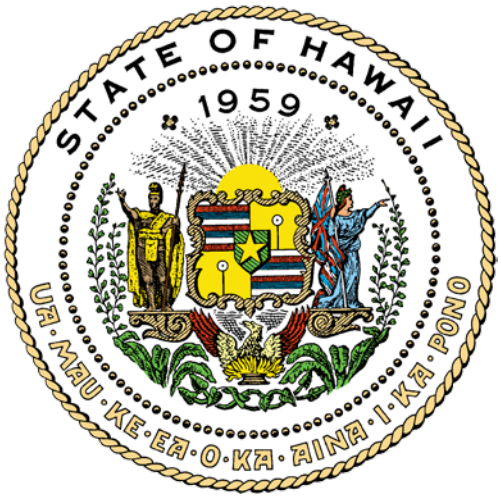

STATE OF HAWAII

PUBLIC UTILITIES COMMISSION

REPORT TO THE 2023 LEGISLATURE RELATED TO AN INTERCONNECTION STUDY AND PROGRESS ON CONTRACTING THE HERA PURSUANT TO ACT 201 (2022)

DECEMBER 2022

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Background

During the 2022 Legislative Session, the Hawaii State Legislature passed Senate Bill ("SB") 2474 SD 2 HD 1 CD 1, which was signed into law on June 27, 2022 as Act 201.[1] The law requires that the Public Utilities Commission ("Commission") contract with a qualified consultant to conduct a study on the accessibility of Hawaii's electric system and procedures for interconnection to Hawaii's electric system, including but not limited to the timeliness and costs of interconnection.

The law states that the Commission shall submit the study required by Act 201 and a report, including its progress in contracting an entity to serve as the Hawaii Electric Reliability Administrator ("HERA") pursuant to Hawaii Revised Statute ("HRS") Section 269-147, to the legislature no later than twenty days prior to the convening of the regular session of 2023.

This report includes the study conducted by the qualified consultant and an update on the Commission's progress in contracting a HERA entity.

Section 1: Act 201 Study

I. Qualified Consultant

The Commission hired PA Consulting Group Inc. ("PA Consulting") to conduct the study required in Act 201. PA Consulting responded to a Request for Proposal ("RFP")[2] issued on July 1, 2022, to serve as an Independent Engineer ("IE") for Hawaiian Electric Company's Stage 3 RFPs.[3] Given the significant overlap between the scope of the Act 201 study and the areas of oversight envisioned for the IE, the Commission included the Act 201 study as a component of the IE's proposed scope of work. Offers in response to the IE RFP were due on August 1, 2022, and the Commission completed its review of qualifying offers, selected PA Consulting, and executed a contract with PA Consulting in October 2022.

II. Study Scope

In PA Consulting's Best and Final Offer, it suggested that it would be efficient to conduct the Act 201 study in two phases due to timing and budget constraints. The Commission agreed with this phased approach given the breadth of required components and recommendations enumerated in Act 201 and the overlap in study areas with the work that the IE would conduct related to the Stage 3 RFPs. The Phase I Study Report details the components and recommendations that will be covered in the two phases of the study.

III. Study Recommendations

The Phase 1 Study Report includes the following recommendations from PA Consulting to address near-term issues related to Hawaiian Electric's interconnection process and reliability standards:

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[1] See Act 201, available at: https://www.capitol.hawaii.gov/sessions/session2022/bills/GM1302_.PDF.

[2] See RFP for IE, available at: https://hands.ehawaii.gov/hands/opportunities/opportunity-details/21686.

[3] Hawaiian Electric Company's Stage 3 RFP is a competitive procurement process that allows market participants to bid utility-scale renewable projects in a competitive solicitation to enable the retirement of large capacities of fossil fuel generation on Oahu, Maui, and Hawaii Island. The Commission is responsible for ensuring these competitive procurements are carried out following a fair set of guidelines to achieve shared benefits for the participants in the bidding process and communities that will be impacted by the development of these projects.

Interconnection Process	Recommendation
Companies' Interconnection Requirements	"The Companies should review interconnection related tariff/rules and revise, if necessary, to provide technical clarity in terms of interconnection requirements. For example, expand and include technical interconnection requirements into the Rule No. 19 Tariff, or into a new generic transmission and sub-transmission interconnection tariff, to capture all the requirements in one document, similar to how Rule No. 14 captures the technical interconnection requirements for connection on the distribution level. This is consistent with the findings from the Reliability Standards Working Group's (RSWG) Report, which recommended that the interconnection tariffs – including Rule No. 14 and Rule No. 19 – be revised to be more consistent with each other and inclusive of the overall process requirements. The revisions will provide project developers clarity regarding interconnection requirements/guidelines and standardize the process. "
Interconnection Process Reporting	"The Companies should establish a database for the purpose of centralizing all information related to all interconnection projects they manage, including their self-build and Independent Power Producer (IPP)-built projects. This would ensure data integrity and ease the process of internal and Commission-related metrics tracking for the different process milestones. The Companies should be consistent in the record-keeping and reporting for both self-build and IPP projects."
Interconnection Cost Comparison Between Self-build Projects and IPP Projects	"The Companies should develop comparable interconnection cost metrics for self-build and IPP-built projects so that interconnection costs can be directly compared. The Companies should track the total interconnection cost of the self-build projects separately by Interconnection Requirements Study, Company-Owned Interconnection Facilities and Seller-Owned Interconnection Facilities costs so that appropriate components can be compared with the IPP-built projects."
Companies' Interconnection Process	"The IE should establish an interconnection-specific dispute resolution process to address any potential disputes between the Companies and project developers. As part of the Companies' Stage 3 RFP process, the Commission has tasked the IE to assist in any interconnection-related disputes that may arise during the RFP process. The Commission may use the IE to develop an interconnection-specific dispute resolution process which could also be used outside the Stage 3 RFP process."
State of Hawaii Electricity Reliability Standards	"The Commission should continue to further develop and establish reliability standards by revisiting the work completed by the RSWG, via Docket Number 2011-0206, and refer to findings from subsequent proceedings, such as the Integrated Grid Planning (IGP) process."

The Commission can address the recommendations that are directed to Hawaiian Electric through various proceedings related to the interconnection process. In response to PA Consulting's final recommendation, the Commission will revisit the prior work that was performed to develop reliability

standards and establish a process to address issues related to reliability standards. For the recommendations relating to actions that fall under the scope of the Independent Engineer, the Commission will work closely with PA Consulting to ensure progress is being made.

IV. Next Steps

PA Consulting will prepare the Phase 2 Study Report in 2023 in parallel to serving as the IE for Hawaiian Electric's Stage 3 RFP.

Section 2: Commission's Progress on Hawaii Electric Reliability Administrator ("HERA")

Act 201 requires that the Commission include in this report its progress in contracting an entity to serve as the HERA.

I. Progress Update

On January 31, 2022, the Commission provided testimony during the proceedings on SB 2474 in which it noted that the Commission was currently undergoing a process to solicit input from the qualified entities to serve under contract as the HERA.[4]

The Commission issued a Request for Information ("RFI") on February 23, 2022, to solicit input from qualified entities to potentially serve under contract as the HERA. The RFI also sought feedback from experts interested in the development, administration, or management of a process, program, or system similar to that envisioned for the HERA.[5] The Commission received responses from entities under both categories. After responses were due on April 8, 2022, Commission staff engaged in follow-up discussions with the responding entities and conducted additional research on analogous entities to the HERA in other jurisdictions. The potential scope of the HERA, as envisioned by the RFI, included 4 principal issues and multiple sub-areas for each issue:

1. Issue: Reliability Standards
    a. Sub-area 1A: Development, Revision, and Repeal of Standards
    b. Sub-area 1B: Enforcement
2. Issue: Interconnection Oversight
    a. Sub-area 2A: Interconnection Process Evaluation
    b. Sub-area 2B: Interconnection Cost Review
    c. Sub-area 2C: Dispute Resolution (Interconnection-related)
    d. Sub-area 2D: Overseeing Interconnection Queue
3. Issue: System Operations Oversight
    a. Sub-area 3A: Grid Operations Monitoring and Data-sharing
    b. Sub-area 3B: System Planning and Operations Studies
4. Issue: Cybersecurity
    a. Sub-area 4A: Utility Cybersecurity Oversight

[4] See Commission's testimony, available at: https://www.capitol.hawaii.gov/sessions/Session2022/Testimony/SB2474_TESTIMONY_EET_01-31-22_.PDF#page=5.

[5] See HERA RFI, available at: https://hands.ehawaii.gov/hands/opportunities/opportunity-details/21007.

b. Sub-area 4B: Cybersecurity Advisory to the Commission
c. Sub-area 4C: Development of Cybersecurity Standards

Subject matter experts responding to the RFI expressed that organizing all the required skills and expertise into a single entity, under a manageable budget would be a challenge. With Hawaiian Electric's Stage 3 RFPs advancing in development and limited information on the total cost of the HERA, the Commission elected to pursue a narrowed scope in the near-term. Concurrently, stakeholders were providing the recommendation to hire an IE to support the development of Hawaiian Electric's Community Based Renewable Energy ("CBRE") and utility-scale renewable projects. Thus, the Commission prepared its RFP for an IE using the proposed scope from the Interconnection Oversight issue from the HERA RFI.

II. Next Steps

As the work of the IE continues, the Commission will monitor the IE's progress and gauge the potential to address additional issue areas of the HERA through the IE or alternative regulatory proceedings. The Commission will also continue to research the total budget needed to address each of the HERA issue areas, in consideration of the appropriate means of funding the HERA.

Attachment A – PA Consulting's Phase I Study Report

STATE OF HAWAII INTERCONNECTION PROCESS STUDY – PHASE 1

PREPARED FOR THE HAWAII PUBLIC UTILITIES COMMISSION PER ACT 201

December 28, 2022

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FIGURES

TABLES

Glossary

AFUDC – Allowance for Funds Used During Construction
CBRE - Community Based Renewable Energy
COD - Commercial Operation Date
COIF - Company-Owned Interconnection Facilities
D&O - Decisions and Orders
EPRM - Exceptional Project Recovery Mechanism
FERC - Federal Energy Regulatory Commission
FS - Facilities Study
GCOD - Guaranteed Commercial Operation Date
GRC - General Rate Case
HERA - Hawaii Electricity Reliability Administrator
HRS – Hawaii Revised Statues
IE - Independent Engineer
IF - Independent Facilitator
IGP – Integrated Grid Planning
IPP - Independent Power Producer
IRS - Interconnection Requirements Study
ISO - Independent System Operators
MPIR – Major Project Interim Recovery (MPIR)
MPR – Multi-year Rate Period
NERC - North American Electric Reliability Corporation
PBR – Performance Based Regulation
PPA - Power Purchase Agreement
RFI - Request for Information
RFP - Request for Proposal
RPS - Renewable Portfolio Standards
RSDG - Reliability Standards Development
REIS - Renewable Energy Infrastructure Surcharge
RSWG - Reliability Standards Working Group
RTO - Regional Transmission Organizations
SIS - System Impact Study
SOIF - Seller-Owned Interconnection Facilities
SSM - Shared Savings Mechanism

Executive Summary

1.1 Introduction

The State of Hawaii Public Utilities Commission (Commission) engaged PA Consulting Group, Inc. (PA) to assess the State's interconnection processes, evaluate the accessibility of Hawaii's electric utility grid, and identify the timeliness and costs of interconnection. The Commission is mandated to hire a qualified consultant to conduct a study of the State's Interconnection Processes via the passing of Act 201[1] by the Hawaii State Legislature. Moreover, Act 201 mandates the study to include interconnection issues encountered for renewable generation projects greater than five megawatts and any community-based renewable energy (CBRE) generation projects of any megawatt size from investor-owned utilities and utilities that serve counties with a population of more than one hundred thousand. Based on the project requirement mandates of Act 201, the interconnection process review applies to the interconnection requirements established by Hawaiian Electric Companies (Hawaiian Electric or Companies) for renewable and CBRE projects.

The Commission has also selected PA to serve as an Independent Engineer (IE) for the Companies' ongoing Stage 3 Request for Proposal (Stage 3 RFP) interconnection process for a three-year period (October 2022 – September 2025).[2] In its role as the IE, PA will oversee various interconnection tasks including, but not limited to, reviewing the Companies' overall interconnection process and technical aspects of the Stage 3 RFP process, developing an interconnection unit-cost guide, and providing insights/advice to the Commission on various interconnection issues. As the IE, PA will assess and review many of the issues listed in Act 201.

Due to the overlapping of issues to be analyzed for the study mandated by Act 201 and as the IE, PA and the Commission agreed to conduct the interconnection evaluation in two phases. This report serves as the first phase of evaluation and assesses a subset of the issues listed in Act 201. We discuss this further in Section 2.

1.2 Hawaiian Electric Companies' Interconnection Process

1.2.1 Companies' Interconnection Requirements

The existing interconnection requirements are covered by a combination of the Companies' interconnection tariffs, the Companies' internal policies and practices, and Commission Decisions and Orders addressing specific interconnection issues within the State, including General Order 7. General Order 7 addresses a broad range of topics related to electric service; however, it does not contain expansive regulations related strictly to interconnection. Instead, General Order 7 regulates specific aspects that are related to, or are components of, the interconnection process.

The Companies have a set of tariffs that regulate the interconnection process: Rule No. 19 and Rule No. 14. The tariffs are subject to the Commission's jurisdiction; therefore, any language updates proposed by the Companies are subject to the Commission's approval.

The Rule No. 19 Tariff includes interconnection guidelines and requirements for projects interconnecting to the Hawaiian Electric system pursuant to an RFP process. The tariff contains general rules and requirements for independently developed projects to interconnect to the electric utility grid. However, it contains very little information regarding stakeholders' expectations for the interconnection process, or for technical requirements for facilities to interconnect. Additionally, if a provision in Rule No. 19 conflicts with one in a Commission-approved RFP, then the provision of the RFP shall prevail.

The Rule No. 14 Tariff specifically governs interconnection guidelines and requirements for projects interconnecting at the Distribution level (25 kV and below for Oahu, and 12 kV and below for other islands). The tariff is inclusive of the expectations for independent developers, as well as the Companies, for the entire interconnection process. The tariff also contains detailed technical requirements for facilities to interconnect successfully to the grid.

[1] Act 201, signed into law on June 27, 2022, Available at https://www.capitol.hawaii.gov/sessions/session2022/bills/GM1302_.PDF .

[2] The Stage 3 RFP is a competitive procurement process that allows market participants to bid utility-scale renewable projects in a competitive solicitation to enable the retirement of large capacities of fossil fuel generation. The Commission is responsible for ensuring these competitive procurements are carried out following a fair set of guidelines to achieve shared benefits for the participants in the bidding process and communities that will be impacted by the development of these projects.

Table ES-1: Companies' Interconnection Requirements related regulations

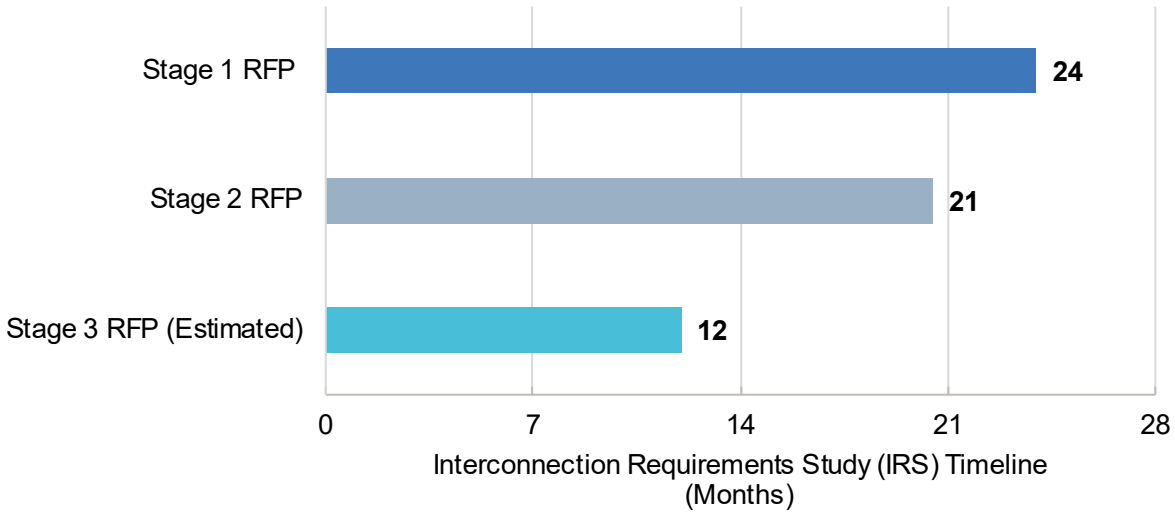
Companies	Interconnection Rules
Hawaiian Electric Company (for the island of Oahu)	Rule No. 14 Rule No. 19
Maui Electric Company (for the islands of Maui, Molokai, and Lanai)	Rule No. 14 Rule No. 19
Hawaii Electric Light Company (for the island of Hawaii)	Rule No. 14 Rule No. 19

1.2.2 Interconnection Process for Renewable Projects from Independent Power Producers (IPPs)

The interconnection process for renewable projects from IPPs is a multiphase approach that can generally be grouped into three distinct phases: Interconnection Requirements Study (IRS) and Power Purchase Agreement (PPA) negotiation process, Commission review and final PPA approval, and the construction and commissioning phase. In the process following Hawaiian Electric's Stage 1 and 2 RFPs (Stage 1 and 2 RFPs), the Companies' IRS process was triggered by the acceptance of a developers' project bid and occurred in parallel to the PPA negotiations; however, the IRS was completed after the Commission made its determination on the approval of the PPA, resulting in a subsequent IRS amendment being filed as an addendum to the PPA. In the process following the upcoming Stage 3 RFP, the IRS will be completed prior to the Companies' final PPA application for approval by the Commission.

The IRS process includes various steps starting from Company's request of data from developers to the Company performing the System Impact Study (SIS) and Facility Study (FS), negotiation of IRS amendments between the Company and the IPPs, and the filing of the IRS amendments to the Commission. The process is shown in detail in Table 4-2. The overall IRS process has remained largely the same for the three recent utility-scale RFPs (Stages 1, 2, and upcoming Stage 3), although the Companies have made process improvements to reduce the interconnection timeline in each subsequent process. The process from award of the project to filing of the IRS Amendments took an average of 24 months for the Stage 1 RFP projects and an average of 21 months for Stage 2 RFP projects.[3] For the Stage 3 RFP projects, the Companies expect to take about 12 months to complete the IRS and PPA Negotiation process.[4]

Figure ES-1: IRS Process Timeline during the RFP Processes[5]



[3] The dates attributed to steps 4 and 5 for Stage 1 and 2 RFP projects are actual dates that have received final approval of their IRS results by their respective developers.
[4] Proposed Schedule filed to the Commission, Docket No. 2017-0352, March 10, 2022.
[5] The IRS timeline of Stage 1 and Stage 2 RFP projects are based on the projects that have completed IRS process and incorporates steps 1-5 in Table 4-2 which, in addition to the study time, also includes time necessary for activities such as the completion of the IRS Amendment.

During the IRS process, IPPs provide project-specific equipment and other modelling information and the Company conducts various technical studies. The SIS is completed to evaluate the effects of the proposed projects interconnecting to the system. The results will be used to identify any required system upgrades necessary for the projects to safely interconnect to the grid, as part of the FS. Once the IPPs and Company agree to terms regarding the construction and financing of the identified interconnection facilities, the PPA will be amended to reflect the required interconnection upgrades -- the IPPs are contractually allowed to declare the contract null and void if they disagree with the interconnection upgrades and costs that are assigned to the project. The RFPs explicitly state that IPPs are responsible for the actual final costs of all interconnection costs, whether or not such costs exceed the interconnection costs estimated in the proposal, and no adjustments are allowed to the proposed price if actual costs exceed the amounts proposed.[6, 7]

After the PPA and IRS Amendment have been executed, the interconnection facilities will be constructed by the responsible party in time to meet the deadlines established in the PPA.[8] Upon completion of construction and the commissioning of any new facilities for interconnection, the project will be granted permission for commercial operation by the Company, and the actual costs the Company incurred for all efforts related to the construction of Company-Owned Interconnection Facilities (COIF) will be trued up.

1.2.3 Interconnection Process Improvements in Stage 3 RFP

The Companies have altered and are trying to optimize the interconnection process for Stage 3 RFP projects in order to reduce the time required for projects to reach commercial operation, compared to the Stage 1 and 2 RFPs' interconnection process. The Companies have worked to reduce the total process time between the initial collection of the developers' models, to the completion of the IRS and filing the PPA application with the Commission to a twelve-month period. They have instituted a new model checkout process, clearly highlighting requirements for developers to ensure that their models are sufficient upon initial submission, to mitigate issues and delays in the SIS phase.[9] The Companies will also provide bidders with pre-highlighted substation requirements typically identified in the FS, to reduce cost risk to developers and decrease the chance of a project being withdrawn due to the projected costs of interconnection facilities. The Companies also believe that bidders will be able to submit more informed bids with additional transparency in the requirements for interconnection to a specific substation. For Stage 2 RFP projects, the Companies started completing certain aspects of the SIS and FS in parallel and for Stage 3 RFP projects, will further revise the schedule to allow for more paralleling of the SIS and FS to reduce the time to complete these studies. The Companies will also complete the IRS prior to negotiating the PPA and submitting the PPA and proposal for the project's overhead line, if applicable, for Commission approval.

1.2.4 Interconnection Process for Self-build Projects

For 'self-build' projects constructed by the Companies, the interconnection process is predominantly identical to the process for IPP projects; however, the PPA negotiation phase does not occur. Also, the self-build projects are managed by separate divisions within the Companies, and in accordance with the Companies' internal Code of Conduct. The Companies file monthly project status reports of self-build projects to the Commission. The monthly reports include projects' status across IRS, engineering/design, permits, land rights, procurement, construction, and testing. However, the Companies do not publicly share a detailed interconnection related metrics database for the self-build projects that is currently maintained for the IPP projects in "IPP Interconnection Reported Metric"[10] database. The Companies do submit a copy of IRS of the self-build projects to the Commission.

The total interconnection costs associated with the self-build projects are not categorized by COIF and Seller-Owned Interconnection Facilities (SOIF) costs since the Companies own all aspects of those facilities for their own projects. They also do not report costs for the efforts related to the IRS for self-build projects, as those are paid by the same entity – the Companies themselves.

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[6] See Section 2.3.4 of Stage 3 RFP for Hawaii Island, Section 2.3.5 of Stage 1 and 2 RFPs.

[7] Hawaiian Electric recently allowed multiple IPPs to renegotiate the pricing for their projects and subsequently submitted executed PPA amendments to the Commission for review. The Companies state that the requests for amendments were due to increased costs and delays caused by the COVID-19 global pandemic and resulting supply chain crisis and were not due to changes in the interconnection costs determined as a result of the IRS. The Commission has reviewed such requests on a case-by-case basis, weighing the implications of the updated pricing proposals on the competitive bidding process, recognizing that certain factors related to the supply chain interruptions from the global pandemic which resulted in equipment cost increases were out of the developers' control. In Phase 2 of this study, PA will solicit feedback from IPPs and will gather more information about the cost drivers that resulted in these PPA amendments.

[8] During the IRS amendment negotiations, Developers may elect to construct interconnection facilities instead of having the Companies handle construction; however, Developers must construct the interconnection facilities to the Companies standards, and the facilities must be deeded to the Companies when completed.

[9] The Companies have included a new model checkout list as part of the Stage 3 RFP document, to highlight the requirements needed for a developer's model to be accepted, further shortening any delays experienced by a developer initially submitting a deficient facility model.

[10] Hawaiian Electric, Interconnection Experience, https://www.hawaiianelectric.com/about-us/performance-scorecards-and-metrics/interconnection-experience.

The cost recovery for self-build projects is subject to approval by the Commission via a 'Request to Recover Capital' spend, per General Order 7, if estimated project costs are above a certain threshold. The Commission also approves the means of cost recovery, which changed after the Performance-Based Regulation (PBR) framework took effect on June 1, 2021. Under PBR, the Companies may request to recover capital and O&M costs for approved self-build projects via the Exceptional Project Recovery Mechanism (EPRM). The EPRM allows the Companies to adjust the target revenues collected and increase rates to cover project costs during the current multi-year rate period (MRP), subject to the Commission approval. Self-build projects may be limited to recovering only actual cost for interconnection and cost recovery may be capped, as determined by the Commission. While the Companies have not received approval for any self-build projects under the EPRM, the Companies proposed a shared savings mechanism (SSM) that would incentivize the Companies to contain projects by allowing the Companies to share in the difference between actual project costs and an estimated project cost target. Previously, Companies could recover capital and O&M costs for self-build projects via the Major Project Interim Recovery (MPIR) mechanism, the Renewable Energy Infrastructure Surcharge (REIS) mechanism which allowed the Companies to recover costs for significant capital projects and costs for renewable energy-related projects, in between general rate cases (GRC). Under PBR, the MPIR mechanism and GRCs are no longer utilized; however, multiple operational self-build projects being recovered via the MPIR mechanism are grandfathered into the PBR framework.

1.2.5 Historical Interconnection Timeline and Metrics

There are 31 projects during 2015-2022 period that meet the reporting criteria set by Act 201. Out of 31 total projects identified, 13 have been interconnected to the Companies' systems, whereas the remaining 18 projects are currently under development. Out of 23 IPP-built projects, nine have been interconnected, whereas 14 projects remain under development. All IPP projects that are currently being developed were procured via the Stage 1 and 2 RFP processes. Among the six CBRE projects, two have been successfully interconnected to the system, and four are under development. The summary also includes two self-build projects, West Loch Solar One (PV, 20 MW) that achieved its Commercial Operations Date (COD) on November 11, 2019, and Schofield Generating Station (biofuel-capable power generation plant, 50 MW) that achieved its COD on June 27, 2018.

Table ES-2: Number of Renewable Projects by Developer Type and Island during 2015-2022 Period

Island	Oahu	Maui*	Hawaii	Total Projects
Projects that Have Reached Commercial Operation				
IPP	9	-	-	9
Self-build	2	-	-	2
CBRE	1	1	-	2
Sub-total	*12*	*1*	-	*13*
Projects Under Development				
IPP	8	4	2	14
CBRE	2	1	1	4
Sub-total	*10*	*5*	*3*	*18*
Total Projects	**22**	**6**	**3**	**31**
**Also includes one CBRE project currently developed in Moloka'i*				

Figure ES-2 includes the actual costs for interconnection for all projects that have reached commercial operation over the last seven years (2015 – 2022). The total interconnection cost for the IPP projects includes the IRS cost and costs for all COIF identified in the projects' respective facility study reports, as well as the costs for gen-ties (the line built to transport generation from the facility to the point of interconnection). The total interconnection costs of interconnected projects vary between $2.4 million to $12.6 million. Similarly, Figure ES-3 indicates estimated interconnection costs of Stage 1 and 2 RFP projects that are currently under development is between $1.4 million and $5.2 million.

Figure ES-2: Interconnection Cost (Actual) of IPP projects interconnected during 2015-2022 period

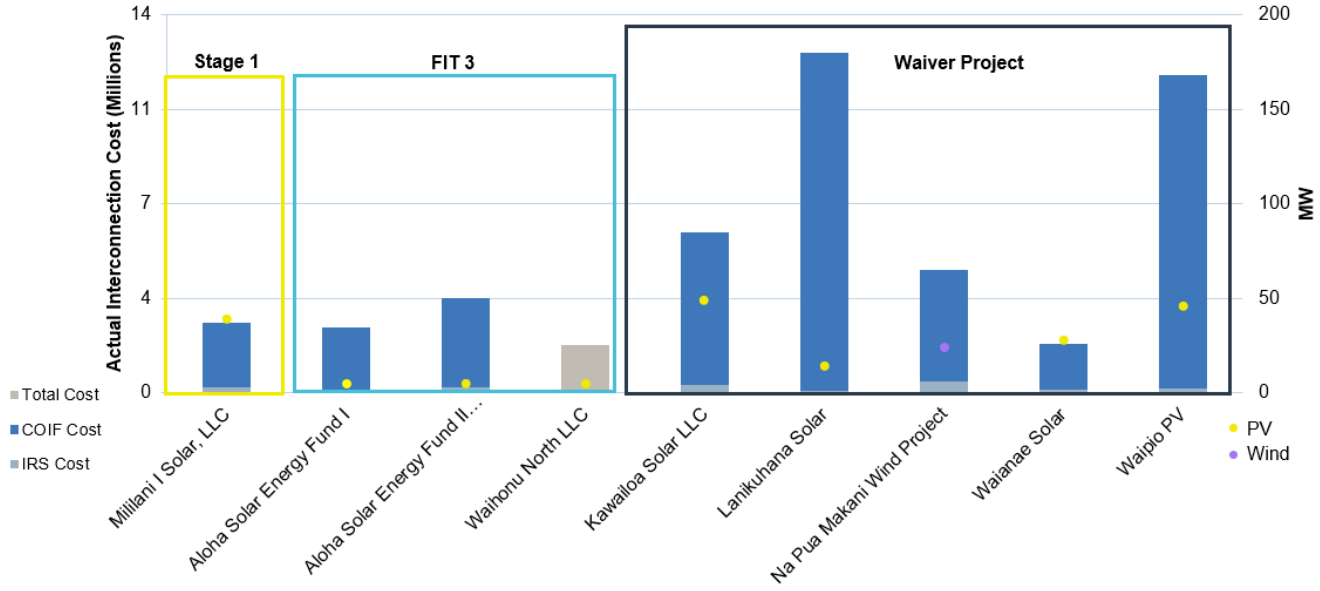


Figure ES-3: Interconnection cost (Estimated) of IPP Projects Currently Under-development[11]

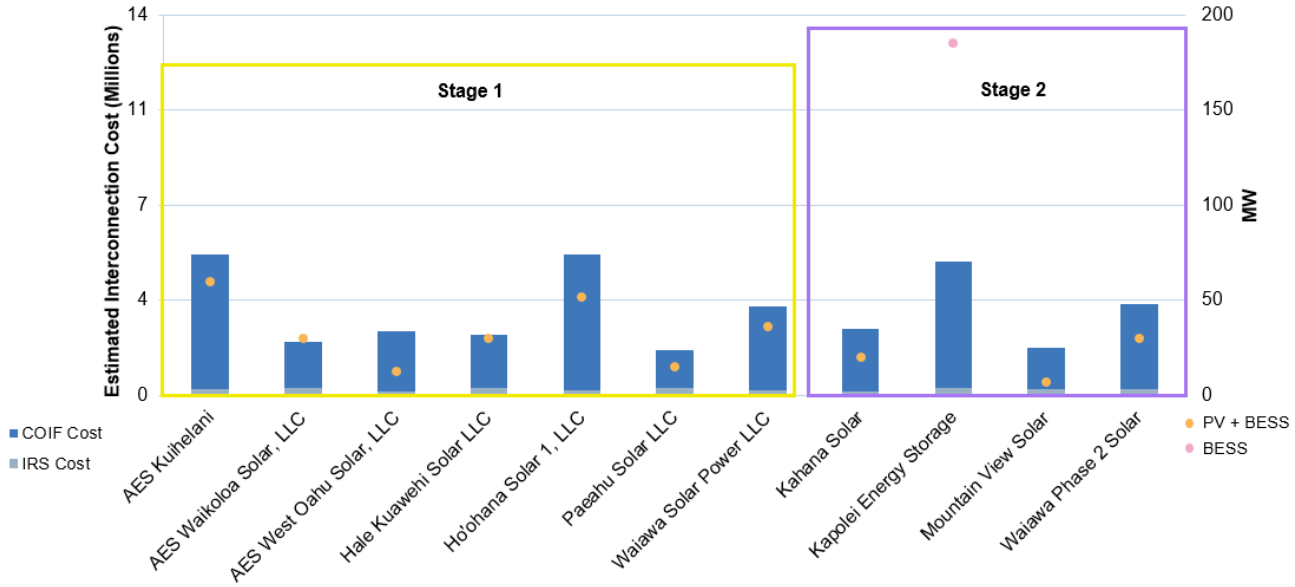


Figure ES-4 and Figure ES-5 summarize the timeliness for all projects analysed during this report's study period, including projects that have already reached commercial operations. For projects currently under development, the average time to date for those procured via the Stage 1 RFP is 30 months, whereas the time for projects procured via the Stage 2 RFP is slightly over 20 months. The Companies have improved the interconnection process in Stage 2 RFP projects as compared to the Stage 1 RFP projects. However, it is likely that the projects currently under development will miss their respective COD timeline for various reasons including, but not limited to, equipment procurement and supply chain issues exacerbated due to as a result of the COVID 19 global pandemic.

[11] The figure does not include the estimated interconnection cost of Kupono solar that was recently approved by the Commission. The Companies mentioned that the estimated cost information will be available in early 2023.

Figure ES-4: Timeline (PPA to COD) of Projects Interconnected during 2015-2022 period

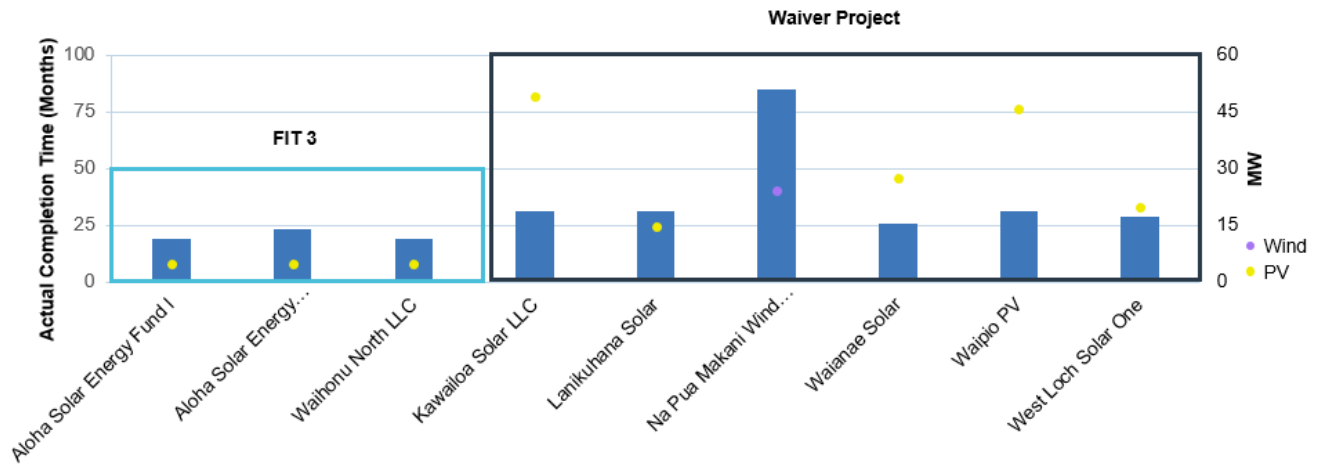
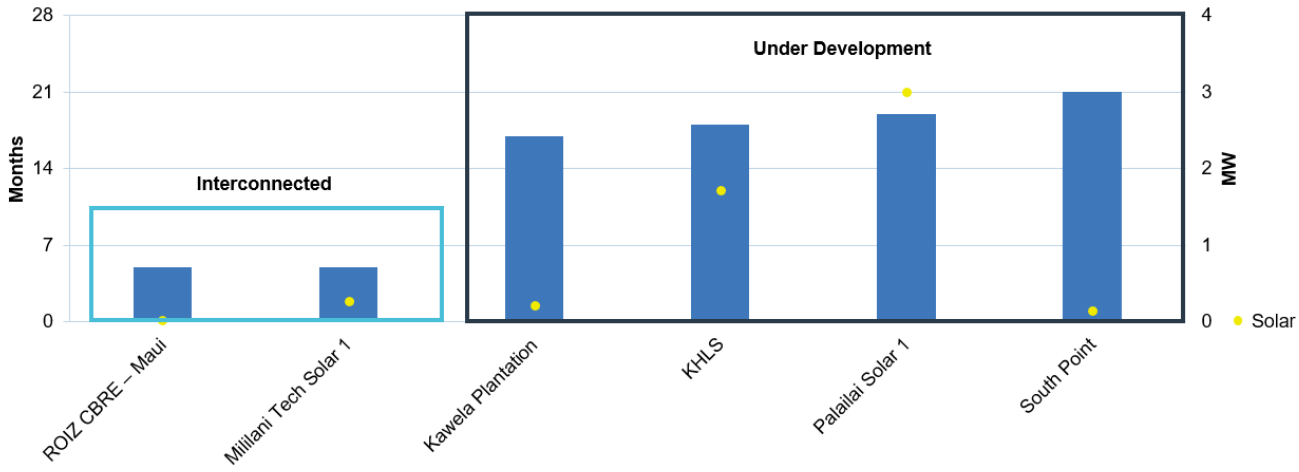


Figure ES-5: Timeline (PPA to-date) of Under-development Projects

Figure ES-6: Timeline (PPA to-date) of CBRE Projects



1.2.6 Interconnection Delays in the Stage 1 and Stage 2 RFP Projects

After reviewing projects that were interconnected over the last seven years (from 2015 to 2022), PA has identified general issues within the different interconnection process steps that have led to delays in projects reaching their COD. The Companies have noted the delays can largely be attributed to the first step in the interconnection process which involves the models submitted by developers. Specifically, the issues identified by the Companies related to model submissions that included multiple deficiencies that prevented the Companies from using the proposed facility's model in the SIS. As a result, developers needed additional time to address deficiencies with model consultants and equipment manufacturers to fix identified issues so that the model could be incorporated into the Companies' SIS. Additionally, since the system impact studies are performed as a cluster of projects, if one project model is delayed in meeting its requirements, it delays the SIS for the rest of the projects in that cluster as well.[12] Finally, the Companies note that any changes a developer may elect to incorporate to their project after completion of the SIS will require a re-study, that could further be impacted by any issues with the updated models needed to analyze the updated project's potential impact to the grid. Phase II of the Act 201 Report will assess delays pertaining to model deficiencies and subsequent restudies.

1.2.7 State of Hawaii Electricity Reliability Standards

The development of reliability standards in the state has been a topic of discussion for over a decade. The Legislature passed Act 166 in 2012 which established the Hawaii Electricity Reliability Administrator (HERA) law. Contemporaneously, the Commission convened stakeholders to discuss the development of reliability standards in Docket No. 2011-0206 and a working group developed and proposed the implementation of 10 reliability standards following NERC's standard format.[13] The findings and recommendations from these efforts were continued in subsequent dockets, including various planning proceedings[14]; however, reliability standards have not been adopted nor applied systematically in the planning proceedings. In 2021, the State Senate passed a resolution S.R. 207 S.D.1 requesting the Commission develop and implement reliability standards and report on various interconnection-related matters, including the HERA.[15] In December 2021, the Commission filed a report to the Legislature in response.[16] In the report, the Commission reported that it is in the process of soliciting input from qualified entities to serve in the role of HERA. Moreover, the Commission provided recommendations and proposed legislation amending section 269-146, Hawaii Revised Statutes (HRS), to ensure that the Commission has discretion in determining how the Hawaii electricity reliability surcharge should be assessed to reduce potential risks to ratepayers and that customers are not forced to bear the cost burden for the establishment of the HERA.

In February 2022, the Commission issued a Request for Information (RFI) soliciting capabilities and expertise of prospective entities interested in contracting with the Commission to serve as the HERA.[17] However, given the Companies Stage 3 RFP process is anticipated to begin in 2022 Q4 and given the complexity and length of time it would take to establish HERA, the Commission instead focused on contracting with an IE in alignment with the Stage 3 RFP process. The Commission carved out some portions of the initial HERA scope to be executed by the role of IE; specifically, the responsibilities of the IE are similar to the scope of interconnection oversight laid out in the HERA statutes. The RFP regarding the IE role was issued on July 1, 2022. The Commission intends to assess the efficacy of the IE role in assisting with various interconnection issues and potentially utilize the experience of the IE to inform the establishment of the HERA at a future date.

1.3 Summary of Findings & Recommendation

As part of PA's work related to the analyses of interconnection in the State of Hawaii, we have compiled our findings and recommendations for process improvements, per the guidelines for this effort set forth in Act 201.

Interconnection Process	Findings	Recommendation
Companies' Interconnection Requirements	The Rule No. 19 Tariff includes interconnection guidelines and requirements for projects interconnecting to the Hawaiian Electric system issued pursuant to a Request for Proposal (RFP) process. However, it contains very little information regarding the expectations for all	The Companies should review interconnection related tariff/rules and revise, if necessary, to provide technical clarity in terms of interconnection requirements. For example, expand and include technical interconnection requirements into the Rule No. 19 Tariff, or into a new generic

[12] All projects in Stage 1, and 2 RFPs were studied in clusters.
[13] Of note, the working group did not reach agreement on certain key standards.
[14] These dockets include Docket Nos. 2014-0192 and 2019-0323, which investigate the interconnection standards for distributed energy resources (DERs) and Docket Nos. 2014-0183 and 2018-0165, which review the Companies planning processes, namely the Power Supply Improvement Plans and the Integrated Grid Planning (IGP) process.
[15] S.R. No. 207, S.D.1, State of Hawaii, The Senate, Thirty-First Legislature, 2021.
[16] State of Hawaii Public Utilities Commission, Report to the Legislature Pursuant to S.R. 207, S.D. 1, Filed December 2021.
[17] Request for Information, Hawaii Electricity Reliability Administrator, March 2022.

	stakeholders during the interconnection process, as well as technical requirements for facilities to interconnect. Furthermore, Rule No. 19 may be superseded by provisions in a Commission-approved RFP process, creating additional uncertainty for developers who must adhere to such requirements.	transmission and sub-transmission interconnection tariff, to capture all the requirements in one document, similar to how Rule No. 14 captures the technical interconnection requirements for connection on the distribution level. This is consistent with the findings from the Reliability Standards Working Group's (RSWG) Report, which recommended that the interconnection tariffs – including Rule No. 14 and Rule No. 19 – be revised to be more consistent with each other and inclusive of the overall process requirements. The revisions will provide project developers clarity regarding interconnection requirements/guidelines and standardize the process.
Interconnection Process Reporting	The Companies rely on time-stamped notices, such as email communications, to maintain records of the different milestones for the interconnection process; they do not maintain a database to store this information either. They also maintain a workbook to memorialize the different milestones for each active project that has not yet reached COD.	The Companies should establish a database for the purpose of centralizing all information related to all interconnection projects they manage, including their self-build and IPP-built projects. This would ensure data integrity and ease the process of internal and Commission-related metrics tracking for the different process milestones. The Companies should be consistent in the record-keeping and reporting for both self-build and IPP projects.
Interconnection Cost comparison between self-build projects and IPP projects	Currently, only the total interconnection costs of self-build projects are reported to the Commission. Whereas the interconnection costs of IPP-built projects reported to the Commission include the breakdowns for IRS and COIF cost components.	The Companies should develop comparable interconnection cost metrics for self-build and IPP-built projects so that interconnection costs can be directly compared. The Companies should track the total interconnection cost of the self-build projects separately by IRS, COIF and SOIF costs so that appropriate components can be compared with the IPP-built projects.
Companies' Interconnection Process	The Companies do not have a separate dispute resolution process for addressing interconnection issues. For the projects solicited via the RFP processes, the Companies rely on a standard dispute resolution process established for the Stage 3 RFP (Section 1.10 of the Stage 3 RFP) to resolve disputes prior to contract execution. Post PPA execution, the dispute resolutions in the PPAs govern all dispute that may arise in the process.	The IE should establish an interconnection-specific dispute resolution process to address any potential disputes between the Companies and project developers. As part of the Companies' Stage 3 RFP process, the Commission has tasked the IE to assist in any interconnection-related disputes that may arise during the RFP process. The Commission may use the IE to develop an interconnection-specific dispute resolution process which could also be used outside the Stage 3 RFP process.
State of Hawaii Electricity Reliability Standards	The development of reliability standards in the state have been a topic of discussion for over a decade. The Commission discusses the development of reliability standards in Docket No. 2011-0206 and a working group developed and proposed the implementation of 10 reliability standards following NERC's standard format.	The Commission should continue to further develop and establish reliability standards by revisiting the work completed by the RSWG, via Docket Number 2011-0206, and refer to findings from subsequent proceedings, such as the Integrated Grid Planning (IGP) process.

1.4 Next Steps – Phase II Report

The Phase 2 Report will continue to build on the findings in this report (Phase 1) and will include the assessment and recommendation of remaining issues listed in Act 201 that are not covered in Phase 1. The Phase 2 Report may also include updates to the issues covered in the Phase 1 Report. PA intends for the Phase 2 report to be a complete study addressing all issues listed in Act 201. The Commission proposes to deliver the Phase 2 report no less than 20 days before the start of 2024 state legislative session.

2 Introduction

The State of Hawaii Public Utilities Commission (Commission) engaged PA Consulting Group, Inc. (PA) to assess the State's interconnection processes, evaluate the accessibility of Hawaii's electric utility grid, and identify the timeliness and costs of interconnection. The Commission is mandated to conduct a study of the State's Interconnection Processes via the passing of Act 201[18] by the Hawaii State Legislature (Legislature). Specifically, Act 201 listed out seventeen different interconnection related issues to be evaluated and requested recommendations on fifteen different interconnection related matters.[19] Act 201 mandates the study to include interconnection issues encountered for renewable generation projects greater than five megawatts and any community-based renewable energy (CBRE) generation projects of any megawatt size from investor-owned utilities and utilities that serve counties with a population of more than one hundred thousand. Based on the project requirement mandates of Act 201, the interconnection process review applies to the interconnection requirements established by Hawaiian Electric Companies (Companies) for the renewable and CBRE projects.

The Commission has also selected PA to serve as an Independent Engineer (IE) for the Hawaiian Electric Companies' (Companies) ongoing Stage 3 Request for Proposal (Stage 3 RFP) interconnection process for a three-year period (October 2022 – September 2025). In its role of IE for the Stage 3 RFP interconnection process, PA has been tasked to oversee various interconnection tasks including, but not limited to, reviewing the Companies' overall interconnection process and technical aspects of the RFP process, developing an interconnection unit-cost guide, and providing insights/advice to the Commission on various interconnection issues. As the IE, PA will assess and review many of the issues listed in Act 201. Due to the overlapping of issues to be analyzed for the study mandated by Act 201 and as an IE, PA and the Commission agreed to conduct the interconnection evaluation in two phases. This report serves as the first phase of evaluation and includes assessment of subset of the issues listed in Act 201. Specifically, Phase 1 of the study will include the review of following matters listed in Act 201, Section 1 (c):

> (1) Include, but not be limited to, reliability standards to be established by the public utilities commission;
>
> (2) Identify interconnection requirements and procedures for interconnection to the State's electric utility grid;
>
> (3) Describe the interconnection process and who is responsible for each element of the process;
>
> (4) Determine the reasonableness of time for each element of the interconnection process;
>
> (7) Include costs of interconnection by an electric utility for the interconnection of the electric utility's self-build projects;
>
> (8) Include reporting and analysis over the previous seven years of the:
>
> (A) Timeliness of the interconnection process from the execution of the power purchase agreement through the interconnection completion, if applicable, or up through the time that the last step is completed; and
>
> (B) Cost of interconnection of renewable energy projects, including: (i) The charges to those who interconnected or are in the process of interconnecting to an electric utility; (ii) Any project management fees; and (iii) Any other elements that are relevant in the methodology, including but not limited to the size of the project, the distance to the interconnection point;
>
> (9) Include documentation of the delays in the interconnection process for Stage 1 and Stage 2 renewable procurement projects, including the cause of each delay as well as the party responsible for the delay;
>
> (10) Determine whether any elements of interconnection are currently rate-based;
>
> (15) Report on the implementation of a Hawaii electric reliability administrator to be implemented by the public utilities commission;
>
> (16) Evaluate the public utilities commission's progress in the implementation of a Hawaii electric reliability administrator.

The Phase 2 Report will continue to build on the findings in this report (Phase 1) and will include the assessment and recommendation of remaining issues listed in Act 201 that are not covered in Phase 1. The Phase 2 Report may also include updates to the issues covered in the Phase 1 Report. PA intends for the Phase 2 report to be a complete study addressing all issues listed in Act 201. We propose to deliver the Phase 2 report no less than 20 days before the start of 2024 state legislative session.

[18] Act 201, signed into law on June 27, 2022, Available at https://www.capitol.hawaii.gov/sessions/session2022/bills/GM1302_.PDF .
[19] Section 1 (c-d) of Act 201.

3 State of Hawaii Interconnection Requirements

The Interconnection process is regulated by existing regulatory policy that is the jurisdiction of the Hawaii Public Utilities Commission. The Companies standardize their process via their individual interconnection tariffs, and any process requirements included in these documents are subject to the oversight and approval by the Commission. Additionally, the State has set further policy regarding interconnection to the grid through Decision & Orders, Public Hearings, and General Order 7, the Standards for Electric Utility Service in the State of Hawaii. General Order 7 contains the requirements for electric service within the state and is jurisdictional to all Companies that operate the state electric grid.[20] The guidelines in General Order 7 are designed to ensure that the Companies maintain the safety and reliability of the grid in their operations, including the interconnection of new generators, in order to ensure that service is reliable and dependable for all users of Hawaii's transmission system.

Furthermore, there are additional requirements and procedures for construction of high-voltage transmission equipment that is jurisdictional to the Commission; this includes, but is not limited to, equipment used to facilitate the interconnection of generation facilities to the electric utility's transmission grid. Regarding the construction of any high-voltage transmission equipment (particularly 138 kV and above), the Commission shall have the final determination as to where in the system new equipment shall be constructed, either above or below ground.[21] The Commission is also required to conduct a public hearing whenever the utility plans to build a new high-voltage transmission line "above the surface of the ground through any residential area."[22] This is consistent with the Companies' interconnection tariffs, which outline that overhead line placements are subject to approval from the Commission. One caveat in HRS § 269-27.6 states that the utility does not need Commission approval if the transmission equipment is to be built underground, the entire cost of the underground upgrade is paid for by an entity other than the utility, and the utility provides a report, prior to construction, detailing the project and the funding source.[23]

Currently, the cost of most elements regarding the interconnection process are not rate-based, and instead are the responsibility to be fulfilled by the generation facility developers. Specifically, any costs associated with the project's generating facility, as well as most grid upgrade costs are the responsibility of the developer. Per General Order 7, the Companies must file their projected capital improvement expenditures with the Commission on an annual basis, as part of the regulations to ensure transparency between the State and the grid operators.[24] The Companies are also required to submit proposed capital expenditures for any single project exceeding $2.5 million in costs, related to plant replacements, and the subsequent interconnection to connect the new facilities to the grid, to the Commission for review in advance of the commencement of construction and/or expenditure.[25] Costs for interconnection facilities deemed necessary for all users of the transmission system, not just necessary to facilitate the export of generation from a new facility, are the only costs that can be rate based.[26] The Companies must submit a request to the Commission to rate-base any other costs associated with interconnection.

The cost recovery for self-build projects is subject to approval by the Commission via a 'Request to Recover Capital' spend, per General Order 7, if costs are above a certain threshold.[27] The Commission also approves the means of cost recovery, which changed after the Performance-Based Regulation (PBR) framework took effect on June 1, 2021. Under PBR, the Companies may request to recover capital and O&M costs for approved self-build projects via the Exceptional Project Recovery Mechanism (EPRM). The EPRM allows the Companies to adjust the target revenues collected and increase rates to cover project costs during the current multi-year rate period (MRP), subject to Commission approval. Self-build projects are typically limited to recovering only actual cost for interconnection and cost recovery may be capped, as determined by the Commission. While the Companies have not received approval for any self-build projects under the EPRM, the Companies proposed a shared savings mechanism (SSM) that would incentivize the Companies to constrain project costs by allowing the Companies to share in the difference between actual project costs and an estimated project cost target. Previously, Companies could recover capital and O&M costs for self-build projects via the Major Project Interim Recovery (MPIR) mechanism which allowed the Companies to recover costs for large capital projects in between general rate cases (GRC). Under PBR, the MPIR mechanism and GRCs are no longer utilized; however, multiple operational self-build projects being recovered via the MPIR mechanism are grandfathered into the PBR framework.

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[20] General Order No. 7, Standards for Electric Utility Service In the State of Hawaii, Title VII – Public Utilities Commission, Department of Regulatory Agency, State of Hawaii.
[21] Hawaii Revised Statutes (HRS), §269-27.6.
[22] HRS §269-27.5.
[23] See Hawaii Revised Statutes (HRS), §269-27.6(d), as revised by Act 65, Session law 2021.
[24] General Order No. 7, Section 2.3.G.
[25] D&O No. 21002 modified General Order No. 7, Section 2.3.G, requiring that proposed capital expenditures for any single project in excess of $2.5 million or 10 percent of the total plant in service, whichever is less, shall be submitted to the Commission for review.
[26] Hawaiian Electric Rule No. 19 Section C.4
[27] See footnote 25.

4 Hawaiian Electric's Interconnection Process

4.1 Companies' Interconnection Requirements

The Companies have set regulatory tariffs that contain the requirements and regulations for both the Companies and independent developers regarding interconnection of third-party generation facilities to the electric utility grid. Each Company has its own set of interconnection tariffs, and those regulations are jurisdictional to their individual service territories:

Table 4-1: Companies Interconnection Requirements related regulations

Companies	Interconnection Rules
Hawaiian Electric Company (for the island of Oahu)	Rule No. 14 Rule No. 19
Maui Electric Company (for the islands of Maui, Molokai, and Lanai)	Rule No. 14 Rule No. 19
Hawaii Electric Light Company (for the island of Hawaii)	Rule No. 14 Rule No. 19

The Rule No. 14 tariffs contain the regulations for service connections, both for load consumption and export of generation, on the utility customer's premises. Regarding the interconnection of generating facilities, the Rule No. 14 tariffs have policy explaining the interconnection standards specifically for generating facilities connecting to the electric utility's distribution grid - meaning, any voltage level at 25 kV or below. Additionally, the Rule No. 14 tariffs explain the process that the Companies must undertake as part of their interconnection process, in Appendix I of the tariffs. The tariffs state that the objective of the interconnection process is principally to ensure the safety of the utility system and its customers, maintaining the reliability of the system, and to allow for acceptable power quality that does not impair operation of the system, or any entity who relies on the electric utility's distribution grid. Appendix I contains detailed requirements for the designs of generating facilities (including separate requirements for inverter-based facilities like energy storage), their operation requirements, and protection engineering requirements that facilities must meet in order to successfully interconnect.

The Rule No. 19 tariffs contain regulations for service connections for facilities looking to interconnect to the electric utility grid pursuant to an RFP process issued by the Companies. The tariffs define the terms used by the Companies to refer to the different aspects of their interconnection processes, for purposes of public education and transparency. The Rule No. 19 tariffs are considerably less detailed in material compared to the Rule No. 14 tariffs. Additionally, Rule No. 19 states that the RFP packages, which contain the technical details and requirements for project design and interconnection, will take precedence over Rule No. 19 if a certain provision is in conflict with the RFP. Furthermore, the Companies' Rule No. 19 tariffs do not include any detail regarding milestone deadlines for both IPPs and the Companies' responsibilities, engineering requirements for facilities to meet interconnection standards, as well as outlining the processes. The Rule No. 19 tariffs do outline the initial bid process for the RFP processes; however, the different RFP documents, rather than Rule No. 19, go into significantly more detail on requirements for IPP projects to be considered. For all purposes, developers hoping to bid into an RFP and eventually interconnect into Hawaiian Electric's system do need to adhere to the Rule No. 19 tariff requirements, but they must refer to the applicable RFP documents to find a majority of the meaningful requirements for interconnection at the transmission or sub-transmission level.

The Rule No. 19 tariffs do include some detail regarding the IRS that the Companies would perform as part of the RFP process, the subsequent FS, as well as information regarding the cost determinations for any required interconnection facilities identified during said FS. The tariffs state that interconnection facilities, "from the point of interconnection to the grid connection point shall be built by the Compan[ies] and paid for by the [developer]"[28]. Like the Rule No. 14 Tariffs, the Rule No. 19 Tariffs also clarify that the document's objectives are to maintain the safety and reliability of the State's electric utility system.

4.2 Overview of the Interconnection Process

4.2.1 Interconnection Process

The Companies' interconnection process is a multiphase process that has evolved over the course of multiple utility-scale renewable energy and CBRE RFPs. It has largely followed the same order, although the Companies have

[28] Rule No. 19, C.3

made process improvements to optimize the interconnection timeline and experiences; following upon the feedback received from external stakeholders, as well as internal team members who support grid interconnection. Figure 4-1 and Figure 4-2 provide an overview of the anticipated interconnection process for the Stage 3 RFP project that is currently undertaken by the Companies.

Project proposals bidding into the Companies' Stage 1 and 2 RFPs first went through the Power Purchase Agreement (PPA) negotiation phase and then sought Commission approval of the executed PPA. While these negotiations and PPA approval were ongoing, the IRS was completed in parallel including: the generation facility's technical information, a single line diagram showing the configuration of all electrical components at the site, proof of site exclusivity, and model collection to start the SIS. The data the Companies require from the developers to submit for completion of the IRS, which is similar across the Stage 1, 2, and 3 RFP processes, is outlined in Appendix H of the RFP.[29] Following PPA approval and completion of the IRS, the Companies would complete the IRS Amendment to the PPA.

Definitions

Interconnection Requirements Study (IRS): a study, performed in accordance with the terms of the IRS Letter Agreement, to assess, among other things, (1) the system requirements and equipment requirements to interconnect the Facility with the Company's System, (2) the Performance Standards of the Facility, and (3) an estimate of interconnection costs and project schedule for interconnection of the Facility.

System Impact Study (SIS): A study to evaluate system impacts and specify the facilities, system upgrades, and other requirements for a project to interconnect with the Company's system in a safe and reliable manner.

Facilities Study (FS): A study to develop the interconnection facilities cost and schedule estimate including the cost associated with the design and construction of the Company-owned interconnection facilities.

Group Study: A method of completing system impact studies for multiple projects at a time; the Companies will simulate the total amount of generation to be exported onto the grid (in MW) of all the projects in the group, in the same simulation run.

Company-Owned Interconnection Facilities (COIF): Interconnection facilities owned by the Companies. They may be financed either by the Company (whose costs would be reimbursed through a rate-base recovery) or by the developer. This determination will be clarified in Section 1(a) of Attachment G of the project-specific IRS Amendment.

Seller-Owned Interconnection Facilities (SOIF): Interconnection facilities constructed, financed, owned, and maintained by the Seller (developer)

Following the submission and acceptance of the Models and IRS data, the Companies will initiate the formal IRS, including the SIS as well as the FS. The Companies' Interconnection Services team completed the IRS studies, along with their team of consultants, transmission engineers, and planners to run the system impact models. Once the preliminary FS and SIS results are compiled, they are shared with the developer, and the two parties begin to negotiate whether the developer will elect to build facilities identified as needed for interconnection or defer to the Company to handle construction. Once the FS is finalized and the IRS is complete, the Companies will amend the PPA to reflect the identified interconnection facilities and upgrades to the grid required for the project to interconnect, the estimated costs for all required facilities to be constructed, and the agreed-upon schedule for construction and commissioning. Furthermore, the IRS amendment must be filed with the Commission for additional review to determine whether to construct the transmission line above or below ground, and Commission approval is necessary unless the line is built underground and funded by an entity other than the utility.[30] Following the construction and commissioning (if the developer elects to manage construction) of all interconnection facilities, the Companies will true-up any construction costs and work to settle payments with the developers.

[29] As an example, see Stage 3 RFP for Hawaii Island, filed November 7, 2022:
[30] See Hawaii Revised Statutes (HRS), §269-27.6.

Figure 4-1: Hawaii Companies' Stage 3 RFP Interconnection Process during RFP Selection Process[31]

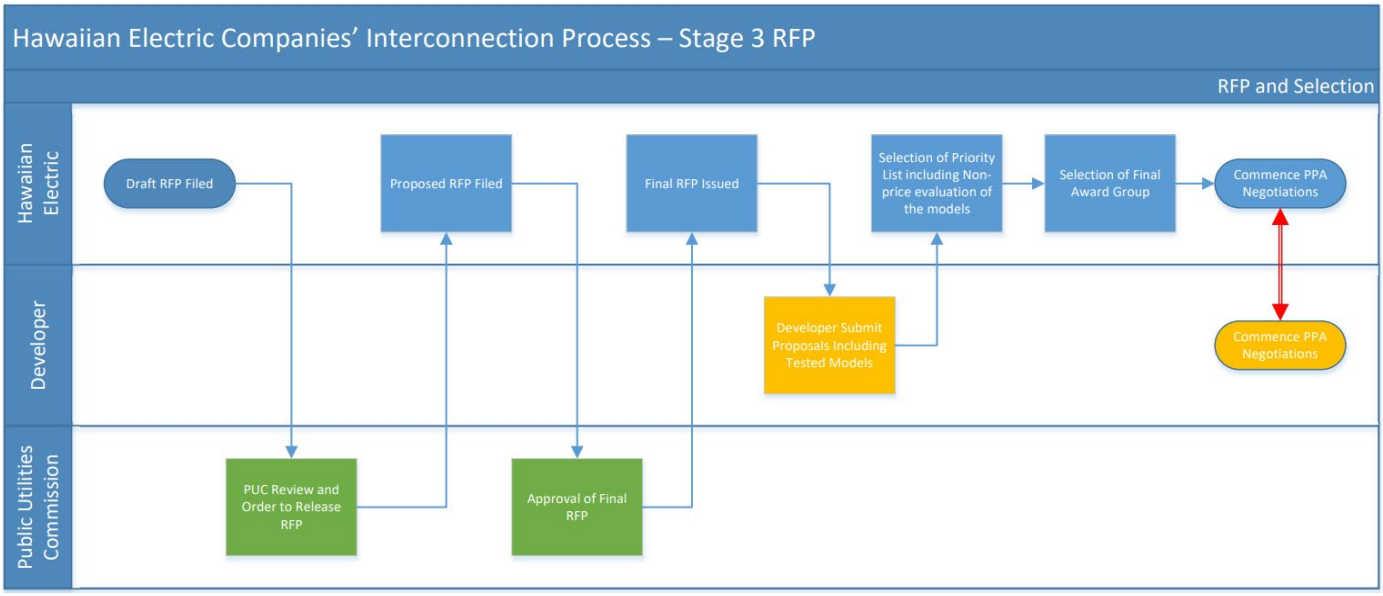
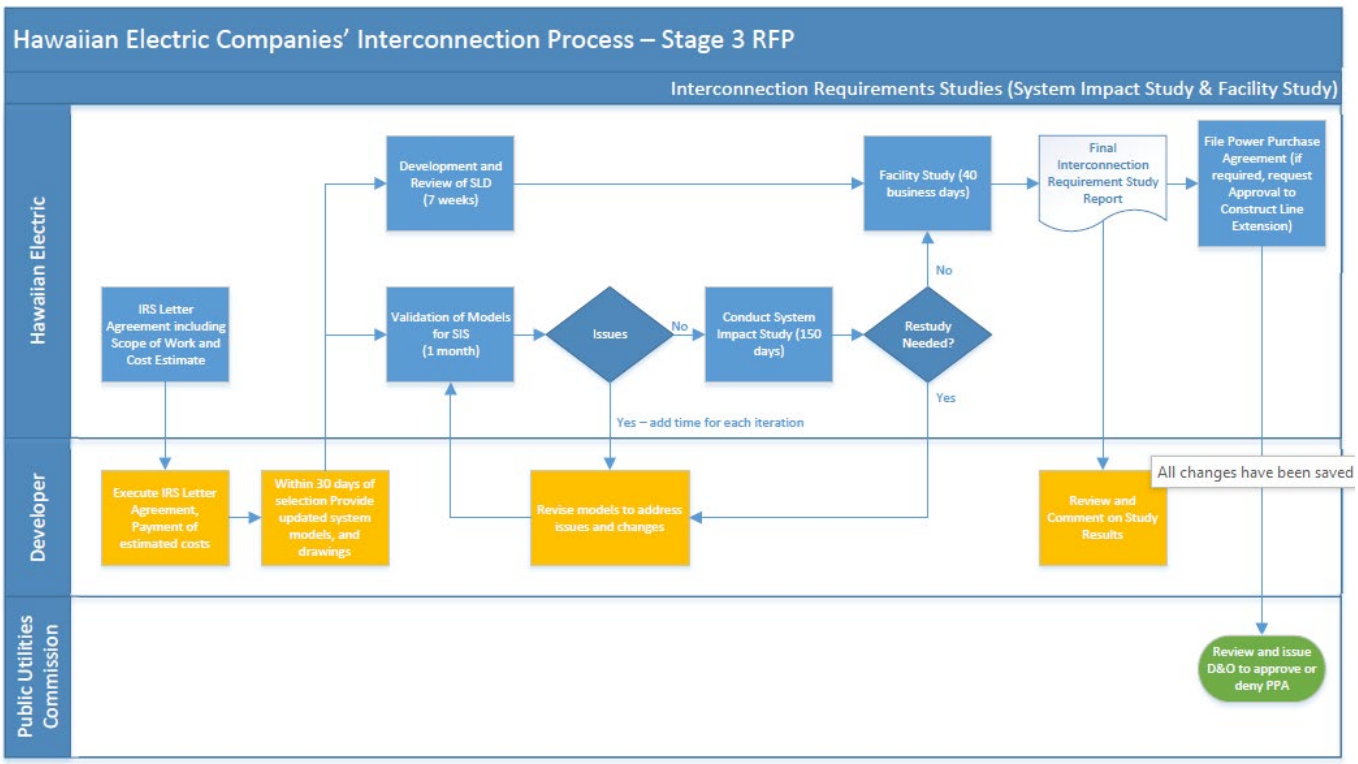


Figure 4-2: Hawaii Companies' Stage 3 RFP Process for Interconnection Requirements Studies[32]



For the 'self-build' projects constructed by the Companies, the interconnection process is predominantly identical to the process for IPP-projects; however, the PPA negotiation phase does not occur. The self-build projects are managed by separate divisions within the Companies, per the Companies' internal Code of Conduct. The Self-build project team's workstream is kept independent to that of the interconnection department. The interconnection department will study self-build projects as they would for an Independent Power Producer (IPP), which is included in a complete IRS, along with a comprehensive FS. Unlike IPP developed projects, self-build projects will not be subject to negotiations regarding construction of interconnection infrastructure, as the Companies will oversee the work to interconnect their own projects. The self-build projects will still be subject to reporting and approval from the Commission; however, they do not require approval for any updates made to the facility plans, although they are still expected to provide updates to the Commission related to the IRS.

[31] Received via Hawaiian Electric in response to PA data request
[32] Received via Hawaiian Electric in response to PA data request

4.2.2 Interconnection Process Improvements for Stage 3 RFP Process

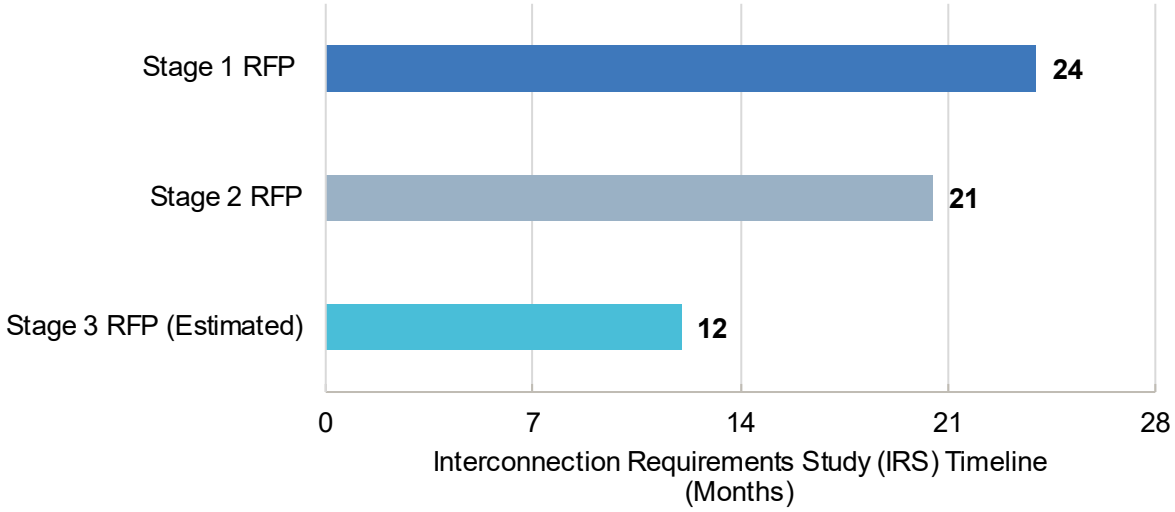
As part of the Stage 3 RFP, the Companies have altered and are trying to optimize the interconnection process in order to reduce the time required for projects to reach commercial operation, compared to the Stage 1 and 2 RFP projects. The Companies intend to reduce the total process time between the initial collection of the developer's model to the filing of the IRS with the Commission to a twelve-month period. They have instituted a new model checkout process, clearly highlighting requirements for developers to ensure that their models are sufficient upon initial submission, to mitigate issues and delays in the SIS phase. The Companies will also provide bidders with pre-highlighted substation requirements, typically identified in the FS, to improve the accuracy of developers' interconnection cost projections and decrease the chance of a project withdrawal due to the unexpected interconnection facility costs. Furthermore, the Companies hope that by completing additional aspects of the SIS and FS in parallel, this would further shorten any delays experienced by a developer initially submitting a deficient facility model. The Companies will also complete the IRS prior to negotiating the PPA and submitting the PPA and proposal for the project's overhead line, if applicable, for Commission approval.

4.2.3 Interconnection Timeline

The interconnection process for renewable projects is a multiphase approach that can be largely grouped into three distinct phases: IRS process, Commission review and final PPA approval, and the construction and commissioning phase. In Stages 1 and 2 RFP projects, the Companies' IRS process was triggered by the acceptance of a developers' project bid via the RFP process and occurred in parallel to the PPA negotiations; however, the IRS was completed after the Commission made its determination on the approval of the PPA, resulting in a subsequent IRS amendment being filed as an addendum to the PPA. In the upcoming Stage 3 process, the IRS will be completed prior to the Companies filing their application for approval of the PPA for the project.

The IRS process includes various steps starting from Company's request of data from developers to start the SIS to multiple steps including performing SIS and FS studies by the Company, negotiation of IRS amendments between the Company and the project developers, and the filing of the IRS amendments to the Commission. The Companies have made process improvements to shorten the interconnection timeline in each subsequent RFP. In completing the IRS process, from award of the project to filing of the IRS Amendments, it took an average of 24 months during the Stage 1 RFP projects, and an average of 21 months during the Stage 2 RFP projects.[33] This includes steps 1 through 5 in Table 4-2 and accounts for items outside of the study itself, such as completing the IRS Amendment. For the Stage 3 RFP projects, the Companies expect to take about 12 months to complete the IRS process.[34]

Figure 4-3: IRS Process Timeline during the RFP Processes[35]



[33] The dates attributed to steps 4 and 5 for Stage 1 and 2 RFP projects are actual dates that have received final approval of their IRS results by their respective developers.
[34] Proposed Schedule filed to the Commission, Docket No. 2017-0352, March 10, 2022.
[35] The IRS timeline of Stage 1 and Stage 2 RFP projects are based on the projects that have completed IRS process and incorporates steps 1 through 5 of Table 4-2.

Table 4-2 shows the interconnection timeline of three different RFP interconnection processes administered by the Companies. The Companies use Steps 1 to 5 to manage the IRS process, Step 6 involves a regulatory filing and review by the Commission, and Step 7 includes the construction of the interconnection and generating facilities.

The Companies do not have a standard timeline for the engineering, designing, and construction of generation facilities (step 7 of the process) due to the unique scope of work of each project. Various project specific factors impact the construction timeline of the projects. The issues include, but not limited to, design and permitting considerations, procurement approach, construction means and methods, and commissioning procedures. The timeline reported for Step 7 in the table below for Stage 1 and Stage 2 projects are based on the schedule provided by the project developers (sellers) during the monthly updates.

Table 4-2: Interconnection Related Timeline Established by Companies during the RFP Processes

Interconnection Review Process	Companies' Interconnection Process Steps	Stage 1 RFP (months)	Stage 2 RFP (months)	Stage 3 RFP (months)	Responsible HECO Dept
Companies Interconnection Requirements Study (IRS)	Step 1. From Company Request to Receipt of IRS Data and Model Collection to Start SIS	2	2-3[36]	2	Interconnection Services
	Step 1a. From Company Request of Developer Drawings to Completion of Company SLD's/Receipt of Developer Drawings	2	2	2	Project Initialization
	Step 2. Start of SIS to SIS Results	5	6[37]	5	Interconnection Services
	Step 2a. Start of Preliminary FS to Preliminary FS Results	2	2	N/A[38]	Project Initialization
	Step 3. Start of Final FS to Acceptance of Final FS	2	2	2	Project Initialization
	Step 4. Presentation of Final IRS Results to Acceptance by Developer	2	1	2	Renewable Acquisition
	Step 4a. Acceptance of IRS to Execution of IRS Amendment	4-10	2-6	2	Renewable Acquisition
	Step 5. Execution of IRS Amendment to Filing of IRS Amendment and Line Approval	1-3	1	1	Renewable Acquisition
Commission Review& Final PPA Approval	Step 6. File IRS Amendment to Receive Approval to Construct Line Extension	5-6	1-3	3-6	Renewable Acquisition
Construction Period	Step 7. Engineering/Design/ Procurement/Construction to Commercial Operations	26-55	38-61	36-72	Project and Program Management
	Total (Steps 1-7) From Request of IRS Data to Commercial Operations	51-89	57-87	55-94	

[36] For Stage 2 RFP procured projects, the timeline for Step 1 varied depending on projects Guaranteed Commercial Operation (GCOD). For projects with GCOD in 2022, the Developers have thirty days to turn in their models, while projects with a GCOD in 2023 will have sixty days for submission.
[37] For Stage 2 RFP projects, the six-month timeframe allocated for Step 2 is to complete the system impact study using a grid following model, which would impact the interconnection facilities.
[38] The Stage 3 RFP process will conduct the PPA negotiation and IRS in parallel so the preliminary FS will not be completed.

4.2.4 Interconnection Costs & True-up

The interconnection cost of each project is determined by facilities identified in the FS that are necessary to interconnect the project to the electric utility's grid. Figure 4-4 provides an illustration of total interconnection cost which includes three major cost components: the IRS costs, COIF costs, and SOIF costs. For IPP built projects, COIFs are paid for by non-utility entities– consistent with the utility's standards and requirements. SOIFs are paid for by non-utility entities, but typically are not disclosed to the utility. Therefore, the Companies are only able to report actual COIF costs for work the Companies performed associated with IPP built projects.

Before a project is even studied under the IRS process, developers are required to submit two payments to the Companies. The first payment is used to complete the SIS and FS which typically ranges from $140,000 to $220,000. The second payment is used to complete the IRS Amendment after completion of the IRS as part of the interconnection process. Any remaining funds are rolled into the amounts due for the COIF. Both fees are subject to a true-up following the completion of the IRS and commercial operation of the project. Certain internal departments, including engineers and consultants contracted by the Companies to assist with the interconnection studies, charge time for their efforts to these fees, whereas other salaries, such as the interconnection contract managers' salaries, are rate-based.

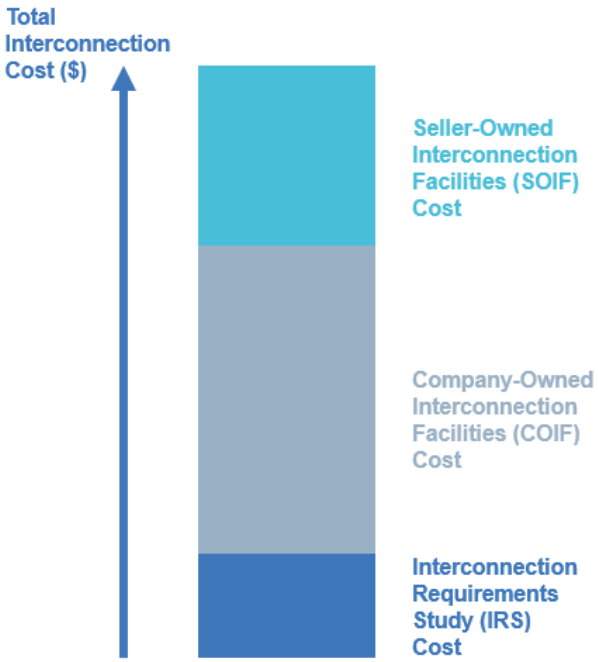
Following feedback from the Stage 1 and 2 RFPs, the Companies have included a publicly-accessible unit cost guide for all transmission-level electric equipment that could be used in constructing interconnection facilities – this unit cost guide can be accessed in Appendix H of the Stage 3 RFP document. The Companies believe that by making the unit cost guide publicly available at the start of the process, developers can have more informed bids, based on the size of their facilities, as well as where they intend to interconnect onto the grid. For self-build projects, the Companies use the same unit cost guide found in Appendix H of the Stage 3 RFP to price out their facilities.

Following the finalization of the IRS, developers concerned with the costs for upgrades quoted in the FS have the ability to withdraw their project from the queue. The RFPs explicitly state that IPPs are responsible for the actual final costs of all interconnection costs, whether or not such costs exceed the interconnection costs estimated in the proposal, and no adjustments are allowed to the proposed price if actual costs exceed the amounts proposed.[39, 40] All costs for interconnection facilities (whether self-builds or IPP), are subject to true ups following the commercial operation of the project.

[39] See Section 2.3.4 of Stage 3 RFP for Hawaii Island, Section 2.3.5 of Stage 1 and 2 RFPs.

[40] Hawaiian Electric recently allowed multiple IPPs to renegotiate the pricing for their projects and subsequently submitted executed PPA amendments to the Commission for review. The Companies state that the requests for amendments were due to increased costs and delays caused by the COVID-19 global pandemic and resulting supply chain crisis and were not due to changes in the interconnection costs determined as a result of the IRS. The Commission has reviewed such requests on a case-by-case basis, weighing the implications of the updated pricing proposals on the competitive bidding process, recognizing that certain factors related to the supply chain interruptions from the global pandemic which resulted in equipment cost increases were out of the developers' control. In Phase 2 of this study, PA will solicit feedback from IPPs and will gather more information about the cost drivers that resulted in these PPA amendments.

Figure 4-4: Illustrative Example of Types of Interconnection Cost[41]



4.2.5 Interconnection Dispute Resolution Process

In the Stage 1 and 2 RFP projects, the Companies did not have a specific dispute resolution process for addressing interconnection issues. For the projects solicited via the RFP processes, the Companies rely on a standard dispute resolution process for disputes that arise prior to execution of the PPA. The Stage 3 RFP outlines the dispute resolution process, as well as the Commission's expectations on the subject, established in the competitive bidding framework (Section 1.10). If a dispute is raised by a developer (bidder), that party is encouraged to work with the Companies to reach a resolution before raising the matter with the Commission. An independent observer is to be present at an initial meeting between the disputer and the Companies and will act as a mediator between the two parties; the independent observer will not have decision-making authority and can only advise the parties on a potential resolution.

Additionally, if the dispute is not resolved within twenty days after the initial meeting, the two parties have the option to procure another third-party firm to attempt mediation independent of the appointed observer, and the two parties will be required to split the cost. If this fails to produce a resolution acceptable to both parties within sixty days of the initial meeting, then the disputer will be allowed to raise their issue(s) with the Commission.[42] If a dispute is escalated further, the Commission will attempt to resolve the issue within thirty days of notice – however, the disputer currently has no right to a hearing or any appeal under this process. [43] Finally, if a bidder submits a dispute outside the process described in the Commission's framework or Section 1.10 of the Stage 3 RFP, then the dispute will be dismissed with prejudice, and the bidder will be held responsible for all attorney fees and costs incurred by both the Commission and the Companies.[44] For disputes that arise after PPA execution, the dispute resolution provisions set forth in the PPA govern any disputes that may arise.[45]

For the Stage 3 RFP process, the Commission has also appointed an IE to oversee various interconnection tasks including, but not limited to, reviewing the Companies' overall interconnection process and technical aspects of the RFP process. The IE is also tasked with assisting the Commission in establishing a dispute resolution process for interconnection-related issues.

[41] Illustrative cost breakdown is not drawn to scale.
[42] Docket No 2003-0372, Order 23121, Issued December 8, 2006. Also included as Appendix C in Stage 3 RFP process.
[43] Docket No 2003-0372, Order 23121, Issued December 8, 2006. Also included as Appendix C in Stage 3 RFP process.
[44] See Section 1.10.6 from Stage 3 RFP for Hawaii Island.
[45] The Companies state that for the post-PPA process, the dispute resolution process is developed on case-by-case basis, but usually follows a consistent structure. Typically, when a dispute arises in post-PPA phase, the first step calls for a management meeting followed by mediation, and finally litigation for any unresolved disputes in the earlier phase. The Companies also mentioned that in some post-PPA dispute resolution processes, the agreed PPA terms could involve a review by an IE mutually selected by the parties, distinct from the IE that was recently hired by the Commission to serve in the Stage 3 RFP process.

4.3 Interconnection Process Reporting

4.3.1 Interconnection Process Data Maintenance

The Companies do not maintain and or rely on any internal databases to track metrics related to the timeliness of completion of the different interconnection process steps. Instead, they rely on official dates of notices related to the completion of each stage of interconnection process (by the Companies), and they account for the different process step completion dates within the master schedule provided in their monthly reports to the Commission for each project.[46] They also account for milestone completion dates in monthly emails that they send to all internal and external stakeholders for each project; for instance, the completion date of the FS is tracked by two emails sent out by internal teams within the Companies, one at the commencement of the study and the other upon completion, and the dates of each email are used to track compliance with the FS's 40-business day requirement. The Companies rely on the monthly reports and emails sent to developers and the Commission as their records, instead of using a database to maintain milestone information. The interconnection team(s) within the Companies also use spreadsheets to track the work done for each interconnection project and send weekly updates for each project to executives.

4.3.2 Reporting of Interconnection Statuses to the Commission

Following the Commission's Status Conference held in March of 2021, the Companies provide the Commission with monthly updates on the status of all RFP projects currently under development (Stage 1 and 2), as well as projects associated with the Community Based Renewable Energy (CBRE) shared solar program. The Commission requires the Companies to also track delay-related costs in commercial operations of all Stage 1, 2 RFP projects and CBRE projects, per the Commission's order No. 37752.[47] The reports also now contain information regarding the project construction schedules, maintenance information, and updates to projects that have not yet reached commercial operation, following a request sent by the Commission to the Companies in February 2022. The reports are very detailed. Updates from previous reports are denoted in red outlines to highlight tracking of new information. Information included in the reports include:

- The Guaranteed Commercial Operations Date (GCOD);
- The gross nameplate rating of the facility, the generating technology(ies);
- The RFP Stage;
- Status on the PPA procurement negotiations;
- Status on the SIS – including any updates to the facility that would trigger a re-study;
- Status on the FS;
- Status on the engineering, design, and construction of the Generation Facility and any Interconnection Facilities;
- Status of permits for the construction of the Generation Facility and any Interconnection Facilities;
- Status on the Commissioning test of the Generation Facility and any Interconnection Facilities.

The reports also use a three-colored system to track the status of the overall project, and whether it is on target to meet the GCOD: green denotes that the project is currently on track to meet the GCOD; yellow denotes that the project is at risk for missing its GCOD; red denotes that the project is expected to miss its GCOD. Each process phase status includes commentary on the current work being done, the expected or actual date of completion, as well as the responsible party for each phase, particularly to highlight any delays that could be caused by either the Companies or the Facility owner.

4.4 Interconnection Metrics and Timeline

4.4.1 Summary of Renewable Projects (Interconnected and Currently Under Development) between 2015-2022

This section provides a summary of 31 eligible projects that have either interconnected to Hawaii's electric utility grid over the last seven years (2015-2022) or are currently in flight within the interconnection process, for each of the three Companies. Although other renewable generation projects have been developed during the same period, these 31 projects meet the criteria set in Act 201 – renewable projects greater than 5 MW, and/or CBRE projects of any size. All 31 projects accounted in our reporting have an executed PPA with the respective Company whose grid it will interconnect to.

[46] For example, see Exhibit 1, November 2022 Report, Docket No. 2021-0024, Filed November 23, 2022.
[47] The Order 37752 was filed with the Commission on April 27, 2021. However, the Companies filed a dispute on May 7, 2021, and Commission responded in Order No. 37792, clarifying its directive to track delay-related costs but not, at the time, record or impose any penalties related to such costs.

Table 4-3 and Table 4-4 provide a summary of projects by project developer type and current status. Out of 31 total projects identified, 13 have been interconnected to the Companies' system, whereas the remaining 18 projects are currently under development. Out of 23 IPP-built projects, nine have interconnected, whereas 14 projects remain under development. IPP projects that are currently being developed were procured via the Stage 1 and 2 RFP processes. Among the six CBRE projects, two have been successfully interconnected in the system, and four are under development. The summary also includes two self-build projects: West Loch Solar One (PV, 20 MW) that reached COD on November 11, 2019, and Schofield Generating Unit (50 MW) that received COD on June 7, 2018. Through the Stage 2 RFP process, two self-build projects have been selected – Keahole Battery Energy Storage (12MW/12 MWh) and Waena Battery Energy Storage System (BESS) (40 MW/160 MWh). These projects are in regulatory review with the Commission and are excluded in the summary.

Table 4-3: Number of Renewable Projects (Interconnected & Under Development) during 2015-2022 Period[48]

Project Developer Type	Interconnected	Under Development	Total Projects
IPP	9	14	23
Self-build	2	0	2
CBRE	2	4	6
Total	**13**	**18**	**31**

Table 4-4: Number of Renewable Projects by Developer Type and Island during 2015-2022 Period

Island	Oahu	Maui*	Hawaii	Total Projects
Projects that Have Reached Commercial Operation				
IPP	9	-	-	9
Self-build	2	-	-	2
CBRE	1	1	-	2
Sub-total	*12*	*1*	-	*12*
Projects Under Development				
IPP	8	4	2	14
CBRE	2	1	1	4
Sub-total	*10*	*5*	*3*	*18*
Total Projects	**22**	**6**	**3**	**31**
**Also includes one CBRE project currently developed in Moloka'i*				

Table 4-5 provides an aggregate size and number of projects by technology type and capacity that have been procured via the various processes during the 2015-2022 period. The renewable projects that have already been interconnected in the Companies' system are mainly solar photovoltaic (PV) facilities. However, most of the projects that are currently under development (that were procured via the Stage 1 and 2 RFP processes) are paired solar PV and BESS facilities. All six CBRE projects are solar PV facilities.

Table 4-5: Renewable Projects by Technology Type and Capacity during 2015-2022 Period

Tech Type/Island	Oahu	Maui*	Hawaii	Total Projects
Projects that Have Reached Commercial Operation				
PV	172 MW (9)	0.02832 MW (1)**		172 MW (10)
PV+BESS	39 MW/156 MWh (1)			39 MW/156 MWh (1)
Wind	24 MW (1)			24 MW (1)
Other (Dual Fuel; bio-fuel capable)	50 MW (1)			
Projects Under Development				
BESS	185 MW/565 MWh (1)			185 MW/565 MWh (1)
PV**	4.72 MW (2)	0.225 MW (1)	0.15 MW (1)	4.87 MW (4)

[48] Please note that this list does not include Barbers Point Solar which was recently cancelled.

PV+BESS	195 MW/905 MWh (7)	135 MW/540 MWh (4)	60 MW/240 MWh (2)	390 MW/1685 MWh (13)
**Also includes one CBRE project currently developed in Moloka'i*				
***Denotes CBRE projects*				

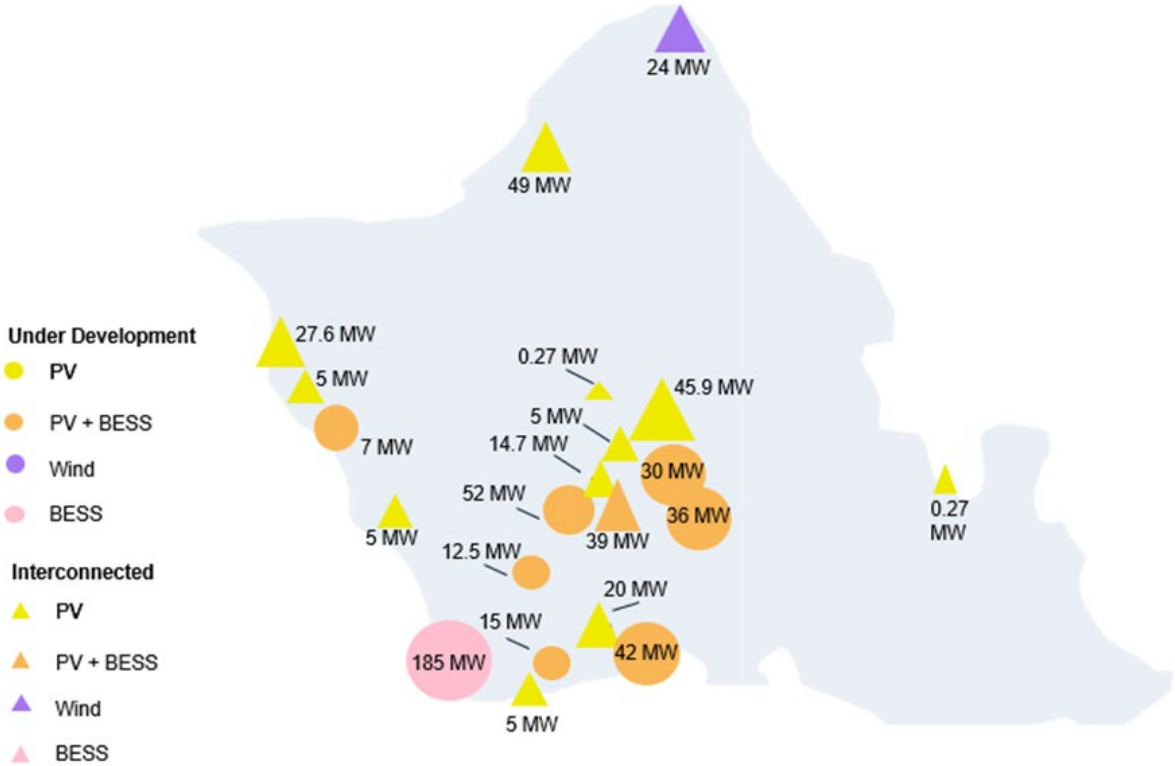
Table 4-6 represents the number of projects that have interconnected into each island Electric Company's grid, at each interconnection voltage level, over the last seven years (2015-2022). Almost all projects have interconnected through the different Stage RFPs and or CBRE programs at the mid-voltage transmission level (greater than 34.5 kV) or higher.

Table 4-6: Renewable Projects by Interconnection Voltage Level

Interconnection Voltage Level	Oahu	Maui*	Hawaii	*Total*
120/208V	2	2	1	*5*
12 KV	2	0	0	*2*
34.5 kV	0	0	0	*0*
46 KV	13	0	0	*13*
69 KV	0	4	2	*6*
138 KV	5	0	0	*5*
Total	**22**	**6**	**3**	**31**
**Also includes one CBRE project currently developed in Moloka'i*				

Figure 4-5, Figure 4-6, and Figure 4-7 present the geographic spread of renewable projects that meet the criteria laid out in Act 201 within each island utility territory.

Figure 4-5: Hawaiian Electric (Oahu) Renewable Projects (Interconnected and Under Development) during 2015-2022[49]



[49] Figure 4-5 does not include the interconnected 50 MW, biofuel-capable Schofield Generating Unit on Oahu.

Figure 4-6: Maui Electric (Maui, Lanai, Molokai) Renewable Projects (Interconnected and Under Development) during 2015-2022

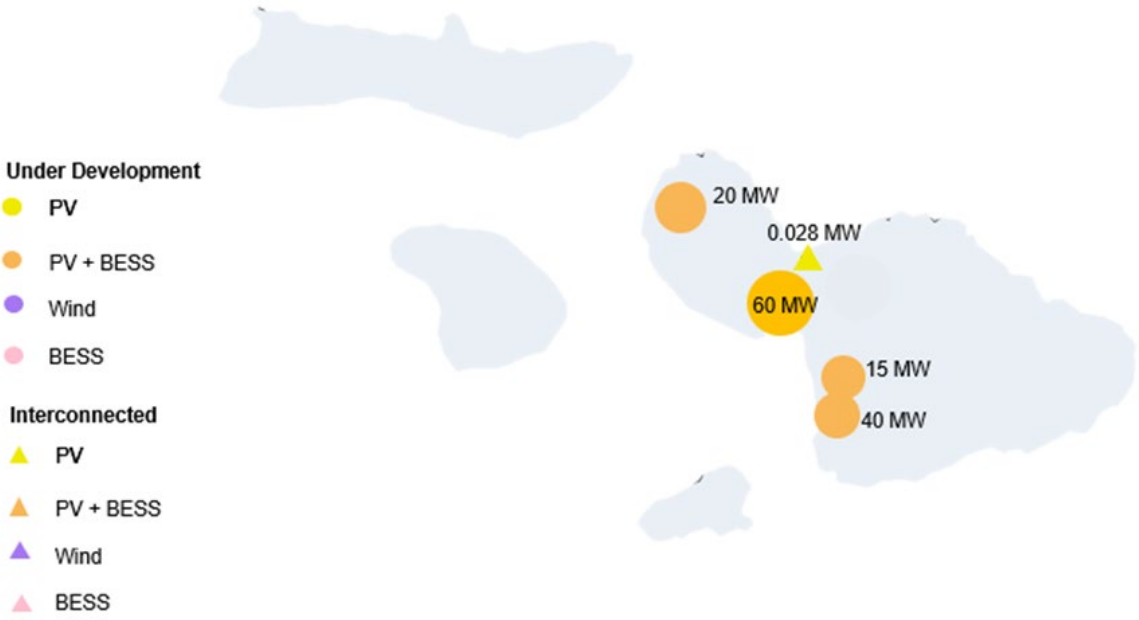
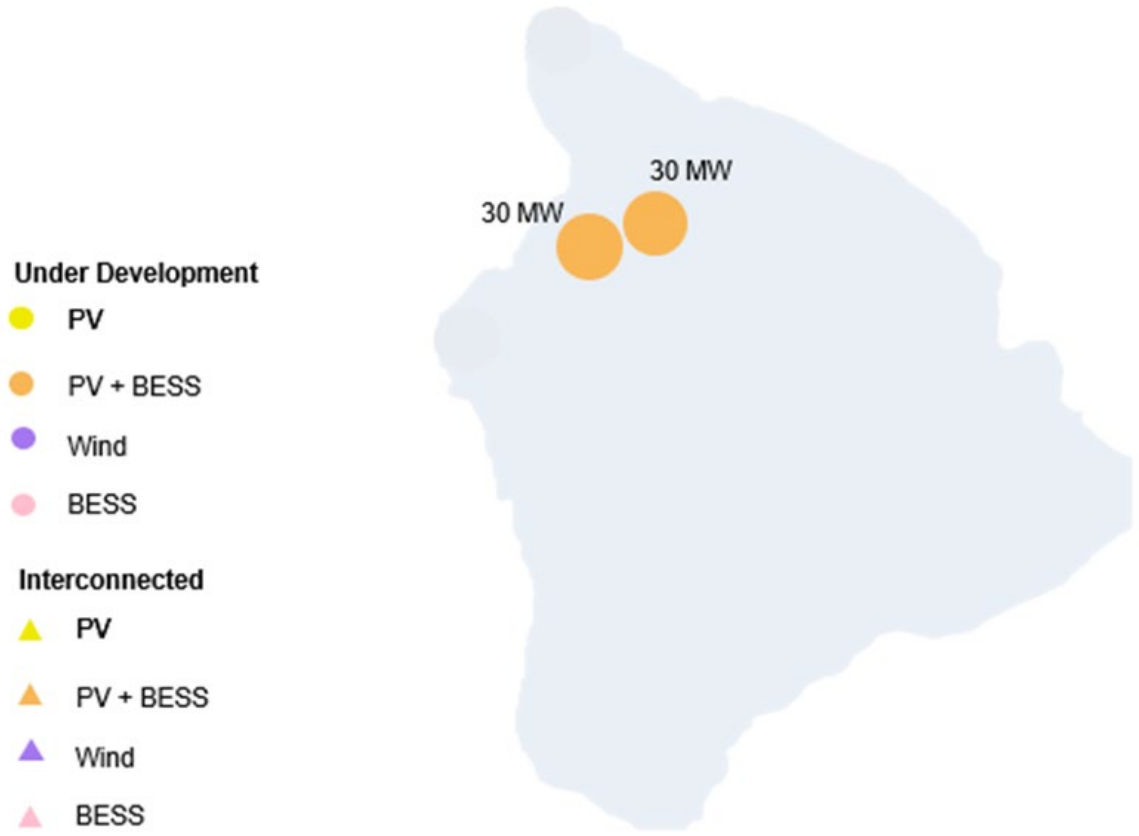


Figure 4-7: Hawaii Electric Light Company (Hawai'i) Renewable Projects (Interconnected and Under Development) during 2015-2022



4.4.2 Interconnection Cost of Renewable Projects during 2015-2022 period

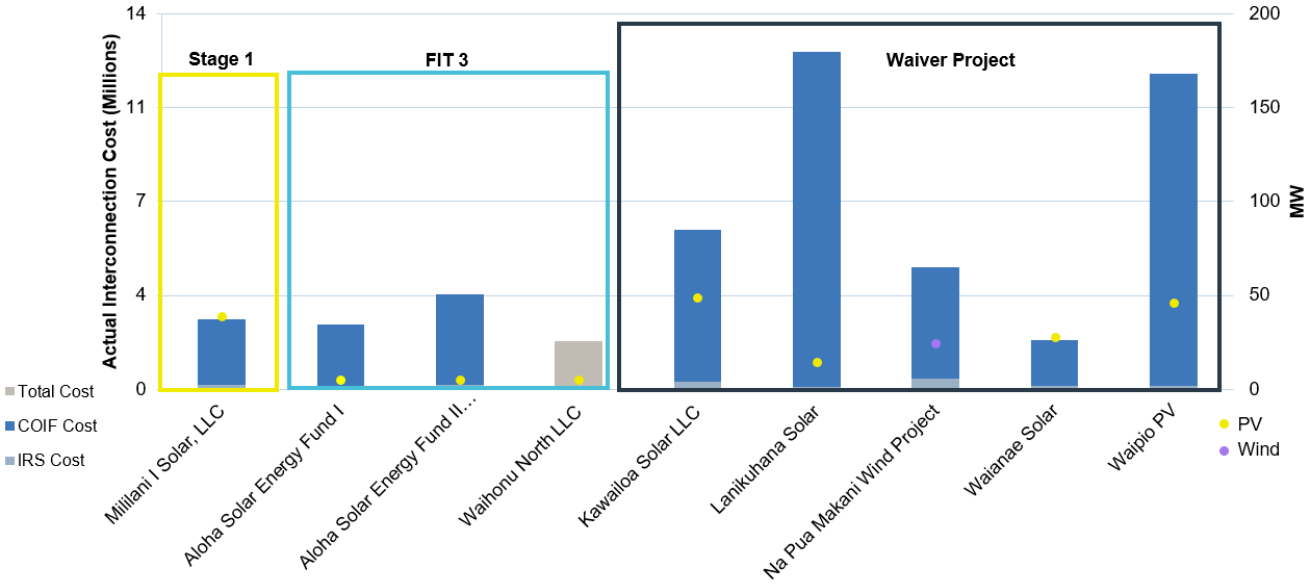
Figure 4-8 includes the actual costs for interconnection for all projects that have reached commercial operation over the last seven years (2015 – 2022) under the Stage 1 RFP, FIT3, and Waiver[50] projects. These costs include all construction costs for company owned interconnection facilities, gen-ties, and any fees for respective SIS and FS. The Figure also includes the capacity of the renewable projects. However, the Companies do not track costs associated with project management of IRS process separately. The total interconnection cost for the IPP projects includes the costs for all COIF identified in the project respective facility study reports, as well as the costs for gen-ties (the line built to transport generation from the facility to the point of interconnection). Costs for gen-ties are dependent on the distance between a project facility and its point of interconnection (POI). Similarly, Figure 4-9 includes estimated interconnection of Stage 1 and 2 projects that are currently under development. All Stage 2 project reported costs include a fee used by the Companies to complete the SIS and FS, as well as any re-studies triggered by changes made to a project by the developer.

As a general trend, the total costs for each project are mostly dependent on the total nameplate rating of each generation facility. Larger sized projects are more likely to cause greater impacts to the grid via the SIS, and therefore require more scope in terms of interconnection facilities to safely export generation onto the grid. Most of the projects captured in Figure 4-8 had actual interconnection costs of less than $7 million, except for Waipio PV ($11.8 million) and Lanikuhana Solar ($12.6 million). Both projects interconnected at the 138 kV level, which required more expensive transmission equipment for interconnection facilities, due to the higher interconnection voltage level. All other projects accounted for in Figure 4-8 interconnected at the 46 kV level or below. Additionally, the total interconnection costs for Lanikuhana Solar are inclusive of a 100 ft gen-tie from the facility to its POI.

In Figure 4-9, the estimated costs reported for projects procured via the Stage 1 and 2 RFPs are between $1.4 million and $5.2 million. The Stage 1 and 2 procured projects have higher gross nameplate ratings than the projects accounted for in Figure 4-8, as they are all larger than 50 MW. Also, over half of the projects captured in Figure 4-9 are interconnecting at higher voltage levels (either 69 kV or 138 kV), necessitating more expensive transmission equipment to be installed. For the Stage 1 and 2 RFP interconnection processes, projects are studied in clusters, which allows for the grid upgrade costs to be allocated amongst all interconnection requests within the group. This may account for the project costs in Figure 4-9 being less than half of those for Lanikuhana Solar and Waipio PV, despite the fact that they all interconnect at the same voltage level. The remaining six projects – AES West Oahu Solar LLC, Barbers Point Solar, Kupono Solar, Mountain View Solar, Waiawa Phase 2 Solar, and Waiawa Solar Power LLC – interconnect at the 46 kV level.

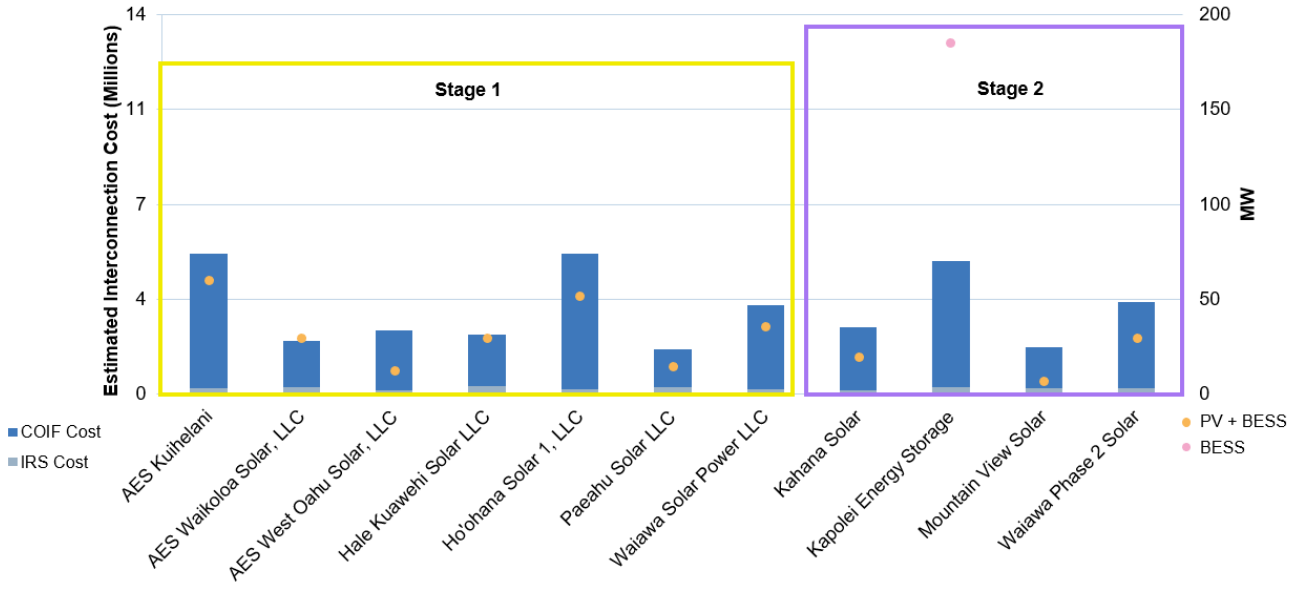
Phase II of the report will discuss the factors driving the reported interconnection cost of the renewable projects by drawing upon further data review and interviews with the project developers.

Figure 4-8: Interconnection Cost (Actual) of projects interconnected during 2015-2022 period



[50] PA defines Waiver projects as the projects procured outside of Companies' structured RFP process.

Figure 4-9: Interconnection cost (Estimated) of Projects Currently Under development[51]

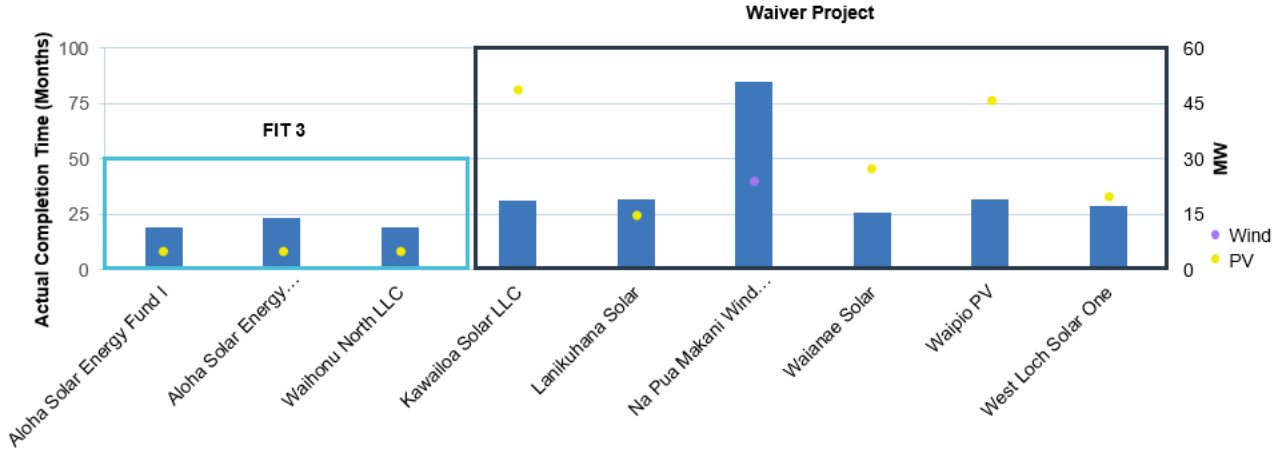


4.4.3 Interconnection Timeline of Renewable Projects during 2015-2022 period

Figure 4-10 and Figure 4-11 summarize the timeliness for all projects analysed during this report's study period, including projects that have already reached commercial operation (Figure 4-10), and those that are currently under development. They are further sorted by the size of the gross nameplate rating of each facility (in MW), and the generating technology for each facility. The general trend for projects reported in each figure is that the time required for each project to reach commercial operation is dependent on its gross nameplate rating; as discussed in Section 3.4.2 of this report, larger-sized projects cause more impacts to the grid in SIS simulations and require a longer time to complete the FS, since more facilities are required to prevent violations in the grid impact simulations as part of the SIS. For projects currently under development, the average IRS completion time for projects procured via the Stage 1 RFP is 30 months, whereas for projects procured via the Stage 2 RFP, the average IRS completion timeline is 21 months (Figure 4-11). The Companies have improved the interconnection process in Stage 2 projects as compared to the Stage 1 projects. However, it is likely that the projects that are currently under development will miss their respective COD timeline for various reasons. This is discussed further in Section 4.5.1.

Similarly, Figure 4-12 shows the interconnection timeline associated with CBRE projects. The average timeline of CBRE projects that have interconnected to the Companies' system is 5 months. Note that the two interconnected CBRE projects are smaller in size as compared with currently developed CBRE projects. The average construction timeline of four CBRE projects that are currently in development is 19 months.

Figure 4-10: Timeline (PPA to COD) of Projects Interconnected during 2015-2022



[51] The figure does not include the estimated interconnection cost of Kupono solar that was recently approved by the Commission. The Companies mentioned that the estimated cost information will be available in early 2023.

Figure 4-11: Timeline (PPA to to-date) of Projects Under Development

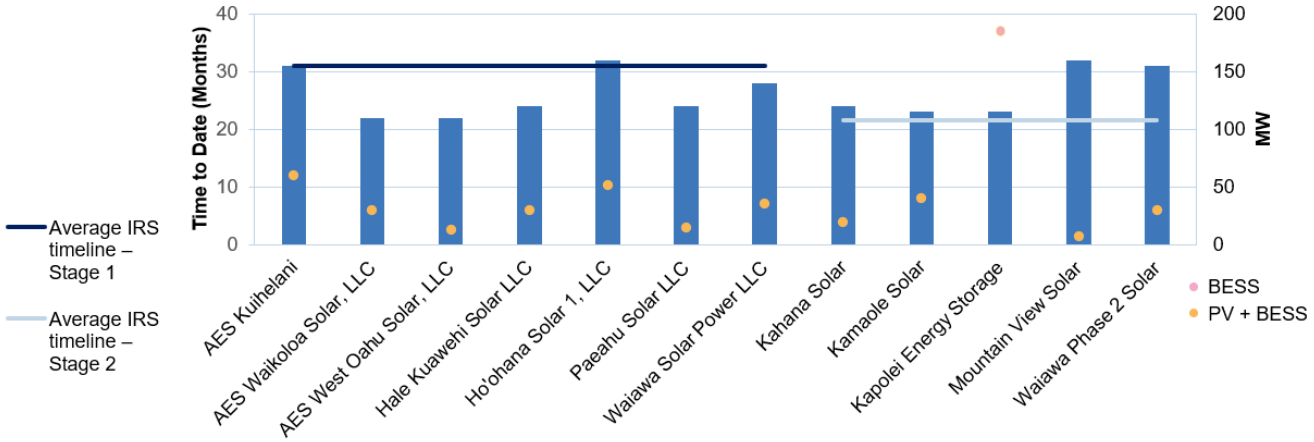
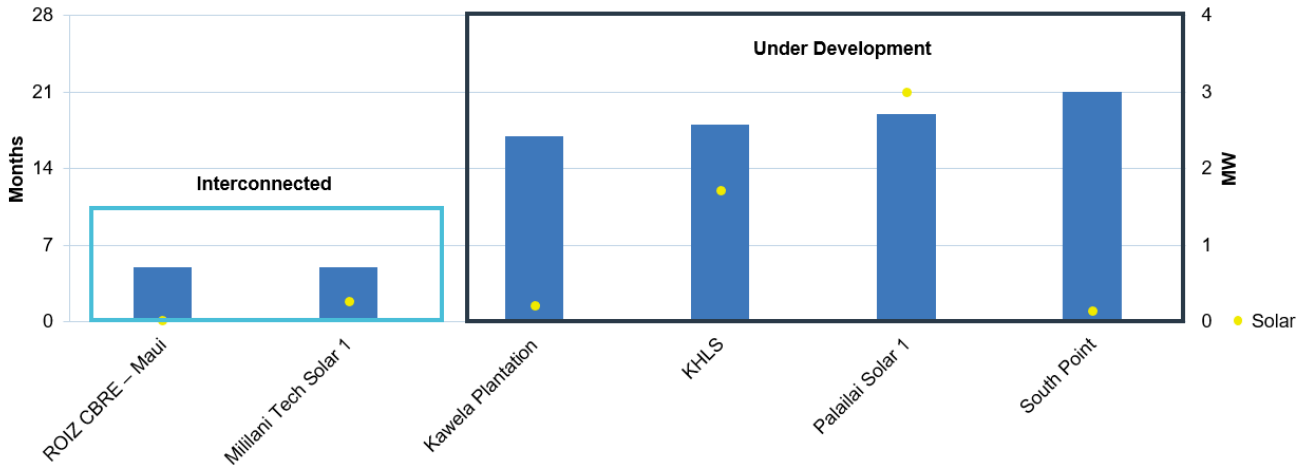


Figure 4-12: Timeline (PPA to to-date) of CBRE Projects



4.4.4 Interconnection Cost and Timeline of Self-build projects

During the seven-year study period, the Companies constructed two self-build projects (West Loch Solar and Schofield Generating Station) that met the criteria outlined in Act 201.[52] There are two additional self-build projects (Keahole BESS and Waena BESS) currently pending regulatory approval by the Commission and may be developed in the future. Table 4-7 includes comprehensive summaries of these four self-build projects.

West Loch Solar One is a 20 MW solar farm and has been commercially operating since November 19, 2019. It interconnects into the West Loch 46kV Substation. The estimated costs for this project were $7.9 million ($395,000 per MW); however, PA Consulting did review the actual costs of the project. The actual costs for this project are not publicly available and therefore were not included in this report. For self-build projects, the Companies do not report categorized costs for the IRS and costs for facility upgrades/construction, as they do for IPP projects.

Schofield Generating Station is a 50 MW biofuel-capable power generation plant and has been commercially operating since June 07, 2018. The Schofield facility was built with private-public partnership between the US Army Garrison Hawaii and the Company. The project is interconnected to the 46 kV Wahiawa station and includes 2 miles of gen-ties constructed from the station to the point of interconnection. The estimated costs for this project were $18.3 million. The actual costs for this project are not publicly available and therefore were not included in this report; however, PA did review the actual costs of the project. The Companies mentioned that the switchyard was built as part of the Engineering, Procurement and Construction (EPC) contract and was included with the Generating station construction. As such, the overheads and Allowance for Funds Used During Construction (AFUDC) was tracked as

[52] Please note that Act 201 mandated the study to include interconnection issues encountered for renewable generation projects greater than five megawatts and any community-based renewable energy (CBRE) generation projects of any megawatt size from investor-owned utilities and municipalities that serve counties with a population of more than one hundred thousand.

a lump-sum and the Company could not separate the overhead costs from the AFUDC associated with the switchyard construction. The Commission approved cost recovery for Schofield Generating Station via MPIR on June 27, 2018.[53]

Moreover, the total interconnection costs for self-build projects do not directly compare with the total costs associated with IPP built projects; this makes it challenging to compare the per-unit interconnection cost of self-build vs IPP-built projects. The actual interconnection upgrade costs reported for the self-build projects includes both costs of COIF and costs of SOIF. For IPP built projects, COIFs are paid for by non-utility entities – consistent with the utility's standards and requirements – whereas SOIFs are paid for by non-utility entities and typically not disclosed to the utility. Therefore, the Companies are only able to report actual COIF costs for work the Companies performed associated with IPP built projects. Costs for self-build projects are not subject to a true-up, however, although the Companies keep track of materials and labor throughout the process to account for actual costs.

Table 4-7: Project and associated Interconnection related Information of Self-build projects

Description	West Loch Solar One	Schofield Generating Station	Keahole Battery Energy Storage	Waena Battery Energy Storage
Tech Type	PV	Other	BESS	BESS
Size	20 MW	50 MW	12MW/12MWh	40MW/160MWh
Interconnecting Island	Oahu	Oahu	Hawaii	Maui
Interconnection Voltage	46 kV	46 kV	69 kV	69 kV
Point of Interconnection	WL Solar Substation	Wahiawa Station	Keahole Generating Station	Waena Switchyard
Distance to POI	100 ft	2 miles (10,556 ft)	Same location	Same location
Procurement Method	Waiver Project	Waiver Project	Stage 2 RFP	Stage 2 RFP
Current Status	Interconnected	Interconnected	Under Commission Review	Under Commission Review
Commercial Operation Date (COD)	11/19/2019	06/07/2018	n/a	n/a
Interconnection Time from PPA to COD	29 months	33 months	n/a	n/a
Interconnection Cost	$7.9 million (Estimated)	$18.3 million (Estimated)	n/a	n/a

4.5 Stage 1 and Stage 2 Project Status

4.5.1 Overall Project Status

As discussed earlier, the Companies use a three-color system to denote the status of each project currently under development, and to indicate whether they believe a project could be in danger of missing its GCOD. Table 4-8 contains a summary of each IPP project currently under development, along with their respective status assigned by the Companies in the November 2022 report to the Commission. Most projects are currently assigned a 'red' status, meaning that they are expected to miss their revised GCOD, with most delays averaging about six months. The primary reason projects miss their GCOD relates to the procurement of equipment. Other issues impacting GCOD are the permitting of facilities, as well as technical issues with the IPP proposals. Table 4-8 also includes the original GCOD which was the GCOD included in the PPA originally approved by the Commission for each project. The CBRE

[53] Docket No 2017-0213, In the Matter of the Application of Hawaiian Electric Company, Inc, For Approval to Recover Costs for Schofield Generating Station through the Major Project Interim Recovery Adjustment Mechanism, Decision and Order No. 35556, Filed June 27, 2018.

projects were executed via Standard Form contracts which, by tariff, have 18 months from contract execution to reach commercial operations, with multiple opportunities to extend the time to completion up to 90 days for "good cause".[54] If CBRE projects have achieved "substantial progress" in construction by the 18-month completion deadline, then projects have up to 6 months from the original commercial operations deadline to complete the project; however, a late fee shall be incurred.[55]

Table 4-8: Summary of Current Timeline of IPP Projects

Project	Status	PPA Approved Date	Original GCOD[56]	Revised GCOD[57]	Anticipated COD[58]	Delay Reason Summary
Stage 1 Projects						
AES Kuihelani		3/25/2019	7/20/2021	10/27/2023	10/27/2023	Completion of seller's engineering drawings and supply chain issues.
AES Waikoloa Solar, LLC		3/25/2019	7/20/2021	4/21/2023	3/9/2023	N/A
AES West Oahu Solar, LLC		8/21/2019	9/30/2021	1/20/2023	6/20/2023	Building permits approval.
Hale Kuawehi Solar LLC		3/25/2019	6/30/2022	12/2/2022	6/1/2023	Procurement delays to due supply chain issues. Has submitted revised pricing and GCOD to HECO, under review.
Ho'ohana Solar 1, LLC		3/25/2019	12/31/2021	8/31/2023	10/31/2024	Equipment procurement issues, permitting delay and amendment to PPA.
Paeahu Solar LLC		1/14/2021	6/30/2022	4/28/2023	9/8/2023[59]	Project to experience delays as part of the re-approval process of CUP/PH2 permits. Project developer did not reach settlement with intervenors in Mediation meetings which occurred during May 3 through May 27, 2022. As a result, the hearing schedule for future settlement process was provided on 08/25/22 indicating steps required for the first phase of the process between September to mid-November, including evidentiary hearing commencing on 11/28/22. The actual hearing did not commence until December 2022 and due to unforeseen circumstances has now been pushed into January 2023 by the hearings officer.

[54] CBRE Phase 1 Program Tariff defines "good cause" as when extraordinary circumstances exist for which CBRE developers must request extensions and the Companies or the IO may each unilaterally approve.
[55] CBRE Phase 1 Program Tariff defines "substantial progress" as having achieved all of the following: (1) Installed all of the PV System foundation, (2) Has a permanent access road to the project facility, and (3) Has a permanent fence surrounding the project facility.
[56] Original GCOD from the Stage 1 and 2 projects' approved PPAs, some projects have an updated GCOD per their PPA amendments
[57] Revised GCOD per November 2022 monthly report.
[58] Anticipated COD per November 2022 monthly report.
[59] The monthly report anticipates the COD could be further delayed to Q1/Q2 2025.

Waiawa Solar Power LLC		3/25/2019	12/31/2021	9/30/2022	12/9/2022	Supply chain and permit delays. Based on further conversation with the Company, the project is currently completing testing and is expected to reach commercial operations by no later than 12/31/2022.
Stage 2 Projects						
Kahana Solar		11/19/2021	12/29/2023	12/29/2023	12/5/2024	Equipment procurement issues / delays and Seller seeking revised pricing and GCOD through a PPA amendment.
Kamaole Solar		9/15/2021	4/30/2023	7/25/2023	12/27/2024	PPA amendment was sought due to market conditions and ongoing pandemic; amendment has been executed and filed with PUC for approval.
Kapolei Energy Storage		4/29/2021	6/1/2022	12/30/2022	6/8/2023	Supply chain and permit delays.
Kupono Solar		7/22/2022	6/1/2022	4/9/2024	4/9/2024	N/A
Mountain View Solar		3/25/2021	5/17/2023	5/17/2023	1/12/2024	Equipment procurement delay, substation design submittal delays. Seller submitted notice seeking a PPA amendment for price and GCOD
Waiawa Phase 2 Solar		12/30/2020	10/30/2023	10/30/2023	5/8/2024	Equipment procurement and substation design submittal delays. Seller submitted notice seeking a PPA amendment for price and GCOD.
CBRE Projects						
Palailai Solar 1		N/A	N/A	1/27/2023	5/1/2023	Additional time needed for engineering and construction, including review for permits.
KHLS		N/A	N/A	12/17/2022	Unknown	Redesigning MV route to move underground for FAA approval - impacting construction and permitting schedules.
Ka Lae		N/A	N/A	12/1/2022	6/1/2023	Seller submitted an additional request for extension in November 2022.
Kawela Plantation		N/A	N/A	1/19/2023	Unknown	Procurement of equipment.

4.5.2 Interconnection Delays in the Stage 1 and Stage 2 RFP Projects

After reviewing projects that were interconnected over the last seven years (from 2015 to 2022), PA has identified general issues within the different interconnection process steps that have led to delays in projects reaching their COD. The Companies have noted the largest issue resulting in delays is with the first step in the interconnection process, regarding the models submitted by developers, wherein models submissions include multiple deficiencies that prevent the Companies from using the proposed facility's model in the SIS. As a result, developers needed additional time to address model deficiencies with consultants and equipment manufacturers so the model could be incorporated into the Companies' SIS. Additionally, since the SIS are performed as a cluster of projects, if one project model is delayed in meeting its requirements, it delays the SIS for the rest of the projects in that cluster as well. Finally, the Companies note that any changes a developer may elect to incorporate into their project after completion of the SIS will require a re-study. As outlined in Table 4-8 above, most of the delays currently faced in Stage 1 and 2 RFP projects is related to procurement issues, as an extension of the global supply chain constraints caused by the COVID-19 Pandemic.

5 State of Hawaii Electric Reliability Standards

5.1 Background and Timeline

Reliability is a necessary component when evaluating the operation and oversight of an electric grid. The Federal Energy Regulatory Commission (FERC) has a role in overseeing the reliable operation of the US's electric grid. FERC certified the North American Electric Reliability Corporation (NERC) as the electric reliability organization, and NERC is responsible for developing and enforcing mandatory reliability standards. Throughout the US there are Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) which are responsible for helping to ensure regional compliance to the reliability standards.

Hawaii is unique compared to many other US states in that its electric grid is not part of a larger regional electric grid managed by an RTO or ISO. Additionally, each island within Hawaii has its own individual grid, geographically and electrically independent from the other islands. This presents unique challenges related to system reliability, especially as the state looks to add renewable resources to meet its renewable portfolio standards (RPS) goal.[60]

Reliability Standards Working Group (RSWG)

The Commission began discussing reliability related issues at both the transmission and distribution levels in the Commission's feed-in tariff investigation.[61] In this docket, the Companies provided a proposal to develop reliability standards for the Companies through a Reliability Standards Working Group (RSWG). The Commission approved this proposal, and a new docket was opened on September 8, 2011.[62] The Commission hired an Independent Facilitator (IF) to facilitate the RSWG which was comprised of various stakeholders including the Companies, Kauai Island Utility Cooperative, the counties, state agencies, IPPs, industry advocates, environmental advocates, and other stakeholders. The IF held its first meeting with the RSWG on July 13, 2011.

The RSWG formed several sub-groups to explore different topics. These sub-groups were focused on:

- Gap Analysis
- Integrated Resource Planning
- Reliability Definitions and Metrics
- Reliability Standards Development (RSDG)
- Minimum Load and Curtailments
- Photovoltaics
- Demand Side Options

The Commission provided guidance to the RSWG through an order[63] which also directed the Companies to file monthly reliability reports. The IF and RSWG held their final meeting on January 24, 2013. The IF filed the final work product of the RSWG on March 25, 2013.[64] Through the RSWG, the RSDG sub-group used then-current utility information to create reliability standards tailored to Hawaii and based on NERC's standard format. The RSDG developed ten reliability standards which were presented in the RSWG's final work product. The reliability standards developed were:

- Real Power Balancing Control Performance;
- Disturbance Control Performance;
- Planning Resource Adequacy Analysis, Assessment and Documentation;
- Development and Reporting of Steady State System Models and Simulations;
- Development and Reporting of Dynamic System Models and Simulations;
- Actual and Forecast Demands, Net Energy for Load, Controllable DSM and Distributed Generation;
- Verification and Data Reporting of Generator Real and Reactive Power Capability and other Reactive Power Sources;

[60] Hawaii has a Renewable Portfolio Standard (RPS) goal of 100% of its electricity being from renewable sources by 2045; established in Act 97, Session Laws of Hawaii 2015.
[61] Docket No. 2008-0273.
[62] Docket No. 2011-0206, Instituting a Proceeding to Investigate the Implementation of Reliability Standards for the Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., and Maui Electric Company, Limited.
[63] Commission Order No. 30371, dated May 4, 2012
[64] Docket No. 2011-0206, *Reliability Standards Working Group Independent Facilitator's Submittal, Final Report and Certificate of Service,* Dated March 17, 2013, Filed with the Commission on March 25, 2013.

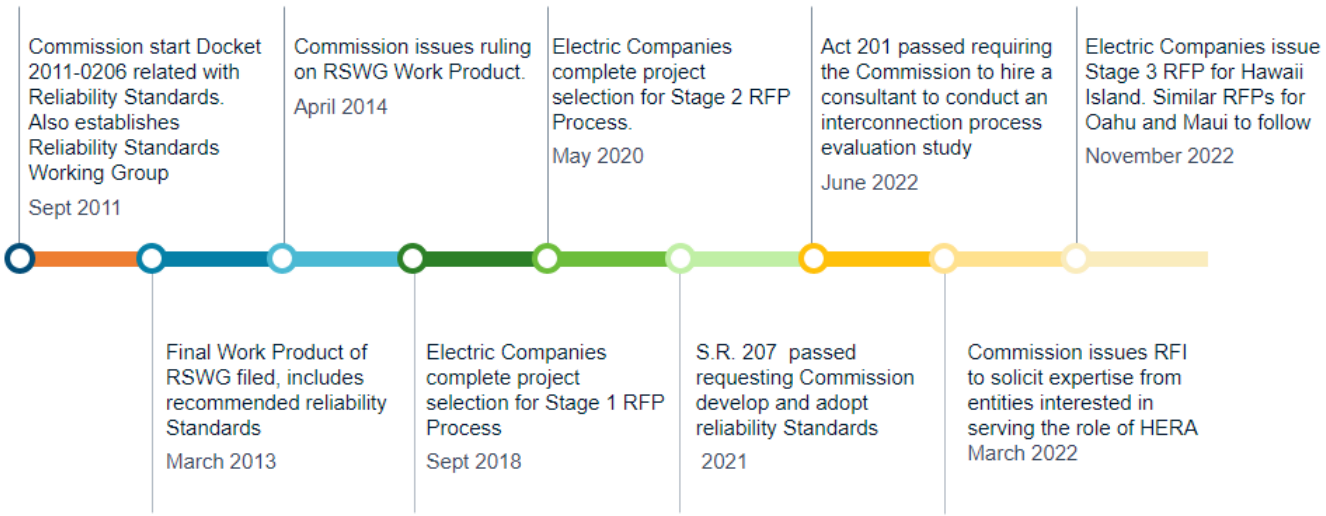
- Verification of Models and Data for Generator / Transmission Equipment Excitation System or Plant Volt / Var Control System;
- Verification of Models and Data for Governor and Load Control or Active Power / Frequency Control;
- Under-frequency Load Shedding.

The Commission issued its ruling related to the RSWG's final work product and other reliability matters on April 28, 2014.[65] In its ruling, the Commission decided to further evaluate proposed reliability standards in related dockets. These dockets include Docket Nos. 2014-0192 and 2019-0323, which investigate the interconnection standards for distributed energy resources (DERs) and Docket Nos. 2014-0183 and 2018-0165, which review the Companies planning processes, namely the Power Supply Improvement Plans and the IGP process. While the Companies have established interconnection practices for DERs, reliability standards for interconnection have not been addressed in a systematic fashion as a part of the Companies' planning proceedings.

The Companies have recently held multiple RFPs in recent years to procure more renewable resources, with project selections for the Stage 1 RFPs being completed on September 17, 2018, and project selections for the Stage 2 RFPs being completed on May 8, 2020. However, due to delays related to the COVID 19 pandemic, supply chain issues, permitting delays, and in some cases interconnection issues, renewable projects that the Companies have procured through its Stage 1 and 2 RFP processes have been delayed in reaching their COD. As such, both the Hawaii State legislature and the Commission have shared concerns regarding interconnection and project delays and their possible impacts on reliability.

In 2021, the Hawaii Senate passed S.R. 207, SD1[66] requesting the Commission to establish reliability standards and interconnection requirements in order to help facilitate timelier interconnection of utility-scale renewable energy projects.

Figure 5-1: Timeline of Activities Related to the Establishment of Reliability Standards



5.2 Hawaii Electric Reliability Administrator

The development of reliability standards in the state has been a topic of discussion for over a decade. The Legislature passed Act 166 in 2012 which authorized the Commission to establish the HERA[67] and perform different oversight functions related to electric reliability. As discussed above, the final RSWG report, via the work of the RSDG sub-group, assessed various aspects of the reliability issues. The RSDG kept in consideration the fact that any approved reliability standards would likely transfer to the HERA, when drafting the new guidelines under the RSWG. In its Order[68], the Commission stated that several important components of the RSWG's work product, including the

[65] Docket No. 2011-0206, Instituting a Proceeding to Investigate the Implementation of Reliability Standards for the Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., and Maui Electric Company, Limited, Commission Order No. 32053, dated April 28, 2014.
[66] S.R. No. 207, S.D.1, State of Hawaii, The Senate, Thirty-First Legislature, 2021.
[67] Hawaii Revised Statutes (HRS), §269-141 through §269-149. Originally passed in 2012 as Act 166, Session Laws of Hawaii 2012.
[68] Docket No. 2011-0206, Instituting a Proceeding to Investigate the Implementation of Reliability Standards for the Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., and Maui Electric Company, Limited, Commission Order No. 32053, dated April 28, 2014

establishment of reliability standards, are closely linked with the HERA and given the Commission's broad authority granted under the statutes, the Commission decided to "initiate its own framework addressing the purpose, scope, and organizational structure of the HERA," and noted that the framework development was underway.

In December 2021, the Commission filed a report to the Legislature in response to the S.R. 207 SD1 resolution that requested the Commission to submit a report regarding various matters including the HERA.[69] In the report, the Commission reported that it is in the process of soliciting input from qualified entities to serve in the role of the HERA. Moreover, the Commission provided recommendations and proposed legislation amending section 269-146, Hawaii Revised Statutes, to ensure that the Commission has discretion in determining how the Hawaii electricity reliability surcharge should be assessed to reduce potential risks to ratepayers and that customers are not forced to bear the cost burden for the establishment of the HERA.

In February 2022, continuing its effort towards the establishment of the HERA, the Commission issued a Request for Information (RFI) requesting capabilities and expertise of prospective entities interested in contracting with the Commission to serve as the HERA.[70] In the RFI, the Commission mentioned that the objective of the HERA is to "ensure the reliable design and operation of the Hawaii electric systems on a continuous basis, with an initial focus on the systems operated by the Hawaiian Electric Companies. The Commission intended the HERA, under its authority, to establish effective and transparent Reliability Standards and oversee interconnection-related matters affecting Hawaii's electric systems, with the goal of maintaining safe and efficient grid operations for all users. Pursuant to HRS § 269-142, the HERA's scope also includes non-utility entities that operate on electric systems (i.e., independent power providers, ancillary service providers, etc.).

Given the Companies' Stage 3 RFP process is anticipated to begin in 2022 Q4 and given the complexity and length of time it would take to establish the HERA, the Commission prioritized the highest impact functions related to interconnection and contracted with an IE in alignment with the Stage 3 RFP process. The Commission carved out some portions of the initial HERA scope to be applied to the role of IE; specifically, the responsibilities of the IE are similar to the scope of interconnection oversight laid out in the HERA statutes. The RFP regarding the IE role was issued on July 1, 2022. The Commission intends to assess the efficacy of the IE role in assisting with various interconnection issues and potentially utilize the experience of IE role in establishing the HERA at a future date.

[69] State of Hawaii Public Utilities Commission, Report to the Legislature Pursuant to S.R. 207, S.D. 1, Filed December 2021.
[70] Request for Information, Hawaii Electricity Reliability Administrator, February 2022.

6 Findings and Recommendations

As part of PA's work related to the analyses of interconnection in the State of Hawaii, we have compiled our findings and recommendations for process improvements, per the guidelines set forth in Act 201. As noted in Section 1, the remaining issues not covered in this report will be addressed in a future Phase 2 study; the report of Phase 2 study will build upon the findings of this document and will include an assessment and recommendations of the remaining issues from Act 201 that were not covered in Phase 1. The Phase 2 report may also update the findings of the issues identified as part of the Phase 1 study and report.

6.1 Findings

PA has organized its findings by each aspect of the interconnection process.

State of Hawaii Interconnection Regulatory Policy

- The State's existing regulatory policy is covered by a combination of decisions and orders addressed to specific interconnection issues within the State, as well as General Order 7. As General Order 7 addresses a broad range of topics related to electric service, it does not contain expansive regulations related strictly to interconnection, but instead regulates specific aspects that are related to, or are components of, the interconnection process.
- All of the Companies' own requirements related to interconnection are under the jurisdiction of the Commission; the Commission can exert influence over some of the Companies' internal processes, specifically through the Commission's regulatory authority.
- In addition to General Order 7, there are additional requirements and procedures for construction of high-voltage transmission equipment that is within the jurisdiction of the Commission; this includes, but is not limited to, equipment used to facilitate the interconnection of generation facilities to the electric utility's transmission grid.[71] Additionally, recent state law revised these requirements, stating that the utility does not need Commission approval if the transmission equipment is to be built underground, the entire cost of the underground upgrade is paid for by an entity other than the utility, and the utility provides a report, prior to construction, detailing the project and the funding source.[72]
- The Commission is also required to conduct a public hearing whenever the utility plans to build a new 46kV and above transmission line above ground and through a residential area.[73]
- Currently, the cost of most elements regarding the interconnection process are not rate-based, and instead are the responsibility to be fulfilled by the generation facility developers. Specifically, any costs associated with the project's generating facility, as well as most grid upgrade costs are the responsibility of the developer.
- The cost recovery for self-build projects is subject to approval by the Commission via a 'Request to Recover Capital', per General Order 7, if costs are above a certain threshold.[74] The Commission also approves the means of cost recovery, which changed after the PBR framework took effect on June 1, 2021. Under PBR, the Companies may request to recover capital and O&M costs for approved self-build projects via the EPRM. Recovery is limited to actual costs and is often capped by the Commission.

Companies' Interconnection Requirements

- Each Company has a set of tariffs that regulate the interconnection process: Rule No. 14 and Rule No. 19. The tariffs are under the Commission's jurisdiction, therefore, any language updates proposed by the Companies are subject to its approval.
- The Rule No. 19 Tariff regards interconnection guidelines and requirements for projects interconnecting pursuant to an RFP issued by the Companies. The tariff contains general rules and requirements for independently developed projects to interconnect to the electric utility grid. However, it contains very little regarding the expectations for all stakeholders during the interconnection process, as well as technical requirements for facilities to interconnect. Additionally, if a provision in Rule No. 19 conflicts with one in a Commission-approved RFP, then the provision of the RFP shall prevail. The RFP materials, rather than Rule No. 19, contain the process expectations, process requirements for the Companies to complete the IRS, as well as technical requirements for facilities.
- The Rule No. 14 Tariff regards interconnection guidelines and requirements for projects interconnecting at the Distribution level (below 25 kV on Oahu, and below 12 kV on the other islands). The tariff is inclusive of

[71] Hawaii Revised Statutes (HRS), §269-27.6.
[72] See Hawaii Revised Statutes (HRS), §269-27.6(d), as revised by Act 65, Session law 2021.
[73] HRS §269-27.5.
[74] D&O No. 21002 modified General Order No. 7, Section 2.3.G, requiring that proposed capital expenditures for any single project in excess of $2.5 million or 10 percent of the total plant in service, whichever is less, shall be submitted to the Commission for review.

the expectations for independent developers, as well as the Companies, for the entire interconnection process. The tariff also contains detailed technical requirements for facilities to interconnect successfully to the distribution system.

- Unlike Rule No. 14, Rule No. 19 does not contain technical details for interconnection so IPPs must refer to the relevant RFP to find meaningful requirements for interconnecting to the sub-transmission or transmission systems.

Companies' Interconnection Process

- The renewable project proposals are first procured through the RFP process, and the bids are evaluated through a set framework outlined in the Stage-specific RFP document. For Stages 1 and 2 RFP projects, once a bid has been selected by the Company, the Company and the developers will move into the interconnection study phase. This runs concurrently with execution of the PPA and Commission approval of the PPA. For Stage 3 RFP projects, the Company will complete the IRS prior to executing the PPA with the developer, so that all interconnection-related upgrades are known at the time of filing the PPA with the Commission for approval.
- The SIS will be completed to evaluate the effects of the proposed projects interconnecting to the system. The results will be used to identify any required system upgrades necessary for the projects to safely interconnect to the grid, as part of the subsequent facility study.
- Once the developers and Companies agree to terms regarding the construction and financing of the identified interconnection facilities, the PPA will be amended to reflect the interconnection upgrades. At the time of the finalization of the FS, developers may elect to terminate their PPA if they deem the interconnection upgrade costs to be too expensive.
- After the PPA and Interconnection Requirements Amendment have been executed, the interconnection facilities will be constructed by the responsible party in time to meet the deadlines established in the PPA. Upon completion of construction and the commissioning of any new facilities for interconnection, the project will be granted permission for commercial operation by the Companies, and the actual costs will be true-ed up, and subsequently reconciled with the developer.
- The Companies do not have a dispute resolution process for specifically addressing interconnection issues. For the projects solicited via the RFP processes, the Companies rely on a standard dispute resolution process established for the Stage 3 RFP (Section 1.10 of the Stage 3 RFP) to resolve disputes prior to contract execution. Post PPA execution, the dispute resolutions in the PPAs govern all dispute that may arise in the process.

Interconnection Process Reporting

- The Companies rely on time-stamped notices, such as email communications, to maintain records of the different milestones for the interconnection process; they do not maintain a database to store this information either. They also maintain a workbook to memorialize the different milestones for each active project that has not yet reached COD.
- The Companies are required to file a monthly status report of all active IPP projects to the Commission;[75] this report contains redlined status updates to highlight any progress or issues that may have been identified for each active project.

Interconnection Timeline and Metrics

- The timelines for each step in the interconnection process is set forth in the State-specific RFP document; in each successive Stage RFP, the Companies have worked to optimize their interconnection processes to reduce the time of completion for their specific action items and milestones.
- There are also set timeframes for the developer-specific milestones as well, and those time limits are reported in the overall timeline completion metrics for each project.
- Based on the Company's November 2022 report regarding the status of Stage 1 and Stage 2 RFP projects, all Stage 1 and 2 RFP projects that are currently being developed will miss the GCODs included in the PPAs approved by the Commission. Only three projects, AES Kuihelani, AES Waikoloa Solar, and Kupono Solar, are expected to meet the revised GCODs. All other remaining eleven projects' anticipated CODs are later than their revised GCODs.
- Based on the discussion with the Companies, most of the interconnection delays have been caused by technical documentation related issues provided prior to the start of the SIS.

Self-Build Projects

[75] For example, see Exhibit 1, October 2022 Report, Docket No. 2021-0024, Filed November 23, 2022.

- The Companies file monthly project status reports of self-build projects to the Commission. The monthly reports include the projects' status regarding: the IRS; engineering and design; permitting and land rights; equipment procurement and construction; and commissioning of the project and interconnection facilities. However, the Companies do not publicly include detailed interconnection related metrics for the self-build projects in the public docket that is currently maintained for the IPP projects related to IPP Interconnection Reported Metrics[76] .
- The total interconnection costs associated with the self-build projects are not categorized by COIF and SOIF costs, as usually done for the IPP projects, since the Companies own all aspects of those facilities for their own projects. They also do not report costs for the efforts related to the IRS for self-build projects, as those are paid by the same entity – the Companies themselves.
- The IRS process for self-build interconnection projects is identical to that for IPP projects; the only difference is the lack of any PPA negotiations, as the Companies already own the generation. The Companies do report the IRS for self-build projects to the Commission.
- The Companies may request to recover costs for self-build projects under the performance-based regulation framework. Previously, Companies recovered costs through general rate cases and separate cost-recovery mechanisms. The costs for self-build projects are also subject to approval by the Commission via a 'Request to Recover Capital', per General Order 7, if costs are above a certain threshold.

State of Hawaii Electricity Reliability Standards

- The development of reliability standards in the state have been a topic of discussion for over a decade. The Commission discusses the development of reliability standards in Docket No. 2011-0206 and a working group developed and proposed the implementation of 10 reliability standards following NERC's standard format. The findings and recommendations from these efforts were continued in subsequent dockets, including various planning proceedings; however, reliability standards have not been adopted nor applied systematically in the planning proceedings.
- In 2022, the State legislature passed legislation (Act 201) mandating the Commission conduct a study of the State's interconnection processes, evaluate the accessibility of Hawaii's electric utility grid, and identify the timeliness and costs of interconnection. In addition, the Act 201 also mandated to assess reliability standards to be established by the Commission and status of HERA establishment.

Hawaii Electricity Reliability Administrator (HERA)

- The Hawaii Legislature established statutes related to the Hawaii Electric Reliability Administrator (HERA),[77] which authorizes the Commission to perform different oversight functions related to electric reliability.
- In March 2022, the Commission issued an RFI soliciting capabilities and expertise of prospective entities interested in contracting with the Commission to serve as the HERA.[78] Given the Companies' Stage 3 RFP process is anticipated to begin in 2022 Q4 and given the complexity and length of time it would take to establish the HERA, the Commission has prioritized the highest impact functions of the HERA related to interconnection, and contracted with an IE in alignment with the Stage 3 RFP process to review and assist in any interconnection related issues during Stage 3 RFP process.

6.2 Recommendations

PA has organized its recommendations by different aspect of the interconnection process.

Interconnection Process	Recommendation
Companies' Interconnection Requirements	The Companies should review interconnection related tariff/rules and revise, if necessary, to provide technical clarity in terms of interconnection requirements. For example, expand and include technical interconnection requirements into the Rule No. 19 Tariff, or into a new generic transmission and sub-transmission interconnection tariff, to capture all the requirements in one document, similar to how Rule No. 14 captures the technical interconnection requirements for connection on the distribution level. This is consistent with the findings from the RSWG's Report, which recommended that the interconnection tariffs – including Rule No. 14

[76] Hawaiian Electric, Interconnection Experience, https://www.hawaiianelectric.com/about-us/performance-scorecards-and-metrics/interconnection-experience.
[77] Hawaii Revised Statutes (HRS), §269-141 through §269-149. Originally passed in 2012 as Act 166, Session Laws of Hawaii 2012.
[78] Request for Information, Hawaii Electricity Reliability Administrator, February 2022.

	and Rule No. 19 – be revised to be more consistent with each other and inclusive of the overall process requirements. The revisions will provide project developers clarity regarding interconnection requirements/guidelines and standardize the process.
Interconnection Process Reporting	The Companies should establish a database for the purpose of centralizing all information related to all interconnection projects they manage, including their self-build and IPP-built projects. This would ensure data integrity and ease the process of internal and Commission-related metrics tracking for the different process milestones. The Companies should be consistent in the record-keeping and reporting for both self-build and IPP projects.
Companies' Interconnection Process	The Companies should develop comparable interconnection cost metrics for self-build and IPP-built projects so that interconnection costs can be directly compared. The Companies should track the total interconnection cost of the self-build projects separately by IRS, COIF and SOIF costs so that appropriate components can be compared with the IPP-built projects.
Interconnection Cost comparison between self-build projects and IPP projects	The IE should establish an interconnection-specific dispute resolution process to address any potential disputes between the Companies and project developers. As part of the Companies' Stage 3 RFP process, the Commission has tasked the IE to assist in any interconnection-related disputes that may arise during the RFP process. The Commission may use the IE to develop an interconnection-specific dispute resolution process which could also be used outside the Stage 3 RFP process.
State of Hawaii Electricity Reliability Standards	The Commission should continue to further develop and establish reliability standards by revisiting the work completed by the RSWG, via Docket Number 2011-0206, and refer to findings from subsequent proceedings, such as the IGP process.

6.3 Next Steps: Phase II Report

As discussed earlier in the report, we plan to assess the remaining issues listed in Act 201 during the Phase 2. The Phase 2 Report may also include updates to the issues covered in the Phase 1 Report. PA intends for the Phase 2 report to be a complete study addressing all issues listed in Act 201. We propose to deliver the Phase 2 report before the start of 2024 state legislative session, or at a different time mandated by the state legislature or the Commission.

Specifically, Phase 2 of the study will include the review of following matters listed in Act 201, Section 1 (c):

> (5) Determine the reasonableness of the elements and methodology that utilities utilize to charge for interconnection;
>
> (6) Determine the reasonableness and equity of costs charged to those that interconnect to an electric utility;
>
> (11) Determine the reasonableness of the cost of project management fees assessed by an electric utility to those entities that interconnect to the electric utility;
>
> (12) Determine the reasonableness of requiring new or additional interconnection studies for changes in equipment;
>
> (13) Determine what would constitute a reasonable change to cause a new or extended interconnection process;
>
> (14) Incorporate comments from entities who connect to an electric utility in a confidential manner and be reported anonymously in the study;
>
> (17) Recommend statutory amendments to the laws relating to the Hawaii electric reliability administrator.

Act 201, Section 1 (d): The study shall include recommendations on:

> (1) Reliability standards that should be considered and imposed by the public utilities commission on an electric utility;

(2) Interconnection procedures;

(3) Reasonable timelines for an electric utility and an entity that interconnects;

(4) How the public utilities commission can monitor the interconnection process;

(5) Processes, data tools, and reporting requirements by the electric utility;

(6) How interconnection costs can be provided to developers prior to the utility procurement process or how to adjust for changes to the power purchase agreement to reflect interconnection costs;

(7) Mechanisms to be imposed by the public utilities commission and the legislature to improve the timeliness of the interconnection process and the reasonableness of cost;

(8) A process to provide transparency in interconnection costs;

(9) Processes for the public utility commission to oversee and approve the cost and timeliness of interconnection;

(10) Whether interconnection costs should be regulated, tariffed, or rate-based for consistency and transparency;

(11) Whether performance incentives, penalties, or both, should be imposed on an electric utility for timely and cost-effective interconnection;

(12) The reasonable interconnection events that would require modification to this study;

(13) The reasonable timelines for modification caused by an electric utility or an entity that interconnects to the State's electric utility grid;

(14) Resolution processes for interconnection disputes; and

(15) Processes, including administrative, technological, policy, or other related requirements for ensuring effective reliability of the Hawaii electric system and interconnection process.

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