



# Hawai'i Natural Energy Institute Research Highlights

## Grid Integration & Renewable Power Generation

### NELHA HOST Park Microgrid Analysis

**OBJECTIVE AND SIGNIFICANCE:** The objective of this project is to determine the feasibility and benefits of modifying the current energy system at Natural Energy Laboratory of Hawai'i Authority (NELHA)'s Hawai'i Ocean Science and Technology (HOST) Park to enable it to operate as a microgrid (or a number of microgrids) connected to the Hawai'i Electric Light Company (HELCO) electric grid system, or as a stand-alone facility. The study will determine those distribution system configurations providing optimal benefit to NELHA, the HELCO grid, and both together. A secondary objective is to maximize the use of renewable energy resources available within the HOST Park.



Figure 1. NELHA's HOST Park site and existing HELCO primary distribution feeder.

**BACKGROUND:** Microgrids, especially those integrating renewable energy resources, are of interest in Hawai'i for their potential to enhance the reliability of the microgrid site and host grid, increase energy assurance, improve security, and potentially reduce cost and carbon footprint. Microgrids can also improve resilience against both manmade and natural disruptions. Act 200 of 2018 directed the Hawai'i Public Utilities Commission (PUC) to open a proceeding to establish a microgrid services tariff to encourage and facilitate development and use of microgrids throughout the State. NELHA's HOST Park facility has been identified by the PUC as a potential microgrid demonstration site for advanced technologies to enable grid resiliency. Along with techno-economic resource optimization, HNEI has identified regulatory and policy issues currently in

place that hinder the development of microgrids and offer modifications to those regulations and policies for future action.

**PROJECT STATUS/RESULTS:** In collaboration with NELHA staff, have completed three tasks and delivered three reports to NELHA. In Task 3.1 and its report, a power system requirements analysis of the HOST Park based on NELHA's energy projections for a ten-year period was conducted, identifying the current and projected future power system requirements of the 870-acre HOST Park. In Task 3.2 and its report, both the technical and regulatory/policy opportunities and barriers, with potential on-site distributed generation, energy storage, power management, and control technology alternatives, were evaluated, and the most promising ones that could be applied at the HOST Park were identified. In Task 3.3 and its report, HNEI developed microgrid power system conceptual design options that meet the HOST Park's power requirements, based on the results of Tasks 3.1 and 3.2, considering current grid, regulatory and policy constraints, as well as designs based on reasoned relaxing of such constraints within the HOST Park boundaries.

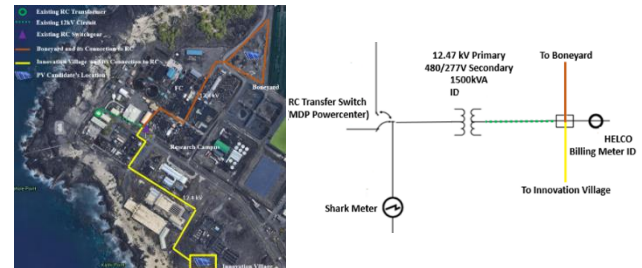


Figure 2. Example of the microgrid power system conceptual design options.

A final report from HNEI providing a roadmap for NELHA to efficiently and effectively realize its microgrid aspirations over a ten-year planning horizon is planned to be issued in November 2021.

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