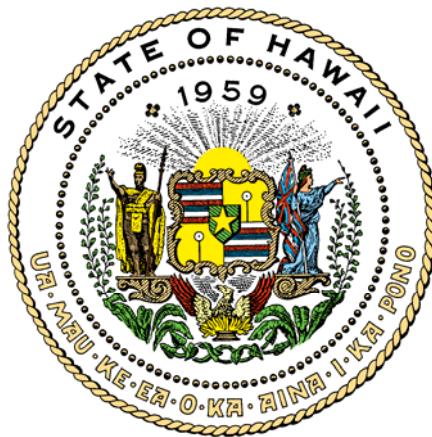


Report to the 2008 Hawai‘i State Legislature

State Facilities Energy Management Advisory Committee



State of Hawai‘i
Department of Business, Economic Development & Tourism
January 2008

This report is submitted in fulfillment of Act 96, SLH 2006, Part III, Section 6.

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Table of Contents

Members of the State Facilities Energy Management Advisory Committee.....	2
Chairperson’s Introduction	3
Executive Summary	7
Chapter 196-18, HRS, State Facilities Energy Management Advisory Committee Recommendations	9
Overview of State Energy Management	
Electricity Consumption	15
Executive Agency Electricity Costs.....	17
Green Buildings/LEED® Green Building Rating System	18
Commissioning and Retrocommissioning	20
Energy Performance Contracting.....	21
Benchmarking and the Energy Star™ Program.....	22
Appendices	
A. Biographies of Members of the State Facilities Energy Management Advisory Committee.....	25
B. Text of §196-18(b), Hawai`i Revised Statutes.....	30

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Chairperson's Introduction

By John T. Harrison, Ph.D.

“Of those to whom much is given, much is required.” These words, spoken by President-elect John F. Kennedy in his farewell to Massachusetts before assuming the Presidency, resonate strongly with the people of Hawai‘i. In truth, we in Hawai‘i enjoy an abundance of gifts.

In addition to its breathtaking beauty and cultural heritage, Hawai‘i offers less widely appreciated bounty:

- Hawai‘i’s low-latitude location places us within a region of abundant solar energy available for displacement of fossil energy resources.
- Hawai‘i includes eleven of the thirteen climates found on earth, but the warm climate enjoyed by the vast majority of our residents makes unnecessary the energy expenses of heating.
- Hawai‘i’s environment is very well studied, and in topical realms of crucial significance to global ecologic concerns, we possess an abundance of data applicable to solving resource problems and conflicting use scenarios.
- Hawai‘i is highly capitalized, and thoroughly integrated into mainstream global markets.

These combined attributes engender in Hawai‘i an unparalleled opportunity. As a laboratory for sustainable living, Hawai‘i is representative of a broad cross-section of the issues and attributes of human interaction with the global biosphere. Many successes achieved here would readily apply in communities elsewhere.

In addition to the advantages that Hawai‘i offers, our state confronts significant challenges. Hawai‘i is home to a human population of sufficient size that most human population-related issues are well represented locally, and our population is increasing steadily. As well, our insular nature limits available space and essential resources such as fresh water, while posing related challenges of crowding and conflicting use demands. Because of our geographic isolation, material and energy resources not produced locally must be transported considerable distances, and in the case of electricity, we are completely reliant on our individual island generating capacities, with no opportunities for the typical grid interconnections widely employed on the mainland.

As a result, Hawai‘i electricity rates, as reported by the U.S. Department of Energy, were more than 30% higher than those of the next highest state in all three major sectors (residential, commercial, and industrial) as of August 2007. To more emphatically underscore the energy costs we confront as a result of geography,

residential electricity and commercial electricity rates in Hawai‘i were more than twice the U.S. average; industrial rates were nearly three times the national average.

Hawai‘i Revised Statutes (HRS) Section 196-1 recognizes both challenges and opportunities related to the State energy economy, calling for “strategic comprehensive planning in the effort towards achieving full utilization of Hawai‘i’s energy resources programs and the most effective allocation of energy resources throughout the State” (§196-1(2), HRS). Part II of HRS 196 directly addresses energy efficiency and planning in State facilities, calling in §196-18 for establishment of a public-private advisory committee to provide input to the State Energy Resources Coordinator.

The Committee appointed by the State Energy Resources Coordinator brought a fertile mixture of experience and insights from diverse sectors to the table. It was an honor, as well as a pleasure, to share ideas with these distinguished leaders, with constant support and guidance from Carilyn Shon, Energy Efficiency Branch Manager and Karen Shishido, Energy Analyst, both of the Department of Business, Economic Development, and Tourism (DBEDT). Over many hours of discussion and mutual enlightenment, the Committee consistently blended wisdom and insight with candid analyses of both the advantages and challenges facing Hawai‘i’s energy future. This report presents recommendations directly responsive to the 8 categories established under §196-18(b), HRS.

At the outset of deliberations, the Chair noted that approval of recommendations by unanimous consent would convey a convincing sense of the Committee’s resolve. However, the alternate process of majority approval with inclusion of minority reports often elicits a more probing discussion, particularly on controversial positions. The Committee never was bound by a procedural requirement for consensus, but after vigorous discussion of the issues, it is noteworthy that all of the final recommendations received unanimous support.

The most compelling recommendation of the State Facilities Energy Management Advisory Committee is the creation of a new line agency within the Executive Branch to assure implementation of policy initiatives to meet State energy needs in the face of growing challenges. The proposal for a State Department of Energy arose spontaneously in the course of Committee deliberations. In spite of wide recognition of how difficult it will be to achieve Legislative and public acceptance of a new line agency, the Committee as a whole quickly came to the unanimous consensus that a State Department of Energy is both an essential necessity for the successful execution of widespread and sustainable energy initiatives, as well as a tacit symbol of the urgency with which these tasks must be addressed. No other implementation alternative offers the emphasis of a dedicated executive agency to ensure greater authority and accountability in effecting sound energy policy.

A framework for the new State energy agency presently exists within the energy-related branches of DBEDT, which, along with additional elements of the agency such as the Energy Auditor’s Office, will provide needed management to

implement the Committee's recommendations and to respond to existing and emerging energy challenges facing Hawai'i. Presently, only two other states, Maryland and Oregon, include a dedicated energy agency in their government organization. Seven other states include an energy division within environmental quality and natural resources line agencies. Authorities for management of energy issues in the remaining states are divided among a variety of boards, commissions, and offices with close organizational ties to the respective state executive branches.

In calling for a Hawai'i State Department of Energy, the Committee is responding forcefully to the growing vulnerability our state faces in the changing global energy market. Recent trends in origins of Hawai'i's crude oil imports, which supply over 90% of the State's energy needs, show increasing reliance on China and the Middle East. Both these and our other sources are strategically and competitively problematic, and any interruption of imported oil supply to Hawai'i will impart severe economic impacts. As well, we face a growing awareness of environmental and climatic effects of energy-related greenhouse gas emissions, and our island coastlines, on which so much of our economic activity depends, are themselves vulnerable to rising sea level. Our nation as a whole faces growing energy challenges both in diversity of supply and from consequences of energy externalities, but no other state is more vulnerable than Hawai'i. Responding to that threat and managing the transition to sustainable energy practices will require effort and resources, as well as the willful dedication and focus that a State Department of Energy will convey.

Funding support for the new department was a topic of extended discussion during Committee meetings, and a variety of mechanisms were considered. Common to all considered alternatives was an underlying conviction that support for the program should largely be drawn from energy related activities. Most states and the federal government as well exact revenue from transactions involving fossil fuels, using funds so derived for a broad array of government purposes. The Committee focused particular attention on the Environmental Response Fund established pursuant to HRS 128D-2, noting the specific reference in §128D-2(b)(2) to "environmental protection and natural resource protection programs, including but not limited to energy conservation and alternative energy development..."

Established in the wake of the Exxon Valdez disaster, the Environmental Response Fund was initially intended to provide immediate relief funding in the event of a major oil spill that might threaten Hawaiian coastal waters. In order to mitigate both environmental and economic consequences of an environmental disaster, the fund was designed to address relatively short-term response needs. However, the funding source comprised a small but steady percentage of petroleum product sales revenues (see HRS 243-3.5), and in the absence of a substantial exigency requiring its expenditure, it was evident that a surplus would accumulate, so the Fund was capped, first at \$7 million, and later at \$20 million.

In discussions surrounding funding for the new Department, the Committee recognized the need for a steady, dedicated funding source to offset costs of administering the expanded program. The widespread use of motor fuel taxes

throughout the nation as a reliable source of funding for environmental purposes, including underground storage tank cleanup and other pollution remediation, served as a key indicator of a publicly acceptable revenue generator. Viewing the Environmental Response Fund as an example of such a funding policy, the Committee noted the parallel application of public monies to remediate environmental and economic consequences of fossil fuel transactions, the major difference being the time frame of the required response.

Most planning is undertaken within a limited time horizon, often politically defined in terms of office of four years or less. In retrospect, the great historical transformations of the world's economic and social institutions have occurred over intervals of decades and centuries. The challenge of transforming our energy economy from traditional, yet unsustainable conventions to renewable self-reliance is daunting, but the alternative of complacency does great disservice to future generations.

Some have drawn analogies between the obstacles we confront in achieving this new energy economy and those faced by proponents of the Apollo Program seeking to expand the tangible reach of humanity to our moon's surface. Certainly, the momentum of national commitment must be at least equivalent, but I note two substantive factors making this leap of achievement more readily within our reach.

First is the expansive, cooperative base upon which the endeavor rests. Rather than an elite community of technical and scientific innovators, the energy transformation relies upon the collective efforts of all members of our community. It is gratifying to observe simple choices of efficiency over waste now evident throughout our islands, and growing every day.

Second, and more fundamental to our success, the challenges of our quest for mastery of space and survival on the unearthly surface of the moon required invention and innovation, leading to the new technologies and the new science necessary to accomplish the Apollo triumphs. In contrast, we already now possess the technological and scientific know-how to achieve energy sustainability. No daunting knowledge barriers bar entrance to the sustainable energy future we envision.

This doesn't alter the reality that the risks and stakes of today's energy crisis far exceed those that confronted our world at the height of the Cold War, but it places our task in a realm of greater confidence. We know what we have to do, and we know how to accomplish our goal. Indeed, here in Hawai'i, much has been given to us, and what's required is for us to rise to the challenge.

Executive Summary

Energy -- its supply and use -- is critical to Hawai'i's economy. How much fuel is imported and how efficiently it is used impacts each resident's personal life and business activities. A stable energy supply is essential to continued prosperity, and the State faces many challenges related to energy supply. Hawai'i, the most oil-dependent of the 50 states, relies on imported petroleum for about 90% of its primary energy. Most of this oil is from foreign nations, with a growing percentage from the Middle East. The islands' electricity grids are not interconnected, which poses challenges for maintaining a stable supply and for integrating renewable energy. Finally, Hawai'i residents pay among the nation's highest prices for electricity and fuel. The costs of operation of state facilities also continue to rise. The importance of efficiency is illustrated by the fact that, although consumption rose by less than 3% in the last three fiscal years, electricity bills for state agencies rose 26% due to rising world oil prices and other factors. However, renewable energy and energy efficiency initiatives, including initiatives by state agencies to "lead by example" in these areas, continue to improve prospects to successfully meet these challenges.

By law, the state's energy program considers these objectives:

- dependable, efficient, and economical statewide energy systems capable of meeting the needs of the people;
- increased energy self-sufficiency;
- greater energy security; and
- reduction, avoidance, or sequestration of greenhouse gas emissions.

The State's energy policy also requires that the total costs and benefits of all energy options—including efficiency—be compared. Alternative transportation fuels and efficient transportation must also be promoted.

The State Facilities Energy Management Advisory Committee (EAC) was created by the Hawai'i State Legislature through Act 96 of 2006, Governor Lingle's comprehensive "Energy For Tomorrow" energy initiative. This legislation called for the State's Energy Resource Coordinator to appoint an advisory committee to provide input on State energy management in the following seven areas:

- (1) Improve the use of energy-savings contracts;
- (2) Improve procurement of ENERGY STAR and other energy efficient products;
- (3) Improve building design;
- (4) Reduce energy use;
- (5) Enhance applications of efficient and renewable energy technologies at state facilities;
- (6) Establish benchmarks and evaluate the State's progress in incorporating energy efficiency and conservation for state facilities, vehicles, and equipment; and

- (7) Make recommendations on how and when to conduct periodic energy audits.

The Committee is also required to make recommendations to the Hawaii State Legislature no later than twenty days prior to the convening of each regular session, starting with the 2008 regular session, regarding policy or other statutory changes to Chapter 196, HRS.

As mandated in Ch.196-18, HRS, the State Facilities Energy Management Advisory Committee is comprised of representatives from state agencies including the University of Hawai'i, energy service companies, utility companies, equipment manufacturers, construction and architectural companies, environmental, energy and consumer groups, and other energy related organizations. This committee of 15 members (see list on page 2, and biographies of members in Appendix A) represents a diverse range of expertise and experience from these sectors, and the viewpoint of each member was instrumental in the ambitious and wide-ranging set of energy management recommendations that resulted. Working together during a series of five meetings in the fall of 2007, the State Facilities Energy Management Advisory Committee wrote a set of recommendations on the seven areas above. The Committee respectfully submits these recommendations regarding policy or other statutory changes to carry out the purposes of Chapter 196 through this report to the 2008 Hawai'i State Legislature.

Chapter 196-18, HRS, State Facilities Energy Management Advisory Committee Recommendations

Preamble:

The Committee recommends that a State of Hawai`i Department of Energy be established and given additional administrative powers in order to fulfill the energy mandates already established by the Administration and the State Legislature, and to carry out the recommendations contained herein as issued by the State Facilities Energy Management Advisory Committee. The function, responsibilities and authority of the state Energy Resources Coordinator, including the activities of staff currently responsible for energy-related programs of the Department of Business, Economic Development, and Tourism, will be transferred to the new Department of Energy and the Coordinator's position renamed "Director of Energy Policy and Implementation." Fiscal support for the department will come from a state energy conservation fund and surcharges collected from imported fossil fuels. The Department will have the responsibility of conducting periodic energy audits as outlined in recommendation (7) below.

It is important for the State to further heighten focus on energy policy and administration because of Hawai'i's unique circumstances in regard to energy. Hawai'i, the most oil-dependent of the 50 states, relies on imported petroleum for about 90% of its primary energy. Most of this oil is from foreign nations, with a growing percentage from the Middle East. Hawai'i residents pay among the nation's highest prices for electricity and fuel. There are significant opportunities to improve energy efficiency, make better use of our renewable resources, and plan now for increased energy security and preparedness.

The Committee also recommends that a transition committee be created to establish the new Department of Energy.

As required in Chapter 196, Section 6, subsection a) and b), HRS, the State Energy Resources Coordinator in June 2007 appointed an advisory committee, whose recommendations on eight (8) areas of State energy management follow. Astute readers will note that the Committee's recommendations appear in an order that departs from that found in the statute. Members felt that the revised order of the recommendations better reflects a rational process of implementation.

(1) Establish benchmarks and evaluate the State's progress in incorporating energy efficiency and conservation for state facilities, vehicles, and equipment;

1. DBEDT shall develop, by December 31, 2008, a standardized data collection system to establish and refine baselines for various target areas: buildings, transportation, environmental practices and procurement.
2. DBEDT shall establish by December 31, 2009, benchmarks for state agency energy consumption using a standardized format and a base reference period, to ensure consistency, with explicit recognition that many buildings vary from benchmark standards because of the character of use, operating hours, differences in service levels, etc. These benchmarks shall be updated every five years.

(2) Make recommendations on how and when to conduct periodic energy audits; and

1. The Legislature shall provide to the DBEDT funding in the amount of \$_____, to conduct energy audits of state facilities in accordance with ASHRAE Standards. The complexity and scope of these audits should be at Level II or Level III according to ASHRAE guidelines. (Level II analysis includes a detailed building survey and energy analysis, with a breakdown of energy use within the building; and identifies and provides savings and cost analysis of conservation measures that meet efficiency goals and economic criteria. A Level III analysis focuses on potential capital-intensive projects identified in a Level II analysis and involves more detailed field data gathering, engineering analysis, and project cost/savings information with a level of confidence sufficient for major capital investment.)
2. The Legislature shall provide to DBEDT funding in the amount of \$_____ to conduct retrocommissioning¹ of selected state facilities to ensure optimum equipment and building performance.
3. Energy audits for State facilities will be coordinated and executed by the state Department of Energy, utilizing its resources and the technical expertise of its staff.
4. The Department of Energy shall initiate by December 31, 2008, a building management program across all departments in which bills for energy are sent by the receiving agency to building users and facility operators for payment to create awareness and allow agencies to take responsibility for their energy consumption. Trends in energy bills and consumption shall be analyzed by DBEDT and sent quarterly to each building user and facility operator. Improving energy management will depend on obtaining and understanding data for state agencies' energy use.

¹ Retrocomimssioning is a systematic process that focuses on the operation of mechanical equipment, lighting, and related controls and is intended to optimize how equipment operates as an integrated system. Retrocommissioning is recognized as cost-effective way to identify operational improvements, achieve energy savings and improve occupant comfort in existing buildings.

5. Allocate a total of 5% of the (Capital Improvement Project) CIP Budget to an Energy Conservation Fund, administered by the Energy Policy and Implementation Director, which will be used as the source of funding for priority Energy Conservation Projects.

(3) Reduce energy use;

1. Establish and fund a Department of Energy as an Executive Agency reporting to the Governor. The responsibilities of the department shall include:
 - a. Follow-up and reporting to the Governor and Legislature on the status of these recommendations.
 - b. Development, monitoring and enforcement of energy policies.
 - c. Establishment of an Energy Auditor's Office to monitor and evaluate energy consumption patterns.
 - d. Serving as a resource for questions from state agencies and state facility operators regarding the use of energy-savings request for proposals (RFPs), contracts, and vendors.
 - e. Administering the Energy Conservation Fund, by analyzing and prioritizing potential projects.
2. Agencies shall institute no-cost operational efficiency and conservation measures (e.g., turning off lights, computers, and monitors at the end of each working day, and having the information technology department implement local area network (LAN) software-based energy saving programs).
3. Aggressively pursue financing opportunities such as utility energy efficiency and conservation program rebates and performance contracting.
4. Set up an "award" system by which agencies that implement energy savings projects receive a share of the savings in the next annual budget for pursuit of additional energy savings projects, as an incentive to actively pursue energy conservation.

(4) Improve procurement of ENERGY STAR and other energy efficient products;

1. The State Procurement Office (SPO) shall continue to assess current contract specifications and review market availability to ensure energy efficient products and supplies are made available through SPO Price and Vendor lists. Products shall include building and construction materials that lead to energy savings.

2. Agencies shall procure Energy Star and Electronic Product Environmental Assessment Tool² (EPEAT) products when available.

(5) Improve the use of energy-savings contracts³;

1. By June 30, 2008, the Department of Accounting and General Services (DAGS) will issue a solicitation(s) for energy savings proposals and contracts covering the 108 highest facilities with the highest electrical consumption (as identified in the 2005 DBEDT Energy Benchmarking study). This approach eliminates the need for each department to issue its own solicitation, focuses the solicitation on the accounts/facilities with the highest consumption and savings impact, and facilitates the development of model documents (solicitations and contracts) for future use.
2. Effective July 1, 2009, departments must evaluate each proposed energy efficiency capital project for applicability as an energy-savings contract.

(6) Enhance applications of efficient and renewable energy technologies at state facilities;

1. DBEDT shall use tools such as workshops, presentations, and fact sheets to introduce the benefits of new efficient and renewable technologies and overcome perceptions of risk. Successful programs in other state and local governments shall be illustrated and provide data on energy and cost savings and other benefits.
2. The Department of Energy, to help reduce operation and maintenance risks of efficient and renewable technologies, shall screen and preauthorize vendors or contractors who are established and trustworthy by June 30, 2009. Contracting agencies (following applicable procurement statutes and rules) shall ensure vendors or contractors are in compliance with the requirements of HRS 103D-310 on responsibility of offerors, prior to award of any operational or maintenance contracts.
3. DBEDT shall complete an investigation into the purchase of renewable energy for state facilities similar to the EPA's Green Power Purchasing program by December 31, 2008.

² EPEAT is a nonprofit organization that has created, through a grant from the U.S. Environmental Protection Agency, a system to help purchasers in the public and private sectors evaluate, compare and select desktop computers, notebooks and monitors based on their environmental attributes. EPEAT also provides a set of performance criteria for the design of products, and provides an opportunity for manufacturers to secure market recognition for efforts to reduce the environmental impact of its products.

³ As defined in Section 196-21, Subsection 1(a), HRS, Energy-savings contracts include:

- (1) Energy performance contracts;
- (2) Municipal lease and purchase financing; and
- (3) Utility energy-efficiency service contracts.

4. DBEDT shall invest public resources in long-term research and development of alternative renewable energy resources such as hydrogen fuel cell technology and wave energy.
5. DBEDT shall by December 31, 2008, investigate carbon trading as a revenue income opportunity for the State and report to the 2009 Legislature.
6. The Department of Taxation and Attorney General shall determine how to implement projects so as to take advantage of federal tax credits. Their recommendations shall be completed by December 31, 2008 and immediately implemented in energy-savings contracts.

(7) Improve building design.

1. Adopt the American Society of Heating, Refrigerating, and Air Conditioning Engineers' (ASHRAE) Standard 90.1, 2004, as the minimum energy standard for new and renovated buildings and facilities. This will bring buildings in compliance with LEED which uses ASHRAE 90.1, 2004, as the baseline for any building certification for LEED Silver.
2. Provide DBEDT with \$300,000 in funding to identify LEED projects, develop commissioning (enhanced and fundamental commissioning) and retrocommissioning guidelines as defined by LEED, and conduct measurement and evaluation efforts for one year following completion of the project.
3. Capability to account for energy (electricity and gas, diesel, gasoline and fuel oil) and water consumption shall be incorporated into each facility.

(8) Make recommendations to the legislature no later than twenty days prior to the convening of each regular session, starting with the 2008 regular session, regarding policy or other statutory changes to carry out the purposes of this chapter."

The State Facilities Energy Management Advisory Committee strongly recommends that this provision be sunsetted. We believe that the recommendations made by this Committee will serve as a framework for future years to come. In addition to this Committee's recommendations, the various departments have their legislative and administrative directives to guide them. The Department of Business, Economic, Development, and Tourism already has authority to convene *ad hoc* discussion groups and committees to discuss and evaluate issues and concerns. The status on activities and achievements may be included in the *Energy Resources Coordinator's Annual Report* to the legislature.

We also strongly note that future results are dependent on securing adequate implementation resources. Therefore, in order for state agencies to comply with not only legislative and administrative mandates, but also with the recommendations of this committee, providing appropriate resources is essential. An unfunded mandate,

although well intended, is difficult for agencies to meet with full and responsive compliance.

Overview of State Energy Management

This section gives a foundational overview of energy management for State government in Hawai'i. Energy consumption includes all forms of energy use - electricity, gas and transportation fuels. However, much of the state's focus has been on electricity consumption, due in part to the magnitude of the expense and the easy availability of data. The following discussion presents a snapshot of the status of electricity consumption and costs to state agencies, and also gives information on statutory mandates and current programs (many of which are administered by the State Department of Business, Economic Development, and Tourism's Strategic Industries Division). These include activities in energy efficiency and renewable energy, as well those established and funded by "Lead By Example," an Administration initiative for State executive agencies that also was set forth in the 2006 "Energy For Tomorrow" legislative package.

Much of the information that follows is published in the *Lead by Example: State of Hawai'i Agencies' Energy Initiatives FY 2006-2007 Report to the 2008 Hawai'i State Legislature*.

Electricity Consumption

Energy use varies widely within individual agencies. Some agencies reported reductions in energy use; others noted minimal increases; a few used significantly more electricity. Overall, however, state executive agencies consumed 2.3% more energy in FY07 than in FY06 and a total of 2.7% more since the baseline year, FY 05. The summary data are shown in Figure 1 below.⁴

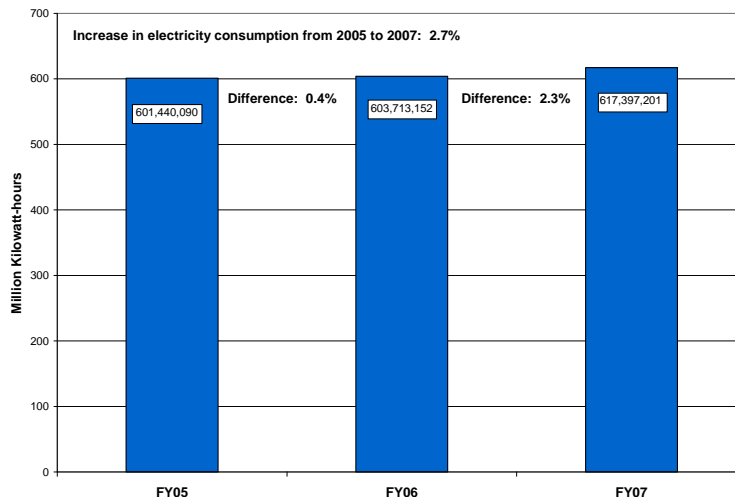


Figure 1. Electricity Consumption by State Agencies from FY 05-FY07, in kWh

⁴ The amounts shown do not include several executive agencies which did not report their kWh consumption to DBEDT: the Department of Defense, the Department of Transportation's Highways Division, and the Hawai'i Public Housing Authority. They do not include data for the Hawaii State Judiciary. Consumption by buildings used by the Hawai'i State Legislature fall under the administration of DAGS and is included in that agency's data.

Some agencies have responsibility for their own electric bills, while others' consumption figures are aggregated under the Department of Accounting and General Services (DAGS). These include the departments of Budget and Finance (B&F), Human Resource Development (DHRD), Taxation (DOTAX), and some offices within the departments of Business, Economic Development, and Tourism (DBEDT), and Commerce and Consumer Affairs (DCCA). Four agencies account for most of the electricity used by the executive branch: The University of Hawai'i (UH) campuses, the Department of Education (DOE), the Airports Division of the Department of Transportation, and DAGS.

As shown in fig. 2 below, the four agencies which consume the most electricity show minimal increases since 2005. Six additional agencies were able to decrease their electricity consumption.

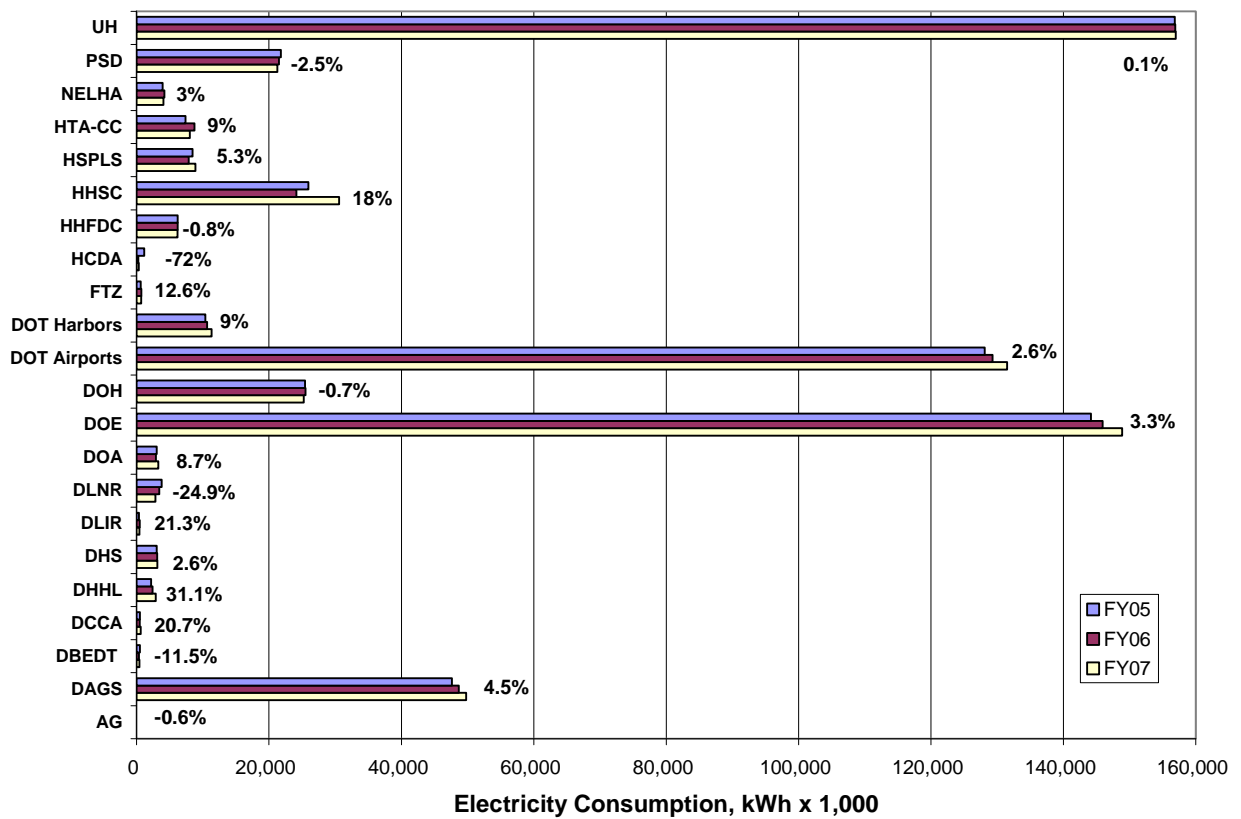


Figure 2. Comparison of FY05, FY05 & FY07 kWh Consumption, by Agency

There were various reasons for increased energy use. In most cases, increased consumption by agencies is tied to an increase in services or the construction of additional facilities. Several new school facilities, including two campuses with completely new meters plus new structures and air conditioning loads connected to existing meters, added to DOE's bills. The Department of Land and Natural Resources (DLNR) reported four new accounts this year. Bills for the Hawai'i State Public Library System (HSPLS) increased in part because of longer operating hours

across the state and the addition of new facilities such as the Thelma Parker Memorial Public and School Library, which was transferred from DOE’s accounts.

A 30% increase in cruise ship traffic, which had the concurrent impact of moving cargo and other port activities to nighttime hours, caused a significant jump in the electrical consumption of the Department of Transportation’s Harbors Division (DOT-Har). The Department of Agriculture (DOA) experienced a tremendous increase in electricity use at its Waimea Irrigation System after the October 15, 2006 Kiholo earthquake extensively damaged its reservoirs, requiring emergency use of a deep well pump. Other irrigation systems also experienced increased electricity consumption due to staff changes and drought. Utility bills for the Hawai’i Health System Corporation (HHSC) increased due to a new 75,000 square foot addition to the Maui Memorial Medical Center and a new emergency room at Samuel Mahelona Memorial Hospital.

The state government owns and operates 2,625 buildings, of which roughly 80% are on Oahu.

Executive Agency Electricity Costs

State agencies reporting their electricity use consumed 619,473,608 kWh in fiscal year 2007, a 3% increase since 2005. However, this electricity was much more expensive than in previous years due to escalating worldwide oil prices. Electricity purchased from utilities cost \$93,394,079 in 2005 but jumped to \$116,973,015 in 2007, an increase of 25%. The totals for the three fiscal years 2005-2007 are given in the chart below.⁵

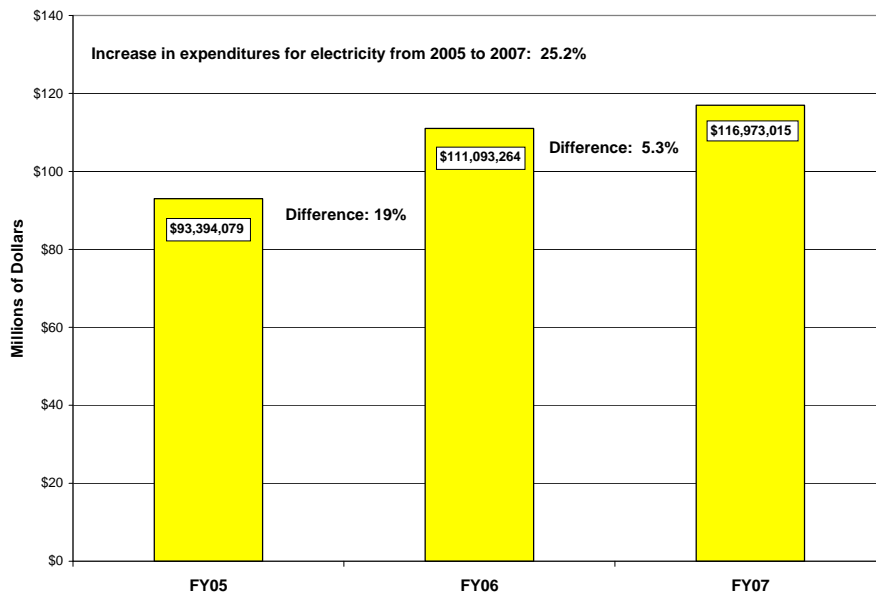


Figure 3. Comparison of Reported State Utility Electricity Costs

⁵ Total electricity costs shown in the chart do not include those of several executive agencies which did not submit these data: Department of Defense, Department of Transportation–Highways Division, and Hawai’i Public Housing Authority.

Individual agencies' energy bills reflected the higher oil costs, which translated to significant increases in utility charges per kilowatt-hour. As discussed above, energy consumption by certain agencies rose, but even those departments that were able to decrease total electricity use experienced increased costs. For example, the Department of Public Safety (PSD) was able to decrease its electricity consumption 2.5% between 2005 and 2007, but its costs increased 17%. Likewise, the Department of Health (DOH) reduced its electricity use by 0.7%, but experienced bills that were 21% higher.

Agencies are actively addressing their energy consumption with methods such as retrofitting lights, converting windows, replacing aging air conditioning systems, and assessing the potential for solar water heating.

Electricity costs for each agency are reported by fiscal year in Figure 4.

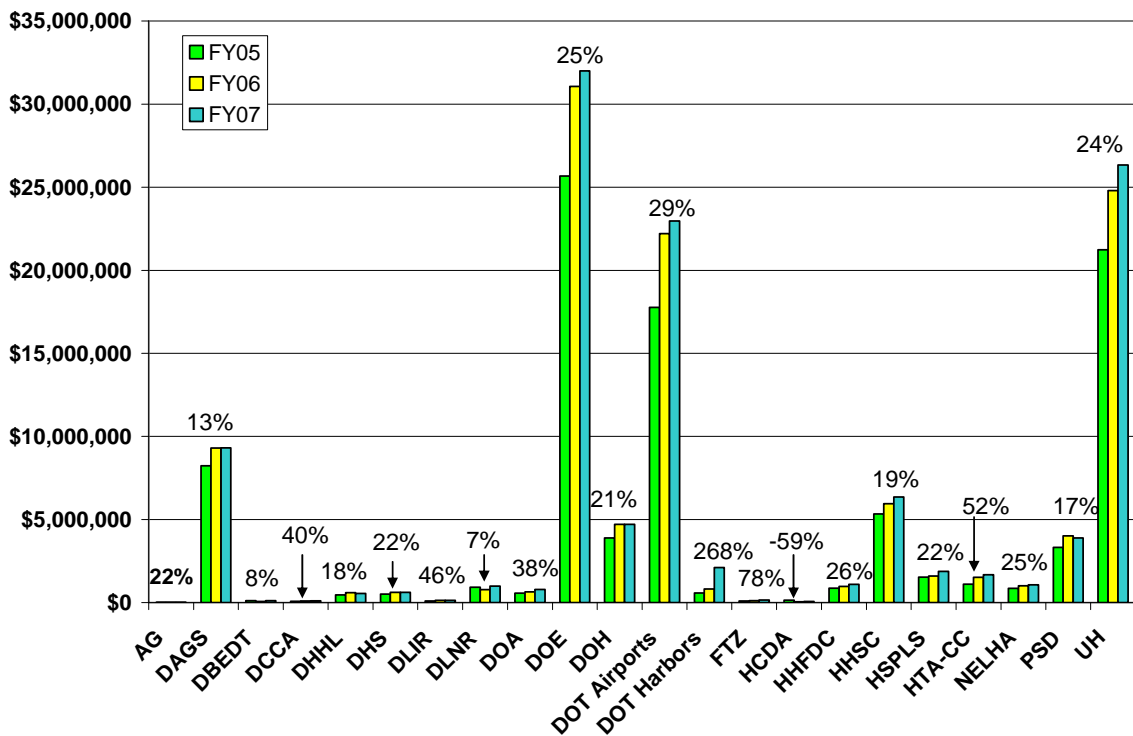


Figure 4. Cost of Purchased Electricity for FY05, FY06 & FY07, by Agency Showing Percentage Change from FY05 to FY07

Green Buildings/LEED® Green Building Rating System

The built environment has a vast impact on the environment, human health, and the economy. By adopting green building strategies, we can maximize both economic and environmental performance and also achieve social benefits. Green buildings save up to 50% more energy than conventional buildings, reducing operating

costs and carbon dioxide emissions. They save water too, through use of more efficient plumbing fixtures and reuse of water when possible. Green buildings emphasize reduction of waste streams and recycling and reuse of construction materials. They also focus on improving indoor air quality, which can improve occupant health, productivity and morale.

In the United States, buildings account for 39 % of total energy use, 12 % of total water consumption, 68 % of total electricity consumption, and 38 % of carbon dioxide emissions.

Recognizing the long-term benefits of green buildings, and in response to the statutory mandates in “Energy For Tomorrow” legislation, State agencies have aggressively pursued sustainable design in new construction, including attaining Leadership in Energy and Environmental Design (LEED) certification, which is administered by the U.S. Green Building Council (USGBC). LEED is the premier system for designing, constructing, operating and certifying green buildings worldwide. There are different LEED categories for types of buildings (including schools, hospitals, commercial buildings), and LEED standards apply to new construction as well as existing buildings. The opportunities for energy and resource efficiency and other benefits are greatest, however, when the building includes LEED design standards from the earliest planning stages.

Currently, each State executive agency is urged wherever possible to design and construct buildings that meet the LEED “Silver” certification (or a comparable nationally-recognized system), unless such a design conflicts with the use of the building as an emergency shelter.

State agencies’ participation in the LEED program is encouraged by DBEDT, which joined the USGBC in 2006. DBEDT’s membership in USGBC on behalf of the state allows all state employees access to USGBC publications and training sessions, as well as exclusive on-line reports and participation in local USGBC chapter events. LEED certification fees are still an obstacle given limited agency resources, and thus agencies such as the Department of Education are designing some buildings to LEED criteria but will not seek formal certification.

In general, U.S. buildings which are built to LEED Silver standards are about 30% more efficient than conventional buildings, but cost an average of only 2% more to construct. As more experience is gained in green design, the cost premium (usually due to increases in design time) has dropped and has now become negligible in some markets. In Hawai‘i, DAGS’ preliminary estimate is that the cost premium may be somewhat higher than the national average, perhaps as much as 10% to 15% more for total design and construction costs. This premium is expected to drop over time. However, over the life of the building, the cost benefits are clear. A life cycle cost analysis and evaluation of applicable green building design practices for a new College of Education building planned for the University of Hawai‘i - Manoa was completed in August 2007. The study concluded that a mix of energy efficiency

measures which emphasized space cooling and lighting has the potential to generate \$54,205 in savings with a simple payback of 9.2 years.

To date, the following state facilities have been constructed and certified to LEED standards:

LEED Platinum

- NELHA Hawai'i Gateway Energy Center

LEED Certified

- DOE Waipahu Intermediate School Cafeteria
- UH-Hilo Imiloa Astronomy Center of Hawai'i

Approximately 25 additional State buildings which are anticipated to meet LEED Silver standards are either being planned or are in the design phase, while the following state facilities are currently under construction and expected to qualify for LEED Silver status:

- UH-Hilo Science and Technology Center
- UH-Hilo Student Life Complex
- UH-Manoa Frear Hall Residence Building

Commissioning and Retrocommissioning

Building commissioning is associated with new construction projects and is a process of ensuring that new buildings and their systems perform as designed. It is a whole-building approach which examines operating systems and characteristics to optimize performance. Unfortunately, most buildings have never gone through any type of commissioning or quality assurance process and are therefore performing well below their potential. Recent studies indicate that on average the operating costs of commissioned buildings ranged from 8% to 20% below those of non-commissioned buildings.

Commissioning of existing buildings, also known as *retrocommissioning*, helps to systematically optimize building systems so that they operate efficiently and effectively. Retrocommissioning typically focuses on heating, ventilating, and air conditioning systems as well as lighting controls to reduce electrical consumption and demand. Commissioning is an important element of the LEED process for designing new buildings or remodeling existing ones.

In 2007, DBEDT obtained a consultant to develop the commissioning process to be implemented by State agencies. This will include development of the commissioning (CX) and retrocommissioning (RCX) process including handbook, training and equipment to be provided to major users of electricity (DOT, DAGS, DOE, UH and others). The handbook will describe all aspects of CX and RCX including the process, standardized format, implementation procedures, forms and equipment checklists.

Commissioning case study projects currently in progress include:

- 1) Department of Transportation Lounge Facility
DBEDT's consultant will be acting as the commissioning agent for the new 3,000 square foot lounge to be designed and built at the airport.
- 2) University of Hawai'i Coconut Island laboratory
DBEDT's consultant will review the Request For Proposals sent out to various commissioning agents and review their qualifications.

DAGS has initiated five retrocommissioning pilot projects: State Capitol Building and Ke'elikolani Building on Oahu, Lihue State Office Building, Hilo State Office Building and Wailuku State Office Building. A second round of retrocommissioning work will address seven additional buildings; preliminary assessments should be underway by summer 2008. The seven facilities in the second phase include: Lili'uokalani Building; Kakuhihewa Building; AAFES Building; Kekuaana'oa Building; Kalanimoku Building; Leiopapa A Kamehameha Building; and No. 1 Capitol District Building.

Energy Performance Contracting

Most State and County agencies face increasing energy costs and the need to replace or upgrade aging, inefficient, and obsolete energy - consuming systems. Although these needs are often evident, capital improvement and operating budgets have typically been inadequate to fund the needed upgrades. To address these concerns, Energy Performance Contracting (EPC) has been developed as an innovative approach to implementing energy and water efficiency projects using guaranteed energy savings to pay for the projects. DAGS is the lead agency for performance contracting for state facilities. The Strategic Industries Division of the DBEDT provides technical assistance to agencies seeking to implement energy performance contracts, and strongly encourages State agencies to take advantage of energy performance contracting.

Energy Performance Contracting (EPC), first and foremost, allows agencies to implement energy and water saving projects that budget constraints would otherwise prevent. An Energy Performance Contract (EPC) is a comprehensive agreement in which an energy services company (an ESCO) performs an investment grade energy audit and develops, designs, arranges financing for, installs, and often operates and maintains energy-saving improvements for a customer, such as a State agency. While EPC projects in Hawaii government facilities have been generally financed by third-party lending institutions using tax-exempt leases, bond financing, and ESCO commercial loan financing have been used as well. The agency uses utility bill savings generated by the project to pay off the original investment plus financing and maintenance costs over the performance period of the contract, which can be up to 20 years. Utility rebates may also be obtained for the project and could be used to buy down the capital costs.

Annual energy savings are contractually guaranteed by the ESCO. To ensure accountability, all EPCs include a formal measurement and verification (M&V) plan that specifies procedures the ESCO must follow to demonstrate that the installed energy conservation measures are delivering the guaranteed savings. If the savings guarantee is not met in a given year, the ESCO must pay the agency the difference between the guaranteed amount and the actual verified amount. This savings guarantee places the risk of performance on the ESCO, not the agency.

Under an EPC, the agency receives new and improved lighting, cooling, and other equipment, while the cost of this equipment, the contractor's services, and financing costs are paid for by the ensuing reduction in utility bills. After project costs have been paid off, the agency owns the equipment and retains all of the savings for the remaining useful life of the equipment.

The use of energy performance contracts by State of Hawaii agencies is authorized (and encouraged) by Hawaii Revised Statutes (HRS) Sections 36-41 and 196-21, as amended in 2004 and 2006, respectively.

Benchmarking and the Energy Star™ Program

Benchmarking is a process that involves calculating the building's annual energy consumption per square foot. This results in an "energy usage index" (EUI), allowing buildings to be quickly compared. For instance, a benchmarking study of 16 schools on four islands revealed EUIs ranging from 3.6 to 20.1 kWh per square foot. Operating costs can also be indexed. In addition to schools, libraries and public office buildings have been benchmarked by DBEDT staff.

Benchmarking is one way of evaluating whether buildings are potential candidates for ENERGY STAR® status. ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy to protect the environment and reduce costs through energy efficient products and practices. ENERGY STAR® certified buildings rank in the top quartile of an EPA performance rating system calculated from actual energy use. ENERGY STAR® certified buildings also must qualify for thermal comfort while meeting lighting, ventilation, and indoor air quality requirements. Hawai'i gained EPA recognition in 2007 for ranking fifth in the nation in total energy cost savings for ENERGY STAR® buildings, more than \$22 million annually.

Hawai'i also has been an active member of EPA's ENERGY STAR® 10% Challenge program since 2005. The program identifies buildings where financially attractive energy efficiency improvements could reduce energy use by 10%, and then implements those changes through low-cost building tune-ups, lighting upgrades, and replacement of old equipment. Another benefit is the reduction of greenhouse gas emissions.

Four state facilities have achieved ENERGY STAR® status. The Kakuhihewa Building (Kapolei State Building) was first certified in 2005 and won recertification in 2006. The other three buildings have been certified for the first time. The Leiopapa A

Kamehameha Building, also known as the State Office Tower, and Abner Paki Hale Courthouse in Kaneohe qualified in 2006. The Hilo State Office Building received its certification in 2007.

Appendices

A. Biographies of Members of the State Facilities Energy Management Advisory Committee

Sam Callejo

Sam Callejo is the Vice President for Administration for the University of Hawai'i System. The System offices work with the ten campuses - UH Manoa, Hilo, West Oahu and the seven Community Colleges. The offices under the Vice President for Administration are:

- i. Office of Human Resources
- ii. Office of External Affairs and University Relations
- iii. Office of Capital Improvements

Robert Hann

Robert S. Hann is the Hawai'i District Manager for Trane, Inc., a leading supplier of air conditioning equipment and services. The company was one of the first four energy services companies asked to participate in the Clinton Climate Initiative, a program launched by former President Bill Clinton to reduce greenhouse gas emissions in 40 of the world's largest cities. The Trane Centravac ® is the most energy-efficient chilled water system in the world for large buildings and has earned the company the "Best of the Best" Award from the EPA.

John T. Harrison, Ph.D.

Dr. Harrison received his Bachelor's degree from Stanford University in Biological Sciences and his Doctorate in Marine Ecology from the University of Hawai'i. After four years as Administrator and Research Scientist at the Mid-Pacific Research Laboratory on Enewetak Atoll, he returned to Hawai'i to work for the University of California Berkeley Marine Sciences Group and the U.S. National Marine Fisheries Service in developing the Federal Environmental Impact Statement for an Ocean Thermal Energy Conversion (OTEC) plant at Kahe Point, Oahu. After two years as an independent environmental consultant, he was appointed as University of Hawai'i Environmental Coordinator and head of the UH Environmental Center in 1987. After two years of service in the University administration, Dr. Harrison returned to his post as Environmental Coordinator in 2001, and he retired at the end of 2006.

Dr. Harrison's research interests include theoretical and applied studies of coastal community dynamics. As head of the Environmental Center, he was responsible for coordination of environmental research and services performed by the university. In addition, he served as Environmental Studies Advisor and taught the Environmental Practicum class for many years. More recently, he has contributed to sustainability efforts in Hawai'i, with an emphasis on renewable energy systems for residential application. Following a recent remodel, his residence in Nu'uuanu now is a net power producing demonstration project.

Alan K.C Hee

Alan Hee is the Manager of Hawaiian Electric Company, Inc.'s (HECO) Energy Services Department overseeing the Customer Efficiency Programs and Pricing Divisions. The Customer Efficiency Program (CEP) Division's objective is to reduce the demand for electricity in order to maintain system reliability and defer the need for future generation. One of the CEP Division's primary vehicles for attaining this objective is the planning, design, and implementation of HECO's Demand-Side Management (DSM) program and related residential and commercial/industrial customer rebate programs that encourage energy efficiency. The Pricing Division designs and administers HECO's various rate schedules and tariffs that determine the retail price of electricity

Alan joined HECO in 1986 as a Corporate Planning Analyst and moved up the ranks to become Director of the Forecasts Division, which helped predict electricity sales and demand growth for Hawaiian Electric Co., Inc., Hawai'i Electric Light Co., Inc., and Maui Electric Company, Ltd. Alan has been manager of the Energy Services Department since 2004.

Dennis Higa

As the Engineering Program Manager for the State Department of Transportation, Airports Division, Higa manages the planning, development, budgeting, design, and construction of larger maintenance projects. He was previously with the Highways Division for 24 years and has spent the last 13 years at the Airports. During that time, he has been in construction management including being the overall construction coordinator for the H-3 program, program coordinator for developing program priorities and budgeting, and serving as overall engineering manager. Higa has been involved in energy initiatives including efforts to bring PV to the airports, looking for ways to improve the comfort level in terminal lobbies without conventional air conditioning, and increasing the efficiency of our air conditioning systems.

Darren Kimura

Mr. Kimura is Founder and Chairman of the Board of Energy Industries, Inc. and President and Chief Executive Officer of Sopogy, Inc. Kimura is a 14 year serial energy entrepreneur. Over his career he created several companies which he led to multimillion dollar success and liquidity. Mr. Kimura founded Energy Industries in 1994 and Energy Laboratories in 2000. His entrepreneurship accolades include Emerging Entrepreneur of the Year 2000, Inaugural Top 40 under Forty 2000, SBA Young Entrepreneur of the Year 2002 for California, Hawai'i and Arizona, Hawaiian Electric Trade Ally of the Year 2006, Technology Leader of the Year 2006 and Green Entrepreneur of the Year 2007. He has a Bachelor of Business Administration from the University of Hawaii and attended Portland State University where he studied electrical engineering. He is a Certified Energy Manager, Certified Demand Side Manager, Certified Distributed Energy Professional and Certified Sustainable Development Professional.

Jim Maskrey

Jim Maskrey is Vice President of Business Development and Sales for Sopogy, Inc. With over 25 years in the energy efficiency and renewable energy fields, Jim was previously with Hawaiian Electric Company where he served as the Demand Side Management program manager for over 10 years. He began his energy career at the Solar Energy Research Institute (now the National Renewable Energy Laboratories aka NREL) and has held energy management positions in the private and public sectors. He is active in the energy community as President of the Rebuild Hawai'i Consortium, Chair of the Environmental Committee of the Chamber of Commerce of Hawaii, and a member of the Hawai'i Electricity Reliability Advisory Committee. He holds a Masters of Environmental Planning degree from Arizona State University, an M.B.A. from the University of Hawai'i, and a Bachelor of Arts degree from the University of California, Santa Barbara.

Stephen Meder, Ph.D.

Dr. Meder is the Director of the Environmental Systems Laboratory at the University of Hawai'i, School of Architecture where he is a member of the faculty. Meder has a Doctor of Architecture degree from the University of Hawai'i. He directs the school's energy and environmental research projects and teaches sustainable architecture design to graduate and undergraduate architecture students along with core classes in hydraulics, lighting, and mechanical systems design. He is past chair of the Energy and Environment Committee of the Honolulu Chapter of the American Institute of Architects (1999-03) and remains an active member of that committee. In 2002, Meder co-authored the University of Hawai'i Charter of Sustainability and has been active in working to establish programs to reduce water and energy demand on campus and to assist in establishing the University of Hawai'i as a model for a sustainable future.

Randy Moore

Randy Moore is Assistant Superintendent of the state Department of Education's Office of Business Services. Moore was president of Oceanic Properties, Inc.- now known as Castle & Cooke Hawai'i--from 1984 to 1986, when he became president and director of Moloka'i Ranch, Ltd. In 1989 he left that position to serve as president and director of the Kaneohe Ranch Company, Ltd., and as executive vice president of the Harold K. L. Castle Foundation. Moore left the corporate world to become a DOE teacher in 2001, teaching math at Central Middle School. He joined the state office in October 2004 as project manager for the implementation of Act 51, the "Reinventing Education Act of 2004."

Chester Saito

Chester Saito is a Senior Project Engineer and Environmental Manager for Hawaiian Dredging Construction Company. He is also a member of several of committees (State Environmental Council, General Contractors Association (GCA) Hawai'i Environmental Committee, AGC of America Environmental Steering Committee), which are involved in energy and fuel conservation to reduce greenhouse gas emissions.

Riley Saito

Riley Saito is Senior Manager, Hawaii Projects, for SunPower Corporation, Systems. Riley has been with SunPower Corporation, Systems, (formally known as PowerLight Corporation) in the State of Hawai'i since 2004 and has been actively involved with the Hawai'i Energy Policy Forum, Hawai'i Renewable Energy Alliance, and overall business development of commercial-scale photovoltaic systems in Hawai'i.

Riley's involvement with renewable energy began prior to his current position with Mauna Lani Resort as a Vice President and Corporate Controller. He championed the resorts' renewable energy initiatives which resulted in the first commercially funded PV system in the USA, (1998 90 kWp – rooftop of Mauna Lani Bay Hotel and Bungalows) along with 5 subsequent PV arrays totaling 675kWp. Responsibilities included a diversity of areas outside of the finance department including Resort Marketing, Information Technology, and product/service development for the resort. He holds a Bachelor of Business Administration degree from the University of Hawai'i-Manoa in Travel Industry Management.

Carilyn Shon

Ms. Shon has extensive experience working on a number of energy efficiency programs. These programs include integrated resources planning and Demand-Side Management program development and intervention before the Public Utilities Commission; renewable industry support and coordination to promote renewable energy use in Hawai'i; legislative initiatives for efficiency and renewable programs; sustainable/energy-efficient building programs for commercial and residential buildings; and partnership programs with the private sector, federal entities, county entities, and other state agencies to promote efficiency and renewable energy programs. Over her 30-year tenure on energy efficiency programs, Ms. Shon has budgeted for, developed, and managed implementation of projects; overseen a significant number of publications; delivered countless presentations; and testified before the Legislature in support of these programs.

Dennis Y. Teranishi

Dennis Teranishi is Vice Chairman and Chief Executive Officer of Hawaiian Host, Inc. For five years, prior to joining Hawaiian Host, Inc. in 1997, Mr. Teranishi was Owner/ President of North Shore Associates, Inc., a business consulting firm that specialized in marketing and organizational development. Prior to that, Mr. Teranishi worked for 19 years at AMFAC, Inc., in Honolulu and San Francisco. Mr. Teranishi received his Bachelor of Science degree in crop science from California State Polytechnic University in 1966. In 1968, he earned a Master of Science degree in soil chemistry and plant nutrition from the University of Hawai'i, and was recognized as an outstanding alumnus of the College of Tropical Agriculture and Human Resource in 1993.

Kerry Yoneshige

Kerry Yoneshige is Business Management Officer for the State Department of Accounting and General Services.

Keith Yoshida

Keith Yoshida is Vice President of Sales, Marketing and Business Development. Keith is responsible for directing the sales and marketing activities for The Gas Company, which serves nearly 70,000 customers throughout the state of Hawai'i. He oversees product and service offerings, advertising, sales programs and promotions. Keith joined The Gas Company in 1986 as a laborer and since has held various positions in Operations, Sales, Marketing, and Planning. He holds a Bachelor's degree in Business Administration from Hawai'i Pacific University. He is a board member of the Energy Solutions Center and serves on the boards of directors of the Hale 'Aina Ohana and West Oahu Economic Development Association.

Appendix

B. Text of §196-18(a) and (b), Hawai`i Revised Statutes

SECTION 6. Section 196-18, Hawaii Revised Statutes, is amended by amending subsections (a) and (b) to read as follows:

"(a) The coordinator shall appoint an advisory committee consisting of representatives from:

- (1) State agencies, including the University of Hawaii;
- (2) Energy service companies;
- (3) Utility companies;
- (4) Equipment manufacturers;
- (5) Construction and architectural companies;
- (6) Environmental, energy, and consumer groups; and
- (7) Other energy-related organizations.

(b) The committee shall provide input on state energy management, including how to:

- (1) Improve the use of energy-savings contracts;
- (2) Improve procurement of ENERGY STAR and other energy efficient products;
- (3) Improve building design;
- (4) Reduce energy use;
- (5) Enhance applications of efficient and renewable energy technologies at state facilities;
- (6) Establish benchmarks and evaluate the State's progress in incorporating energy efficiency and conservation for state facilities, vehicles, and equipment;
- (7) Make recommendations on how and when to conduct periodic energy audits; and
- (8) Make recommendations to the legislature no later than twenty days prior to the convening of each regular session, starting with the 2008 regular session, regarding policy or other statutory changes to carry out the purposes of this chapter."

