



Hawai'i Natural Energy Institute Research Highlights

Grid Integration & Renewable Power Generation Hawai'i Virtual Power Plant (Hi-VPP) Demonstration

OBJECTIVE AND SIGNIFICANCE: The objective of HNEI's Hawai'i Virtual Power Plant Demonstration Project (Hi-VPP) is to quantify the economic value and operational effectiveness of battery and solar (BESS+PV) resources to simultaneously provide customer and grid-side services when aggregated as part of a virtual power plant (VPP). This project is expected to provide key insights into the economic synergy and optimization of multiple services under BESS control, as well as the functional tradeoffs between simple, low-bandwidth and advanced, highly-coordinated methods of VPP aggregation. Ultimately, it will help better quantify the business case for VPPs, including the value proposition for customer participation in a VPP and utility utilization of the same.

BACKGROUND: At the completion of the JUMPSmart Maui (JSM) smart grid project funded by the New Energy and Industrial Technology Development Organization (NEDO) of Japan, HNEI negotiated and executed an Equipment Transfer Agreement with NEDO resulting in HNEI acquiring significant grid assets deployed in the JSM project. HNEI's GridSTART team has leveraged the acquisition of the Sunverge Solar Integration System (SIS) BESS + PV units installed at Haleakala Solar's business office to conduct this project, with a goal of demonstrating and assessing the technology application and the value proposition/prioritization of alternative use cases based on stakeholder interests and functional/economic trade-offs.



Figure 1. Sunverge Solar Integration System (SIS) BESS + PV units.

PROJECT STATUS/RESULTS: A new electrical service was installed to connect the SIS BESS units at the Haleakala Solar location to the power system of the local utility, Maui Electric Company, Ltd. (MECO). End-user loads at the host location were also transferred to the new service. After a series of

maintenance and repair efforts, four of the BESS+PV units are online, operational, and approved for operation by MECO.

Identifying that the system required new sensors to measure behind-the-meter (BTM) loads, HNEI built and is currently contracting the installation of a load measurement box based on four Advanced Real-Time Grid Energy Monitor System (ARGEMS) devices.



Figure 2. Load measurement box.

Significant progress had been made in the formulation, implementation, and control application of the underlying economic optimization. The GridSTART team began by investigating relevant grid services and value streams for the Hawai'i market, discussing the application with Sunverge representatives, and formulating a baseline optimization problem. Programming and configuration of the optimal controls, including the solver and plant communications, is well underway.

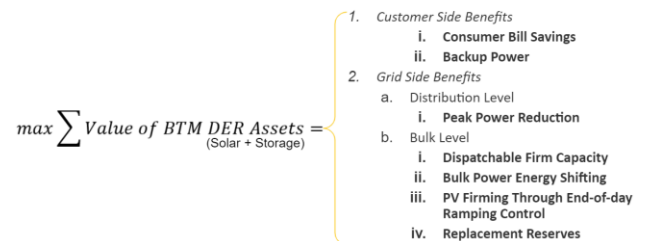


Figure 3. Summary of value streams and optimization.

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