

**Progress Report**

**To  
the Governor  
and  
the Legislature  
of the State of Hawaii**

**Regarding  
State Support  
for Achieving Hawaii's  
Renewable Portfolio Standards**

**By  
the State of Hawaii Department of Business,  
Economic Development, and Tourism**

**December 2005**

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**By the Hawaii State Department of Business, Economic Development, and Tourism**

**December 31, 2005**

### **Introduction**

Section 196-41, Hawaii Revised Statutes (HRS), "State support for achieving renewable portfolio standards", was part of Act 95, Session Laws of Hawaii, 2004, which established the renewable portfolio standard (RPS) signed by Governor Lingle on June 2, 2004. The statute assigns duties to the Department of Land and Natural Resources (DLNR) and the Department of Business, Economic Development, and Tourism (DBEDT) to support the private sector in attaining the RPS. This section reads as follows:

#### **[\$196-41] State support for achieving renewable portfolio standards.**

- (a) The department of land and natural resources and department of business, economic development, and tourism shall facilitate the private sector's development of renewable energy projects by supporting the private sector's attainment of the renewable portfolio standards in section 269-92. Both departments shall provide meaningful support in areas relevant to the mission and functions of each department as provided in this section, as well as in other areas the directors of each department may deem appropriate.
- (b) The department of land and natural resources shall:
  - (1) Develop and publish a catalog by December 31, 2006, and every five years thereafter, of potential sites for the development of renewable energy; and
  - (2) Work with electric utility companies and with other renewable energy developers on all applicable planning and permitting processes to expedite the development of renewable energy resources.
- (c) The department of business, economic development, and tourism shall:
  - (1) Develop a program to maximize the use of renewable energy and cost-effective conservation measures by state government agencies;
  - (2) Work with federal agencies to develop as much research, development and demonstration funding, and technical assistance as possible to support Hawaii in its efforts to achieve its renewable portfolio standards; and

- (3) Biennially, beginning in January 2006, issue a progress report to the governor and legislature.

This report was prepared to meet requirement (c) (3) above by summarizing DBEDT's activities in compliance with Section 196-41 from June 2, 2004 through December 31, 2005. The report is organized into four major sections as follows:

- A. DBEDT support to DLNR;
- B. Maximizing Use of Renewable Energy and Cost Effective Conservation Measures in State Government;
- C. Federal Support Obtained for Hawaii's RPS; and
- D. Potential Opportunities for Future Federal Support.

#### **A. DBEDT Support to DLNR**

As noted above, Section 196-41(b) requires DLNR to:

- (1) Develop and publish a catalog by December 31, 2006, and every five years thereafter, of potential sites for the development of renewable energy; and
- (2) Work with electric utility companies and with other renewable energy developers on all applicable planning and permitting processes to expedite the development of renewable energy resources.

The directors of the two Departments met and discussed these projects and assigned staff to work together to fulfill the requirements of the statute. DBEDT staff is assisting DLNR with both of these provisions.

1. **DBEDT Assistance to DLNR in Developing the Catalog.** To assist with the "catalog of potential sites for the development of renewable energy" (Catalog), the DBEDT Strategic Industries Division (SID) collected existing renewable energy resource assessments, which cover wind, solar thermal, solar photovoltaic, geothermal, hydroelectric, biomass, wave, and ocean thermal energy conversion and put electronic copies on a CD-ROM which was provided to DLNR, and potentially may become part of the Catalog. The Office of Planning has previously placed wind, solar, and geothermal resources on the State Geographic Information System. Working with DLNR and OP, SID retained a consultant to assist in creating the Catalog, which will assist renewable energy developers in identifying potential project sites. DLNR, SID, and OP will work together with the consultant on the Catalog.

The foundation of the Catalog will likely be elements of the study contracted by DBEDT, *Update of Select Hawaii Renewable Energy Cost and Performance Estimates*, completed in July 2004, and its antecedents. These are the most

thorough assessments of renewable energy resources and sites in Hawaii to date. The 2004 *Update* was the second update to the initial cost and performance estimates produced in the Renewable Energy Resource Assessment and Development Program in 1995, which form the foundation of the State's renewable energy assessment efforts. The consultant for the original work and both updates was Global Energy Concepts (formerly RLA Associates). The Program, which was Project 3 of the *Hawaii Energy Strategy* (1995), produced a comprehensive assessment of Hawaii's renewable energy resources (wind, solar, biomass, hydroelectric, ocean thermal energy conversion, geothermal, and wave energy) and a long-range development strategy.

The first update, produced in November 2000, Global Energy Concepts (GEC) produced *An Update of Selected Cost and Performance Estimates* as an appendix and source of data to *An Analysis of Renewable Portfolio Standard Options for Hawaii*, produced by GDS Associates.

The principal purpose of the 2004 *Update* was to provide new current and future cost and performance data to demonstrate the affordability and availability of renewable energy resources to move Hawaii toward the Governor's goal of 20% renewable energy by 2020 codified in the RPS set by Act 95. The second purpose was to identify specific renewable energy deployment opportunities for utilities and renewable energy developers. A third purpose was to provide renewable energy cost and performance information for consideration in utility Integrated Resource Planning.

2. **DBEDT Assistance to DLNR Efforts to Expedite Permitting.** DBEDT is providing assistance to DLNR's efforts to expedite all applicable planning and permitting processes involved in the development of renewable energy resources. This included providing DLNR with its detailed analysis of permitting issues included in the Hawaii Integrated Energy Plan in 1991.

DBEDT also provided DLNR with the report, *Strategies to Facilitate the Development and Use of Renewable Energy Resources in the State of Hawaii, a Report to the Legislature Pursuant to S.C.R. 40, S.D. 1, 1994*, issued by the Public Utilities Commission in February 1996. Twenty-one entities, including state and county agencies, regulated utilities, independent power producers, vendor/developers, and business and community interest groups were parties in the docket. The Commission initiated with a series of workshops featuring presentations by local and mainland experts on renewable energy. The parties subsequently participated in an intensive collaborative process in an attempt to build consensus in identifying barriers to deployment of renewable energy resources in Hawaii and developing strategies to overcome those barriers.

Both of these documents should prove useful to DLNR as background materials in developing a plan to work with stakeholders to expedite permitting requirements. Many of the issues identified in the reports continue to be cited

as barriers by various parties involved in the development of renewable energy projects.

## **B. Maximizing Use of Renewable Energy and Cost Effective Conservation Measures in State Government**

DBEDT main efforts focused on two major projects intended to maximize the use of renewable energy and cost effective conservation measures in State government facilities. These projects are also examples of DBEDT's acquisition and use of federal funds to further the objectives of the RPS in addition to those detailed in section C of this report. The two projects will be included in the table summarizing, federally funded projects at the end of Section C.

The two projects seek to improve energy efficiency of state-owned facilities. The first identifies energy conservation measures that could significantly improve efficiency and state buildings on Oahu. The second provides information and tools to help improve the efficiency of school buildings. The following is a description of the projects:

1. ***State of Hawaii Facilities on Oahu Energy Benchmarking Study***, July 15, 2005. Funding of \$24,000 for this project was provided by the U.S. Department of Energy (USDOE) under the State Energy Program. The study evaluated electricity consumption and characterized electricity use by the State of Hawaii facilities on Oahu by State agency, building occupancy type, and end use. The report also benchmarked various Energy Conservation Measures (ECMs), including a projection of the cost for their implementation, and their associated energy savings potential. The study will be valuable in developing programs to implement the savings identified.

The study identified 2,625 buildings owned and operated by the State of Hawaii. Approximately 80% of the buildings are on Oahu. The total building floor space of the State facilities on Oahu, excluding pavements, sidewalks, courtyards and any open spaces, is estimated at 26,367,927 square feet. The total electricity consumption of these facilities for 2004 was 557,654,688 kWh, which cost \$71,372,318.

The study found that by applying eleven ECMs, the State could reduce those facilities annual energy use by up to 14.2%. The measures would save at least \$10.7 million in electricity costs annually. Estimated costs to install the measures would be \$78.3 million.

Air conditioners use the largest percentage (44%) of electricity in State facilities, followed by lighting at 30%. The recommended ECMs, which would produce energy savings with paybacks of less than 15 years, included lighting retrofits, reflective solar window tinting, replacement of motors with high efficiency units, and roof insulation. Installing facility management systems had the shortest to payback of less than two years followed by waste heat recovery systems.

2. **High Performance Schools, 2005.** Funding of \$99,930 for this project was provided by the USDOE under a competitively awarded State Energy Program Special Project Grant. The High Performance Schools Project produced four deliverables intended to identify building design, cooling, and lighting techniques to enhance the learning environment for students and to reduce the schools' energy bills. The products from this project included:
- a. ***Hawaii High Performance School Guidelines.*** The guidelines focused on detailed design guidance topics related to new school construction and major renovations that were either unique to Hawaii or not well covered by existing guidelines. The guidelines were established in collaboration between DOE, DAGS, DBEDT, and Architectural Energy Corporation.
  - b. ***Life Cycle Cost (LCC) Calculations.*** The LCC tool is used to help calculate the LCC of various school construction and renovation options. Use of LCC analyses maximizes project values. The tool takes both operating and maintenance costs into account and makes the most of integrated design opportunities. The tool allows comparison of a base case scenario against different alternatives.
  - c. ***Commissioning for Schools.*** Commissioning is a systematic process of ensuring that building systems interact and perform as specified, as intended, and according to the school's operational needs. It results in increased energy efficiency, reduced change orders, better maintainability, and improved occupant comfort and productivity. The report discusses two tiers of school commissioning and suggests guidelines.
  - d. ***High Performance Hawaii Classroom Prototypes.*** This document includes illustrations and key considerations for integrated design for visual and thermal comfort, as well as optimal energy efficiency. These considerations include:
    - Daylighting & Lighting Features
    - Ventilation & Envelope Features
    - Integrated Design Strategies
    - 100% Naturally Ventilated Classroom Prototype
    - Portable Classroom Prototype
    - Gymnasium Prototypes

### C. Federal Support Obtained for Hawaii's RPS

DBEDT's Strategic Industries Division obtained and used federal State Energy Program funds and obtained a variety of U.S. Department of Energy grants to fund projects that provide technical information to assist the electric utilities and others to meet Hawaii's RPS.

In this section, the federally-funded projects completed or continuing since Act 95 was signed on June 2, 2004 except those already discussed in Section A, are summarized. Many of these projects were initiated prior to the enactment of the RPS law in the course of DBEDT's general mission of support of the State Energy Objectives (Section 226-18, HRS). However, this does not diminish their value relative to support of the RPS. Each project's funding and outcomes, or planned outcomes, will be briefly described below, followed by a table at the end of the section that summarizes the projects, their funding sources and amounts.

1. ***Managing High Saturations of Distributed Energy Resources (DER) as a Microgrid on the Big Island of Hawaii, October 2004.*** Funding of \$100,000 for this project was provided by the U.S. Department of Energy under a Special Project Grant awarded through a competitive selection process. DBEDT partnered with Hawaii Electric Light Company (HELCO) on the project, and both partners provided in-kind matching required as a condition of the grant. HELCO was the primary consultant for the project, assisted by a subcontractor, Sentech, Inc.

The project was undertaken because the electric generation, transmission and distribution system on the Big Island of Hawaii faces complex reliability, environmental, and economic issues. While the west side of the island is experiencing rapid load growth, the majority of power plants are located on the island's east side. At the day and evening peaks, approximately 50% of the load demand is on the West side and at minimum load, 54% of the load is on the West side. Only 21% of the installed generation capacity is located on the West side.

Thus the West side load is supported from the East side generation through the cross-island transmission system. There are a limited number of cross-island transmission lines. Some of these lines have low capacity ratings and three are already operating at or near capacity. This can lead to voltage or stability problems during atypical generation dispatch or transmission configurations. In several cases, a single line outage or loss of a single critical generator can create line overloads and low voltages in the West side transmission system.

HELCO investigated various technological options that may help reduce costs and improve system reliability. The study examined how distributed energy resources (DER), which includes on-site power generation and combined heat and power, could reduce the transmission system challenges caused by the imbalance between load and generation. The use of combined heat and power and renewable DER would also help meet Hawaii's RPS.

The primary objective of the study was to ascertain whether using a micro-grid with DER on the distribution system and at customer locations controlled by the utility's centralized computer control system would be a technically and economically viable option to reduce the operating issues and constraints faced by the island's current electric network.

Sites with the greatest potential to use DER technologies to reduce HELCO's peak loads were identified. Technical load flow analyses and economic

assessments were made for each of those sites. By looking at potential DER technologies as parts of integrated hybrid systems, dispatched by HELCO as a micro-grid, it was found that many functions could be combined to offer benefits to the utility and its customers that would not be realizable under single-function customer-controlled installations.

2. ***Report on HELCO Operational Issues: Bulk Energy Storage***, October 2004. Funding of \$70,000 for this project was provided by the USDOE under a State Energy Program Special Project Grant awarded through a competitive selection process. DBEDT partnered with HELCO on the project, and both partners provided in-kind matching required for the grant. HELCO was the primary consultant for the project and was assisted by a subcontractor, Sentech, Inc.

The purpose of this project was to evaluate the ability of energy storage to alleviate electricity transmission and reliability issues on the Big Island, which are expected to increase due to the projected growth in the use of distributed energy resources (DER) and intermittent renewable energy. It was postulated that bulk energy storage located at strategically selected nodes on the transmission network could result in a more robust electrical system that is inherently more flexible, especially for non-dispatchable renewable generation, such as wind, solar, and run-of-the-river hydro. This project assessed available bulk energy storage technologies, and determined their explicit value and to increasing the reliability and flexibility of the HELCO system.

The addition of approximately 20 MW of bulk energy storage at Keahole and/or Kailua substations appears necessary for HELCO to continue to operate its system reliably and economically with the load growth and renewable energy development anticipated on the island. To verify this, the next step would be to perform more detailed site-specific cost analyses, load flows, production cost and unit commitment studies, system reliability analyses, and wind speed simulation studies to determine the optimum size and location, the effects on revenue requirements, and the resulting degree of dependence on fossil fuels of this nominal 20 MW of storage.



3. **Workshop on Distributed Energy Resources and Combined Heat and Power in Regulated and Competitive Markets** August 24 –25, 2004, and Report, *An Evaluation of Alternative Commercial Approaches to Distributed Energy Resources and Combined Heat and Power in Hawaii*, October 2004. Funding of \$25,000 for this project was provided by the USDOE under a Special Project Grant. Although the focus of the Workshop was on fossil-fueled systems, the definition of renewable energy in Act 95 includes, “use of rejected heat from co-generation and combined heat and power systems excluding fossil-fueled qualifying facilities that sell electricity to electric utility companies,” which applies to the systems discussed in the workshop that would be “counted” toward achievement of the RPS, if deployed. The purpose of the workshop was to offer Hawaii's energy stakeholders information on the following:
- a. The benefits and challenges involved in incorporating DER into Hawaii's utility planning and regulatory processes.
  - b. Presentation of an objective model-based comparison of the economic benefits and risks associated with the application of at least three prototypical Hawaii DG/CHP projects under regulated or unregulated scenarios.
  - c. Suggestions on how to apply the beneficial aspects of the California experience with DER to Hawaii.
  - d. Information on the fuel cell and hydrogen/LPG powered reciprocating engine CHP system that was then mean planned for the City and County of Honolulu's Kapolei Hale office building.

The report, *An Evaluation of Alternative Commercial Approaches to Distributed Energy Resources and Combined Heat and Power in Hawaii*, was prepared by Competitive Energy Insight, Inc., which donated in-kind support valued at \$11,000 dollars to develop and present the details behind their presentation of the objective model-based comparison of the economic benefits and risks associated with the application of at least three prototypical Hawaii DER/CHP projects under regulated or unregulated scenarios. Key findings of the analysis included:

- Hawaii is an economically attractive market opportunity for DER.
- The economics of DER are island and site specific.
- In many instances, diesel appears to be the most economic fuel for DER on the islands. However, more expensive gas fields offer important benefits with regard to transportation, storage, permitting and environmental protection. For many sites this may prevail over the fuel cost difference. It is important to note that both diesel and gas fuels can exhibit attractive returns for host, Third Party, or utility investment, especially on the Neighbor Islands.

- Utility-Owned DER, as proposed by HECO, provides an economically attractive alternative option for hosts, especially on Oahu where electric rates are lower. Under HECO's proposal, site owners would be provided with guaranteed savings and with capital and risk management by the utility.
  - In many circumstances host or Third Party ownership can offer additional savings and benefits compared to Utility-Owned DER projects.
5. **Windpowering America, 2004-2005.** The USDOE's Windpowering America program provided funding for interested parties, including developers, to learn more about Hawaii's wind energy resources:
    - a. **Updated Wind Resource Maps, June 30, 2004.** Partial funding of \$12,000 for this project was provided by the USDOE under a Cooperative Agreement. Other funding and support was provided by HECO, Maui Electric Company, and the USDOE's National Renewable Energy Laboratory. High-resolution wind resource maps were developed for Hawaii and are available on the Internet as well as on CD-ROM. These maps have a grid resolution of 200 meters and provide wind speeds at 30, 50, 70, and 100 meters as well as wind power densities at 50 meters. These maps were validated by local meteorologists and by NREL.
    - b. **Meetings of the Hawaii Wind Working Group** were conducted in 2004 and 2005, providing a forum for interested members of Hawaii's energy community to share information in support of expanding the use of wind energy in Hawaii.
    - c. **The Wind Energy Applications and Training Symposium (WEATS)** was held at Maui Community College, July 20-21, 2005. The WEATS was "designed for project planners, developers, utility officials, and engineers who are directly involved with energy projects, or are considering wind energy development, and want to learn more about wind energy technology applications. . . . (It provided) participants with practical knowledge and analytical tools for conducting project pre-feasibility and identification analysis and implementing wind energy projects large and small. . . (and taught) about the capabilities of the technology, and about economic and financial aspects of sustainable project development."
    - d. **The *Small Wind Electric Systems: A Hawaii Consumer's Guide*** was developed by the National Renewable Energy Laboratory for Hawaii, with input from DBEDT. The consumer guide provides information to help consumers determine if a small wind electric system can provide all or a portion of the energy needed for a home or business, based on the available wind resource, home energy needs, and comparative economics.
  6. ***Assessment of Energy Reserves and Costs of Geothermal Resources in Hawaii***, September 30, 2005. Funded by a SEP Special Project Grant from USDOE totaling \$42,763. The assessment, prepared in collaboration with the DLNR,

includes (1) an assessment of the available exploration, drilling, and well testing data to estimate the megawatt capacity potentially available from the various resource areas in Hawaii and (2) an assessment of available well and reservoir performance data, as well as drilling and operations costs from the Kilauea East Rift zone (KERZ), to estimate the capital cost (\$ per installed kilowatt) and operations and maintenance cost (¢ per kilowatt-hour) of geothermal power in the KERZ.

The following seven geothermal resource areas in Hawaii – five on the Island of Hawaii and two on Maui – have significant potential for electrical generation:

- Kilauea East Rift Zone;
- Kilauea Southwest Rift Zone
- Mauna Loa Southwest Rift Zone;
- Mauna Loa Northeast Rift Zone;
- Hualalai;
- Haleakala Southwest Rift Zone; and
- Haleakala East Rift Zone.

7. ***Hawaii Island Geothermal Direct Use Working Group***, September 30, 2005. Funded by a \$10,000 GeoPowering the West (GPW) Grant from USDOE. As a participant in the GPW Program, the State of Hawaii provided \$9,560 to the County of Hawaii for a 13 month geothermal project to support the use of direct use applications in the Kapoho area. Project objectives were to establish a working group, to support utilization of direct use of geothermal heat through education and outreach, and to solicit community input through public meetings. During the project duration, September 2004 to September 2005, the group was established, and held several planning and public meetings, and prepared informational materials for education and outreach.

Supported by the interest of the County and community, the state proposed a direct use feasibility project to the USDOE and was awarded \$100,000 in late 2004.

8. ***Direct Use Enterprises in Kapoho, Puna District, County of Hawaii*** (ongoing). Funded by a Geothermal Outreach Grant from USDOE of \$100,000. This project will advance the use of geothermal energy through an examination of barriers and incentives to the development of direct use projects, proactive public information activities, and a feasibility and design study for specific applications including an incubator park. The project period is October 1, 2004 to September 30, 2006.
9. ***Pacific Regional Biomass Energy Program***. 2004 -2005. With grant funding from the U. S. Department of Energy's Pacific Regional Biomass Energy Program, DBEDT SID provided assistance to a variety of projects statewide to encourage the use of renewable biomass energy resources as follows:

- a. ***Study Relating to Used Cooking Oil Generation and Biodiesel Production Incentives in the County of Hawaii***, December 2004. Funded by \$10,000 from the USDOE Pacific Regional Biomass Energy Program (PRBEP). In partnership with DBEDT, the County of Hawaii's Department of Environmental Management (DEM), Solid Waste Division surveyed about 725 licensed eating establishments on the Island of Hawaii to establish the amounts of used cooking oil being generated by local businesses. The County's final report, completed in December 2004, indicates that 800 tons of waste oil a year is available for production of biodiesel.
- b. ***County of Hawaii Biodiesel Education and Outreach Program***, December 2005. Funded by \$10,000 from the USDOE PRBEP. As a follow-on project, the DEM will conduct a public education program to disseminate the results of the survey conducted in 2004 to all potential generators of used cooking oil and grease trap waste, to encourage the recycling of used cooking oil, and to promote the economic benefits of local biodiesel production. For the program, the DEM has prepared a biodiesel brochure to that will be disseminated to educational institutions and the general public via special events and workshops, and will be made available via the DEM website.
- c. ***County of Kauai Landfill Gas Analysis for the Kekaha Landfill***, March 2005. Funded by \$10,000 from the USDOE PRBEP. The Kauai County Solid Waste Division completed a landfill gas analysis at the County's only active landfill to determine suitability for power production. The work involved drilling and installation of temporary landfill gas collection and sampling pipes, and analysis of gas samples. The analysis found that the Phase 2 is suitable for power production using internal combustion engines and microturbines. The analysis will be used for a landfill project RFP. Additional PRBEP funding has been requested for similar testing of gas quality and distribution and collection system design for Phase 1 of the landfill. The Phase 1 analysis and design will be conducted as a separate task within a Federal Energy Management Program CHP project partnership involving the Pacific Missile Range Facility, which is near the landfill.
- d. ***City and County of Honolulu Kapaa Landfill Gas Analysis***, December 2004, and ***Landfill Gas Production Model and Preparation of Request for Proposals (RFP)***, December 2005. Funded by \$20,000 from the USDOE PRBEP, the City and County of Honolulu has completed work necessary to solicit contractors for bioenergy production at the Kapaa landfill. The landfill had produced about 3 MW from 1989 to 2002, until turbine problems forced closure. The gas analysis confirmed that the methane Btu content of the gas sampled was consistent with landfills of its age, and that sulfur and siloxane values were relatively low. The County has updated its gas production model for the landfill and will

issue an RFP for resumption of electricity generation operations at the landfill.

- e. ***Hawaii Biomass Resource Maps***, December 2005. Funded by \$21,500 from the USDOE State Energy Program. The University of Hawaii's Hawaii Natural Energy Institute (HNEI) is preparing statewide biomass resource maps scheduled for completion in late 2005.
- f. ***Physicochemical Analysis of Selected Biomass Materials in Hawaii***, 2005, and ***Preliminary Gasification Testing of Mixed Eucalyptus Derived Fuels***, 2005. Funded by \$21,500 from the USDOE PRBEP, HNEI completed two analyses and reports to provide technical information necessary for potential developers of nearer term biomass resource energy projects. The physicochemical analysis includes cane trash (leaf and top material) from Hawaiian Commercial & Sugar, and mahogany, eucalyptus, gum, and tropical ash tree samples from Hawaii forestry plantings. The gasification analysis includes heating values and chemical compositions of available forestry feedstocks.
- g. ***Estimates of Hawaii Ethanol Production Capacity***, Ongoing. Funded by \$21,500 from the USDOE PRBEP, the HNEI is conducting a study to determine Hawaii's ethanol production capacity related to the April 2006 implementation of Hawaii's requirement for ten percent (10%) ethanol in gasoline. The report will include estimates of production potential -- short-term (to 2010), mid-term (to 2015), and long-term (to 2025) -- by county, with consideration of available and probable feedstocks and ethanol production technologies; and estimates of costs of production and cost effectiveness in the short-term.

10. **Investigation of the Potential for Production of Electricity from Hawaii's Wave Energy Resources, 2004-2005.** DBEDT and others continued to investigate the potential for electricity production from Hawaii's wave energy resources. In late 2004, an updated wave energy assessment for Hawaii and several other states was completed by the Electric Power Research Institute. Studies funded by DBEDT in previous years were used in this latest effort, which highlighted Hawaii's consistent wave resource and discussed recent milestones in the research, development, and demonstration of several wave power devices.

To gain a better understanding of the status of wave energy development, the DBEDT Deputy Director attended the European Ocean and Wave Energy Conference in Scotland during September, 2005. Contacts made at the conference have encouraged several wave device manufacturers to initiate discussions with the State regarding possible future deployments. As of the end of 2005, a representative from one company had visited Oahu, meeting with State government officials, private shipyards, marine engineering firms and the electric utility.

Hawaii's only wave power demonstration to date, the Ocean Power Technology "PowerBuoy," was redeployed off the Kaneohe Marine Corps Base in late 2005 after maintenance and upgrades. A second, improved

PowerBuoy intended for installation at the same site is undergoing initial tests off the New Jersey coast.

Summary of Federal Funds Obtained by DBEDT  
to Assist Renewable Energy and Cost-Effective Conservation

<b>Project Title</b>	<b>Fund Source</b>	<b>Amount</b>
State of Hawaii Facilities on Oahu Energy Benchmarking Study	USDOE, SEP	\$24,000
High Performance Schools	SPG	\$99,930
Managing High Saturations of Distributed Energy Resources (DER) as a Microgrid on the Big Island of Hawaii	SPG	\$100,000
Report on HELCO Operational Issues: Bulk Energy Storage	SPG	\$70,000
Workshop on Distributed Energy Resources and Combined Heat and Power in Regulated and Competitive Markets	SPG	\$25,000
Updated Wind Resource Maps	WPA	\$12,000
Assessment of Energy Reserves and Costs of Geothermal Resources in Hawaii	GPW	\$42,763
Hawaii Island Geothermal Direct Use Working Group	GPW	\$10,000
Development of Direct Use [of Geothermal] Enterprises in Kapoho, Puna District, County of Hawaii	GOG	\$100,000
Study Relating to Used Cooking Oil Generation and Biodiesel Production Incentives in the County of Hawaii	PRBEP	\$10,000
County of Kauai Landfill Gas Analysis for the Kekaha Landfill	PRBEP	\$10,000
City and County of Honolulu Kapaa Landfill Gas Analysis, and Landfill Gas Production Model and Preparation of Request for Proposals	PRBEP	\$20,000
Hawaii Biomass Resource Maps	SEP	\$21,500
Physicochemical Analysis of Selected Biomass Materials in Hawaii, and Preliminary Gasification Testing of Mixed Eucalyptus Derived Fuels	PRBEP	\$21,500
Estimate of Hawaii Ethanol Production Capacity	PRBEP	\$21,500
<b>Total</b>		<b>\$588,193</b>

GOG = Geothermal Outreach Grant

GPW = "Geopowering the West"

PRBEP = "Pacific Regional Biomass Energy Program"

SEP = "State Energy Project"

SPG = "Special Project Grant"

WPA = "Wind Powering America"

## D. Opportunities for Future Federal Support

1. **DBEDT Seeking Federal Funding for Future Projects.** Most federal funding opportunities are announced in the January through March timeframe. DBEDT will seek to identify opportunities to benefit Hawaii's energy by competing for specific projects. DBEDT recently applied for funding of \$3 million for installation of a roof-mounted photovoltaic system at Kauai High School was requested under a proposal entitled "Kauai High School Energy Cost Reduction Project" in response to the United States Department of Agriculture (USDA) Rural Utility Service (RUS) High Energy Cost Grant Program. The proposal was submitted jointly by DBEDT, the Hawaii State Department of Education, and the Kauai Island Utility Cooperative. When this report was completed, grant awards had not yet been announced
2. **Provisions and potential sources of funds contained in the Federal Energy Policy Act of 2005 that may help Hawaii achieve the RPS.** The following, provided by DBEDT's Washington Liaison Consultant, is a summary of the most relevant provisions of the Energy Policy Act of 2005 ("Bill") of interest to Hawaii in the context of the RPS. As a general matter, the authorizing provisions of the Bill will not be funded without specific interest from individual members of Congress. DBEDT continues to monitor these provisions closely and is prepared to pursue appropriate funding opportunities as they arise.
  - **Section 355 (Assessment of Dependence of State of Hawaii on Oil)** – This provision requires the Secretary of Energy to examine Hawaii's level of dependence on oil, including the impacts of supply disruptions, price volatility, feasibility of increasing renewable energy penetration, the potential for LNG, the potential use of hydrogen in the transportation sector and other uses for hydrogen. Section 355(d) permits the Secretary to contract out this activity to "qualified public or private entities." Three hundred days after enactment, a report must be prepared (in consultation with Hawaii state agencies).
  - **Section 123 (SEP)** – This provision invites the Governors to submit revised SEP plans to expand energy efficiency programs.
  - **Section 125 (Energy Efficiency in Public Buildings)** – If funded, this program could enhance energy efficiency in public buildings.
  - **Section 127 (State Technologies Advancement Collaborative (STAC))** – The DBEDT Energy Program Administrator is the chair of the STAC. STAC could serve as a helpful model for state-to-state cooperation on individual projects. The State has initiated work with New Mexico and may want to consider joint projects with other states.
  - **Sections 131, 132, 133, 134 (Energy Education/Public Information)** – These programs all fit under the rubric of energy education. Energy



Star (131) is finally authorized and is expected to result in expanded cooperation between state energy offices and the Energy Star office at EPA. While this is mostly technical assistance with a funding level of approximately \$50 million, the new initiatives: Home Performance with Energy Star, Clean Energy and Environment State Partnerships, Public Utility Commission Regulatory Barriers and Clean Energy Plans, provide an opportunity for a systematic vehicle to promote these activities at the state level. The Hawaii Public Utilities Commission is participating in the regulatory barriers activity, along with five however other states. Hawaii could serve as a test-bed for new ideas, in light of its high energy costs and the opportunities available to deploy additional renewable energy resources.

- **Section 151 and 152 (Public Housing)** – Third party contracts for public housing authorities are extended to 20 years under this Bill (Section 151), providing an opportunity to use energy efficiency performance contracts or other third party financing mechanisms.
- **Section 204 (Photovoltaic Programs for Public Buildings)** – This provision encourages federal public buildings to utilize photovoltaic systems. This could be helpful in Hawaii with the large number of federal facilities.
- **Section 206 (Renewable Energy in Weatherization)** – Considering the limited utility of the Low-Income Weatherization Assistance Program in Hawaii, this program would permit up to \$3,000/dwelling to utilize renewable energy systems.
- **Section 209 (Rural and Remote Community Electrification Grants)** – While apparently originally intended to address remote communities in Alaska, it could apply to areas in Hawaii, and includes a variety of renewable energy activities that have application in the State (such as “ocean waves, solar, biomass, wind, and geothermal”), and applies to energy efficiency, as well as upgrading transmission and distribution circuits. Renewable energy receives a preference under this provision.
- **Sections 801-813 (Hydrogen)** – Sections 801-813 provide for an extensive hydrogen R&D program. It also includes fuel cells. The Secretary of Energy is required to submit a plan to Congress regarding hydrogen and fuel cells by February 8, 2006. A federal interagency task force is to be established (Section 806) with a technical advisory committee (Section 807). A demonstration program is to be established with a fairly wide range of potential applications (Section 808) and “system demonstrations” are also included with specific cooperation with state governments (Section 808(b) (1) (iii)). Section 812 would create five hydrogen projects at solar facilities and wind facilities, respectively. One of the criteria is “regional and climatic diversity,” which could provide an opportunity to encourage a demonstration in Hawaii. Section 933 also would provide an R&D program for

universities dealing with hydrogen and infrastructure programs for vehicles.

3. **Research and Development.** The following R&D provisions set forth in the Bill have potential for Hawaii, and might provide opportunities for partnering with other states and universities or institutions within Hawaii.
  - **Section 917 (Advanced Energy Efficiency Technology Transfer Centers)** – would create a “geographically dispersed” network of these centers, as well as an advisory committee (including one state or local energy office representative)(Section 917(f)(1));
  - **Section 932 – (Bioenergy Program);**
  - **Section 935 – (Renewable Energy in Public Buildings),** including buildings owned by state and local governments;
  - **Section 941 (especially Section 941(e)) - Expanded biomass research, including state research agencies;** and
  - **Section 986A** – This creates a coordinated training program including examination of “energy user and demand side response . . . [and] international trade of energy.
4. **Electricity.** The mandatory purchase and sale requirements for Qualifying Facilities under the Public Utilities Regulatory Policies Act of 1978 (PURPA) is repealed, assuming market power and other standards are satisfied (Section 1253). In addition, new provisions require net metering and require that state commissions consider smart metering (time-of-use pricing, real-time pricing, etc.) options (Sections 1251 and 1252).
5. **Tax Provisions and Financial Incentives.** The following tax provisions and financial incentives and enhance the business case for renewable energy.
  - **Production Tax Credit** – The Section 45 production tax credit for solar, wind, geothermal, etc., is extended through the end of 2007 (Section 1301).
  - A new “clean energy bond” is created for cooperatively or municipally-owned utilities for provisions covered under the Section 45 credit (Section 1303).
  - Other new or increased energy efficiency and renewable energy tax provisions: 1) energy efficient commercial buildings deduction (Section 1331); 2) credit for new energy efficient homes (Section 1332); 3) credit for nonbusiness energy property (Section 1333); 4) credit for residential energy efficient property (Section 1335); 5) credit for

business installation of fuel cells and stationary microturbines (Section 1336); and 6) the business solar investment tax credit.

- Sections 1701-1703 would provide certain incentives, including loan guarantees, for “innovative technologies”. It appears to be especially targeted to integrated gasification combined cycle (IGCC)(Section 1703(c)), but does include a variety of other technologies, such as renewable energy, hydrogen fuel cells (residential, industrial or transportation), carbon sequestration, distributed generation, efficient end-use technologies, and refineries. These provisions require appropriations.

## **Conclusion and Outlook**

DBEDT has initiated significant efforts to assist DLNR in meeting the requirements of Section 196-41, to produce a Catalog of Renewable Energy Sites and to expedite the permitting process for renewable energy resources.

At the same time, DBEDT continues its efforts to encourage the use of cost effective energy efficiency and renewable energy in state facilities, and throughout the state’s energy systems. Most of the funding of the state energy office is from federal sources, and additional funding has been attained in the form of competitively won grants or from other federal programs. Additional opportunities to obtain future grants should be announced during the first quarter of calendar year 2006. Many of these will derive from programs incorporated in the Energy Policy Act of 2005. DBEDT will be carefully monitoring announcements from the USDOE, the U.S. Environmental Protection Agency, and the U.S. Department of Agriculture for opportunities to obtain federal support to advance efforts to comply with Hawaii’s RPS.