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Grid Systems

In connection with the Energy Policy Act of 2005, Hawaii Natural Energy Institute (HNEI) efforts have included assessment of the technical and economic feasibility for increasing renewable energy electricity generation capacity and production in Hawai?i. Among the results of these efforts was the identification of potential negative impacts on Hawaiian Island electricity grids from increases in certain renewable energy sources feeding into the grids. This has lead to a series of grid studies and analyses being conducted by HNEI to address these negative impacts and to formulate potential solutions. Other work by HNEI has involved two solution areas: 1) use of renewable energy storage systems, and 2) implementation of smart grid technology. The Institute has, therefore, interacted with the various utilities involved and has collaborated with subcontractors having the required special expertise in addressing problem solutions.

Grid studies and analyses have been conducted for the Big Island, Maui, and O?ahu. This work has led to grid analysis activities and subsequent model development. Such work has included interactions with the Hawai?i Electric Light Company (HELCO), Maui Electric Company (MECO) and Hawaiian Electric Company (HECO), as well as collaboration with General Electric Company (GE) and Alstom Grid Inc. Furthermore, involvement in all of these activities culminated in HNEI being awarded the Maui Smart Grid Project by the US Department of Energy (DOE). This project includes $7 million in DOE funding and $7.4 million in cost-share funding by the project partners, including HNEI, HECO, MECO, and GE. Most recently, Alstom Grid Inc. has been added as a new partner on the project. The project objective is to use a MECO grid substation together with new smart meters and smart technology to enable increased renewable energy utilization and yield benefits to the MECO utility and its customers. A related, more recent project deals with the use of smart grid inverters to assist on grids with high penetration of PV systems. HNEI has also been involved in a variety of projects dealing with alternate energy storage systems for addressing negative renewable energy impacts on grids.

The Grid Systems research area consists of three subareas which deal with various aspects of the problems facing electric utilities. The specific subareas are given below. Click on any of these for details.

- Grid Modeling and Analysis [1]
- Grid Storage Systems [2]
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