

Lead by Example for FY 2006/2007 Energy Efficiency

State executive agencies consumed slightly more electricity in each of the past two fiscal years, but that electricity has grown significantly more expensive due to the escalating price of oil. Between 2006 and 2007, kWh consumption increased 2.3%, and costs increased 5.3%. The impact of the world oil market is more striking when comparing current figures to those of 2005: state agencies used only 2.7% more electricity in 2007 than in 2005, but that electricity cost 25% more. Hawaii relies on imported petroleum for about 90% of its primary energy.

State of Hawaii agencies made progress in efficiency, renewable energy, transportation, and environmentally preferable practices during 2007. Some highlights follow.

Efficiency

- Four state buildings have received ENERGY STAR® awards, acknowledging that they rank in the top 25% of similar buildings nationwide. (NOTE: a 5th was added after FY07 ended--ATG)
- The Department of Accounting and General Services (DAGS) constructed their first Leadership in Energy and Environmental Design (LEED™) Certified facility, the Waipahu Intermediate School Cafeteria, which the Department of Education (DOE) now operates.
- DAGS has completed preliminary energy audits for a number of its buildings and initiated the retrocommissioning of five buildings: the State Capitol, the Keelikolani Building, and the state office buildings in Lihue, Hilo and Wailuku.
- Numerous buildings have been benchmarked, allowing quick identification of the facilities with the least efficient use of energy.
- DAGS has identified seven additional buildings for the second phase of its retrocommissioning program.
- In 2007, DOE filled the energy coordinator position established by Act 96.
- DOE initiated a share-the-savings pilot project at 15 schools during the second semester of the 2006-07 school year.
- The public library system was fully funded for energy efficiency measures at all 51 of its libraries statewide and is working with DAGS to initiate the improvements promptly.
- The Department of Public Safety received funding for a department-wide energy conservation program and will address energy-efficient window options.
- The Natural Energy Laboratory of Hawaii (NELHA) conducted an audit of its water pumping stations which confirmed that the pumps are operating efficiently. Cold ocean-water air conditioning has been utilized at NELHA for years.

- The Department of Transportation (DOT) Airports Division is considering a similar cold ocean-water air conditioning system for the enclosed areas of Kona International Airport.
- DOT-Airports has made efficiency improvements in taxiway lights and airfield lighted signs at the Honolulu, Hilo and Kalaeloa airports, and replaced the chiller plant at Kahului airport with more efficient equipment.
- Iolani Palace's chiller system will be upgraded by the Department of Land and Natural Resources (DLNR), improving efficiency while preserving the Palace's priceless cultural and historical artifacts. (NOTE: Tom is helping with this—ATG)
- Recommendations for efficiency upgrades at the State Capitol include lighting and air conditioning improvements; the latter will also minimize ongoing air quality problems relating to the growth of mold. (NOTE: This is also Tom's project—ATG).
- The Department of Business, Economic Development, and Tourism (DBEDT) has helped the Hawaii Public Housing Authority prepare a request for proposals for performance contracting, and has briefed other agencies on how to implement similar contracts.
- Major performance contracts statewide have already saved millions of dollars. DAGS is leading the state's efforts in performance contracting and has formed an inter-agency task force to examine procurement issues.
- A cost/benefit analysis for the proposed College of Education building at the University of Hawaii (UH) indicates that a mix of green building design practices would have a simple payback of 9.2 years.
- Efficiency measures implemented at community colleges include an energy management system for the Honolulu CC's central air conditioning system and clustering night classes at Windward CC to minimize the use of lights and air conditioning. Also, the Sustainable Living Institute of Maui has been established at Maui CC.
- State agencies have received more than \$4 million in efficiency rebates from the Hawaiian Electric Company (HECO), with cumulative dollar savings totaling \$69.4 million.
- State efficiency rebates have thus far saved 354,557 megawatt-hours of electricity; the annual savings is approximately enough to service 6,634 Hawaii homes. Over the life of the efficient equipment, the electricity savings are expected to grow to 812,010 megawatt-hours, enough to serve over 99,000 homes.

Renewables

- DAGS is considering power purchase agreements for photovoltaic (PV) installations on buildings it manages.
- Eight public schools will receive PV installations during FY07, utilizing \$5 million appropriated by the 2006 Legislature.
- UH-Hilo has already installed 10 kW of photovoltaics on portable buildings, and a 30 kW array for the new science and technology building is out to bid.

- A request for proposal (RFP) is being prepared to solicit PV installations on airports and other facilities managed by DOT, as well as DBEDT's Foreign Trade Zone.
- NELHA is also preparing RFPs for both concentrating solar electric and ocean thermal energy conversion plants at Keahole Point.
- An integrated wind system for an electrical vault is planned for construction by DOT-Airports in 2008.
- Although most state facilities do not use hot water, solar water heating is being promoted where appropriate. DOE plans to install solar water heaters in cooperation with energy savings companies in FY08.
- In 2007, the Public Utilities Commission began consideration of "wheeling" electricity through the utility grid between state facilities.

Transportation

- State vehicles are utilizing E-10 Unleaded gasoline which contains 10% ethanol; state law requires its sale.
- Many state vehicles are also flexible-fuel capable, and could use higher percentages of ethanol if they became available.
- The state offers a pricing preference for biodiesel, and several agencies are prepared to use it.

Purchasing Practices

- Most departments already utilize life-cycle cost analyses, purchase efficient equipment such as those with the ENERGY STAR® label, and take advantage of utility rebates.
- At DOE, procurement officers are developing bid specifications to analyze life cycle costs when purchasing equipment over \$25,000.
- The State Procurement Office (SPO) continues to provide price and vendor listings which include ENERGY STAR®, recycled, or environmentally preferred products.
- For products and supplies not included on the SPO price lists, purchasing agencies are still required to preferentially order recycled products, oil products with greater recycled content, and biofuels.
- DAGS has been working with HECO staff to develop a process to ensure that all DAGS-managed projects on Oahu apply for available rebates.
- DAGS began field testing environmentally friendly custodial cleaning products in FY2006, with the goal of increasing the use of such products by 70%.
- DBEDT began working with a consultant on a green cleaning pilot project for State facilities, with a focus on schools and the university.
- Information on recycled and environmentally preferable products has been prepared by DBEDT and is available to state agencies.

Leadership in Energy and Environmental Design

Hawaii remains a member of the U.S. Green Building Council, the non-profit entity which administers the Leadership in Energy and Environmental Design (LEED) program. To date, the following three state facilities have been certified as meeting LEED standards, and the UH John A. Burns School of Medicine is awaiting confirmation as LEED Certified.

LEED Platinum

- NELHA Hawaii Gateway Energy Center

LEED Certified

- DOE Waipahu Intermediate School Cafeteria
- UH-Hilo Imiloa Astronomy Center of Hawaii

A significant number of additional 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 bid or 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

The following is a full listing of agencies' plans to design and construct buildings and facilities to LEED standards. The following state buildings either have achieved LEED standards or are in process toward that goal. A number of these projects were already underway before the LBE initiative began.

LEED Platinum

- NELHA Hawaii Gateway Energy Center (completed)
- NELHA Gateway Center office structure (planned)

LEED Gold

- UH Institute of Marine Biology Coconut Island Biology Research Laboratories (design)

LEED Silver

- DOE Ewa Makai Middle School (planned)
- DOE Kapaa Elementary School library (design)
- DOE Lahaina III Elementary School (planned)
- DOE Naalehu Elementary School six-classroom building (design)
- DOE Wailuku Elementary School II (planned)
- DOH Hawaii State Hospital new forensic facility (funds to be requested)
- DOH Kamamalu Building renovations (planned)
- HSPLS Aiea Public Library (planned)
- HSPLS Kohala Public Library (design)

- HSPLS Koloa Public Library (planned)
- HSPLS Manoa Public Library (design)
- HSPLS Nanakuli Public Library (planned)
- PSD Maui Community Correctional Center relocation (planned)
- UH-Hilo Hawaiian Language Building (design)
- UH-Hilo Science and Technology Center (being bid)
- UH-Hilo Student Life Complex (under construction)
- UH-Hilo Student Services Building addition and renovation (funded for design)
- UH-Manoa Campus Center renovation and addition (funded for planning and design)
- UH-Manoa College of Education (planned)
- UH-Manoa Frear Hall Residence Building (under construction; certification pending)
- UH-Manoa Gartley Hall renovation (funded for design)
- UH-Manoa Kennedy Performance Arts Facilities (funded for design)
- UH-Manoa School of Law addition and renovation (funded for planning)
- UH-Manoa new classroom building (funded for planning)
- UH-West Oahu new campus development (design)
- Honolulu Community College Advanced Technology Training Center (funded for design)
- Kapiolani Community College Culinary Institute of the Pacific (design)
- Leeward Community College Social Science and Teacher Education Building (funded for design)
- Maui Community College science facility (funded for design)
- Windward Community College Library and Learning Center (funded for design and construction)

LEED Certified

- DOE Waipahu Intermediate School Cafeteria (completed)
- UH John A. Burns School of Medicine (completed; certification pending)
- UH-Hilo Imiloa Astronomy Center of Hawaii (completed)

Figure 1. Comparison of Reported State kWh Consumption

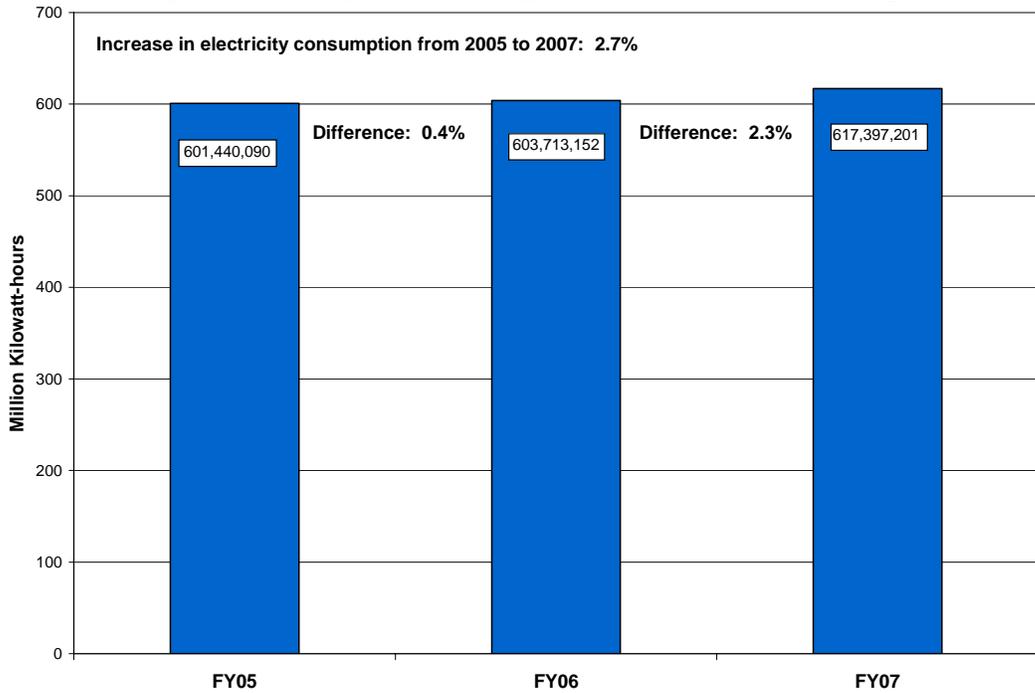


Figure 2. Comparison of FY05, FY06 & FY07 kWh Consumption, by Agency Showing Percentage Change from FY05 to FY07

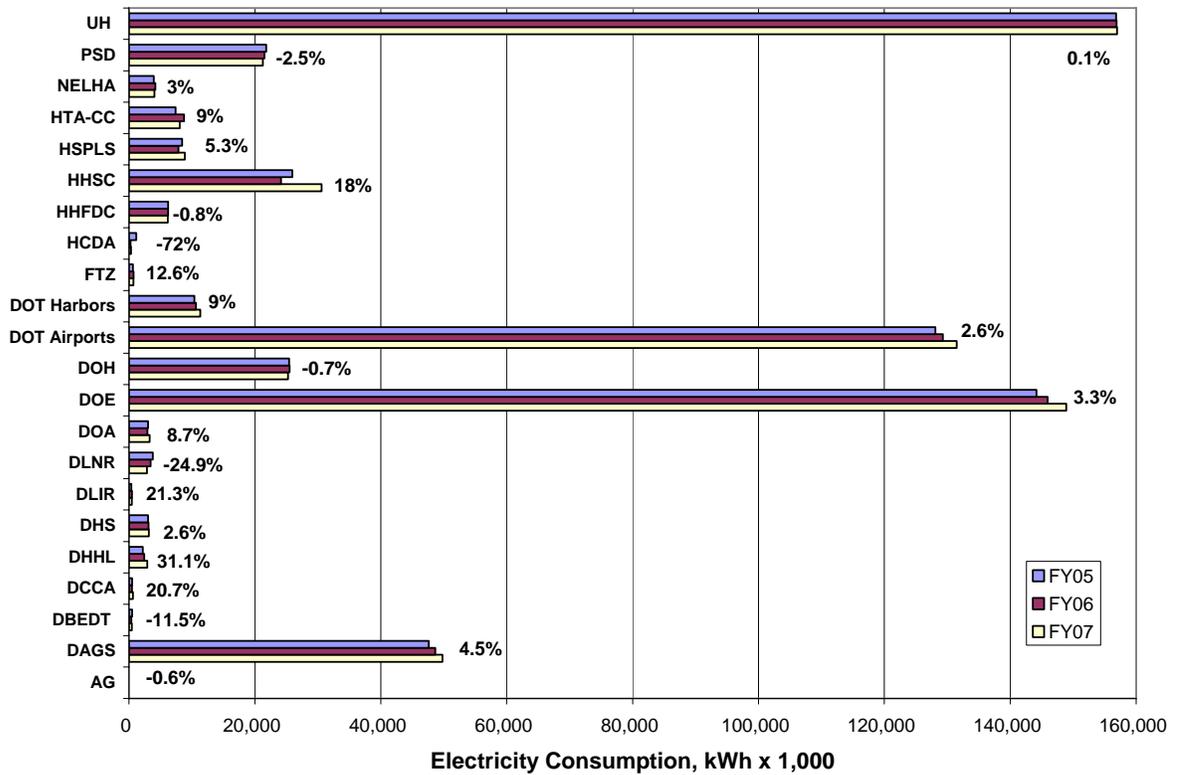


Figure 3. Comparison of Reported State Utility Electricity Costs

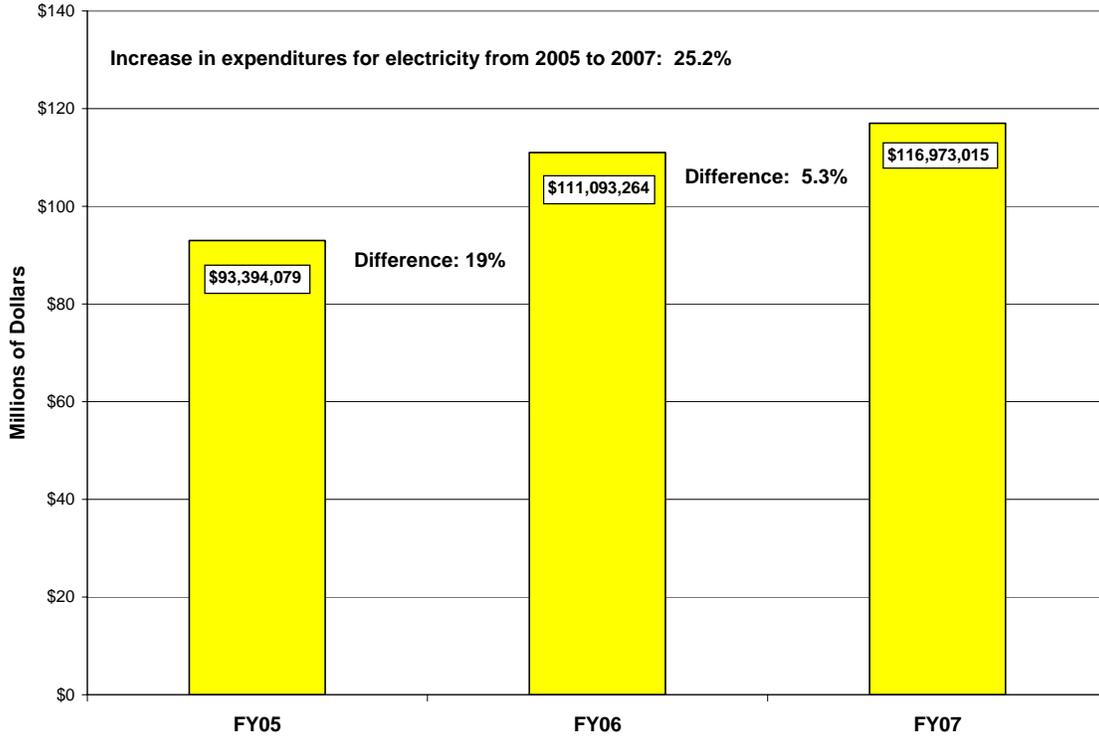
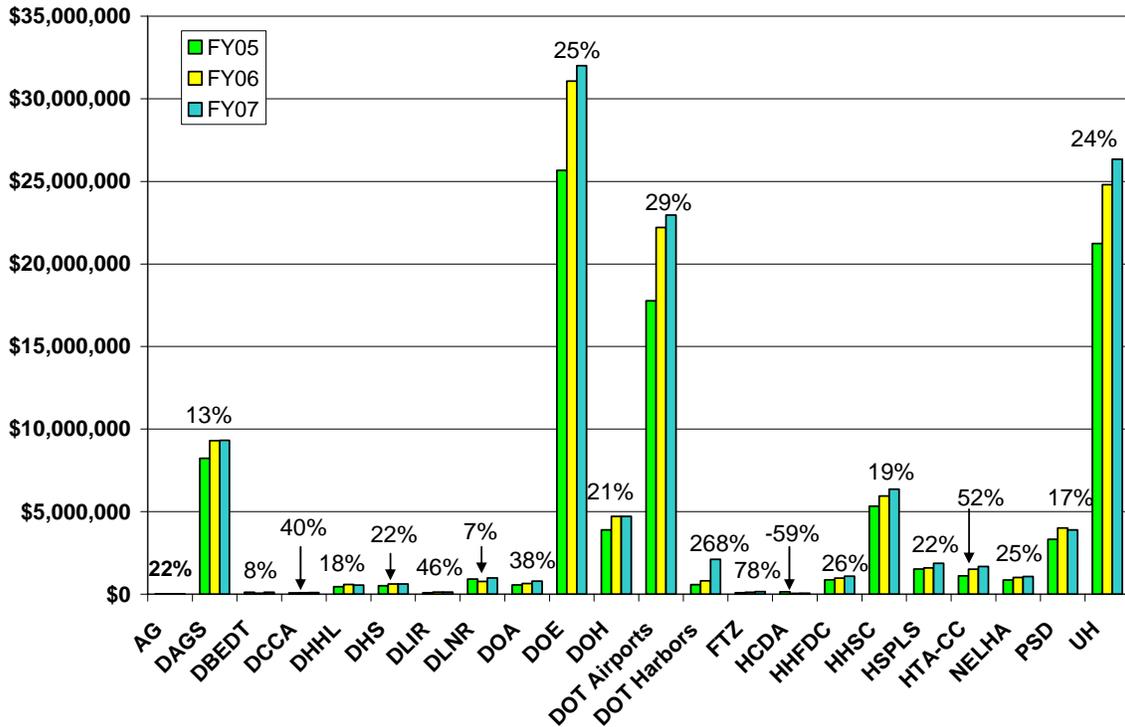


Figure 4. Cost of Purchased Electricity for FY05, FY06 & FY07, by Agency Showing Percentage Change from FY05 to FY07



Utility Rebates Save Money at State Facilities

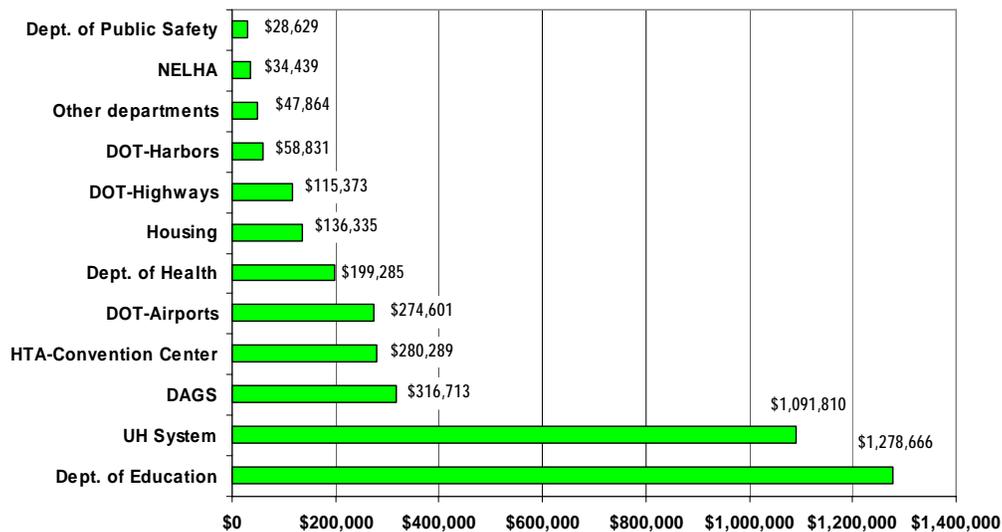
Many public agencies have taken advantage of utility-sponsored demand-side-management (DSM) programs offered during the past decade. Under various DSM programs, utilities have provided rebates for both retrofit and new construction in the areas of lighting, motors, and heating/ventilation/air conditioning (HVAC), and also have supported customized approaches.

According to figures from Hawaiian Electric Company, Ltd. (HECO), more than \$4 million in rebates have been provided by HECO and its subsidiaries to State of Hawaii agencies¹ from 1996 through June 2007. Most of the rebates—\$2.9 million—were provided to agencies on Oahu, with facilities on the island of Hawaii receiving \$526,766 and those in Maui County receiving \$622,636.

Kauai Island Utility Cooperative (KIUC) also provides rebates. Energy assessments have been performed for some state facilities on Kauai, resulting in requests for rebates. KIUC is currently processing three of these requests.

The Department of Education and the University of Hawaii system were the largest beneficiaries, with over \$1 million in rebates each as shown in Figure 5.²

Figure 5. Selected State Facilities' DSM Rebates from HECO since 1996, by Agency



¹ This includes The Judiciary which, since it is not an executive branch agency, is not discussed in this report. Only 5% of the kW demand and kWh electricity savings accrued by state buildings through DSM rebates are attributable to The Judiciary, which received 4% of the rebate funds from HECO.

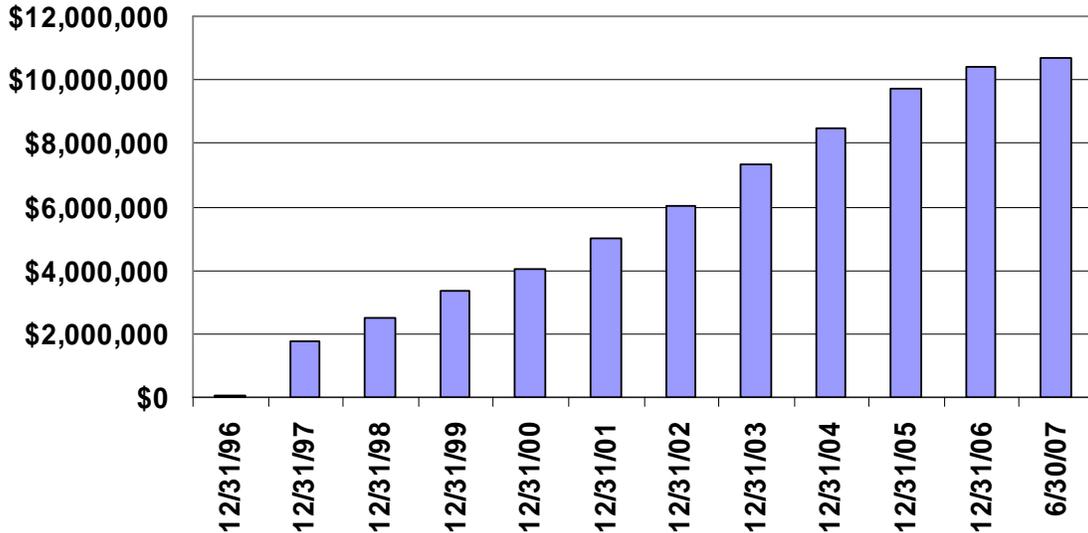
² These data are for executive agencies only, excluding The Judiciary which received rebates totaling \$165,790 for the same period. The "Housing" rebates were provided to the Housing and Community Development Corporation of Hawaii which was reorganized in 2005 into two agencies, HPHA and HHFDC.

The state agencies which received utility DSM rebates saved the equivalent of \$10.8 million³ per year on their electricity bills from 1996 to June 30, 2007. Cumulatively, the agencies have saved \$69.4 million during the same period. The cumulative dollar savings are projected to grow to \$162 million over the life of the efficient equipment. Cost savings as of June 30, 2007 are depicted in Figure 6.⁴

³ Equivalent savings are calculated using \$0.20/kWh as the cost for electricity. This is the average cost for facilities on Oahu in late 2007.

⁴ These data include cost savings due to utility DSM rebates to all state agencies participating in the rebate programs, including The Judiciary, which is not an executive department.

Figure 6. Cumulative State Facilities' DSM Rebate Savings (\$) from HECO since 1996



The benefits of HECO-supported rebates include 54,134 MWh of energy savings each year, approximately enough electricity to serve 6,634 homes annually. Cumulatively, since 1996, 354,557 MWh have been saved at state facilities. These electricity savings are expected to grow to 812,010 MWh, equivalent to the electricity consumed by 99,551 homes, over the life of the energy-efficient equipment. Total demand savings for the period is 11.7 MW. Cumulative electricity savings due to utility efficiency rebate programs since 1996 are depicted for all state agencies which participated in the programs in Figure 7.⁵

Most of the savings, in both MW demand and kWh electricity consumption is from lighting retrofits: 7.2 MW of demand and 33.4 million kWh per year of consumption. Space cooling is a distant second, saving 3.1 MW of demand and 10.3 million kWh annually. Other rebates were provided for custom retrofits, motors and water heating. The annual energy savings due to utility DSM rebate programs for each technology is depicted in Figure 8.

HECO's data show that a typical office building's electricity is primarily used for space conditioning: providing cooling and operating heating, ventilation and air-conditioning (HVAC) fans required 43% of a building's electricity. Lighting was a strong second at 27%. "Plug loads" such as computers, copiers and other equipment were responsible for 17% of the electricity consumed, and water heating was only 0.2%. Miscellaneous uses (e.g. elevators, water coolers) accounted for the remaining 12.8%. These data, shown in Figure 9, indicate some of the most promising targets for energy conservation.

⁵ These data include electricity savings due to utility DSM rebates to all state agencies participating in the rebate programs, including The Judiciary, which is not an executive department.

Figure 7. Cumulative State Facilities' DSM Rebate Savings (kWh) from HECO since 1996

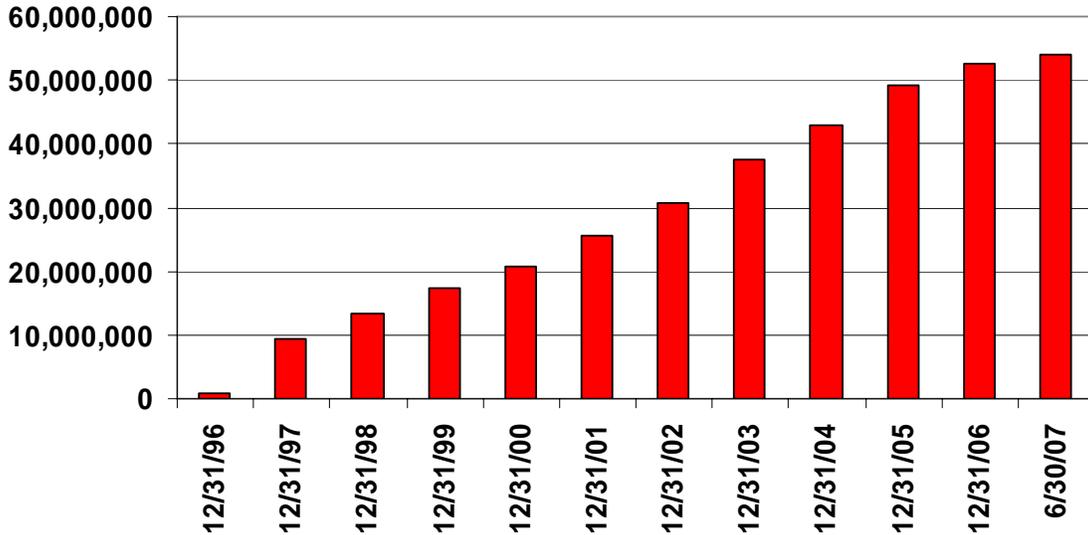
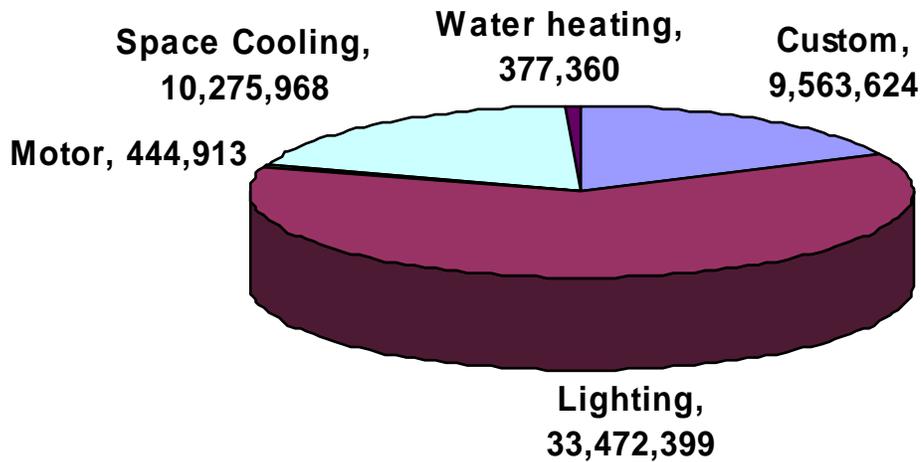


Figure 8. State Facility DSM Rebate Energy Savings (kWh/year) by Technology



When State of Hawaii facilities on Oahu are examined by type, it is evident that campuses consisting of classrooms and offices consume half of the electricity. Office buildings and the Honolulu International Airport respectively consume 17.7% and 17.6% of the total. The public hospital system is also a significant consumer, accounting for 6.3%. These data are shown in Figure 10.

Figure 9. Office Building Energy Breakdown (per HECO data)

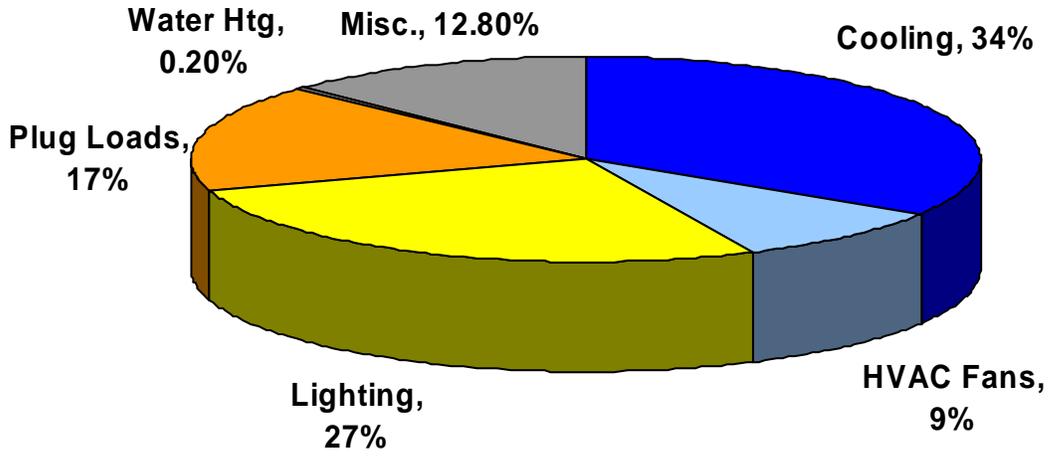


Figure 10. State of Hawaii Facilities on Oahu, Electricity Consumption by Occupancy Type

