



Hawai'i Natural Energy Institute Research Highlights

International Support

U.S. India Collaborative for Smart Distribution with Storage (UI-ASSIST)

OBJECTIVE AND SIGNIFICANCE: The project objective is to foster international collaboration around smart grids, particularly distribution systems and microgrids with solar photovoltaics (PV) and energy storage. The Hawai'i Natural Energy Institute (HNEI) at the University of Hawai'i is among an esteemed group of U.S. institutions, including Washington State University (WSU), Massachusetts Institute of Technology, Texas A&M University, General Electric, ABB, and several U.S. Department of Energy national laboratories, as well as peer organizations in India including five Indian Institute of Technology (IIT) campuses involved in this project. This project is an important opportunity to highlight Hawai'i's challenges and solutions at the forefront of renewable energy (RE) integration, while inviting input from international leaders in smart grid research and technology development.

BACKGROUND: HNEI's work addresses the following objectives within the larger project:

- Provide models and data from distribution circuits with high distributed PV penetration as a basis to explore advanced devices, controls, and distribution system operation (see Figure 1);
- Operate these models on HNEI's hardware-in-the-loop (HIL) equipment linked in real time to devices and controls at, for instance, WSU and the National Renewable Energy Laboratory (NREL) as a means to provide realistic testing in a controlled environment;
- Provide live updates of multi-horizon PV forecasts from HNEI's solar forecasting system alongside real PV measurements to support third-party applications including distribution grid operations and optimal energy storage control; and
- Provide outreach and workforce development addressing smart grid technologies and RE grid integration.

PROJECT STATUS/RESULTS: As of year four of the six-year project, UH researchers and postdoctoral fellows have:

- Adapted and tested Hawai'i distribution circuit models for real-time simulation (Figure 1);
- Provided ongoing satellite-based PV forecasts;
- Co-authored two papers and an extended abstract;

- Hosted two professors from IIT for a U.S.-India Partnership to Advance Clean Energy (PACE) fellowship;
- Gave numerous webinars and presentations including at the IEEE Power and Energy Society panel; and
- Supported K-12 education by advising two high school students on the research projects related to the RE grid integration and presenting an exhibit attended by approximately 1,000 Hawai'i K-12 students (Figure 2).

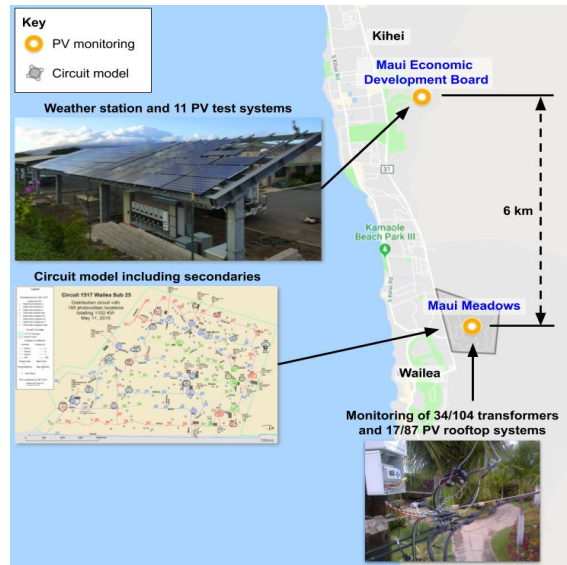


Figure 1. Overview of HNEI's data and models from the area of South Kīhei, Maui.

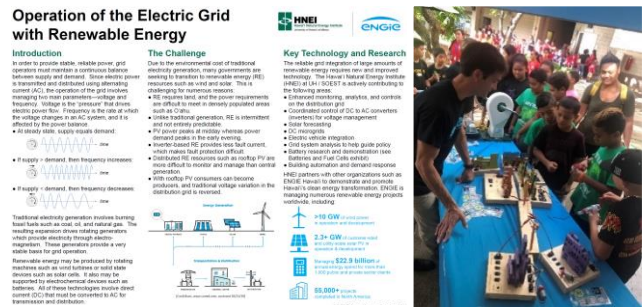


Figure 2. Poster and interactive display presented to K-12 students at the 2019 SOEST Open House at UH Mānoa.

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