HiSERF -- Hawai‘i Sustainable Energy Research Facility

The Hawai‘i Fuel Cell Test Facility was established in 2003 with a grant from the Office of Naval Research (ONR) to conduct research on fuel cells and methane hydrates. Using the grant, the Hawai‘i Natural Energy Institute (HNEI) of the University of Hawai‘i at Manoa established a partnership with Hawaiian Electric Company (HECO) and UTC Fuel Cells, a leading developer of Proton Exchange Membrane Fuel Cells, to accelerate development of fuel cells for commercial and military applications. Since that time the program has benefited from continued funding from ONR and additional support from the U.S. Department of Energy (USDOE) and other private sector firms.

Significant ongoing projects include:

- Characterization of the impacts of air contaminants and development of mitigation measures to allow operation of fuel cells (FC) in harsh environments.
- Testing and design of fuel cell systems for improved durability and mission duration in FC-powered, unmanned vehicles, including battery-fuel cell hybrid systems.
- Evaluation and design of gas separation systems using fuel cells for helium purification and recovery.
- Development of advanced instrumentation for characterization of fuel cell and battery energy storage systems.

Since the opening of the facility, funding for fuel cell research exceeds $12 million.
Additionally, HNEI and HECO have cooperated on other programs focused on reducing the islands’ dependence on fossil fuels. Many of these programs have resulted in significant ONR and USDOE investment, much of it of direct benefit to the electric utility. For example:

- Through its USDOE programs, HNEI has provided approximately $2 million to support the grid-modeling efforts to better understand the impacts of high penetration renewables on the grid.
- With funds from ONR, HNEI is procuring and testing several advanced, grid-scale battery energy storage systems (BESS) with individual power ratings of one to two megawatts which will be deployed at three different sites on the grids to assess the performance and cost of various ancillary service applications. ONR, via HNEI, has provided over $4 million for these storage projects.

Such projects support the Department of Navy’s energy programs intended to demonstrate technologies that enable increased implementation of alternative energy sources and promote energy security. They are made possible by the efforts of Senator Daniel Inouye who chairs the U.S. Senate Appropriations Committee to ensure that the Department of Defense has adequate resources to make these critical and cutting edge investments in energy technology. HNEI and HECO have also partnered on the Maui Smart Grid Demonstration Program (approximately $7 million from USDOE via HNEI) and are collaborating in the Japan-US Island Smart Grid Project.

To reflect this expanding partnership and the growing capabilities of the fuel cell test facility it is being renamed the Hawai‘i Sustainable Energy Research Facility or HiSERF.

HiSERF will remain at its current site, a 4,000-square-foot facility on Cooke Street on HECO property near downtown Honolulu. In addition to continuing their work on fuel cell power systems, HiSERF personnel are developing new programs to evaluate the performance and durability of energy storage technologies including liquid and solid electrolyte batteries, and flow-battery systems. Instrumentation and techniques developed for the fuel cell power systems research will be applied to gain better understanding of the performance limitations of these emerging technologies. These HiSERF activities are expected to contribute to HECO’s ongoing efforts to reduce the use of fossil fuels.