



Hawai'i Natural Energy Institute Research Highlights

Energy Policy & Analysis

Decision Support Services to the Hawai'i Public Utility Commission

OBJECTIVE AND SIGNIFICANCE: HNEI provides regular technical analysis and assistance to the Hawai'i Public Utilities Commission (PUC). This support provides ongoing review of utility plans and technical challenges faced by the electricity grid during the transition to higher renewable energy. By providing an unbiased, technical review of utility plans and grid challenges, HNEI has established itself as a trusted third-party in ongoing dockets and policy discussions.

BACKGROUND: The PUC is the regulatory body tasked with reviewing and deciding on investment decisions, rates, and long-term planning of Hawai'i's investor owned utility, Hawaiian Electric Company (HECO). They are also tasked with reviewing the reliability of the electric power system and its customers. At any point, there may be dozens of dockets under review by the Commission, many of which are based on highly technical and detailed analyses.

The topics under review by the PUC are diverse and multi-faceted. In the past, the PUC has been short-staffed and does not have access to the same modeling tools and skillsets typically deployed by the utility for their long-term planning and docket filings. As a result, having the ability to draw on the expertise of HNEI, and their contractor Telos Energy, provides independent third-party technical expertise to augment the analyses being conducted at the Commission. The flexible nature of this support ensures that work can be deployed in a timely and low cost manner relative to the use of other third-party consultants. This collaboration with HNEI provides a flexible option to quickly analyze both near-term and long-term questions posed by the Commission.

Examples of past support included a review of HECO's distributed energy resources (DER) Grid Service definitions [Docket #2019-0323], the economic merits of HECO's standalone battery proposals [Docket #2020-0136], and benefits and challenges of biomass conversion for the AES coal plant [Docket #2021-0024].

This paper briefly discusses four recent examples of HNEI support to the PUC. These are also described in more detail in other project summaries located in the [Energy Policy and Analysis](#) section.

PROJECT STATUS/RESULTS: The HNEI-Telos team met with the Commission in person in January 2023 to discuss ongoing developments at the utility, HNEI analysis, and other critical issues for the state.

AES Retirement and Replacement: The AES Hawai'i coal plant, the largest power plant on O'ahu retired on September 1, 2022. This retirement decreased the amount of dispatchable fossil capacity available to the utility by more than 10%. Throughout 2021 and 2022, the HNEI-Telos Energy team routinely conducted reliability analysis of the retirement to brief HECO, the PUC, and the Governor's Power Past Coal Task Force on the impacts of project delays, cancellations, and other events [Docket #2021-0024]. The objective of this ongoing study is to evaluate the ability of proposed solar + storage resources to provide the required energy needed while also maintaining grid reliability with the pending AES coal plant retirement. The results of this work are expected to have important implications for power system planning and policy for O'ahu.

Stochastic analysis, using the tools developed by the HNEI-Telos Energy team and reported last year, are being used to assess capacity reliability risks associated with the AES retirement, updates for utility plans, and possible impacts due to delays in project schedules, and new trends in HECO's generator outage rates (-), the recent failure of Kahe 4 (-), project delays (-), and load (+). Analysis shows that with the retirement of AES in September with only one replacement resource available (Mililani I, 39 MW). In 2023, an additional resource was brought online (Waiawa I, 36 MW), but challenges in commissioning and testing the KES standalone battery have continued to challenge O'ahu reliability. Fortunately peak levels on O'ahu continue to trend well below pre-pandemic levels. O'ahu, however, is currently in a supply deficit until the KES plant is brought online or other Stage 1 and 2 solar + storage resources become available. This work is described in more detail in the "[O'ahu Near-Term Grid Reliability with AES Retirement](#)" project summary.

Maui Oil Unit Retirement and Replacement: The Kahului Power Plant (KPP) is scheduled to retire by the end of 2024. Analysis in 2021 showed how the retirement could be reliably achieved with proposed

solar + storage projects. Since that analysis, project delays have occurred with replacement resources. In addition, the Mā‘alaea M10-M13 diesel engine may need to be retired earlier than expected. The combined retirements would represent the loss of over 85 MW of firm capacity, over 40% of Maui’s peak demand.

Similar to the work conducted in O‘ahu, the objective of this study was to update the 2021 analysis and reevaluate Maui’s reliability if one or both of the plants are retired and evaluate potential mitigations necessary. The results of this analysis were briefed to the PUC [Docket #2021-0024] and the Maui Accelerating Clean Energy & Decarbonization Technical Working Group (ACET) and are expected to have important implications for power system planning and policy for Maui.

The HNEI-Telos team continues to monitor ongoing developments in Maui, including the status of Stage 1 and Stage 2 project commissioning, adoption of DER and BTM storage, peak load levels, and generator reliability. While the M10-13 plants are expected to remain available for 4-5 more years, any new capacity additions beyond those under development in Stage 1 and 2 will likely take that much time or longer. As a result, HNEI will continue to support the Commission with independent reviews of Maui reliability. This work is described in more detail in the “[Maui Near-Term Reliability and Kahului Retirement Analysis](#)” project summary.

Clean Firm Needs: HNEI conducted a study to inform ongoing procurement and proposed legislation for both variable and firm renewable energy. It sought to determine the minimum amount of firm power that the system would require at various levels of wind, solar, and storage additions. It also informed decisions on whether to integrate more variable renewable energy today, considering that these decisions may shut the door on future options. This information can be used to determine characteristics of future systems to inform decisions on oil-fired power plant retirements, procurement of new resources, and to show how robust the system can be with variable renewable energy and storage alone.

In 2023, HNEI expanded that analysis to consider specific resources that could provide the firm

renewable needs, including biodiesel, hydrogen, and multi-day energy storage. As specific projects are considered in the Stage 3 Firm Renewable RFP [Docket #2017-0352] – the results of which are expected by the end of 2023, HNEI will review proposals and provide recommendations and analysis to the Commission upon request. This work is described in more detail in the “[Clean Firm Needs](#)” project summary.

Time of Use Rates and Equity: In 2023, there were two notable developments at the Commission. The first was the acceptance of HECO’s proposed time of use (TOU) rates [Docket #2019-0323] and a new docket and priority afforded to customer equity [Docket #2022-0250]. To support the Commission in their review of these priorities, the HNEI-Telos team conducted a TOU Rate analysis.

This work included a review of HECO’s AMI data to calculate changes to bill payments with and without the new TOU structure. This analysis quantified bill impacts (\$) and (%) across a sample of several thousand HECO ratepayers using actual, 15-minute interval consumption data. This analysis also allowed the study to calculate changes in revenue for the utility and the potential for costs to shift from TOU early adopters to other ratepayers and current solar customers. This raises concerns over equity because some lower income ratepayers may not be able to adopt new technologies to benefit from load shifting and TOU rates.

As the regulatory priorities in Hawai‘i continue to shift, HNEI will support ongoing analysis and recommendations to ensure a fair, cost-effective, renewable energy transition for the state. In 2024, HNEI anticipates supporting a review of the Stage 3 RFPs, ongoing reliability concerns, and further support for land use and equity concerns. This work is described in more detail in the “[Analysis of Bill Impacts and Equity of Time-of-Use Rate Design](#)” project summary.

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