

ENERGY CONSERVATION MEASURES TO BE FURNISHED AND INSTALLED

DHHL's energy consultant, NORESKO, LLC, has identified energy conservation measures (ECMs) that can be implemented at the property to reduce the building's energy consumption. These measures are described in this section. The measures are presented in order from shortest to longest payback period.

Each measure includes a description of the existing condition and a recommendation. In addition, photos are provided for selected measures to enhance their description. The recommendations herein are the basis for furnishing and installing the ECMs and for preparing the Offeror's bid. Offerors shall furnish the recommended ECM meeting the minimum specifications or better but keeping in mind that award under the IFB will go to the bidder with the lowest Total Bid Price.

1. ECM #1 – Exit Lighting Upgrade

Existing Condition:

The existing exit signs in the DHHL space are illuminated with fluorescent lamps. Exit signs in the Association space are not illuminated and the conditions in the OHA space are unknown.



Figure 1: Fluorescent Exit Sign

Measures to Furnish and Install:

Replace all fluorescent exit signs with LED exit signs. Based on the virtual site visit, NORESKO estimates that there are four (4) total fluorescent exit signs.

Interactive Effects:

Reducing interior lighting energy consumption will reduce the building's cooling load. This interactive effect is included in the Economic Summary table for this measure.

Potential Incentives:

Hawai'i Energy provides "instant rebates" for lighting products purchased through approved lighting distributors. Visit <https://hawaiienergy.com/for-businesses/incentives/lighting> for more information.

Minimum Performance Requirements:

LED Exit signs shall be selected and installed to meet all applicable codes and standards including but not limited to NFPA 101, NFPA 70, listed in accordance with the American National Standards Institute (ANSI)/Underwriters Laboratory (UL) 924, Standard for Emergency Lighting and Power Equipment, and the Hawaii Administrative Rules, Title 12, Department of Labor and Industrial Relations, Subtitle 8, Division of Occupational Safety and Health, Part 2, General Industry Standards, Chapter 71.1, Exit Routes, Emergency Action Plans and Fire Prevention Plan.

2. ECM #2 – Weatherization**Existing Condition:**

During the virtual site visit to prepare the energy audit report, it was noted that the exterior doors were allowing some infiltration. The doors are original and have gaps between the door and frame. There may be additional envelope issues which are not visible above the dropped ceiling and at the roof. Windows are fixed (not operable) and no infiltration was noted around the frames. Outdoor air infiltration increases the cooling load on the building which causes increased cooling energy and negatively impacts occupant comfort.

Recommendation:

Install door sweeps and replace failed gaskets between doors and frames. Ensure that door sweeps are properly installed and create a good seal without interfering with door operation. It is recommended that door sweeps and seals be inspected regularly for proper fit and damage.



Figure 2: Example Door Sweep

Interactive Effects :

There are no interactive effects for this measure.

Potential Incentives:

No incentives were found for this measure.

Minimum Performance Requirements:

Door sweeps, gaskets, and weatherstripping shall be designed for commercial applications and suitable for high traffic and heavy use and shall limit air infiltration.

3. ECM #3 – Interior Lighting Upgrade**Existing Condition:**

The interior lighting for the facility is primarily composed of direct/indirect linear pendants with 32 watt T8 fluorescent lamps and 2x4 recessed troffers with 32 watt T8 fluorescent lamps.



Figure 3: Typical Interior Lighting Fixture

Measures to Furnish and Install:

Replace all interior linear and compact fluorescent lighting with LED lighting. Replace the fluorescent lamps with LED lamps and remote drivers. This installation would require an electrician to remove the existing ballast and replace it with an external LED driver. The LED driver would then be wired to the existing fixtures which would be retrofitted with LED tubes. This type of installation has good reliability as the functional components of the lighting system would be new.

Interactive Effects:

Reducing interior lighting energy consumption will reduce the building's cooling load. This interactive effect is included in the Economic Summary table for this measure.

Potential Incentives:

Hawai'i Energy provides "instant rebates" for lighting products purchased through approved lighting distributors. Visit <https://hawaiienergy.com/for-businesses/incentives/lighting> for more information.

Minimum Performance Requirements:

Contractor shall be responsible for maintaining and confirming light levels are within 10%+/- of recommended light levels for Office/Workplace areas as stated in the Illuminating Engineer Society (IES) Lighting Handbook 10th Edition.

LED products shall be listed on ENERGY STAR® or Design Lights Consortium (DLC) qualified products list. DLC qualified products shall be installed in line with the Primary Use Category (For example, a fixture designated by DLC under the primary use category Outdoor Full-Cutoff Wall-Mounted Area Luminaires shall not be installed in an interior space).

Additionally, LED products shall be selected to be compatible with any existing and new controls such as the daylight dimming controls listed in ECM #8.

4. ECM #4 – Exterior Lighting Upgrade

Existing Condition:

Exterior lighting consists of recessed down lights with 13 watt compact fluorescent lamps underneath the covered walkway on the north side of the building.



Figure 5: Exterior Light Fixture

Measures to Furnish and Install:

Replace all exterior fluorescent lighting with LED lighting. Replace the fluorescent lamps with LED lamps and remote drivers. This installation would require an electrician to remove the existing ballast and replace it with an external LED driver. The LED driver would then be wired to the existing fixtures which would be retrofitted with LED tubes. This type of installation has good reliability as the functional components of the lighting system would be new.

Interactive Effects:

There are no interactive effects for this measure.

Potential Incentives:

Hawai'i Energy provides "instant rebates" for lighting products purchased through approved lighting distributors. Visit <https://hawaiienergy.com/for-businesses/incentives/lighting> for more information.

Minimum Performance Requirements:

Contractor shall be responsible for maintaining and confirming light levels are within +/- 10% of recommended light levels for Office/Workplace areas as stated in the Illuminating Engineer Society (IES) Lighting Handbook 10th Edition.

LED products shall be listed on ENERGY STAR® or Design Lights Consortium (DLC) qualified products list. DLC qualified products shall be installed in line with the Primary Use Category (For example, a fixture designated by DLC under the primary use category Outdoor Full-Cutoff Wall-Mounted Area Luminaires shall not be installed in an interior space).

Additionally, LED products must be selected to be compatible with the existing controls.

5. ECM #5 – Apply Window Film

Existing Condition:

The windows are generally fixed vinyl frames with clear single pane glass. The main conference room in the DHHL space has floor to ceiling windows facing south-east and south-west. Additionally, there are clerestory windows around the perimeter of the building. Despite some overhangs above the south aspect of the building, the windows are a source of solar heat gain in the building and cause increased cooling loads.



Figure 6: Building Exterior from the South

Measures to Furnish and Install:

Apply window film to the South, East, and West-facing glass around the building. Window film are engineered to reduce solar heat gain and are available with a variety of shades and performance levels. Generally, for a cooling dominated climate such as Molokai, a film with a lower solar heat gain coefficient (SHGC) is beneficial.

Interactive Effects:

Measures which affect the cooling energy of the building such as interior lighting upgrades and weatherization will reduce the potential savings from subsequent cooling energy ECMs. Savings for this ECM are calculated assuming that ECMs #1, #2, and #3 have been implemented.

Potential Incentives:

Hawai'i Energy provides incentives for window film. The level of incentive varies depending on the characteristics of the specific product applied. Estimated Implementation costs for this measure do not include incentives. Visit <https://hawaiienergy.com/for-businesses/incentives/building-envelope-improvements> for more information.

Minimum Performance Requirements:

The window film product shall have a solar heat gain coefficient (SHGC) of 0.26 or less. The product shall be selected to minimize the visual impact on the building and shall provide as much visual light transmittance as possible while maintaining the SHGC requirement. The film shall be applied per the manufacturer's recommendations and shall come with a minimum 7-year warranty.

6. ECM #6 – Install Energy Star Appliances

Existing Condition:

The existing appliances in the kitchenettes are standard appliances and are not Energy Star rated. The DHHL space has one (1) 24.7 cu. ft. standard refrigerator/freezer and one (1) water cooler that also dispenses hot water. The OHA space has one (1) 17.6 cu. ft. refrigerator/freezer and one (1) water cooler that also dispenses hot water. The Association space has one (1) 14.0 cu. ft. standard refrigerator/freezer, one (1) water cooler that dispenses hot water, and two (2) tankless water heaters.



Figure 7: Existing Refrigerator

Measures to Furnish and Install:

The DHHL, OHA and Association spaces will each have their refrigerator/freezer replaced with Energy Star rated appliances of capacities to match existing. The water coolers in each space and the tankless water heaters in the Association space will not be replaced.

Interactive Effects:

There are no interactive effects for this measure.

Potential Incentives:

Hawai'i Energy provides a refrigerator trade-in program. A \$150 incentive is available for qualified energy star replacements. Visit <https://hawaiienergy.com/for-businesses/incentives/appliances-electronics> for more information.

Minimum Performance Requirements:

All appliances shall be ENERGY STAR® certified and shall have equal or greater capacity to the existing appliances.

7. ECM #7 – Install Programmable Daylight Dimming Controls**Existing Condition:**

The existing interior lighting is controlled via manual wall switches, some of which have occupancy sensors. There are large windows and clerestory windows around the entire perimeter of the building providing excellent natural light. This provides an opportunity for daylight dimming controls.

Measures to Furnish and Install:

Install programmable daylight dimming controls in perimeter areas such as offices and the conference rooms. Daylight dimming controls employ photocell sensors strategically located in each lighting zone to determine the actual light level in the space. The sensors are tied into a daylight dimming control module which modulates the overhead lighting to maintain an appropriate light level in the space. The lighting can be controlled as on/off, step dimming (discrete output levels), or continuously dimming depending on the requirements in the space.

This ECM should be coordinated with an interior lighting upgrade to ensure that the LED lamps, drivers, and/or fixtures being installed are compatible with dimming controls.



Figure 8: Example Ceiling Mounted Photocells

Interactive Effects:

ECMs that reduce interior lighting energy consumption such as ECM #3 - Interior Lighting Upgrade will reduce the effectiveness of daylight dimming controls. Additionally, ECM #5 – Apply Window Film will reduce the amount of natural lighting in the building which reduces the effectiveness of the daylight dimming controls. Savings for this ECM were calculated assuming that ECM #3 and #5 will be implemented. Additionally, reducing interior lighting energy consumption via daylight dimming controls will reduce the building's cooling load. These interactive effects accounted for in the energy savings calculation for this measure.

Potential Incentives:

No incentives were found for this measure. However, Hawai'i Energy provides a customized project incentive for ECMs that do not fit the standard incentives. Visit: <https://hawaiienergy.com/for-businesses/incentives/customized-projects-support> for more information.

Minimum Performance Requirements:

Dimming shall be continuous or stepped at 4 or more levels. Daylight dimming control systems shall be designed in accordance with IESNA practice as delineated in "IES RP-5-13, Recommended Practice of Daylighting." The daylight dimming control system shall be compatible with the LED lighting products selected in ECM #3.

8. ECM #8 – Install a Plug Load Management System

Existing Condition:

Plug loads are estimated to account for approximately 20% of the building's electricity usage. The existing electric outlets do not provide control to de-energize equipment during unoccupied periods when the plug load equipment is not being utilized.

Measures to Furnish and Install:

Install a plug load management system to reduce plug load usage during unoccupied periods. This system would replace the existing outlets that power copiers, printers, kitchenette equipment, TVs, etc. with smart outlets that allow the user to monitor usage and setup schedules to turn off equipment when the spaces are unoccupied or not in use. These devices are estimated to save ~5% - 20% of the plug load consumption and typically communicate wirelessly back to a front end where time of day operating schedules can be setup.

The savings shown are based on 8% plug load energy savings and the cost estimate accounts for a total of 18 outlets to be located in offices, conference rooms, kitchenettes, and workspaces throughout the building.



Figure 9: Example Smart Outlets and Sensors

The receptacles can be programmed to enable equipment such as copiers when the room is occupied and disable it based on day and time, room temperature, or after the room has been unoccupied for a selected period of time.

Interactive Effects:

Reducing plug load energy consumption would reduce the building's cooling load. Interactive effects are included in the Economic Summary table for this measure.

Potential Incentives:

No incentives were found for this measure. However, Hawai'i Energy provides a customized project incentive for ECMs that do not fit the standard incentives. Visit: <https://hawaiienergy.com/for-businesses/incentives/customized-projects-support> for more information.

Minimum Performance Requirements:

The plug load management system shall be programmable to disable appropriate receptacles during unoccupied hours. The system shall be wireless and designed in such a way as to minimize obstructions and space concerns. Installation shall be installed and programmed and training shall be provided to building staff and occupants.
