



Project Fact Sheet

BACKGROUND

This research, development and demonstration project will assess use of distributed energy resource (DER) technologies to enhance penetration of Hawaii's indigenous renewable energy resources in order to reduce the island's dependence on imported fossil fuels. More specifically, the project will examine how DER technologies might be utilized in microgrids on Hawaii - the Big Island. Some microgrid technologies are commercially available and could be used now, however, a number of promising emerging technologies require further demonstration, testing, and evaluation prior to commercial use in order to limit technical and economic risk. In addition, DER technologies will be evaluated to assure that they will provide for a more robust transmission and distribution system on Hawaii while not adversely impacting the safety, reliability, and security of the island's grid.

The National Energy Technology Laboratory (NETL) is managing this and other electric grid R&D projects on behalf of the DOE Office of Electricity Delivery and Energy Reliability (OE).

GOALS

The overall goal of this research is to enhance the energy security of the State of Hawaii by reducing its predominant dependence on imported fossil fuels. Project activity will focus on:

- Demonstrating, testing and evaluating DER technologies to facilitate greater penetration of Hawaii's indigenous renewable energy resources.
- Completing a comprehensive assessment of the Big Island's (Hawaii) electricity and transportation infrastructure.
- Developing a more robust transmission and distribution system on the Big Island.
- Developing better mechanisms and information for linking public policy initiatives with technology development and deployment; and



- Providing a linkage between technology development and deployment in the state with the related technology needs in the rest of the country.

HOW DOES IT WORK?

This project will examine how specific technologies could be most effectively used on the Big Island of Hawaii. The combination of several renewable energy sources available and some challenging energy issues make the Big Island an ideal model for evaluating penetration of renewables and DER applications, from the perspectives of technology and the electrical grid. The efforts concerning scenario analysis, testing, evaluation, demonstration and potential deployment must necessarily involve a number of stakeholder groups. To ensure that stakeholder issues are adequately addressed, the Hawaii Natural Energy Institute (HNEI) of the University of Hawaii is working closely with:

End-use Customers - Involvement of customers such as commercial and residential users and consideration of their needs will enable development of better systems.

Electricity Companies - Strong relationships are being forged with the electric utility companies, who will be heavily involved with the systems under development.

Federal & State Governments - To continually obtain feedback from key managers of federal agencies and state governments in order to ensure state and national needs are addressed as part of project activities.

Team:

Hawaii Natural Energy Institute (HNEI), University of Hawaii
University of Hawaii Economic Research Organization

State of Hawaii Department of Business, Economic Development and Tourism
National Renewable Energy Laboratory

Hawaii Energy Policy Forum
GE Global Research Center
Hawaii Electric Light Company
Hawaii Gateway Energy Center
Chevron Hawaii

Tesoro Hawaii Corporation
Sentech

New Mexico Institute of Mining and Technology

Period of Performance:

7/26/2006 – 12/31/2007

Cumulative Project Funding:

Non-DOE: \$ 806,507 (32.2%)
DOE: \$1,700,000 (67.8%)
Total: \$2,506,507

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Links:

HNEI:
<http://www.hnei.hawaii.edu>
Office of Electricity Delivery and Energy Reliability:
<http://www.oe.energy.gov>
NETL:
www.netl.doe.gov
MGI:
www.netl.doe.gov/moderngrid

Technology Suppliers - To develop strong relationships with private sector technology providers.

International Relationships - To obtain support from international technology providers (Japan, Korea, China, etc.).

The Hawaii Gateway Energy Center on the Big Island will be used for evaluation of some of the DER technologies to be considered. The most promising technologies can then be assessed for actual deployment and integration within the Big Island electrical grid.

While giving attention to energy, environmental and economic opportunities associated with the project, HNEI will also ensure that cultural, siting and other socio-economic issues are properly addressed.

Specific work efforts will include the following:

- Assessment of the Big Island electricity infrastructure and microgrid applications.
- Research, development and testing of DER and microgrid technologies; and
- Development of public policy/outreach to accelerate acceptance of DER and microgrid technologies.

WHAT ARE THE BENEFITS?

The primary benefits of this project are the identification of DER technologies that can be demonstrated and deployed to enhance the overall energy security for the State of Hawaii by increasing renewable energy use, coupled with a corresponding decrease in imported fossil fuels. Based on the model developed during the course of this project, a further benefit would be the usefulness of this model for examining the potentials for expanded integration of DER technologies and renewable energy sources at the national level.

WHAT ARE THE PRIMARY APPLICATIONS?

The DER and microgrid technologies explored during this project can be applied in a wide variety of electricity-generating systems located across the nation. Usefulness for a specific system will depend on the appropriateness of local conditions as required by individual DER technologies. Example technologies include the penetration of wind and geothermal resources, and the use of microgrid demonstration systems.

Hawaii Natural Energy Institute
Hawaii Distributed Energy Resource
Technologies for Energy Security

WHAT ARE THE STATUS AND ACCOMPLISHMENTS TO DATE?

The overall project team has been established. Assessment and modeling of the electricity and transportation systems on the Big Island are currently well under way. The contract was executed in January 2007 to cover further efforts aimed at conducting a series of interviews with key stakeholders concerning the needs of the Big Island energy infrastructure. A decision-making conference regarding these initial project efforts will be held in Hawaii in March 2007.



WHAT IS THE MARKET POTENTIAL?

The market potential of individual DER technologies will be measured based on a combination of factors including local, environmental and geological conditions, population density, costs for use of existing technology, as well as forecasts for the cost of currently-used fossil fuels. Since the application of DER technologies to facilitate expanded use of renewable energy sources generally will reduce dependence on imported fuels, increased energy security will also be considered in assessing market potential.