



June 18, 2021

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

Dear Commissioners:

Subject: Docket No. 2018-0165
Instituting a Proceeding to Investigate Integrated Grid Planning
Hawaiian Electric Updated Timeline and Stakeholder Engagement Plan

In accordance with Ordering Paragraph No. 3 of Order No. 37730,¹ issued on April 14, 2021 in the subject proceeding, Hawaiian Electric² respectfully submits an update on the Integrated Grid Planning ("IGP") Workplan, updated timeline and stakeholder engagement plan, including the date that the Company will file its revised Draft IGP Inputs and Assumptions.³

Sincerely,

/s/ Marc Asano

Marc Asano
Director
Integrated Grid Planning

Enclosure

c: Service List

¹ Ordering Paragraph No. 3 of Order No. 37730 provided: "By June 18, 2021, Hawaiian Electric shall file an updated timeline for implementing the directives in this Order, including an updated stakeholder engagement plan, and a projected date by which it will file revised Draft IGP Inputs and Assumptions, provided that the date for filing revised Draft IGP Inputs and Assumptions shall be no later than August 3, 2021."

² Hawaiian Electric Company, Inc., Maui Electric Company, Limited, and Hawai'i Electric Light Company, Inc. are each doing business as "Hawaiian Electric" and have jointly registered "Hawaiian Electric" as a trade name with the State of Hawai'i Department of Commerce and Consumer Affairs, as evidenced by Certificate of Registration No. 4235929, dated December 20, 2019.

³ Order No. 37043 *Setting Forth Public Utilities Commission Emergency Filing and Service Procedures related to COVID-19* (non-docketed), issued on March 13, 2020, the Company is serving this filing to the Parties on the Service List via email.

IGP Workplan Update

June 18, 2021

1 Introduction and Summary

The Integrated Grid Planning (“IGP”) effort has made substantial progress over the past two years to create an industry leading integrated planning process to achieve the State’s energy objectives, including a reduction in the use of fossil fuels, increasing our diversified renewable energy portfolio, improving grid reliability and resilience, providing affordable electricity for customers, working with communities on impacts and land use, and removing greenhouse gas emissions in the State’s economy. Consistent with the Company’s Customer Energy Resource strategy¹ and performance based regulation framework, the IGP is a customer-centric planning process supported by performance incentive mechanisms² that are rooted in promoting Distributed Energy Resources (“DER”)³ as the first resource option, particularly energy efficiency and responsive demand. The Company has continuously improved its process to seek and incorporate stakeholder feedback and remains committed to improving its process going forward to ensure that DER integration and customer needs remain central to the planning process. For example, the Company has incorporated stakeholder feedback to consider and evaluate different future scenarios through a “bookend” analysis to define a future energy system that envisions deep decarbonization through high adoption of customer DER technologies relative to current market forecasts. While the Company remains committed to this continuous improvement process and identifying the most accurate assumptions and inputs reasonably possible, it also understands and agrees that this effort must be balanced with the critical need to implement the plans developed, and procure the resources identified through the planning process, in a timely manner consistent with the State’s energy objectives.

Hawai‘i is at the forefront of decarbonization and the utilization of DER at scale in island systems. Customers remain the focal point of the planning process where a distributed resource first approach places customers in a unique role of providing significant resources and solutions to achieve Hawai‘i’s clean energy goals. To that end, the Company continues to make adjustments and improve the IGP process for stakeholder engagement, refining forecast and modeling inputs and assumptions based on stakeholder feedback, and utilizing a variety of

¹ Available at, https://www.hawaiianelectric.com/documents/products_and_services/customer_renewable_programs/20210503_customer_energy_resources_for_hawaii.pdf

² The Company’s performance incentive mechanisms include: “accelerated achievement of the State’s renewable energy goals; faster interconnection of small scale Distributed Energy Resource systems; increased procurement of grid services from customer-based programs; improved collaboration with Hawai‘i Energy to reach low-to-moderate income customers and promote energy saving measures; and improved utilization of next generation grid modernization infrastructure”. See, https://puc.hawaii.gov/wp-content/uploads/2021/06/PBR-PIM-DO-Press-Release.Final_V2.06-01-2021.pdf

³ DER includes, energy efficiency, demand response, time-of use tariffs, distributed and rooftop PV, battery energy storage systems, and managed electric vehicle charging.

modeling tools and techniques to evaluate and balance economic and system reliability considerations while achieving decarbonization and RPS goals. This updated stakeholder engagement plan and timeline modifies the previous stakeholder engagement framework to ensure robust stakeholder discussion and feedback that continues to break new ground collectively. As described in the Company's March 4, 2021 reply comments, stakeholders have had a meaningful impact on improving and steering the planning process, inputs and assumptions.⁴ The Company now turns its focus to the remaining items highlighted by Commission Order No. 37730 ("Review Point Guidance").⁵

The Company anticipates filing the revised Inputs & Assumptions deliverable by August 3, 2021 in compliance with the Review Point Guidance. The Company further intends to file a revised Grid Needs Assessment deliverable as a Review Point by October 1, 2021 that incorporates stakeholder feedback, including items raised by the Commission in its Review Point Guidance such as planning criteria and modeling methods. Upon acceptance of these two major deliverables, the Company will begin the IGP Grid Needs Planning process step with an expected duration that will be dependent in part on the scope of modeling iterations between the various modeling tools.

As the Company focuses on building consensus on the remaining items highlighted by the Commission, it will also establish a "Parking Lot" for new suggestions or ideas brought to light over the course of working group discussions, which stakeholders agree can be evaluated and vetted at a later time.

Finally, the Company notes several key inputs and assumptions where additional guidance will be helpful, related to other on-going proceedings that may impact the grid needs planning phase of the IGP process.

2 Stakeholder Engagement Plan

The Company is already executing on its stakeholder engagement plan with positive results. There are ten areas⁶ highlighted by the Commission ("Remaining Items") in its Review Point

⁴ See Docket No. 2018-0165, Hawaiian Electric Reply Comments, filed on March 4, 2021, available at https://www.hawaiianelectric.com/documents/clean_energy_hawaii/integrated_grid_planning/dkt_2018_0165_2021_0304_HECO_reply_comments.pdf

⁵ See Docket No. 2018-0165, Order No. 37730 Directing Hawaiian Electric to File Revised Forecasts and Assumptions, issued on April 14, 2021.

⁶ Review Point Guidance at pages 51-52, stating, "the Commission directs Hawaiian Electric to: (1) adjust its resource/technology cost projections; (2) adjust its fuel price forecasts; (3) adjust and better explain its DER and load forecasts; (4) provide qualitative and quantitative summaries of LoadSEER findings and disaggregated location-specific load forecasts; (5) provide the results of the probabilistic DER hosting capacity analysis from the Synergi circuit models; (6) demonstrate how the probabilistic forecasts developed with LoadSEER will inform the different reference case load forecast scenarios to be established using the "bookends" approach; (7) develop a retirement schedule for the baseline forecast; (8) further develop and clearly explain its modeling sensitivities; (9) better explain and analytically support its grid services and planning criteria; and (10) work with AEG to develop modeling inputs for energy efficiency."

Guidance. Broadly, the ten areas can be grouped into four categories: Resource and Fuel cost forecasts, DER and load forecasts, energy efficiency, and planning criteria.

The Company will implement the following stakeholder engagement plan to meaningfully incorporate stakeholder feedback into the revised inputs and assumptions. The Company is employing various avenues to solicit feedback to incorporate into the IGP process:

- A stakeholder technical working group (“STWG”) that streamlines the previous working group structure to focus stakeholder time and efforts, provide opportunities for stakeholder presentations and input on working group agendas, and allows for robust and comprehensive discussion and collaboration on the Remaining Items, among others;
- The Stakeholder Council, which is now focused on advising the company on strategic issues. Among the topics the Stakeholder Council identified for its attention include: inputs, assumptions, forecasts, and modeling; and
- Additional engagement outside of the formal working group process to seek additional clarification and feedback. This recognizes that from time to time, the working group meetings may not provide sufficient time for deep dive discussions. The Company will seek feedback through additional discussions outside the formal working group meetings where needed and appropriate.

Additionally, the Company seeks the input and independent review by the technical advisory panel (“TAP”) that has been revised to reflect the Commission’s direction and stakeholder feedback on composition.

These renewed engagement efforts have already provided valuable insight. At the June 4th Technical Conference, the Company along with stakeholders participated in facilitated deep dive discussions in the four major areas. The Company provided clarifications on specific subject matter highlighted in the Review Point Guidance, updates on stakeholder discussions held to-date, and presented key questions for stakeholders to encourage feedback. The technical conference facilitated by Rocky Mountain Institute proved effective to increase stakeholders’ understanding regarding the details of modeling, inputs, and assumptions, among other things, and to receive feedback from stakeholders that can be incorporated into the IGP process.

The Company appreciates the continued engagement by stakeholders since the Commission issued the Review Point Guidance. As described below, real progress is being made in addressing the Remaining Items. However, the Company observes that although new or evolving considerations brought forward by stakeholders can aid the discussions, they must be balanced with the need to build consensus on the Remaining Items such that the Integrated Grid Needs Planning process step of IGP can begin. The Stakeholder Council and STWG could assist in assessing and prioritizing the Remaining Items with consideration of whether assumptions and inputs are reasonable and sufficient to proceed rather than striving for perfection in every case. To this end, the Company will implement a “Parking Lot” where items identified by stakeholders that are worthy of further exploration can be analyzed at a later date (*i.e.*, prior to starting the next IGP cycle). Otherwise, further delays to the IGP process could result in a missed opportunity to inform various dockets and policymaking over the next 9-12 months.

The Company wishes to re-emphasize that the stakeholder process necessitates feedback and course correction along the way, in real-time, rather than at the end of a process step. This will help to ensure that issues are discussed and addressed in a timely manner.

3 Workplan Update

Based on the stakeholder discussions to-date to resolve the Remaining Items, the Company anticipates filing the revised Inputs & Assumptions deliverable by August 3, 2021. Certain Remaining Items that are included in the Grid Needs Assessment deliverable,⁷ will require additional analysis. Therefore, the Company anticipates filing an updated Grid Needs Assessment deliverable reflecting stakeholder feedback as a Review Point by October 1, 2021. Section 3.3 describes in more detail an updated IGP workplan and schedule.

As described in Section 3.2, the Company also recognizes the need for and appreciates any further Commission and stakeholder guidance and clarification, to the extent possible, on key assumptions that are currently being discussed in this and other parallel proceedings currently before the Commission.

3.1 Revised Forecast and Inputs and Assumptions

The Company has been executing on the stakeholder engagement plan described above. The Company appreciates the additional feedback and input from the Commission, TAP, and stakeholders subsequent to the Review Point Guidance. This additional dialogue has provided more clarity for some of the Company's inputs and assumptions and hopefully resulted in additional insight and transparency for the Commission and stakeholders. To-date, the Company held several meetings with stakeholders to listen and find consensus on addressing the Remaining Items. Engagement thus far includes:

- On April 27, 2021, the Company held a working group meeting to discuss the four modeling methods proposed by Ulupono Initiative.⁸ Through robust stakeholder discussion on the issues, including a presentation by Ulupono Initiative, the Company came to a consensus agreement with Ulupono and other stakeholders on recommendations to address the methods proposed by Ulupono Initiative.
- On May 25, 2021, the Company met with the TAP to discuss the recommendations resulting from the April 27, 2021 meeting. The TAP subsequently filed their independent review on June 1, 2021, which generally concurred with the modeling method recommendations.

⁷ Available at, https://www.hawaiianelectric.com/documents/clean_energy_hawaii/integrated_grid_planning/stakeholder_engagement/working_groups/solution_evaluation_and_optimization/20210330_wg_seo_deliverable_draft.pdf. Also see Review Point Guidance at 54, which states: "As Hawaiian Electric develops its revised Draft IGP Inputs and Assumptions, Hawaiian Electric may continue parallel efforts such as developing the long-term RFP concept, or the Draft Grid Needs Assessment, which the Commission will review at a later review point."

⁸ Review Point Guidance at pages 37-39.

- On May 20, 2021, the Company officially stood up the STWG to streamline and consolidate the previous working group structure.⁹ The STWG will be called upon as the Company advances through the next couple of phases of the IGP process, including responding to the Review Point Guidance, input on the upcoming grid needs assessment step, and other work products for which the Company seeks stakeholder feedback.
 - Four working group agendas were sent out to working group members laying out objectives, key questions, topics to discuss, and expected deliverables intended to address the Review Point Guidance. The Company also sought comments from stakeholders on agenda items and called for stakeholders to present on any topic of interest. No comments were received on the agenda and two stakeholders offered to present regarding DER forecasts and electric vehicles.
- The June 2, 2021, STWG meeting discussed the purpose and objective of each model being used in the grid needs assessment phase, RESOLVE day weight and day sample methodology, the TAP recommendations based on their review of the Ulupono Modeling method and planning criteria recommendations, DER forecasts, and bookend scenarios.
- On May 20 and June 1, 2021, the Company met with Applied Energy Group, 2050 Partners, and Hawai‘i Energy to begin initial discussions on the data needed to model energy efficiency on a comparable basis to other supply side options. The State of Hawai‘i energy efficiency potential study would need to be updated to model energy efficiency on the supply side; however, the current study represents 85-90% of the work that would be needed to develop the supply curves.
 - Applied Energy Group, 2050 Partners, and Hawai‘i Energy noted that this was not part of their current scope of work and funding would be needed to develop the specific modeling inputs.
 - Further discussions are needed to determine how the efficiency measures are bundled to create the supply curves for all 5 islands
 - AEG is developing a scope of work and costs for the incremental work needed to develop the energy efficiency supply curves
- On May 27, 2021, the Company and Ulupono met to discuss the fuel price and resource cost forecasts as part of the inputs and assumptions for IGP.
- For the fuel price forecasts, comparisons between the FGE and EIA forecasts were shared. In discussing the merits of both forecasts, one suggested approach was to use the EIA reference as a high forecast and the FGE forecast as the low forecast if there was a wide enough spread between the two forecasts. There was general agreement that the EIA high forecast was not reasonable. The final resource plans could be tested across multiple fuel price forecasts, but it would be better to develop the plans using fewer fuel price forecasts to limit the number of iterations.
- For the resource cost forecasts, comparisons between the IHS based and NREL ATB based forecasts were shared. It was noted that the near term levelized costs for PV-storage

⁹ Combines the Forecast Assumptions, Competitive Procurement, Distribution Planning, Grid Services, and Solution Evaluation and Optimization Working Groups. The Standardized Contracts Working Group has completed its work for its specific task. The Resilience Working Group will continue as a separate working group.

was higher than recent procurements. A proposed method to reconcile the forecasts was to align the near-term forecast in real dollars to actual projects, then allow the forecast trend to determine the future costs.

- The Company provided the historical record of FGE forecasts and EIA forecasts to compare their long-term outlook performance against actuals. The Company also shared the resource cost forecast updates in real dollars to better understand the technology cost trend in the NREL ATB.
- On June 17, 2021, the Company convened a meeting of the STWG to further explore in a collaborative fashion issues raised in the Review Point Guidance. More specifically, the STWG continued discussion regarding updated DER forecasts including assumptions for best estimates of the tariff and program values for DER, EE and EoT. The STWG also conducted a deep dive into the LoadSEER and Synergi models including further disaggregation of forecasts by location and rate class and how LoadSEER is used to inform DER forecasts; discussion of EV managed and unmanaged charging assumptions including a presentation by Blue Planet regarding legislative updates on EVs in Hawaii and how other jurisdictions account for EVs in their integrated grid planning; discussion of hourly charging profiles for managed charging and associated assumptions; and discussion of efforts to finalize the inputs and assumptions on bookend sensitivities.

As the Company listens to stakeholder feedback and works to incorporate that feedback, additional STWG meetings may be scheduled to “close the loop” on topics previously discussed. Additionally, as noted above the Company envisions using the STWG to seek feedback on other work products related to IGP such as, grid needs assessment, RFP development, and program development, among others.

3.2 Interdependencies and Guidance Needed to Finalize Inputs and Assumptions

There are key developments and determinations in other Commission dockets that require coordination with IGP inputs and assumptions in order to properly and more accurately assess the grid needs of the system. Accordingly, as the process of finalizing inputs and assumptions proceeds, it will be important to identify and understand, among other key inputs, the following:

- Additional insight to help inform the best guess on long-term future DER programs (following the fulfillment of the emergency demand response (EDR) scheduled dispatch program (SDP)), including the expected rules and requirements around daytime export;
- Any contemplated expansion of the Phase 2 Community Based Renewable Energy (“CBRE”) Program, and whether energy storage should be assumed to be paired with the CBRE resources;
- The additional work required to model energy efficiency as a supply-side resource. Guidance on whether the Commission may extend AEG’s scope, including by potentially funding through PBF funds, would be helpful;
- Assumptions related to the Hawai‘i Island Stage 3 RFP.

3.3 Updated Schedule and Deliverables

Based on consensus reached with stakeholders on certain items, resolving the Remaining Items, in some cases, will involve additional modeling and analysis. However, items that will take longer to address, such as the planning criteria, are part of the Grid Needs Assessment deliverable resulting from the Solution Evaluation Optimization Working Group (“SEOWG”). Of the Remaining Items that are included in the Inputs & Assumptions deliverable, the Company anticipates that the updated Inputs and Assumptions will be filed by August 3, 2021.

By October 1, 2021, the Company anticipates filing as a Review Point the Grid Needs Assessment deliverable that will address certain of the Remaining Items which are separate and apart from the August 3, 2021 deliverable addressed in the Review Point Guidance. The Grid Needs Assessment deliverable includes descriptions of the different modeling tools, the methodology and framework for assessing grid needs and services, planning criteria, and solution evaluation and optimization methodologies. This Review Point filing will include stakeholder feedback incorporated through the current ongoing engagement process. For example, the recommendation to conduct additional analyses to determine the appropriate energy reserve margin for each island will require additional detailed modeling and will be included as part of the Grid Needs Assessment deliverable. Feedback from other planning criteria and modeling methods currently being vetted through the TAP and stakeholders will also be reflected in the Grid Needs Assessment review point.

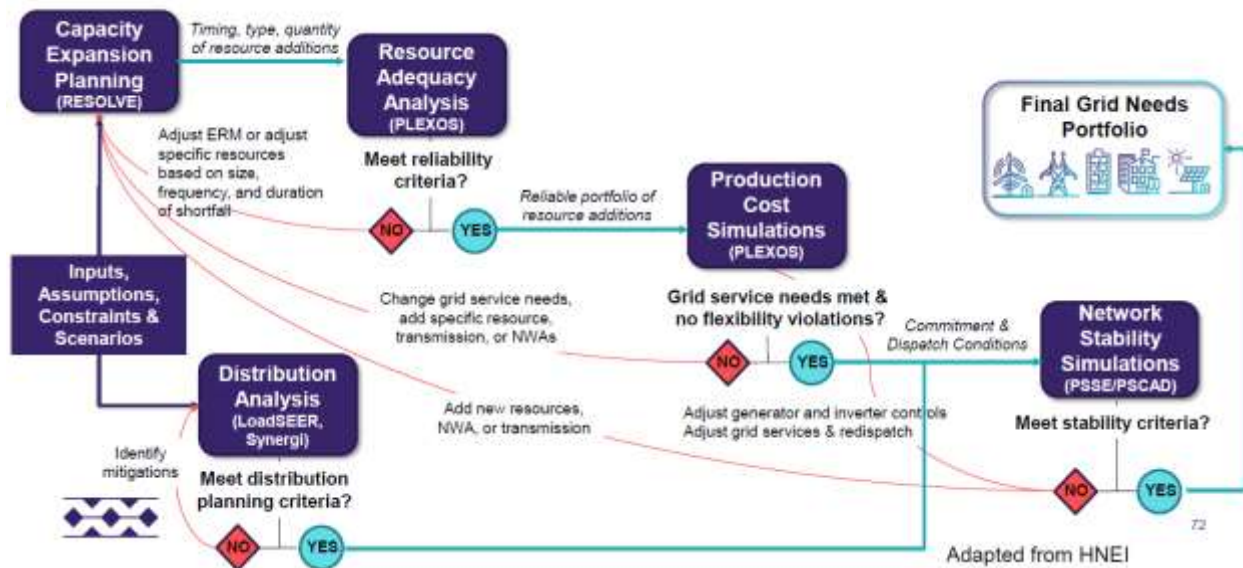
Attachment 1 outlines the major tasks to be completed to meet the Commission’s directives outlined in the Review Point Guidance. Attachment 1 clarifies which IGP deliverable will reflect each of the major tasks to be completed.

Upon Commission approval or acceptance of the Inputs and Assumptions deliverable and Grid Needs Assessment deliverable, the Company may commence the modeling analysis needed to complete the Grid Needs Planning phase of the IGP process. Attachment 2 shows an updated schedule and timeline inclusive of high level assumptions regarding the timing of Commission review.

3.4 Integrated Grid Needs Planning

The integrated grid needs planning step assesses the grid needs of the system based on the inputs, assumptions, forecast, and planning criteria. To conduct a fully integrated grid needs assessment, a suite of modeling tools are employed. Figure 1, below, illustrates the modeling framework as discussed with stakeholders, Stakeholder Council, and the TAP. This framework was adapted from HNEI and the TAP’s review of the modeling methods and planning criteria.

Figure 1 – Tools Utilized in the IGP Modeling Framework



The duration for this step is expected to take 6 months; however, depending on the number of modeling iterations within the framework, additional time may be required. As discussed in the working group meetings, the decision to iterate back to a previous modeling step is in part based on engineering judgement. The Company will strive to make those decisions as transparent as possible through stakeholder discussions. The Company intends to seek stakeholder input over the course of the 6 months such that any adjustments can be made in real-time, and culminate in a review point that will include an integrated grid needs assessment (and associated analysis) that has been vetted through the stakeholder engagement process described above.

One of the more significant ways the Company has incorporated feedback from stakeholders and the TAP is through the inclusion of bookend scenarios to capture a range of future outcomes. Four drivers for the bookend scenarios included the pace of customer adoption of DER, EV, EE and TOU. Different levels of customer adoption will be analyzed through four scenarios as summarized in Figure 2, below. These assumptions made for DER technologies for the bookend scenarios highlights the customer centric approach to IGP. The Company expects that stakeholders will play a central role in shaping these scenarios.

Figure 2 – Bookend Scenarios Currently Under Discussion

Assumption	Slower Customer Technology Adoption	Base	Faster Customer Technology Adoption	High Load
DER	Market Forecast	HE Company Proposal	DER Parties Proposal	Market Forecast
Electric Vehicles	EV--	Market Forecast	EV++	EV++
Energy Efficiency	EE--	Market Forecast	EE++	EE--
Time-of-Use	None	Managed EV	Managed EV	None

Additionally, Commission Staff and stakeholders expressed interest in sensitivities to understand the value of individual load layers. These sensitivities are useful to inform program design as the DER (rooftop PV) freeze case was useful in designing DER programs in the DER docket. The Company has now added additional sensitivities as shown in Attachment 1, where electric vehicle and energy efficiency freeze cases were added to the list of scenarios and sensitivities.

3.5 Solution Sourcing

IGP solution sourcing involves three mechanisms, pricing, programs and procurements. Based on the direction of the Commission and in recognition of the opportunities that energy efficiency and other DER can provide, the Company is bifurcating the solution sourcing process into two tracks as shown in the updated schedule (Attachment 2). The first track is to identify, with stakeholder input, the potential for performance-based energy efficiency and DER programs along with TOU pricing tailored to meet grid needs. This effort will coincide with the grid needs analysis which means that the resulting grid needs analysis will be net of the DER programs and TOU pricing potential.

Because programs and pricing will address some of the grid needs, competitive procurements to source the remainder of needs will occur after the integrated grid needs step. The procurement sourcing process is described in the Competitive Bidding Framework (“CBF”) filing currently under consideration by the Commission in the instant docket.

To closely coordinate the interrelationship of the needs analysis with performance based energy efficiency DER programs resulting from the DER docket,¹⁰ the Company may propose to make updates to DER programs based on the latest market data and information or to address emerging grid needs identified in the IGP process. This could also include, updates to pricing, assessment of current market uptake/adoption, and new programs to target locational needs,

¹⁰ See Docket No. 2019-0323 – Instituting a Proceeding to Investigate Distributed Energy Resource Policies Pertaining to the Hawaiian Electric Companies.

among others. This approach will allow rapid deployment of program updates instead of waiting for the completion of the entire integrated grid needs assessment.

The Company anticipates that integrating development of performance based DER programs and TOU pricing during the grid needs analysis can achieve the desired value from DER. The modeling will use the energy efficiency programs developed in collaboration with Hawai'i Energy, the DER programs and TOU pricing approach determined in the DER docket, and results of the CBRE procurement. This approach has not been undertaken in the industry before and will likely involve a learning curve to achieve acceptable results. In this regard, the Company's intent is to achieve a good first result that can be improved upon over time.

After first determining how these various DER can meet the identified grid needs, RFPs will then be issued to procure resources and grid services to meet the remaining grid needs to satisfy, among other things, customer electricity demand and energy use. Developers and service providers will submit proposals with different types of resources and technologies to contribute towards meeting the cumulative grid needs. Proposals will be evaluated in line with the CBF to satisfy the grid needs in a resource portfolio that provides grid services to meet near to medium term grid needs while incrementally progressing towards the RPS goals.

Based on the several discussions in stakeholder meetings and the recent technical conference, it is important to consider Hawaii's position in the market. IGP's distinguishing characteristic is that it is fundamentally based on technology-neutral competitive market responses to the identified grid needs. These competitive solutions often incorporate technological advancements that are also outside of the Company's control. The Company remains committed to adoption of new technologies that can lower costs and improve performance. The U.S. DOE is committing significant funding to the further development of battery storage and grid power electronics, for example, that when commercially available will provide significant benefits. However, this is also dependent upon the marketplace to subsequently commercially develop and propose these solutions through the several IGP sourcing mechanisms. As noted by two national lab experts on the TAP, deployment of emerging technology at scale such as grid forming inverters is also necessary to realize system benefits, which requires wide deployment by DER and independent developers and the yet to be developed ability to coordinate a large number (*e.g.*, thousands) of these devices.

It is sometimes forgotten that Hawai'i is not a primary driver for technological investment by product developers, for example the California market is over 25 times our size. The result is that Hawai'i is a market taker – not a market maker for these solutions. However, the flexibility of the IGP process is that it provides cyclical onramps for new technologies and business innovation to become part of the solution portfolio to enable Hawai'i's decarbonization goals.

Attachment 1 – Key tasks to revise Inputs and Assumptions and Grid Needs Assessment Deliverables

	<u>Modeling Case/Input</u>	<u>Purpose</u>	<u>Deliverable to be Updated</u>	<u>Revision Date</u>	<u>Assumptions to be Updated</u>
1	Base				
	- DER	Base case	Inputs & Assumptions	Aug 3	Revised uptake for based on DER docket proposals, updated resource costs and emergency demand response program
	- Electric Vehicles	Base case	Inputs & Assumptions	N/A	N/A, current market uptake
	- Energy Efficiency	Base case	Inputs & Assumptions	N/A	N/A, current market uptake
	- Time-of-use	Base case	Inputs & Assumptions	N/A	N/A, current managed EV profile
2	High Bookend				
	- DER	Bookend for faster customer technology adoption	Inputs & Assumptions	Aug 3	Revised uptake based on stakeholder input – expanded addressable market, updated resource costs and emergency demand response program
	- Electric Vehicles	Bookend for faster customer technology adoption	Inputs & Assumptions	Aug 3	Higher uptake to be developed with stakeholder feedback (<i>i.e.</i> , 100% ZEV by 2045 as proposed by Blue Planet)
	- Energy Efficiency	Bookend for faster customer technology adoption	Inputs & Assumptions	Aug 3	Higher uptake to be developed with stakeholder feedback, needs to be aligned with EE as a resource
	- Time-of-use	Bookend for faster customer technology adoption	Inputs & Assumptions	N/A	N/A, current managed EV profile
3	Low Bookend				
	- DER (Market uptake)	Bookend for slower customer technology adoption	Inputs & Assumptions	Aug 3	Revised market uptake for updated resource costs
	- Electric Vehicles	Bookend for slower customer technology adoption	Inputs & Assumptions	Aug 3	Lower uptake to be developed with stakeholder feedback
	- Energy Efficiency	Bookend for slower customer technology adoption	Inputs & Assumptions	Aug 3	Lower uptake to be developed with stakeholder feedback, needs to be aligned with EE as a resource
	- Time-of-use	Bookend for slower customer technology adoption	Inputs & Assumptions	N/A	N/A, no TOU assumed
4	High Load				
	- DER	Bookend for higher load	Inputs & Assumptions	Aug 3	Revised market uptake for updated resource costs.
	- Electric Vehicles	Bookend for higher load	Inputs & Assumptions	Aug 3	Higher uptake to be developed with stakeholder feedback
	- Energy Efficiency	Bookend for higher load	Inputs & Assumptions	Aug 3	Lower uptake to be developed with stakeholder feedback, needs to be aligned with EE as a resource
	- Time-of-use	Bookend for higher load	Inputs & Assumptions	N/A	N/A, no TOU assumed
5	Market DER/DER Freeze				

	<u>Modeling Case/Input</u>	<u>Purpose</u>	<u>Deliverable to be Updated</u>	<u>Revision Date</u>	<u>Assumptions to be Updated</u>
	- DER	Value of market uptake of DER	Inputs & Assumptions	Aug 3	Revised market uptake frozen at 2021 levels, originally developed in DER docket
6	No Future Transmission Infrastructure				
	- DER	Value of additional DER above market uptake	Inputs & Assumptions	Aug 3	DER aggregator costs updated for NREL ATB
7	High Energy Efficiency				
	- Energy Efficiency	Value of higher energy efficiency	Inputs & Assumptions	N/A	N/A, part of high bookend
8	No State ITC PV				
	- DER	Impact of removing State ITC for PV	Inputs & Assumptions	Aug 3	Revised lower DER uptake below market forecast
	- Grid-scale PV	Impact of removing State ITC for PV	Inputs & Assumptions	Aug 3	Higher capital costs for grid-scale, aggregator PV resources
9	No Onshore Development				
	- Offshore Wind	Impact of offshore wind as resource	Inputs & Assumptions	Aug 3	Offshore wind costs and profiles from NREL O'ahu study
10	Low Renewable Generation				
	- Grid-scale PV and wind	Impact of low PV, low wind, low PV & wind	Inputs & Assumptions	Aug 3	Lower production profiles for PV and wind
11	Non Grid-Participating Customer Storage				
	- Customer storage	Value of additional distributed BESS in forecast	Inputs & Assumptions	N/A	N/A, add increment of distributed BESS to existing profiles, originally developed in DER docket by DER Parties
12	Grid-Participating Customer Storage				
	- DER	Value of additional DER as a resource that can provide grid services	Inputs & Assumptions	N/A	N/A, add increment of PV-BESS DER that can participate in grid services, originally developed in DER docket
13	Unmanaged Electric Vehicle Charging				
	- Time-of-use	Value of unmanaged charging	Inputs & Assumptions	N/A	N/A, part of low bookend
14	Managed Electric Vehicle Charging				
	- Time-of-use	Value of managed charging	Inputs & Assumptions	N/A	N/A, current managed EV profile
15	EV Freeze				
	- Electric Vehicles	Value of market uptake of EV	Inputs & Assumptions	Aug 3	Revised market uptake frozen at 2021 levels
16	EE Freeze				
	- Energy Efficiency	Value of market uptake of EE	Inputs & Assumptions	Aug 3	Revised market uptake frozen at 2021 levels
17	High Fuel Price				
	- Fuel price	Impact of higher fuel price	Inputs & Assumptions	Aug 3	Higher fuel forecast to be developed with stakeholder feedback

<u>Modeling Case/Input</u>	<u>Purpose</u>	<u>Deliverable to be Updated</u>	<u>Revision Date</u>	<u>Assumptions to be Updated</u>
Other Inputs	Purpose	Deliverable to be Updated	Revision Date	Assumptions to be Updated
18 Updated Resource Technology Costs	Provided in response to Ulupono Comments	Inputs & Assumptions	Aug 3	Resource costs
19 Energy Efficiency Supply Curves	Provided in response to IGP Order 37730	Inputs & Assumptions	Aug 3	Dependent on AEG scope and schedule
20 Circuit level hosting capacity (base forecast)	Provided in response to IGP Order 37730	Inputs & Assumptions	Aug 3	Grid Upgrades for current DER market forecast
21 Circuit level hosting capacity (high/low)	Provided in response to IGP Order 37730	Grid Needs Assessment	Oct 1	Grid Upgrades for high/low DER circuit hosting capacity is dependent on when high/low forecasts are finalized.
22 Locational DER and Load Forecasts (LoadSEER)	Provided in response to IGP Order 37730	Inputs & Assumptions	Aug 3	Circuit level forecasts to be used to identify distribution grid needs
23 Planning criteria review for inertia, FFR, regulating reserve, transmission planning	Continue stakeholder review of the planning criteria	Grid Needs Assessment	Oct 1	
24 Generating Unit Retirement Schedule	Provided in response to IGP Order 37730	Inputs & Assumptions	Aug 3	
25 Transmission Renewable Energy Zones (REZ)	Required transmission resources needed to interconnect resource potential	Grid Needs Assessment	Oct 1	Updated interconnection costs for PV and wind candidate resources
26 NREL resource potential updates	Updated resource potential including feedback from Ulupono	Inputs & Assumptions	Aug 3	Updated resource potential for PV and wind candidate resources
27 <u>Inertia Criteria Testing Analyses</u>	<u>Purpose</u>	<u>Deliverable to be Updated</u>	<u>Revision Date</u>	<u>Analyses to be Updated</u>
Virtual Inertia	Impact of inverter based resources providing virtual inertia	Inputs & Assumptions	Aug 3	Remove the inertia constraint
28 <u>ERM Criteria Testing Analyses</u>	<u>Purpose</u>	<u>Deliverable to be Updated</u>	<u>Revision Date</u>	<u>Analyses to be Updated</u>
- 30% target	Assess cost and reliability impact of lower ERM target values	Grid Needs Assessment	Oct 1	
- 20% target	Assess cost and reliability impact of lower ERM target values	Grid Needs Assessment	Oct 1	Revised ERM target
- 10% target	Assess cost and reliability impact of lower ERM target values	Grid Needs Assessment	Oct 1	Revised ERM target
- 0% target	Assess cost and reliability impact of lower ERM target values	Grid Needs Assessment	Oct 1	Revised ERM target

<u>Modeling Case/Input</u>		<u>Purpose</u>	<u>Deliverable to be Updated</u>	<u>Revision Date</u>	<u>Assumptions to be Updated</u>
	- Replace HDC with production profiles	Assess cost and reliability impact of less constrained renewable profiles for capacity planning criteria	Grid Needs Assessment	Oct 1	Revised variable renewable profiles

Attachment 2 – Updated IGP Workplan Schedule

		2021										2022												2023						
Year																														
Month																														
ID	Task Description	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	
1	Order 37730																													
	2021 Revised Forecast, Inputs and																													
2	Assumptions																													
3	PUC Review Point - Revised Inputs &																													
4	Grid Needs Assessment (GNA) Deliverable																													
5	PUC Review Point - GNA Deliverable																													
6	DER Program Solution Sourcing																													
	Integrated Grid Needs Planning Analysis																													
7	(Grid Services, T&D NWA, Resilience)																													
7.A	Technical Advisory Panel Reviews																													
	Stakeholder Technical Working Group Input &																													
7.B	Feedback (incl. Task 6)																													
8	PUC Review Point - Grid Needs Plan																													
9	Integrated Solution Sourcing																													
9.A	Independent Observer																													
9.B	RFP Development																													
9.C	Bid Period																													
9.D	Solution (Bid) Evaluation																													
10	PUC Review Point - Proposed Solutions																													
11	Updated Integrated System Plan / Action Plan																													
	Commission Action																													
	IGP Process Step																													
	Stakeholder Input																													
	Independent 3rd Party																													

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(Docket No. 2018-0165)

DEAN NISHINA
EXECUTIVE DIRECTOR
DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS
DIVISION OF CONSUMER ADVOCACY
P.O. Box 541
Honolulu, HI 96809
Dean.K.Nishina@dcca.hawaii.gov

1 Copy
Electronic Transmission

JOSEPH K. KAMELAMELA
CORPORATION COUNSEL
ANGELIC M.H. HALL
DEPUTY CORPORATION COUNSEL
COUNTY OF HAWAI'I
101 Aupuni Street, Suite 325
Hilo, Hawaii 96720
Attorneys for COUNTY OF HAWAI'I
AngelicMalia.Hall@hawaiicounty.gov

1 Copy
Electronic Transmission

ISAAC H. MORIWAKE
KYLIE W. WAGER CRUZ
Earthjustice
850 Richards Street, Suite 400
Honolulu, HI 96813
Attorneys for BLUE PLANET FOUNDATION
imoriwake@earthjustice.org
kwager@earthjustice.org

1 Copy
Electronic Transmission

WILLIAM J. ROLSTON
DIRECTOR – ENERGY ISLAND
73-4101 Lapa‘au Place
Kailua Kona, Hawaii 96740-8424
willenergyisland@gmail.com

1 Copy
Electronic Transmission

BEREN ARGETSINGER
Keyes & Fox LLP
P.O. Box 166
Burdett, NY 14818
Counsel for HAWAI'I PV COALITION
bargetsinger@keyesfox.com

1 Copy
Electronic Transmission

TIM LINDL
Keyes & Fox LLP
580 California Street, 12th Floor
San Francisco, CA 94104
Counsel for HAWAI'I PV COALITION
tlindl@keyesfox.com

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(Docket No. 2018-0165)

ROBERT R. MOULD
HAWAII SOLAR ENERGY ASSOCIATION
PO Box 37070
Honolulu, HI 96817
rmould@hsea.org

1 Copy
Electronic Transmission

HENRY Q CURTIS
VICE PRESIDENT FOR CONSUMER AFFAIRS
LIFE OF THE LAND
P.O. Box 37158
Honolulu, Hawaii 96837
henry.lifeoftheland@gmail.com

1 Copy
Electronic Transmission

DOUGLAS A. CODIGA
MARK F. ITO
Schlack Ito
A Limited Liability Law Company
Topa Financial Center
745 Fort Street, Suite 1500
Honolulu, Hawaii 96813
Attorneys for PROGRESSION HAWAII OFFSHORE WIND, LLC
dcodiga@schlackito.com

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GERALD A. SUMIDA
ARSIMA A. MULLER
Carlsmith Ball LLP
ASB Tower, Suite 2100
1001 Bishop Street
Honolulu, HI 96813
Attorneys for ULUPONO INITIATIVE LLC
gsumida@carlsmith.com
amuller@carlsmith.com

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Chun, Marisa

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