

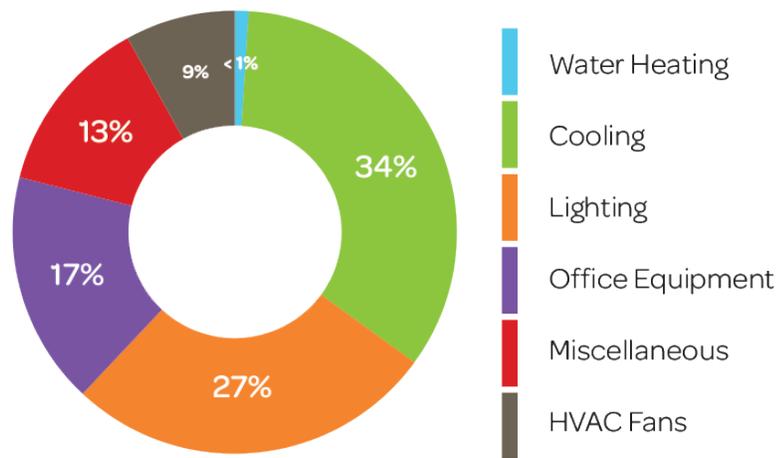
Energy Cost Reduction
For
State Departments and Agencies

December 2018

In accordance with HCR 123, SD 1, SLH 2018, the Department of Accounting and General Services (DAGS) was requested to examine projects that would reduce energy costs for state departments and agencies and submit a report of its finding and recommendations to the Legislature.

Herewith are guidelines and information to assist state departments and agencies with identifying energy cost reduction initiatives.

The typical use of electricity in an office building in Hawaii¹ is reflected below.



Cooling (heating, ventilation, and air conditioning – HVAC)	34 %
Lighting	27%
Office Equipment (plug load)	17%
Miscellaneous	13%
HVAC Fans	9%
Water Heating	<1%

The top three (3) energy usages are HVAC, lighting, and office equipment. Combined, these consume 87 percent of the total electricity expenditure of an office building. By reducing the energy used by these items, the State could realize appreciable energy costs savings.

¹ Figures based on Hawaiian Electric Company data and an average electric consumption of 23 kilowatt-hour/square-foot-year. Electricity use is affected by weather; number of occupants; building size and thermal integrity; cooling, heating, and water systems; and miscellaneous equipment. Referenced by Hawaii Energy website.

Here are recommendations that could save energy for each user



Lighting.

Upgrading the facilities' lighting is the first recommendation when considering reducing energy costs. The older the lighting system, the greater the return on investment.

1. If a building uses T12 lamps with magnetic ballasts, lamps and ballasts should be upgraded to LED lamps and electronic ballasts. There will be a substantial reduction in energy usage from performing this upgrade. Even facilities that upgraded their lighting to T8s with electronic ballast in the late 1990s to early 2000s could see a benefit to further upgrading to LED lamps.
2. Installing reflectors will reduce the number of lamps needed by directing more light more precisely where it is most needed.
3. Whenever possible, utilize daylighting to reduce the need for artificial lighting.
4. The installation of LED lamps also has the added potential reduction of electricity used as these lamps have a lower heat gain, thereby reducing the cooling load for any HVAC systems.



Building Envelope.

Facilities should seal their buildings to reduce air leaks and cooling losses. Properly sealed buildings will reduce the amount of energy work required to cool the building while also keeping out unwanted moisture.



Plug Loads. “Plug load” is the energy used by equipment that is plugged into electrical outlets. These include office equipment, appliances, computers, etc. While this would not be considered a capital improvement program project, reducing unnecessary plug loads will reduce the electricity consumed at the facility as well as lessen the amount of energy required to cool the building.

Reduction of plug loads may be achieved by:

1. Educating employees and building occupants to use electricity wisely.
2. Eliminating the use of non-essential equipment.
3. Eliminating the use of personal space heaters, which are incompatible with use of HVAC systems. The HVAC system is hard at work cooling the office that the space heater is warming up. Instead, staff should inform facility managers to adjust the temperature thermostat settings to make office spaces more comfortable.
4. Reducing usage of multiple kitchen appliances in the same space, which may accumulate to be a huge electrical power draw. Although appliances such as microwaves, traditional coffee pots, and single serve machines may not be in continual use, the power required to create heat in these items is more than that of an energy efficient refrigerator running all the time. In addition, these appliances generate heat which also increases the cooling requirements for the space.



HVAC.

HVAC should be last after reducing all other system loads which can reduce the size of equipment needed for cooling.

1. Decrease the amount of cooling needed. By decreasing the amount of cooling to the buildings, the HVAC equipment can be sized according.
2. Right sizing the equipment will have a lower first cost and reducing operational costs.
3. Installing energy-efficient HVAC equipment.
4. Installing variable frequency drives that can control motor and pump speeds, reducing the amount of electricity needed to run them.
5. Installing building automation systems



Other projects.

1. Installation of renewables at facilities where practical.



Useful Websites.

- Hawaii Energy <https://hawaiienergy.com/>
- Hawaii State Energy Office <http://energy.hawaii.gov/>
- Clean Energy Hawaii <https://www.hawaiianelectric.com/clean-energy-hawaii>