹⁷⁵ The HECO Companies state that activating Volt-VAR or Fixed Power Factor alone will not provide the same reliability performance.¹⁷⁶

The HECO Companies note that the VROS Report demonstrated that "Volt-Watt can in fact increase DER interconnection with minimal energy losses to customers," and that

¹⁷⁴See HECO Cos. ISOP at 34; and HECO Cos. FSOP at 30.

¹⁷⁵See HECO Cos. ISOP at 23 and 28.

¹⁷⁶HECO Cos. FSOP at 26.

while "Volt-Var and fixed power factor are effective at flattening voltage and reducing the number of voltage violations . . . overvoltage still persists and additional measures would be required [such as activation of Volt-Watt]."¹⁷⁷ Furthermore, the HECO Companies argue that the benefits of Volt-Watt are cumulative, in that in order to be effective and realize long-term high DER penetration scenario benefits, a "critical mass" of Volt-Watt and Volt-VAR inverters must be activated as soon as possible.¹⁷⁸ Concomitantly, the HECO Companies oppose the concept of activating Volt-Watt on an "opt in" basis.¹⁷⁹

Regarding the risk of curtailment to customers, the HECO Companies note that the VROS Report found that: (1) under the combined activation of Volt-VAR and Volt-Watt, the majority of customers would likely experience small amounts of curtailment, with larger curtailment amounts of 5-15% only affecting a small proportion of customers;¹⁸⁰ and (2) "the combination of Volt-Var and Volt-Watt always resulted in less total energy reduction than fixed power factor and Volt-Watt."¹⁸¹ Furthermore, the

¹⁷⁷HECO Cos. ISOP at 24.

¹⁷⁸See HECO Cos. ISOP at 24; and HECO Cos. FSOP at 25-26.

¹⁷⁹See HECO Cos. FSOP at 28-29.

¹⁸⁰See HECO Cos. ISOP at 26-27.

¹⁸¹HECO Cos. ISOP at 26.

HECO Companies note that on September 14, 2017, they submitted an updated NREL VROS Report,¹⁸² which reduced the overall expected levels of curtailment due to advanced inverter functions.¹⁸³ Specifically, in the near-term, annual energy reduction fell from 0.3-1.1% (of which 0.06-0.2% was attributed to Volt-Watt) to 0.06-0.5% (of which 0.01-0.1% is attributed to Volt-Watt).¹⁸⁴ In the long-term, annual energy reduction fell from 0.4-3.5% (of which 0.4-1.6% was attributed to Volt-Watt) to 0.04-0.9% (of which 0.2-0.3% is attributed to Volt-Watt).¹⁸⁵

In sum, the HECO Companies maintain that "the remote possibility that a small minority of customers could encounter

¹⁸²See Letter From: D. Brown To: Commission Re: Docket No. 2014-0192 - Instituting a Proceeding to Investigate Distributed Energy Resource Policies - Advanced Inverter Working Group, NREL Technical Report TP-5D00-68681, filed September 14, 2017, Attachment 1 (the "September VROS Update"). According to the September VROS Update, the VROS Report, originally published in July 2017, was revised in September 2017 to correct the following specific results: (1) Weekly and annual energy curtailment values from activating grid support functions in rooftop solar PV customers; (2) Annual reactive power absorption at the feeder level from Volt-VAR/Volt-Watt; (3) Annual energy curtailment from Volt-Watt when combined with Volt-VAR; and (4) Annual energy curtailment per solar PV rooftop customer. September VROS Update at page 4 of 118.

¹⁸³See HECO Cos. FSOP at 25 n.49 and Exhibit A at 3-5; see also, HECO Cos. Response to CA/HECO-IR-8.

¹⁸⁴Compare Advanced Inverter Stipulation at 8-9 with HECO Cos. FSOP, Exhibit A at 3.

¹⁸⁵Compare Advanced Inverter Stipulation at 9 with HECO Cos. FSOP, Exhibit A at 4.

some reduction in energy production should not outweigh the enormous benefit to all customers, including DER customers, with the activation of all advanced inverter functions as recommended in the VROS Report."¹⁸⁶

2.

The Consumer Advocate

The Consumer Advocate is a signatory to the Advanced Inverter Stipulation, and clarifies that it fully supports that Stipulation, including the activation of the Volt-Watt function.¹⁸⁷ In support of the activation of the Volt-Watt function (in combination with the Volt-VAR function), the Consumer Advocate refers to the VROS Report and notes that of the two highly penetrated feeders the Report studied, it estimated that activation of Volt-Watt would result in significant increases in PV penetration to those feeders.¹⁸⁸ Against these benefits, the Consumer Advocate states that "these estimated level of PV penetration can be achieved with the Volt-Watt and Volt-VAR functions activated with approximate energy reductions of

¹⁸⁶HECO Cos. ISOP at 29.

¹⁸⁷See CA ISOP at 6; and CA FSOP at 3.

¹⁸⁸See CA ISOP at 10 (noting a 27.8% increase to Feeder L in the near-term and a 277.8% increase in the long-term; and noting a 205.9% increase to Feeder M34 in the near-term and a 320.6% increase in the long-term).

0.06-1.6% on Feeder M34 and 0.2-0.4% on Feeder L in the near and long term, respectively."¹⁸⁹ Accordingly, the Consumer Advocate states that the VROS Report shows the potential for significant benefits associated with the combined activation of the Volt-VAR and Volt-Watt functions in addressing issues with increasing PV penetration.¹⁹⁰

Regarding opposition to the activation of the Volt-Watt function, the Consumer Advocate states that this issue has previously been raised before in this proceeding. Specifically, the Consumer Advocate refers to Decision and Order No. 33258, where the commission included the Volt-Watt function in the HECO Companies' Rule 14H, notwithstanding the Joint Parties' concerns.¹⁹¹

Based on its participation in the Working Groups, the Consumer Advocate states that it understands that the AIFs will: (1) allow for additional DER systems to be interconnected, especially in the near-term; (2) mitigate the need for additional review of voltage impacts associated with DER systems; (3) defer

¹⁸⁹CA ISOP at 11.

¹⁹⁰CA ISOP at 11.

¹⁹¹See CA ISOP at 6-7.

and/or obviate the need for circuit upgrades; and (4) mitigate the need to perform cost estimates for the circuit upgrades.¹⁹²

Given these anticipated benefits, and bolstered by the results of the VROS Report, the Consumer Advocate expresses surprise at the opposition to activating Volt-Watt.¹⁹³

That being said, the Consumer Advocate appears to appreciate some of the concerns regarding curtailment and agrees that customers should be notified of curtailment risks.¹⁹⁴

In sum, the Consumer Advocate supports the activation of all the AIFs in the Advanced Inverter Stipulation, including the Volt-Watt function. The Consumer Advocate notes that these AIFs can be activated at little to no cost, and that "the only known alternative at this time would be to consider upgrading the feeders for the interconnection of new DER systems, which would limit the number of systems that could be interconnected in the near-term and slow down the interconnection process."¹⁹⁵

¹⁹²CA ISOP at 8.

¹⁹³See CA ISOP at 8-9.

¹⁹⁴CA FSOP at 7.

¹⁹⁵CA ISOP at 13; see also, CA FSOP at 5 ("The activation of the AI functions, including Volt-Watt will have significant benefits in allowing the near-term interconnection to clearing the existing queue as indicated by the near term results of the original and Revised VROS Report, without incurring significant upgrades to the grid.").

DBEDT

DBEDT is a signatory to the Advanced Inverter Stipulation. While DBEDT initially had reservations about activating the Volt-Watt function,¹⁹⁶ it subsequently clarified that it supports activating all the proposed changes to Rule 14H, Appendix I, including Volt-VAR, Volt-Watt, Frequency-Watt, return-to-service window settings, deactivation of Fixed Power Factor, and the revisions intended to harmonize Rule 14H with the HECO Companies' SRD and the pending IEEE 1547 update.¹⁹⁷ That being said, DBEDT still encourages the HECO Companies to: (1) "proactively provide customers information regarding [the] potential for high energy reductions and[,] to the extent practicable[,] cost of alternative related mitigation actions that would be incurred by [the HECO] Companies and/or customers due to activation of [the] Volt-Watt advanced inverter function prior to system interconnection; and (2) . . . work with [the Parties] to develop consistent measuring, tracking and

¹⁹⁶See Advanced Inverter Stipulation at 12 n.18.

¹⁹⁷See DBEDT ISOP at 6 (DBEDT refers to IEEE 1541; the relevant update is to IEEE 1547); and DBEDT FSOP at 10. In its ISOP, DBEDT maintained reservations about activation of Volt-Watt (see, DBEDT ISOP at 6-7); however, in its FSOP, it clarified that based on the September VROS Update, showing a decreased overall curtailment impact due to Volt-Watt, DBEDT now supports activation of Volt-Watt. DBEDT FSOP at 10.

reporting methodology to provide customers with visibility and record of their DER curtailment and any other critical data parameters due to [the] Volt-Watt advanced inverter function.”¹⁹⁸

4.

The Joint Parties

The Joint Parties are signatories to the Advanced Inverter Stipulation, and affirm their support for immediate activation of the Frequency-Watt and Volt-VAR functions.¹⁹⁹ However, they state that they cannot support the proposed blanket activation of the Volt-Watt function at this time.²⁰⁰

Essentially, the Joint Parties maintain that the estimated curtailment impacts resulting from activation of Volt-Watt, as provided in the VROS Report, indicate that potential curtailment of DERs is too unpredictable to support activation at this time. The Joint Parties note that in modeling annual average customer curtailment, the VROS Report acknowledged that location-specific variation in voltage could result in certain customers experiencing much higher levels of curtailment (e.g., 1% curtailment for 97% of customers, but up to

¹⁹⁸DBEDT FSOP at 10.

¹⁹⁹Joint Parties ISOP at 15.

²⁰⁰See Joint Parties ISOP at 13.

5% curtailment for the remaining 3% of customers).²⁰¹ The Joint Parties maintain that these are not insignificant amounts, and that "[c]urtailment of 5% to 15% is more than enough to ruin customers' expectations when investing in DER and could negate their value proposition in such investments altogether."²⁰²

The Joint Parties also argue that the VROS Report does not present a complete picture; for example, the Joint Parties state that the Report only models voltage up to the meter (also known as "point of common coupling"), but does not account for rises and drops in voltage between the point of common coupling (where voltage standards apply) and inverter terminals (where the inverters sense and react to voltage).²⁰³ According to the Joint Parties, the curtailment impact of Volt-Watt is "potentially far beyond the amounts that the VROS study calculated."²⁰⁴ Furthermore, the Joint Parties argue that the VROS Report only modeled traditional (uncontrolled) exporting systems, and did not take into account non-export or smart export systems, which

²⁰¹Joint Parties ISOP at 17. These figures appear to be based on the original VROS Report and do not appear to reflect the September VROS Update, which was filed after the Parties' ISOPs were submitted.

²⁰²Joint Parties ISOP at 20.

²⁰³See Joint Parties ISOP at 18.

²⁰⁴Joint Parties ISOP at 18.

eliminated consideration of the impact these systems might have on mitigating voltage-related hosting capacity constraints.²⁰⁵

Rather than blanket activation, the Joint Parties recommend that the Volt-Watt function be activated on a pilot basis, to further review the benefits and impacts and inform the development of implementation protocols.²⁰⁶ The Joint Parties also suggest that activation of the Volt-Watt function could be offered as one potential mitigation option to customers during the interconnection process; i.e., customers would have the option of choosing to activate the Volt-Watt function as a means of bypassing some of the review process, thereby expediting their interconnection process.²⁰⁷ In this regard, the Joint Parties note that the HECO Companies are currently conducting a pilot program in which the option of activating the Volt-Watt function is offered to customers who would otherwise have to wait for circuit upgrades.²⁰⁸

The Joint Parties argue that activation of Volt-Watt should be deferred for non-exporting systems and modes, as the

²⁰⁵Joint Parties ISOP at 19.

²⁰⁶Joint Parties ISOP at 22-23; see also, Joint Parties FSOP at 2.

²⁰⁷See Joint Parties ISOP at 23; see also, Joint Parties FSOP at 2 and 4.

²⁰⁸Joint Parties FSOP at 6.

VROS Report did not consider these systems and the impacts are unknown.²⁰⁹ (The Joint Parties clarify that this should apply to Smart Export systems that are in "non-export" mode as well, an issue which, they argue, further supports deferring Volt-Watt activation at this time, as it is unclear whether, and to what extent advanced inverters are capable of switching the Volt-Watt function on and off to correspond with changes from export to non-export mode).²¹⁰

If the commission is inclined to support blanket activation of the Volt-Watt function, the Joint Parties emphasize that the commission must first establish integrated distribution planning framework principles and implementation details, so as to be able to address any negative impacts in a proactive, timely manner (for example, tracking the occurrences of voltage conditions at the meter that would cause curtailment; revising Rule 14H to allow inverter manufacturers flexibility to develop capabilities aimed at addressing voltage concerns; allowing customers to enjoy a streamlined interconnection in exchange for activating Volt-Watt, particularly in areas with minimal voltage concerns; providing transparency during the interconnection process so that customers are aware of the curtailment risks,

²⁰⁹Joint Parties ISOP at 23-24; and Joint Parties FSOP at 2.

²¹⁰See Joint Parties FSOP at 4 n.13.

including if they live in a voltage/curtailment "hot spot;" and establishing curtailment limits, which, if exceeded, would obligate the utility to take action to remedy the problem).²¹¹ Additionally, if blanket activation of Volt-Watt is required, the Joint Parties argue that existing customers who have already installed DER systems should be grandfathered or exempted from such requirement.²¹²

5.

DERC

DERC is not a signatory to the Advanced Inverter Stipulation and maintains that "any discussion pertaining to the activation of advanced inverter autonomous functions must include both the technical and market tracks under this docket to ensure that DER policies will integrate successfully with other utility programs in addition to ensuring that issues of curtailment are fully valued and addressed."²¹³

DERC argues that AIFs that react to grid conditions in a way that results in curtailment to an individual customer represent a grid service (versus a requirement for

²¹¹See Joint Parties ISOP at 24-26; and Joint Parties FSOP at 7-13.

²¹²Joint Parties ISOP at 26.

²¹³DERC Joinder to Joint Parties ISOP at 10.

interconnection), for which the customer should receive compensation.²¹⁴ In this regard, DERC raises concerns over the overlap this issue has with the issues being considered in the Demand Response Docket (Docket No. 2015-0412) and recommends integrating the Market Track of the DER Docket into the Demand Response Docket.²¹⁵

DERC opposes the activation of any AIF that may curtail a customer's load without compensation.²¹⁶ DERC expresses concern that DER policies that do not compensate customers for such grid services will result in customers either foregoing enrollment in future program offers (such as Demand Response) or defecting from

²¹⁴See DERC Joinder to Joint Parties ISOP at 5.

²¹⁵DERC Joinder to the Joint Parties ISOP at 6. For example, "DERC views any adjustment of self-generation either through the activation of certain autonomous functions on advanced inverters and/or independent controllability as a demand response function, where the [HECO] Companies would request that the customer either reduce load (by using behind-the-meter storage or some other energy control device) or increase load, depending on the needs of the grid at the time. To have a DR program that compensates customers for reducing load on demand while requiring customers to produce load upon demand as a requirement for interconnection confuses the overall purpose of an active DR program and should not be bundled together with other interconnection requirements." Id. at 7.

²¹⁶See DERC FSOP at 7 ("We therefore believe that any grid-connected tariff that utilizes advanced inverter functions should also include some form of compensation for the grid services provided by the customer's advanced inverter as it reacts to the local and system-wide grid conditions."); see also, id. at 13.

the grid entirely, either of which would represent the loss of a valuable DER resource.²¹⁷

DERC encourages the commission and the Parties to "consider a wide range of mechanisms to reasonably compensate DERs for grid service."²¹⁸ For example, DERC submits that "the installation of a DER under specific interconnection requirements should not later prevent a DER customer from enrolling in a [Demand Response] tariff, even if the [Demand Response] tariff is largely similar to the interconnection requirement."²¹⁹ Similarly, DERC supports the advanced inverter pilot currently offered by the HECO Companies (in which customers on circuits with heavy load, may voluntarily opt-in to activating Volt-Watt in exchange for receiving an expedited interconnection approval), and recommends that this option stay in place pending further examination of the issue of compensation for grid services provided by AIFs.²²⁰

²¹⁷See DER FSOP at 6-7.

²¹⁸DERC Joinder to Joint Parties ISOP at 11.

²¹⁹DERC Joinder to Joint Parties ISOP at 11-12.

²²⁰See DERC FSOP at 14.

EFCA

EFCA is not a signatory to the Advanced Inverter Stipulation, and expresses concern over what it feels is "significant ambiguity in terms of what exactly is being stipulated to" (for example, despite reservations by some of the signatories over activation of Volt-Watt, the attached revisions to Rule 14H contemplate activation; similarly, activation of Volt-VAR is only contemplated in combination with Volt-Watt, and not by itself).²²¹

Nevertheless, EFCA states that the Advanced Inverter Stipulation "unquestionably pushes the conversation in a positive direction[.]"²²² However, it appears that EFCA opposes activation of the AIFs at this time, as it takes the position that some of the services provided by AIFs: (1) provide grid services; (2) impose costs to the DER customer; and (3) should therefore be compensated by the utility.²²³ Accordingly, it appears that EFCA supports continued discussion as to how, and to what extent,

²²¹EFCA ISOP at 10. In this regard, the commission also observes that it is unclear as to the perceived effect and intent of the signatories to the Advanced Inverter Stipulation who, despite voicing objection to various feature (i.e., activation of Volt-Watt), still signed the Stipulation with its proposed Rule 14H revision incorporating activation of the Volt-Watt function.

²²²EFCA ISOP at 10.

²²³See EFCA FSOP at 15-16.

such AIF grid services should be compensated before approving their activation.²²⁴

7.

REACH

REACH is a signatory to the Advanced Inverter Stipulation, but expresses reservations about the activation of the Volt-Watt function.²²⁵

REACH does not elaborate on its concerns regarding the Volt-Watt function in its briefing, but rather, encourages the HECO Companies to come to a consensus on a planning process to better understand, accept, and prioritize renewable energy options to deliver optimal benefits to their customers.²²⁶ In its FSOP, REACH elaborates on this proposal by describing an "Option Evaluation Process" which could lead the HECO Companies into an "Implementation Accelerator," which would result in a virtuous cycle of using knowledge to re-evaluate and inform future decision-making.²²⁷

²²⁴See EFCA FSOP at 16-17.

²²⁵See Advanced Inverter Stipulation at 12 n.8; see also, REACH ISOP at 8.

²²⁶See generally, REACH ISOP.

²²⁷See generally, REACH FSOP.

8.

SunPower

SunPower did not submit an ISOP or FSOP to the commission, but is a signatory to the Advanced Inverter Stipulation. However, the commission observes that SunPower was one of the signatories who objects to the activation of the Volt-Watt function at this time.²²⁸

9.

Apollo Energy

Apollo Energy does not offer any specific comments regarding activation of AIFs, but instead appears to oppose any decisions on the Deferred and Technical Track issues at this time.²²⁹

²²⁸See Advanced Inverter Stipulation at 12 n.18.

²²⁹Apollo ISOP at 2.

C.

KIUC's Proposal²³⁰

1.

KIUC

KIUC submits what it calls a "comprehensive proposal," which includes proposed revisions to its Schedule Q tariff to offer, among other things, a Smart Export program, as well as proposed technical requirements to implement them, if approved. Under its Proposal, KIUC proposes to revise its Schedule Q tariff to offer its members/customers three DER options: (1) Smart Export; (2) Self Supply; and (3) Legacy Schedule Q.²³¹ KIUC proposes to accomplish this by revising its Schedule Q tariff to eliminate the existing Schedule Q options of "Schedule Q Export" and "Schedule Q Non-Export" and replacing them with the Smart Export, Self Supply, and Legacy Schedule Q options.²³²

Self Supply. Under this option, a KIUC customer would operate a self-supply system that allows the customer to use the total output of the system to meet his/her own load.²³³

²³⁰Similar to the situation facing KIUC regarding the proposals to the HECO Companies, KIUC's Proposal does not affect the HECO Companies and the HECO Companies did not address KIUC's Proposal in their briefing.

²³¹KIUC ISOP at 7.

²³²KIUC ISOP at 8.

²³³KIUC ISOP, Exhibit 1 at 2.

The customer cannot receive compensation for any electrical energy exported to the grid, including inadvertent exports.²³⁴ In practice, this is similar to the CSS program offered by the HECO Companies.

Smart Export. Under this option, a customer would only be compensated for exported energy during certain time periods each day (i.e., times when exported energy has value to the utility). Similarly, compensation for exported energy would reflect the value of that energy to the utility at the time it is exported.²³⁵ Conceptually, this is similar to the interim Smart Export programs proposed in the Smart Export Stipulation and by the HECO Companies, but with different characteristics.

The pertinent features of KIUC's proposed Smart Export program include four defined time periods for the purpose of setting rates: (1) a non-export period set during mid-day when the system is least benefitted by additional DER customer exports; (2) a daytime shoulder period, intended to capture hours of the day when excess solar generation, though not a threat to the operator's ability to physically balance load and non-curtable generation, may nevertheless lead to such a reduction in value of customer exported energy; (3) a system peak period, when daily

²³⁴KIUC ISOP, Exhibit 1 at 2.

²³⁵KIUC ISOP, Exhibit 1 at 2.

system peak load occurs, and DER exported electricity is most valuable to the utility; and (4) other hours period, which applies to all hours not covered by the non-export period, daytime shoulder period, or system peak period.²³⁶

As noted above, KIUC proposes to implement time-based export credit rates, based on the value the exported energy provides to the grid at the time of export. Accordingly, the midday period would not be compensated; this is to signal to customers that they should manage their systems to avoid or minimize exports during this time.²³⁷ KIUC proposes to set the export rate for the other time periods at a "base rate" that will be "based on the next long-term, cost-effective resource addition that KIUC would add to its system." ("Base Rate")²³⁸ KIUC submits that the next scheduled available cost-effective resource addition to its system is the grid-scale AES-Lawai Battery Energy Storage System ("PV + BESS"), which has a power purchase agreement-set rate of 11.08 c/kWh.²³⁹ This Base Rate would be applied to the "other hours" time period.

²³⁶KIUC ISOP, Exhibit 1 at 8-9.

²³⁷KIUC ISOP, Exhibit 1 at 9.

²³⁸KIUC ISOP, Exhibit 1 at 9.

²³⁹KIUC ISOP, Exhibit 1 at 9-10.

Accordingly, the Base Rate would be set at approximately 11.08 c/kWh. The rate for the daytime shoulder period would be the Base Rate, minus a "Curtailment Adjustment" to reflect that customer DER exports during this time may result in curtailment of other generation sources. KIUC proposes calculating the Curtailment Adjustment as:

$$\frac{[(\text{actual curtailment}) \times (\text{Base Rate})]}{(\text{actual customer exports from NEM, NEM Pilot, Schedule Q, and Smart Export})}^{240}$$

Conversely, exports during the system peak period would be set at Base Rates plus a "Peak Adder," to recognize the additional value of those exports to the grid during those hours. However, KIUC argues that with the planned additions of several large PV + BESS resources, it will be able to dispatch energy to effectively "flatten" KIUC's system peaks, thereby eliminating any additional value from customer DER exports during the system peak period. As a result, KIUC proposes that the Peak Adder be set at 0.00 c/kWh for the time being.²⁴¹

²⁴⁰KIUC Response to CA/KIUC-IR-1(e). In its ISOP, KIUC originally suggested using expected curtailment and expected customer exports to calculate the Curtailment Adjustment, but revised its calculation in response to an IR from the Consumer Advocate inquiring how KIUC would forecast these expected values. See, KIUC ISOP, Exhibit 1 at 10; KIUC Response to CA/KIUC-IR-1(e); and KIUC FSOP at 1 n.1.

²⁴¹KIUC ISOP, Exhibit I at 10.

Below is a table illustrating KIUC's Smart Export Proposal time periods and applicable export rates:

KIUC Smart Export Proposal	
Export Window	Credit Rate
Daytime Shoulder (9am - 12am, 3pm - 4pm)	11.08 c/kWh minus Curtailment Adjustment (estimated at 10.59 c/kWh) ²⁴²
System Peak (6pm - 9pm)	11.08 c/kWh + Peak Adder (estimated at \$0.00)
Other Hours (9pm - 9am 4pm - 5pm)	11.08 c/kWh (Base Rate)
Midday 12pm - 3pm	Export of power can occur, but customer won't be compensated.
Program Size: KIUC does not propose a program cap.	

Legacy Schedule Q. This option would only be available to Legacy Schedule Q customers. Customers would be paid a fixed rate for all exported energy, but have no limits on when they can export energy to the grid. This is intended to recognize that many Legacy Schedule Q customers do not have advanced inverters capable of limiting exports to specified times of the day. However, the Legacy Schedule Q export compensation rate would be set below the Smart Export option to incentivize Legacy Schedule Q customers to upgrade to smart inverters. Any change in size,

²⁴²See KIUC Response to CA/KIUC-IR-1(c).

technology, configuration, or addition to a Legacy Schedule Q customer's system would render them ineligible to continue under the Legacy Schedule Q program.²⁴³

Technical requirements. KIUC proposes technical requirements and interconnection standards that are aligned with the HECO Companies in the following areas: (1) inadvertent export time limit of less than 30 seconds for a Self Supply system; (2) monthly inadvertent export energy threshold not to exceed [(maximum kW export) times (1-hour)] for a Self Supply system; (3) voltage ride through requirements; (4) frequency ride through requirements; (5) Volt-VAR requirements; (6) Volt-Watt requirements; and (7) return-to-service reconnection time delay.²⁴⁴

At the same time, KIUC also argues that "[b]ecause of KIUC's unique circumstance and differences as compared to the [HECO Companies] . . . special considerations need to be factored into designing DER programs and associated tariffs and/or technical interconnection requirements/standards that are appropriate for KIUC and all of KIUC's members/customers."²⁴⁵ Notably, unlike the HECO Companies, which plan to implement their technical and interconnection modifications through revisions to

²⁴³KIUC ISOP, Exhibit 1 at 11.

²⁴⁴KIUC ISOP at 10.

²⁴⁵KIUC ISOP at 11.

their filed tariff rules (i.e., Rule 14H), KIUC "has proposed that if KIUC's Comprehensive Proposal is approved by the Commission, KIUC will post the technical requirements for the Smart Export and Self Supply Schedule Q tariff options on KIUC's website[.]"²⁴⁶

In this regard, "KIUC maintains that these technical requirements should not be memorialized or incorporated as part of KIUC's tariff, [and] KIUC believes that posting such technical requirements on KIUC's website will provide sufficient transparency regarding the technical requirements corresponding to the Smart Export and Self Supply Schedule Q options."²⁴⁷ According to KIUC, "[a]ny efforts to memorialize or incorporate these technical requirements/interconnection standards within KIUC's tariff would limit, hamper, and unduly delay KIUC's ability to: (i) in the future, timely update KIUC's technical requirements/interconnection standards in response to technological evolutions or advancements, and (ii) work with individual members/customers on interconnection solution(s) on a case-by-case basis in situations where, for example, a particular member/customer would otherwise be unable to interconnect due to overly prescriptive and/or outdated requirements."²⁴⁸

²⁴⁶KIUC FSOP at 8.

²⁴⁷KIUC FSOP at 8.

²⁴⁸KIUC FSOP at 8-9.

2.

The Consumer Advocate

Regarding KIUC's Smart Export proposal, the Consumer Advocate "will not oppose KIUC's proposed Smart Export tariff as an interim program, [but] . . . believes that the calculation of marginal costs and how they compare to KIUC's long-term and near-term measures of avoided costs should be explored in the Market Track of Phase 2."²⁴⁹ Additionally, the Consumer Advocate notes that KIUC's Smart Export proposal does not contain technical capacity limits; in order to provide greater transparency regarding the program status and system impacts, the Consumer Advocate recommends that KIUC provide a review of the program within two years after the Smart Export program is launched.²⁵⁰

3.

DBEDT

DBEDT offers a few comments in support of salient features of KIUC's proposed Smart Export program. Specifically, DBEDT supports KIUC's uncapped Smart Export program, but suggests that KIUC bear the burden in the future of justifying why it should

²⁴⁹CA FSOP at 24.

²⁵⁰CA FSOP at 24.

be limited or closed;²⁵¹ DBEDT supports the methodology supporting KIUC's Smart Export compensation rate;²⁵² DBEDT supports, in principle, a peak adjustment, but states that further review of KIUC's proposed curtailment adjustment is warranted,²⁵³ and states that KIUC should make available to DBEDT information and data it collects regarding its Smart Export program.²⁵⁴

4.

The Joint Parties

The Joint Parties express general support for KIUC's proposed Self Supply program, but state that certain features should be implemented to align it more closely with the HECO Companies' CSS program.²⁵⁵

The Joint Parties appear to support KIUC's Smart Export proposal as well, stating that they support the creation of peak, shoulder, and off-peak pricing periods, as well as a zero-compensation period (all of which align with the

²⁵¹See DBEDT FSOP at 18.

²⁵²DBEDT FSOP at 21.

²⁵³DBEDT FSOP at 21-22.

²⁵⁴DBEDT FSOP at 23.

²⁵⁵See Joint Parties ISOP at 29.

export-compensation structure proposed by KIUC).²⁵⁶ However, the Joint Parties state that Smart Export rates should reflect more than the value of avoided energy and recommend exploring a more refined methodology for calculating Smart Export rates during the Market Track.²⁵⁷

That being said, the Joint Parties object to KIUC's proposed method for implementing its Proposal. Rather than as a revision to its Schedule Q tariff, the Joint Parties recommend that KIUC file separate tariffs for its proposed Self Supply and Smart Export programs.²⁵⁸ Additionally, the Joint Parties state that KIUC should be required to make revisions to its Tariff No. 2 to accommodate the technical and tariff-based requirements for such programs.²⁵⁹

²⁵⁶See Joint Parties ISOP at 30.

²⁵⁷Joint Parties ISOP at 31.

²⁵⁸Joint Parties ISOP at 32; see also, Joint Parties FSOP at 25 ("Although the Joint Parties recommended KIUC file separate tariffs for each of its Smart Export and Self Supply programs, and that approach remains their preference, their primary concern is that the programs are contained in a tariff so that they cannot be modified at KIUC's discretion without prior Commission approval In contrast, KIUC's insistence that it retain the ability to modify the terms and conditions of these programs without the Commission's approval is contrary to state law and likely will lead to future disputes requiring the Commission's resolution.").

²⁵⁹Joint Parties ISOP at 32.

In this regard, the Joint Parties argue that "contrary to KIUC's assertions, the cooperative cannot legally impose any conditions or requirements regarding the Self-Supply and Smart Export program on participants unless the Commission has approved such provisions," and cautions that "KIUC's suggested approach has proven problematic in the past and is bound to lead to future disputes."²⁶⁰ To that end, the Joint Parties request that the commission "expressly rule that KIUC may not unilaterally impose any generally applicable requirements on Self-Supply and Smart Export customers via customer agreements, or by any other means, unless the Commission has approved them."²⁶¹

The Joint Parties also offer comments on a number of various issues concerning KIUC's Proposal. First, the Joint Parties support KIUC's proposal to remove the Schedule Q requirement for installing curtailment meters, but argues KIUC should also remove existing curtailment meters as well (this is consistent with the Joint Parties position regarding the HECO Companies and controllability).²⁶²

Regarding KIUC's proposed Legacy Q program, the Joint Parties state that KIUC should allow Legacy Schedule Q

²⁶⁰Joint Parties FSOP at 26.

²⁶¹Joint Parties FSOP at 26.

²⁶²Joint Parties FSOP at 26.

customers to continue being compensated according to the existing Schedule Q rate methodology, as the issue of compensation for Schedule Q is beyond the scope of this docket, and is an issue currently pending in Docket No. 2008-0069, which specifically addresses Schedule Q.²⁶³ Additionally, the Joint Parties state that KIUC should revise its Legacy Q program to allow Legacy Q customers to install grid-supportive modifications without forfeiting their Legacy Q status (this is consistent with the Joint Parties' position on allowing the HECO Companies' NEM customers to install non-export generating capacity).²⁶⁴

5.

DERC

DERC filed a Joinder to the Joint Parties' ISOP and joins in the Joint Parties' position regarding KIUC's Proposal.²⁶⁵

²⁶³Joint Parties FSOP at 27.

²⁶⁴Joint Parties FSOP at 28-29.

²⁶⁵See DERC Joinder to Joint Parties ISOP at 16.

6.

EFCA

EFCA does not offer any comments to KIUC's Proposal save that KIUC should begin developing its own hosting capacity analyses to support deployment and effective utilization of DERs.²⁶⁶

7.

REACH

REACH did not submit briefing regarding KIUC's Proposal.

8.

SunPower

SunPower did not submit an ISOP or FSOP to the commission, and its only indication as to its position on the issues is reflected through its status as a signatory to the Deferred Issues Stipulation, Advanced Inverter Stipulation, Smart Export Stipulation, and Self-Certification Stipulation. As noted above, these Stipulations are limited in scope to proposing revisions to the HECO Companies' tariff rules and do not purport to affect KIUC. Accordingly, the commission concludes that SunPower does not take a position on KIUC's Proposal.

²⁶⁶EFCA FSOP at 8.

9.

Apollo Energy

As noted above, Apollo Energy does not offer any specific comments regarding activation of AIFs, but instead appears to oppose any decisions on the Deferred and Technical Track issues at this time.²⁶⁷

D.

Additional Proposals

1.

The HECO Companies' DER Integration Analyses

A number of Parties have raised the issue of improvements to the HECO Companies' DER integration analyses.

The HECO Companies note that the commission had earlier, during Phase 1, rejected the HECO Companies' request for a Rule 14H revision that would require a system-level hosting capacity screen.²⁶⁸ The HECO Companies observe that they filed their System-Level Hosting Capacity Report on December 11, 2015, and maintain that the Report and its updates "collectively demonstrate that System-Level Hosting Capacity together with Circuit-Level Hosting Capacity provide a technically superior and transparent

²⁶⁷Apollo ISOP at 2.

²⁶⁸HECO Cos. ISOP at 20.

means to pre-determine the amount of DER that the grid and distribution system can safely and reliably accommodate before significant mitigations [(e.g. upgrades)] are required."²⁶⁹ "The [HECO] Companies maintain, as noted in the [HECO] Companies Phase 1 FSOP, that to maintain system reliability and safety, the technical review process should include a technical system impact screen[.]"²⁷⁰

The HECO Companies also include a document entitled "Circuit Hosting Capacity Analysis: Benefits and Future Improvements" as Exhibit C to their ISOP, in which they state that they are planning on implementing a number of improvements, both for the near-term and long-term.

Regarding near-term improvements, the HECO Companies state that "within the next six months" they will implement changes to "provide customers [with] secondary circuit information" and "seek improvements in the way non-export or smart export systems are modeled."²⁷¹ Specifically, the HECO Companies state that they intend to incorporate the specific local factors that currently trigger supplementary review as an automated part of the customer

²⁶⁹HECO Cos. ISOP at 20.

²⁷⁰HECO Cos. ISOP at 20.

²⁷¹HECO Cos. ISOP, Exhibit C at 6.

information tool provided to customers.²⁷² The HECO Companies also state that "[f]or service transformer and secondary equipment overload analysis, the [HECO] Companies are adopting an updated technique to account for non-export systems," such that "[t]he updated service transformer overload calculation considers non-export systems as load offsetting, while accounting for exporting systems and non-DER customers connected to that transformer as separate variables" (the HECO Companies state that this is consistent with the Deferred Issues Stipulation).²⁷³

Regarding long-term improvements, the HECO Companies state that hosting capacity should have the following capabilities: (1) improved methods of distribution level forecasting of load and DER; (2) hourly load and DER profiles for time-series analysis . . . derived through a standard methodology; (3) flexibility to model different programs (CSS, Smart Export, TOU, etc.); and (4) incorporation of advanced inverter functions."²⁷⁴ In particular, the HECO Companies state that they

²⁷²HECO Cos. ISOP, Exhibit C at 6. According to the HECO Companies, the specific local factors that increase the likelihood of secondary issues include: "overhead or underground construction, whether the secondary is on a 4 kV distribution circuit, the total number of customers connected to the service transformer, whether the proposed generating facility is greater than 10 kW, the service transformer penetration, and the distance between the customer's service and the service transformer." Id.

²⁷³HECO Cos. ISOP, Exhibit C at 6.

²⁷⁴HECO Cos. ISOP, Exhibit C at 7.

intend to use LoadSEER, a load forecasting engine by Integral Analytics, "to extract feeder-level, peak, minimum, and hourly load forecasting for up to ten years," from which LoadSEER will then account for historical substation SCADA data, smart meter data, customer billing data, distribution transformer monitoring data, geospatial data, and economic variable, before forwarding to distribution planners.²⁷⁵ The HECO Companies also state that LoadSEER will assist in creating hourly load profiles and baseline DER profiles to be used as inputs to the Synergi circuit hosting capacity models.²⁷⁶ According to the HECO Companies, once the data from LoadSEER is imported into Synergi, distribution planners will be able to simulate circuit hosting capacity for a given DER scenario or forecast.²⁷⁷ The HECO Companies intend to use data collected from the Smart Export program to continually update LoadSEER.²⁷⁸ The HECO Companies' plan to update their circuit hosting capacity to work toward modeling the advanced inverter functions of Volt-VAR and Volt-Watt (currently, hosting capacity analysis only incorporates the use of Fixed Power Factor).²⁷⁹

²⁷⁵See HECO Cos. ISOP, Exhibit C at 7.

²⁷⁶HECO Cos. ISOP, Exhibit C at 8.

²⁷⁷HECO Cos. ISOP, Exhibit C at 9.

²⁷⁸HECO Cos. ISOP, Exhibit C at 9.

²⁷⁹HECO Cos. ISOP, Exhibit C at 10.

In terms of timing, the HECO Companies plan to implement LoadSEER at HECO by the end of the first quarter of 2018, and use the following twelve months to create an interface between LoadSEER and Synergi; implementation of LoadSEER at HELCO will then take place in the second and third quarter of 2018, followed by MECO in 2019.²⁸⁰ The HECO Companies states that they have spent approximately \$1.3 million over the past two years on improving hosting capacity (of which approximately \$150,000 was covered by grants), and estimates that they will incur approximately \$1.6 million to \$4.5 million in additional expenses to implement the planned circuit hosting capacity improvements.²⁸¹ The HECO Companies suggest discussing recovery of these costs during the Market Track of this proceeding, such as whether some or all of these costs should be recovered through an interconnection fee.²⁸²

The Consumer Advocate notes that it has supported setting both circuit-level and system-level hosting capacity levels in prior filings;²⁸³ however, the Consumer Advocate does not offer any proposals to improve the HECO Companies' integration analyses.

²⁸⁰HECO Cos. ISOP, Exhibit C at 10.

²⁸¹HECO Cos. ISOP, Exhibit C at 11-12.

²⁸²HECO Cos. ISOP, Exhibit C at 13.

²⁸³CA ISOP at 14.

DBEDT proposes that the HECO Companies should: (1) publish an updated DER Integrated Analysis methodology (including updated assumptions based on the types and capabilities of DER systems that exist or may exist in the near future) and updated results documents for circuit- and system-level hosting capacity; (2) provide more granular transparency on circuit-level hosting capacity, location of circuits that could strategically benefit from DER, and associated upgrade costs; and (3) provide specific upgrade solutions prioritized by the transparent criteria each HECO Company is planning to pursue and the related implementation plan.²⁸⁴

The Joint Parties also raise concerns about the HECO Companies' hosting capacity analyses. Specifically, the Joint Parties argue that both the system- and circuit-level hosting capacity analyses need to be updated to address more than just "traditional export DER systems," and begin accounting for DER such as "advanced solar-plus-battery non-export systems" and "smart-export systems."²⁸⁵ Given its limitations, the Joint Parties observe that the HECO Companies' hosting capacity analyses function more as thresholds for further review of DER

²⁸⁴DBEDT FSOP at 14-16.

²⁸⁵Joint Parties ISOP at 8.

systems, rather than as interconnection limits or caps.²⁸⁶ Ultimately, the Joint Parties view the existing hosting capacity analyses as incomplete due to the narrow focus on identifying limits as to how much DER can be integrated, without consideration for how DER can help mitigate system constraints and offer other low-cost grid solutions.²⁸⁷ The Joint Parties conclude that hosting capacity analyses should be viewed in the broader context as just one of many tools to support a holistic Integrated Distribution Planning framework.²⁸⁸

DERC joins many of the other Parties in noting that the HECO Companies' hosting capacity methodology "has not yet integrated CGS and CSS systems with or without energy storage."²⁸⁹

EFCA states that a number of assumptions regarding the HECO Companies' hosting capacity need to be modified. First, EFCA argues that hosting capacity methodologies should recognize the minimal impact that CSS systems, as non-exporting systems, have on hosting capacity, and that CSS systems should not deduct from the

²⁸⁶Joint Parties ISOP at 9. While the Joint Parties are not opposed to the hosting capacity analyses being used in this manner, they maintain that this distinction should be "clarified and refined in more refined terminology." Id.

²⁸⁷See Joint Parties ISOP at 9-10.

²⁸⁸Joint Parties ISOP at 10.

²⁸⁹DERC Joinder to Joint Parties ISOP at 9.

available hosting capacity.²⁹⁰ Second, when determining operating circuit limits, circuit-hosting capacity should consider whether circuit limits can be reconfigured to host larger amounts of DER.²⁹¹ Third, the capabilities of advanced inverter voltage regulation should be incorporated in determining what level of voltage rise is acceptable.²⁹² Third, geographical dispersion should be considered as a means to increase circuit-level hosting capacity.²⁹³ Fourth, system-level hosting analyses should be modified to consider whether, and to what extent, DER can provide grid services which are capable of reducing the impact of DER systems to the grid, and not just model uncontrolled exporting DER.²⁹⁴ Fifth, HECO and its consultant, Energy and Environmental Economics, "should provide additional details on the minimum amount of firm generation assumed in their model, as well as additional information regarding the different thresholds used to assess system-level hosting capacity (e.g., economic level of hosting capacity)."²⁹⁵

²⁹⁰EFCA ISOP at 7.

²⁹¹EFCA ISOP at 7-8.

²⁹²EFCA ISOP at 8.

²⁹³EFCA ISOP at 8.

²⁹⁴EFCA ISOP at 8.

²⁹⁵EFCA ISOP at 9.

In addition, EFCA states that the HECO Companies should perform their hosting capacity analyses under different scenarios, assuming different mixes of DER resources (e.g., NEM, CSS, CGS, etc.).²⁹⁶ EFCA also raises concerns about the estimated costs associated with improving the HECO Companies' hosting capacity analyses, and submits that not all of these estimated costs should be attributed to DER (for example, EFCA notes that the LoadSEER software can also be used for load forecasting in traditional planning, not just for DER forecasting).²⁹⁷

2.

Allowing NEM Customers To Add Non-Export Technology

In its ISOP, the Consumer Advocate briefly notes that it has remaining concerns about adding storage to current programs, such as NEM, as this could compound the existing problem of non-participating customers subsidizing the NEM program.²⁹⁸

EFCA responds directly to the Consumer Advocate, and argues that prohibiting NEM customers from adding non-export energy storage technology represents "a missed opportunity to ease DER integration concerns through both increasing functionality

²⁹⁶EFCA FSOP at 9.

²⁹⁷EFCA FSOP at 12-13.

²⁹⁸CA ISOP at 14.

from existing systems, and creating opportunities for such systems to participate in additional programs and tariffs (e.g., Demand Response).²⁹⁹ EFCA argues that forcing customers to forego NEM if they wish to deploy non-export energy storage technology will likely result in customers not adopting this technology.³⁰⁰ In sum, EFCA strongly urges the commission to direct the HECO Companies to ensure that NEM customers who wish to install non-export storage technology are not required to forego their NEM enrollment.³⁰¹

The Joint Parties also support allowing a NEM customer to add a battery energy storage system ("BESS"), in exchange for the customer's agreement to comply with advanced inverter functionality.³⁰² The Joint Parties maintain that this offers a "simple, no-regrets approach to DER integration," as it would: (1) increase the functionality of existing NEM systems; and (2) create opportunities for NEM systems to participate in the new programs and tariffs currently being developed (e.g., Demand Response).³⁰³ Conversely, echoing EFCA's concerns,

²⁹⁹EFCA FSOP at 13 (citing Joint Parties ISOP at 11-12).

³⁰⁰EFCA FSOP at 14.

³⁰¹See EFCA FSOP at 14.

³⁰²Joint Parties ISOP at 11.

³⁰³Joint Parties ISOP at 11-12.

the Joint Parties warn that requiring existing NEM customers to abandon the NEM program in order to install BESS will only discourage customers from making those investments, or compel them to pursue off-grid alternatives.³⁰⁴

DERC also supports the permitted addition of non-export energy storage systems to existing NEM systems. According to DERC, "[t]he addition of grid-connected storage to the electrical grid will add value for all rate payers, as grid-connected energy storage can provide a variety of grid services including peak shaving and shifting and participation in TOU programs, capacity to assist the [HECO] Companies when they need to reduce load, and other grid services such as those in the upcoming DR tariffs."³⁰⁵

3.

DERC's DC Microgrid Proposal

DERC proposes an alternative DC microgrid option as a means to expedite interconnection for CSS systems. As described by DERC, "DC microgrid architecture connects on-site solar PV arrays and energy storage devices directly to energy-efficient DC loads [which] forms a single building DC grid that operates cohesively in parallel with other [AC] loads in the facility. This

³⁰⁴See Joint Parties ISOP at 12.

³⁰⁵DERC FSOP at 11.

architecture eliminates AC/DC rectifiers on the loads and DC/AC solar inverters, increasing the efficiency and reliability of the connected devices."³⁰⁶ The DC microgrid, in turn, "is connected in parallel with the utility grid either through a bi-directional or a converter device[,] " which "does not permit export to the grid of back feed, eliminating the risk of reverse power flow or fault current to the distribution grid."³⁰⁷

DERC recommends that the HECO Companies' Rule 22 be amended "so that CSS systems under 100 kW that are connected to the electrical grid with a converter device receive the same expedited interconnection review that is afforded CSS systems with an inverter programed to non-export mode."³⁰⁸ Specifically, DERC proposes that new "Option 6 for converter devices be added to the non-export requirements in Appendix II of Rule 22, and that converters be included where necessary in Rule 14H and Rule 22 and its applicable application forms[.]"³⁰⁹ DERC "hope[s] that [this proposal] can be addressed in the further deliberations under the technical track portion of the DER docket."³¹⁰

³⁰⁶DERC Joinder to Joint Parties ISOP at 12-13.

³⁰⁷DERC Joinder to the Joint Parties ISOP at 13.

³⁰⁸DERC Joinder to Joint Parties ISOP at 14.

³⁰⁹DERC Joinder to Joint Parties ISOP at 14; and DERC FSOP at 20-22.

³¹⁰DERC Joinder to Joint Parties ISOP at 14.

V.

DISCUSSION

A.

The Commission's Efforts In Developing DER Customer Options

At the outset, the commission provides some context for its decisions and affirms its vision for this docket, as well as the future of DER in Hawaii. Roughly two years ago, through Decision and Order No. 33258, the commission initiated the transition toward a longer-term DER market structure for acquiring grid-supportive DER to provide value to all customers. By this Decision and Order, the commission articulates and advances the next step in this evolutionary process.

In October 2015, DER penetration had reached nontrivial levels in Hawaii and, while it remains clear that DER can provide significant benefits to both participating and non-participating customers, the NEM program, which obligates the electric utility to accept energy exported by a customer's system and compensates the customer at the retail rate, was not originally structured for DER at scale. Indeed, the NEM program lacks sufficient flexibility to: (1) incorporate pricing that appropriately reflects the value of energy exported to the grid, particularly during periods of overgeneration; (2) incent advanced grid-supportive functionality that modern DER systems can provide (which are increasingly valuable given the high costs of alternatives to meet

grid needs); or (3) allocate responsibility for applicable grid integration costs.

Accordingly, in October 2015, the commission capped the NEM program as fully subscribed and established two new interim DER options: CGS and CSS. The CGS and CSS options represent two fundamental value propositions of DER and were created with the intent to provide customer choice, enable continued interconnection of DER systems, and offer value to the electric systems of the State.³¹¹

These new development options were designed to address many near-term technical concerns with further interconnection of DER systems, institute a more certain and timely interconnection process for systems that utilize advanced technologies to mitigate grid-integration challenges, and establish pricing for future grid-supply energy systems that is more aligned with the economic value these resources supply to the electric grid.³¹²

And yet, as the commission noted at the time, the CGS tariff option does not resolve all of the concerns related to the NEM program, including exports of "uncontrolled energy onto the grid, regardless of whether the power system can economically or physically accommodate such exports" and that "unconstrained

³¹¹See Decision and Order No. 33258 at 117.

³¹²See Decision and Order No. 33258 at 117.

growth in the grid-supply option is not in the public interest, given the finite capacity of each island grid to accommodate uncontrolled export of energy during mid-day hours . . . particularly if such growth comes at the expense of future opportunities to acquire even lower-cost renewable energy from other sources, or prevents the HECO Companies from offering CBRE options for their customers."³¹³

In May 2016, certain Parties filed a Motion to Adjust CGS Cap, expressing concern that the remaining capacity for each of the service territories would be reached before the commencement of Phase 2 of this proceeding.³¹⁴ The Motion to Adjust CGS Cap indicated that, at the current pace, CGS applications would likely fill any remaining capacity while the commission's contemplated transition to a more permanent DER market structure in Phase 2 of this docket is still pending.³¹⁵ The Motion therefore requested that the commission adjust upward the interim CGS cap in order to allow sufficient time to undertake and complete this transition.³¹⁶

³¹³Decision and Order No. 33258 at 139-141.

³¹⁴See "Hawaii PV Coalition's, Hawaii Solar Energy Association's, SunPower Corporation's, and The Alliance for Solar Choice's Motion to Adjust Customer Grid Supply Tariff Cap; Memorandum in Support of Motion; Affidavits of Hajime Alabanza and Mark Duda; and Certificate of Service," filed May 16, 2016 ("Motion to Adjust CGS Cap").

³¹⁵Motion to Adjust CGS Cap at 1.

³¹⁶Motion to Adjust CGS Cap at 1.

In December 2016, the commission denied the Motion to Adjust CGS Cap.³¹⁷ The commission concluded that the Motion did not adequately demonstrate how increasing the CGS cap, at that time, was consistent with Decision and Order No. 33258 or in public interest.³¹⁸ Nonetheless, the commission instructed the HECO Companies to transfer program capacity from the NEM program queue associated with withdrawn NEM applications to the CGS cap, as was suggested by the HECO Companies.³¹⁹ The net effect of this decision, per the HECO Companies' "Weekly Queue Report," dated October 10, 2017, was the addition of roughly 26 MW for Oahu, 9 MW for Maui, and 5 MW for Hawaii Island.

Also in December 2016, after review of comments from Parties on the preliminary Phase 2 issues as set forth in Order No. 33598, the commission established a statement of issues to govern Phase 2 of this docket, wherein the commission reiterated

³¹⁷See Order No. 34205, "Denying Hawaii PV Coalition's, Hawaii Solar Energy Association's, SunPower Corporation's, and The Alliance for Solar Choice's Motion to Adjust Customer Grid Supply Tariff Cap," filed December 9, 2016 ("Order No. 34205"); and Order No. 34458, "Clarifying Order No. 34205," filed March 17, 2017 ("Order No. 34458"), at 6-7.

As discussed below, the language of the CGS tariff provides for an October 21, 2017, expiration of the fixed nature of the CGS export price, but does not indicate an expiration of the entire CGS program.

³¹⁸See Order No. 34205 at 14.

³¹⁹See Order No. 34205 at 26.

the need to develop successor tariffs to enable a longer-term competitive market structure for DER.³²⁰ The commission notes that the stated purpose of Priority Issue No. 1 was to identify modifications that should be made to existing tariffs, including CGS. More specifically, Priority Issue No. 1 reads:

What changes, if any, should be made to existing interim DER options (e.g., developing time-varying export credit rates, revising technical requirements to facilitate increased deployment, adjusting tariff features such as duration, eligibility, etc.) prior to resolution of other Phase 2 issues?³²¹

In response to this issue, many of the Parties proffered a "limited" export approach and design. This concept was first introduced in the record in the Parties' proposed tariff changes to the CGS program, filed on January 30, 2017, in response to Order No. 34206.³²² A number of the Parties from the solar PV industry proposed that the CGS program should be modified to

³²⁰See Order No. 34206.

³²¹Order No. 34206 at 7.

³²²See "Energy Freedom Coalition of America, LLC's Tariff Proposals For Issue Nos. 1 and 2 Pursuant To Order No. 34206; Exhibits A and B; and Certificate of Service," filed January 30, 2017 ("EFCA Priority Issue Tariff Proposals"), at 8-9; and "Blue Planet Foundation, Hawaii PV Coalition, Hawaii Solar Energy Association, SunPower Inc., and The Alliance for Solar Choice's Tariff Proposals On Phase 2 Priority Issues; Attachments A-D; Declaration of Bari Barnes; Declaration of Steven Rymsha; and Certificate of Service," filed January 30, 2017 ("Solar Parties Priority Issue Tariff Proposals"), at 2 and 14-21.

incorporate many Smart Export features, such as limited export time periods and time-based compensation rates.³²³ These Parties also proposed that the "Limited Export" option should apply to any systems installed after June 1, 2017.³²⁴ The HECO Companies also proposed a "Smart Export CGS Option" that, in addition to limiting the period of time during which a generating facility could export to the grid, would prevent host load from being served by the generating facility at certain times.³²⁵

Citing these emergent Smart Export proposals, the commission applauded the Parties' efforts for their innovative thinking and willingness to embrace new market designs and solutions.³²⁶ The commission stated its interest in a range of options, including one or more proposals for time-varying export, scheduled delivery, and/or utility dispatch enabled CGS tariff models.³²⁷ In addition, the commission expressed interest in further revisions to the CSS tariff to clarify the intent that the non-export requirements for CSS systems are subordinate to customers' options to provide grid services to the utility, such

³²³See Solar Parties Priority Issue Tariff Proposals at 15-21.

³²⁴See Solar Parties Priority Issue Tariff Proposals at 15.

³²⁵See "Hawaiian Electric Companies' Statement of Position Regarding Phase 2 Priority Issues; Exhibits 'A' Through 'C;' and Certificate of Service," filed January 30, 2017, at 10-12.

³²⁶See Decision and Order No. 34534 at 34-35

³²⁷See Decision and Order No. 34534 at 35.

as through advanced inverter functions and participation in Demand Response programs.³²⁸

Intending to build upon this productive momentum, the commission instructed the HECO Companies and KIUC to work with the other Parties to develop a Smart Export program proposal or proposals.³²⁹ This work and further collaboration by the Parties yielded dividends, as evidenced by the robust discussion and various Smart Export proposals produced during the Technical Track, culminating in the commission's approval of an interim Smart Export program in this Decision and Order.

Nevertheless, the commission notes that the CGS program caps, as augmented by withdrawn NEM capacity, have nearly been reached on Maui and Hawaii Island, with roughly 9 MW remaining on Oahu.³³⁰ Absent a direct-to-grid solar PV option going forward, the commission observes that the only viable DER options available to customers would require, for all intents and purposes, significant investment in energy storage. While the commission continues to support the cost-effective adoption of energy storage

³²⁸See Decision and Order No. 34534 at 35.

³²⁹See Decision and Order No. 34534 at 37.

³³⁰Pursuant to Order No. 32737, the HECO Companies submit weekly reports to the commission and the Parties on the status of the interconnection queue, including available capacity in the CGS program. The most recent report, dated October 10, 2017, indicates 9.02 MW of CGS capacity remaining for HECO, 0.69 MW remaining for MECO, and 0.09 MW remaining for HELCO.

and anticipates that energy storage will continue to be a critical part of the resource mix going forward, it acknowledges that the energy storage market is still relatively nascent. Accordingly, the commission intends to continue offering customers greater choice and flexibility as the energy storage market continues to mature and, critically, as technology costs continue to decline.

That said, the commission recognizes that it must balance this against the physical limitations of the HECO Companies' ability to integrate additional, uncontrolled direct-to-grid solar PV. As the HECO Companies state, "[o]ne of the current challenges in accommodating DER at the system level is that the amount of active power being produced is not visible to or controllable by the grid operator. In the event of an excess generation event at the bulk system level or other conditions that endanger safety or reliability of the grid, other resources must be adjusted."³³¹ Thus, while a variety of DER options are desirable to accommodate customer choice, there also needs to be some "means of controlling the amount of power being produced by DER systems under abnormal circumstances that threaten grid reliability and stability."³³²

³³¹HECO Cos. FSOP at 18.

³³²HECO Cos. FSOP at 18.

In light of the desire to provide customers with choice and flexibility regarding DER options, as well as the need to establish measures that allow the utility to better measure, monitor, and, if necessary, control the output of DER going forward, the commission, as part of this Decision and Order, directs the HECO Companies to establish two new interim DER program options: (1) a Smart Export option featuring limited compensable export opportunities, but more granular, time-value compensation; and greater customer control; and (2) CGS+, a utility-controllable, direct-to-grid DER option, expected to deliver energy as-available, except where system-wide technical conditions require curtailment to output. The salient parameters for both the interim Smart Export program and the interim CGS+ program are outlined further in this section.

In sum, the commission's directives in this Decision and Order represent the next incremental step in this Docket's progression toward reaching a long-term DER market structure, which will remain the focus of the subsequent Market Track. The long-term vision of the commission remains a robust environment where customers have a variety of DER options, and, in this sense, the current spectrum of options, ranging from CGS+ to Smart Export to CSS, gives customers choice and flexibility about when, and to what degree, to invest in energy storage technology. Such DER tariff options are anticipated to serve as foundational building

blocks, upon which additional grid service tariff options can be layered.³³³

B.

Clarifications And Modifications To Existing DER Programs

1.

Clarification Regarding The NEM Program

The commission observes that a number of Parties have supported allowing NEM customers to install energy storage and non-exporting generating systems without jeopardizing their enrollment in the NEM program.

Notwithstanding the Consumer Advocate's concerns that the addition of energy storage or non-exporting generation may exacerbate cross-subsidization of NEM customers,³³⁴ the commission finds that NEM customers should be permitted to add energy storage systems or non-exporting generating capacity technology (collectively, "non-export technology"). While the addition of non-export technology, such as a CSS system, may allow a NEM

³³³The HECO Companies, in Docket No. 2015-0412, have developed a tariff structure covering a range of grid services, from capacity to ancillary services, that would permit customer-owned DER to be compensated for providing operational support to the electric utility network. See e.g., In re Hawaiian Elec. Co., Inc., Hawaii Electric Light Co., Inc., Maui Elec. Co., Ltd., Docket No. 2015-0412, "Revised DR Portfolio," filed February 10, 2017.

³³⁴See CA ISOP at 14.

customer to export more energy from the NEM system to the grid, any NEM credit increase would result directly from the CSS system serving the NEM customer's onsite load (thereby freeing up more energy for export), and is no different, practically speaking, than a situation where the NEM customer exports more to the grid due to reductions in onsite load via energy efficiency measures or through a Rule 14, Appendix IIB, non-parallel system (i.e., a system that does not operate in parallel with the grid). Furthermore, the NEM program is designed for customers who wish to serve part or all of their annual onsite electricity needs. Thus, any accumulated credits after one year are forfeited, which benefits all customers through reduced system costs.

Accordingly, while there may be a perceived effect of increased exports from the NEM program resulting from greater NEM system output, this ignores the reality that a NEM customer may achieve a similar "increase" in output by pursuing a non-grid-connected alternative, such as installing a non-parallel system. Such an outcome is undesirable, as it not only results in a similar level of NEM export, but it also represents a lost opportunity to interconnect a system which may ultimately provide grid-supportive services.

Non-interconnected systems are at best non-helpful to the grid, and could remove load from the grid without the added benefits of controllability or capability to provide grid

services. Allowing NEM customers to add non-export technology, such as a CSS system, provides a positive path forward in which NEM customers can eventually provide grid services, and an interconnection path that enables the HECO Companies to offer options to meet their customer's needs.

The concerns raised by the Consumer Advocate are related to the underlying rate design, and are appropriately addressed in the Market Track of this proceeding. Rate design is also a critical aspect of each utility's general rate case. Thus, these concerns can be addressed as the Parties continue to discuss these issues and should not serve as a basis for denying NEM customers the opportunity to add non-exporting systems, particularly given the risk that they may seek off-grid alternatives instead.³³⁵

In addition, as noted by some of the Parties, permitting NEM customers to add non-export technology provides an opportunity to upgrade "legacy" NEM systems with advanced inverters.³³⁶ Given the increasingly sophisticated nature of DER programs and policies that are being developed in Hawaii, it is desirable to update as much legacy equipment as possible, while minimizing costs to ratepayers. Thus, this recommendation has the combined appeal of supporting a proposal which provides an incentive to invest in

³³⁵See e.g., Joint Parties ISOP at 11-12.

³³⁶See Joint Parties ISOP at 11-12; EFCA FSOP at 13-14; and DERC FSOP at 11.

grid-interconnected systems, while also upgrading legacy equipment at no direct cost to other customers, and the commission adopts it accordingly.

In Decision and Order No. 33258, the commission capped enrollment in the NEM program.³³⁷ In doing so, the commission grandfathered existing NEM customers, but held that "no additional individual system capacity shall be added to approved or pending NEM systems."³³⁸ While the commission did not further define "individual system capacity," the context of Decision and Order No. 33258 indicates that the commission was primarily concerned with the addition of export generating capacity when it made this ruling. For example, in reaching its decision on the NEM program, the commission considered the effect enrollment in the NEM program had on the HECO Companies' system peak load.³³⁹ Thus, the commission's concern at the time was primarily focused on the system effects of NEM exports, and the reference to "system capacity" should be read in that context.

The question before the commission today, i.e., whether NEM customers should be allowed to add non-export technology to serve their own load without increasing the amount of export

³³⁷Decision and Order No. 33259 at 162-63.

³³⁸Decision and Order No. 33258 at 164.

³³⁹See Decision and Order No. 33258 at 160-61.

capacity to their NEM system, does not implicate these concerns. Rather, as noted above, the ability of a NEM customer to use non-export technology to serve his or her own onsite load (thereby freeing up more generation for export) does not actually "increase" the amount of generation capacity of the NEM system, and, as discussed above, can be compared to a NEM customer who simply implements energy-efficiency measures to reduce their onsite load or invests in a non-grid-connected (non-parallel) energy storage system.

Given the benefits of incentivizing NEM customers to remain connected to the grid, as well as upgrading their legacy equipment, the commission finds that it should re-visit its ruling in Decision and Order No. 33258 to clarify that its prohibition on "additional individual systems capacity" to approved or pending NEM systems does not apply to non-export technology intended to serve onsite load, such as what is provided for in the CSS program.³⁴⁰ However, as noted above, NEM customers who choose to add non-export technology will be required to update their systems with advanced inverters. In this regard, this option should also provide a benefit to the HECO Companies, as it offers an opportunity for legacy systems to be updated at little or no cost to the utility.

³⁴⁰See Decision and Order No. 33258 at 164-65.

Accordingly, the commission instructs the HECO Companies to work with the Parties to develop a policy and procedure for the HECO Companies regarding how to address and account for NEM customers who wish to add non-export technology.

2.

Modifications To The CGS Program

As the commission proceeds with approving new interim DER program options, it also takes this opportunity to resolve any potential uncertainty surrounding the CGS program. In particular, the commission wishes to: (1) clarify that, to the extent any capacity remains in the CGS program after October 21, 2017, applications for the CGS program may continue to be accepted until that capacity is depleted; and (2) resolve ambiguity regarding the future of the CGS program.

As discussed above, the CGS program was intended to be "a transitional option for customers who wish to interconnect DER systems that export uncontrolled energy onto the grid, regardless of whether the power system can economically or physically accommodate such exports."³⁴¹ Following the program's popularity, program capacity was quickly filled, prompting some of the Parties to file the Motion to Adjust CGS Cap.

³⁴¹Decision and Order No. 33258 at 139.

Although the commission denied the Motion to Adjust CGS Cap, it permitted capacity associated with withdrawn applications from the NEM program to be transferred to the HECO Companies' respective CGS programs until October 21, 2017, after which, no additional NEM capacity, even if available, would be transferred.³⁴² At the time the commission made this decision, it was unknown how much, if any, NEM capacity would actually be transferred, and how much capacity, if any, the CGS program would have on October 21, 2017.

Currently, it appears that there is little or no available capacity for the CGS programs in the HELCO and MECO service territories, while the CGS program in HECO's service territory appears to still possess approximately 9 MW of available capacity.³⁴³ To the extent this represents capacity that was transferred from the NEM program to the CGS program on or before October 21, 2017, pursuant to Order Nos. 34205 and 34458, the commission does not believe this capacity should be removed from the CGS program.

The commission notes that its holding in Order No. 34458 may be construed as prohibiting CGS applications from being

³⁴²See Order No. 34458 at 6-7.

³⁴³See the HECO Companies weekly queue reports, as noted in n. 330, supra.

accepted after October 21, 2017.³⁴⁴ Accordingly, to dispel any confusion over this issue, the commission clarifies Order No. 34458 to make clear that, to the extent capacity remains in any of the HECO Companies' CGS programs as of October 21, 2017, applications for those CGS programs with remaining capacity shall continue to be accepted beyond October 21, 2017, until any such remaining capacity is depleted, based on installed CGS projects. However, consistent with Order No. 34458, no new capacity may be transferred from the NEM program to the CGS program after October 21, 2017.

Next, the commission is aware that there may be some uncertainty as to both the compensation rate for the CGS program, as well as the long-term plans for the program itself. Under the express language of CGS tariff, the fixed pricing structure of the CGS program ceases after October 21, 2017, and the commission may modify the energy credit rates at its discretion.³⁴⁵

As noted above, the intent of the CGS program was to provide an interim direct-to-grid export DER option to customers and assist the market in Hawaii as it transitions away from the

³⁴⁴See Order No. 34458 at 7 (stating that CGS applications filed on or before October 21, 2017, shall still be accepted, but not mentioning CGS applications filed after October 21, 2017).

³⁴⁵See HECO Companies' Rule 23 at Revised Sheet No. 45B ("Energy Credit Rates shall be effective for a period of two (2) years from the effective date of this Grid-Supply Tariff. Thereafter, the applicable Energy Credit Rates shall be subject to any further modification by the Commission.").

uncontrolled export model of the NEM program toward a more sophisticated DER market structure. Since then, the Parties have developed new proposals aimed at safely integrating increasing amounts of DER in Hawaii, primarily through proposing a Smart Export program and activation of various AIFs, both of which are the subject of this Decision and Order.

That being said, the commission does not believe it is desirable to radically alter the CGS program at this time; indeed, abruptly terminating or dramatically altering the CGS program may cause unwanted and unnecessary market disruption during this transitional period.

Accordingly, in keeping with the commission's desire to effectuate a gradual transition toward a more sophisticated DER market, the commission provides additional guidance regarding the CGS program. First, as noted above, CGS programs with remaining capacity as of October 21, 2017, if any, may continue to accept applications until that capacity is depleted; however, no new capacity shall be added to the program after October 21, 2017. Second, the CGS Energy Credit Rate shall remain at the amount currently specified in Rule 23 for each of the HECO Companies' respective service territories and shall remain fixed for an additional five (5) years. Thereafter, the Energy Credit Rate shall be subject to any future modification by the commission.

This guidance is intended to provide stability to the DER market and reassurance to those customers who have enrolled in the CGS program and made the corresponding investments, as well as provide additional time to facilitate the market transition away from uncontrolled systems to more sophisticated export DER options.

C.

Interim Smart Export Program For The HECO Companies

Upon reviewing the Smart Export Stipulation and the Smart Export proposals submitted by the HECO Companies and KIUC, as well as the considerations raised by the Parties, the commission finds that it cannot unequivocally support any of the specific proposals. Rather, the commission is drawn to various programmatic features of all the different proposals, but cannot support any single proposal, *in toto*. In doing so, the commission rejects both the Smart Export Stipulation as well as the HECO Companies' Smart Export proposal. Rather, the commission approves an interim Smart Export program with the following features:

Compensation. In analyzing the Smart Export proposals submitted in this proceeding, the commission observes that the two pertinent features that appear to significantly influence customer value are the program's export windows and the export credit rate. While there is very little data upon which to estimate the value

propositions for any of the Smart Export proposals,³⁴⁶ the commission can reasonably conclude that as long as the export credit rate is set below the retail rate for electricity, there is an incentive for Smart Export customers to use their stored energy to offset their own energy consumption at strategic times, rather than export it to the grid in exchange for compensation.³⁴⁷

Of the three Smart Export proposals before the commission (i.e., the Smart Export Proposal, the HECO Companies' Smart Export proposal, and KIUC's Smart Export proposal), the Smart Export Stipulation's export credit rate is by the far the highest (based on the credit rate caps proposed in the CBRE Docket). While

³⁴⁶See e.g., HECO Cos. Response to CA/IR-3(c) and (d) (indicating that the HECO Companies have not conducted any analyses regarding the expected bill impact of either the HECO Companies' Smart Export proposal or the Smart Export Stipulation's proposal); HECO Cos. Response to SP-IR-1 (indicating that the HECO Companies have not conducted a formal analysis of the cost for a system that could meet the proposed requirements for the HECO Companies' Smart Export proposal; HECO Cos. Response to SP-IR-2 (indicating that the HECO Companies have not conducted a formal analysis of the economic viability of its Smart Export proposal); and Joint Parties Response to CA/JOINT-IR-3 (indicating that they have not conducted any analyses regarding how the proposed Smart Export Stipulation's proposed export credit rates compare to a customer's cost to install a DER facility).

³⁴⁷See e.g., Joint Parties Response to CA/JOINT-IR-3 ("With respect to the proposed [Smart Export Stipulation], to the extent that the value of exported power to the customer is less than the value in offsetting the retail cost of electricity, these systems are unlikely to be designed to primarily export energy when it is in the customer's best interest to serve onsite load.").

the Joint Parties maintain that the proposed export rate contained in the Smart Export Stipulation "comprises a basic time-based value of energy provided to the grid,"³⁴⁸ they do not provide compelling evidence in support of this proposition other than relying on the fact that similar credit rate caps were proposed in the commission's CBRE Docket.³⁴⁹ The commission is not persuaded by the Smart Export Stipulation's reliance on the proposed CBRE export rates as: (1) the CBRE framework has not been approved by the commission; (2) the CBRE credit rate caps were proposed to occur in a competitive environment, in which actual compensation levels would potentially be significantly less than the caps; and (3) the proposed CBRE rate caps are designed to achieve the objectives of the CBRE Docket, which are not directly applicable to the Smart Export program.

The concept of using annual average on-peak avoided cost, as proposed by the HECO Companies, is not new, as it is the same methodology used to determine the export rates for the

³⁴⁸Smart Export Stipulation at 13.

³⁴⁹See Joint Parties FSOP at 24; and Smart Export Stipulation at 12 (indicating that the Smart Export Stipulation's export credit "is based on the Commission's own analysis," but referring to the Smart Export Stipulation itself, where it merely states that "the Parties recommend setting a time-based rate at the same level the Commission proposed in the CBRE docket[.]").

CGS program, and the underlying data is readily available.³⁵⁰ However, the commission prefers the Consumer Advocate's alternate proposal of using the utility's marginal costs instead.³⁵¹ While annual average on-peak avoided cost may be an appropriate basis for determining compensation for the CGS program, the commission believes that as DER programs become more sophisticated (i.e., "smart"), their compensation structure should reflect increasing granularity and sophistication.

As a major purpose of the interim Smart Export program is to begin recognizing, and compensating, the time-varying difference in value of exported energy to the grid, the commission finds that basing the Smart Export credit rate on the utility's average marginal costs for the respective interim Smart Export time periods is a more appropriate approach, under the circumstances. The commission notes that the HECO Companies have

³⁵⁰See CA FSOP at 13-14 n.26 (indicating that the HECO Companies' 12-month average on-peak avoided cost data is available at the HECO Companies' website).

³⁵¹See CA ISOP at 19 ("Finally, the Consumer Advocate underscores its concerns that credit rates should reflect the value of the energy to the system at the time of delivery . . . rather than being set strictly to provide incentives for customers to participate."); and CA FSOP at 15-16 ("As such, although the Consumer Advocate continues to maintain that export rates should be based on near-term forecasts of avoided cost or marginal cost for their respective time periods, the Consumer Advocate does not oppose basing an interim Smart Export rate on a twelve month average of avoided costs given the information currently available.").

provided their 2017 average hourly marginal costs in response to the Consumer Advocate's information request.³⁵² By basing the compensation on the HECO Companies' marginal costs during the export windows, this approach also mitigates cost impacts potentially borne by non-participants.

Accordingly, the commission will use the 2017 average marginal cost data provided by the HECO Companies to establish the energy credit rates for the interim Smart Export program, which will correspond to the export windows approved by the commission, as discussed below.³⁵³

Export windows. As noted above, in addition to the export credit rate, the export windows are another major factor in determining the economic attractiveness of the interim Smart Export program. Given the challenges the interim Smart Export program faces in competing with retail rates for electricity, the Smart Export program's export windows assume a

³⁵²See HECO Cos. Response to CA/HECO-IR-3(a).

³⁵³The HECO Companies state in their Response to CA/HECO-IR-3(a) that they "are in the process of calculating 2017 average hourly marginal costs in order to revise the existing interim residential time-of-use rates for calendar 2018. When those calculations are completed, a revision to this response will be provided." However, the HECO Companies did not supplement their response in time for the commission to incorporate it into this Decision and Order.

greater role in determining the program's potential economic value to participating customers.³⁵⁴

As a result, the commission observes that KIUC's proposal may provide a better economic value to customers than the Smart Export Stipulation's proposal,³⁵⁵ as it offers significantly wider export windows. Despite the more generous export credit rate proposed by the Smart Export Stipulation, there is still an economic incentive for Smart Export customers to serve their own load first, as the Smart Export Stipulation's credit rate is still far below the retail rate for electricity (i.e., greater than 25 c/kWh).³⁵⁶ As the export windows proposed by both the Smart Export Stipulation and the HECO Companies are narrowly

³⁵⁴In this regard, the commission notes that another large factor, the initial costs of purchasing and installing a Smart Export system, are still largely unknown at this time. See Joint Parties Response to CA/JOINT-IR-6(b)(1) and (2). As a result, the program's export window takes on an increased importance.

³⁵⁵As the HECO Companies' Smart Export proposal recommends the same export constraints as the Smart Export Stipulation, but at an even lower export credit rate, it would likely be even less economically attractive than the Smart Export Stipulation's proposal.

³⁵⁶See <https://www.hawaiianelectric.com/my-account/rates-and-regulations/average-price-of-electricity> (reflecting 26.07 c/kWh for Oahu residential customers; 31.52 c/kWh for Hawaii Island residential customers; and 28.49 c/kWh for Maui, 32.71 c/kWh for Molokai, and 33.52 c/kWh for Lanai residential customers, respectively).

tailored to address time periods when the HECO Companies' systems face peak demand from customer load, there is very limited opportunity for customers to export energy, a concern that is exacerbated by the economic incentive for a customer to use stored energy to serve host load before exporting to the grid. Under these circumstances, a customer may elect to enroll in the CSS program instead, given the CSS program's lower costs, comparatively smoother interconnection process, and overall simplicity.

Conversely, KIUC's Smart Export proposal, while offering an export credit rate less than that proposed by the Smart Export Stipulation, may offer greater economic opportunity for customers by virtue of its wider export windows. Also, unlike the Smart Export Stipulation's and the HECO Companies' proposals to use a control device to prevent export during the non-export periods, KIUC proposes to use a price signal to provide an economic incentive to encourage customers to avoid or minimize exports during the solar peak (i.e., setting compensation at \$0 during the non-export period). The commission is inclined to favor this approach, as it reduces upfront costs for customers and more closely reflects the kind of economic-based behavior incentives that the commission envisions for a mature DER market.

Accordingly, the commission is inclined to approve an interim Smart Export program with an export structure that more

closely reflects those proposed in KIUC's Smart Export proposal. That being said, the commission does not believe that simply applying KIUC's Smart Export proposal to the HECO Companies is practical or desirable. In addition to the different circumstances and challenges facing the HECO Companies and KIUC, KIUC's Smart Export proposal incorporates a number of economic incentives (and disincentives) that the commission believes need to be discussed further. For example, the "Peak Adder" and "Curtailment Adjustment" features, while intriguing, implicate a host of questions and concerns, including vetting the underlying methodology, assessing the applied amount,³⁵⁷ determining how often these amounts should be updated, and determining which time periods they should affect.³⁵⁸ In approving an interim Smart Export program with export windows that are more aligned with KIUC's proposal, the commission is merely acknowledging that the DER market may not yet be mature enough to handle the drastic transition from a "no restrictions" CGS export model to the narrowly proscribed export

³⁵⁷Under KIUC's Smart Export proposal, KIUC proposes to set its Peak Adder at \$0, and the methodology for its Curtailment Adjustment is estimated to significantly reduce the compensable Base Rate.

³⁵⁸Unlike the Smart Export Stipulation and the HECO Companies' Proposal, which are roughly divided into "export" and "non-export" periods, KIUC has created four time periods, each with a different "export rate" (i.e. Base Rate; Base Rate - curtailment adjustment; Base Rate + peak adder; and no compensation).

windows proposed by the Smart Export Stipulation and the HECO Companies.³⁵⁹

In establishing this interim Smart Export program, the commission again wishes to emphasize the beneficial, albeit incremental, step forward this program represents. In addition to offering Smart Export customers the option to receive time value-based compensation in exchange for their energy exports, the program also seeks to deliver benefits to non-participants in the form of improved grid reliability in that interim Smart Export customers will likely: (1) decrease system strain during peak consumption hours in the evening (where Smart Export customers may either serve their own load independently or contribute generation in the form of compensated exports); and reduce the amount of exported energy during the peak export hours in the middle of the day (where Smart Export customers will instead use the solar energy

³⁵⁹This is not to say that the commission does not appreciate the ideas expressed in the Smart Export Stipulation and the HECO Companies' proposal. Ultimately, the commission seeks to implement market policies that recognize the time-varying value of energy exports to the grid. By focusing on the time periods when the system faces peak customer demand for load, the Smart Export Stipulation and the HECO Companies' Smart Export proposals both recognize that this is when energy exported to the grid has its highest value. Indeed, the commission has directed focus to this particular concern in the past (see Decision and Order No. 34534 at 36), and applauds the signatories to the Smart Export Stipulation and the HECO Companies for building off of the proposals submitted in response to the Phase 2 Priority Issues and focusing their Smart Export proposals on the system peak periods.

captured by their PV systems to charge their storage systems for onsite consumption or compensable export at later times). At a minimum, this diminishes (or at least, does not contribute to) grid concerns, while contributing to the development of increasingly sophisticated, and equitable, market-based solutions to the energy challenges facing Hawaii today.

Based on the above, after reviewing the Parties' various Smart Export proposals, the commission has determined that the interim Smart Export program should contain the following export and non-export windows and corresponding export credit rates:

Credit Rates and Export Windows for Interim Smart Export Program for the HECO Companies				
12 a.m. - 9 a.m.		9 a.m. - 4 p.m.	4 p.m. - 12 a.m.	
HECO	14.97 c/kWh	No credit	HECO	14.97 c/kWh
HELCO	11.00 c/kWh		HELCO	11.00 c/kWh
MECO (Maui)	14.41 c/kWh		MECO (Maui)	14.41 c/kWh
MECO (Molokai)	16.64 c/kWh		MECO (Molokai)	16.64 c/kWh
MECO (Lanai)	20.79 c/kWh		MECO (Lanai)	20.79 c/kWh

The export credit rates outlined above will remain fixed for five (5) years from the effective date of the tariff, after which time they may be modified at the commission's discretion.

As noted above, the export credit rate is based on the HECO Companies' average marginal costs for these export time periods, as provided in the HECO Companies' Response to CA/HECO-IR-3(a) and Attachment 1.³⁶⁰ Additionally, consistent with KIUC's Smart Export proposal, the non-export windows are enforced by price signals (i.e., zero compensation).

Ultimately, the commission envisions a future where the DER market is developed and robust enough to support increasingly granular time-varying export rates consistent with the sentiment expressed in the Smart Export Stipulation. However, the commission must also recognize that the DER market in Hawaii is still in the early stages of shifting from an uncontrolled export model to a "smart" export model. As the interim Smart Export program approved

³⁶⁰While the Consumer Advocate has noted that the HECO Companies submitted different marginal cost data in their April 2016 Power Supply Improvement Plan Update, see CA FSOP at 15, the commission does not believe relying on these figures is appropriate. The commission found that the HECO Companies' April 2016 PSIP Update was insufficient, and ordered them to revise and re-submit their Update. See Order No. 33877 "Establishing a Procedural Schedule to Address the Hawaiian Electric Companies' Power Supply Improvement Plan Update," filed August 16, 2016, in Docket No. 2014-0183. In addition, the HECO Companies refer to the marginal cost figures submitted in response to the Consumer Advocate's IRs as their "current" estimates of hourly marginal costs for 2017, notwithstanding the fact that the HECO Companies filed the April 2016 PSIP after submitting the 2017 marginal cost figures. Accordingly, the commission believes it is more prudent to rely on the 2017 marginal cost figures submitted by the HECO Companies in this proceeding in response to the Consumer Advocate's IRs.

in this Decision and Order merely represents another incremental step toward developing a more complete and sophisticated DER market, the commission is electing to proceed with caution at this time so as to mitigate or avoid any unnecessary disruptions.

Program Size. The Smart Export Stipulation proposes Smart Export program capacity caps of 25 MW for HECO and 5 MW for MECO and HELCO, respectively. Additionally, the Smart Export Stipulation proposes that program capacity be measured in terms of projects actually installed.

The Joint Parties emphasize the importance of establishing a program size that generates sufficient market interest and enables DER companies to develop products, establish supply chains, and market the tariff to potential customers. The commission agrees. Bearing in mind the popularity of the NEM and CGS export programs, the commission is inclined to support the Smart Export Stipulation's program capacity proposal.

In support of their smaller program capacity limits for MECO and HELCO,³⁶¹ the HECO Companies cite concerns about the impacts that removing load from the grid during daylight hours will have on reliability and grid-scale curtailment.³⁶² However,

³⁶¹As the HECO Companies have also proposed 25 MW of capacity for Oahu for the Smart Export program, it does not appear that they opposed the Smart Export Stipulation on this issue.

³⁶²See HECO Cos. ISOP, Exhibit A.

the HECO Companies do not verify these concerns in their ISOP or their system-level hosting capacity analysis, and in response to IRs from the Consumer Advocate, state that they have not forecasted the likely impact of either their own Smart Export proposal's capacity limits or the Smart Export Stipulation's capacity limits on curtailment at the system and/or circuit level.³⁶³ Furthermore, the HECO Companies' proposal is inconsistent with projections for DER adoption in their recently approved PSIP.³⁶⁴

For the reasons discussed above, the commission will approve interim Smart Export program capacity limits of 25 MW for HECO, 5 MW for HELCO, and 5 MW for MECO. For purpose of determining program capacity limits, capacity shall be based on a kW measure of systems actually installed, measured by the lesser of the system's inverter or the total of the PV generation. The HECO Companies shall process and approve applications until the capacity associated with approved applications reaches the program cap. Thereafter, the HECO Companies shall continue to accept applications, but shall issue a notice to the applicant informing him or her that the application has been accepted, but approval will be conditioned on available capacity space. In this

³⁶³See HECO Cos. Response to CA/HECO-IR-1(a) and (b).

³⁶⁴See "Hawaiian Electric Companies' PSIPs Update Report Filed December 23, 2016," filed December 23, 2016, in Docket No. 2014-0183, Book 3 of 4, at J-26 to J-28 (containing the HECO Companies' Market DG-PV Capacity Forecasts).

sense, a queue will be formed, based on the acceptance date of the application. In the event that an approved application ultimately does not proceed with installation and interconnection, the capacity associated with that application shall be returned to the program and be used toward granting approval to the next accepted application waiting in the queue.

This approach should address the concerns of both the Consumer Advocate and the signatories to the Smart Export Stipulation. As the commission understands the process applied by the HECO Companies, an application can be accepted, but not necessarily approved, if there is no remaining program capacity to accommodate the accepted application. Thus, there should not be a situation where an "approved" application results in an increase in the program cap; i.e., an application should not be "approved" unless there is available program cap space. Accordingly, the process outlined by the commission above should satisfy the Smart Export Stipulation signatories' concerns that an "approved" application be afforded "a clear path to completion,"³⁶⁵ since all approved applications are, by definition, those that have been processed and approved before the program cap has been reached. At the same time, this should also address the Consumer Advocate's concern that "approved" projects will continue to be installed

³⁶⁵See Smart Export Stipulation at 16.

after the program cap has been reached,³⁶⁶ since, by definition, there should not be any "approved" projects in excess of the program cap.

Accordingly, the HECO Companies shall accept and approve applications until the capacity associated with the approved applications has reached the interim Smart Export program cap. Once this has occurred, the HECO Companies may continue to accept applications, but cannot approve them unless program space is made available by a withdrawn, approved, application. As noted above, this will likely form a queue of accepted, but not "approved," applications. In managing this queue, the HECO Companies shall implement greater levels of transparency by notifying customers who submit applications after the amount of program space has been allocated to approved applications that: (1) their application has been accepted, but approval is conditioned on space being made available in the program by virtue of withdrawn or cancelled approved applications; and (2) the customer's relative position in the queue, based on the chronological date of their accepted application. This should help educate customers about the process for receiving approval for an interim Smart Export system, better manage their expectations regarding the likelihood and timeline for approval, and assist them in making more informed

³⁶⁶See CA ISOP at 21.

decisions about whether they wish to consider investing in a Smart Export system.

Program renewal and off-ramps. That being said, the commission understands that there may be confusion as the interim Smart Export cap is reached, and therefore agrees with the proposal for periodic notices as the program capacity is filled. Accordingly, the commission will adopt the Smart Export Stipulation's proposal that the HECO Companies publicly announce and notify the commission and Parties when 50%, 75%, and 90% of their respective interim Smart Export program caps have been reached.³⁶⁷ The commission also agrees that a technical conference with the Parties should be held when 75% of an interim Smart Export program's capacity has been reached.³⁶⁸ Upon receiving such notice from any of the HECO Companies, the commission intends to issue a notice to the Parties, setting a date and time for a technical conference.

Metering and data collection. The commission observes that all the Parties appear to agree on the necessity of installing a smart net meter and the value of collecting and exchanging time-differentiated electricity consumption and export data. As these meters measure the flow of energy to and from the grid, they

³⁶⁷See Smart Export Stipulation at 17.

³⁶⁸See Smart Export Stipulation at 17.

should produce valuable data that can assist the Parties and commission in further refining and developing program options during the Market Track.

Regarding the costs of metering, the commission notes that customers enrolled in the NEM, CGS, and CSS programs currently do not directly bear the costs of metering. Requiring a change in this policy at this time may require the HECO Companies to develop a new administrative process to account for the costs of metering and data analysis for the interim Smart Export Program. While the commission generally agrees with the Consumer Advocate's position that "costs should follow the cost causer," the commission notes that this is an interim program of relatively small size, so the effect of maintaining existing treatment of metering costs should not be unduly detrimental to ratepayers, under the circumstances.

Accordingly, the commission concludes that under the circumstances, the HECO Companies shall not separately charge participants in the interim Smart Export program for metering costs, unless otherwise ordered by the commission.

However, for reasons discussed below, the commission is not convinced that the HECO Companies' proposed additional smart production meter for the interim Smart Export program is necessary at this time.

Controllability. The commission is not persuaded, at this time, that there is a need for smart production meters to control the output from Smart Export systems.

Given the defined export windows established in the interim Smart Export program, as outlined above, the program provides a greater degree of predictability for the utility. Critically, Smart Export systems are not expected to export energy during the peak solar irradiance period (i.e., Mid-day), which is typically when system-level technical conditions have been most pronounced.

Accordingly, the commission will not require a smart production meter for the interim Smart Export program at this time.

Credit reconciliation and facility size. The Smart Export Stipulation proposes applying an annual, versus monthly, true-up period for export credits. The HECO Companies do not challenge this proposal in their ISOP or FSOP, and note in a response to the Consumer Advocate's IRs that they have not conducted any research on the potential impacts of an annual versus monthly true-up on DER "right-sizing."³⁶⁹ Similarly, the Consumer Advocate does not oppose an annual true-up mechanism for the interim Smart Export program.³⁷⁰

³⁶⁹See HECO Cos. Response to CA/HECO-IR-6(c).

³⁷⁰See CA FSOP at 17.

Based on the apparent lack of opposition and detrimental evidence in the record, the commission will approve the Smart Export Stipulation's proposal to apply an annual true-up to the interim Smart Export program.

Regarding generation facility capacity limits, the HECO Companies do not specify any system limits, but propose offering an expedited interconnection process for customers who agree to limit their system exports during approved export windows to 3 kW. Although not opposed by the Consumer Advocate,³⁷¹ the commission is not persuaded that this proposal is sufficiently grounded in a technical basis. While the commission appreciates the HECO Companies' initiative in proposing creative solutions to expedite interconnection, and supports the exploration of fast-tracking applications based on sound technical criteria, the commission believes that the HECO Companies should strive to expedite interconnection of all interim Smart Export systems, not just those who voluntarily limit their export capability to 3 kW. The commission encourages the HECO Companies to continue exploring creative solutions to streamline the interconnection process. Ideally, feedback and data collected from implementation of the interim Smart Export program will help inform new proposals during the Market Track of this proceeding.

³⁷¹See CA FSOP at 17-18.

Participation in future DER programmatic offerings. It is the commission's intent to ultimately provide a market place where customers may selectively enroll in a suite of unbundled DER options, addressing both consumption of energy as well as provision of grid services. To that end, the commission wishes to create opportunities for customers to better manage their behavior toward consuming and generating electric energy, to the extent circumstances permit.

In addition to this interim Smart Export program, the commission notes that it is also working with the utilities and stakeholders toward developing a Demand Response portfolio program, which is expected to be available to customers in the near future. Given the overlapping principles between DER and Demand Response programs, the commission sees no reason why customers should be forced to choose one over the other. Accordingly, customers who enroll in the interim Smart Export program, as described above, shall be encouraged to also apply for enrollment in a Demand Response program, when made available.

D.

Establishing An Interim CGS+ Program

As discussed above, the commission's stated intent with respect to establishment of the interim CGS and CSS programs was to begin to address the technical and economic concerns associated

with the uncontrolled export of energy under the NEM program, while avoiding a complete termination of all direct-to-grid PV export options.³⁷² Similarly, by this Decision and Order, the commission directs the establishment of a revised CGS+ program in order to accommodate the continued gradual transition toward energy storage-based DER offerings, while continuing to recognize and address the technical and economic concerns associated with direct-to-grid PV output. The commission sets forth the pertinent features of the CGS+ program as follows:

Compensation. As with past commission statements on the matter, the compensation rate for CGS+ system output should be closely aligned with the value that energy provides to the grid along with the price of other low-cost renewable energy alternatives, in order to mitigate any increases in costs borne by non-participants and to help facilitate cost-effective renewable energy procurement.

Consistent with this approach, and in line with the compensation methodology of the original CGS option, the commission finds and concludes that the 12-month average on-peak avoided cost is a reasonable interim approximation of the relative value of energy exported to the grid from CGS+. However, unlike the original CGS program, which incorporates a fixed-rate for

³⁷²See Order No. 34205 at 13.

compensation based on figures approved at the time of its establishment (i.e., October 2015), the CGS+ program should utilize updated figures under this methodology to provide a more accurate value of the energy to the HECO Companies:

Island	Current CGS ³⁷³	Updated CGS+ ³⁷⁴
Oahu	15.07	10.08
Hawaii Island	15.14	10.55
Maui	17.16	12.17
Molokai	24.07	16.77
Lanai	27.88	20.80

In order to promote market stability and to help provide a reasonable amount of customer investment certainty, the HECO Companies shall fix the export credit rate for the CGS+ program for five (5) years. Thereafter, the commission may modify the export credit rate at its discretion.

³⁷³See HECO Companies' Rule 23.

³⁷⁴See https://www.hawaiianelectric.com/Documents/my_account/rates/avoided_energy_cost/avoid_energy_cost_table.pdf (this figure incorporates the HECO Companies' most recent October 2017 data). See n.114, *supra*.

Program size. Given the communication and control requirements inherent in the CGS+ program coupled with the HECO Companies' ability to curtail CGS+ customers when system conditions dictate (as discussed, infra), there is less of an immediate concern regarding the impact CGS+ systems may have on system reliability. That said, it remains prudent to establish program capacity caps to provide guardrails and to serve as a natural checkpoint for program evaluation and adjustments over time.

In order to help foster near- to medium-term market certainty while the commission considers and resolves Market Track issues in this proceeding, the commission hereby establishes the following program capacity caps for the CGS+ program:

Company	CGS+ Program Cap
HECO	35 MW
HELCO	7 MW
MECO	7 MW

The program capacity caps for CGS+ are informed by the HECO Companies' PSIP projections for Distributed Generation-PV uptake over the next five years and reflects the view that CGS+ stands as a complementary program to the interim Smart Export

program. The CGS+ program is being allotted additional program capacity above that allocated to the interim Smart Export program to reflect that this direct-to-grid PV export program is intended to serve as a complementary option to facilitate market stability while the commission resolves pertinent issues in the Market Track of this docket.

Consistent with the commission's approval of the interim Smart Export program,³⁷⁵ the CGS+ program's capacity cap shall be based on a kW measure of systems actually installed, measured by the lesser of the system's inverter or the total of the PV generation. The HECO Companies shall process and approve applications until the capacity associated with approved applications reaches the program cap. Thereafter, the HECO Companies shall continue to accept applications, but shall issue a notice to the applicant informing him or her that the application has been accepted, but approval will be conditioned on available capacity space, thereby forming a queue. In the event that an approved application ultimately does not proceed with installation and interconnection, the capacity associated with that application shall be returned to the program and used toward granting approval to the next accepted application waiting in the queue.

³⁷⁵See Section IV.C. supra.

In managing this queue, the HECO Companies shall strive for transparency by notifying customers who submit applications after the amount of program space has been allocated to approved applications that: (1) their application has been accepted, but approval is conditioned on space being made available in the program by virtue of withdrawn or cancelled approved applications; and (2) the customer's relative position in the queue, based on the chronological date of their accepted application.

Program renewal and off-ramps. In addition, the commission will likewise require the HECO Companies to provide notice to the public and the commission and Parties when 50%, 75%, and 90% of their respective CGS+ program caps have been reached.³⁷⁶ Upon receiving notice from any of the HECO Companies that 75% of its CGS+ program capacity has been reached, the commission intends to issue a notice to the Parties, setting a date and time for a technical conference to discuss the program cap.

Metering and data collection. Consistent with the original CGS program, metering costs shall be borne by the utility. While the commission generally agrees with the Consumer Advocate that "costs should follow the causer," the commission finds that the circumstances here, including the system-wide benefits anticipated from the data collection from the meters,

³⁷⁶See Section IV.C., supra.

controllability offered to the utility, and relatively small size of the program, justify recovering the costs of the smart production meters from ratepayers.

Controllability. A core component and critical revision embodied in the CGS+ program is the requirement that participating customers implement technology that allows the utility to measure, monitor, and, if necessary, control CGS+ systems. The commission's preference is for such communication and control to be effectuated through the acceptance of aggregated data from system aggregators that can meet technical requirements for reliability of data collection and provision to the HECO Companies.³⁷⁷ Such third-party aggregators should also provide a flexible mechanism, or "virtual switch," through which a general connect/disconnect function could be configured; i.e., a function that separates DER from the grid while leaving the customer's load connected to the grid. This is similar to a feature proposed by the HECO Companies as part of their Smart Export Proposal.³⁷⁸

However, understanding that system aggregators may not stand ready to provide the requisite DER communication and control functionality at the outset of the CGS+ program, in the alternative, CGS+ customers may elect to have the HECO Companies

³⁷⁷See HECO Cos. FSOP at 16.

³⁷⁸See HECO Cos. FSOP at 16.

install a separate smart production meter that will transmit data to the HECO Companies for the purposes of evaluating, monitoring, and verifying technical compliance, generating facility performance, and power quality, all of which will help ensure the safe and reliable operation of both the generating facility and the grid.³⁷⁹ Where the non-system aggregator communication and control option is elected, smart production meters shall be purchased, owned, and installed by the HECO Companies on the customer's premise.

While the commission has declined to adopt this feature for the interim Smart Export program, the commission observes that the interim Smart Export program is distinguishable from the CGS+ program in several key respects. First, given the defined export windows established in the interim Smart Export program, the program contains a greater degree of predictability for the utility, thereby diminishing the urgency for utility control of the customer's system. Additionally, the inclusion of an energy storage system to the interim Smart Export program provides customers with the opportunity and means to store their PV generation during peak solar periods for later use during more economically desirable times.

³⁷⁹See HECO Cos. FSOP at 16.

Conversely, less sophisticated, direct-to-grid export systems, such as CGS+, may be incapable of regulating their level of export to the grid, and are thus more likely to be associated with unstable grid conditions, which could warrant curtailment. In sum, the difference in treatment between the interim Smart Export program and CGS+ on this issue can be seen as a trade-off; in exchange for investing in more sophisticated technology, Smart Export customers pose less of a risk to grid system safety and reliability, particularly during the peak solar irradiance period, and thus, necessitate fewer safeguards and utility control, at this time.

Curtailment treatment. As outlined above, CGS+ systems shall be equipped with communication and control features such that the HECO Companies can ensure the safe and reliable operation of both the generating facility and the grid. When system conditions dictate, CGS+ systems may be curtailed as a single block. Given the HECO Companies' representations in their system-level hosting capacity analyses, the commission expects that curtailment of these systems would only occur after controllable renewable resources with lower curtailment priority (i.e., utility-scale renewable projects) have been fully curtailed

and the utility is at risk of violating a system operational constraint that is necessary to maintain reliable service.³⁸⁰

Additionally, with respect to curtailment priority, the CGS+ program curtailment block shall be curtailed second-to-last on each island system.³⁸¹ In light of the projected headroom for each island, as articulated in the HECO Companies' most recent system-level hosting capacity analysis, and given the CGS+ program capacity caps, the commission does not expect CGS+ systems to experience much, if any, curtailment, at least initially. That said, the commission seeks to establish CGS+ curtailment reporting requirements to illuminate historic curtailment treatment for prospective CGS+ customers as well as to ensure that CGS+ systems are curtailed in a fair and equitable manner consistent with the curtailment guidelines articulated herein.

To that end, the HECO Companies shall file CGS+ curtailment reports, to be submitted as part of a quarterly comprehensive DER Technical Track compliance filing ("DER Technical Report") addressing all of the report requirements

³⁸⁰Based on the HECO Companies' system-level hosting capacity analyses, curtailment of CGS+ systems would be expected: (1) after all committed units have been reduced to minimum operational output; (2) after fully curtailing available controllable renewable resources; and (3) before triggering violations of operational down reserves.

³⁸¹It is anticipated that CBRE facilities will enjoy the highest curtailment priority.

set forth in this Decision and Order. The first such DER Technical Report shall be due March 30, 2018. The curtailment report component shall include:

- Start and end times of any CGS+ curtailment events in the reporting period;
- An estimate of the number of MW and MWh of curtailment, on a per event and aggregate basis for the reporting period;
- Data specifying the relevant system conditions at the time of each curtailment event, including: (a) net load; (b) committed units; (c) level of dispatch for each committed unit; (d) level of output for any "as-available" or "must take" resources; (e) whether any curtailment had been initiated for other resources; and
- An explanation and justification for each curtailment event for the CGS+ block.

Participation in future DER programmatic offerings.

Similar to guidance offered on the interim Smart Export program, customers who enroll in the CGS+ program, as described above, shall be encouraged to also apply for enrollment in a Demand Response program(s), when made available.

E.

Activation Of Advanced Inverter Functions

By Decision and Order No. 33258, the commission stated, "it is well established that advanced inverter functions are

essential to continued beneficial deployment of DER in Hawaii.”³⁸² The commission observes that the majority of Parties signing the Advanced Inverter Stipulation signal agreement that AIFs remains essential for enabling continued DER deployment. Accordingly, notwithstanding the commission’s denial of the Advanced Inverter Stipulation, the commission approves the majority of the provisions addressed in the Advanced Inverter Stipulation, with the exception of activation of the Volt-Watt function and the proposed change to range of return-to-service, pending further consideration by the Parties during the Market Track.

1.

Approving Volt-VAR, Frequency-Watt, And Revisions To
Rule 14H Definitions

As a preliminary matter, the commission observes that there does not appear to be any significant opposition to the immediate activation of the Volt-VAR and Frequency-Watt AIFs.³⁸³ Given the assistance in improving integration of DERs these AIFs are anticipated to provide, the commission finds that it is

³⁸²See Decision and Order No. 33258 at 104.

³⁸³As noted above, opposition to these functions appears to be minimal. While DERC and EFCA have not signed the Advanced Inverter Stipulation, their stated concerns have been focused on the activation of the Volt-Watt function. Similarly, Apollo Energy has only raised generalized objections to any changes being made at this time.

reasonable to approve the activation of the Volt-VAR and Frequency-Watt functions at this time. Concomitantly, consistent with the recommendation of the Advanced Inverter Stipulation, the commission also approves the de-activation of Fixed Power Factor.

In addition, the commission also approves the proposed changes to, and additions of, definitions to the HECO Companies' Rule 14H to harmonize Rule 14H with the HECO Companies' SRD, UL 1741 SA, and the pending update to IEEE 1547 standards.

In the event that unforeseen consequences or other negative impacts arising from the activation of the Volt-VAR and Frequency-Watt functions result, the commission may make adjustments to applicable interconnection requirements accordingly.

2.

Deferring Activation Of Volt-Watt

Many of the signatories to the Advanced Inverter Stipulation state that activation of Volt-Watt should not be approved at this time due to unknown curtailment impacts, which may potentially reach 10% or higher, depending on individual customer circumstances.³⁸⁴ That being said, most of the Parties

³⁸⁴See Advanced Inverter Stipulation at 12; and September VROS Update, Attachment 1 at page 13 of 118.

still agree that Volt-Watt can be a beneficial tool for addressing circuit voltage issues, but claim that more work is still needed before establishing Volt-Watt as a universal interconnection requirement.³⁸⁵

As an initial matter, the commission appreciates the efforts expended by the HECO Companies on this issue, including working with NREL to produce the VROS Report (which has performed extensive modeling on the effects of AIFs) and launching a pilot, opt-in program by which to gather field data on the activation of the Volt-Watt function in circuits experiencing high voltage constraints.³⁸⁶ Indeed, many of the Parties acknowledge this progress, but express concerns about the limited nature of the modeling performed in the VROS Report and the potential amount of curtailment that may actually occur as a result of blanket activation of the Volt-Watt function.³⁸⁷

After review of the record and briefing regarding Volt-Watt activation, the commission concludes that the Volt-Watt function should not be required as a mandatory AIF at this time, for the reasons set forth below.

³⁸⁵See Joint Parties FSOP at 1-2.

³⁸⁶See VROS Report, Attachment 1 at pages 103-104 of 116; see also, Advanced Inverter Stipulation at 11.

³⁸⁷See Joint Parties ISOP at 17-21; Joint Parties FSOP at 2-3.

First, as raised in the Joint Parties' ISOP, there is uncertainty regarding the amount of potential curtailment resulting from Volt-Watt activation that customers may experience, and a corresponding need for further field measurement, analysis, and verification. Given the limited data presented and the unknown levels of curtailment that may result if Volt-Watt is deployed on a blanket basis, the commission agrees with the Joint Parties and DBEDT that the HECO Companies should provide an analysis of customer curtailment impacts by activation of Volt-Watt that includes field verification via distribution grid monitoring to show if the VROS Report is representative of the entire grid.³⁸⁸ In this regard, the commission notes that it has previously tasked the HECO Companies with both modeling and comprehensive distribution circuit monitoring to address uncertainty about existing conditions on the distribution system.³⁸⁹

Second, this issue is intertwined with the broader issue of determining appropriate compensation for voltage regulation services. The commission agrees with several of the Parties that there should be eventual compensation for grid services provided

³⁸⁸See Joint Parties ISOP at 7; and DBEDT FSOP at 10.

³⁸⁹See Order No. 32053, "Ruling on RSWG Work Product," filed April 28, 2014, in Docket No. 2011-0206 ("Order No. 32053"), at 57-62, 107, and 121-22.

by DER, including AIFs such as Volt-Watt.³⁹⁰ However, at this time, there is insufficient evidence in the record to determine the value of the Volt-Watt function, among other voltage regulation services, or establish a mechanism for compensation. Additionally, the commission anticipates that the HECO Companies will continue to seek non-wire alternative solutions to distribution system issues, which may alleviate some of the potential curtailment impacts associated with Volt-Watt activation. In sum, Volt-Watt impact measurement, Volt-Watt compensation, and other technical and economic considerations should be addressed before the commission will consider mandatory activation of Volt-Watt. The commission intends to further address these issues in the Market Track.

Third, the commission observes that the HECO Companies' pilot program for opt-in activation of Volt-Watt by customers seeking to expedite interconnection of their DER systems is underway.³⁹¹ Use of Volt-Watt on an opt-in basis has also been proposed by the Joint Parties, who state that Rule 14H supports use of opt-in "[a]ctive and reactive power requirements" as a way to address issues in the interconnection review process.³⁹² To the

³⁹⁰See DERC FSOP at 6-8 and 13-14; Joint Parties FSOP at 13; and EFCA FSOP at 15-17.

³⁹¹See Advanced Inverter Stipulation at 11.

³⁹²See Joint Parties FSOP at 4.

extent that this is not already being done, the commission instructs the HECO Companies to expand the implementation of this pilot opt-in program by offering it to customers that fail supplemental review due to overvoltage concerns and who may be permitted to interconnect by activating the Volt-Watt function on an opt-in basis.

In summary, the commission does not believe a sufficient basis of information currently exists to support blanket activation of the Volt-Watt function throughout the HECO Companies' service territories. Customers considering the significant investment in a DER system should have information available to understand the likely locations and potential magnitude of curtailment before this function becomes a mandatory requirement. The HECO Companies have identified further field data collection and validation as part of additional work with NREL and within the scope of the VROS project. The HECO Companies are encouraged to further supplement the record on this topic through these studies, data collected from customers that opt-in to Volt-Watt activation, and further discussion and collaboration with stakeholders.

Deferring Approval Of The Proposed Return-To-Service Range

While the Advanced Inverter Stipulation refers to the May 2017 IEEE P1547 as the "latest draft of IEEE P1547,"³⁹³ the commission notes that a subsequent draft was issued in September 2017, which proposes a narrower return-to-service range of adjustment (59.0 Hz to 59.5 Hz, as compared to the May 2017 draft's recommendation of 59.9 Hz to 60.1 Hz).³⁹⁴ Accordingly, the Advanced Inverter Stipulation's proposed return-to-service range of 59.9 Hz to 60.1 Hz may no longer be consistent with the updated draft of IEEE 1547.³⁹⁵

After reviewing both the record and the Advanced Inverter Stipulation, the commission notes that the HECO Companies have not submitted additional technical support beyond the limited and unpersuasive explanation provided in their November 12, 2015 filing, which the commission deems insufficient

³⁹³Advanced Inverter Stipulation at 17-18.

³⁹⁴The April 2017 ballot (P1547/D6.7.2) specified a single return to service range, with default setting 59.5 to 60.1 Hz, range of adjustability 59.0 to 61.0 Hz. The September 2017 ballot (P1547/D7.0) specified minimum and maximum values separately: minimum default ≥ 59.5 , range of adjustability of 59.0 to 59.5 Hz; maximum default ≤ 60.1 Hz, range of adjustability 60.1 to 61.0 Hz.

³⁹⁵The IEEE P1547/D6.7.2, April 2017 (balloting dates May 19, 2017 - June 18, 2017) was re-circulated with amendments as IEEE P1547/D7.0 (balloting dates September 19, 2017 - October 2, 2017). At this time, it is unknown if there will be additional revisions and another balloting.

to justify a deviation from the IEEE standards for return-to-service.³⁹⁶ Accordingly, given the ambiguity over the return-to-service range proposed in the May 2017 IEEE 1547 and September 2017 IEEE 1547 drafts, the commission finds that the record still lacks sufficient demonstration of a need to differ from the current IEEE standards for return-to-service range. Thus, the commission does not approve this change to a narrower return-to-service range at this time. However, noting that the updated IEEE 1547 standard with new return-to-service ranges is expected to be published soon, the commission invites the Parties to provide input with respect to this issue as part of the Market Track.

F.

Improvements To The HECO Companies' DER Integration Analyses

In order to improve the HECO Companies' DER integration analyses, a number of Parties have proposed improvements to the HECO Companies' circuit-level hosting capacity analysis. In particular, many of the commenting Parties agree that the hosting capacity analysis should be updated to account for more advanced forms of DER beyond merely uncontrolled export systems,

³⁹⁶See Decision and Order No. 33258 at 75.

such as energy storage systems and pending smart export systems.³⁹⁷ The commission agrees that the HECO Companies' hosting capacity analysis should, to the extent practicable, reflect actual conditions. Given the pending and near-term development of DER and DER-related programs that are intended to provide grid-supportive services, the commission agrees with these Parties' proposals for the HECO Companies to update their hosting capacity methodology to better reflect reasonable assumptions about DERs, focusing not just on the effect of their energy exports, but also on the grid-supportive services they can provide.

In this regard, the commission notes that the HECO Companies appear to have taken proactive steps in this direction, and have provided a plan for implementing improvements to their hosting capacity analysis in both the near-term and long-term.³⁹⁸

According to the HECO Companies, they have incorporated feedback from the Parties in determining these improvements to their hosting capacity analysis, and have laid out a timetable which anticipates improvements being implemented as soon as next year.³⁹⁹ Upon reviewing the HECO Companies' proposed improvements,

³⁹⁷See Joint Parties ISOP at 8; DERC Joinder to Joint Parties ISOP at 9; DBEDT FSOP at 14; and EFCA ISOP at 7-8.

³⁹⁸See HECO Cos. ISOP, Exhibit C at 6-11.

³⁹⁹See HECO Cos. ISOP, Exhibit C at 2-3 and 6.

the commission concludes that they appear reasonable, as they should assist the HECO Companies in forecasting the impacts of a variety of DERs, as well as increasing transparency for customers.⁴⁰⁰

That being said, the commission shares EFCA's concerns regarding the costs associated with these improvements and whether they may result in economic barriers for customers in the form of unreasonably high interconnection fees or otherwise cause unfair bias against DERs.⁴⁰¹

The commission intends to monitor the HECO Companies' progress in this area, to ensure that the pledged improvements are taking place, as well as to assess how to address the costs associated with these improvements. Accordingly, the commission instructs the HECO Companies to include in its quarterly DER Technical Report updates on the progress of these hosting capacity improvements. Per the HECO Companies' proposed schedule, near-term improvements should be implemented by February 2018. The HECO Companies' first quarterly DER Technical Report is due March 30, 2018, and the commission anticipates that it will describe the implementation of the near-term improvements discussed in Exhibit C to the HECO Companies' ISOP. In the event

⁴⁰⁰See HECO Cos. ISOP, Exhibit C at 6-9.

⁴⁰¹See EFCA FSOP at 11-12.

improvements have not been realized, the HECO Companies shall explain, in detail, the reason for delay, what actions they have taken to address the delay, and a revised timetable for implementation of improvements.

Regarding the issue of cost recovery of these improvements, including whether costs should be recovered through an interconnection fee, the commission agrees with the HECO Companies that this may be considered in the Market Track. Related to that issue, though, is the ongoing issue of costs associated with the HECO Companies' Interconnection Requirements Study. As this issue may overlap with the issue of cost recovery for hosting capacity improvements, the commission believes it prudent to acquire more information on that issue as well.

Accordingly, in addition to the above reporting requirements on the status of hosting capacity improvements, the commission also instructs the HECO Companies to include a component justifying the necessity of, and cost for, an Interconnection Requirements Study, as well as other associated interconnection costs charged to, or requirements imposed on, customers. This report shall be due with the HECO Companies' first quarterly DER Technical Report, due March 30, 2018. Thereafter, the HECO Companies may supplement this report at their discretion or as directed by the commission.

G.

DERC's DC Microgrid Proposal

The commission notes that in its FSOP, DERC raises a proposal for a DC Microgrid as another alternative DER program that might enjoy expedited approval. However, as this issue has not been addressed by the Parties and has relatively little development in the record, the commission will not issue any findings on this proposal at this time. However, the commission invites the Parties to consider this proposal as part of the continued discussion in the Market Track.

H.

Issues Regarding KIUC's Proposal

1.

KIUC's Proposed Implementation Of Its Proposal

KIUC, in accordance with commission guidance and directives as set forth in Decision and Order No. 34534, is proposing modifications to KIUC's existing Schedule Q tariff structure. Similar to the currently existing Schedule Q options,⁴⁰² three options would be provided under the modified

⁴⁰²KIUC's current Schedule Q tariff gives the customer two options for subscribing to Schedule Q: Option 1 - whereby the customer does not sell any energy to KIUC, and elects to purchase its net load requirement from KIUC; and Option 2 - whereby the customer elects to sell energy in excess of its total load to KIUC and to purchase its net load requirement from KIUC.

Schedule Q tariff: (1) Self Supply; (2) Smart Export; and (3) Legacy Schedule Q.⁴⁰³

It is KIUC's position that, in order for these new Schedule Q DER options (i.e., Smart Export and Self Supply) to be effective and function properly, its existing Schedule Q tariff needs to be revised to simultaneously: (1) incorporate the new Smart Export and Self Supply DER options; (2) close the existing Schedule Q tariff options to further enrollment; and (3) revise the methodology utilized to set rates for KIUC's existing Schedule Q tariff.

KIUC states that "[t]o do otherwise would allow the proposed new Smart Export and Self Supply DER options to compete with the existing Schedule Q tariff options and could result in DER customers choosing to subscribe to the existing Schedule Q tariff options over the new Smart Export and Self Supply tariff options. This would result in the new Smart Export and Self Supply Schedule Q DER tariff options not achieving the objectives for which such options were conceived: to take advantage of technological advancements and compensate customer generators for their respective exported energy at rates based on the value of

⁴⁰³See Section III.C., supra.

the exported energy for use by the utility's other ratepayers/customers."⁴⁰⁴

2.

HAR Title 6, Chapter 74 And Schedule Q

The Schedule Q tariff in Hawaii has its roots in the Public Utilities Regulatory Policies Act of 1978 ("PURPA"). Schedule Q is made a part of the tariffs of each of the HECO Companies and KIUC in order to comply with the requirement in the Federal Energy Regulatory Commission ("FERC") rules implementing PURPA, and the commission rules based on the FERC rules are outlined in HAR Title 6, Chapter 74.⁴⁰⁵ Under Schedule Q, an electric utility is required to purchase "any energy or capacity which is made available from a qualifying facility."⁴⁰⁶ A qualifying facility ("QF") can be either a

⁴⁰⁴KIUC ISOP, Exhibit 1 at 3-4.

⁴⁰⁵The intent and purpose of promulgating and adopting the standards for small power production and cogeneration in the state of Hawaii was to comply with §§ 201 and 210 of PURPA. See In re Wind Power Investors-III, Docket No. 4779, Decision and Order No. 7578, filed June 20, 1983, at 81 ("Decision and Order No. 7578"). The commission standards that were promulgated and adopted were, for all intents and purposes, a copy of the FERC rules relating to small power production. See id. The commission has previously concluded that where FERC has made an interpretation of its own rules, when consistent with state policy, it is reasonable for the commission to adopt that interpretation. Id.

⁴⁰⁶HAR § 6-74-21(a).

cogeneration facility meeting certain efficiency requirements, or a small power producer whose energy input is primarily from waste, biomass, or renewable resources.⁴⁰⁷

For QFs with a design capacity of 100 kW or less, "[t]here shall be placed into effect with respect to each electric utility, standard rates for purchases[.]"⁴⁰⁸ For a QF acting as an "as-available" energy facility (i.e., providing energy as it determines that energy to be available for purchase), "the rates for such purchases shall be based on the purchasing utility's avoided energy costs calculated at the time of delivery. . . ." ⁴⁰⁹ For purposes of HAR Chapter 6-74, "[c]alculated at the time of delivery" means "calculated using the basic projections and assumptions used to develop the system cost data provided by an electric utility pursuant to [HAR] §§ 6-74-17 and 6-74-18 most closely preceding the actual time of delivery. . . ." ⁴¹⁰ The "basic projections and assumptions" referenced in HAR § 6-74-22(c) refers

⁴⁰⁷See HAR § 6-74-1 ("Qualifying facility" "means a cogeneration facility or a small power production facility which is a qualifying facility under '6-74-4 and subpart 2 of the regulations of the FERC regarding qualifying cogeneration and small power production facilities, 18 CFR Part 292.[sic]")

⁴⁰⁸HAR § 6-74-22(b).

⁴⁰⁹HAR § 6-74-22(c)(1).

⁴¹⁰HAR § 6-74-22(c).

to HAR § 6-74-17, which governs the utility's obligation to provide avoided costs data, including avoided energy costs.⁴¹¹

Thus, payment rates specified in Schedule Q are currently based on KIUC's filed avoided energy costs.

3.

Issues Requiring Further Discussion

At the outset, the commission acknowledges that there are positive aspects to several salient features of KIUC's smart export design, including price-differentiated export windows with shoulder periods, placeholders for a "Peak Adder" and a "Curtailed Adjustment," as well as the utilization of price signals to govern non-export periods, rather than export "bans" enforced via smart net meters or smart production meters.

Notwithstanding these commendable concepts, in its Proposal, KIUC has proposed to modify its Schedule Q tariff such that the only options presented to new customers under Schedule Q

⁴¹¹See HAR § 6-74-17(b), which states, in relevant part: "Each electric utility shall submit avoided energy costs consisting of cost of fuel, which shall be computed based on the latest composite fuel price stated in cents per million BTU multiplied by the heat rate per million BTU per net kilowatt hour. The subtotal is then adjusted for the power factor adjustment in cents per net kilowatt hour multiplied by the hour-weighting factor for on-peak and off-peak periods. The heat rate, power factor adjustment and generation operating and maintenance costs shall be derived from the electric utility's last rate increase approval by the commission."

would be a self-supply system or a smart export system.⁴¹² In addition, KIUC proposes to modify its avoided cost methodology for existing and prospective Schedule Q customers.⁴¹³

Such an approach raises several questions that require additional briefing by the Parties before KIUC's Proposal is ripe for disposition. For illustrative purposes, some of the questions that are raised by KIUC's Proposal to modify Schedule Q and adopt a new avoided cost methodology include, inter alia, the following:

1. How does KIUC's proposed changes to Schedule Q comport with the requirements set forth in HAR Title 6, Chapter 74?
2. Should modifications to Schedule Q avoided cost methodology be addressed in the instant proceeding or in Docket No. 2008-0069?⁴¹⁴
3. Should KIUC's proposed avoided cost rate methodology modifications be approved, both as applied to "legacy" Schedule Q customers and as applied to new smart export customers?
4. To what extent, if any, is PURPA implicated by KIUC's proposed modifications to Schedule Q?

⁴¹²See KIUC ISOP at 7-8.

⁴¹³See KIUC ISOP, Exhibit 1 at 9-10 (describing the cost methodology for KIUC's Smart Export proposal).

⁴¹⁴The commission notes that Docket No. 2008-0069 is an open proceeding established to examine avoided cost rate methodologies. See In re Public Util. Comm'n, Docket No. 2008-0069, Order No. 24157, filed April 18, 2008 (initiating an investigation to consider methodology for calculating Schedule Q payment rates).

5. Should smart export and self-supply options for KIUC customers be offered as separate tariffs or as options under a single Schedule Q tariff?

Given the complexity of KIUC's Proposal vis-à-vis the approach to smart export taken by the HECO Companies,⁴¹⁵ the commission finds the current record insufficient to make a determination on KIUC's Proposal at this time.

The commission further notes that the Joint Parties have also raised concerns with aspects of KIUC's request for the commission to approve a modification to the compensation methodology it applies to existing Schedule Q customers. The Joint Parties observe that no decision has yet been reached in Docket No. 2008-0069 and that the analysis pertinent to the proposed avoided cost methodology is stale and "requires close scrutiny due to a number of problematic factors," including: (a) what impacts the change in methodology will have on existing customer-generators; (b) whether KIUC's proposed methodology adequately reflects the value provided by DER; and (c) whether the proposed compensation rate works against PURPA's purpose.⁴¹⁶ Similarly, the Joint Parties have also objected to KIUC's proposal to implement its technical requirements and interconnection

⁴¹⁵Critically, neither the HECO Companies nor the Smart Export Stipulation proposes to implement their Smart Export option for the HECO Companies under Schedule Q.

⁴¹⁶Joint Parties FSOP at 27-28.

standards for its Smart Export and Self Supply program options outside of its Tariff No. 2.⁴¹⁷

That being said, none of this should be construed as criticism or disapproval of KIUC's efforts to date. The commission notes that KIUC has had much less time to examine the issues and programmatic details associated with a new DER program, such as Smart Export. The focus of the Priority Issues established in Order No. 34206 has centered on the HECO Companies, and it was in response to proposed changes to the HECO Companies' CGS program that initiated the discussion of a Smart Export program.⁴¹⁸ The emphasis, at that time, was on developing a Smart Export program for the HECO Companies, and a Working Group was established specifically to address this issue.⁴¹⁹

While the commission recognized that "the Parties should consider the extent to which similar program offerings should be developed for KIUC," and instructed KIUC to begin working on a Smart Export proposal,⁴²⁰ KIUC's progress in developing similar DER options was less advanced than that of the HECO Companies, and a separate KIUC-specific Working Group was also established.⁴²¹

⁴¹⁷See Joint Parties FSOP at 25-26.

⁴¹⁸See Decision and Order No. 34534 at 34-38.

⁴¹⁹See Decision and Order No. 34534 at 44-45.

⁴²⁰Decision and Order No. 34534 at 35 and 37.

⁴²¹See Decision and Order No. 34534 at 45.

Accordingly, there has been less opportunity to examine and develop a record to support KIUC's Proposal, and, thus, it is not surprising that many outstanding issues remain. The commission intends to work with KIUC and the other Parties to continue examining KIUC's proposal and address any outstanding concerns.

In sum, because of the questions and concerns outlined above, and the inadequacy of the current record with respect to these issues, the commission is unable to make a determination on KIUC's Proposal at this time. Rather, the commission will further explore these issues with KIUC and the Parties so that a sufficient record may be developed and a disposition on KIUC's smart export program may be reached.

VI.

FINDINGS AND CONCLUSIONS

Based on the above, the commission finds and concludes as follows:

A.

The Deferred Issues Stipulation

1. Upon reviewing the Deferred Issues Stipulation, it appears that all of the issues identified by the commission in Decision and Order No. 34534 for further collaboration and stipulation have been addressed.

2. The Deferred Issues Stipulation reflects broad consensus among the Parties, with the non-signatories offering little material opposition.

3. Given the near unanimous consent of the Parties, as well as lack of meaningful opposition by the non-signing Parties, the commission approves the Deferred Issues Stipulation as just and reasonable and in the public interest.

4. The HECO Companies shall submit proposed tariffs with the revised Stipulation language to the commission within thirty (30) days of this Decision and Order.

B.

The Advanced Inverter Stipulation

5. The commission notes that the Advanced Inverter Stipulation does not reflect consensus of all the Parties, nor does it appear to reflect consensus of all the signatories as to the issues discussed in the Stipulation.

6. Critically, there appears to be an internal disagreement over the activation of the Volt-Watt function among the Stipulation's signatories. This concern over activation of the Volt-Watt function is also raised by a number of non-signing Parties as well, including EFCA, DERC, Apollo Energy, and, by implication, LOL and PPA (by virtue of their joint ISOP and FSOP).

7. Furthermore, regarding the return-to-service range proposed in the Advanced Inverter Stipulation, the commission is aware that the May 2017 IEEE P1547 draft, upon which the Advanced Inverter Stipulation relies, has been superseded by a September 2017 version, which features a minimum return-to-service range.

8. Given these concerns, the commission is not persuaded that approving the Advanced Inverter Stipulation, is warranted at this time. Accordingly, the commission denies the Advanced Inverter Stipulation.

9. However, the commission observes that the Stipulation appears to reflect consensus among the Parties on certain AIFs, such as Volt-VAR and Frequency-Watt. As a result, the commission will still consider the Advanced Inverter Stipulation, including those aspects of the Stipulation that do not appear to be opposed, as part of its larger consideration of the proposed AIFs, as discussed below.

10. In addition, the commission notes that one issue covered by the Stipulation, the request to revise Rule 14H, Appendix I, Subparagraph 4A has been addressed by commission order, as well as the Self-Certification Stipulation, and is addressed by the findings in Section V.D., infra.

C.

The Smart Export Stipulation

11. Upon reviewing the Smart Export Stipulation, the commission notes that, like the Advanced Inverter Stipulation, the Smart Export Stipulation does not reflect strong consensus among the Parties.

12. Rather than a true stipulation, it appears that the Smart Export Stipulation is more akin to a joint position statement on the Smart Export issue and appears to reflect the Joint Parties' and other signatories' position on this issue as contained in their respective ISOPs and FSOPs.

13. Accordingly, the commission finds that it is not reasonable to approve the Smart Export Stipulation. Instead, the commission will consider the Smart Export Stipulation as part of its larger consideration of the proposed Interim Smart Export Tariff as discussed below.

D.

The Self-Certification Stipulation

14. Like the Deferred Issues Stipulation discussed above, the Self-Certification Stipulation reflects broad consensus among the Parties, with the non-signatories offering little in terms of material opposition.

15. Regarding the proposed changes to the HECO Companies' Rule 14H, Appendix I, Subparagraph 4A, the commission notes that it has already issued Order No. 34794, which granted a request by the HECO Companies to modify the language of Subparagraph 4A. As stated in the Self-Certification Stipulation, the Stipulation was filed in response to the commission's suggestions in Order No. 34794 that further revisions may be necessary to clearly articulate the HECO Companies' intent.

16. Upon reviewing the Stipulation, it appears that it has sufficiently responded to Order No. 34794 by: (1) including a "Certification Deadline Date" that is expressly tied to March 10, 2018; and (2) stating that self-certification may continue until the "Certification Deadline Date."⁴²²

17. Considering that the commission has already approved revisions to Subparagraph 4A with an identical intent, and that the Self-Certification Stipulation is in direct response to the commission's Order No. 34795, and given the broad consensus of the Parties and lack of meaningful opposition, the commission approves the Self-Certification Stipulation as just and reasonable and in the public interest.

⁴²²Self-Certification Stipulation at 4.

18. The HECO Companies shall submit proposed tariffs with the revised Stipulation language to the commission within thirty (30) days of this Decision and Order.

E.

Clarification Regarding The NEM Program

19. The commission finds that allowing NEM customers to install non-export technology is beneficial to the grid, as it represents an opportunity for these customers to provide grid services in the future. Conversely, prohibiting NEM customers from installing non-export technology may drive NEM customers toward purchasing non-parallel energy storage systems which may have the same practical effect on the NEM customer's ability to increase exports, but without the corresponding benefit of grid services that comes with having the energy storage system connected to the grid.

20. Accordingly, the commission finds that NEM customers should be able to install non-export technology and enroll in grid-connected energy storage programs that do not increase a system's export capacity, such as CSS. In doing so, the commission clarifies that its ruling in Decision and Order No. 33258 that "no additional system capacity shall be added to approved or pending NEM systems" does not apply to non-export technology.

21. However, NEM customers who choose to install non-export technology shall be required to upgrade their equipment on their systems such that it complies with the advanced inverter functionality approved by the commission. The commission finds that this achieves a reasonable balance between providing an opportunity for NEM customers to continue to participate in the developments in the DER market and addressing the concerns related to "legacy" systems such as NEM.

22. The HECO Companies shall work with the Parties and submit a proposed policy and procedure by which to guide the HECO Companies in addressing NEM customers who wish to add non-export technology. The HECO Companies shall submit their proposed policy(ies) within thirty (30) days of this Decision and Order.

F.

Modification To The CGS Program

23. Pursuant to Order Nos. 34205 and 34458, withdrawn capacity from the NEM program may be transferred to the CGS program through October 21, 2017.

24. To the extent capacity that was transferred from the NEM program to the CGS program on or before October 21, 2017, remains in the CGS program, the commission believes that such capacity should remain in the CGS program.

25. Accordingly, the commission clarifies that applications to the CGS program may continue to be accepted after October 21, 2017, until any such remaining capacity in the CGS program is depleted.

26. Pursuant to the HECO Companies' Rule 23, the fixed pricing structure of the CGS program will cease after October 21, 2017, and the commission may modify the energy credit rate at its discretion.

27. In keeping with the commission's desire to effectuate a gradual transition toward a more sophisticated DER market, as well as avoiding any unnecessary market disruption during this transition period, the commission will re-establish the fixed Energy Credit Rate for the CGS program as currently reflected in Rule 23 for each of the HECO Companies' respective service territories for an additional five (5) years. Thereafter, the Energy Credit Rate shall be subject to any future modification by the commission.

28. The HECO Companies shall submit a proposed tariff with the appropriate revisions within thirty (30) days of this Decision and Order.

G.

Interim Smart Export Program For The HECO Companies

29. Based on its review of the Smart Export Stipulation and the Smart Export proposals submitted by the HECO Companies and KIUC, as well as the concerns and considerations raised by the Parties, the commission is left with concerns such that it will not approve any specific proposal.

30. Rather, the commission approves an interim Smart Export program with the following features:

31. **Compensation.** The Smart Export credit rate shall be based on the utility's average marginal costs for the respective interim Smart Export time periods is a more appropriate interim approach, as provided by the HECO Companies in this proceeding, as reflected in the table below.

32. **Export windows.** The commission finds that an interim Smart Export program with wider export windows, such as those proposed in KIUC's Smart Export proposal, is prudent at this point in time, as it is better calculated to support the economic viability of the interim Smart Export program, given the marginal cost-based export rates approved by the commission (as discussed above), and the lack of data regarding initial costs to purchase and install a Smart Export system.

33. Based on its review and analysis of the record in this proceeding, the commission establishes the following export

windows and corresponding export credit rates for the interim Smart Export program:

Credit Rates and Export Windows for Interim Smart Export Program for the HECO Companies				
12 a.m. - 9:00 a.m.		9 a.m. - 4:00 p.m.	4 p.m. - 12:00 a.m.	
HECO	14.97 c/kWh	No credit	HECO	14.97 c/kWh
HELCO	11.00 c/kWh		HELCO	11.00 c/kWh
MECO (Maui)	14.41 c/kWh		MECO (Maui)	14.41 c/kWh
MECO (Molokai)	16.64 c/kWh		MECO (Molokai)	16.64 c/kWh
MECO (Lanai)	20.79 c/kWh		MECO (Lanai)	20.79 c/kWh

34. Based on its review of the record, the commission finds that the larger proposed program capacity sizes of 25 MW for HECO, 5 MW for HELCO, and 5 MW for MECO are reasonable for the interim Smart Export program.

35. For purpose of program capacity limits, capacity shall be based on a kW measure of systems actually installed, measured by the lesser of the system's inverter or the total of the PV generation. The HECO Companies shall process and approve applications until the capacity associated with approved applications reaches the program cap. Thereafter, the HECO Companies shall continue to accept applications, but shall

issue a notice to the applicant informing him or her that the application has been accepted, but approval is conditioned on available capacity space.

36. In this sense, a queue will likely be formed, based on the acceptance date of the application. In managing this queue, the HECO Companies shall implement greater levels of transparency by notifying customers who submit applications after the amount of program space has been allocated to approved applications that: (1) their application has been accepted, but approval is conditioned on space being made available in the program by virtue of withdrawn or cancelled approved applications; and (2) the customer's relative position in the queue, based on the chronological date of their accepted application.

37. In addition, the HECO Companies shall publicly announce and notify the commission and Parties when 50%, 75%, and 90% of their respective interim Smart Export program caps have been reached. The commission also intends to hold a technical conference with the Parties when 75% of an interim Smart Export program's capacity has been reached.

38. The commission approves the requirement of a smart net meter for the interim Smart Export program that can measure the bi-directional flow of energy between the DER system and the grid. Consistent with past DER programs, the costs of metering shall be borne by the utility.

39. **Controllability.** The commission does not find that an additional smart production meter is necessary for the interim Smart Export program at this time, given the program's export structure.

40. **Credit reconciliation and facility size.** The commission notes that there does not appear to be any opposition to the Smart Export Stipulation proposal to reconcile energy export credits on an annual, rather than monthly basis.

41. Based on the lack of opposition to this proposal, the commission approves the inclusion of an annual true-up to the interim Smart Export program.

42. The commission instructs the HECO Companies to submit a proposed tariff consistent with the findings above, along with any applicable forms, within sixty (60) days of this Decision and Order.

H.

Interim CGS+ Program For The HECO Companies

43. As discussed above, the commission directs the establishment of a revised CGS+ program containing the following features:

44. **Compensation.** In line with the compensation under the original CGS option, the commission finds and concludes that the 12-month average on-peak avoided cost continues to be a

reasonable approximation of the relative value of energy exported to the grid, and serves as an acceptable basis for establishing the value of direct-to-grid PV export compensation.

45. However, the commission concludes that the CGS+ program should reflect recent figures under this methodology to provide a more accurate value of the energy to the HECO Companies. Accordingly, the CGS+ program shall contain the following export rates:

Island	Current CGS	Updated CGS+
Oahu	15.07	10.08
Hawaii Island	15.14	10.55
Maui	17.16	12.17
Molokai	24.07	16.77
Lanai	27.88	20.80

46. In order to promote market stability and to help provide a reasonable amount of customer investment certainty, the above CGS+ export credit rates shall remain fixed for five (5) years. Thereafter, the commission may modify the export credit rate at its discretion.

47. **Program size.** In order to help foster near- to medium-term market certainty while the commission considers and resolves Market Track issues in this proceeding, the commission hereby establishes the following program capacity caps for the CGS+ program:

Utility	CGS+ Program Cap
HECO	35 MW
HELCO	7 MW
MECO	7 MW

48. Consistent with the commission's approval of the interim Smart Export program, the CGS+ program's capacity cap shall be based on a kW measure of systems actually installed, measured by the lesser of the system's inverter or the total of the PV generation. The HECO Companies shall process and approve applications and manage the application queue, if any, in a manner consistent with the interim Smart Export program, as discussed in this Decision and Order, supra.

49. **Program renewal and off-ramps.** In addition, consistent with the interim Smart Export program, the commission will likewise require the HECO Companies to provide notice to the public and the commission and Parties when 50%, 75%, and 90% of

their respective CGS+ program caps have been reached. Upon receiving notice from any of the HECO Companies that 75% of its CGS+ program capacity has been reached, the commission intends to issue a notice to the Parties, setting a date and time for a technical conference to discuss the program cap.

50. **Metering and data collection.** Consistent with the original CGS program, metering costs shall be borne by the utility.

51. **Controllability.** A core component and critical revision embodied in the CGS+ program is the requirement that participating customers implement technology that allows the utility to measure, monitor, and, if necessary, control CGS+ DER systems.

52. While the commission's preference is for such communication and control to be effectuated through a third-party aggregator, absent the availability of a qualified aggregator, CGS+ customers may elect to have the HECO Companies install a separate smart production meter that will transmit data to the HECO Companies for the purposes of evaluation, monitoring, and verification of technical compliance, generating facility performance, and power quality, all of which will help ensure the safe and reliable operation of both the generating facility and the grid.

53. **Curtailement treatment.** As outlined above, CGS+ systems shall be equipped with communication and control features

such that the HECO Companies can ensure the safe and reliable operation of both the generating facility and the grid (i.e., the smart production meter). When system conditions dictate, CGS+ systems may be curtailed as a single block, consistent with guidance provided by the commission on this issue, supra.

54. With respect to curtailment priority, the CGS+ program curtailment block shall be curtailed second-to-last on each island system.

55. That said, the commission intends to monitor the CGS+ program's curtailment to observe curtailment trends and to ensure that CGS+ customers are curtailed in a fair and equitable manner consistent with the curtailment guidelines articulated herein.

56. Accordingly, the HECO Companies shall submit a quarterly DER Technical Report compliance report which shall contain, in part, curtailment reports from the CGS+ program, which shall include:

- Start and end times of any CGS+ curtailment events in the reporting period;
- An estimate of the number of MW and MWh of curtailment, on a per event and aggregate basis for the reporting period;
- Data specifying the relevant system conditions at the time of each curtailment event, including: (a) net load; (b) committed units; (c) level of dispatch for each committed unit; (d)

level of output for any "as-available" or "must take" resources; (e) whether any curtailment had been initiated for other resources; and

- An explanation and justification for each curtailment event for CGS+ block.

57. **Participation in future DER programmatic offerings.**

Similar to the guidance offered on the interim Smart Export program, customers who enroll in the CGS+ program, as described above, are encouraged to participate in a Demand Response program, when made available.

I.

Activation Of Advanced Inverter Functions

58. The commission observes that there does not appear to be any opposition to the activation of the Volt-VAR and Frequency-Watt functions. The activation of these functions is provided for in the Advanced Inverter Stipulation, and none of the Parties have voiced any opposition to these AIFs in their ISOPs or FSOPs. Concomitantly, there does not appear to be any opposition to the proposed deactivation of Fixed Power Factor.

59. Earlier in this proceeding, the commission has previously indicated in Decision and Order No. 33258 that it finds

that "advanced inverter functions are essential to continued beneficial deployment of DER in Hawaii."⁴²³

60. Recognizing the important and valuable role AIFs can fulfill in assisting the HECO Companies with integrating additional DERs in Hawaii, the commission finds that there does not appear to be any good reason to delay the activation of the Volt-VAR and Frequency-Watt functions, as well as the deactivation of Fixed Power Factor, at this time.

61. Accordingly, the commission finds and concludes that the Volt-VAR and Frequency-Watt functions should be activated at this time, and Fixed Power Factor deactivated.

62. Likewise, there does not appear to be any opposition to the proposed modifications to the HECO Companies' Rule 14H definitions, as set forth in the Advanced Inverter Stipulation.

63. According to the Stipulation, these modifications are intended to harmonize Rule 14H with the HECO Companies' SRD and the recent approval of UL 1741 SA, as well as the pending update to IEEE 1547.

64. The commission finds and concludes that these proposed modifications to the Rule 14H definitions appear

⁴²³Decision and Order No. 33258 at 104.

reasonable, and, noting the lack of opposition, finds that they should be approved.

65. In the event that unforeseen consequences or other negative impacts arising from the activation of the Volt-VAR and Frequency-Watt functions result, the commission reserves the discretion to modify its holding in this Decision and Order accordingly.

66. However, the commission finds that blanket activation of the Volt-Watt Function at this time is not appropriate.

67. The commission does not believe a sufficient basis of information currently exists to support blanket activation of Volt-Watt throughout the HECO Companies' service territories at this time. Further field data collection and validation is required by the HECO Companies in order to better anticipate the potential curtailment effects that may result upon blanket activation of Volt-Watt.

68. In reaching this conclusion, the commission is mindful of the estimated benefits blanket activation of Volt-Watt is expected to produce. However, the lack of relevant data surrounding activation of Volt-Watt warrants caution at this time. Given the significant costs associated with installing a DER system, customers should have access to sufficient information to understand the likelihood and potential magnitude

of curtailment they may face before making this substantial investment.

69. The commission notes that the HECO Companies are currently offering a pilot program in which customers may opt-in to activate the Volt-Watt function in exchange for expediting the interconnection process. Consistent with the commission's discussion on this issue above, the commission instructs the HECO Companies to expand the implementation of this pilot, opt-in program by offering it to customers that fail supplemental review due to overvoltage concerns, to the extent that this is not already being done.

70. Additionally, the commission finds that it is not appropriate to approve the HECO Companies' proposed return-to-service range, as contained in the Advanced Inverter Stipulation.

71. As it appears that this proposal is based on assumptions contained in the May 2017 IEEE P1547 draft, the commission observes that the record indicates that this may no longer reflect the current standards being considered by the IEEE. Given the ambiguity surrounding the IEEE 1547 update, the commission concludes that the record lacks sufficient demonstration of a need to differ from IEEE standards for return-to-service range at this time.

72. Consistent with the commission findings and conclusions above, the commission instructs the HECO Companies to submit proposed tariff revisions and any applicable forms within thirty (30) days of this Decision and Order.

J.

Improvements To The HECO Companies' Hosting Capacity Analyses

73. Upon reviewing the HECO Companies' proposed improvements to its hosting capacity analyses, the commission concludes that they appear reasonable, as they should assist the HECO Companies in forecasting the impacts of a variety of DERs, as well as increasing transparency for customers.

74. However, the commission intends to monitor the HECO Companies' progress in this area, to ensure that the pledged improvements are taking place, as well as to assess how to address the costs associated with these improvements. Thus, as part of their quarterly DER Technical Report, the HECO Companies shall include updates on the progress of their proposed hosting capacity improvements.

75. In addition, the commission instructs the HECO Companies to include a report justifying the necessity of, and cost for, an Interconnection Requirements Study, as well as other associated interconnection costs charged to customers, as part of their first quarterly DER Technical Report. Thereafter,

the HECO Companies may supplement this report at its discretion or as directed by the commission.

K.

DERC's DC Microgrid Proposal

76. The commission finds that there is insufficient evidence in the record to make a ruling on this proposal at this time, but may consider it as part of the discussion in the Market Track.

L.

KIUC's Proposal

77. KIUC proposes to implement its Proposal through a revision to its Schedule Q, and contemplates, among other things, changes to its avoided cost methodology for existing and prospective Schedule Q customers.

78. The commission finds that this may raise legal issues in terms of compliance with HAR Chapter 6-74 and PURPA, and necessitates further examination and development in the record.

79. Thus, given the unresolved legal concerns noted above, as well as the objections raised by the Joint Parties, and the overall insufficiency of the record to date, the commission concludes that KIUC's Proposal is not ripe for decision making and will be further explored in the next phase of this proceeding.

M.

Reporting Requirements

80. As discussed above, the commission has consolidated a number of compliance filings and program updates into a comprehensive DER Technical Report, to be filed on a quarterly basis with the commission. The HECO Companies' first DER Technical Report shall be due March 30, 2018.

VII.

ORDERS

THE COMMISSION ORDERS:

1. The commission approves the Deferred Issues Stipulation, filed August 7, 2017. The HECO Companies shall submit proposed tariff revisions for the commission's review within thirty (30) days of this Decision and Order.

2. The commission approves the Self-Certification Stipulation, filed September 18, 2017. The HECO Companies shall submit proposed tariff revisions for the commission's review within thirty (30) days of this Decision and Order.

3. The commission denies the Smart Export Stipulation and instead instructs the HECO Companies to file a tariff for an interim Smart Export program consistent with the commission's findings discussed in this Decision and Order. The HECO Companies

shall submit a proposed tariff for the commission's review within sixty (60) days of this Decision and Order.

4. The commission denies the Advanced Inverter Stipulation and instead instructs the HECO Companies to revise their Rule 14H to:

- (A) activate the Volt-VAR and Frequency-Watt functions,
- (B) deactivate Fixed Power Factor, and
- (C) implement modifications to Rule 14H's definitions;

The HECO Companies shall submit proposed tariff revisions for the commission's review within thirty (30) days of this Decision and Order.

5. The commission instructs the commission to expand its pilot, opt-in program for activation of Volt-Watt, as discussed above.

6. The commission provides clarification regarding the NEM program to permit the addition of non-export technology. The HECO Companies shall propose a policy and procedure to effectuate this ruling within thirty (30) days of this Decision and Order.

7. The commission provides clarification and approves modifications to the CGS program as discussed above. The HECO Companies shall submit proposed tariff revisions for the commission's review within thirty (30) days of this Decision and Order.

8. The commission establishes an interim CGS+ program. The HECO Companies shall submit a proposed tariff for the commission's review within sixty (60) days of this Decision and Order.

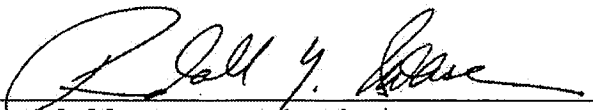
9. The commission determines that KIUC's Proposal is not ripe for decision making and defers resolution pending further briefing and development of the record.

10. The HECO Companies' first quarterly DER Technical Report is due March 30, 2018.

11. The commission retains the authority to modify any provision of this Decision and Order.

DONE at Honolulu, Hawaii OCT 20 2017.


PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

By 
Randall Y. Iwase, Chair

By 
Lorraine H. Akiba, Commissioner

By 
James P. Griffin, Commissioner

APPROVED AS TO FORM:


Mark Kaetsu
Commission Counsel

2014-0192.ncm

CERTIFICATE OF SERVICE

The foregoing order was served on the date of filing by mail,
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