# Attachment G

# Technical Reference Manual

# Hawaii Energy Efficiency Program

Program Year 3
July 2011 through June 2012

# Technical Reference Manual (TRM)

No. 2011

Measure Savings Calculations

# Table of Contents

# 1 Introduction

METHODS AND ASSUMPTIONS
This reference manual provides methods, formulas and default assumptions for estimating energy and demand peak impacts from measures and projects that receive cash incentives from the Hawaii Energy Efficiency Program.

This reference manual is organized by program, end-use and measure. Each section provides mathematical equations for determining savings (algorithms), other program Technical Reference Manual (TRM) methodologies as well as default assumptions for all equation parameters that are not based on site-specific information. In addition, any descriptions of calculation methods or baselines are provided, as appropriate.

The parameters for calculating savings are listed in the same order for each measure. Algorithms are provided for estimating annual energy and demand impacts.

Data assumptions are based on Hawaii specific data, where available. Where Hawaii data was not available, data from neighboring regions is used where available and in some cases, engineering judgment is used.

Data sources used, in the general order of preference, included, but were not necessarily limited to the following:

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007 Demand Management Programs – KEMA
- HECO IRP-4: Energy Efficiency Potential Study (HECO DSM Docket)
- 2004-2005 Database for Energy Efficiency Resources (CA DEER database)
- 2007-2008 Database for Energy Efficiency Resources (CA DEER database) Update
- Other EE Program Design Information (e.g. Efficiency Maine, Focus on Energy, etc.)
- SAIC Staff expertise
- Evergreen TRM Review – 2/23/12

# 2 Gross Customer-to-Net Program Savings Calculation

The algorithms shown with each measure calculate gross customer electric savings without counting the effects of line losses from the generator to the customer or free ridership.

The formulae for converting gross customer-level savings to net generation-level savings are as follows:

Net Program kWh = Gross Customer Level $\Delta$kWh $\times$ (1 + SLF) x RR

Net Program kW = Gross Customer Level $\Delta$kW $\times$ (1 + SLF) x RR

Where:

Net kWh = kWh energy savings at generation-level, net of free riders and system losses
Net kW = kWh energy savings at generation-level, net of free riders and system losses

Gross Cust. $\Delta$kWh = Gross customer level annual kWh savings for the measure
Gross Cust. $\Delta$kW = Gross customer level connected load kW savings for the measure

SLF = System Loss Factor
RR = Realization Rate that includes Free Riders and Engineering Verification

| Hawaii Energy PY2009 Portfolio Energy (kWh) Reduction Impacts by Level | | | | | |
|---|---|---|---|---|---|
| | **Gross Customer Level Savings** | **System Loss Factor (SLF)** | **Gross System Level Savings** | **Realization Rate (RR)** | **Net Program Level Savings (Net kWh)** |
| Oahu | 110,545,694 | 11.17% | 122,893,648 | 73% | 89,712,363 |
| Hawaii | 12,590,195 | 9.00% | 13,723,313 | 73% | 10,018,018 |
| Maui | 9,182,496 | 9.96% | 10,097,072 | 73% | 7,370,863 |
| Lanai | 61,712 | 9.96% | 67,858 | 73% | 49,537 |
| Molokai | 85,269 | 9.96% | 93,762 | 73% | 68,447 |
| Total | 132,465,366 | | 146,875,654 | | 107,219,227 |
| % of Customer Level Savings | | | 111% | | 81% |

***SLF – System Loss Factor***
The system loss factors were provided by HECO, MECO and HELCO. The do not vary by measure, but by island, and are in the following Table 1.1:

### Table 2.1

| County Customer to System Loss Factor | | |
|---|---|---|
| Oahu | Maui | Hawaii |
| 11.17% | 9.96% | 9.00% |

***RR - Realization Rate***
The Realization Rate used was estimated using the following information from the HECO 2008 A&S report:

## Table 2.2

| Program | Realization Rate | | | |
|---|---|---|---|---|
| | Energy | Demand | Net System Level Energy Savings 2008 | Gross System Level Energy Savings 2008 |
| 1. CIEE | 0.6530 | 0.6640 | 45,798,527 | 70,135,569 |
| 2. CINC | 0.5960 | 0.6100 | 17,469,147 | 29,310,648 |
| 3. CICR | 0.7590 | 0.7550 | 28,749,233 | 37,877,777 |
| 4. ESH | 0.8500 | 0.8500 | 32,203,749 | 37,886,763 |
| 5. REWH | 0.7290 | 0.7310 | 8,237,872 | 11,300,236 |
| 6. RNC | 0.8410 | 0.8850 | 8,267,217 | 9,830,222 |
| 7. RLI | 1.0000 | 1.0000 | 7,899,869 | 7,899,869 |
| TOTAL | | | 148,625,614 | 204,241,087 |

The total Net Energy Savings divided by the total Gross Energy Savings for 2008 is 73%.

Therefore, the overall realization rate for HECO was 0.73 and Table 1.3 reflects the use of this for the other islands.

## Table 2.3

| County Customer Realization Rate | | |
|---|---|---|
| Oahu | Maui | Hawaii |
| 73% | 73% | 73% |

# 3 Interactive Effects

The TRM provides specific savings algorithms for many prescriptive measures. When a customer installs a prescriptive measure, the savings are determined according to these algorithms. In some cases these algorithms include the effects of interactions with other measures or end.

For "custom" measures, Hawaii Energy performs site-specific customized calculations. In this case, Hawaii Energy takes into account interactions between measures (e.g., individual savings from installation of window film and replacement of a chiller are not additive because the first measure reduces the cooling load met by the second measure).

Hawaii Energy will calculate total savings for the package of custom measures being installed, considering interactive effects, either as a single package or in rank order of measures as described below.

If a project includes both prescriptive and custom measures, the prescriptive measures will be calculated in the normal manner. However, the prescriptive measures will be assumed to be installed prior to determining the impacts for the custom measures.

For commercial lighting measures, the following factors are applied for facilities with air conditioning.

### Table 3.1

| Building Type | Expected Level of Similarity | Energy Factor | Demand Factor |
|---|---|---|---|
| All Commercial | Low | 1.056 | 1.075 |
| Misc Commercial | Low | 1.056 | 1.075 |
| Cold Storage | Very High | 1.423 | 1.22 |
| Education | Low | 1.061 | 1.039 |
| Grocery | Low | 1.043 | 1.114 |
| Health | High | 1.122 | 1.233 |
| Hotel/Motel | High | 1.115 | 1.236 |
| Industrial | Low | 1.043 | 1.074 |
| Office | Low | 1.068 | 1.102 |
| Restaurant | Low | 1.051 | 1.073 |
| Retail | Low | 1.054 | 1.085 |
| Warehouse | Low | 1.019 | 1.053 |

# 4 Persistence

Persistence factors may be used to reduce lifetime measure savings in recognition that initial engineering estimates of annual savings may not persist long term.

This might be because a measure is removed or stops functioning prior to the end of its normal engineering lifetime, because it is not properly maintained, it is overridden, it goes out of calibration (controls only), or for some other reason.

Some of the measure algorithm may contain an entry for persistence factor. The default value if none is indicated is 1.00 (100%). A value lower than 1.00 will result in a downward adjustment of lifetime savings and total resource benefits.

For any measure with a persistence value less than 1.00, the normal measure life ("Engineering Measure Life") will be reduced to arrive at an "Effective Useful Life" for the purposes of estimating the TRB of a measure or program.

# 5 Glossary

The following glossary provides definitions for necessary assumptions needed to calculate measure savings.

Attribution Factor (AF): The Attribution Factor is the amount of savings attributable to the program impact. It is calculated by subtracting from one the % free ridership.

Baseline Efficiency ($\eta_{base}$): The assumed standard efficiency of equipment, absent an Hawaii Energy program.

Coincidence Factor (CF): Coincidence factors represent the fraction of connected load expected to be "on" and using electricity coincident with the system peak period.

Connected Load: The maximum wattage of the equipment, under normal operating conditions, when the equipment is "on".

Freeridership (FR): A program's ***free ridership rate*** is the percentage of program participants deemed to be free riders. A ***free rider*** refers to a customer who received an incentive through an energy efficiency program who would have installed the same or a smaller quantity of the same high efficiency measure on their own within one year if the program had not been offered.

Full Load Hours (FLH): The equivalent hours that equipment would need to operate at its peak capacity in order to consume its estimated annual kWh consumption (annual kWh/connected kW).

High Efficiency ($\eta_{effic}$): The efficiency of the energy-saving equipment installed as a result of an efficiency program.

Incremental Cost: The cost difference between the installed cost of the high efficiency measure and the standard efficiency measure.

Lifetimes: The number of years (or hours) that the new high efficiency equipment is expected to function. These are generally based on engineering lives, but sometimes adjusted based on expectations about frequency of remodeling or demolition.

System Loss Factor (SLF): The marginal electricity losses from the generator to the customer meter – expressed as a percent of meter-level savings. The Energy Line Loss Factors vary by period. The Peak Line Loss Factors reflect losses at the time of system peak, and are shown for two seasons of the year (winter and summer). Line loss factors are the same for all measures.

Load Factor (LF): The fraction of full load (wattage) for which the equipment is typically run.

Operating Hours (HOURS): The annual hours that equipment is expected to operate.

Persistence (PF): The fraction of gross measure savings obtained over the measure life.

Realization Rate (RR): The fraction of gross measure savings realized by the program impact. It includes the gross verification adjustment and free ridership or attribution adjustment.

Spillover (SPL): Spillover refers to energy-efficient equipment installed in any facility in the program service area due to program influences, but without any financial or technical assistance from the Program. It is expressed as a percent or fraction of the gross savings attributable to program participation.

Total Resource Benefits (TRB): The present value of benefits from the program savings resulting from avoided energy and capacity costs for the utility and their ratepayers.

# 6 Load shapes and Demand Coincidence Factors

Load shapes for different types of equipment or systems were not needed because the savings values estimated in the KEMA 2008 impact evaluation already accounted for these load shapes. The coincidence factors were developed based on the calculated full load demand reduction and the KEMA values for each building type. The resulting coincidence factors were evaluated for reasonableness depending on the system type and the building type.

# 7 Total Resource Benefits – Avoided Costs and Measure Life

HECO provided avoided energy and capacity costs for future years shown in the table below:

**Table 7.1**

| Year | $/MWh | $/kW |
|---|---|---|
| 2006 | $109.62 | $180.20 |
| 2007 | $107.16 | $181.14 |
| 2008 | $102.19 | $181.14 |
| 2009 | $106.89 | $181.14 |
| 2010 | $98.90 | $0.00 |
| 2011 | $100.41 | $0.00 |
| 2012 | $104.04 | $0.00 |
| 2013 | $103.69 | $0.00 |
| 2014 | $108.86 | $0.00 |
| 2015 | ($139.65) | $1,530.33 |
| 2016 | ($132.67) | $1,704.00 |
| 2017 | ($118.95) | $1,537.80 |
| 2018 | ($115.35) | $1,412.69 |
| 2019 | ($109.01) | $1,304.38 |
| 2020 | ($104.57) | $1,207.27 |
| 2021 | ($100.02) | $1,149.38 |
| 2022 | ($109.30) | $1,112.04 |
| 2023 | ($111.41) | $1,076.56 |
| 2024 | $137.80 | ($411.76) |
| 2025 | $144.46 | ($744.16) |

The avoided cost values for energy and capacity that was originally provided by HECO was deemed inappropriate to use for reasons that included a negative avoided cost value for energy in the year 2015 to 2023 and no capacity costs for years 2010 to 2014. Therefore, the avoided cost used for the program was estimated using an extrapolation of the HECO provided avoided energy in the first few years of data for energy and the capacity costs leveled over 20 years. The following table was developed from this extrapolation.

**Table 7.2**

| Year | $/MWh | $/kW |
|---|---|---|
| 2006 | 109.62 | 180.20 |
| 2007 | 107.16 | 181.14 |
| 2008 | 102.19 | 181.14 |
| 2009 | 106.89 | 181.14 |
| 2010 | 98.90 | 279.79 |
| 2011 | 100.41 | 305.64 |
| 2012 | 104.04 | 338.65 |
| 2013 | 103.69 | 353.19 |
| 2014 | 108.86 | 370.59 |
| 2015 | 112.36 | 382.51 |
| 2016 | 113.45 | 386.22 |
| 2017 | 113.90 | 387.74 |
| 2018 | 114.30 | 389.12 |
| 2019 | 115.13 | 391.92 |
| 2020 | 114.76 | 390.68 |
| 2021 | 115.92 | 394.63 |
| 2022 | 117.01 | 398.34 |
| 2023 | 116.75 | 397.44 |
| 2024 | 117.91 | 401.41 |
| 2025 | 119.18 | 405.71 |

This table was deemed a good estimate of actual avoided energy and capacity costs as it was more in line with the avoided costs used in many other programs. Therefore, these avoided costs were used to calculate the Total Resource Benefits.

# Effective Useful Life (EUL): Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2010
End date: TBD

**Referenced Documents:** Econorthwest TRM Review – 6/23/10
DEER (The Database for Energy Efficient Resources)

**TRM Review Actions:**
- 6/23/10 Rec. – Adopt DEER values in those cases where there is a greater than 20 percent difference between DEER and current TRM. – Adopted

**Major Changes:**
- Hawaii Energy will adopt DEER EUI values across the board and will follow DEER changes as they are updated unless obvious differences for Hawaii applications are identified.

The measure Effective Useful Life estimated for each measure is shown in the following table:

## Table 7.3

| Measure Type | Measure ID | Equipment Description | DEER Effective Useful Life (EUL) |
|---|---|---|---|
| Appliances | a0730000005Jvi3 | Ceiling Fan | 5 |
| | a0730000005JvjB | Central AC Maint | 1 |
| | a0730000005JvhQ | Clothes Washer | 11 |
| | a0730000004zRqn | COMPACT FLUORESCENT LIGHT | 6.4 |
| | a0730000005K0Xc | compact fluorescent light | 2.8 |
| | a0730000005Jvi8 | Dishwasher | 11 |
| | a0730000005JviI | Ductless Split AC | 15 |
| | a0730000004zRqo | ENERGY STAR CEILING FAN | 5 |
| | a0730000004zRqp | ENERGY STAR CLOTHES WASHER | 11 |
| | a0730000004zRqv | ENERGY STAR DISHWASHER | 11 |
| | a0730000004zRqw | ENERGY STAR REFRIGERATOR | 14 |
| | a0730000005Jvht | Refrigerator | 14 |
| | a0730000004zRr5 | refrigerator replacement (not E*) | 14 |
| | | | |
| Water Items | a0730000004zRr1 | low flow showerhead | 10 |
| | a0730000004zRqx | faucet aerator | 10 |
| | a0730000004zRr2 | LOW FLOW SHOWERHEAD – ELECTRIC WATER HEATER | 10 |
| | a0730000004zRr3 | LOW FLOW SHOWERHEAD – HEAT PUMP WATER HEATER | 10 |
| | a0730000004zRr4 | LOW FLOW SHOWERHEAD – SOLAR WATER HEATER | 10 |
| | | | |
| Water Heating | a0730000004zRr0 | HIGH EFFICIENCY ELECTRIC RESISTANCE WATER HEATER | 13 |
| | a0730000004zRqy | HEAT PUMP WATER HEATER – ADD ON | 10 |
| | a0730000004zRrP | HEAT PUMP WATER HEATER – INTEGRAL | 10 |
| | a0730000005Jvim | HEWH 35 Gal or less HEWH .94 EFF | 10 |
| | a0730000005JviS | HEWH 36-45 Gal or less HEWH .93 EFF | 10 |
| | a0730000005Jvic | HEWH 46-64 Gal or less HEWH .92 EFF | 10 |
| | a0730000005Jviw | HEWH 66+ Gal HEWH .88 EFF | 10 |
| | a0730000004zRrT | SOLAR WATER HEATER | 15 |
| | a0730000005Jvhf | Solar Hot Water Heater | 15 |

| Measure Type | Measure ID | Equipment Description | DEER Effective Useful Life (EUL) |
|---|---|---|---|
| Air Conditioning | a0730000004zRqz | HIGH EFFICIENCY AIR CONDITIONER | 15 |
| | a0730000004adko | HVAC – Chiller | 20 |
| | a0730000004adl4 | HVAC – Fan Variable Frequency Drive | 15 |
| | a0730000004adl9 | HVAC – Packaged/Split | 15 |
| | a0730000004adkx | HVAC – Pump Variable Frequency Drive | 15 |
| | a0730000004adkq | HVAC – Window AC | 9 |
| | a0730000004zRr6 | SPLIT SYSTEM AIR CONDITIONER | 15 |
| | a0730000005Jvhe | Window AC | 9 |
| | a0730000004adlC | Window Film | 10 |
| | a0730000004zRr7 | WINDOW ROOM AIR CONDITIONER | 9 |
| Motors | a0730000004adlD | Motors | 15 |
| Lighting | a0730000004adkf | L01 Comm CFL 15W 40W | 2.8 |
| | a0730000004adlB | L010 High Pressure Sodium indoor >200 W | 14 |
| | a0730000004adjq | L011 Pulse St MH <100 W | 14 |
| | a0730000004adkY | L012 Pulse St MH 100 W-200 W | 14 |
| | a0730000004adkc | L013 Pulse St MH >200 W | 14 |
| | a0730000004adjs | L014 Induction <100 W | 2 |
| | a0730000004adl1 | L015 Induction >100W | 2 |
| | a0730000004adkV | L016 2’ T8 or T8 w/EB T12, 28W/25W/high lumen 32W | 14 |
| | a0730000004adky | L017 3’ T8 or T8 w/EB T12, 28W/25W/high lumen 32W | 14 |
| | a0730000004adl7 | L018 4’ T8 or T8 w/EB T12, 28W/25W/high lumen 32W | 14 |
| | a0730000004adkp | L019 8’ T8 or T8 w/EB T12, 28W/25W/high lumen 32W | 14 |
| | a0730000004adki | L02 Comm CFL 20W 60W | 14 |
| | a0730000004adkT | L020 4’ Super T8 w/HEEB T12, 28W/25W/high lumen 32W | 14 |
| | a0730000004adjt | L021 4’ Super T8 w/HEEB T8, 28W/25W/high lumen 32W | 14 |
| | a0730000004adkz | L022 4’ Super T8 w/HEEB New, 28W/25W/high lumen 32W | 14 |
| | a0730000004adkU | L023 2’ T8/T12 delamp w/reflectors | 14 |
| | a0730000004adks | L024 4’ T8/T12 delamp w/reflectors | 14 |
| | a0730000004adke | L025 8’ T8/T12 delamp w/reflectors | 14 |
| | a0730000004adkv | L026 2’ T8/T12 delamp no reflectors | 14 |
| | a0730000004adkZ | L027 4’ T8/T12 delamp no reflectors | 14 |
| | a0730000004adjr | L028 8’ T8/T12 delamp no reflectors | 14 |
| | a0730000004adl3 | L029 2’ T8 w/EB, replacement w/delamp | 14 |

| Measure Type | Measure ID | Equipment Description | DEER Effective Useful Life (EUL) |
|---|---|---|---|
| **Lighting** | a0730000004adkg | L03 Reflectored CFL | 2.8 |
| | a0730000004adkh | L030 2' T8 w/EB, delamp w/reflector | 14 |
| | a0730000004adku | L031 4' T8 w/EB, replacement w/delamp | 14 |
| | a0730000004adka | L032 4' T8 w/EB, delamp w/reflector | 14 |
| | a0730000004adkX | L033 8' T8 w/EB, replacement w/delamp | 14 |
| | a0730000004adl6 | L034 8' T8 w/EB, delamp w/reflector | 14 |
| | a0730000004adkm | L035 2' T5 w/EB | 14 |
| | a0730000004adkt | L036 3' T5 w/EB | 14 |
| | a0730000004adkr | L037 4' T5 w/EB | 14 |
| | a0730000004adkn | L038 2' T5HO w/EB | 14 |
| | a0730000004adlA | L039 3' T5HO w/EB | 14 |
| | a0730000004adkw | L04 Cold Cathode CFL | 2.8 |
| | a0730000004adl2 | L040 4' T5HO w/EB | 14 |
| | a0730000004adl8 | L041 Metal Halide indoor <100 W | 14 |
| | a0730000004adkW | L042 Metal Halide indoor 100 W-200 W | 14 |
| | a0730000004adkj | L043 Metal Halide indoor >200 W | 14 |
| | a0730000004adkk | L05 Dimmable CFL | 2.8 |
| | a0730000004adkl | L06 Pin mount CFL | 16 |
| | a0730000004adl5 | L07 LED Exit | 16 |
| | a0730000004adkb | L08 High Pressure Sodium indoor <100 W | 14 |
| | a0730000004adl0 | L09 High Pressure Sodium indoor 100 W-200 W | 14 |
| | a0730000004adkd | Lighting – Sensor | 8 |
| | | | |
| Maintenance | a0730000004zRqm | AIR CONDITIONING SERVICES | 1 |

# 8 (REEM) Residential Energy Efficiency Measures

## 8.1 High Efficiency Water Heating

### 8.1.1 Solar Water Heater

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2010
End date: TBD

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007 Demand Management Programs – (KEMA 2005-07)
- Econorthwest TRM Review – 6/23/10
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. # 6 – For PY 2010, adjust claimed demand savings based on participant data from all service territories covered. Adjust Demand Savings based on participant data weighted average of KEMA results across all counties. Change from 0.50 to 0.46 kW. non-military – Adopted and incorporated into PY2010-1 TRM.
- 6/23/10 Rec. # 7 - For PY 2010, include a discussion of shell losses in the savings analysis and supporting documentation. Discussion included in PY2010-1 TRM.
- 10/5/11 – Currently Under Review.

**Major Changes:**

- Eliminated Military figure as no foreseeable military retrofit applications will be received.
- Demand change to weighted average from KEMA 2008. 0.46 kW
- Changed individual water usage from 13.3035 to 13.3

**Measure Description:**
Replacement of Electric Resistance Water Heater with a Solar Water Heater designed for a 90% Solar Fraction. The new Solar Water Heating systems most often include an upgrade of the hot water storage tank sized at 80 or 120 gallons.

Systems must comply with Hawaii Energy Solar Standards and Specifications which call out:

- Panel Ratings
- System Sizing
- Installation orientation de-rating factors
- Hardware and mounting systems

**Shell Losses:**
The increase in size from a 40 or 60 gallon to an 80 or 120 gallon standard electric resistance water heater would in and of itself increase the “shell” losses of the system. These shell losses are the result of a larger surface area exposing the warm water to the cooler environment and thus more heat lost to the environment through conduction through the tank. Engineering calculations by Econorthwest puts this at a 1% increase in losses. This is further reduced by 90% as the solar water system provides that fraction of the annual water heating requirements.

**Baseline Efficiencies:**
Baseline usage is a 0.9 COP Electric Resistance Water Heater. The baseline water heater energy consumption is by a single 4.0kW electric resistance element that is controlled thermostatically on/off controller based of tank finish temperature set point. The tank standby loss differences between baseline and high efficiency case are assumed to be negligible.

Demand Baseline has been determined by field measurements by KEMA 2005-07 report. The energy baseline also comes from the KEMA 2005-07 report and is supported by engineering calculations shown in this TRM.

| Building Types | Demand Baseline(kW) | Energy Baseline (kWh) |
|---|---|---|
| Residential | 0.57 | 2,733 |

**High Efficiency:**
Solar Water Heater designed for a 90% Solar Fraction. The Solar Systems use solar thermal energy to heat the water 90% of the time and continue to utilize electricity to operate the circulation pump and provide heating through a 4.0 kW electric resistance element when needed.

Solar Contractors do not favor Photo-Voltaic powered DC circulation pumps as they have proven less reliable in the field than an AC powered circulation pump.

The electric resistance elements in the high efficiency case do not have load control timers on them.

The energy is the design energy of a 90% solar fraction system with circulation pump usage as metered by KEMA 2008.

The on peak demand is the metered demand found by KEMA 2008.

| Building Types | Demand High Efficiency (kW) | Energy High Efficiency (kWh) | Circ. Pump % |
|---|---|---|---|
| Residential | 0.07 | 379 | 28% |

**Energy Savings:**

Solar Water Heater Gross Savings before operational adjustments:

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Residential | 0.46 | 2,354 |

| Operational Factor | Adjustment Factor |
|---|---|
| Solar Fraction Performance (sfp) | 0.94 |
| Persistence Factor (pf) | 0.93 |
| Demand Coincidence Factor (cf) | 1.0 |

Solar Water Heater Net Savings after operational adjustments:

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Residential | 0.46 | 2,065 |

## Savings Algorithms

**Solar Water Heater - Non-Military Single Family Home**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.141 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,000 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,000 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,459 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,732 | kWh / Year | KEMA 2008 - HECO |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element | |
| Energy Usage per Year at the Meter | | 2,732 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | 72% |
| Pump Energy used per Year | + | 106 | kWh / Year | 28% |
| Design Solar System Energy Usage | | 379 | kWh / Year | |
| Base SERWH Energy Usage per Year at the Meter | | 2,732 | kWh / Year | |
| Design Solar System Energy Usage | - | 379 | kWh / Year | |
| Design Solar System Energy Savings | | 2,353 | kWh / Year | |
| Design Solar System Energy Savings | | 2,353 | kWh / Year | |
| Performance Factor | | 0.94 | pf | HE |
| Persistance Factor | x | 0.93 | pf | KEMA 2008 |
| | | 2,065 | kWh / Year | KEMA 2008 |
| **Residential Solar Water Heater Energy Savings** | | **2,065** | **kWh / Year Savings** | |
| Base SERWH Element Power Consumption | | 4.0 | kW | |
| Coincidence Factor | x | 0.143 | cf | 8.6 Minutes per hour |
| Base SERWH On Peak Demand | | 0.57 | kW On Peak | KEMA 2008 |
| Base SERWH On Peak Demand | - | 0.57 | kW On Peak | |
| Solar System Metered on Peak Demand | - | 0.11 | kW On Peak | KEMA 2008 |
| | | 0.46 | kW On Peak | |
| **Residential Solar Water Heater Demand Savings** | | **0.46** | **kW Savings** | |

**Operating Hours**
See Table above.

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Persistence**
The persistence factor has been found to be 0.93 based in the KEMA 2005-07 report that found 7% of the systems not operational.

**Lifetime**
15 years

**Measure Costs and Incentive Levels**

Table 1 – SWH Measure Costs and Incentive Levels

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Non-Military | $ 750 | $6,600 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

## 8.1.2 Solar Water Heating Loan Interest Buydown (LIB)

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: May 22, 2011
Effective date: November 1, 2011
End date: TBD

**Referenced Documents:**
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007 Demand Management Programs – (KEMA 2005-07)
- Econorthwest TRM Review – 6/23/10
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 6/23/10 Rec. # 6 – For PY 2010, adjust claimed demand savings based on participant data from all service territories covered. Adjust Demand Savings based on participant data weighted average of KEMA results across all counties. Change from 0.50 to 0.46 kW. non-military – Adopted and incorporated into PY2010-1 TRM.
- 6/23/10 Rec. # 7 - For PY 2010, include a discussion of shell losses in the savings analysis and supporting documentation. Discussion included in PY2010-1 TRM.
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Eliminated Military figure as no foreseeable military retrofit applications will be received.
- Demand change to weighted average from KEMA 2008. 0.46 kW
- Changed individual water usage from 13.3035 to 13.3

**Measure Description:**
The Solar Water Heating Loan Interest Buydown Program offers eligible borrowers an interest buy down of $1,000 (with a minimum loan of $5,000) toward the financing of a solar water heating system from a participating lender – see www.hawaiienergy.com for a list of participating lenders.

Replacement of Electric Resistance Water Heater with a Solar Water Heater designed for a 90% Solar Fraction. The new Solar Water Heating systems most often include an upgrade of the hot water storage tank sized at 80 or 120 gallons.

Systems must comply with Hawaii Energy Solar Standards and Specifications which call out:
- Panel Ratings
- System Sizing
- Installation orientation de-rating factors
- Hardware and mounting systems

**Shell Losses:**
The increase in size from a 40 or 60 gallon to an 80 or 120 gallon standard electric resistance water heater would in and of itself increase the “shell” losses of the system. These shell losses are the result of a larger surface area exposing the warm water to the cooler environment and thus more heat lost to the environment through conduction through the tank. Engineering calculations by Econorthwest puts this at a 1% increase in losses. This is further reduced by 90% as the solar water system provides that fraction of the annual water heating requirements.

**Baseline Efficiencies:**
Baseline usage is a 0.9 COP Electric Resistance Water Heater. The baseline water heater energy consumption is by a single 4.0 kW electric resistance element that is controlled thermostatically on/off

controller based of tank finish temperature set point. The tank standby loss differences between baseline and high efficiency case are assumed to be negligible.

Demand Baseline has been determined by field measurements by KEMA 2005-07 report. The energy baseline also comes from the KEMA 2005-07 report and is supported by engineering calculations shown in this TRM.

| Building Types | Demand Baseline(kW) | Energy Baseline (kWh) |
|---|---|---|
| Residential | 0.57 | 2,733 |

**High Efficiency:**
Solar Water Heater designed for a 90% Solar Fraction. The Solar Systems use solar thermal energy to heat the water 90% of the time and continue to utilize electricity to operate the circulation pump and provide heating through a 4.0 kW electric resistance element when needed.

Solar Contractors do not favor Photo-Voltaic powered DC circulation pumps as they have proven less reliable in the field than an AC powered circulation pump.

The electric resistance elements in the high efficiency case do not have load control timers on them.

The energy is the design energy of a 90% solar fraction system with circulation pump usage as metered by KEMA 2008.

The on peak demand is the metered demand found by KEMA 2008.

| Building Types | Demand High Efficiency (kW) | Energy High Efficiency (kWh) | Circ. Pump % |
|---|---|---|---|
| Residential | 0.07 | 379 | 28% |

**Energy Savings:**

Solar Water Heater Gross Savings before operational adjustments:

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Residential | 0.46 | 2,354 |

| Operational Factor | Adjustment Factor |
|---|---|
| Solar Fraction Performance (sfp) | 0.94 |
| Persistence Factor (pf) | 0.93 |
| Demand Coincidence Factor (cf) | 1.0 |

Solar Water Heater Net Savings after operational adjustments:

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Residential | 0.46 | 2,065 |

## Savings Algorithms

**Solar Water Heater - Non-Military Single Family Home**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.141 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,000 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,000 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,459 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,732 | kWh / Year | KEMA 2008 - HECO |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element | |
| Energy Usage per Year at the Meter | | 2,732 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | 72% |
| Pump Energy used per Year | + | 106 | kWh / Year | 28% |
| Design Solar System Energy Usage | | 379 | kWh / Year | |
| Base SERWH Energy Usage per Year at the Meter | | 2,732 | kWh / Year | |
| Design Solar System Energy Usage | - | 379 | kWh / Year | |
| Design Solar System Energy Savings | | 2,353 | kWh / Year | |
| Design Solar System Energy Savings | | 2,353 | kWh / Year | |
| Performance Factor | | 0.94 | pf | HE |
| Persistance Factor | x | 0.93 | pf | KEMA 2008 |
| | | 2,065 | kWh / Year | KEMA 2008 |
| **Residential Solar Water Heater Energy Savings** | | **2,065** | **kWh / Year Savings** | |

### Operating Hours
See Table above.

### Loadshape
TBD

### Freeridership/Spillover Factors
TBD

**Persistence**
The persistence factor has been found to be 0.93 based in the KEMA 2005-07 report that found 7% of the systems not operational.

**Lifetime**
15 years

**Measure Costs and Incentive Levels**
Hawaii Energy will be allowed to claim credit for the fraction of the energy and demand savings and total resource benefits that is proportional to the share of customer incentive cost paid with PBFA funds.

The following distribution is provided for energy and demand impacts:

| | |
|---|---|
| PBFA (Public Benefit Fee Administrator) | 25% |
| ARRA (American Recovery and Reinvestment Act) | 75% |

| | |
|---|---|
| Energy Savings | 2065 kWh/year |
| Demand Savings | 0.46 kW |

| Pre-Bonus Period (11/1/10 - 3/21/11) | | | PBF | | | | ARRA | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unit Incentive | Incremental Cost | Unit Incentive | % Contribution | Energy Savings (kWh/year) | Demand Savings (kW) | Unit Incentive | % Contribution | Energy Savings (kWh/year) | Demand Savings (kW) |
| Military | $ 1,000 | $ 4,400 | $ 250 | 25% | 516 | 0.12 | $ 750 | 75% | 1549 | 0.35 |
| Non-Military | $ 1,000 | $ 6,600 | $ 250 | 25% | 516 | 0.12 | $ 750 | 75% | 1549 | 0.35 |

| Bonus Period (3/22/11 - 6/30/11) | | | PBF | | | | ARRA | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unit Incentive | Incremental Cost | Unit Incentive | % Contribution | Energy Savings (kWh/year) | Demand Savings (kW) | Unit Incentive | % Contribution | Energy Savings (kWh/year) | Demand Savings (kW) |
| Military | $ 1,750 | $ 4,400 | $ 250 | 14% | 295 | 0.07 | $ 1,500 | 86% | 1770 | 0.39 |
| Non-Military | $ 1,750 | $ 6,600 | $ 250 | 14% | 295 | 0.07 | $ 1,500 | 86% | 1770 | 0.39 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

### 8.1.3 Solar Water Heater Energy Hero Gift Packs

Measure ID:

Version Date & Revision History
Draft date: October 4, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07)
- Econorthwest TRM Review – 6/23/10
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007 Demand Management Programs – (KEMA 2005-07)
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- 11/22/11 – LED algorithm updated. See section 8.2.2 for changes.
- 11/22/11 – Akamai Power Strip kWh savings updated based on NYSERDA Measure Characterization for Advanced Power Strips.
- 11/22/11 – Updated content in headings *Description*, *Base Case*, *High Efficiency Case*, and *Energy Savings* in regard to LED lamps to match section 8.2.2.
- 11/29/11 – Low Flow Shower Head algorithm updated – previously claiming only 50% of total energy savings due to inaccurately calculating hot and cold water mix. Also updated *Energy Savings* table as necessary.
- 4/17/12 – Updated CFL and LED algorithms to refer to CFL and LED sections in TRM to ensure accuracy. Updated energy savings numbers to be consistent with EMV revisions.
- 8/1/12 – Updated Low Flow Shower Head algorithm to reduce demand savings from 40% to 20% as per EM&V review (Feb. 2012)

**Description:**

Potential gift pack components:

- Compact Fluorescent Lamp
- Akamai Power Strip
- LED Lamp
- Low Flow Shower Head

**Base Case**

- 60 W incandescent lamps
- Standard power strip or no power strip
- 25% 60W incandescent, 25% 40W incandescent, 25% 23W CFLs and 25% 13W CFLs (See LED TRM)
- Low Flow Shower Head rated at 2.5 gpm

**High Efficiency Case**

- 15W CFLs
- Akamai Power Strip
- 50% 7W LED Lamp and 50% 12.5W LED Lamp
- Low Flow Shower Head rated at 1.5 gpm

## Energy Savings

| Measure | Energy Savings (kWh/year) | Demand Savings (kW) |
|---|---|---|
| 3 CFL | 109 | 0.016 |
| Power Strip | 78 | 0.009 |
| LED | 17 | 0.003 |
| Low Flow Shower Head - Solar | 42 | 0.022 |
| **TOTAL** | **246** | **0.05** |

## Measure life

| Measure | Measure Life (Years) |
|---|---|
| 3 CFL | 5 |
| Power Strip | 5 |
| LED | 5 |
| Low Flow Shower Head | 5 |

## Savings Algorithms

**CFL - Single and Multi Family Residential Home**

**Refer to TRM Compact Fluorescent Lamp (CFL) Section**

| **Akamai Power Strips** | | | | |
|---|---|---|---|---|
| Savings per Unit | 56.5 kWh | | 102.8 kWh | *NYSERDA Measure Characterization for* |
| Plugs per Unit | 5 plugs | | 7 plugs | Advanced Power Strips |
| Savings per Plug | 11.3 kWh/plug | | 14.68571 kWh/plug | |
| Average Savings per Plug | | | 13.0 kWh | |
| | | x | 6 plugs/unit | |
| **Akamai Power Strip Energy Savings** | | | **78 kWh per Unit first year** | |
| Hours of Operation | | | 8760 hours/year | |
| **Demand Savings** | | | **0.0089 kW** | |
| | | | | |
| First Year Savings | | | 78 kWh first year | |
| Measure Life | | x | 5 year measure life | |
| Lifetime Savings | | | 389.78571 kWh lifetime | |
| | | | | |
| Total Resource Cost | | | $ 30.96 | |
| Total Resource Benefit | | ÷ | $ 46.15 | |
| Total Resource Cost Ratio | | | 1.5 TRB Ratio | |
| | | | | |
| Potential Akamai Power Strip Incentive | | | $ 7.00 | |
| First Year Savings | | ÷ | 66 kWh first year | |
| | | | $ 0.11 per kWh first year | |
| | | | | |
| Standard Power Strip Cost | | | $ 14.49 | |
| Akamai Power Strip Cost | | - | $ 30.96 | |
| Incremental Akamai Power Strip Cost | | | $ 16.47 | |
| | | | | |
| Incremental Akamai Power Strip Cost | | | $ 16.47 | |
| Potential Akamai Power Strip Incentive | | ÷ | $ 7.00 | |
| Percentage of Incremental Cost | | | 43% | |
| | | | | |
| Akamai Power Strip Cost | | | $ 30.96 | |
| Potential Akamai Power Strip Incentive | | ÷ | $ 7.00 | |
| Percentage of Customer Measure Cost | | | 23% | |

**LED - Single and Multi Family Residential Home**

**Refer to TRM Light Emitting Diode (LED) Section**

**Low Flow Showerhead w/Solar Water Heating**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.2 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | BTU/kWh | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,460 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,733 | kWh / Year | KEMA 2008 - HECO |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element | |
| Energy Usage per Year at the Meter | | 2,733 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | 72% |
| Pump Energy used per Year | + | 106 | kWh / Year | 28% |
| Design Solar System Energy Usage | | 379 | kWh / Year | |
| Utilization Factor | | 28% | | Hot water used for showers (AMMA) |
| Hot Water Usage from Showers | | 106 | | |
| Base Case Showerhead | | 2.5 | GPM | |
| High Efficiency Case Showerhead | | 1.5 | GPM | |
| Savings = (1 - High Efficiency/Base) | | 40% | | |
| **Energy Savings** | | **42** | **kWh / Year** | |
| Solar System Metered on Peak Demand | | 0.11 | kW On Peak | KEMA 2008 |
| Peak Coincidence Factor | | 0.20 | | William B., De Oreo, P.E., Peter W. Mayer. The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis. Aquacraft, Inc. Water Engineering and Management. |
| **Residential Low Flow Shower Head Demand Savings** | | **0.022** | **kW Savings** | |

### 8.1.4 Heat Pump Water Heaters

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- From SalesForce Measures (Impact)
- October 2004 (KEMA Report)
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Recognizing the growing product availability and sales efforts regarding residential heat pumps, increase educational efforts.
- Changed base SERWH element power consumption from 4.5 kW to 4.0 kW

**Measure Description:**
Residential heat pump rebates are available at $175. Rebate applications for water heaters are provided by the retailers at the time of purchase or a customer can visit our website and download the form. Rebate applications must include an original purchase receipt showing brand and model number.

**Baseline Efficiencies:**

The base case is a standard electric resistance water heater (SERWH).

| Measure | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| SERWH | 0.57 | 2,732 |

**High Efficiency:**

| Measure | Demand Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Heat Pump Water Heating | 0.36 | 1,230 |

**Energy Savings:**

| | Demand Savings (kW) | Energy Savings (kWh/year) |
|---|---|---|
| Savings | 0.25 | 1,503 |

## Savings Algorithms

**Heat Pump Water Heater**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.1 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,000 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,000 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,459 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,732 | kWh / Year | KEMA 2008 - HECO |
| Energy (kWh) Needed to Heat Water per Year | | 2,459 | kWh / Year | |
| Heat Pump Water Heating Efficiency | ÷ | 2.00 | COP | |
| Heat Pump Water Heating Energy Usage | | 1,230 | kWh / Year | |
| Base SERWH Energy Usage per Year at the Meter | | 2,732 | kWh / Year | |
| Heat Pump Water Heating Energy Usage | - | 1,230 | kWh / Year | |
| Residential Heat Pump Water Heating Savings | | 1,503 | kWh / Year | |
| Heat Pump Power Consumption | | 4.5 | kW | |
| Coincedence Factor | x | 0.08 | cf | 4.80 Minutes per hour |
| | | 0.36 | kW On Peak | |
| Base SERWH Element Power Consumption | | 4.0 | kW | |
| Coincidence Factor | x | 0.143 | cf | 8.6 Minutes per hour |
| Base SERWH On Peak Demand | | 0.57 | kW On Peak | KEMA 2008 |
| Base SERWH On Peak Demand | - | 0.57 | kW On Peak | |
| Heat Pump Water Heater Demand | - | 0.36 | kW On Peak | KEMA 2008 |
| | | 0.21 | kW On Peak | |
| **Residential Solar Water Heater Demand Savings** | | **0.21** | **kW Savings** | |

**Operating Hours**
See Table above.

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Persistence**

**Lifetime**
10 years (DEER)

**Measure Costs and Incentive Levels**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Heat Pump Water Heater | $ 175.00 | $ 4,000.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**

## 8.2 High Efficiency Lighting

### 8.2.1 Compact Fluorescent Lamp (CFL)

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07)
- Econorthwest TRM Review – 6/23/10
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. # 8 – Starting with PY2010, adjust the hours used per day for CFLs from 4.98 to 2.3 in order to be consistent with other literature. Conduct additional research to verify the most appropriate hours of operation for the Hawaii customer base, which can be incorporated into future years. – Adopted.
- 6/23/10 Rec. # 9 - Starting with PY 2010, adjust the peak coincidence factor from 0.334 to 0.12 to be consistent with the literature. Conduct additional research to verify the most appropriate coincidence factor for the Hawaii customer base, which can be incorporated into future years.-Adopted.
- 10/5/11 – Currently Under Review.
- 4/17/12 – Updated persistence factor to 0.96 and removed adjustment for mix of CFL sizes found in CA study as per EMV report February 23, 2012. Updated energy and demand savings accordingly.

**Major Changes:**

- Hours used per day for CFLs from 4.98 to 2.3 hrs.
- Peak coincidence factor from 0.334 to 0.12
- Persistence factor changed from 0.80 to 0.96 as per EMV
- Adjustment for mix of CFL sized found in CA study removed as per EMV

**Measure Description:**
The replacement of incandescent screw-in lamps to standard spiral compact fluorescent lamps in Residential Single Family and Multi-family homes.

Lamps must comply with:

- Energy Star
- UL

**Baseline Efficiencies:**
Baseline usage is a 60W A-Shaped incandescent lamp with the energy consumption as follows:

| Building Types | Demand Baseline(kW) | Energy Baseline (kWh) |
|---|---|---|
| Single Family | 0.060 | 50.4 |
| Multi Family | 0.060 | 50.4 |

**High Efficiency:**
The high efficiency case is a 15W Spiral CFL with the energy consumption as follows:

| Building Types | Demand High Efficiency (kW) | Energy High Efficiency (kWh) |
|---|---|---|
| Single Family | 0.015 | 12.6 |
| Multi Family | 0.015 | 12.6 |

**Energy Savings:**
CFL Gross Savings before operational adjustments:

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Single Family | 0.005 | 36.3 |
| Multi Family | 0.005 | 36.3 |

CFL Net Savings after operational adjustments:

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 0.960 |
| Demand Coincidence Factor (cf) | 0.12 |

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Single Family | 0.005 | 36.3 |
| Multi Family | 0.005 | 36.3 |

## Savings Algorithms

| CFL - Single and Multi Family Residential Home | | | | |
|---|---|---|---|---|
| 60W Incandescent Lamp Demand | 0.060 | kW | | |
| | 2.30 | Hours per Day | | |
| | x 365 | Days | 839.5 | Hours per Year |
| 60W Incandescent Lamp Energy Usage | 50.4 | kWh per Year | | |
| | | | | |
| 15W Compact Fluorescent Lamp Demand | 0.015 | kW | | |
| | 2.30 | Hours per Day | | |
| | x 365 | Days | 839.5 | Hours per Year |
| 15W Compact Fluorescent Lamp Energy Usage | 12.6 | kWh per Year | | |
| | | | | |
| 60W Incandescent Lamp Energy Usage | 50.4 | kWh per Year | | |
| 15W Compact Fluorescent Lamp Energy Usage | - 12.6 | kWh per Year | | |
| CFL Savings Before Adjustments | 37.8 | kWh per Year | | |
| | | | | |
| | 37.8 | kWh per Year | | |
| Persistance Factor | x 0.960 | pf | 4.0% | Lamps not installed or replaced back |
| CFL Energy Savings | 36.3 | kWh per Year | | |
| | | | | |
| **CFL Energy Savings** | **36.3** | **kWh / Year Savings** | | |
| | | | | |
| 60W Incandescent Lamp Demand | 0.060 | kW | | |
| 15W Compact Fluorescent Lamp Demand | - 0.015 | kW | | |
| CFL Demand Reduction Before Adjustments | 0.045 | kW | | |
| | | | | |
| CFL Demand Reduction Before Adjustments | 0.045 | kW | | |
| Coincidence Factor | 0.120 | cf | 12.0% | Lamps on between 5 and 9 p.m. |
| Persistance Factor | x 0.960 | pf | 4.0% | Lamps not installed or replaced back |
| CFL Demand Savings | 0.005 | kW | | |
| | | | | |
| **CFL Demand Savings** | **0.005** | **kW Savings** | | |

**Operating Hours**
2.3 hours per day, 839.5 hours per year

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Demand Coincidence Factor**
Estimated coincidence factor of 0.12 cf assumes that 12% of the lamps purchased would be operating during the winter 5 p.m. to 9 p.m. weekday peak period.

**Persistence**
Estimated persistence factor of 0.96 pf which assumes 4% of the lamps purchased not installed or returned back to incandescent.

**Lifetime**
5 years

**Measure Costs and Incentive Levels**

Table 1 – Residential CFL Measure Costs and Incentive Levels

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Standard CFL - Res | $ 1.00 | $ 2.50 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

## 8.2.2 Light Emitting Diode (LED)

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- 11/21/11 – Updated tables and text in the following headings:
  - Measure description
  - Baseline efficiencies
  - High efficiency
  - Energy savings
  - Savings algorithm

  Updates made to capture a broader range of lamp types (two wattages per lamp type) and obtain more accurate savings calculations.
- 11/21/11 – Changed the following text under *Energy Savings* heading: 1) "LED Gross Savings before operational adjustments" was changed to "LED Savings before…" and 2) "CFL Net Savings after operational adjustments" was changed to "LED Savings after…"
- 11/21/11 – Under *Energy Savings* heading changed table to only one building type because savings are calculated the same between single and multi-family housing.
- Removed the 1.08 size adjustment factor.

**Measure Description:**
The replacement of a standard incandescent lamp (40W or 60W) or spiral compact fluorescent lamp (13W or 23W) with a light emitting diode (7W or 12.5 W) in both Residential Single Family and Multi-family homes.

Lamps must comply with:
- Energy Star
- UL

**Baseline Efficiencies:**

Baseline usage is a combination of standard incandescent lamp (40W or 60W) or spiral compact fluorescent lamp (15W or 23W) A-Shaped incandescent lamp with the energy consumption as follows:

| Baseline Efficiency | | | | | |
|---|---|---|---|---|---|
| **Lamp Types** | **Demand Baseline (kW)** | **Hours per Day** | **Energy Baseline (kWh/year)** | **%** | **Totals** |
| Incandescent | 0.060 | 2.3 | 50.4 | 25% | 12.59 |
| CFL | 0.015 | 2.3 | 12.6 | 25% | 3.15 |
| Incandescent | 0.040 | 2.3 | 33.6 | 25% | 8.40 |
| CFL | 0.023 | 2.3 | 19.3 | 25% | 4.83 |
| **Demand Ave** | **0.035** | | **Total Baseline Energy (kWh)** | | **28.96** |

**High Efficiency:**
The high efficiency case is a 7W or 12.5W LED with the energy consumption as follows:

| High Efficiency | | | | | |
|---|---|---|---|---|---|
| **Lamp Types** | **Demand Baseline (kW)** | **Hours per Day** | **Energy Baseline (kWh/year)** | **%** | **Totals** |
| LED | 0.007 | 2.3 | 5.9 | 50% | 2.94 |
| LED | 0.0125 | 2.3 | 10.5 | 50% | 5.25 |
| **Demand Ave** | **0.010** | | **Total High Efficiency Energy (kWh)** | | **8.19** |

**Energy Savings:**
LED Savings before operational adjustments:

| | |
|---|---|
| Total Baseline Energy (kWh) | 29.0 |
| Total High Efficiency Energy (kWh) | 8.2 |
| **Annual Energy Savings (kWh)** | **20.8** |

LED Savings after operational adjustments:

Persistence Factor (pf) 0.80
Demand Coincidence Factor (cf) 0.12

| Demand Savings (kW) | Energy Savings (kWh) |
|---|---|
| 0.003 | 16.6 |

## Savings Algorithms

**LED - Single and Multi Family Residential Home**

| | | | | |
|---|---|---|---|---|
| Lamp Average Demand | | 0.035 kW | | |
| | | 2.30 Hours per Day | | |
| | x | 365 Days | 839.50 | Hours per Year |
| Baseline Energy Usage | | 28.96 kWh per Year | | |
| | | | | |
| Enhanced LED Lamp Average Demand | | 0.010 kW | | |
| | | 2.30 Hours per Day | | |
| | x | 365 Days | 839.50 | Hours per Year |
| Enhanced LED Lamp Energy Usage | | 8.19 kWh per Year | | |
| | | | | |
| Baseline Energy Usage | | 29.0 kWh per Year | | |
| Enhanced LED Lamp Energy Usage | - | 8.2 kWh per Year | | |
| LED Savings Before Adjustments | | 20.78 kWh per Year | | |
| | | | | |
| | | 20.8 kWh per Year | | |
| Persistance Factor | x | 0.800 pf | 20.0% | Lamps not installed or replaced back |
| | | 16.6 kWh per Year | | |

**LED Energy Savings — 16.6 kWh / Year Savings**

| | | | | |
|---|---|---|---|---|
| Baseline Lamp Demand | | 0.035 kW | | |
| Enhanced LED Lamp Demand | - | 0.007 kW | | |
| LED Demand Reduction Before Adjustments | | 0.028 kW | | |
| | | | | |
| LED Demand Reduction Before Adjustments | | 0.028 kW | | |
| Coincidence Factor | | 0.120 cf | 12.0% | Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 0.800 pf | 20.0% | Lamps not installed or replaced back |
| | | 0.003 kW | | |

**LED Demand Savings — 0.003 kW Savings**

**Operating Hours**
2.3 hours per day, 839.5 hours per year

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Demand Coincidence Factor**
Estimated coincidence factor of 0.12 cf assumes that 12% of the lamps purchased would be operating during the winter 5 p.m. to 9 p.m. weekday peak period.

**Persistence**
Estimated persistence factor of 0.80 pf which assumes 20% of the lamps purchased not installed or returned back to incandescent.

**Lifetime**
5 years

**Measure Costs and Incentive Levels**

Table 1 – Residential LED Measure Costs and Incentive Levels

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| LED - Res | $ 10.00 | $ 35.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

### 8.2.3 Residential Daylighting

Measure ID:

Version Date & Revision History
Draft date:
Effective date: March 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- http://www.solatube.co.uk/Residential/solatube-product-info/unrivalled-performance/index.php

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- New program measure

**Measure Description:**
A tubular daylighting device (TDD) is a non-operable device primarily designed to transmit daylight from a roof surface of a residential building to an interior ceiling surface via a tubular conduit. The device consists of an exterior glazed weathering surface, a light transmitting tube with a reflective inside surface and an interior sealing device, such as a translucent ceiling panel.

**Baseline Efficiencies:**
The baseline efficiency case is utilizing both incandescent and CFLs as a 50% mix for each. Two (2) incandescent lamps rated at 75 watts and two (2) CFLs rated at 18 watts each are utilized on average for the basecase.

| Baseline Efficiency | | | | | | |
|---|---|---|---|---|---|---|
| **Lamp Types** | **Quantity** | **Demand Baseline (kW)** | **Total Demand Baseline (kW)** | **Hours per Day** | **Totals (kWh/year)** | **Lumens** |
| Incandescent | 2 | 0.075 | 0.150 | 2.3 | 125.93 | 2400 |
| CFL | 2 | 0.018 | 0.036 | 2.3 | 30.22 | 2350 |
| **Demand Ave** | | | **0.186** | | **156.15** | **4750** |

**High Efficiency:**
High efficiency case is the installation of a tubular daylighting device (TDD)

**Energy Savings:**
Annual energy savings = 156.15 kWh/year
Demand savings = 0 kW (5PM-9PM)

## Savings Algorithms

| Daylighting | | | | |
|---|---|---|---|---|
| Lamp Average Demand | | 0.186 | kW | |
| | | 2.3 | Hours per Day | |
| | x | 365 | Days | 840 Hours per ` |
| Baseline Energy Usage | | 156.15 | kWh per Year | |

| Incandescent | |
|---|---|
| 125.93 | kWh/Year |
| 840 | hours/year |
| 0.15 | kW |
| 150 | Watts |
| 75 | Watt Incandescent |
| 2.0 | Lamps turned off |
| 2,400 | Lumens |

| Compact Fluoruescent Lamps | |
|---|---|
| 30.22 | kWh/Year |
| 840 | hours/year |
| 0.036 | kW |
| 36 | Watts |
| 18 | Watt CFL |
| 2.0 | Lamps turned off |
| 2,350 | Lumens |

| Lamp | Watts | Lumens | Type |
|---|---|---|---|
| A19 | 40 | 480 | Incandescent |
| A19 | 60 | 880 | Incandescent |
| A19 | 75 | 1200 | Incandescent |
| A19 | 100 | 1750 | Incandescent |
| A19 | 7 | 400 | CFL |
| A19 | 13 | 800 | CFL |
| A19 | 18 | 1175 | CFL |
| A19 | 27 | 1675 | CFL |

**Operating Hours**
2.3 hours per day

**Demand Coincidence Factor**
Coincidence Factor = 0
No demand savings between 5PM – 9PM

**Persistence**
Persistence = 1

**Lifetime**
10 years

**Measure Costs and Incentive Levels**
Incentive = $75/unit
Installed Cost = $700

## 8.3 High Efficiency Air Conditioning

### 8.3.1 Ductless Split AC

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- HECO DSM Docket – Backup Worksheets - Global Energy (07-14-06)
- Econorthwest TRM Review – 6/23/10
- Energy Star Calculator
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- No changes recommended

**Measure Description:**
The selection of a new 12.0 EEER Ductless Split Air Conditioner versus or replacing a standard 9.8 EER Room Air Conditioner in Residential Single Family and Multi-family homes.

Appliances must comply with:

- Energy Star

*Energy Star Air Conditioners* – use at least 10% less energy than conventional models and often include timers for better temperature control, allowing you to use the minimum amount of energy you need to cool your room.

**Baseline Efficiencies:**

Base efficiency is a window a/c unit or central AC with 9.8 EER.

| | Demand Baseline (kW) | Energy Baseline (kWh) | Notes |
|---|---|---|---|
| Non ES Qualifying Room AC | 1.224 | 6,142 | 9.8 EER, 12,000 BTUh |

**High Efficiency:**
The high efficiency case Energy Star energy usage based on 2009 Energy Star Information for Ductless Split AC is as follows:

Energy Star Criteria is 12 EER

| | Demand High Efficiency (kW) | Energy High Efficiency (kWh) | Notes |
|---|---|---|---|
| ES Qualifying Room AC | 1.0 | 5,016 | 12.0 EER, 12,000 BTUh |

**Energy Savings:**
Energy Star Ductless Split AC Gross Savings before operational adjustments:

| | Demand Savings (kW) | Energy Savings (kWh) | Notes |
|---|---|---|---|
| ES Qualifying Room AC | 0.224 | 1,126 | 9.8 to12.0 EER, 12,000 BTUh |

Energy Star Appliance Net Savings after operational adjustments:

| Single Family versus Multi Family Factored Energy Savings | Adjustment Factor* | Energy Savings (kWh) |
|---|---|---|
| Single Family Home AC Energy Savings | 46% | 518 |
| Multi Family Home AC Energy Savings | 25% | 276 |

| Contribution Factored Measure Savings | Contribution | Net Energy Savings (kWh) |
|---|---|---|
| Single Family Contribution Energy Savings | 40% | 207 |
| Multi Family Contribution Energy Savings | 60% | 166 |
| Energy Star Room AC Measure Energy Savings | 100% | 373 |

| | Operational Factor | Adjustment Factor | Gross Unit Demand Savings (kW) | Adjusted for Home Unit Demand Savings (kW) |
|---|---|---|---|---|
| Single Family | Demand Coincidence Factor (cf) | 1.00 | 0.224 | 0.224 |
| Multi Family | Demand Coincidence Factor (cf) | 0.74 | 0.224 | 0.167 |
| Single & Multi Family | Persistence Factor (pf) | 1.00 | | |

| Contribution Factored Demand Savings | Per Home Factored Demand Savings (kW) | Contribution | Measure Demand Savings (kW) |
|---|---|---|---|
| Single Family Contribution Demand Savings | 0.224 | 40% | 0.09 |
| Multi Family Contribution Demand Savings | 0.167 | 60% | 0.10 |
| Energy Star Ductless Split AC Measure Energy Savings | | 100% | 0.19 |

## Savings Algorithms

**Ductless Split - Single and Multi Family Residential Home**

| | | | | |
|---|---|---|---|---|
| Base Case | | | | |
| Conventional Room AC Built After 1994 | | | | |
| Average Unit Cooling Capacity | | 12,000 | BTU / Hr | ( Equals 1 Ton Cooling Capacity) |
| Energy Efficiency Ratio | ÷ | 9.8 | EER | DOE Federal Test Procedure 10CFR 430, Appendix F |
| Full Load Demand | | 1,224.5 | Watts | |
| Conversion | ÷ | 1,000.0 | Watts / kW | |
| Full Load Demand | | 1.2 | kW | |
| | | | | |
| Conventional Room AC Full Load Demand | | 1.2 | kW | |
| Honolulu Full Load Equivalent Cooling Hours | x | 5,016.0 | Hours per Year | EPA 2002 |
| Conventional Room AC Annual Energy Consumption | | 6,142.0 | kWh per Year | |
| | | | | |
| Energy Star Qualified Ductless Split AC | | | | |
| Average Unit Cooling Capacity | | 12,000 | BTU / Hr | ( Equals 1 Ton Cooling Capacity) |
| Energy Efficiency Ratio | ÷ | 12.0 | EER | HECO DSM Docket 2006 - Global Energy Partners |
| Full Load Demand | | 1,000.0 | Watts | (Energy Star Criteria = 10.8 EER) |
| Conversion | ÷ | 1,000.0 | Watts / kW | |
| Full Load Demand | | 1.0 | kW | |
| | | | | |
| Energy Star Ductless Split AC Full Load Demand | | 1.0 | kW | |
| Honolulu Full Load Equivalent Cooling Hours | x | 5,016.0 | Hours per Year | EPA 2002 |
| Energy Star Ductless Split Annual Energy Consumption | | 5,016.0 | kWh per Year | |
| | | | | |
| Conventional Room AC Annual Energy Consumption | | 6,142.0 | kWh per Year | |
| Energy Star Ductless Split Annual Energy Consumption | - | 5,016.0 | kWh per Year | |
| Energy Star Ductless Split Annual Energy Savings | | 1,126.0 | kWh per Year | Energy Star Consumer Room AC Calculator Cadmus 4/2009 |
| | | | | |
| Energy Star Ductless Split Annual Energy Savings | | 1,126 | kWh per Year | |
| Single Family Use Factor | x | 0.46 | | 2,307 Single Family Full Load Operating Hours (inferred) |
| Single Family ES Ductless Split AC Annual Energy Savings | | 518 | kWh per Year | |
| | | | | |
| Energy Star Ductless Split Annual Energy Savings | | 1,126 | kWh per Year | |
| Multi Family Use Factor | x | 0.25 | | 1,229 Multi Family Full Load Operating Hours (inferred) |
| Multi Family ES Ductless Split AC Annual Energy Savings | | 276 | kWh per Year | |
| | | | | |
| Single Family Use Weighting | | 40% | | HECO DSM Docket 2006 - Global Energy Partners |
| Multi Family Use Weighting | | 60% | | HECO DSM Docket 2006 - Global Energy Partners |
| | | | | |
| Single Family ES Ductless Split AC Annual Energy Savings | | 518 | kWh per Year | |
| Single Family Use Weighting | x | 40% | | |
| Single Family Savings Contribution to Measure | | 207 | kWh per Year | |
| | | | | |
| Multi Family ES Ductless Split AC Annual Energy Savings | | 276 | kWh per Year | |
| Multi Family Use Weighting | x | 60% | | |
| Multi Family Savings Contribution to Measure | | 166 | kWh per Year | |
| | | | | |
| Single Family Savings Contribution to Measure | | 207 | kWh per Year | |
| Multi Family Savings Contribution to Measure | + | 166 | kWh per Year | |
| | | 373 | kWh per Year | |
| | | | | |
| | | 373 | | |
| Persistance Factor | x | 1 | pf | 100.0% |
| | | 373 | kWh per Year | |
| **Ductless Split AC Energy Savings** | | **373** | **kWh / Year Savings** | |

| | | | | |
|---|---|---|---|---|
| Conventional Room AC Full Load Demand | | 1.224 | kW | 0.225 |
| Energy Star Ductless Split AC Full Load Demand | - | 1.000 | kW | 0.167 |
| Ductless Split AC Demand Reduction Before Adjustments | | 0.224 | kW | |
| | | | | |
| Single Family | | | | |
| Ductless Split AC Demand Reduction Before Adjustments | | 0.224 | kW | |
| On Peak Demand Coincidence Factor | x | 1.00 | cf | 100.0% Single Family ACs on between 5 and 9 p.m. |
| Single Family Demand Savings | | 0.224 | kW | |
| Single Family Use Weighting | x | 40% | | |
| Single Family Savings Contribution to Measure | | 0.090 | kW | |
| | | | | |
| Multi Family | | | | |
| Ductless Split AC Demand Reduction Before Adjustments | | 0.224 | kW | |
| On Peak Demand Coincidence Factor | x | 0.74 | cf | 74.4% Multi Family ACs on between 5 and 9 p.m. |
| Multi Family Demand Savings | | 0.167 | kW | |
| Multi Family Use Weighting | + | 60% | | |
| Multi Family Savings Contribution to Measure | | 0.100 | kW | |
| | | | | |
| Single Family Savings Contribution to Measure | | 0.09 | kW | |
| Multi Family Savings Contribution to Measure | x | 0.10 | kW | |
| Ductless Split AC Measure Demand Savings | | 0.19 | kW | |
| | | | | |
| Ductless Split AC Measure Demand Savings | | 0.190 | kW | |
| Persistance Factor | x | 1.0 | pf | 100.0% ACs installed and operational at EER Efficiency |
| | | 0.19 | kW | |
| **Single & Multi Family Ductless Split AC Demand Savings** | | **0.19** | **kW Savings** | |

**Operating Hours**

Room AC = 5,016 hours per year EPA 2002
Single Family Room AC = 2,307 hours per year.
Multi Family Room AC = 1,229 hours per year

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Demand Coincidence Factor**
NA

**Persistence**
NA

**Lifetime**
12 years

**Measure Costs and Incentive Levels**

Table 1 – Residential CFL Measure Costs and Incentive Levels

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| ES Ductless Split AC | $110 | $ 1000 per ton |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

## 8.3.2 VRF Split System AC

Measure ID: See Table 7.3 (TBD)
Measure Code: Inverter VRF AC

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Description:** Inverter driven variable refrigerant flow (VRF) air conditioning systems are direct expansion AC systems that utilize variable speed evaporator/condenser fans, and a combination of fixed and variable speed compressors along with most often multiple individual zone evaporators to provide the ability to more closely match the AC system's output with the building's cooling requirements.
Savings comes from:
- *Part Load Efficiencies*: Increased part-load efficiency operation
- *High Efficiency Motors*: Many systems use ECM motors
- *Higher Room Temperatures*: The capacity matching allows for better humidity control through longer cooling operation.
- *Reduction of Distribution Losses*: Duct losses are reduced with DX systems. This may be offset by dedicated outside air distribution systems when needed.

**Payback Qualifications:** VRF products need a payback requirement of 1 year or greater. The TRB/TRC must be greater than 1.

**Energy and Demand Savings:** VRF systems have demonstrated a 20-30% reduction in energy consumption as compared to standard DX equipment. The energy savings and demand tables that follow provide the savings by building type and system size for VRF systems.

The VRF applications have been new construction projects with no ability to perform pre and post measurements. Hawaii Energy will perform field pre and post field measurements to determine the measure effectiveness in the local environment

## Savings Algorithms

| | | | | |
|---|---|---|---|---|
| **VRF Split System AC - Single and Multi Family Residential Home** | | | | |
| Base Case | | | | |
| Conventional Room AC Built After 1994 | | | | |
| Average Unit Cooling Capacity | | 12,000 | BTU / Hr | ( Equals 1 Ton Cooling Capacity) |
| Energy Efficiency Ratio | ÷ | 9.8 | EER | DOE Federal Test Procedure 10CFR 430, Appendix F |
| Full Load Demand | | 1,224.5 | Watts | |
| Conversion | ÷ | 1,000.0 | Watts / kW | |
| Full Load Demand | | 1.2 | kW | |
| Conventional Room AC Full Load Demand | | 1.2 | kW | |
| Honolulu Full Load Equivalent Cooling Hours | x | 5,016.0 | Hours per Year | EPA 2002 |
| Conventional Room AC Annual Energy Consumption | | 6,142.0 | kWh per Year | |
| VRF Split System AC | | | | |
| Average Unit Cooling Capacity | | 12,000 | BTU / Hr | ( Equals 1 Ton Cooling Capacity) |
| Energy Efficiency Ratio | ÷ | 13.0 | EER | Minimum Requirement (AHRI 1230) |
| Full Load Demand | | 923.1 | Watts | (Energy Star Criteria = 10.8 EER) |
| Conversion | ÷ | 1,000.0 | Watts / kW | |
| Full Load Demand | | 0.9 | kW | |
| VRFSplit AC Full Load Demand | | 0.923 | kW | |
| Honolulu Full Load Equivalent Cooling Hours | x | 5,016.0 | Hours per Year | EPA 2002 |
| VRF Split Annual Energy Consumption | | 4,630.2 | kWh per Year | |
| Conventional Room AC Annual Energy Consumption | | 6,142.0 | kWh per Year | |
| VRF Split Annual Energy Consumption | - | 4,630.2 | kWh per Year | |
| VRF Split Annual Energy Savings | | 1,511.9 | kWh per Year | |
| VRF Split Annual Energy Savings | | 1,512 | kWh per Year | |
| Single Family Use Factor | x | 0.46 | | 2,307 Single Family Full Load Operating Hours (inferred) |
| Single Family VRF Split AC Annual Energy Savings | | 695 | kWh per Year | |
| VRF Split Annual Energy Savings | | 1,512 | kWh per Year | |
| Multi Family Use Factor | x | 0.25 | | 1,135 Multi Family Full Load Operating Hours (inferred) |
| Multi FamilyVRF Split AC Annual Energy Savings | | 371 | kWh per Year | |
| Single Family Use Weighting | | 40% | | HECO DSM Docket 2006 - Global Energy Partners |
| Multi Family Use Weighting | | 60% | | HECO DSM Docket 2006 - Global Energy Partners |
| Single Family VRF Split AC Annual Energy Savings | | 695 | kWh per Year | |
| Single Family Use Weighting | x | 40% | | |
| Single Family Savings Contribution to Measure | | 278 | kWh per Year | |
| Multi FamilyVRF Split AC Annual Energy Savings | | 370.5734266 | kWh per Year | |
| Multi Family Use Weighting | x | 60% | | |
| Multi Family Savings Contribution to Measure | | 222 | kWh per Year | |
| Single Family Savings Contribution to Measure | - | 278 | kWh per Year | |
| Multi Family Savings Contribution to Measure | + | 222 | kWh per Year | |
| | | 501 | kWh per Year | |
| | | 501 | | |
| Persistance Factor | x | 1 | pf | 100.0% |
| | | 501 | kWh per Year | |
| **VRF Split AC Energy Savings** | | **501** | **kWh / Year Savings** | |
| Conventional Room AC Full Load Demand | | 1.224 | kW | 0.225 |
| VRF Split AC Full Load Demand | - | 0.923 | kW | 0.167 |
| VRF AC Demand Reduction Before Adjustments | | 0.301 | kW | |
| Single Family | | | | |
| VRF Split AC Demand Reduction Before Adjustments | | 0.301 | kW | |
| On Peak Demand Coincidence Factor | x | 1.00 | cf | 100.0% Single Family ACs on between 5 and 9 p.m. |
| Single Family Demand Savings | | 0.301 | kW | |
| Single Family Use Weighting | x | 40% | | |
| Single Family Savings Contribution to Measure | | 0.121 | kW | |
| Multi Family | | | | |
| VRF Split AC Demand Reduction Before Adjustments | | 0.301 | kW | |
| On Peak Demand Coincidence Factor | x | 0.74 | cf | 74.4% Multi Family ACs on between 5 and 9 p.m. |
| Multi Family Demand Savings | | 0.224 | kW | |
| Multi Family Use Weighting | + | 60% | | |
| Multi Family Savings Contribution to Measure | | 0.135 | kW | |
| Single Family Savings Contribution to Measure | | 0.12 | kW | |
| Multi Family Savings Contribution to Measure | x | 0.13 | kW | |
| VRF Split AC Measure Demand Savings | | 0.26 | kW | |
| VRF Split AC Measure Demand Savings | - | 0.255 | kW | |
| Persistance Factor | x | 1.0 | pf | 100.0% ACs installed and operational at EER Efficiency |
| | | 0.26 | kW | |
| **Single & Multi Family VRF Split AC Demand Savings** | | **0.26** | **kW Savings** | |

## 8.3.3 Ceiling Fans

Measure ID: See Table 7.3
Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- ENERGY STAR Ceiling Fan Savings Calculator

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
This measure describes the instillation of an ENERGY STAR ceiling fan that uses a high efficiency motor and contains compact fluorescent bulbs in place of a standard fan with integral incandescent bulbs.

**Baseline Efficiencies:**
The baseline equipment is assumed to be a standard fan with integral incandescent bulbs.

**High Efficiency:**
The efficient equipment must be an ENERGY STAR certified ceiling fan with integral CFL bulbs.

**Energy Savings:**

| | Average Annual kWh savings per unit | Average Coincident Peak kW savings per unit |
|---|---|---|
| 2010 - 2013 | 167 | 0.019 |
| 2014 on | 97 | 0.012 |

$$\Delta kWh = ((\%_{low} * (LowKW_{base} - LowKW_{ee}) + \%_{med} * (MedKW_{base} - MedKW_{ee}) + \%_{high} * (HighKW_{base} - HighKW_{ee})) * HOURS_{fan}) + ((IncKW – CFLKW) * HOURS_{light} * WHFe)$$

Where:

| | | |
|---|---|---|
| $\%_{low}$ | = Percent of time on Low Speed | = 40% |
| $\%_{med}$ | = Percent of time on Medium Speed | = 40% |
| $\%_{high}$ | = Percent of time on High Speed | = 20% |
| $LowWatt_{base}$ | = Low speed baseline ceiling fan wattage | = 0.0152 kW |
| $LowWatt_{ee}$ | = Low speed ENERGY STAR ceiling fan wattage | = 0.0117 kW |
| $MedWatt_{base}$ | = Medium speed baseline ceiling fan wattage | = 0.0348 kW |
| $MedWatt_{ee}$ | = Medium speed ENERGY STAR ceiling fan wattage | = 0.0314 kW |
| $HighWatt_{base}$ | = High speed baseline ceiling fan wattage | = 0.0725 kW |
| $HighWatt_{ee}$ | = High speed ENERGY STAR ceiling fan wattage | = 0.0715 kW |
| $HOURS_{fan}$ | = Typical fan operating hours (2.8/day, 365 days per year) | = 1022 hours |
| IncWatt | = Incandescent bulb kW (assumes 3 * 60W bulb) | = 0.180kW |
| CFLWatt | = CFL bulb kW (assumes 3 * 20W bulb) | = 0.060kW |
| $HOURS_{light}$ | = Typical lighting operating hours (3.5/day, 365 days per year) | = 1277.5 hours |
| WHFe | = Waste Heat Factor for Energy to account for cooling savings from Efficient lighting. | = 1.07 |

ΔkWh = ((0.4 * (0.0152 – 0.0117) + 0.4 * (0.0348 – 0.0314) + 0.2 * (0.0725 – 0.0715)) * 1022) + ((0.18 – 0.06) * 1277.5 * 1.07)

= **167 kWh**

**<u>Baseline Adjustment</u>**
Federal legislation stemming from the Energy Independence and Security Act of 2007 will require all general-purpose light bulbs between 40 and 100W to be approximately 30% more energy efficient than current incandescent bulbs, in essence beginning the phase out of standard incandescent bulbs. In 2012 100W incandescents will no longer be manufactured, followed by restrictions on 75W in 2013 and 60W in 2014. The baseline for this measure will therefore become bulbs (improved incandescent or halogen) that meet the new standard. To account for these new standards, first year annual savings for this measure must be reduced beginning in 2014. This measure assumes 60W baseline bulbs, which in 2014 will become 43W and so the annual savings beginning in 2014 should therefore be:

ΔkWh = ((0.4 * (0.0152 – 0.0117) + 0.4 * (0.0348 – 0.0314) + 0.2 * (0.0725 – 0.0715)) * 1022) + ((0.129 – 0.06) * 1277.5 * 1.07)

= **97 kWh**

In addition, since during the lifetime of a CFL, the baseline incandescent bulb will be replaced multiple times, the annual savings claim must be reduced within the life of the measure. Therefore, for bulbs installed in 2010, the full savings (167kWh) should be claimed for the first four years, but the reduced annual savings (97kWh) claimed for the remainder of the measure life. The savings adjustment is therefore equal to 97/167 = 58%.

**<u>Coincident Peak Demand Savings</u>**

ΔkW = (%low * (LowKWbase - LowKWee) + %med * (MedKWbase - MedKWee) + %high * (HighKWbase - HighKWee)) + ((IncKW – CFLKW) * WHFd) * CF

Where:

WHFd = Waste Heat Factor for Demand to account for cooling savings from efficient lighting
= 1.21

CF = Peak Coincidence Factor for measure
= 0.11

ΔkW = ((0.4 * (0.0152 – 0.0117) + 0.4 * (0.0348 – 0.0314) + 0.2 * (0.0725 – 0.0715)) + ((0.18 – 0.06) * 1.21) * 0.11

ΔkW = **0.019kW**

After 2014, this will be reduced to:

ΔkW = ((0.4 * (0.0152 – 0.0117) + 0.4 * (0.0348 – 0.0314) + 0.2 * (0.0725 – 0.0715)) + ((0.129 – 0.06) * 1.21) * 0.11

ΔkW = **0.012kW**

**Operating Hours**
See Table above.

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Lifetime**
5 years (DEER)

**Measure Costs and Incentive Levels**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Ceiling Fan | $ 40.00 | $ 86.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

## 8.3.4 Solar Attic Fans

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:** Solar attic fan is assumed to reduce 10% of existing air conditioning load energy usage and no demand reduction from 5PM – 9PM.

**Baseline Efficiencies:**

The baseline case is no solar attic fan.

| Base Case | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| No Solar Attic Fan | 1.00 | 5,016 |

**High Efficiency:**

| High Efficiency Case | Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Solar Attic Fan | 1.00 | 4,514 |

**Energy Savings:**

| Savings Type | Gross Customer Savings (kW) | Gross Customer Savings (kWh/year) |
|---|---|---|
| Gross Savings | 0.00 | 502 |

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 0.00 |
| Demand Coincidence Factor (cf) | 0.00 |

| Savings Type | Net Customer Savings (kW) | Net Customer Savings (kWh/year) |
|---|---|---|
| Net Savings | 0.000 | 502 |

## Savings Algorithms

| Solar Attic Fan - Single Family Residential Home | | | |
|---|---|---|---|
| Energy Star Room AC Full Load Demand | | 1.0 | kW |
| Honolulu Full Load Equivalent Cooling Hours | x | 5,016 | Hours per Year |
| Energy Star Room AC Annual Energy Consumption | | 5,016 | kWh per Year |
| | | | |
| Energy Reduction Percentage with Solar Attic Fan | | 10.0% | |
| Energy Usage with Solar Attic Fan | | 4,514 | kWh / Year Savings |
| | | | |
| Energy Star Room AC Annual Energy Consumption | | 5,016 | kWh / Year Savings |
| Energy Usage with Solar Attic Fan | - | 4,514 | kWh / Year Savings |
| Solar Attic Fan Annual Energy Savings | | 502 | kWh / Year Savings |
| | | | |
| Solar Attic Fan Annual Energy Savings | | 502 | kWh / Year Savings |
| Persistance Factor | x | 1.0 | |
| Net Customer Level Savings | | 502 | kWh / Year Savings |
| | | | |
| Solar Attic Fan Energy Savings | | 502 | kWh / Year Savings |
| | | | |
| Energy Star Room AC Full Load Demand | | 1.00 | kW |
| | | | |
| Peak Demand Reduction | | 0% | |
| | | | |
| AC Demand with Solar Attic Fan | | 1.00 | kW |
| | | | |
| Energy Star Room AC Full Load Demand | | 1.00 | kW |
| AC Demand with Solar Attic Fan | - | 1.00 | kW |
| Gross Customer Demand Savings | | - | kW |
| | | | |
| Solar Attic Fan Demand Savings | | 0.000 | kW Savings |

**Operating Hours**
See Table above.

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Persistence**
1.0

**Lifetime**
5 years

**Measure Costs and Incentive Levels**

| Description | Incentive | Incremental Cost |
|---|---|---|
| Solar Attic Fan | $ 25.00 | $ 500.00 |

### 8.3.5 Whole House Fans

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- KEMA for the Sate of California Low-Income Energy Efficiency Program; calmac.org/publications/2001_LIEE_Impact_Evaluation.pdf
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 4/9/12 – Energy reduction percentage changed from .25 to .2 as per the EM&V report dated 23 Feb 2012. Added reference document from EM&V report.
- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**

**Baseline Efficiencies:**

| Base Case | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| No Whole House Fan | 1.00 | 5,016 |

**High Efficiency:**

| High Efficiency Case | Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Whole House Fan | 0.15 | 3,762 |

**Energy Savings:**

| Savings Type | Gross Customer Savings (kW) | Gross Customer Savings (kWh/year) |
|---|---|---|
| Gross Savings | 0.85 | 1,254 |

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.00 |
| Demand Coincidence Factor (cf) | 0.59 |

| Savings Type | Net Customer Savings (kW) | Net Customer Savings (kWh/year) |
|---|---|---|
| Net Savings | 0.50 | 1,254 |

## Savings Algorithms

| Whole House Fan - Single Family Residential Home | | | |
|---|---|---|---|
| Energy Star Room AC Full Load Demand | | 1.0 | kW |
| Honolulu Full Load Equivalent Cooling Hours | x | 5,016 | Hours per Year |
| Energy Star Room AC Annual Energy Consumption | | 5,016 | kWh per Year |
| | | | |
| Energy Reduction Percentage with Whole House Fan | | 20.0% | |
| Energy Usage with Whole House Fan | | 4,013 | kWh / Year Savings |
| | | | |
| Energy Star Room AC Annual Energy Consumption | | 5,016 | kWh / Year Savings |
| Energy Usage with Whole House Fan | - | 4,013 | kWh / Year Savings |
| Solar Attic Fan Annual Energy Savings | | 1,003 | kWh / Year Savings |
| | | | |
| Solar Attic Fan Annual Energy Savings | | 1,003 | kWh / Year Savings |
| Persistance Factor | x | 1.0 | |
| Net Customer Level Savings | | 1,003 | kWh / Year Savings |
| | | | |
| Whole House Fan Energy Savings | | 1,003 | kWh / Year Savings |
| | | | |
| Energy Star Room AC Full Load Demand | | 1.00 | kW |
| Whole House Fan Demand | - | 0.15 | kW |
| Gross Customer Demand Reduction | | 0.85 | kW |
| | | | |
| Gross Customer Demand Reduction | | 0.850 | kW |
| | | | |
| Gross Customer Demand Reduction | | 0.850 | kW |
| Persistence Factor | | 1.000 | |
| Coincedence Factor | x | 0.590 | |
| | | | |
| Net Whole House Fan Demand Savings | | 0.50 | kW Savings |

**Operating Hours**
See Table above.

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Persistence/Coincidence Factor**

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.00 |
| Demand Coincidence Factor (cf) | 0.59 |

**Lifetime**
5 years

**Measure Costs and Incentive Levels**

| Description | Incentive | Incremental Cost |
|---|---|---|
| Whole House Fans | $ 75.00 | $ 1,000.00 |

## 8.4 High Efficiency Appliances

### 8.4.1 Energy Star Clothes Washer & Refrigerator

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- HECO DSM Docket – Backup Worksheets - Global Energy (07-14-06)
- Econorthwest TRM Review – 6/23/10
- Department of Energy Refrigerator Profile – Updated December 2009

**TRM Review Actions:**
- 6/23/10 Rec. # 11 – Revise savings to be consistent with ENERGY STAR estimates. – Adopted with modifications on refrigerator figures based on DOE Refrigerator profile and the addition of bounty, recycle with new figures.
- 6/23/10 Rec. # 12 – Split the claimed savings by appliance. – Adopted.
- 6/23/10 Rec. # 13 – Incorporate solar hot water heating into appliance savings values – Adopted.
- 6/23/10 Rec. # 14 – Revise demand savings values for ENERGY STAR appliances – Adopted.
- 10/4/11 – Removed dishwashers from appliance list.
- 4/9/12 – Baseline efficiency for non-ES Refrigerator changed from 537 to 540. Number changed to match ES data.
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Split between ESH appliances
- Incorporation of three refrigerator categories (new, new with turn in, and bounty (turn in only))
- All ESH 313 kWh and 0.12 kW changed to:
  - New ES Refrigerator Only – 105 kWh, .017 kW
  - New ES Refrigerator with Turn-In – 822 kWh, .034 kW
  - Bounty (Turn in only) – 859 kWh, .034 kW
  - Washing Machine – 206 kWh, .028 kW

**Measure Description:**
The replacement of standard Clothes Washers and Refrigerators in Residential Single Family and Multi-family homes.

Appliances must comply with:
- Energy Star

*Refrigerators* – ENERGY STAR refrigerators utilize improvements in insulation and compressors.

*Clothes Washers* – Clothes washers that meet ENERGY STAR criteria use next generation technology to cut energy and water consumption by over 40% compared to conventional washers. Clothes washers come in either front-load or redesigned top-load designs. Both configurations include technical innovations that help save substantial amounts of energy and water.
- **No Central Agitator** Front-loaders tumble clothes through a small amount of water instead of rubbing clothes against an agitator in a full tub. Advanced top loaders use sophisticated wash systems to flip or spin clothes through a reduced stream of water. Both designs dramatically reduce the amount of hot water used in the wash cycle, and the energy used to heat it.

- **High Spin Speeds** Efficient motors spin clothes two to three times faster during the spin cycle to extract more water. Less moisture in the clothes means less time and energy in the dryer.

**Baseline Efficiencies:**
Baseline energy usage based on 2009 Energy Star Information for the appliances are as follows:

| | Demand Baseline (kW) | Energy Baseline (kWh) | Notes |
|---|---|---|---|
| Non ES Qualifying Refrigerator | | 540 | 19.0-21.4 Top Freezer |
| Non ES Qualifying Clothes Washer | | 787 | 392 Loads per Year |

**High Efficiency:**
The high efficiency case Energy Star energy usage based on 2009 Energy Star Calculator Information and DOE Refrigerator Market Profile for the appliances is as follows:

| | Demand High Efficiency (kW) | Energy High Efficiency (kWh) | Notes |
|---|---|---|---|
| ES Qualifying Refrigerator | | 435 | 19.0-21.4 Top Freezer |
| ES Qualifying Clothes Washer | | 563 | 392 Loads per Year |

**Energy Savings:**

Energy Star Appliance Gross Savings before operational adjustments:

| | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| ES Refrigerator | 0.017 | 105 |
| ES Refrigerator with Turn-In | 0.034 | 822 |
| Bounty (Turn in only) | 0.034 | 859 |
| ES Washing Machine | 0.028 | 206 |

Energy Star Appliance Net Savings operational adjustments:

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.0 |
| Demand Coincidence Factor (cf) | 1.0 |

**Savings Algorithms**

**Energy Star Dishwasher & Clothes Washers - Single and Multi Family Residential Home**

Based on DOE/EPA Energy Star Calculator and Econorthwest adjustment factor

| | Standard Efficiency (kWh) | Energy Star Qualified (kWh) | Energy Savings (kWh) | Solar Water Heater Penetration Adjustment Factor | Claimed Energy Savings | Notes |
|---|---|---|---|---|---|---|
| ES Qualifying Clothes Washer | 787 | 563 | 224 | 92% | 206 | 392 Loads per Year |

**Energy Star Refrigerator and Turn In Refrigerator - Single and Multi Family Residential Home**

| Opportunity | | Energy Usage | | |
|---|---|---|---|---|
| New Non-ENERGY STAR | | 540 | | Table 2 |
| New ENERGY STAR Refrigerator | - | 435 | | Table 2 |
| | | 105 | kWh/Year | Table 1 |
| #1 - Purchase of ENERGY STAR Refrigerator | | 105 | | Table 1 |
| #2 - Removal of Old Unit from Service (off the grid) | + | 717 | | Table 1 |
| #1 + #2 = Purchase ES and Recycle old unit | | 822 | kWh/Year | |

| | Energy Usage | Ratio | Contribution | | |
|---|---|---|---|---|---|
| Post-1993 Refrigerator | 640 | 55% | 354.54 | | Table 3 |
| Pre-1993 Refrigerator | 1,131 | 45% | 504.46 | | Table 3 |
| | | | 859 | kWh/Year | |

**Table 1**

## Energy Savings Opportunities for Program Sponsors

| Opportunity | Annual Savings | | | |
|---|---|---|---|---|
| | Per Unit | | Aggregate U.S. Potential | |
| | kWh | $ | MWh | $ million |
| 1. Increase the number of buyers that purchase ENERGY STAR qualified refrigerators.<br>• 9.3 million units were sold in 2008.<br>• 70 percent were not ENERGY STAR.<br>• 6.5 million potential units per year could be upgraded. | 105 | 11.64 | 675,928 | 75 |
| 2. Decrease the number of units kept on the grid when new units are purchased.<br>• 8.7 million primary units were replaced in 2008.<br>• 44 percent remained in use, whether they were converted to second units, sold, or given away.<br>• 3.8 million units are candidates for retirement every year. | 717 | 79.53 | 2,746,062 | 305 |
| 3. Decrease the number of second units.<br>• 26 percent of households had a second refrigerator in 2008.<br>• 29.6 million units are candidates for retirement. | 859 | 95.28 | 25,442,156 | 2,822 |
| 4. Replace pre-1993 units with new ENERGY STAR qualified models.<br>• 19 percent of all units in use in 2008 were manufactured before 1993.<br>• 27.3 million total potential units are candidates for targeted replacement. | 730 | 81 | 19,946,440 | 2,212 |

Sources: See endnote 10.

**Table 2**

## Energy and Cost Comparison for Upgrading to ENERGY STAR

| Purchase Decision | New Non-ENERGY STAR Qualified Refrigerator | New ENERGY STAR Qualified Refrigerator |
|---|---|---|
| Annual Consumption | 540 kWh | 435 kWh |
| | $60 | $48 |
| Annual Savings | – | 105 kWh |
| | – | $12 |
| Average Lifetime | 12 years | 12 years |
| Lifetime Savings | – | 1,260 kWh |
| | – | $140 |
| Price Premium | – | $30 - $100 |
| Simple Payback Period | – | 3-9 years |

Note: Calculations based on shipment-weighted average annual energy consumption of 2008 models. An ENERGY STAR qualified model uses 20 percent less energy than a new non-qualified refrigerator of the same size and configuration.

Source: See endnote 10.

**Table 3**

## Energy and Cost Comparison for Removing a Second Refrigerator from the Grid

| Fate of Unit | Post-1993 Unit | | Pre-1993 Unit | |
|---|---|---|---|---|
| | Remains on the Grid | Removed from the Grid | Remains on the Grid | Removed from the Grid |
| Annual Consumption | 640 kWh | – | 1,131 kWh | – |
| | $71 | – | $125 | – |
| Annual Savings | – | 640 kWh | – | 1,131 kWh |
| | – | $71 | – | $125 |
| Average Lifetime* | 6 | – | 6 | – |
| Lifetime Savings* | – | 3,840 kWh | – | 6,788 kWh |
| | – | $426 | – | $753 |
| Removal Cost | – | $50 - $100 | – | $50 - $100 |
| Simple Payback Period | – | 1-2 years | – | <1 year |

*Assumes unit has six years of functionality remaining.

Sources: See endnote 10.

**Operating Hours**
Refrigerators = 8,760 hours per year
Clothes Washers = 392 Loads per Year

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Demand Coincidence Factor**
NA

**Persistence**
NA

**Lifetime**
(DEER) 11 years for clothes washer
(DEER) 14 years for refrigerator

**Measure Costs and Incentive Levels**

Residential Measure Costs and Incentive Levels

| Description | Unit Incentive | Incremental Cost HECO DSM Docket 2006 | Incremental Cost Energy Star 2009 |
|---|---|---|---|
| ES Refrigerator | $50 | $ 60.36 | $ 65 |
| ES Clothes Washer | $50 | $ 398.36 | $ 258 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Water Descriptions**

| | Base Water Usage (Gallons) | High Efficiency Water Usage (Gallons) | Water Savings (Gallons) | Notes |
|---|---|---|---|---|
| Refrigerator | n/a | n/a | | 19.0-21.4 Top Freezer |
| Clothes Washer | 12,179 | 5,637 | 6,542 | 392 Loads per Year |

**Reference Tables**
None

## 8.4.2 Pool VFD Controller Pumps

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Davis Energy Group (2008). Proposal Information Template for Residential Pool Pump Measure Revisions. Prepared for Pacific Gas and Electric Company; Page 2.
- Residential Retrofit High Impact Measure Evaluation Report. The Cadmus Group. February 8, 2010.

**TRM Review Actions:**

- 4/9/12 – Measure updated per EMV report February 23, 2012. Coincidence Factor of .0862 added. Added algorithm for Evergreen with 4.25 hours in place of 6 hours per day. Added Cadmus Group reference.
- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description**
A variable speed residential pool pump motor in place of a standard single speed motor of equivalent horsepower.

**Definition of Efficient Equipment**
The high efficiency equipment is a variable speed residential pool pump.

**Definition of Baseline Equipment**
The baseline efficiency equipment is assumed to be a single speed residential pool pump.

$$\Delta kWh = (kWBASE \times Hours) \times 55\%\ BASE$$

Where:

Unit = variable speed pool pump
ΔkWh = Average annual kWh reduction
Hours = Average annual operating hours of pump
kWBASE = connected kW of baseline pump
55% = average percent energy reduction *(Davis Energy Group, 2008)*

**Baseline Efficiency**
The baseline efficiency case is a single speed pump.

| | |
|---|---|
| Based Demand | 0.70 kW |
| Base Energy Usage per day | 2.97 kWh/day |
| Base Energy Usage per year | 1085 kWh/year |

**High Efficiency**
The high efficiency case is variable speed pump.

| | | |
|---|---|---|
| Demand Reduction | 10% | |
| High Efficiency Demand | 0.63 | kW |
| Energy Savings | 55% | |
| High Efficiency Energy Usage | 488 | kWh/year |

**Energy and Demand Savings**

| | | |
|---|---|---|
| Demand Savings | 1.278 | kW |
| Coincidence Factor | 0.0862 | kW |

| | | |
|---|---|---|
| Energy Savings per year | 597 | kWh/year |
| Peak Demand Reduction | 0.006 | kW |

**Savings Algorithm**

| | | |
|---|---|---|
| Average Pool Pump Horesepower | 0.75 | HP |
| Efficiency | 0.8 | |
| Hours of operation per day | 4.25 | hours |
| Number of days pool in use | 365 | days per year |
| 1 HP Equals | 0.746 | kW |

| | | |
|---|---|---|
| Based Demand | 0.70 | kW |
| Base Energy Usage per day | 2.97 | kWh/day |
| Base Energy Usage per year | 1085 | kWh/year |

| | | |
|---|---|---|
| Demand Reduction | 10% | |
| High Efficiency Demand | 0.63 | kW |
| Energy Savings | 55% | |
| High Efficiency Energy Usage | 488 | kWh/year |

| | | |
|---|---|---|
| Demand Savings | 1.278 | kW |
| Coincidence Factor | 0.0862 | kW |

| | | |
|---|---|---|
| Energy Savings per year | 597 | kWh/year |
| Peak Demand Reduction | 0.006 | kW |

**Lifetime of Efficient Equipment**
The estimated useful life for a variable speed pool pump is 10 years.

**Measure Cost**
The incremental cost is estimated to be $750 for a variable speed motor

**Incentives**
$150

## 8.5 Energy Awareness, Measurement and Control Systems

### 8.5.1 Room Occupancy Sensors

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
Flex your Power – "Occupancy sensors can reduce lighting costs by up to 50% in rooms where lights are frequently left on when on one is around."

According to the Federal Energy Management Program (FEMP) of the US Department of Energy, in a small, private office, an occupancy sensor can reduce energy use by almost 30% shaving 100kWh off the annual energy use. In a large open office area, energy use can be reduced by approximately 10%.

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
This measure is for wall switch sensors that controls the use of lighting in areas around the home with variable use such as laundry, storage, garage, bedrooms or spare areas.

Occupancy sensors must comply with:
- Energy Star
- UL Listing

**Baseline Efficiencies:**
The base case is an even split between two (2) 60W A-Shaped incandescent lamp and 15W Compact Fluorescent Lamp with the energy consumption as follows:

| Lamp Types | Demand Baseline (kW) | Hours per Day | Energy Baseline (kWh/year) | % | Totals |
|---|---|---|---|---|---|
| Incandescent | 0.060 | 2.30 | 50.4 | 50% | 25.2 kWh |
| CFL | 0.015 | 2.30 | 12.6 | 50% | 6.3 kWh |
| | | | | Watts per Lamp | 31.5 W |
| | | | | Lamps | 2 |
| | | | | Total Baseline Energy (kWh) | 63.0 kWh |

**High Efficiency:**
The high efficiency case is 33% run time reduced.

| Lamp Types | Demand Baseline (kW) | Hours per Day | Energy Baseline (kWh/year) | % | Totals |
|---|---|---|---|---|---|
| Incandescent | 0.060 | 1.54 | 33.7 | 50% | 16.9 kWh |
| CFL | 0.015 | 1.54 | 8.4 | 50% | 4.2 kWh |
| | | | | Watts per Lamp | 21.1 W |
| | | | | Lamps | 2 |
| | | | | Total High Efficiency Energy (kWh) | 42.2 kWh |

**Energy Savings:**

| | |
|---|---|
| Total Baseline Energy (kWh) | 63.0 kWh |
| Total High Efficiency Energy (kWh) | 42.2 kWh |
| | 20.8 kWh |

## Savings Algorithms

| Room Occupancy Sensors - Single and Multi Family Residential Home | | | | |
|---|---|---|---|---|
| Two (2) - Lamp Demand | | 0.075 | kW | Even split between 60W Incand. and 15W CFL |
| | | 2.30 | Hours per Day | |
| | x | 365 | Days | 839.5 Hours per Year |
| Baseline Energy Usage | | 63.0 | kWh per Year | |
| Run Time Reduced (RTR) | | 0.76 | Hours per Day | 33% |
| | | 63.0 | kWh per Year | |
| | x | 0.330 | | 33% Run Time Reduced |
| | | 20.8 | kWh per Year | |
| **Energy Savings** | | **20.8** | **kWh / Year Savings** | |
| Two Lamp Demand Reduction Before Adjustments | | 0.075 | kW | |
| Demand Reduction Before Adjustments | | 0.038 | kW | |
| Coincidence Factor | | 0.120 | cf | 12.0% Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 1.000 | pf | 100.0% |
| | | 0.0046 | kW | |
| **Demand Savings** | | **0.0046** | **kW Savings** | |

**Operating Hours**
2.3 hours per day

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Coincidence**
CF = 0.12 (12% lamps on between 5PM – 9PM)

**Persistence**
PF =1.0

**Lifetime**
8 years (DEER)

**Measure Costs and Incentive Levels**

| Measure | Incentive | Incremental Cost |
|---|---|---|
| Occupancy Sensor | $ 20.00 | $ 30.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

## 8.5.2 Peer Group Comparison

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: September 18, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- *Study 1* - Environmental Defense Fund: Behavior and Energy Savings (Matt Davis) 2011 - Reports sent to a random subset of customers are shown to reduce energy demand by **1.8%** on average, with the effectiveness of individual programs ranging from 0.9% to 2.9%.

- *Study 2* - Navigant Consulting Evaluation Report: OPOWER SMUD Pilot Year2 (February 20, 2011) - OPOWER is pleased to share the latest analysis of the nation's longest running behavioral energy program, our 35,000 household Home Energy Report deployment with Sacramento Municipal Utility District (SMUD). The analysis was led by Bill Provencher, Associate Director of the Navigant Consulting Energy Practice, and reviews data from April 2008 to October 2010. Navigant confirms the persistence, and even increase, of savings over the program's lifetime. The key findings of the updated report are:
  - Year 1 savings = **2.25%**
  - Year 2 savings = 2.89%, a 22% increase over Year 1
  - Highest savings occur during the peak season: 3.56% savings in July and August of 2009
  - No sign of impact deterioration over 30 months

- *Study 3* - DBEDT / ARRA Hawaii Energy Residential Peer Group Pilot Program – This program was implemented in 2011 for 15,000 participants with 10,000 control group. The energy savings results for the program to date are as follows:
  - April 2011: 0.60%
  - May 2011: 1.10%
  - June 2011: 1.37%
  - August 2011: 1.50%
  - Average YTD: **1.14%**

**TRM Review Actions:**

- Continue to monitor participant vs control group energy usage comparison.
- 10/5/11 – Currently Under Review.

**Major Changes:**

- New PBFA 100% funded program.
- 11/22/11 – Removed detailed table from *Energy Savings* heading – not pertinent information.

**Measure Description:**
The Behavior/Feedback programs send monthly energy use reports to participating electric customers in order to change customers' energy-use behavior. These reports rank the customers within a group of 100 similar sized homes in their neighborhood. Customers are also directed to a website with energy efficient tips and recommendations on energy conservation.

**Energy Savings**
The unit energy savings of 1.73% is deemed based on study results, forecasting and prior OPOWER program performances.

| Peer Group Program - First Year Performance Average | |
|---|---|
| Study 1 | 1.80% |
| Study 2 | 2.25% |
| Study 3 | 1.14% |
| Average | 1.73% |

Example Algorithm Calculating Customer Level Impact

$\Delta$kWh = (Total Monthly Base Energy Usage)(# of Participating Months)(%Savings)
$\Delta$kW = Annual $\Delta$kWh per Unit/ 3000 hours

Where:
Unit = One participant household
%Savings = Energy savings percent per program participant

**Baseline Efficiency**
The baseline efficiency case is the control group that does not receive behavior and feedback program reports.

**High Efficiency**
The high efficiency case is 60,000 active participants for the period from December 1, 2011 until June 30, 2012 who receives a behavior and feedback program report.

- 30,000 designated customers on Maui, Lanai and Molokai, with an effort to maximize the number of customers on Lanai and Molokai.
- 30,000 designated customers on the island of Hawaii.

**Persistence**
1 year

**Measure Life**
1 year

### 8.5.3 Whole House Energy Metering

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Hawaii Energy Historic Utility Billing Research – Residential Review 2010
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Changed energy savings from 2% to 3.8% based on EM&V Review.

**Measure Description:**
Whole house metering systems allow the occupant to see in real time the energy usage in their home. This "dashboard" allows them to see what actions and equipment drive their energy usage and the associated costs of running them. These devices collect energy data for the whole house at the panel and transmit the information to a display unit "dashboard" which can be located anywhere in the house.

**Baseline Efficiencies:**

| Building Types | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| No Metering | 1.50 | 12,000 |

**High Efficiency:**

| Building Types | Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Whole House Meter | 1.47 | 11,544 |

**Energy Savings:**

| Building Types | Gross Customer Savings (kW) | Gross Customer Savings (kWh/year) |
|---|---|---|
| Gross Customer Savings | 0.03 | 456 |

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 0.90 |
| Demand Coincidence Factor (cf) | 0.30 |

| Building Types | Net Customer Savings (kW) | Net Customer Savings (kWh/year) |
|---|---|---|
| Net Customer Savings | 0.01 | 410 |

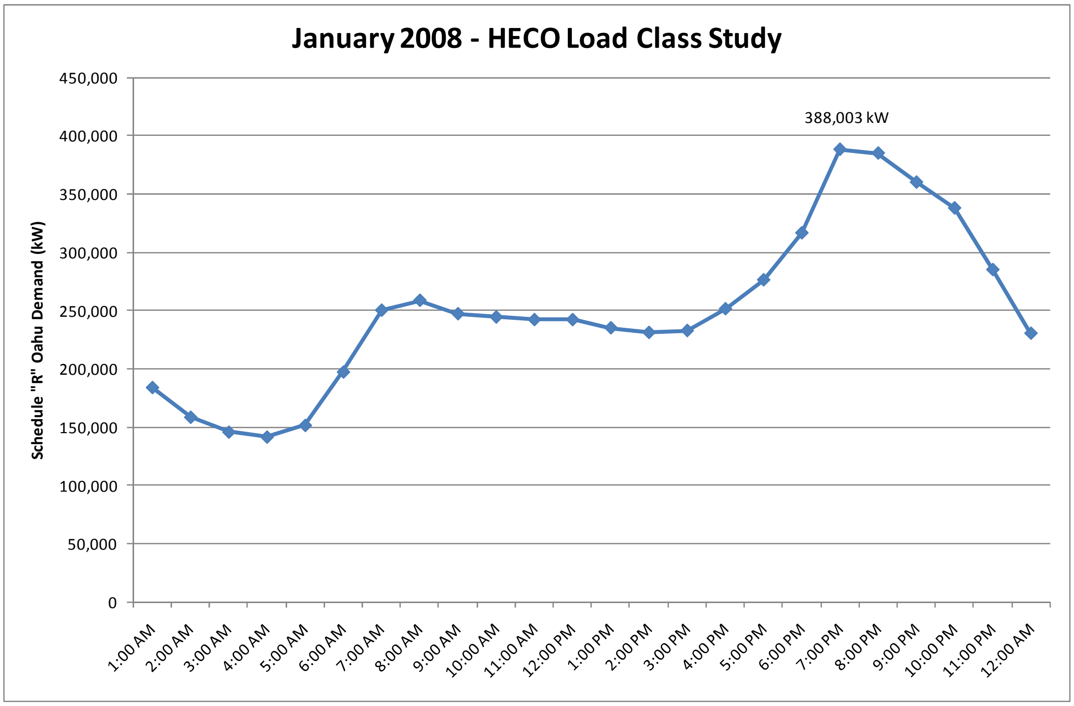
## Savings Algorithms

**Whole House Metering - Single Multi Family Residential Home**

| | | | | |
|---|---|---|---|---|
| High Energy Usage Home (85th percentile) | | 1,000 | kWh per home per month | Hawaii Energy review - HECO 2010 Data |
| | x | 12 | | |
| Baseline Household Energy Usage | | 12,000 | kWh per Year | |
| Energy Reduction | | 3.8% | | |
| Actively Informed Household Energy Usage | | 11,544 | kWh per Year | |
| Baseline Household Energy Usage | | 12,000 | kWh per Year | |
| Actively Informed Household Energy Usage | - | 11,544 | kWh per Year | |
| Gross Customer Level Energy Savings | | 456 | kwh per Year | |
| | x | 1,000 | Watts per kW | |
| | ÷ | 8,760 | Hours per Year | |
| Average 24/7 Demand Reduction | | 52 | Watts | |
| Gross Customer Level Energy Savings | | 456 | kwh per Year | |
| Persistance Factor | x | 0.9 | | |
| Net Customer Level Savings | | 410 | kwh per Year | |
| Whole House Metering Energy Savings | | 410 | kWh / Year Savings | |
| Baseline Household Demand | | 1.50 | kW | HECO 2008 Load Study |
| Peak Demand Reduction | | 1.75% | | |
| Actively Informed Household Demand | | 1.47 | kW | |
| Baseline Household Demand | | 1.50 | kW | |
| Actively Informed Household Demand | - | 1.47 | kW | |
| Gross Customer Demand Savings | | 0.026 | kW | |
| Gross Customer Demand Savings | | 0.026 | kW | |
| Persistance Factor | x | 0.90 | | |
| Coincidence Factor | x | 0.30 | | |
| | | 0.007 | kW | |
| Whole House Metering Demand Savings | | 0.007 | kW Savings | |

**Operating Hours**
8,760 hours per year

**Loadshape**
TBD




**Freeridership/Spillover Factors**
0.73

**Persistence Factor**
PF = 0.9

**Coincedence Factor**
CF= 0.3

**Lifetime**
5 years

**Measure Costs and Incentive Levels**

| | | Low | High |
|---|---|---|---|
| Measure Cost | | $100 | $450 |
| Incremental Cost | | $100 | $450 |

Incentive Level 50% up to $100

# 9 (CESH) Custom Energy Solutions for the Home

## 9.1 Target Cost Request for Proposals

### 9.1.1 Custom Packaged Proposals

Measure ID:

Version Date & Revision History
Draft date: October 4, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
Custom Packaged Proposals will be on a case-by-case review for approval. Hawaii Energy will utilize existing TRM figures, new engineering calculations, modeling simulations as well as pre and post metering as appropriate to the measures proposed.

# 10 (RESM) Residential Direct Installation

## 10.1 Residential Direct Installation

### 10.1.1 Real Time Metering

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
This program will be implemented to target residential properties that can influence the energy usage. A whole house meter will be installed by either a grassroots organization or a participating electrical contractor. After meter installation,

**Energy Savings:**
Meter data will not be shared with customers for the first month of operation to obtain baseline energy usage. After one month of operation, will be encouraged to take actions to reduce energy consumption and will have access to meter data.

**Savings Algorithms**

## 10.2 Residential Design and Audits

### 10.2.1 Efficiency Inside (New Home Construction Incentive)

Measure ID: See Table 7.3 (TBD)
Measure Code: Efficiency Inside

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Description:** This measure provides developers with financial, technical and other assistance to promote the
construction of homes that require the least amount of air conditioning to meet customer demands.
It is assumed that all new homes will have Solar Water Heating, Energy Star Appliances, and CFLs.
The components are:

- *Energy Model Review* – Used to compare the projected home performance as compared to an IECC
2006 built home. At least 6 scenarios must be modeled (IECC 2006, Proposed Home, Proposed with
Cool Roof, Proposed with 4.0 ACH @ 50Pa, Proposed other energy feature, Proposed home with all
modeled features).
- *Construction Quality Control (CQC)* – Mandatory inspections of a sampling of units during construction
to insure best construction practices are used to maximize design and to encourage field improvements. (Sampled)
- *Performance Testing (PT)* – A sampling of units tested to document the final result of the design and
building practices.
- *Whole House Metering System* – Permanent devices to support home owner energy awareness and
persistence of savings.

Savings comes from:

- *Lower Cooling Loads*: Through design and construction techniques.
- *Right Sizing of AC Systems*: Selection of smaller ACs match energy models load determination.
- *Energy Use Awareness*: Home equipped with metering will have greater user awareness that will drive energy use behavior.

**Energy and Demand Savings:** It is expected that the best built homes systems will provide a 20-30% reduction in energy consumption as compared to IECC 2006 code built homes. Net zero homes will provide
100% reductions.

- *Energy Modeling*: Energy savings will be determined through the cooling reductions modeled. This will be a combination of the construction and AC equipment selection.
- *Net Zero*: Net zero homes with PV are allowed and the predicted PV system output will be included in energy savings.

### Sample New Home Construction Worksheet

**Efficiency Inside - Hawaii Energy New Residential Home Construction Incentive Program**

| Contractor | Project | Type | Units | Start | End | Modeled Scenarios | Scenario Energy Usage (kWh/year) | Over Baseline Savings (kWh/year) | Quality Inspections | Performance Tested | Adopted Recommendations | Solar Thermal | Energy Star Appl. | CFLs | Low Wattage T8 | Per Unit Incentive | Total Incentive | Project Status | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GC Pacific | 60 Parkside | Multi | 60 | Oct-2011 | Jun-2011 | 1. Baseline - IECC 2006 | | | 20% | 20% | | | | | | $450 | $27,000 | Approved | x |
| | | | | | | 2. Energy Star Roof | | | | | | | | | | | | Modeled | |
| | | | | | | 3. Insulation / HP Window options | | | | | | | | | | | | Inspected | |
| | | | | | | 4. Air tightness (4.0 @ 50 pa) | | | | | | | | | | | | Tested | |
| | | | | | | 5. AC Equipment Sizing & Technology | | | | | | | | | | | | M&V | |
| | | | | | | 6. As Constructed | | 2,400 | | | | | | | | | | Paid | |
| Gentry Pacific | | Single | 120 | Oct-2011 | Jun-2011 | 1. Baseline - IECC 2006 | | | 20% | 20% | | | | | | $600 | $72,000 | Approved | |
| | | | | | | 2. Energy Star Roof | | | | | | | | | | | | Modeled | |
| | | | | | | 3. Insulation / HP Window options | | | | | | | | | | | | Inspected | |
| | | | | | | 4. Air tightness (4.0 @ 50 pa) | | | | | | | | | | | | Tested | |
| | | | | | | 5. AC Equipment Sizing & Technology | | | | | | | | | | | | M&V | |
| | | | | | | 6. As Constructed | | 3,200 | | | | | | | | | | Paid | |
| Haseko | | Single | 120 | Oct-2011 | Jun-2011 | 1. Baseline - IECC 2006 | | | 20% | 20% | | | | | | $600 | $72,000 | Approved | |
| | | | | | | 2. Energy Star Roof | | | | | | | | | | | | Modeled | |
| | | | | | | 3. Insulation / HP Window options | | | | | | | | | | | | Inspected | |
| | | | | | | 4. Air tightness (4.0 @ 50 pa) | | | | | | | | | | | | Tested | |
| | | | | | | 5. AC Equipment Sizing & Technology | | | | | | | | | | | | M&V | |
| | | | | | | 6. As Constructed | | 2,200 | | | | | | | | | | Paid | |
| DHHL | | Single | 19 | Oct-2011 | Jun-2011 | 1. Baseline - IECC 2006 | | | 20% | 20% | | | | | | $600 | $11,400 | Approved | |
| | | | | | | 2. Energy Star Roof | | | | | | | | | | | | Modeled | |
| | | | | | | 3. Insulation / HP Window options | | | | | | | | | | | | Inspected | |
| | | | | | | 4. Air tightness (4.0 @ 50 pa) | | | | | | | | | | | | Tested | |
| | | | | | | 5. AC Equipment Sizing & Technology | | | | | | | | | | | | M&V | |
| | | | | | | 6. As Constructed | | 15,000 | | | | | | | | | | Paid | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **Totals** | | | **319** | **units** | | | | **5,700** | **kWh/yr. per home reduction** | | | | | | | | **$182,400** | | |

## 10.2.2 Tradewind Design

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

### 10.2.3 Hawaii Energy Hero Audits

Measure ID: See Table 7.3 (TBD)
Measure Code: Efficiency Inside

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- 11/22/11 – Akamai Power Strip kWh savings updated based on NYSERDA Measure Characterization for Advanced Power Strips. – NO LONGER RELEVANT.
- 4/17/12 – Removed gift pack information/data. Updated measure to match energy audit measure under "Residential Hard to Reach" in order to make savings consistent with an energy audit. This change was a complete revamp of the entire measure and did changed expected savings.
- 8/1/12 – Updated energy savings table to have consistent demand savings (0.0342 kW)

**Measure Description:**
- Work with grass roots organization(s) to develop a residential educational presentation and a high level household energy audit based on use of a Belkin Conserve Insight or Kill-A-Watt style single outlet energy monitor.
- Identify individuals/homes who accept participation in the program with an energy challenge commitment to reduce energy consumed within their household.
- Participants will receive the energy monitor and possibly other energy savings devices for the purpose of performing the energy audit, applying energy savings devices and achieving energy savings.
- Provide the energy monitors and possibly other energy savings devices along with funds to the grass roots organizations. The organizations will distribute energy monitors and devices, provide training to recipient households and perform a high level audit with selected individuals.

**Energy Savings:**

| | |
|---|---|
| Monthly Usage (kWh/month) | 625 |
| Percent Savings (%) | 4% |
| Hours per Year | 8760 |

| Savings | Energy Savings (kWh) | Demand Savings (kW) |
|---|---|---|
| Monthly Savings | 25 | 0.0342 |
| Yearly Savings | 300 | 0.0342 |

**Measure Costs and Incentive Levels**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Energy Hero Audits | $ 100.00 | $ 400.00 |

## Savings Algorithm

**CFL - Single and Multi Family Residential Home**

**Refer to TRM Compact Fluorescent Lamp (CFL) Section**

| **Akamai Power Strips** | | | | | |
|---|---|---|---|---|---|
| Savings per Unit | 56.5 kWh | | 102.8 kWh | | *NYSERDA Measure Characterization for* |
| Plugs per Unit | 5 plugs | | 7 plugs | | Advanced Power Strips |
| Savings per Plug | 11.3 kWh/plug | | 14.68571 kWh/plug | | |
| Average Savings per Plug | | | 13.0 kWh | | |
| | | x | 6 plugs/unit | | |
| **Akamai Power Strip Energy Savings** | | | **78 kWh per Unit first year** | | |
| Hours of Operation | | | 8760 hours/year | | |
| **Demand Savings** | | | **0.0089 kW** | | |

| | | | |
|---|---|---|---|
| First Year Savings | | 78 | kWh first year |
| Measure Life | x | 5 | year measure life |
| Lifetime Savings | | 389.78571 | kWh lifetime |
| | | | |
| Total Resource Cost | | $ 30.96 | |
| Total Resource Benefit | ÷ | $ 46.15 | |
| Total Resource Cost Ratio | | 1.5 | TRB Ratio |
| | | | |
| Potential Akamai Power Strip Incentive | | $ 7.00 | |
| First Year Savings | ÷ | 66 | kWh first year |
| | | $ 0.11 | per kWh first year |
| | | | |
| Standard Power Strip Cost | | $ 14.49 | |
| Akamai Power Strip Cost | - | $ 30.96 | |
| Incremental Akamai Power Strip Cost | | $ 16.47 | |
| | | | |
| Incremental Akamai Power Strip Cost | | $ 16.47 | |
| Potential Akamai Power Strip Incentive | ÷ | $ 7.00 | |
| Percentage of Incremental Cost | | 43% | |
| | | | |
| Akamai Power Strip Cost | | $ 30.96 | |
| Potential Akamai Power Strip Incentive | ÷ | $ 7.00 | |
| Percentage of Customer Measure Cost | | 23% | |

# 10.3 Residential System Tune-Ups

## 10.3.1 AC Annual Tune Up

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 21, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Split Systems addition to central systems for AC tune-up
- Reduced savings percentage from 20% to 8% based on EM&V review.

**Measure Description:**
- Demonstrate the benefits of tune-ups
- Educate customer of potential savings and system longevity
- Utilize the participating contractors to contact the customers and have them arrange for the service work
- Participating contractors will use the Hawaii Energy Checklist to inspect and record the pre and post conditions
- Participating contractor's invoice must show that checklist requirements have been met and signed by the servicing technician
- Customers can have two incentives per location annually

**Baseline Efficiencies:**

| Building Types | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| Residential Household | 2.77 | 4,367 |

**High Efficiency:**

With AC Annual Tune Up

| Building Types | Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Residential Household | 2.70 | 4,043 |

**Energy Savings:**

| Building Types | Gross Customer Savings (kW) | Gross Customer Savings (kWh/year) |
|---|---|---|
| Residential Household | 0.07 | 323 |

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.00 |
| Demand Coincidence Factor (cf) | 0.20 |

| Building Types | Net Customer Savings (kW) | Net Customer Savings (kWh/year) |
|---|---|---|
| Residential Household | 0.000 | 323 |
| On Peak Run Time Reduction Peak Demand Savings | 0.07 | |

## Savings Algorithms

| Home AC Tune Up - Single Multi Family Residential Home | | | | |
|---|---|---|---|---|
| Average AC unit Size | | 3 | ton unit | |
| Average AC Unit EER | | 13.0 | EER | |
| EER to kW Conversion | | 12 | | |
| | ÷ | 13.0 | EER | |
| Average AC Unit kW/Ton | | 0.92 | kW/Ton | |
| | | | | |
| Equivelant Full Load Run Hours (EFLRH) | | 1460 | hrs./Year | 4.0 hrs. per Day |
| | | | | |
| Average AC unit Size | | 3 | ton unit | |
| Average AC Unit kW/Ton | | 0.92 | kW/Ton | |
| Equivelant Full Load Run Hours (EFLRH) | x | 1,460 | hrs./Year | |
| Post Tune Up - Average AC Unit Energy Consumption | | 4,043 | kWh/Year | |
| | | | | |
| Incorrect Refrigerant Charge | | | | |
| Clogged AHU Filter | | | | |
| Dirty Condenser Coil | | | | |
| Pre Tune Up AC Operational Problems EFLRH Adjustment Factor | | 8% | | Updated number based on EMV 23 Feb 12. 20% changed to 8%. |
| | | | | |
| Post Tune Up - Average AC Unit Energy Consumption | | 4,043 | kWh/Year | |
| Pre Tune Up AC Operational Problems EFLRH Adjustment Factor | ÷ | 108% | | |
| Pre Tune Up - Average AC Unit Energy Consumption | | 4,367 | kWh/Year | 1,577 hrs. per year |
| | | | | 4.3 hrs. per Day |
| Pre Tune Up - Average AC Unit Energy Consumption | | 4,367 | | |
| Post Tune Up - Average AC Unit Energy Consumption | | 4,043 | | |
| Post Tune Up - Average AC Unit Energy Savings | | 323 | kWh/Year | |
| | | | | |
| Post Tune Up - Average AC Unit Energy Savings | | 323 | kWh/Year | |
| Persistance Factor | x | 1.0 | | |
| Net Customer Level Savings | | 323 | kWh/Year | |
| | | | | |
| AC Tune Up Energy Savings | | 323 | kWh / Year Savings | |
| | | | | |
| Average AC unit Size | | 3 | ton unit | |
| Average AC Unit kW/Ton | | 0.92 | kW/Ton | |
| Average AC Unit Demand | | 2.77 | kW | |
| | | | | |
| Average AC Unit Demand | | 2.77 | kW | |
| Persistance Factor | x | 1.00 | | |
| Pre Tune Up Coincidence Factor | x | 0.33 | | Updated number based on EMV 23 Feb 12. 0.25 changed to 0.33. |
| Pre Tune Up On Peak Demand | | 0.925 | kW | |

AC Unit Demand will not change. A reduction in operational hours will occur once tune up is completed. This lowers Coincidence Factor

| | | | |
|---|---|---|---|
| Pre Tune Up Coincidence Factor | | 0.33 | |
| Post Tune Up Run Time Reduction Adjustment Factor | x | 92% | |
| Post Tune Up Coincidence Factor | | 0.31 | |
| | | | |
| Average AC Unit Demand | | 2.77 | |
| Persistance Factor | x | 1.00 | |
| Post Tune Up Coincidence Factor | x | 0.31 | |
| Post Tune Up On Peak Demand | | 0.851 | kW |
| | | | |
| Pre Tune Up On Peak Demand | | 0.92 | |
| Post Tune Up On Peak Demand | - | 0.85 | |
| AC Tune Up Demand Savings | | 0.074 | kW |
| | | | |
| AC Tune Up Demand Savings | | 0.074 | kW Savings |

**Operating Hours**

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Coincidence Factor**
CF = 0.30

**Persistence**
PF = 0.90

**Lifetime:**
1 Year

**Measure Costs and Incentive Levels**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Home AC Tune Up | $ 50.00 | $ 300.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

## 10.3.2 Solar Water Heating Tune-up

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 21, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- KEMA "Impact Evaluation Report of the 2001-2003 Demand Side Management Programs" October 2004. Page 2-36 "Inoperable systems are those that use more than an average of 5 kWh per day, and problem systems use between 2-5 kWh per day.

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- New

**Measure Description:**

- ➢ Demonstrate the benefits of tune-ups
- ➢ Educate customer of potential savings and system longevity
- ➢ Utilize the participating contractors to contact the customers and have them arrange for the service work
- ➢ Participating contractors will use the Hawaii Energy Checklist to inspect and record the pre and post conditions
- ➢ Participating contractor's invoice must show that checklist requirements have been met and signed by the servicing technician
- ➢ Customers can have two incentives per location annually

**Baseline Efficiencies:**

| | Energy (kWh) | Demand (kW) |
|---|---|---|
| Baseline | 577 | 0.079 |

**High Efficiency:**

| | Energy (kWh) | Demand (kW) |
|---|---|---|
| High Efficiency | 328 | 0.05 |

**Energy/Demand Savings:**

| | Energy (kWh) | Demand (kW) |
|---|---|---|
| Energy Savings | 249 | 0.029 |

KEMA 2005-2007 Energy and Peak Demand Impact Evaluation Report

| Samples | Group | kWh per Unit | On Peak Demand | Total kWh | On Peak Demand |
|---|---|---|---|---|---|
| 260 | All | 577 | 0.079 | 150,020 | 20.5 |
| 18 | Failed | 3,925 | 0.469 | 70,644 | 8.4 |
| 242 | Operating | 328 | 0.050 | 79,376 | 12.1 |

**Operating Hours**
10 hours

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Demand Coincidence Factor**

**Persistence**

**Lifetime**
5 years

**Measure Costs and Incentive Levels**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Solar Water Heating Tune Up | $ 50.00 | $ 300.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

# 11 (RHTR) Residential Hard to Reach

## 11.1 Energy Efficiency Equipment Grants

### 11.1.1 Solar Inspections (Weatherization Assistance Program)

Measure ID: See Table 7.3 (TBD)
Measure Code: Solar Inspections (WAP)

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Description:**

**Energy and Demand Savings:**

Based on the percentage (%) the Solar Inspection cost compared to incentives. For example, Solar Inspection Cost = $75 and the Solar Water Heater Incentive = $750. The energy savings = $75/$750 = 10%

Energy Savings = 10% x 2066 kWh/year
= 206.6 kWh/year

Demand Savings = 10% x 0.46 kW
= 0.046 kW

**Example**

| | | |
|---|---|---|
| Solar Inspection (WAP) Cost | $ 75.00 | |
| Solar Water Heating Incentive | $ 750.00 | |
| Percentage Savings = Cost/Incentive | 10% | Savings |
| **Solar Inspection Energy Savings** | **206.6** | **kWh / Year Savings** |
| **Solar Inspection Demand Savings** | **0.046** | **kW Savings** |

## Savings Algorithm

**Solar Water Heater - Single Family Home**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.2 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,460 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,733 | kWh / Year | KEMA 2008 - HECO |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element | |
| Energy Usage per Year at the Meter | | 2,733 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | 72% |
| Pump Energy used per Year | + | 106 | kWh / Year | 28% |
| Design Solar System Energy Usage | | 379 | kWh / Year | |
| Base SERWH Energy Usage per Year at the Meter | | 2,733 | kWh / Year | |
| Design Solar System Energy Usage | - | 379 | kWh / Year | |
| Design Solar System Energy Savings | | 2,354 | kWh / Year | |
| Design Solar System Energy Savings | | 2,354 | kWh / Year | |
| Performance Factor | | 0.94 | pf | HE |
| Persistance Factor | x | 0.93 | pf | KEMA 2008 |
| | | 2,066 | kWh / Year | KEMA 2008 |
| **Residential Solar Water Heater Energy Savings** | | **2,066** | **kWh / Year Savings** | |
| Base SERWH Element Power Consumption | | 4.0 | kW | |
| Coincidence Factor | x | 0.143 | cf | 8.6 Minutes per hour |
| Base SERWH On Peak Demand | | 0.57 | kW On Peak | KEMA 2008 |
| Base SERWH On Peak Demand | - | 0.57 | kW On Peak | |
| Solar System Metered on Peak Demand | - | 0.11 | kW On Peak | KEMA 2008 |
| | | 0.46 | kW On Peak | |
| **Residential Solar Water Heater Demand Savings** | | **0.46** | **kW Savings** | |
| Solar Inspection (WAP) Cost | | $ 75.00 | | |
| Solar Water Heating Incentive | | $ 750.00 | | |
| Percentage Savings = Cost/Incentive | | 10% | Savings | |
| **Solar Inspection Energy Savings** | | **206.6** | **kWh / Year Savings** | |
| **Solar Inspection Demand Savings** | | **0.046** | **kW Savings** | |

## 11.1.2 Energy Hero Gift Packs

Measure ID: See Table 7.3 (TBD)
Measure Code: Energy Hero Gift Packs

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07)
- Econorthwest TRM Review – 6/23/10
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007 Demand Management Programs – (KEMA 2005-07)
- US DOE: Federal Energy Management Program (2010). Cost Calculator for Faucets & Shower Heads. http://www1.eere.energy.gov/femp/technologies/eep_faucets_showerheads_calc.html#output
- http://www.aquacraft.com/Download_Reports/DISAGGREGATED-HOT_WATER_USE.pdf

**TRM Review Actions:**

- 10/06/11 – Added additional items to possible gift pack components list and corresponding data. Items included: LED lamp, low flow shower head for standard electric water heating systems, low flow shower head for solar heating systems, and faucet aerators.
- 10/06/11 – Currently Under Review.

**Major Changes:**

- 10/06/11 – Added additional items to possible gift pack components list (including data)
- 11/22/11 – LED algorithm updated. See section 8.2.2 for changes.
- 11/22/11 – Akamai Power Strip kWh savings updated based on NYSERDA Measure Characterization for Advanced Power Strips.
- 11/22/11 – Updated content in headings *Base Case*, *High Efficiency Case*, and *Energy Savings* in regard to LED lamps to match section 8.2.2.
- 11/29/11 – Low Flow Shower Head algorithms updated – previously claiming only 50% of total energy savings due to inaccurately calculating hot and cold water mix. Also updated *Energy Savings* table as necessary.
- 11/29/11 – Faucet Aerator algorithm updated – recalculated to follow low flow shower head algorithm, and include solar and non-solar calculations. Also updated *Energy Savings* table as necessary.
- 8/1/12 – Updated Low Flow Shower Head w/solar algorithm to reduce demand savings from 40% to 20% as per EM&V review (Feb. 2012)
- 8/1/12 – Updated Low Flow Shower Head algorithm to reduce demand savings from 40% to 20% as per EM&V review (Feb. 2012)
- 8/1/12 – Updated Faucet Aerator algorithm to using calculations method recommended by the EM&V review (Feb. 2012)
- 8/1/12 – Updated Faucet Aerator w/solar algorithm to align with Faucet Aerator w/o solar – based on the EM&V review (Feb. 2012)

**Description:**
Potential gift pack components:
- Compact Fluorescent Lamp (15W)
- Akamai Power Strip
- LED Lamp (7W)
- Low Flow Shower Head – Solar Water Heater (1.5 gpm)
- Low Flow Shower Head – Standard Electric Water Heater (1.5 gpm)
- Faucet Aerator (2.2 gpm)

**Base Case**
- 60 W incandescent lamps
- Standard power strip or no power strip
- 25% 60W incandescent, 25% 40W incandescent, 25% 23W CFLs and 25% 13W CFLs (See LED TRM)
- Low Flow Shower Head – Solar Water Heater (1.5 gpm)
- Low Flow Shower Head – Standard Electric Water Heater (1.5 gpm)
- Faucet Aerator (1.5 gpm)

**High Efficiency Case**
- Replace 60 W incandescent lamps with CFLs rated at 15W
- Replace existing standard power strip or no power strip with Akamai Power Strip
- Replace existing non-LED lamp with LED lamp (50% 7W and 50% 12.5W)
- Replace 2.5 gpm Low Flow Shower Head with Low Flow Shower (Solar) Head rated at 1.5 gpm
- Replace 2.5 gpm Low Flow Shower Head with Low Flow Shower (Electric) Head rated at 1.5 gpm
- Replace 2.2 gpm Faucet Aerator with Low Flow Faucet Aerator rated at 1.5 gpm

**Energy Savings**

| Measure | Energy Savings (kWh/year) | Demand Savings (kW) |
|---|---|---|
| 3 CFL | 109 | 0.016 |
| Power Strip | 78 | 0.009 |
| LED | 17 | 0.003 |
| Low Flow Shower Head - Solar | 42 | 0.022 |
| Low Flow Shower Head - Electric Water Heater | 306 | 0.114 |
| Faucet Aerator - Solar | 6.5 | 0.00017 |
| Faucet Aerator - Electric Water Heater | 65 | 0.0017 |
| **TOTAL** | **623** | **0.16** |

**Measure life**

| Measure | Measure Life (Years) |
|---|---|
| 3 CFL | 5 |
| Power Strip | 5 |
| LED | 5 |
| Low Flow Shower Head | 5 |
| Faucet Aerator | 5 |

## Savings Algorithms

**CFL - Single and Multi Family Residential Home**

**Refer to TRM Compact Fluorescent Lamp (CFL) Section**

**Akamai Power Strips**

| | | | | | |
|---|---|---|---|---|---|
| Savings per Unit | 56.5 kWh | | 102.8 kWh | | *NYSERDA Measure Characterization for* Advanced Power Strips |
| Plugs per Unit | 5 plugs | | 7 plugs | | |
| Savings per Plug | 11.3 kWh/plug | | 14.68571 kWh/plug | | |
| Average Savings per Plug | | | 13.0 kWh | | |
| | | x | 6 plugs/unit | | |
| **Akamai Power Strip Energy Savings** | | | **78 kWh per Unit first year** | | |
| Hours of Operation | | | 8760 hours/year | | |
| **Demand Savings** | | | **0.0089 kW** | | |

| | | |
|---|---|---|
| First Year Savings | | 78 kWh first year |
| Measure Life | x | 5 year measure life |
| Lifetime Savings | | 389.78571 kWh lifetime |
| | | |
| Total Resource Cost | | $ 30.96 |
| Total Resource Benefit | ÷ | $ 46.15 |
| Total Resource Cost Ratio | | 1.5 TRB Ratio |
| | | |
| Potential Akamai Power Strip Incentive | | $ 7.00 |
| First Year Savings | ÷ | 66 kWh first year |
| | | $ 0.11 per kWh first year |
| | | |
| Standard Power Strip Cost | | $ 14.49 |
| Akamai Power Strip Cost | - | $ 30.96 |
| Incremental Akamai Power Strip Cost | | $ 16.47 |
| | | |
| Incremental Akamai Power Strip Cost | | $ 16.47 |
| Potential Akamai Power Strip Incentive | ÷ | $ 7.00 |
| Percentage of Incremental Cost | | 43% |
| | | |
| Akamai Power Strip Cost | | $ 30.96 |
| Potential Akamai Power Strip Incentive | ÷ | $ 7.00 |
| Percentage of Customer Measure Cost | | 23% |

**LED - Single and Multi Family Residential Home**

**Refer to TRM Light Emitting Diode (LED) Section**

**Low Flow Showerhead w/Solar Water Heating**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.2 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | BTU/kWh | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,460 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,733 | kWh / Year | KEMA 2008 - HECO |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element | |
| Energy Usage per Year at the Meter | | 2,733 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| Back Up Element Energy Used at Meter | | 273 | kWh / Year | 72% |
| Pump Energy used per Year | + | 106 | kWh / Year | 28% |
| Design Solar System Energy Usage | | 379 | kWh / Year | |
| Utilization Factor | | 28% | | Hot water used for showers (AMMA) |
| Hot Water Usage from Showers | | 106 | | |
| Base Case Showerhead | | 2.5 | GPM | |
| High Efficiency Case Showerhead | | 1.5 | GPM | |
| Savings = (1 - High Efficiency/Base) | | 40% | | |
| **Energy Savings** | | **42** | **kWh / Year** | |
| Solar System Metered on Peak Demand | | 0.11 | kW On Peak | KEMA 2008 |
| Peak Coincidence Factor | | 0.20 | | William B., De Oreo, P.E., Peter W. Mayer. The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis. Aquacraft, Inc. Water Engineering and Management. |
| **Residential Low Flow Shower Head Demand Savings** | | **0.022** | **kW Savings** | |

**Low Flow Showerhead w/Standard Electric Resistance Water Heater (SERWH)**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water Temp)

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.2 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 23,006 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | BTU/kWh | |
| Energy per Day (kWh) | | 6.7 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 205 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 2,460 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 2,733 | kWh / Year | KEMA 2008 - HECO |
| Utilization Factor | | 28% | | Hot water used for showers (AMMA) |
| Base SERWH Energy Usage per Year at the Meter | | 765 | kWh / Year | Energy Usage for showers |
| Base Case Showerhead | | 2.5 | GPM | |
| High Efficiency Case Showerhead | | 1.5 | GPM | |
| Savings = (1 - High Efficiency/Base) | | 40% | | |
| **Energy Savings** | | **306** | **kWh / Year** | |
| SERWH Element Power Consumption | | 4.0 | kW | |
| Coincidence Factor | x | 0.143 | cf | |
| SERWH On Peak Demand | | 0.57 | kW On Peak | |
| Peak Coinsidence Factor | | 0.20 | | William B., De Oreo, P.E., Peter W. Mayer. The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis. Aquacraft, Inc. Water Enegineering and Management. |
| **Residential Low Flow Shower Head Demand Savings** | | **0.114** | **kW Savings** | |

| **Faucet Aerator w/Solar Water Heating** | | | | |
|---|---|---|---|---|
| Base Usage | | 10.9 | gal/day/person | EPA Data |
| Base Flow Rate | ÷ | 2.2 | gpm | EPA Watersense Data |
| Faucet Run Time / day | | 4.95 | min | |
| | | | | |
| Proposed Flow Rate | | 1.5 | gpm | |
| Faucet Run Time / day | x | 4.95 | min | |
| | | 7.43 | gal/day | |
| | | | | |
| Base Flow Rate | | 10.9 | gal/day | |
| Proposed Usage | - | 7.43 | gal/day | |
| Water Savings | | 3.48 | gal/day | |
| | | | | |
| Faucet Temperature | | 80 | F | Ohio and Connecticut Programs |
| Initial Temperature | - | 75 | F | Hawaii TRM |
| Temperature Rise | | 5 | F | |
| | | | | |
| Water Density | | 8.34 | lbs/gal | |
| Energy Conversion | | 3412 | kWh/Btu | |
| | | | | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| | | | | |
| Water Heating Energy Saved | | 0.042469959 | kWh | |
| People per Household | | 3.77 | people | |
| Days per Year | x | 365 | days | |
| Annual Energy Needed | | 58.44 | kWh | |
| | | | | |
| Water Heater Efficiency | | 0.9 | | |
| | | | | |
| | | 65 | gross kWh saved by faucet aerator | |
| | | | | |
| Design Annual Solar Fraction | | 90% | water heated by solar system | HE Program Design |
| | | 10% | water heated by backup element | |
| | | | | |
| **Annual Energy Savings w/ Solar** | | **6.5** | **kWh** | |
| | | | | |
| | | 14.3% | faucet use during peak hours | |
| | x | 4.95 | min / day | |
| | | 0.708 | minutes | |
| | ÷ | 240 | minutes during peak period | |
| | | **0.002949375** | **coinsidence factor** | |
| | | | | |
| | | 10.9 | base gal / day / person | |
| | x | 3.77 | person / household | |
| | x | 365 | days / year | |
| | ÷ | 2.2 | GPM | |
| | ÷ | 60 | min / hour | |
| | | **114** | **hours** | |
| | | | | |
| | | 6.5 | kWh savings | |
| | ÷ | 114 | hours | |
| | | 0.06 | average kW | |
| | x | 0.00295 | coinsidence factor | |
| | | 0.00017 | peak kW savings | |
| | | | | |
| **Peak kW Savings** | | **0.00017** | **kW** | |

| Faucet Aerator w/Standard Electric Resistance Water Heater (SERWH) | | | | |
|---|---|---|---|---|
| Base Usage | | 10.9 | gal/day/person | EPA Data |
| Base Flow Rate | ÷ | 2.2 | gpm | EPA Watersense Data |
| Faucet Run Time / day | | 4.95 | min | |
| | | | | |
| Proposed Flow Rate | | 1.5 | gpm | |
| Faucet Run Time / day | x | 4.95 | min | |
| | | 7.43 | gal/day | |
| | | | | |
| Base Flow Rate | | 10.9 | gal/day | |
| Proposed Usage | - | 7.43 | gal/day | |
| Water Savings | | 3.48 | gal/day | |
| | | | | |
| Faucet Temperature | | 80 | F | Ohio and Connecticut Programs |
| Initial Temperature | - | 75 | F | Hawaii TRM |
| Temperature Rise | | 5 | F | |
| | | | | |
| Water Density | | 8.34 | lbs/gal | |
| Energy Conversion | | 3412 | kWh/Btu | |
| | | | | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| | | | | |
| Water Heating Energy Saved | | 0.0425 | kWh | |
| People per Household | | 3.77 | people | |
| Days per Year | x | 365 | days | |
| Annual Energy Needed | | 58.44 | kWh | |
| | | | | |
| Water Heater Efficiency | | 0.9 | | |
| **Annual Energy Savings** | | **65** | **kWh** | |
| | | | | |
| | | 14.3% | faucet use during peak hours | |
| | x | 4.95 | min / day | |
| | | 0.708 | minutes | |
| | ÷ | 240 | minutes during peak period | |
| | | **0.0029** | **coinsidence factor** | |
| | | | | |
| | | 10.9 | base gal / day / person | |
| | x | 3.77 | person / household | |
| | x | 365 | days / year | |
| | ÷ | 2.2 | GPM | |
| | ÷ | 60 | min / hour | |
| | | **114** | **hours** | |
| | | | | |
| | | 65 | kWh savings | |
| | ÷ | 114 | hours | |
| | | 0.57 | average kW | |
| | x | 0.0029 | coinsidence factor | |
| | | 0.0017 | peak kW savings | |
| | | | | |
| **Peak kW Savings** | | **0.0017** | **kW** | |

## 11.1.3 CFL Exchange

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07)
- Econorthwest TRM Review – 6/23/10

**TRM Review Actions:**

- 6/23/10 Rec. # 8 – Starting with PY2010, adjust the hours used per day for CFLs from 4.98 to 2.3 in order to be consistent with other literature. Conduct additional research to verify the most appropriate hours of operation for the Hawaii customer base, which can be incorporated into future years. – Adopted.
- 6/23/10 Rec. # 9 - Starting with PY 2010, adjust the peak coincidence factor from 0.334 to 0.12 to be consistent with the literature. Conduct additional research to verify the most appropriate coincidence factor for the Hawaii customer base, which can be incorporated into future years.- Adopted.
- 10/5/11 – Currently Under Review.

**Major Changes:**

- Hours used per day for CFLs from 4.98 to 2.3 hrs.
- Peak coincidence factor from 0.334 to 0.12
- Updated persistence factor from 0.8 to 1.0. Lamps are replaced in a one-for-one fashion therefore all lamps will be used.

**Measure Description:**
The replacement of incandescent screw-in lamps to standard spiral compact fluorescent lamps in Residential Single Family and Multi-family homes.

Lamps must comply with:

- Energy Star
- UL

**Baseline Efficiencies:**
Baseline usage is a 60W A-Shaped incandescent lamp with the energy consumption as follows:

| Building Types | Demand Baseline(kW) | Energy Baseline (kWh) |
|---|---|---|
| Single Family | 0.060 | 50.4 |
| Multi Family | 0.060 | 50.4 |

**High Efficiency:**
The high efficiency case is a 15W Spiral CFL with the energy consumption as follows:

| Building Types | Demand High Efficiency (kW) | Energy High Efficiency (kWh) |
|---|---|---|
| Single Family | 0.015 | 12.6 |
| Multi Family | 0.015 | 12.6 |

**Energy Savings:**
CFL Gross Savings before operational adjustments:

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Single Family | 0.045 | 37.8 |
| Multi Family | 0.045 | 37.8 |

CFL Net Savings after operational adjustments:

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.0 |
| Demand Coincidence Factor (cf) | 0.12 |

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| Single Family | 0.005 | 37.8 |
| Multi Family | 0.005 | 37.8 |

## Savings Algorithms

**CFL Exchange - Single and Multi Family Residential Home**

| | | | | | |
|---|---|---|---|---|---|
| 60W Incandescent Lamp Demand | | 0.060 | kW | | |
| | | 2.30 | Hours per Day | | |
| | x | 365 | Days | 839.5 | Hours per Year |
| 60W Incandescent Lamp Energy Usage | | 50.4 | kWh per Year | | |
| 15W Compact Fluorescent Lamp Demand | | 0.015 | kW | | |
| | | 2.30 | Hours per Day | | |
| | x | 365 | Days | 839.5 | Hours per Year |
| 15W Compact Fluorescent Lamp Energy Usage | | 12.6 | kWh per Year | | |
| 60W Incandescent Lamp Energy Usage | | 50.4 | kWh per Year | | |
| 15W Compact Fluorescent Lamp Energy Usage | - | 12.6 | kWh per Year | | |
| CFL Savings Before Adjustments | | 37.8 | kWh per Year | | |
| | | 37.8 | kWh per Year | | |
| Persistance Factor | x | 1.000 | pf | 0.0% | Lamps not installed or replaced back |
| CFL Energy Savings | | 37.8 | kWh per Year | | |

**CFL Energy Savings 37.8 kWh / Year Savings**

| | | | | | |
|---|---|---|---|---|---|
| 60W Incandescent Lamp Demand | | 0.060 | kW | | |
| 15W Compact Fluorescent Lamp Demand | - | 0.015 | kW | | |
| CFL Demand Reduction Before Adjustments | | 0.045 | kW | | |
| CFL Demand Reduction Before Adjustments | | 0.045 | kW | | |
| Coincidence Factor | | 0.120 | cf | 12.0% | Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 1.000 | pf | 0.0% | Lamps not installed or replaced back |
| CFL Demand Savings | | 0.005 | kW | | |

**CFL Demand Savings 0.005 kW Savings**

## 11.1.4 Hawaii Energy Hero Audits

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 21, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Increased focus and penetration of direct install and educational outreach
- Updated energy savings table to have consistent demand savings (0.0342 kW)

**Measure Description:**
- Work with grass roots organization(s) to develop a residential educational presentation and a high level household energy audit based on use of a Belkin Conserve Insight or Kill-A-Watt style single outlet energy monitor.
- Identify individuals/homes who accept participation in the program with an energy challenge commitment to reduce energy consumed within their household.
- Participants will receive the energy monitor and possibly other energy savings devices for the purpose of performing the energy audit, applying energy savings devices and achieving energy savings.
- Provide the energy monitors and possibly other energy savings devices along with funds to the grass roots organizations. The organizations will distribute energy monitors and devices, provide training to recipient households and perform a high level audit with selected individuals.

**Energy Savings:**

| | |
|---|---|
| **Monthly Usage (kWh/month)** | 625 |
| **Percent Savings (%)** | 4% |
| **Hours per Year** | 8760 |

| Savings | Energy Savings (kWh) | Demand Savings (kW) |
|---|---|---|
| Monthly Savings | 25 | 0.0342 |
| Yearly Savings | 300 | 0.0342 |

**Measure Costs and Incentive Levels**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Energy Hero Audits | $ 100.00 | $ 400.00 |

## 11.2 Landlord / Tenant, AOAO Measures

### 11.2.1 Hawaii Energy Hero Landlord Program

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**<u>Savings Algorithms</u>**

## 11.2.2 Tiered / Split Incentives

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**<u>Savings Algorithms</u>**

## 11.2.3 Townhome Targeted Program

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**<u>Savings Algorithms</u>**

# 12 (BEEM) Business Energy Efficiency Measures

## 12.1 High Efficiency Lighting

### 12.1.1 Compact Fluorescent Lighting (CFL)

Measure ID: See Table 7.3
Measure Code: L01, L02, L03, L04, L05, L06

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Econorthwest TRM Review – 6/23/10
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- DEER - The Database for Energy Efficient Resources
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. 15 – For PY 2010, revise lighting hours of operation and peak coincidence factors, conduct additional research to evaluate the assumed hours of operation and coincidence factor for Hawaii customer base. - Adopted
- 6/23/10 Rec. # 16 – Consider developing commercial CFL measure categories by lamp size - Adopted.
- 10/5/11 – Currently Under Review.
- 8/1/12 – Added military housing CFL algorithm.

**Major Changes:**

- Wholesale replacement of prior TRM using DEER operational data and CEUS Commercial CFL Data
- Added interactive effect factors for energy and demand Table 3.

**Description:** A compact fluorescent lamp is a type of fluorescent lamp. Many CFL's are designed to replace an incandescent lamp and can fit in the existing light fixtures formerly used for incandescent lamps. CFLs typically replace 100 watts or less of incandescent.

CFL retrofit savings are determined by the delta wattage between the incandescent and CFL lamp, annual hours of operation, and the percent of peak period the lamps are on. The average delta wattage is typically a readily available value. The annual hours, persistence factor and peak percent are utilized based on DEER data.

Although the breakdown of lamp sizes installed is reasonable, the savings for this measure could be broken up based on lamp size. This would allow greater flexibility in matching claimed savings to actual projects completed. Savings for each wattage category are based on the savings for typical CFL lighting replacement projects from DEER, with the DEER wattage categories are shown below:

| | CFL Wattage Reduction | | |
|---|---|---|---|
| | < 16W | 16-26W | > 26W |
| Average Savings (W) | 32 | 60 | 76 |

| Military Residential Values | kWh/year | kW |
|---|---|---|
| CFLs | 45.3 | 0.004 |

**Energy Savings:** Using the DEER operational hours the energy savings are (see Table 3 for Interactive Effect):

| | CFL Energy Reduction | | |
|---|---|---|---|
| **Building Type** | **< 16W** | **16-26W** | **> 26W** |
| All Commercial | 131.5 | 246.5 | 312.3 |
| Misc. Commercial | 131.5 | 246.5 | 312.3 |
| Cold Storage | 126.5 | 237.1 | 300.4 |
| Education | 80.7 | 151.2 | 191.5 |
| Grocery | 177.0 | 332.0 | 420.5 |
| Health | 196.8 | 369.0 | 467.4 |
| Hotel/Motel | 150.2 | 281.6 | 356.7 |
| Misc. Industrial | 130.4 | 244.5 | 309.7 |
| Office | 85.4 | 160.1 | 202.7 |
| Restaurant | 160.5 | 300.8 | 381.1 |
| Retail | 128.0 | 240.0 | 304.0 |
| Warehouse | 126.5 | 237.1 | 300.4 |

Military Housing CFL energy savings: 45.3 kWh

**Demand Savings:** Using the CEUS coincidence factors the demand savings are (see Table 3 for Interactive Effect):

| | CFL Demand Reduction | | |
|---|---|---|---|
| **Building Type** | **< 16W** | **16-26W** | **> 26W** |
| All Commercial | 0.015 | 0.029 | 0.036 |
| Misc. Commercial | 0.009 | 0.017 | 0.022 |
| Cold Storage | 0.015 | 0.029 | 0.036 |
| Education | 0.006 | 0.011 | 0.014 |
| Grocery | 0.026 | 0.048 | 0.061 |
| Health | 0.020 | 0.037 | 0.047 |
| Hotel/Motel | 0.018 | 0.034 | 0.043 |
| Misc. Industrial | 0.015 | 0.029 | 0.036 |
| Office | 0.015 | 0.029 | 0.036 |
| Restaurant | 0.023 | 0.043 | 0.054 |
| Retail | 0.018 | 0.034 | 0.043 |
| Warehouse | 0.014 | 0.026 | 0.032 |

Military Housing CFL demand savings: 0.004 kW

**CFL Operational Hours and Peak Coincidence Factors:**

**Commercial Lighting Factors**

| Building Type | Hours of Operation[1] | Peak Coincidence Factor[2] |
|---|---|---|
| All Commercial | 4,325 | 0.50 |
| Misc. Commercial | 4,325 | 0.30 |
| Cold Storage | 4,160 | 0.50 |
| Education | 2,653 | 0.20 |
| Grocery | 5,824 | 0.85 |
| Health | 6,474 | 0.65 |
| Hotel/Motel | 4,941 | 0.60 |
| Misc. Industrial | 4,290 | 0.50 |
| Office | 2,808 | 0.50 |
| Restaurant | 5,278 | 0.75 |
| Retail | 4,210 | 0.60 |
| Warehouse | 4,160 | 0.45 |

[1] The Database for Energy Efficient Resources (DEER)

[2] California Commercial End Use Summary (CEUS)

**Saving Algorithm:**

**CFL - Commercial Use (16-26W All Commercial Example Calculation)**

| | | | | |
|---|---|---|---|---|
| Incandescent Lamp Demand | | 0.083 | kW | |
| | | 11.85 | Hours per Day | |
| | x | 365 | Days | 4,325.0 Hours per Year |
| Incandescent Lamp Energy Usage | | 359.0 | kWh per Year | |
| Compact Fluorescent Lamp Demand | | 0.023 | kW | |
| | | 11.85 | Hours per Day | |
| | x | 365 | Days | 4,325.0 Hours per Year |
| Compact Fluorescent Lamp Energy Usage | | 99.5 | kWh per Year | |
| Incandescent Lamp Energy Usage | | 359.0 | kWh per Year | |
| Compact Fluorescent Lamp Energy Usage | - | 99.5 | kWh per Year | |
| CFL Savings Before Adjustments | | 259.5 | kWh per Year | |
| | | 259.5 | kWh per Year | |
| Persistance Factor | x | 0.950 | pf | 5.0% Lamps not installed or replaced back |
| | | 246.5 | kWh per Year | |
| **CFL Energy Savings** | | **246.5** | **kWh / Year Savings** | |
| Incandescent Lamp Demand | | 0.083 | kW | |
| Compact Fluorescent Lamp Demand | - | 0.023 | kW | |
| CFL Demand Reduction Before Adjustments | | 0.060 | kW | |
| CFL Demand Reduction Before Adjustments | | 0.060 | kW | |
| Coincidence Factor | | 0.500 | cf | 50.0% Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 0.950 | pf | 5.0% Lamps not installed or replaced back |
| | | 0.029 | kW | |
| **CFL Demand Savings** | | **0.029** | **kW Savings** | |

| Military CFL - Single and Multi Family Residential Home | | | | | |
|---|---|---|---|---|---|
| 60W Incandescent Lamp Demand | | 0.060 | kW | | |
| | | 3.45 | Hours per Day | | Updated number based on EMV 23 Feb 12. 2.3 hours (residential number) multiplied by 1.5. |
| | x | 365 | Days | 1,259.3 | Hours per Year |
| 60W Incandescent Lamp Energy Usage | | 75.6 | kWh per Year | | |
| 15W Compact Fluorescent Lamp Demand | | 0.015 | kW | | |
| | | 3.45 | Hours per Day | | |
| | x | 365 | Days | 1,259.3 | Hours per Year |
| 15W Compact Fluorescent Lamp Energy Usage | | 18.9 | kWh per Year | | |
| 60W Incandescent Lamp Energy Usage | | 75.6 | kWh per Year | | |
| 15W Compact Fluorescent Lamp Energy Usage | - | 18.9 | kWh per Year | | |
| CFL Savings Before Adjustments | | 56.7 | kWh per Year | | |
| | | 56.7 | kWh per Year | | |
| Persistance Factor | x | 0.800 | pf | 20.0% | Lamps not installed or returned |
| CFL Energy Savings | | 45.3 | kWh per Year | | |
| **CFL Energy Savings** | | **45.3** | **kWh / Year Savings** | | |
| 60W Incandescent Lamp Demand | | 0.060 | kW | | |
| 15W Compact Fluorescent Lamp Demand | - | 0.015 | kW | | |
| CFL Demand Reduction Before Adjustments | | 0.045 | kW | | |
| CFL Demand Reduction Before Adjustments | | 0.045 | kW | | |
| Coincidence Factor | | 0.120 | cf | 12.0% | Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 0.800 | pf | 20.0% | Lamps not installed or returned |
| CFL Demand Savings | | 0.004 | kW | | |
| **CFL Demand Savings** | | **0.004** | **kW Savings** | | |

**Measure**
2.8 years (DEER)

**Unit Incentive/Incremental Cost**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| CFL | $ 1.00 | $ 2.50 |

| Military CFL - Single and Multi Family Residential Home | | | | |
|---|---|---|---|---|
| 60W Incandescent Lamp Demand | | 0.060 | kW | |
| | | 3.45 | Hours per Day | Updated number based on EMV 23 Feb 12. 2.3 hours (residential number) multiplied by 1.5. |
| | x | 365 | Days | 1,259.3 Hours per Year |
| 60W Incandescent Lamp Energy Usage | | 75.6 | kWh per Year | |
| 15W Compact Fluorescent Lamp Demand | | 0.015 | kW | |
| | | 3.45 | Hours per Day | |
| | x | 365 | Days | 1,259.3 Hours per Year |
| 15W Compact Fluorescent Lamp Energy Usage | | 18.9 | kWh per Year | |
| 60W Incandescent Lamp Energy Usage | | 75.6 | kWh per Year | |
| 15W Compact Fluorescent Lamp Energy Usage | - | 18.9 | kWh per Year | |
| CFL Savings Before Adjustments | | 56.7 | kWh per Year | |
| | | 56.7 | kWh per Year | |
| Persistance Factor | x | 0.800 | pf | 20.0% Lamps not installed or returned |
| CFL Energy Savings | | 45.3 | kWh per Year | |
| **CFL Energy Savings** | | **45.3** | **kWh / Year Savings** | |
| 60W Incandescent Lamp Demand | | 0.060 | kW | |
| 15W Compact Fluorescent Lamp Demand | - | 0.015 | kW | |
| CFL Demand Reduction Before Adjustments | | 0.045 | kW | |
| CFL Demand Reduction Before Adjustments | | 0.045 | kW | |
| Coincidence Factor | | 0.120 | cf | 12.0% Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 0.800 | pf | 20.0% Lamps not installed or returned |
| CFL Demand Savings | | 0.004 | kW | |
| **CFL Demand Savings** | | **0.004** | **kW Savings** | |

## 12.1.2 T12 to T8 with Electronic Ballast

Measure ID: See Table 7.3
Measure Code: L016, L017, L018, L019

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- DEER - The Database for Energy Efficient Resources
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 6/23/10 Rec. #18 – Break down T8 savings by lamp length – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Wholesale replacement of prior TRM using DEER operational data and CEUS Commercial Data
- Added interactive effect factors for energy and demand Table 3.

**Description:** This measure involves the replacement of an existing T12 lamp with a new high efficiency T8 lamp, and savings are calculated assuming standard T12 lamps and magnetic ballasts. The average watt savings per lamp for replacing 2', 3', 4', and 8' lamps is calculated by weighting the average toward those replacements that most likely to occur; largely 4' 2 lamp and 4' 4 lamp fixtures. Based on the assumed fixture distribution, the average savings per lamp is 18.6W.

**Base Efficiency**

The base case efficiency is either an existing T12 lamp with magnetic ballast.

**High Efficiency**

The high efficiency case is a T8 lamp with electronic ballast.

**Demand Savings:** Using the CEUS coincidence factors the demand savings are (see Table 3 for Interactive Effect):

| | Demand Savings (kW) | | | |
|---|---|---|---|---|
| **Building Type** | **2' Lamp** | **3' Lamp** | **4' Lamp** | **8' Lamp** |
| All Commercial | 0.0040 | 0.0070 | 0.0100 | 0.0200 |
| Misc. Commercial | 0.0020 | 0.0040 | 0.0060 | 0.0120 |
| Cold Storage | 0.0040 | 0.0070 | 0.0100 | 0.0200 |
| Education | 0.0020 | 0.0030 | 0.0040 | 0.0080 |
| Grocery | 0.0070 | 0.0110 | 0.0160 | 0.0340 |
| Health | 0.0050 | 0.0080 | 0.0130 | 0.0260 |
| Hotel/Motel | 0.0050 | 0.0080 | 0.0120 | 0.0240 |
| Misc. Industrial | 0.0040 | 0.0070 | 0.0100 | 0.0200 |
| Office | 0.0040 | 0.0070 | 0.0100 | 0.0200 |
| Restaurant | 0.0060 | 0.0100 | 0.0140 | 0.0300 |
| Retail | 0.0050 | 0.0080 | 0.0120 | 0.0240 |
| Warehouse | 0.0040 | 0.0060 | 0.0090 | 0.0180 |

**Energy Savings:** Using the DEER operational hours the energy savings are (see Table 3 for Interactive Effect):

| | Energy Savings (kWh/year) | | | |
|---|---|---|---|---|
| **Building Type** | **2' Lamp** | **3' Lamp** | **4' Lamp** | **8' Lamp** |
| All Commercial | 35.9 | 56.4 | 83.2 | 170.8 |
| Misc. Commercial | 35.9 | 56.4 | 83.2 | 170.8 |
| Cold Storage | 34.5 | 54.3 | 80.0 | 164.3 |
| Education | 22.0 | 34.6 | 51.0 | 104.8 |
| Grocery | 48.3 | 76.0 | 112.0 | 230 |
| Health | 53.7 | 84.5 | 124.5 | 255.7 |
| Hotel/Motel | 41.0 | 64.5 | 95.0 | 195.2 |
| Misc. Industrial | 35.6 | 56.0 | 82.5 | 169.5 |
| Office | 23.3 | 36.6 | 54.0 | 110.9 |
| Restaurant | 43.8 | 68.9 | 101.5 | 208.5 |
| Retail | 34.9 | 54.9 | 81.0 | 166.3 |
| Warehouse | 34.5 | 54.3 | 80.0 | 164.3 |

**Incentive**

| Equipment Description | All Commercial Demand (kW) Savings | All Commercial Energy Savings (kWh) | Current Incentive |
|---|---|---|---|
| 2'T12 - 2'T8 | 0.004 | 35.9 | $4.80 |
| 3'T12 - 3'T8 | 0.007 | 56.4 | $5.20 |
| 4'T12 - 4'T8 | 0.01 | 83.2 | $5.60 |
| 8'T12 - 8'T8 | 0.02 | 170.8 | $7.20 |

## 12.1.3 T8 to T8 Low Wattage

Measure ID: See Table 7.3
Measure Code: L020, L021

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- DEER-The Database for Energy Efficient Resources
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. #no number– Adjust with DEER/CEUS usage characteristics – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**

- Adjustment of hours and coincidence factors of prior TRM using DEER operational data and CEUS Commercial Data
- Added interactive effect factors for energy and demand Table 3.

**Description:**
This measure involves the replacement of 4' standard T8 with low wattage T8 fixtures and electronic ballasts.

**Base Efficiency**

The baseline T8 fixtures are assumed to be standard T8 (32W) lamps with standard magnetic ballasts.

**High Efficiency**

The high efficiency case is super T8 low wattage (25W/28W) lamps with high performance electronic ballasts.

**Energy and Demand Savings:**
The Base Watts and New Watts values are taken from Appendix B of the KEMA Report Table B-2. Appendix G of the KEMA report gives the same value for all Building Types. The following table shows the savings for low wattage T8 lamps and ballast compared to standard T8 lamps.

**Energy and Demand Savings and Incentive Levels:** Using the DEER operational hours (Energy) and the CEUS coincidence factors (Demand) the savings are the following (see Table 3 for Interactive Effect):

| T8 to low wattage T8 with HEEB | | |
|---|---|---|
| Building Type | Demand (kW) Savings | Energy (kWh) Savings |
| All Commercial | 0.009 | 78.1 |
| Misc. Commercial | 0.005 | 78.1 |
| Cold Storage | 0.009 | 75.1 |
| Education | 0.004 | 47.9 |
| Grocery | 0.015 | 105.1 |
| Health | 0.012 | 116.9 |
| Hotel/Motel | 0.011 | 89.2 |
| Misc. Industrial | 0.009 | 77.4 |
| Office | 0.009 | 50.7 |
| Restaurant | 0.014 | 95.3 |
| Retail | 0.011 | 76.0 |
| Warehouse | 0.008 | 75.1 |

**Commercial Lighting Factors**

| Building Type | Hours of | Peak |
|---|---|---|
| All Commercial | 4,325 | 0.50 |
| Misc. Commercial | 4,325 | 0.30 |
| Cold Storage | 4,160 | 0.50 |
| Education | 2,653 | 0.20 |
| Grocery | 5,824 | 0.85 |
| Health | 6,474 | 0.65 |
| Hotel/Motel | 4,941 | 0.60 |
| Misc. Industrial | 4,290 | 0.50 |
| Office | 2,808 | 0.50 |
| Restaurant | 5,278 | 0.75 |
| Retail | 4,210 | 0.60 |
| Warehouse | 4,160 | 0.45 |

[1] The Database for Energy Efficient Resources (DEER)

[2] California Commercial End Use Summary (CEUS)

### Incentive

| Equipment Description | All Commercial Demand (kW) Savings | All Commercial Energy Savings (kWh) | Current Incentive | ¢ /kWh |
|---|---|---|---|---|
| 4'T12 - LW 4'T8 | 0.01 | 78.1 | $8.40 | $0.11 |
| 4'T8 - LW 4'T8 | 0.006 | 78.1 | $5.60 | $0.07 |

## 12.1.4 Delamping

Measure ID: See Table 7.3
Measure Code: L023, L024, L025

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- DEER-The Database for Energy Efficient Resources
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. #20 – Break down the savings by lamp size***.*** – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**

- Adjustment of hours and coincidence factors of prior TRM using DEER operational data and CEUS Commercial Data
- Added interactive effect factors for energy and demand Table 3.

**Description:** The ballasts are re-wired for de-lamping.

**Base Efficiency**

The base case is no delamping

**High Efficiency**

The savings for this measure are determined by calculating the average watt reduction by removing either a 32 W T8, or a standard 40 W or reduced wattage 34 W T12 lamp from a standard ballast fixture, magnetic energy saving ballast fixture, or electric ballast fixture. This measure covers 2', 4' and 8' fixtures.

**Incremental Cost**
$4 per lamp

**Energy and Demand Savings – see Table 3 for Interactive Effect.**

| | Delamping Avg. Wattage Reduction | | | |
|---|---|---|---|---|
| | 2' Lamp | 3' Lamp | 4' Lamp | 8' Lamp |
| Average | 18.5 | 27.5 | 34.5 | 77.0 |

| | Delamping Energy Reduction | | | |
|---|---|---|---|---|
| Building Type | 2' Lamp | 3' Lamp | 4' Lamp | 8' Lamp |
| All Commercial | 80.0 | 118.9 | 149.2 | 333.0 |
| Misc. Commercial | 80.0 | 118.9 | 149.2 | 333.0 |
| Cold Storage | 77.0 | 114.4 | 143.5 | 320.3 |
| Education | 49.1 | 73.0 | 91.5 | 204.3 |
| Grocery | 107.7 | 160.2 | 200.9 | 448.4 |
| Health | 119.8 | 178.0 | 223.4 | 498.5 |
| Hotel/Motel | 91.4 | 135.9 | 170.5 | 380.5 |
| Misc. Industrial | 79.4 | 118.0 | 148.0 | 330.3 |
| Office | 51.9 | 77.2 | 96.9 | 216.2 |
| Restaurant | 97.6 | 145.1 | 182.1 | 406.4 |
| Retail | 77.9 | 115.8 | 145.2 | 324.2 |
| Warehouse | 77.0 | 114.4 | 143.5 | 320.3 |

| | Delamping Demand Reduction | | | |
|---|---|---|---|---|
| Building Type | 2' Lamp | 3' Lamp | 4' Lamp | 8' Lamp |
| All Commercial | 0.009 | 0.014 | 0.017 | 0.039 |
| Misc. Commercial | 0.006 | 0.008 | 0.010 | 0.023 |
| Cold Storage | 0.009 | 0.014 | 0.017 | 0.039 |
| Education | 0.004 | 0.006 | 0.007 | 0.015 |
| Grocery | 0.016 | 0.023 | 0.029 | 0.065 |
| Health | 0.012 | 0.018 | 0.022 | 0.050 |
| Hotel/Motel | 0.011 | 0.017 | 0.021 | 0.046 |
| Misc. Industrial | 0.009 | 0.014 | 0.017 | 0.039 |
| Office | 0.009 | 0.014 | 0.017 | 0.039 |
| Restaurant | 0.014 | 0.021 | 0.026 | 0.058 |
| Retail | 0.011 | 0.017 | 0.021 | 0.046 |
| Warehouse | 0.008 | 0.012 | 0.016 | 0.035 |

**Commercial Lighting Factors**

| Building Type | Hours of Operation[1] | Peak Coincidence Factor[2] |
|---|---|---|
| All Commercial | 4,325 | 0.50 |
| Misc. Commercial | 4,325 | 0.30 |
| Cold Storage | 4,160 | 0.50 |
| Education | 2,653 | 0.20 |
| Grocery | 5,824 | 0.85 |
| Health | 6,474 | 0.65 |
| Hotel/Motel | 4,941 | 0.60 |
| Misc. Industrial | 4,290 | 0.50 |
| Office | 2,808 | 0.50 |
| Restaurant | 5,278 | 0.75 |
| Retail | 4,210 | 0.60 |
| Warehouse | 4,160 | 0.45 |

[1] The Database for Energy Efficient Resources (DEER)

[2] California Commercial End Use Summary (CEUS)

| Equipment Description | All Commercial Demand (kW) Savings | All Commercial Energy Savings (kWh) | Current Incentive |
|---|---|---|---|
| Delamping 2' | 0.009 | 80 | $2.50 |
| Delamping 3' | 0.014 | 118.9 | N/A |
| Delamping 4' | 0.017 | 149.2 | $5.00 |
| Delamping 8' | 0.039 | 333 | $7.50 |

## 12.1.5 Delamping with Reflectors

Measure ID: See Table 7.3
Measure Code: L023, L024, L025

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- New Buildings Institute, Advanced Lighting Guidelines, 2003
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- DEER-The Database for Energy Efficient Resources
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. #20 – Break down the savings by lamp size**.** – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**

- Adjustment of hours and coincidence factors of prior TRM using DEER operational data and CEUS Commercial Data
- Added interactive effect factors for energy and demand Table 3.

**Description:** Putting reflectors on the ballasts allows for more light, with less lamps. The ballasts are re-wired for de-lamping.

**Base Case**

The base efficiency case is no delamping with reflectors.

**High Efficiency**

The savings for this measure are determined by calculating the average watt reduction by removing either a 32 W T8, or a standard 40 W or reduced wattage 34 W T12 lamp from a standard ballast fixture, magnetic energy saving ballast fixture, or electric ballast fixture.

**Energy and Demand Savings:**
The wattage per lamp varies greatly depending on the size of the lamp. See Table 3 for Interactive Effect.

| | Demand Savings (kW) | | | |
|---|---|---|---|---|
| Building Type | 2' Lamp | 3' Lamp | 4' Lamp | 8' Lamp |
| All Commercial | 0.0090 | 0.0140 | 0.0170 | 0.0390 |
| Misc. Commercial | 0.0060 | 0.0080 | 0.0100 | 0.0230 |
| Cold Storage | 0.0090 | 0.0140 | 0.0170 | 0.0390 |
| Education | 0.0040 | 0.0060 | 0.0070 | 0.0150 |
| Grocery | 0.0160 | 0.0230 | 0.0290 | 0.0650 |
| Health | 0.0120 | 0.0180 | 0.0220 | 0.0500 |
| Hotel/Motel | 0.0110 | 0.0170 | 0.0210 | 0.0460 |
| Misc. Industrial | 0.0090 | 0.0140 | 0.0170 | 0.0390 |
| Office | 0.0090 | 0.0140 | 0.0170 | 0.0390 |
| Restaurant | 0.0140 | 0.0210 | 0.0260 | 0.0580 |
| Retail | 0.0110 | 0.0170 | 0.0210 | 0.0460 |
| Warehouse | 0.0080 | 0.0120 | 0.0160 | 0.0350 |

| | Energy Savings (kWh/year) | | | |
|---|---|---|---|---|
| Building Type | 2' Lamp | 3' Lamp | 4' Lamp | 8' Lamp |
| All Commercial | 80.0 | 118.9 | 149.2 | 333 |
| Misc. Commercial | 80.0 | 118.9 | 149.2 | 333 |
| Cold Storage | 77.0 | 114.4 | 143.5 | 320.3 |
| Education | 49.1 | 73.0 | 91.5 | 204.3 |
| Grocery | 107.7 | 160.2 | 200.9 | 448.4 |
| Health | 119.8 | 178.0 | 223.4 | 498.5 |
| Hotel/Motel | 91.4 | 135.9 | 170.5 | 380.5 |
| Misc. Industrial | 79.4 | 118.0 | 148.0 | 330.3 |
| Office | 51.9 | 77.2 | 96.9 | 216.2 |
| Restaurant | 97.6 | 145.1 | 182.1 | 406.4 |
| Retail | 77.9 | 115.8 | 145.2 | 324.2 |
| Warehouse | 77.0 | 114.4 | 143.5 | 320.3 |

**Incentives**

| Equipment Description | All Commercial Demand (kW) Savings | All Commercial Energy Savings (kWh) | Current Incentive |
|---|---|---|---|
| Delamping w/ Refl. 2' | 0.009 | 80 | $5.00 |
| Delamping w/ Refl. 3' | 0.014 | 118.9 | N/A |
| Delamping w/ Refl. 4' | 0.017 | 149.2 | $10.00 |
| Delamping w/ Refl. 8' | 0.039 | 333 | $15.00 |

## 12.1.6LED Refrigerated Case Lighting

Measure ID:

Version Date & Revision History
Draft date: October 3, 2011
Effective date: July 1,2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- 8/13/12 – Measure updated as per EM&V report. The kWh calculations were updated to use new COP and hours per year numbers, and kW numbers were updated respectively.

**Measure Description:**
This measure involves the replacement of a 40W T8 fluorescent lamp with a 23W LED linear lamp fixtures.

**Baseline Efficiencies:**
40W F40 T8 Linear Fluorescent Lamp

**High Efficiency:**
23W LED Linear Lamp

**Energy Savings:**
223.6 kWh

**Demand Savings:**
036 kW

## Savings Algorithms

**LED Refrigerated Case Lighting**

| | | | |
|---|---|---|---|
| Base: 40W F40 T8 Linear Fluorescent Lamp | | 0.040 kW | |
| | | 17 Hours per Day | |
| | x | 365 Days | 6205 Hours per Year |
| 40W F40 T8 kWh/Year | | 248.2 kWh per Year | |
| Enhanced: 29W LED Linear Lamp | | 0.023 kW | |
| | | 17 Hours per Day | |
| | x | 365 Days | 6205 Hours per Year |
| LED Fixture kWh/Year | | 142.7 kWh per Year | |
| 40W F40 T8 kWh/Year | | 248.2 kWh per Year | |
| LED Fixture kWh/Year | - | 142.7 kWh per Year | |
| Lamp kWh Savings | | 105.5 kWh per Year | |
| Lamp kWh Reduction | | 105.5 kWh per Year | |
| % of Lighting Savings reduced from Compressor Load | x | 100% | |
| Cooling Energy Reduced from System | | 105.5 kWh per Year | |
| Refrigerator Compressor Efficiency | x | 1.12 COP | |
| Compressor kWh Savings | | 118.1 kWh per Year | |
| Lamp kWh Savings | | 105.5 kWh per Year | |
| Compressor kWh Savings | + | 118.1 kWh per Year | |
| Total kWh Savings Per Year | | 223.6 kWh per Year | |

**223.6 Annual Energy Savings (kWh)**

| | | | |
|---|---|---|---|
| Annual Energy Savings | | 223.6 kWh | |
| Compressor kW Savings | ÷ | 6205 Hours per Year | |
| Total kW Savings Per Year | | 0.036 kW | |

**0.036 Annual Demand Savings (kW)**

# 12.1.7 LED

Measure ID:
Measure Code: LED

Version Date & Revision History
Draft date: November 30, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- The Database for Energy Efficient Resources (DEER)
- California Commercial End Use Summary (CEUS)
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- 11/30/11 – Moved *LED Product Customized Process* measure to addendum (section 16.2.1) and created new prescriptive *LED* measure.
- Added interactive effect factors for energy and demand Table 3.

**Measure Description:** Light Emitting Diodes (LED) are a lighting technology that utilizes solid-state technology to produce light, opposed to fluorescent or incandescent lighting sources. In general, LED technology will provide energy levels 15% of a comparable incandescent lamp (15W to a 100W equivalent).

**Baseline & High Efficiency:**

**25%** *Dimmable Demand Reduction*

| Lamp | Base Case Incandescent Demand (kW) | Percent Incandescent Base | Base Case CFL Demand (kW) | Percent CFL Base | Base Mix Demand (kW) | Enhanced Case LED Demand (kW) | *LED* Demand Savings (kW) | *Dimmable LED* Demand Savings (kW) |
|---|---|---|---|---|---|---|---|---|
| MR16 | 0.0500 | 100% | n/a | 0% | 0.0500 | 0.0065 | 0.0435 | 0.0326 |
| PAR20 8 deg. | 0.0600 | 80% | 0.0150 | 20% | 0.0510 | 0.0086 | 0.0424 | 0.0318 |
| PAR20 25 deg. | 0.0550 | 80% | 0.0130 | 20% | 0.0466 | 0.0090 | 0.0376 | 0.0282 |
| PAR30 Short Neck | 0.0750 | 80% | 0.0200 | 20% | 0.0640 | 0.0163 | 0.0477 | 0.0358 |
| PAR30 Long Neck | 0.0750 | 80% | 0.0200 | 20% | 0.0640 | 0.0163 | 0.0477 | 0.0358 |
| PAR38 25 deg. | 0.0750 | 80% | 0.0200 | 20% | 0.0640 | 0.0203 | 0.0437 | 0.0328 |
| A-19 | 0.0600 | 20% | 0.0150 | 80% | 0.0240 | 0.0078 | 0.0162 | 0.0122 |

**Energy Savings by Building/Usage Type (see Table 3 for Interactive Effect):**

| | | | Dimmable Commercial Lighting | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MR16 | | PAR20 8 deg. | | PAR20 25 deg. | | PAR30 Short Neck | | PAR30 Long Neck | | PAR38 25 deg. | | A-19 | |
| Building Type | Hours of Operation[1] | Peak Coincidence Factor[2] | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) |
| All Commercial | 4,325 | 0.50 | 188.1 | 0.0218 | 183.4 | 0.0212 | 162.6 | 0.0188 | 206.3 | 0.0239 | 206.3 | 0.0239 | 189.0 | 0.0219 | 70.1 | 0.0081 |
| Misc. Commercial | 4,325 | 0.30 | 188.1 | 0.0131 | 183.4 | 0.0127 | 162.6 | 0.0113 | 206.3 | 0.0143 | 206.3 | 0.0143 | 189.0 | 0.0131 | 70.1 | 0.0049 |
| Cold Storage | 4,160 | 0.50 | 181.0 | 0.0218 | 176.4 | 0.0212 | 156.4 | 0.0188 | 198.4 | 0.0239 | 198.4 | 0.0239 | 181.8 | 0.0219 | 67.4 | 0.0081 |
| Education | 2,653 | 0.20 | 115.4 | 0.0087 | 112.5 | 0.0085 | 99.8 | 0.0075 | 126.5 | 0.0095 | 126.5 | 0.0095 | 115.9 | 0.0087 | 43.0 | 0.0032 |
| Grocery | 5,824 | 0.85 | 253.3 | 0.0370 | 246.9 | 0.0360 | 219.0 | 0.0320 | 277.8 | 0.0405 | 277.8 | 0.0405 | 254.5 | 0.0371 | 94.3 | 0.0138 |
| Health | 6,474 | 0.65 | 281.6 | 0.0283 | 274.5 | 0.0276 | 243.4 | 0.0244 | 308.8 | 0.0310 | 308.8 | 0.0310 | 282.9 | 0.0284 | 104.9 | 0.0105 |
| Hotel/Motel | 4,941 | 0.60 | 214.9 | 0.0261 | 209.5 | 0.0254 | 185.8 | 0.0226 | 235.7 | 0.0286 | 235.7 | 0.0286 | 215.9 | 0.0262 | 80.0 | 0.0097 |
| Misc. Industrial | 4,290 | 0.50 | 186.6 | 0.0218 | 181.9 | 0.0212 | 161.3 | 0.0188 | 204.6 | 0.0239 | 204.6 | 0.0239 | 187.5 | 0.0219 | 69.5 | 0.0081 |
| Office | 2,808 | 0.50 | 122.1 | 0.0218 | 119.1 | 0.0212 | 105.6 | 0.0188 | 133.9 | 0.0239 | 133.9 | 0.0239 | 122.7 | 0.0219 | 45.5 | 0.0081 |
| Restaurant | 5,278 | 0.75 | 229.6 | 0.0326 | 223.8 | 0.0318 | 198.5 | 0.0282 | 251.8 | 0.0358 | 251.8 | 0.0358 | 230.6 | 0.0328 | 85.5 | 0.0122 |
| Retail | 4,210 | 0.60 | 183.1 | 0.0261 | 178.5 | 0.0254 | 158.3 | 0.0226 | 200.8 | 0.0286 | 200.8 | 0.0286 | 184.0 | 0.0262 | 68.2 | 0.0097 |
| Warehouse | 4,160 | 0.45 | 181.0 | 0.0196 | 176.4 | 0.0191 | 156.4 | 0.0169 | 198.4 | 0.0215 | 198.4 | 0.0215 | 181.8 | 0.0197 | 67.4 | 0.0073 |

[1] The Database for Energy Efficient Resources (DEER)
[2] California Commercial End Use Summary (CEUS)

| | | | Non-Dimmable Commercial Lighting | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MR16 | | PAR20 8 deg. | | PAR20 25 deg. | | PAR30 Short Neck | | PAR30 Long Neck | | PAR38 25 deg. | | A-19 | |
| Building Type | Hours of Operation[1] | Peak Coincidence Factor[2] | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) | Energy Savings (kWh/year) | Demand Savings (kW) |
| All Commercial | 4,325 | 0.50 | 141.1 | 0.0163 | 137.5 | 0.0159 | 122.0 | 0.0141 | 154.7 | 0.0179 | 154.7 | 0.0179 | 141.8 | 0.0164 | 52.5 | 0.0061 |
| Misc. Commercial | 4,325 | 0.30 | 141.1 | 0.0098 | 137.5 | 0.0095 | 122.0 | 0.0085 | 154.7 | 0.0107 | 154.7 | 0.0107 | 141.8 | 0.0098 | 52.5 | 0.0036 |
| Cold Storage | 4,160 | 0.50 | 135.7 | 0.0163 | 132.3 | 0.0159 | 117.3 | 0.0141 | 148.8 | 0.0179 | 148.8 | 0.0179 | 136.3 | 0.0164 | 50.5 | 0.0061 |
| Education | 2,653 | 0.20 | 86.6 | 0.0065 | 84.4 | 0.0064 | 74.8 | 0.0056 | 94.9 | 0.0072 | 94.9 | 0.0072 | 87.0 | 0.0066 | 32.2 | 0.0024 |
| Grocery | 5,824 | 0.85 | 190.0 | 0.0277 | 185.2 | 0.0270 | 164.2 | 0.0240 | 208.4 | 0.0304 | 208.4 | 0.0304 | 190.9 | 0.0279 | 70.8 | 0.0103 |
| Health | 6,474 | 0.65 | 211.2 | 0.0212 | 205.9 | 0.0207 | 182.6 | 0.0183 | 231.6 | 0.0233 | 231.6 | 0.0233 | 212.2 | 0.0213 | 78.7 | 0.0079 |
| Hotel/Motel | 4,941 | 0.60 | 161.2 | 0.0196 | 157.1 | 0.0191 | 139.3 | 0.0169 | 176.8 | 0.0215 | 176.8 | 0.0215 | 161.9 | 0.0197 | 60.0 | 0.0073 |
| Misc. Industrial | 4,290 | 0.50 | 140.0 | 0.0163 | 136.4 | 0.0159 | 121.0 | 0.0141 | 153.5 | 0.0179 | 153.5 | 0.0179 | 140.6 | 0.0164 | 52.1 | 0.0061 |
| Office | 2,808 | 0.50 | 91.6 | 0.0163 | 89.3 | 0.0159 | 79.2 | 0.0141 | 100.5 | 0.0179 | 100.5 | 0.0179 | 92.0 | 0.0164 | 34.1 | 0.0061 |
| Restaurant | 5,278 | 0.75 | 172.2 | 0.0245 | 167.8 | 0.0239 | 148.8 | 0.0212 | 188.8 | 0.0268 | 188.8 | 0.0268 | 173.0 | 0.0246 | 64.1 | 0.0091 |
| Retail | 4,210 | 0.60 | 137.4 | 0.0196 | 133.9 | 0.0191 | 118.7 | 0.0169 | 150.6 | 0.0215 | 150.6 | 0.0215 | 138.0 | 0.0197 | 51.2 | 0.0073 |
| Warehouse | 4,160 | 0.45 | 135.7 | 0.0147 | 132.3 | 0.0143 | 117.3 | 0.0127 | 148.8 | 0.0161 | 148.8 | 0.0161 | 136.3 | 0.0147 | 50.5 | 0.0055 |

[1] The Database for Energy Efficient Resources (DEER)

[2] California Commercial End Use Summary (CEUS)

**Equipment Qualifications:** Incentivized LED lamps must be Energy Star labeled.

### Incentives

| Type | LED Incentive | Dimmable LED Incentive |
|---|---|---|
| MR16 | $17.50 | $20.00 |
| PAR20 8 deg. | $17.50 | $20.00 |
| PAR20 25 deg. | $17.50 | $20.00 |
| PAR30 Short Neck | $17.50 | $20.00 |
| PAR30 Long Neck | $17.50 | $20.00 |
| PAR38 25 deg. | $17.50 | $20.00 |
| A-19 | $5.00 | $7.50 |

## 12.1.8 LED Exit Signs

Measure ID: See Table 7.3
Measure Code: L07

Version Date & Revision History
Draft date: January, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007 Demand Management Programs – KEMA (KEMA 2005-07). http://www.energystar.gov/ia/business/small_business/led_exitsigns_techsheet.pdf
- Econorthwest TRM Review – 6/23/10

**TRM Review Actions:**
- 6/23/10 No Changes
- 10/5/11 – Currently Under Review.

**Major Changes:**
- No changes

**Measure Description:**
Replacement of Incandescent Exit Signs with LED Exit Signs. Savings are equal across all building use types.

**Baseline Efficiencies:**
Demand Baseline has been determined by technical specifications of an incandescent exit sign, which typically holds two 20 W bulbs (40 W). The Energy Baseline is based on 24/7 operation of the sign (8,760 hours).

| Building Types | Demand Baseline(kW) | Energy Baseline (kWh) |
|---|---|---|
| All Types | 0.040 | 351 |

**High Efficiency:**
The typical technical specification on an LED Exit Sign (through energystar.gov) claims "less than 5W" of Demand. The Energy High Efficiency figure is based on 24/7 operation (8,760 hours).

| Building Types | Demand High Efficiency (kW) | Energy High Efficiency (kWh) |
|---|---|---|
| All Types | 0.005 | 44 |

**Final Savings:**
The Impact Evaluation Report by KEMA states that LED exit signs are expected to have high realization ratios and that measured savings were typically 100% of claimed savings. These figures match the suggested savings by the KEMA report.

| Building Types | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| All Types | 0.035 | 307 |

**Saving Algorithm:**

| | | | | |
|---|---|---|---|---|
| **Exit Signs - Businesses** | | | | |
| Incandescent Exit Sign | | 0.040 | kW | |
| | | 24.00 | Hours per Day | |
| | x | 365 | Days | 8,760 Hours per Year |
| Incandescent Exit Sign | | 350.4 | kWh per Year | |
| LED Exit Sign | | 0.005 | kW | |
| | | 24.00 | Hours per Day | |
| | x | 365 | Days | 8,760 Hours per Year |
| LED Exit Sign | | 43.8 | kWh per Year | |
| Incandescent Exit Sign | | 350.4 | kWh per Year | |
| LED Exit Sign | - | 43.8 | kWh per Year | |
| Savings Before Adjustments | | 306.6 | kWh per Year | |
| | | 306.6 | kWh per Year | |
| Persistance Factor | x | 1.000 | pf | 0.0% Lamps not installed or replaced back |
| | | 307 | kWh per Year | |
| **CFL Energy Savings** | | **307** | **kWh / Year Savings** | |
| Incandescent Exit Sign | | 0.040 | kW | |
| LED Exit Sign | - | 0.005 | kW | |
| Demand Reduction Before Adjustments | | 0.035 | kW | |
| Demand Reduction Before Adjustments | | 0.035 | kW | |
| Coincidence Factor | | 1.000 | cf | 100.0% Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 1.000 | pf | 0.0% Lamps not installed or replaced back |
| | | 0.035 | kW | |
| **CFL Demand Savings** | | **0.035** | **kW Savings** | |

**Incentive**

$25

## 12.1.10 HID Pulse Start Metal Halide

Measure ID: See Table 7.3
Measure Code: L011, L012, L013

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- DEER-The Database for Energy Efficient Resources
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 6/23/10 Rec. #17 – Break down savings by wattage ranges pulse start metal halides- Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**

- Wholesale replacement of prior TRM using DEER operational data and CEUS Commercial Data
- Added interactive effect factors for energy and demand Table 3.
- Updated document regarding persistence and coincident factors based on EM&V review.

**Referenced Documents:**

**Description:** Traditional probe-start metal halide lamps do not use an igniter and require three electrical contacts to ignite the gas and remain lit. Recently developed pulse-start metal halide lamps use only two contacts and use an igniter located inside the ballast pod. Pulse-start lamps offer higher light output per unit of electric power. Multiple Wattages of Pulse-Start Metal Halides are installed. The most common have rated wattages between 100 and 250, with the majority of installations being 250 W.

**Incremental Cost**
$150 (320W PS Replacing 400W HID)

**Base Case**
Probe start metal halide

**High Efficiency**
Lower wattage pulse start metal halide

**Energy Savings**

The savings for pulse start metal halide fixtures are calculated based on a wattage savings for the replacement of a metal halide fixture with a smaller wattage pulse start metal halide fixture. Based on the wattages provided, it appears that it was assumed that a 175W metal halide fixture would be replaced with a 100W pulse start metal halide fixture, 250W metal halide fixture would be replaced with either a 150W or 175W pulse start metal halide fixture, and a 400W metal halide would be replaced with a 250W pulse start metal halide fixture. Based on the expected fixture wattages and breakdown of fixture installations, an average savings of 123W per fixture was assumed.

| Measure | Metal Halide (W) | Pulse Start Metal Halide (W) |
|---|---|---|
| Equivalent Replacement | 175 | 100 |
| | 250 | 150 or 175 |
| | 400 | 250 |

**Savings**

| | Pulse Start Wattage Reduction | | |
|---|---|---|---|
| | <=100W | 101-200W | 201-350W |
| Average | 48 | 70 | 109 |

**Energy Savings:** Using the DEER operational hours the energy savings are (see Table 3 for Interactive Effect):

| | Pulse Start Energy Reduction | | |
|---|---|---|---|
| **Building Type** | **<=100W** | **101-200W** | **201-350W** |
| All Commercial | 209.0 | 302.0 | 471.4 |
| Misc. Commercial | 209.0 | 302.0 | 471.4 |
| Cold Storage | 201.1 | 290.4 | 453.4 |
| Education | 128.2 | 185.2 | 289.2 |
| Grocery | 281.5 | 406.6 | 634.8 |
| Health | 312.9 | 452.0 | 705.7 |
| Hotel/Motel | 238.8 | 345.0 | 538.6 |
| Misc. Industrial | 207.4 | 299.5 | 467.6 |
| Office | 135.7 | 196.0 | 306.1 |
| Restaurant | 255.1 | 368.5 | 575.3 |
| Retail | 203.5 | 293.9 | 458.9 |
| Warehouse | 201.1 | 290.4 | 453.4 |

**Demand Savings:** Using the CEUS coincidence factors the demand savings are (see Table 3 for Interactive Effect):

| | Pulse Start Demand Reduction | | |
|---|---|---|---|
| **Building Type** | **<=100W** | **101-200W** | **201-350W** |
| All Commercial | 0.024 | 0.035 | 0.055 |
| Misc. Commercial | 0.015 | 0.021 | 0.033 |
| Cold Storage | 0.024 | 0.035 | 0.055 |
| Education | 0.010 | 0.014 | 0.022 |
| Grocery | 0.041 | 0.059 | 0.093 |
| Health | 0.031 | 0.045 | 0.071 |
| Hotel/Motel | 0.029 | 0.042 | 0.065 |
| Misc. Industrial | 0.024 | 0.035 | 0.055 |
| Office | 0.024 | 0.035 | 0.055 |
| Restaurant | 0.036 | 0.052 | 0.082 |
| Retail | 0.029 | 0.042 | 0.065 |
| Warehouse | 0.022 | 0.031 | 0.049 |

**Pulse Start Operational Hours and Peak Coincidence Factors:**

**Commercial Lighting Factors**

| Building Type | Hours of Operation[1] | Peak Coincidence Factor[2] |
|---|---|---|
| All Commercial | 4,325 | 0.50 |
| Misc. Commercial | 4,325 | 0.30 |
| Cold Storage | 4,160 | 0.50 |
| Education | 2,653 | 0.20 |
| Grocery | 5,824 | 0.85 |
| Health | 6,474 | 0.65 |
| Hotel/Motel | 4,941 | 0.60 |
| Misc. Industrial | 4,290 | 0.50 |
| Office | 2,808 | 0.50 |
| Restaurant | 5,278 | 0.75 |
| Retail | 4,210 | 0.60 |
| Warehouse | 4,160 | 0.45 |

[1] The Database for Energy Efficient Resources (DEER)

[2] California Commercial End Use Summary (CEUS)

## 12.1.12 Induction

Measure ID: See Table 7.3
Measure Code: L011, L012, L013

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- DEER-The Database for Energy Efficient Resources
- The California Energy Commission California Commercial End Use Summary http://www.energy.ca.gov/ceus/
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Wholesale replacement of prior TRM using DEER operational data and CEUS Commercial Data
- Added interactive effect factors for energy and demand Table 3.

**Description:**
This measure involves the installation of induction lighting to replace high intensity discharge (HID) lighting. The calculation breaks down the savings into two different size bins; induction fixtures that are less than 100W, and those that are greater than 100W.

**Base Case**
- (For Induction Lighting < 100W) - 45 W Induction lamp compared to 75W Metal Halide lamp
- (For Induction Lighting > 100W) – 150W Induction lamp compared to 250W Metal Halide lamp

**High Efficiency Case**

The high efficiency case is utilizing induction Lighting

**Energy and Demand Savings**
See Table 3 for Interactive Effect.

**Commercial Lighting Factors**

| | | | < 100W | | > 100W | |
|---|---|---|---|---|---|---|
| **Building Type** | **Hours of Operation**[1] | **Peak Coincidence Factor**[2] | **Energy Savings (kWh/year)** | **Demand Savings (kW)** | **Energy Savings (kWh/year)** | **Demand Savings (kW)** |
| All Commercial | 4,325 | 0.50 | 163 | 0.019 | 567 | 0.066 |
| Misc. Commercial | 4,325 | 0.30 | 163 | 0.011 | 567 | 0.039 |
| Cold Storage | 4,160 | 0.50 | 157 | 0.019 | 545 | 0.066 |
| Education | 2,653 | 0.20 | 100 | 0.008 | 348 | 0.026 |
| Grocery | 5,824 | 0.85 | 220 | 0.032 | 763 | 0.111 |
| Health | 6,474 | 0.65 | 244 | 0.025 | 848 | 0.085 |
| Hotel/Motel | 4,941 | 0.60 | 186 | 0.023 | 647 | 0.079 |
| Misc. Industrial | 4,290 | 0.50 | 162 | 0.019 | 562 | 0.066 |
| Office | 2,808 | 0.50 | 106 | 0.019 | 368 | 0.066 |
| Restaurant | 5,278 | 0.75 | 199 | 0.028 | 691 | 0.098 |
| Retail | 4,210 | 0.60 | 159 | 0.023 | 552 | 0.079 |
| Warehouse | 4,160 | 0.45 | 157 | 0.017 | 545 | 0.059 |

[1] The Database for Energy Efficient Resources (DEER)
[2] California Commercial End Use Summary (CEUS)

**Savings Algorithm**

| Induction Lighting < 100 W | | | |
|---|---|---|---|
| Base Case (Metal Halide) | | 75 | Watts |
| Ballast Factor | | 1.18 | |
| Demand | | 88.69 | Watts |
| Demand | | 0.09 | kW |
| Hours of Operation | | 4325 | hours/year |
| Base Case Energy Usage | | 383.57 | kWh/year |
| Base Case Demand | | 0.09 | kW |
| | | | |
| High Efficiency Case (Induction) | | 49 | Watts |
| Ballast Factor | | 1.00 | |
| Demand | | 49.00 | Watts |
| Demand | | 0.05 | kW |
| Hours of Operation | | 4325 | hours/year |
| High Efficiency Energy Usage | | 211.93 | kWh/year |
| | | | |
| Energy Savings Before Adjustments | | 171.65 | kWh/year |
| Persistance Factor | x | 0.95 | |
| Energy Savings | | 163.07 | kWh/year |
| | | | |
| **Induction Lighting < 100 W Energy Savings** | | **163.07** | **kWh/year** |
| | | | |
| Base Case Demand | | 0.09 | kW |
| High Efficiency Demand | - | 0.05 | kW |
| Demand Reduction Before Adjustments | | 0.04 | kW |
| | | | |
| Demand Reduction Before Adjustments | | 0.04 | kW |
| Coincidence Factor | | 0.50 | kW |
| Persistance Factor | x | 0.95 | kW |
| | | 0.019 | kW |
| | | | |
| **Induction Lighting < 100 W Demand Savings** | | **0.019** | **kW** |

**Savings Algorithm**

| | | | |
|---|---|---|---|
| **Induction Lighting > 100 W** | | | |
| Base Case (Metal Halide) | | 250 | Watts |
| Ballast Factor | | 1.18 | |
| Demand | | 295.90 | Watts |
| Demand | | 0.30 | kW |
| Hours of Operation | | 4325 | hours/year |
| Base Case Energy Usage | | 1,279.77 | kWh/year |
| Base Case Demand | | 0.30 | kW |
| | | | |
| High Efficiency Case (Induction) | | 158 | Watts |
| Ballast Factor | | 1.00 | |
| Demand | | 158.00 | Watts |
| Demand | | 0.16 | kW |
| Hours of Operation | | 4325 | hours/year |
| High Efficiency Energy Usage | | 683.35 | kWh/year |
| | | | |
| Energy Savings Before Adjustments | | 596.42 | kWh/year |
| Persistance Factor | x | 0.95 | |
| Energy Savings | | 566.60 | kWh/year |
| | | | |
| **Induction Lighting > 100 W Energy Savings** | | **566.60** | **kWh/year** |
| | | | |
| Base Case Demand | | 0.30 | kW |
| High Efficiency Demand | - | 0.16 | kW |
| Demand Reduction Before Adjustments | | 0.14 | kW |
| | | | |
| Demand Reduction Before Adjustments | | 0.14 | kW |
| Coincidence Factor | | 0.50 | kW |
| Persistance Factor | x | 0.95 | kW |
| | | 0.066 | kW |
| | | | |
| **Induction Lighting > 100 W Demand Saving** | | **0.066** | **kW** |

**Incentive**

**Existing:**
Induction lighting < 100 W = $45
Induction lighting > 100 W = $60

**New Construction:**
Induction lighting < 100 W = $25
Induction lighting > 100 W = $35

**Incremental Cost**
Induction lighting < 100 W = $200
Induction lighting > 100 W = $800

**Measure Life**
2 year (DEER) – Is this correct or typo from DEER list?

## 12.1.13 Sensors

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
Occupancy sensors can reduce lighting costs by up to 50% in rooms where lights are frequently left on when on one is around."

According to the Federal Energy Management Program (FEMP) of the US Department of Energy, in a small, private office, an occupancy sensor can reduce energy use by almost 30% shaving 100kWh off the annual energy use. In a large open office area, energy use can be reduced by approximately 10%.

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- TRM measure previously discussed using smart-strips with occupancy sensors. Changed to occupancy sensors for lighting as intended in the annual plan. Updated energy conservations numbers accordingly.

**Measure Description:**
This measure is for wall switch sensors that controls the use of lighting in areas around the home with variable use such as laundry, storage, garage, bedrooms or spare areas.

Occupancy sensors must comply with:
- Energy Star
- UL Listing

**Baseline Efficiencies:**
The base case is two (2) 32W T8 fluorescent lamp.

**High Efficiency:**
The high efficiency case is 33% reduced run time from the base case.

**Energy Savings:**
Energy savings is calculated at 67.8 kWh per year per sensor.

## Savings Algorithms

| Room Occupancy Sensors - Commercial | | | | |
|---|---|---|---|---|
| 4' T8 Lamp | | 0.032 | kW | |
| Two (2) - Lamp | | 2.0 | | |
| | | 0.064 | | |
| Ballast Factor | | 0.880 | | |
| | | 0.056 | kW | |
| | | 10.00 | Hours per Day | |
| | x | 365 | Days | 839.5 Hours per Year |
| Baseline Energy Usage | | 205.6 | kWh per Year | |
| | | | | |
| Run Time Reduced (RTR) | | 3.30 | Hours per Day | 33% |
| | | | | |
| | | 205.6 | kWh per Year | |
| | x | 0.33 | | 33% Run Time Reduced |
| | | 67.8 | kWh per Year | |
| **Energy Savings** | | **67.8** | **kWh / Year Savings** | |
| | | | | |
| Two Lamp Demand Reduction Before Adjustments | | 0.056 | kW | |
| Coincidence Factor | | 0.120 | cf | 12.0% Lamps on between 5 and 9 p.m. |
| Persistance Factor | x | 1.000 | pf | 100.0% |
| | | 0.0068 | kW | |
| **Demand Savings** | | **0.0068** | **kW Savings** | |

**Operating Hours**

10 hours per day

**Loadshape**

TBD

**Freeridership/Spillover Factors**
TBD

**Coincidence**
CF = 0.12 (12% lamps on between 5PM – 9PM)

**Persistence**
PF =1.0

**Lifetime**
8 years (DEER)

**Measure Costs and Incentive Levels**

| Measure | Incentive | Incremental Cost |
|---|---|---|
| Occupancy Sensor | $ 20.00 | $ 30.00 |

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

## 12.1.14 Daylighting

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
This measure is currently evaluated and incentivized through the custom program.

## 12.2 High Efficiency HVAC

### 12.2.1 Chiller

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Econorthwest TRM Review – 6/23/10
- IECC 2006

**TRM Review Actions:**

- 6/23/10 Rec. #23 – Utilize IECC 2006 Efficiencies as the Baseline Efficiency and Efficient Packaged
  Unit 15% better than IECC 2006 – Adopted
- 6/23/10 Rec. #24 - break down the savings by chiller type and size. Conduct additional research for future program years to calibrate claimed savings for Hawaii
  customer base.- Adopted

**Major Changes:**

- Chiller efficiency selected at 15% improvement over IECC 2006.

**Description:** The replacement of chillers with Energy Efficiency above the code efficiency values in place at the time of permitting the project. In multiple unit chiller plants, a review of operational chillers will be conducted to determine what fraction of installed chillers will be incentivized. This is to avoid paying for standby units.

**High Efficiency Chiller - 15% higher than IECC 2006**

| | | IECC 2006 IPLV (kW/Ton) | Hawaii Energy Premium Efficiency (kW/Ton) |
|---|---|---|---|
| Reciprocating | All | 0.70 | 0.60 |
| Rotary Screw and Scroll | < 150 tons | 0.68 | 0.58 |
| | 150-300 tons | 0.63 | 0.54 |
| | > 300 tons | 0.57 | 0.48 |
| Centrifugal | < 150 tons | 0.67 | 0.57 |
| | 150-300 tons | 0.60 | 0.51 |
| | > 300 tons | 0.55 | 0.47 |

**Energy Savings:**

**High Efficiency Chiller - 15% higher than IECC 2006 - Energy Reduction (kWh/Ton)**

| Building Type | Recipricating | Rotary Screw or Scroll | | | Centrifugal | | |
|---|---|---|---|---|---|---|---|
| | All | <150 | 150-300 | >300 | <150 | 150-300 | >300 |
| All Commercial | 312.5 | 303.6 | 281.2 | 254.4 | 299.1 | 267.8 | 245.5 |
| Misc. Commercial | 312.5 | 303.6 | 281.2 | 254.4 | 299.1 | 267.8 | 245.5 |
| Cold Storage | 536.7 | 521.3 | 483.0 | 437.0 | 513.7 | 460.0 | 421.7 |
| Education | 307.9 | 299.1 | 277.1 | 250.7 | 294.7 | 263.9 | 241.9 |
| Grocery | 536.7 | 521.3 | 483.0 | 437.0 | 513.7 | 460.0 | 421.7 |
| Health | 435.7 | 423.3 | 392.1 | 354.8 | 417.0 | 373.5 | 342.3 |
| Hotel/Motel | 312.4 | 303.5 | 281.2 | 254.4 | 299.0 | 267.8 | 245.5 |
| Misc. Industrial | 435.7 | 423.3 | 392.1 | 354.8 | 417.0 | 373.5 | 342.3 |
| Office | 520.1 | 505.3 | 468.1 | 423.5 | 497.8 | 445.8 | 408.7 |
| Restaurant | 349.0 | 339.0 | 314.1 | 284.2 | 334.1 | 299.2 | 274.2 |
| Retail | 273.9 | 266.1 | 246.5 | 223.1 | 262.2 | 234.8 | 215.2 |
| Warehouse | 536.7 | 521.3 | 483.0 | 437.0 | 513.7 | 460.0 | 421.7 |

**Demand Savings:**

**High Efficiency Chiller - 15% higher than IECC 2006 - Demand Reduction (kW/Ton)**

| Building Type | Recipricating | Rotary Screw or Scroll | | | Centrifugal | | |
|---|---|---|---|---|---|---|---|
| | All | <150 | 150-300 | >300 | <150 | 150-300 | >300 |
| All Commercial | 0.064 | 0.062 | 0.058 | 0.052 | 0.061 | 0.055 | 0.050 |
| Misc. Commercial | 0.064 | 0.062 | 0.058 | 0.052 | 0.061 | 0.055 | 0.050 |
| Cold Storage | 0.072 | 0.070 | 0.065 | 0.059 | 0.069 | 0.062 | 0.057 |
| Education | 0.084 | 0.082 | 0.076 | 0.068 | 0.080 | 0.072 | 0.066 |
| Grocery | 0.056 | 0.054 | 0.050 | 0.045 | 0.053 | 0.048 | 0.044 |
| Health | 0.071 | 0.069 | 0.064 | 0.058 | 0.068 | 0.061 | 0.056 |
| Hotel/Motel | 0.055 | 0.053 | 0.049 | 0.044 | 0.052 | 0.047 | 0.043 |
| Misc. Industrial | 0.064 | 0.062 | 0.058 | 0.052 | 0.061 | 0.055 | 0.050 |
| Office | 0.048 | 0.047 | 0.043 | 0.039 | 0.046 | 0.041 | 0.038 |
| Restaurant | 0.056 | 0.054 | 0.050 | 0.045 | 0.053 | 0.048 | 0.044 |
| Retail | 0.069 | 0.067 | 0.062 | 0.056 | 0.066 | 0.059 | 0.054 |
| Warehouse | 0.063 | 0.061 | 0.057 | 0.051 | 0.060 | 0.054 | 0.050 |

**Measure Life**
20 years (DEER)

**Incentive**
$50 / Ton

## 12.2.2 VFD – Chilled Water

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- IECC 2006

**TRM Review Actions:**
- 6/23/10 Rec. #25 - Breakdown the savings by building types. Conduct additional research for future program years to calibrate claimed savings for Hawaii customer base – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Energy savings separated into building type breakdown.

**Description:** The installation of variable frequency drives on chilled and/or condenser water pumps used in HVAC systems.

**Qualification**
- Require pre-notification before projects begin.
- The program reserves the right to perform on-site verifications, both pre- and post-installation.
- Existing equipment must not have a VFD. (i.e. – incentives are not available for replacement)
- For existing facilities, motor hp must be between 3 and 100.
- For new facilities, motor hp must be between 3 and 50.
- The VFDs must actively control and vary the pump speed.

**Energy and Demand Savings**

Energy Savings = 902.7 kWh per HP
Demand Savings = 0.245 kW per HP

**HVAC Pump Motor VFD**

DSMIS Values for All Commercial
kW = 0.245 per HP
kWh = 902.7 per HP

KEMA 2008 Values for All Commercial (HECO):
kW = none available
kWh = none available

**Base Pump Motor Use:**

| | | |
|---|---|---|
| Base HP = | 10 HP | Example |
| Motor Efficiency = | 92% | Estimated Typical |
| Average Load = | 75% | Estimated Typical |
| HP to kW conversion = | 0.746 | |
| kW load = HP*0.746*% Load/eff = | 6.1 kW | |
| Hours of operation = | 6000 hours | Estimated |
| kWh Used Annually = kW load * Hours = | 36,489 | |

**Pump Motor Savings with VFD:**

| | | |
|---|---|---|
| Energy Savings percentage = | 24.74% | Needed to meet the kWh savings from DSMIS |
| kWh savings = % savings * kWh annual use = | 9,027 kWh | |
| kW average savings = kWh savings/Hours = | 1.50 kW | |
| kW savings = average kW savings * CF = | 2.45 kW | Based on DSMIS value of 245 watts per HP |
| CF needed = kW savings (program) / kW average = | 1.63 | |

**Incentive**
$80/HP

## 12.2.3 VFD – AHU

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Energy and Peak Demand Impact Evaluation Report of the 2005-2007
- Demand Management Programs – KEMA (KEMA 2005-07).
- Econorthwest TRM Review – 6/23/10
- IECC 2006
- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**
- 6/23/10 Rec. #25 - Breakdown the savings by building types. Conduct additional research for future program years to calibrate claimed savings for Hawaii customer base – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Energy savings separated into building type breakdown.
- Updated energy and demand savings based on EM&V review.

**Description:** The installation of variable frequency drives on fans used in HVAC systems.

Values for this measure are not called out in the KEMA report. The DSMIS values for this measure are 200 watts and 760.9 kWh per horsepower. The primary assumption used for the savings calculation is that the percentage savings of the energy used before the VFD is applied. This percent savings is shown in the calculations below as about 21%. Based on information from the EPRI Adjustable Speed Drive directory and comparing energy use for outlet damper, inlet damper and VFD controls the average savings for this profile would be 50% for replacement of an outlet damper and 33% for replacement of an inlet damper. See table below.

| Percentage of Full Load Power | | | | Power Savings % | |
|---|---|---|---|---|---|
| % Flow | Outlet Dampers | Inlet Dampers | VFD | Outlet Savings | Inlet Savings |
| 100 | 111 | 109 | 105 | 6 | 4 |
| 90 | 107 | 93 | 73 | 34 | 20 |
| 80 | 104 | 82 | 57 | 47 | 25 |
| 70 | 99 | 75 | 44 | 55 | 31 |
| 60 | 94 | 69 | 32 | 62 | 37 |
| 50 | 87 | 65 | 21 | 66 | 44 |
| 40 | 80 | 63 | 14 | 66 | 49 |
| 30 | 72 | 60 | 8 | 64 | 52 |
| | | | **Average** | **50** | **33** |

Therefore, the 21% of base case savings used in to match the DSMIS values in the calculations below appears to be reasonable and possibly conservative. The actually savings for the customer will depend on many factors related to their type of building, system and hours of operation.

VFD AHU – Energy and Demand Savings:

| Building Type | Hours | Demand Savings (kW/HP) | Energy Savings (kWh/HP) |
|---|---|---|---|
| All Commercial | 3,720 | 0.20 | 471.69 |
| Misc. Commercial | 3,720 | 0.20 | 471.69 |
| Cold Storage | 6,389 | 0.20 | 810.12 |
| Education | 3,665 | 0.20 | 464.72 |
| Grocery | 6,389 | 0.20 | 810.12 |
| Health | 5,187 | 0.20 | 657.71 |
| Hotel/Motel | 3,719 | 0.20 | 471.57 |
| Misc. Industrial | 5,187 | 0.20 | 657.71 |
| Office | 6,192 | 0.20 | 785.14 |
| Restaurant | 4,155 | 0.20 | 526.85 |
| Retail | 3,261 | 0.20 | 413.49 |
| Warehouse | 6,389 | 0.20 | 810.12 |

### Example Calculation:

**HVAC Fan Motor VFD**

DSMIS Values for All Commercial
kW = 0.200 per HP
kWh = 760.9 per HP

KEMA 2008 Values for All Commercial (HECO):
kW = none available
kWh = none available

**Base Pump Motor Use:**

| | | | |
|---|---|---|---|
| Base HP = | 10 | HP | Example |
| Motor Efficiency = | 92% | | Estimated Typical |
| Average Load = | 75% | | Estimated Typical |
| HP to kW conversion = | 0.746 | | |
| kW load = HP*0.746*% Load/eff = | 6.1 | kW | |
| Hours of operation = | 3,720 | hours | Estimated |
| kWh Used Annually = kW load * Hours = | 22,623 | | 22623.26 |

**Pump Motor Savings with VFD:**

| | | | |
|---|---|---|---|
| Energy Savings percentage = | 20.85% | | Needed to meet the kWh savings from DSMIS |
| kWh savings = % savings * kWh annual use = | 4,717 | kWh | |
| kW average savings = kWh savings/Hours = | 1.268 | kW | |
| kW savings = average kW savings * CF = | 2.0 | kW | Based on DSMIS value of 200 watts per HP |
| CF needed = kW savings (program) / kW average = | 1.58 | | |

## 12.2.4 Garage Demand Ventilation Control

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: October 3, 2011
Effective date: October 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- ASHRAE Standard 62
- International Mechanical Code
- Department of Health (DOH) Title 11 Chapter 39 (Air Conditioning and Ventilation)

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- New program offering.
- 11/22/11 – Under *Description,* the phrase "City Codes" was changed to "Codes" for accuracy.

**Description:**

Demand-controlled ventilation (DCV) using carbon monoxide (CO) sensing is a combination of two technologies: Sensors that monitor CO levels in the parking garage, and an air-handling system that uses data from the sensors to regulate the amount of ventilation air admitted. CO sensors continually monitor the air in a parking garage. Given a predictable activity level, automobiles will exhaust CO at a predictable level. Thus CO production in the parking garage will closely track activity. Given these two characteristics, a CO measurement can be used to measure and control the amount of outside air that is being introduced to dilute the CO generated by automobiles. The result is that ventilation rates can be measured and controlled to a specific cfm/ft2. This is in contrast to the traditional method of ventilating at a fixed rate regardless of occupancy.

City codes for enclosed parking areas require ventilation during all hours of operation to protect against an unhealthful build-up of carbon monoxide (CO). As a result, exhaust fans generally run 100% of operating hours. Although some buildings use timers to cut fan run time, it is important to note that the use of timers may not meet code compliance and health considerations. To achieve major energy savings and meet all health requirements, carbon monoxide sensors have now been authorized by code and mandated in some jurisdictions for new construction. Sensors measure CO levels, activating fans only when necessary to maintain CO at an acceptable level, saving upwards to 90% of energy cost.

**Program Requirements:**

1. Pre-notification before equipment is purchased and installed.
2. New construction is not eligible.
3. Incentive amount not to exceed Installed Cost.
4. Failure of devices causes the exhaust fans to operate in the ON position

**Energy and Demand Savings:**
All assumptions, data and formulas used in the calculations must be clearly documented. Standard engineering principles must be applied, and all references cited. Pre and post monitoring will be conducted to determine measured energy and demand savings.

**Savings Algorithms**
Gross energy and demand savings estimates for custom projects are calculated using engineering analysis and project-specific details including pre and post monitoring. A physical fan motor audit will be performed as well as spot amperage checks and logging of pre and post operational times.

**Baseline Efficiency**
The baseline efficiency case assumes compliance with the efficiency requirements as mandated by the Hawaii State Energy Code or industry accepted standard practice.

**High Efficiency**
The high efficiency case is the installation of a parking garage ventilation demand control device utilizing carbon monoxide sensors.

**Persistance Factor**
PF = 1 since all custom projects require verification of equipment installation.

**Incentives**
- $0.18/kWh
- Incentives is limited to 100% of incremental costs.
- Installations are subject to inspection for up to 5 years. Removal will be cause for incentive forfeiture.

**Measure Life**
5 years

## Example

| Zone | New Fan Tag | Fan Location | Old Fan Tag | HP | Measured kW | | 100% 8,760 hr/yr. | 1.0% 88 hr/yr. | 6/7 to 6/15 | Notes | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GEF-1 | 1-B | PEF-2 | 10.0 | 7.2 | | 63,072 | 631 | 100.0% | Data logger installed | 7.5 | 0.3 | 96.5% |
| | GSF-1 | 1-B | PSF-4 | 5.0 | 3.4 | | 29,784 | 298 | | | 3.7 | 0.3 | 91.2% |
| | GSF-2 | 1-B | PSF-4 | 5.0 | 3.4 | | 29,784 | 298 | | | 3.7 | 0.3 | 91.2% |
| 2 | GEF-3 | 2-B | PEF-2 | 10.0 | 7.7 | | 67,452 | 675 | | | 7.5 | (0.2) | 103.2% |
| | GSF-3 | 2-B | PSF-4 | 10.0 | 7.5 | | 65,700 | 657 | 100.0% | Data logger installed | 7.5 | (0.0) | 100.5% |
| 3 | GEF-6 | 3-B | PEF-2 | 10.0 | 7.4 | | 64,824 | 648 | 99.9% | Data logger installed | 7.5 | 0.1 | 99.2% |
| | GSF-4 | 3-B | PSF-2 | 10.0 | 7.4 | | 64,824 | 648 | 100.0% | Data logger installed | 7.5 | 0.1 | 99.2% |
| 4 | GEF-9 | 4-B | PEF-1 | 7.5 | 4.5 | | 39,420 | 394 | 100.0% | Data logger installed | 5.6 | 1.1 | 80.4% |
| | GEF-10 | 4-B | PEF-4 | 3.0 | 2.6 | | 22,776 | 228 | | | 2.2 | (0.4) | 116.2% |
| 5 | GEF-7 | 4-A | PEF-1 | 7.5 | 4.5 | | 39,420 | 394 | | | 5.6 | 1.1 | 80.4% |
| | GSF-5 | 4-A | PSF-3 | 7.5 | 5.8 | | 50,808 | 508 | 100.0% | Data logger installed | 5.6 | (0.2) | 103.7% |
| 6 | GEF-11 | 5-A | PEF-1 | 7.5 | 4.9 | | 42,924 | 429 | | | 5.6 | 0.7 | 87.6% |
| | GSF-6 | 5-A | PSF-3 | 7.5 | 5.8 | | 50,808 | 508 | 100.0% | Data logger installed | 5.6 | (0.2) | 103.7% |
| 7 | GEF-13 | 6-A | PEF-2 | 10.0 | 7.5 | | 65,700 | 657 | | | 7.5 | (0.0) | 100.5% |
| | GSF-7 | 6-A | PSF-3 | 7.5 | 5.0 | | 43,800 | 438 | 100.0% | Data logger installed | 5.6 | 0.6 | 89.4% |
| 8 | GEF-2 | 1-B | PEF-1 | 7.5 | 3.6 | | 31,536 | 315 | | | 5.6 | 2.0 | 64.3% |
| | GEF-4 | 2-A | PEF-2 | 10.0 | 7.4 | | 64,824 | 648 | | | 7.5 | 0.1 | 99.2% |
| | GEF-5 | 3-A | PEF-3 | 5.0 | 3.1 | | 27,156 | 272 | | | 3.7 | 0.6 | 83.1% |
| | GEF-8 | 4-A | PEF-3 | 5.0 | 3.1 | | 27,156 | 272 | | | 3.7 | 0.6 | 83.1% |
| | GEF-12 | 5-A | PEF-1 | 7.5 | 4.9 | | 42,924 | 429 | 99.9% | Data logger installed | 5.6 | 0.7 | 87.6% |
| | GEF-14 | 6-A | PEF-4 | 3.0 | 2.4 | | 21,024 | 210 | | | 2.2 | (0.2) | 107.2% |
| **TOTALS** | | | | **156.0** | **109.1** | kW | Pre-Project 955,716 | 9,557 | | | 116.4 | 7.3 | |
| | | | | Coincidence Factor | 1.0 | | Post-Project (9,557) | | | | | | |
| | | | | On Peak Demand Savings | 109.1 | kW | Energy Savings per Year 946,159 | kWh | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | 109.1 | kW | | 946,159 | kWh/yr. |
| Demand Cost per Unit $ | 12.60 | /kW month | Energy Cost per Unit $ | 0.21 | /kWh |
| Demand Cost Savings $ | 1,375 | /month | Energy Cost Savings $ | 200,586 | /yr. |
| | 12 | months | | | |
| $ | 16,496 | /Year | | | |

Incentive $ 0.18

| | | |
|---|---|---|
| Demand Cost Savings $ | 16,496 | |
| Energy Cost Savings $ | 200,586 | |
| $ | 217,082 | /yr. |

| | |
|---|---|
| **Project Cost $** | **152,323** |
| **Incentive not to exceed 100% of project cost** | **170,308.6** |
| **Incentive** | **152,323.0** |

## 12.2.5 Package Unit AC

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Econorthwest TRM Review – 6/23/10
- Econorthwest Email Correspondence – 1/23/12
- IECC 2006, pg. 34

**TRM Review Actions:**
- 6/23/10 Rec. #21 – Utilize IECC 2006 Efficiencies as the Baseline Efficiency and Efficient Packaged Unit 15% better than IECC 2006 – Adopted
- 6/23/10 Rec. #22 - Break down packaged AC savings based on equipment size. – Adopted
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Package chiller unit AC efficiency selected at 15% improvement over IECC 2006.
- 12/12/11 – kW/ton and EER values updated to match IECC 2006 package unit values as per Econorthwest's direction, high efficiency numbers adjusted accordingly. Energy & demand savings updated accordingly.

**Description:** The replacement of package and split unit air conditioners with Energy Efficiency above the Hawaii Model Energy Code.

**Package Units**

| Unit Size (Btu/Hr.) | IECC 2006 Efficiency (kW/ton) | SEER/EER | Hawaii Energy Premium Efficiency (kW/ton) | SEER/EER |
|---|---|---|---|---|
| < 65,000 | 1.364 | 9.7 SEER | 1.159 | 11.2 SEER |
| 65,000 to 134,999 | 1.165 | 10.3 EER | 0.990 | 11.8 EER |
| 135,000 to 239,999 | 1.237 | 9.7 EER | 1.052 | 11.2 EER |
| 240,000 to 759,999 | 1.263 | 9.5 EER | 1.074 | 10.9 EER |
| > 760,000 | 1.304 | 9.2 EER | 1.109 | 10.6 EER |

## Energy Savings

### Package Unit AC - 15% higher than IECC 2006 - Energy Reduction - kWh

| Building Type | < 65,000 | 65,001 to 135,000 | 135,001 to 240,000 | 240,001 to 760,000 | > 760,000 |
|---|---|---|---|---|---|
| All Commercial | 608.7 | 520.1 | 552.2 | 563.9 | 582.3 |
| Misc. Commercial | 608.7 | 520.1 | 552.2 | 563.9 | 582.3 |
| Cold Storage | 1,045.4 | 893.2 | 948.5 | 968.4 | 1,000.0 |
| Education | 599.7 | 512.4 | 544.1 | 555.5 | 573.7 |
| Grocery | 1,045.4 | 893.2 | 948.5 | 968.4 | 1,000.0 |
| Health | 848.8 | 725.2 | 770.0 | 786.2 | 811.9 |
| Hotel/Motel | 608.5 | 519.9 | 552.1 | 563.7 | 582.1 |
| Misc. Industrial | 848.8 | 725.2 | 770.0 | 786.2 | 811.9 |
| Office | 1,013.2 | 865.7 | 919.2 | 938.6 | 969.2 |
| Restaurant | 679.9 | 580.9 | 616.8 | 629.8 | 650.3 |
| Retail | 533.6 | 455.9 | 484.1 | 494.3 | 510.4 |
| Warehouse | 1,045.4 | 893.2 | 948.5 | 968.4 | 1,000.0 |

## Demand Savings

### Package Unit AC - 15% higher than IECC 2006 - Demand Reduction - kW

| Building Type | < 65,000 | 65,001 to 135,000 | 135,001 to 240,000 | 240,001 to 760,000 | > 760,000 |
|---|---|---|---|---|---|
| All Commercial | 0.102 | 0.087 | 0.093 | 0.095 | 0.098 |
| Misc. Commercial | 0.061 | 0.052 | 0.056 | 0.057 | 0.059 |
| Cold Storage | 0.102 | 0.087 | 0.093 | 0.095 | 0.098 |
| Education | 0.041 | 0.035 | 0.037 | 0.038 | 0.039 |
| Grocery | 0.174 | 0.149 | 0.158 | 0.161 | 0.166 |
| Health | 0.133 | 0.114 | 0.121 | 0.123 | 0.127 |
| Hotel/Motel | 0.123 | 0.105 | 0.111 | 0.114 | 0.117 |
| Misc. Industrial | 0.102 | 0.087 | 0.093 | 0.095 | 0.098 |
| Office | 0.102 | 0.087 | 0.093 | 0.095 | 0.098 |
| Restaurant | 0.153 | 0.131 | 0.139 | 0.142 | 0.147 |
| Retail | 0.123 | 0.105 | 0.111 | 0.114 | 0.117 |
| Warehouse | 0.092 | 0.079 | 0.084 | 0.085 | 0.088 |

# 12.2.6 Inverter Variable Refrigerant Flow (VRF) Split Air Conditioning Systems

Measure ID: See Table 7.3 (TBD)
Measure Code: Inverter VRF AC

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- Original TRM values was divided by .8 but have been corrected to be multiplied by 1.2 in order to obtain a 20% increase in efficiency.

**Description:** Inverter driven variable refrigerant flow (VRF) air conditioning systems are direct expansion AC systems that utilize variable speed evaporator/condenser fans, and a combination of fixed and variable speed compressors along with most often multiple individual zone evaporators to provide the ability to more closely match the AC system's output with the building's cooling requirements. Savings comes from:

- *Part Load Efficiencies*: Increased part-load efficiency operation
- *High Efficiency Motors*: Many systems use ECM motors
- *Higher Room Temperatures*: The capacity matching allows for better humidity control through longer cooling operation.
- *Reduction of Distribution Losses*: Duct losses are reduced with DX systems. This may be offset by dedicated outside air distribution systems when needed.

**Payback Qualifications:** VRF products need a payback requirement of 1 year or greater. The TRB/TRC must be greater than 1.

**Energy and Demand Savings:** VRF systems have demonstrated a 20-30% reduction in energy consumption as compared to standard DX equipment. The energy savings and demand tables that follow provide the savings by building type and system size for VRF systems. These figures are conservatively determined to be 20% greater than provided by the "Standard" Package Unit AC measures that require EERs 15% greater than IECC 2006 requirements.

The VRF applications have been new construction projects with no ability to perform pre and post measurements. Hawaii Energy will perform field pre and post field measurements to determine the measure effectiveness in the local environment

**Variable Refrigerant Flow AC**
**20% better than Non-VRF with efficiencies 15% over IECC 2006 - Energy Reduction**

| Building Type | < 65,000 | 65,001 to 135,000 | 135,001 to 240,000 | 240,001 to 760,000 | > 760,000 |
|---|---|---|---|---|---|
| All Commercial | 494.5 | 636.5 | 676.7 | 676.7 | 698.8 |
| Misc. Commercial | 494.5 | 636.5 | 676.7 | 676.7 | 698.8 |
| Cold Storage | 849.2 | 1,093.1 | 1,162.1 | 1,162.1 | 1,200.0 |
| Education | 487.2 | 627.0 | 666.6 | 666.6 | 688.4 |
| Grocery | 849.2 | 1,093.1 | 1,162.1 | 1,162.1 | 1,200.0 |
| Health | 689.5 | 887.4 | 943.4 | 943.4 | 974.3 |
| Hotel/Motel | 494.4 | 636.2 | 676.4 | 676.4 | 698.5 |
| Misc. Industrial | 689.5 | 887.4 | 943.4 | 943.4 | 974.3 |
| Office | 823.1 | 1,059.4 | 1,126.3 | 1,126.3 | 1,163.0 |
| Restaurant | 552.2 | 710.9 | 755.8 | 755.8 | 780.4 |
| Retail | 433.4 | 557.9 | 593.2 | 593.2 | 612.5 |
| Warehouse | 849.2 | 1,138.6 | 1,162.1 | 1,162.1 | 1,200.0 |

**Variable Refrigerant Flow AC**
**Same as Non-VRF with efficiencies 15% over IECC 2006 - Demand Reduction**

| Building Type | < 65,000 | 65,001 to 135,000 | 135,001 to 240,000 | 240,001 to 760,000 | > 760,000 |
|---|---|---|---|---|---|
| All Commercial | 0.069 | 0.089 | 0.095 | 0.095 | 0.098 |
| Misc. Commercial | 0.042 | 0.053 | 0.057 | 0.057 | 0.059 |
| Cold Storage | 0.069 | 0.089 | 0.095 | 0.095 | 0.098 |
| Education | 0.028 | 0.036 | 0.038 | 0.038 | 0.039 |
| Grocery | 0.118 | 0.151 | 0.161 | 0.161 | 0.166 |
| Health | 0.090 | 0.116 | 0.123 | 0.123 | 0.127 |
| Hotel/Motel | 0.083 | 0.107 | 0.114 | 0.114 | 0.117 |
| Misc. Industrial | 0.069 | 0.089 | 0.095 | 0.095 | 0.098 |
| Office | 0.069 | 0.089 | 0.095 | 0.095 | 0.098 |
| Restaurant | 0.104 | 0.134 | 0.142 | 0.142 | 0.147 |
| Retail | 0.083 | 0.107 | 0.114 | 0.114 | 0.117 |
| Warehouse | 0.062 | 0.080 | 0.085 | 0.085 | 0.088 |

# 12.3 High Efficiency Water Heating

## 12.3.1 Commercial Solar Water Heating

Measure ID: See Table 7.3 (TBD)
Measure Code: High Efficiency Water Heating – Solar Water Heating

Version Date & Revision History
Draft date: May 30, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
Replacement of a Standard Electric Resistance Water Heater (SERWH) or heat pump with a Solar Water Heater. Solar equipment must comply with Solar Rating and Certification Corporation (SRCC) standards.

**Baseline Efficiencies:**
Baseline usage is a 0.9 COP Electric Resistance Water Heater or heat pump with a COP of 3.5.

The baseline water heater energy consumption is by a single 4.0 kW electric resistance element that is controlled thermostatically on/off controller based of tank finish temperature set point. The tank standby loss differences between baseline and high efficiency case are assumed to be negligible.

The baseline water heater energy consumption by a heat pump is 6.0 kW.

**Energy Savings**

| Base Case | Annual Energy Savings (kWh/year) (per 5,000 BTU capacity derated) | Demand Savings (kW) |
|---|---|---|
| Standard Electric Resistance Water Heater (COP = 0.9) | 429 | 0.46 |
| Heat Pump (COP 3.5) | 32 | 0.75 |

## Savings Algorithm (Standard Electric Water Heater) – BASE CASE

| **Commercial Solar Water Heating - Standard Electric Water Heater (SERWH) - BASE CASE** | | | | |
|---|---|---|---|---|
| Energy per Day (BTU) Needed in Tank | | 5,000 | BTU/Day | |
| | | | | |
| Energy per Day (BTU) Needed in Tank | | 5,000 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 1.5 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 45 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 535 | kWh / Year | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.90 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 594 | kWh / Year | |
| | | | | |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element | |
| | | | | |
| Energy Usage per Year at the Meter | | 594 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element | |
| Back Up Element Energy Used at Meter | | 59 | kWh / Year | |
| | | | | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| | | | | |
| Back Up Element Energy Used at Meter | | 59 | kWh / Year | 36% |
| Pump Energy used per Year | + | 106 | kWh / Year | 64% |
| Design Solar System Energy Usage | | 165 | kWh / Year | |
| | | | | |
| Design Solar System Energy Usage | | 165 | kWh / Year | |
| Performance Factor | | 0.94 | pf | HE |
| Persistance Factor | x | 0.93 | pf | KEMA 2008 |
| Residential Solar Water Heater Energy Savings | | 145 | kWh/ Year | KEMA 2008 |
| | | | | |
| Base SERWH Energy Usage per Year at the Meter | | 594 | kWh / Year | |
| Design Solar System Energy Usage | - | 165 | kWh / Year | |
| | | 429 | kWh / Year | |
| | | | | |
| **Energy Savings** | | **429** | **kWh/year (Per 5,000 BTU panel installed derated)** | |
| | | | | |
| SERWH Element Power Consumption | | 4.0 | kW | |
| Coincidence Factor | x | 0.143 | cf | 8.6 Minutes per hour |
| SERWH On Peak Demand | | 0.57 | kW On Peak | KEMA 2008 |
| | | | | |
| Solar System Metered on Peak Demand | | 0.11 | kW On Peak | KEMA 2008 |
| **Commercial Solar Water Heating Demand Savings** | | **0.46** | **kW Savings** | |

## Savings Algorithm (Heat Pump) – BASE CASE

| | | | | |
|---|---|---|---|---|
| **Commercial Solar Water Heating - Heat Pump - BASE CASE** | | | | |
| Energy per Day (BTU) Needed in Tank | | 5,000 | BTU/Day | |
| Energy per Day (BTU) Needed in Tank | | 5,000 | BTU/Day | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 1.5 | kWh / Day | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 45 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 535 | kWh / Year | |
| Heat Pump Efficiency | ÷ | 3.50 | COP | |
| Base Heat Pump Energy Usage per Year at the Meter | | 153 | kWh / Year | |
| Design Annual Solar Fraction | | 90% | Water Heated by Solar System | Program Design |
| | | 10% | Water Heated by Remaining Backup Element (Heat Pump) | |
| Energy Usage per Year at the Meter | | 153 | kWh / Year | |
| | x | 10% | Water Heated by Remaining Backup Element (Heat Pump) | |
| Back Up Element Energy Used at Meter | | 15 | kWh / Year | |
| Circulation Pump Energy | | 0.082 | kW | KEMA 2008 |
| Pump Hours of Operation | x | 1,292 | Hours per Year | KEMA 2008 |
| Pump Energy used per Year | | 106 | kWh / Year | |
| Back Up Element Energy Used at Meter | | 15 | kWh / Year | 13% |
| Pump Energy used per Year | + | 106 | kWh / Year | 87% |
| Design Solar System Energy Usage | | 121 | kWh / Year | |
| Design Solar System Energy Usage | | 121 | kWh / Year | |
| Performance Factor | | 0.94 | pf | HE |
| Persistance Factor | x | 0.93 | pf | KEMA 2008 |
| Residential Solar Water Heater Energy Savings | | 106 | kWh/ Year | KEMA 2008 |
| Base Heat Pump Energy Usage per Year at the Meter | | 153 | kWh / Year | |
| Design Solar System Energy Usage | - | 121 | kWh / Year | |
| | | 32 | kWh / Year | |
| **Energy Savings** | | **32** | **kWh/year (Per 5,000 BTU panel installed derated)** | |
| SERWH Element Power Consumption | | 4.0 | kW | |
| Coincidence Factor | x | 0.143 | cf | 8.6 Minutes per hour |
| SERWH On Peak Demand | | 0.57 | kW On Peak | KEMA 2008 |
| Solar System Metered on Peak Demand | | 0.11 | kW On Peak | KEMA 2008 |
| **Commercial Solar Water Heating Demand Savings** | | **0.46** | **kW Savings** | |

### Incentive
$50 per 5,000 BTU panel output after derated based on orientation and tilt factor.

### Measure Life
15 years

## 12.3.2 Heat Pump

Measure ID: See Table 7.3 (TBD)
Measure Code: High Efficiency Water Heating – Heat Pump

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- Adjust the assumptions so the description and calculations are consistent.

**Measure Description**
This measure relates to the installation of a heat pump water heater (HPWH) in place of a standard electric water heater. HPWHs can be added to existing domestic hot water (DHW) systems to improve the overall efficiency. HPWHs utilize refrigerants (like an air source heat pump) and have much higher coefficients of performance (COP) than standard electric water heaters. HPWHs remove waste heat from surrounding air sources and preheat the DHW supply system. HPWHs come in a variety of sizes and the size of HPWH will depend on the desired temperature output and amount of hot water needed by application. The savings from water heater heat pumps will depend on the design, size (capacity), water heating requirements, building application and climate. This measure could relate to either a retrofit or a new installation.

**Definition of Efficient Equipment**
In order for this characterization to apply, the efficient equipment is assumed to be a heat pump water heater with or without an auxiliary water heating system.

**Definition of Baseline Equipment**
In order for this characterization to apply, the baseline equipment is assumed to be a standard electric storage tank type water heater with a thermal efficiency of 98%. This measure does not apply to natural gas-fired water heaters.

**Deemed Lifetime of Efficient Equipment**
The expected measure life is assumed to be 10 years

**Deemed Measure Cost**
Due to the complexity of heat pump water heater systems, incremental capital costs should be determined on a case by- case basis. High capacity heat pump water heaters will typically have a supplemental heating source such as an electric resistance heater. For new construction applications, the incremental capital cost for this measure should be calculated as the difference in installed cost of the entire heat pump water heater system including any auxiliary heating systems and a standard electric storage tank water heater of comparable capacity. For retrofit applications, the total installed cost of heat pump water heater should be used.

## Savings Algorithm

**Heat Pump Water Heater**

Energy per Day (BTU) = (Gallons per Day) x (lbs. per Gal.) x (Temp Rise) x (Energy to Raise Water

| | | | | |
|---|---|---|---|---|
| Hot Water needed per Person | | 13.3 | Gallons per Day per Person | HE |
| Average Occupants | x | 3.77 | Persons | KEMA 2008 |
| Household Hot Water Usage | | 50.1 | Gallons per Day | |
| Mass of Water Conversion | | 8.34 | lbs/gal | |
| Finish Temperature of Water | | 130 | deg. F Finish Temp | |
| Initial Temperature of Water | - | 75 | deg. F Initial Temp | |
| Temperature Rise | | 55 | deg. F Temperature Rise | |
| Energy to Raise Water Temp | | 1.0 | BTU / deg. F / lbs. | |
| Energy per Day (BTU) Needed in Tank | | 12,000 | BTU/Ton | |
| Energy per Day (BTU) Needed in Tank | | 12,000 | BTU/Ton | |
| BTU to kWh Energy Conversion | ÷ | 3,412 | kWh / BTU | |
| Energy per Day (kWh) | | 3.5 | kWh /Ton | |
| Days per Month | x | 30.4 | Days per Month | |
| Energy (kWh) per Month | | 107 | kWh / Month | |
| Days per Year | x | 365 | Days per Year | |
| Energy (kWh) Needed in Tank to Heat Water per Year | | 1,283 | kWh /Ton | |
| Elec. Res. Water Heater Efficiency | ÷ | 0.98 | COP | |
| Base SERWH Energy Usage per Year at the Meter | | 1,309 | kWh /Ton | KEMA 2008 - HECO |
| Energy (kWh) Needed to Heat Water per Year | | 1,283 | kWh /Ton | |
| Heat Pump Water Heating Efficiency | ÷ | 3.50 | COP | |
| Heat Pump Water Heating Energy Usage | | 367 | kWh /Ton | |
| Base SERWH Energy Usage per Year at the Meter | | 1,309 | kWh /Ton | |
| Heat Pump Water Heating Energy Usage | - | 367 | kWh /Ton | |
| Commercial Heat Pump Water Heating Savings | | 943 | kWh /Ton | |
| Hours per Day | | 10 | | |
| Hours per Year | | 3,650 | | |
| Heat Pump Power Consumption | | 0.3 | kW | |
| Coincedence Factor | x | 0.08 | cf | 4.80 Minutes per hour |
| | | 0.02 | kW On Peak | |
| Base SERWH Element Power Consumption | | 0.4 | kW | |
| Coincidence Factor | x | 0.143 | cf | 8.6 Minutes per hour |
| Base SERWH On Peak Demand | | 0.05 | kW On Peak | KEMA 2008 |
| Base SERWH On Peak Demand | - | 0.05 | kW On Peak | |
| Heat Pump Water Heater Demand | - | 0.02 | kW On Peak | KEMA 2008 |
| | | 0.03 | kW On Peak | |

**Commercial Solar Water Heater Demand Savings 0.03 kW Savings per Ton**

## Incentive

$65/ton

## 12.4 High Efficiency Water Pumping

### 12.4.1 Domestic Water Booster Packages

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: May 23, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- The increased incentive was based on previous paid booster pump installations and measured energy/demand savings. Previous Incentive Level = $0.06/kWh. New Incentive Levels = $0.08/kWh
- The energy and demand impacts are based on HECO's evaluation from past projects and monitoring.

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- <u>Effective 7/1/10 through 3/6/11</u>
  VFD Installation: $1,600
  HP Reduction: $65 x Number of reduced HP
- <u>Effective 3/7/11 through 6/30/11</u>
  VFD Installation: $3,000
  HP Reduction: $80 x Number of reduced HP
- Updated the TRM algorithm. Clarified energy savings to calculate per HP.

**Description:**
The purpose of this measure is to reduce energy consumption through more efficient domestic water booster systems by installing a VFD and/or reducing pump HP. Pump improvements can be done to optimize the design and control of water pumping systems. The measurement of energy and demand savings for commercial and industrial applications will vary with the type of pumping technology, operating hours, efficiency and current and proposed controls. Depending on the specific application, slowing the pump, trimming or replacing the impeller, or replacing the pump may be suitable options for improving pumping efficiency.

**Base Efficiency**
The baseline equipment is assumed to be a non-optimized existing pumping system.

**High Efficiency**
In order for this characterization to apply, the efficient equipment is assumed to be an optimized pumping system meeting applicable program efficiency requirements. The proposed Booster Pump System must be a more efficient design than the existing system. (i.e. Installed with VFD.). All pump motors must meet NEMA Premium Efficiency standards.

**Qualification**

- Booster Pump applications require pre-notification before equipment is purchased and installed.
- The new Booster Pump System's total horsepower must be equal to or less than that of the existing system.

- The system horsepower reduction must be between 0 to 129 hp. For projects with greater than 129hp, please contact the program
- Booster Pump applications do not apply to New Construction.

### Energy and Demand Savings:

| Source of Savings *(per HP)* | Yearly kWh Reduction | kW Reduction |
|---|---|---|
| Reduced HP | 3921 | 0.373 |
| Installation of VFD | 588 | 0.056 |

### Savings Algorithm:

**Domestic Water Booster Packages**

**REDUCED HP**

| | | | |
|---|---|---|---|
| Motor Energy Consumption | | 0.746 | kW / hp |
| Run Time | x | 8760 | hrs / year |
| Percent Run Time | x | 60% | percent run / day |
| Yearly Savings per HP Reduction | | 3921 | Total kWh savings / hp / year |
| | | **3921** | **kWh Reduction / HP / Year** |

| | | | |
|---|---|---|---|
| Demand Savings per HP | | 0.746 | kW savings per hp |
| Coincidence Factor | x | 50% | peak coincidence factor |
| Peak Demand Savings | | 0.373 | kW savings per hp during peak hour *(5 p.m. to 9 p.m.)* |
| | | **0.373** | **Peak kW Reduction / HP** |

**INSTALLATION OF VFD**

| | | | | |
|---|---|---|---|---|
| Motor Energy Consumption | | 0.746 | kW / hp | |
| Percent Load Reduction with VFD | x | 15% | percent load reduction | |
| Demand Savings per HP | | 0.112 | kW savings per hp | |
| Run Time | x | 8760 | hrs / year | |
| Energy Savings per hp with VFD | | 980.24 | kWh savings / hp / year | |
| Percent Run Time | x | 60% | pump percent run time | |
| Total Energy Savings per hp with VFD | | 588 | Total kWh savings / hp / year | EM&V review comments recommend 500 - 700 kWh savings (Feb. 23, 2012) |
| | | **588.15** | **kWh Reduction / HP / Year** | |

| | | | |
|---|---|---|---|
| Demand Savings per HP | | 0.112 | kW savings per hp |
| Coincidence Factor | x | 50% | peak coincidence factor |
| Peak Demand Savings | | 0.056 | kW savings per hp during peak hour *(5 p.m. to 9 p.m.)* |
| | | **0.056** | **Peak kW Reduction / HP** |

### Incentives:

VFD Installation: $3,000

HP Reduction: $80 x Number of reduced HP

## 12.4.2 VFD Pool Pump Packages

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- 12/15/11 – Updated algorithm average pump size from 1.5 HP pump to 1 HP pump. Updated baseline and high efficiency calculations accordingly.

**Measure Description**
A variable speed commercial pool pump motor in place of a standard single speed motor of equivalent horsepower.

**Definition of Efficient Equipment**
The high efficiency equipment is a variable speed commercial pool pump.

**Definition of Baseline Equipment**
The baseline efficiency equipment is assumed to be a single speed commercial pool pump.

$$\Delta kWh = (kWBASE \times Hours) \times 55\%$$

Where:

| | |
|---|---|
| Unit | = 2-speed or variable speed pool pump |
| ΔkWh | = Average annual kWh reduction |
| Hours | = Average annual operating hours of pump |
| kWBASE | = connected kW of baseline pump |
| 55% | = average percent energy reduction from switch to 2-speed or variable speed pump (1) |

**Baseline Efficiency**
The baseline efficiency case is a single speed pump.

**High Efficiency**
The high efficiency case is a 2-speed or variable speed pump.

**Energy and Demand Savings**
Demand Savings: 0.093 kW / HP
Energy Savings: 1123 kWh per year / HP

(1) Davis Energy Group (2008). Proposal Information Template for Residential Pool Pump Measure Revisions. Prepared for Pacific Gas and Electric Company; Page 2.

## Savings Algorithm

**Commercial Pool Pump**

| | | |
|---|---|---|
| Pool Pump Horesepower | 1 | HP |
| Efficiency | 0.8 | |
| Hours of operation per day | 6 | hours |
| Number of days pool in use | 365 | days per year |
| 1 HP Equals | 0.746 | kW |

**Baseline**

| | | | |
|---|---|---|---|
| Pump Size | | 1.00 | HP |
| kW / HP | x | 0.75 | kW / HP |
| | | 0.75 | kW |
| Efficiency | ÷ | 0.80 | |
| Based Demand | | 0.93 | kW |
| Hours of operation | x | 6 | hours/day |
| Base Energy Usage per day | | 5.60 | kWh/day |
| Base Energy Usage per year | | 2042 | kWh/year |

**High Efficiency**

| | | |
|---|---|---|
| Base Demand | 0.93 | kW |
| Demand Reduction | 10% | |
| High Efficiency Demand | 0.839 | kW |
| Base Energy Usage | 2042 | kWh/year |
| Energy Reduction | 55% | |
| High Efficiency Energy Usage | 919 | kWh/year |

| | | |
|---|---|---|
| **Demand Savings** | **0.093** | **kW per HP** |

| | | |
|---|---|---|
| **Energy Savings per year** | **1123** | **kWh/year per HP** |

## Deemed Lifetime of Efficient Equipment
The estimated useful life for a variable speed pool pump is 10 years.

## Deemed Measure Cost
The incremental cost is estimated to be $350 for a two speed motor and $1,500 for a variable speed motor

## Incremental Cost
$161 per motor. – (from: 2001 DEER Update Study, CCIG-CRE-02, p. 4-84, Xenergy, Oakland, CA.

## Incentives
$80/HP

## 12.5 High Efficiency Motors

### 12.5.1 CEE Listed Premium Efficiency Motors

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- 11/22/11 – Removed the following sentence from *Measure Description*: "Therefore, this measure should be suspended at that time."

**Measure Description**
This measure relates to the installation of premium efficiency three phase Open Drip Proof (ODP) and Totally Enclosed Fan-Cooled (TEFC) motors less than or equal to 450 HP, meeting minimum qualifying efficiency for the following HVAC applications: supply fans, return fans, exhaust fans, chilled water pumps, and boiler feed water pumps. On December 9, 2010, new federal efficiency standards will take effect requiring motors in this size category to meet National Electric Manufacturers Association (NEMA) premium efficiency levels.

**Baseline**
2007 EISA nominal efficiency (as defined in NEMA MG1 Table 12-12) motors.

| | |
|---|---|
| Demand | 0.746 kW |
| Base Efficiency | 80% |
| Base Demand | 0.933 kW |
| Base Energy | 1531.6 kWh/year |

**High Efficient Condition**
The CEE Motors List includes motors that are 1-200 hp NEMA Design A/B, 460 volts, TEFC or ODP and 1200rpm, 1800 rpm, or 3600 rpm. To be eligible to be included, a motor's nominal efficiency must be at least one full NEMA band higher than the 2007 EISA nominal efficiency (as defined in NEMA MG1 Table 12-12) and the motor and corresponding nominal efficiency must be listed in a publicly available document, such as product catalog or cut sheet amounting to an advertised claim of performance, or the reporting entity must wish it to be treated as publicly available (and expressly claim to achieve performance based upon the noted test procedure).

| | |
|---|---|
| Demand | 0.746 kW |
| High Efficiency | 82.50% |
| High Efficiency Demand | 0.904 kW |
| High Efficiency Energy | 1485.2 kWh/year |

**Energy Savings**
Based on per HP

| | |
|---|---|
| Demand Savings | 0.0283 kW |
| Energy Savings | 46.4 kWh/year |

**Savings Algorithm**

$$\Delta kWh = HP \times 0.746 \times ((1/\eta BASE)-(1/\eta EE)) \times LF \times HOURS$$

Where:

| | |
|---|---|
| HP | = Motor Horse Power |
| | = Actual installed |
| ηBASE | = Efficiency of baseline motor. Based on EPACT 92 for installed HP |
| ηEE | = Efficiency of premium efficiency motor |
| | = Actual installed |
| LF | = Load factor of motor = 0.75 |
| HOURS | = Annual motor run hours |

| | | | |
|---|---|---|---|
| 1 | HP | equals | 0.746 kW |
| Hours of Operation | 6 per day | | |
| Hours of Operation | 2190 per year | | |
| Load Factor | 0.75 | | |

| | |
|---|---|
| Demand | 0.746 kW |
| Base Efficiency | 80% |
| Base Demand | 0.933 kW |
| Base Energy | 1531.6 kWh/year |
| | |
| Demand | 0.746 kW |
| High Efficiency | 82.50% |
| High Efficiency Demand | 0.904 kW |
| High Efficiency Energy | 1485.2 kWh/year |

| | |
|---|---|
| Demand Savings | 0.0283 kW |
| Energy Savings | 46.4 kWh/year |

| MOTOR INCENTIVES REFERENCE TABLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| Motor Size (hp) | 3600 RPM | | 1800 RPM | | 1200 RPM | | Incentive Per Motor |
| | ODP | TEFC | ODP | TEFC | ODP | TEFC | |
| 1 | 77.0 | 77.0 | 85.5 | 85.5 | 82.5 | 82.5 | $15 |
| 1.5 | 84.0 | 84.0 | 86.5 | 86.5 | 86.5 | 87.5 | $23 |
| 2 | 85.5 | 85.5 | 86.5 | 86.5 | 87.5 | 88.5 | $30 |
| 3 | 85.5 | 86.5 | 89.5 | 89.5 | 88.5 | 89.5 | $45 |
| 5 | 86.5 | 88.5 | 89.5 | 89.5 | 89.5 | 89.5 | $50 |
| 7.5 | 88.5 | 89.5 | 91.0 | 91.7 | 90.2 | 91.0 | $75 |
| 10 | 89.5 | 90.2 | 91.7 | 91.7 | 91.7 | 91.0 | $100 |
| 15 | 90.2 | 91.0 | 93.0 | 92.4 | 91.7 | 91.7 | $120 |
| 20 | 91.0 | 91.0 | 93.0 | 93.0 | 92.4 | 91.7 | $160 |
| 25 | 91.7 | 91.7 | 93.6 | 93.6 | 93.0 | 93.0 | $200 |
| 30 | 91.7 | 91.7 | 94.1 | 93.6 | 93.6 | 93.0 | $210 |
| 40 | 92.4 | 92.4 | 94.1 | 94.1 | 94.1 | 94.1 | $240 |
| 50 | 93.0 | 93.0 | 94.5 | 94.5 | 94.1 | 94.1 | $300 |
| 60 | 93.6 | 93.6 | 95.0 | 95.0 | 94.5 | 94.5 | $360 |
| 75 | 93.6 | 93.6 | 95.0 | 95.4 | 94.5 | 94.5 | $450 |
| 100 | 93.6 | 94.1 | 95.4 | 95.4 | 95.0 | 95.0 | $600 |
| 125 | 94.1 | 95.0 | 95.4 | 95.4 | 95.0 | 95.0 | $750 |
| 150 | 94.1 | 95.0 | 95.8 | 95.8 | 95.4 | 95.8 | $900 |
| 200 | 95.0 | 94.4 | 95.8 | 96.2 | 95.4 | 95.8 | $1,200 |
| 250 | 95.0 | 95.8 | 95.8 | 96.2 | 95.4 | 95.8 | $1,500 |
| 300 | 95.4 | 95.8 | 95.8 | 96.2 | 95.4 | 95.8 | $1,800 |
| 350 | 95.4 | 95.8 | 95.8 | 96.2 | 95.4 | 95.8 | $2,100 |
| 400 | 95.8 | 95.8 | 95.8 | 96.2 | 95.8 | 95.8 | $2,400 |
| 450 | 95.8 | 95.8 | 96.2 | 96.2 | 96.2 | 95.8 | $2,700 |

**Measure Life**
15 years

**Incremental Cost**
1 to 5HP ($35.20 per HP)
7.5 to 20HP ($17.30 per HP)
25 to 100HP ($10.28 per HP)
125 to 250HP ($5.95 per HP)

# 12.6 Commercial Industrial Processes

## 12.6.1 Waste Water Process Improvements

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

## 12.6.2 Air Compressor Technologies and Operations

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

<u>**Savings Algorithms**</u>

### 12.6.3 Demand Control Kitchen Ventilation (DCKV)

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Detailed Energy Savings Report, Melink Corporation, http://www.melinkcorp.com/Intellihood/Energy_Analysis.pdf

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
Kitchen ventilation with DCKV hood exhaust. Demand ventilation uses temperature and/or smoke sensing to adjust ventilation rates. This saves energy comparing with the traditional 100% on/off kitchen ventilation system.

**Baseline Efficiencies:**
Kitchen ventilation without DCKV. Usage per HP:

Basecase = (HP x .746 KW/HP x Hours per Year)/efficiency

| | |
|---|---|
| Basecase fan motor usage per HP (kWh/year) | 4827 |
| Basecase fan motor demand (kW) | 0.83 |

**High Efficiency:**

Usage per HP:

| | |
|---|---|
| Enhanced case fan motor usage per HP (kWh/year) | 2194 |
| Enhanced case fan motor demand (kW) | 0.38 |

**Energy Savings:**
The demand control kitchen ventilation savings were determined using the method described in the Melink Detailed Energy Savings Report.

| | |
|---|---|
| Energy Savings from fan motor per HP (kWh/year) | 2633 |
| Demand Savings from fan motor per HP (kW) | 0.45 |

**Savings Algorithms**

| % Rated RPM | % Run Time | Time HRS/YR | Output KW/HP | System Efficiency | Input KW/HP | KWH/HP/YR |
|---|---|---|---|---|---|---|
| H | I | J=GXI | K | L | M=K/L | N=JXM |
| 100 | 5% | 291.2 | 0.746 | 0.9 | 0.829 | 241 |
| 90 | 20% | 1164.8 | 0.544 | 0.9 | 0.604 | 704 |
| 80 | 25% | 1456 | 0.382 | 0.9 | 0.424 | 618 |
| 70 | 25% | 1456 | 0.256 | 0.9 | 0.284 | 414 |
| 60 | 15% | 873.6 | 0.161 | 0.9 | 0.179 | 156 |
| 50 | 10% | 582.4 | 0.093 | 0.9 | 0.103 | 60 |
| 40 | 0% | 0 | 0.048 | 0.9 | 0.053 | 0 |
| 30 | 0% | 0 | 0.02 | 0.9 | 0.022 | 0 |
| 20 | 0% | 0 | 0.015 | 0.9 | 0.017 | 0 |
| 10 | 0% | 0 | 0.01 | 0.9 | 0.011 | 0 |
| **Total kWh/HP/YR** | | | | | | **2194** |

Basecase = (HP x .746 KW/HP x Hours per Year)/efficiency

| | |
|---|---|
| **Basecase fan motor usage per HP (kWh/year)** | **4827** |
| **Basecase fan motor demand (kW)** | **0.83** |

| | |
|---|---|
| **Enhanced case fan motor usage per HP (kWh/year)** | **2194** |
| **Enhanced case fan motor demand (kW)** | **0.38** |

| | |
|---|---|
| **Energy Savings from fan motor per HP (kWh/year)** | **2633** |
| **Demand Savings from fan motor per HP (kW)** | **0.45** |

| Operating Schedule | |
|---|---|
| 16 | HR/DAY |
| 7 | DAY/WK |
| 52 | WK/YR |
| **5824** | |

**Demand Coincidence Factor**
TBD

**Persistence**
TBD

**Lifetime**
15 Years (Hawaii Energy assumption)

**Measure Costs and Incentive Levels**
Measure Cost: $1,200 - $1,700 per HP based on business vertical and site complications (provided my Melink)
Incentive Levels: $300/installed HP

# 12.7 Building Envelope Improvements

## 12.7.1 Window Tinting

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Basis for a Prescriptive Window Film Rebate Program (Attachment G) prepared for HECO (XENERGY Inc.) November 5, 1999

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- Rebate increased from $0.35 to $1.00 per square foot
- Changed from 0.4 shading coefficient (SC) to 0.5 SC

**Description:**

- *Warranty* – Film must have a minimum five-year manufacturer's warranty and one-year installer's warranty
- *Conditioned Space* – Rebates shall be paid on actual square footage of glass in a conditioned space
- *Eligible Types* – Windows may be clear or factory tinted, single or double pane, but must not have reflected glass. All orientations are eligible.
- *Unshaded* – Windows significantly shaded by buildings, trees or awnings are not eligible for rebates.
- *Replacement Film* – Replacement of deteriorated window film is eligible for 50% of the rebate if the customer did not receive a rebate for the existing film.

**Equipment Qualifications:**

Shading Coefficient < 0.5
Solar Heat Gain Coefficient (SHGC) < 0.435
SC = 0.87*SHGC

**Payback Qualifications:**

None

**Energy and Demand Savings:**

| Savings | Hotel | Office | Other | Average |
|---|---|---|---|---|
| Energy Savings (kWh/ft2) | 5.6 | 4.5 | 4.5 | **4.9** |
| Demand Savings (kW/ft2) | 0.0014 | 0.0008 | 0.0016 | **0.0013** |

**Incentives:**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Window Film per square feet | $ 1.00 | $ 3.00 |

**Persistence Factor**

1.0

**Coincidence Factor**

1.0

**Lifetime**

10 years (DEER)

## 12.7.2 Cool Roof Technologies

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- Evergreen TRM Review – 2/23/12

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Description**
This section covers installation of “cool roof” roofing materials in commercial buildings. The cool roof is assumed to have a solar absorptance of 0.3(1) compared to a standard roof with solar absorptance of 0.8(2). Energy and demand saving are realized through reductions in the building cooling loads. The approach utilizes DOE-2.2 simulations on a series of commercial prototypical building models. Energy and demand impacts are normalized per thousand square feet of roof space.

**Definition of Efficient Equipment**
The efficient condition is a roof with a solar absorptance of 0.30.

**Definition of Baseline Equipment**
The baseline condition is a roof with a solar absorptance of 0.80

**Deemed Lifetime of Efficient Equipment**
The expected lifetime of the measure is 15 years (3)

**Deemed Measure Cost**
The full installed cost for retrofit applications is $8,454.67 per one thousand square feet (4).

**Deemed O&M Cost Adjustments**
There are no expected O&M cost adjustments for this measure.

**Coincidence Factor**
The coincidence factor is 0.74(5).
REFERENCE SECTION
Calculation of Savings

**Energy Savings**
$\Delta kWh = SF / 1000 * \Delta kWhkSF$

(1) Maximum value to meet Cool Roof standards under California’s Title 24
(2) Itron. 2004-2005 Database for Energy Efficiency Resources (DEER) Update Study. December 2005.
(3) 2008 Database for Energy-Efficiency Resources (DEER), Version 2008.2.05, “Effective/Remaining Useful Life Values”,California Public Utilities Commission, December 16, 2008
(4) 2005 Database for Energy-Efficiency Resources (DEER), Version 2005.2.01, “Technology and Measure Cost Data”,California Public Utilities Commission, October 26, 2005

(5) Coincidence factor supplied by Duke Energy for the commercial HVAC end-use. Pending verification based on information from the utilities.

Hawaii Building Example:

ΔkWh = 0.25 kWh / square feet

Coincident Peak Demand Savings
ΔkW ΔkW x CF

Where:

CF = The coincident peak factor, or 0.50

Demand Savings per square feet

ΔkW = 0.0001 * 0.50
= 0.00005 kW

**Baseline Adjustment**
There are no expected future code changes to affect this measure.

**Deemed O&M Cost Adjustment Calculation**
There are no expected O&M costs or savings associated with this measure.

Unit energy, demand, and gas savings data is based on a series of prototypical small commercial building simulation runs.

**Incentive**
$1.00/Square Foot (Roof Surface Area)

# 12.8 Energy Star Business Equipment

## 12.8.1 Refrigerators w/Recycling

Measure ID: See Table 7.3

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- HECO DSM Docket – Backup Worksheets - Global Energy (07-14-06)
- Econorthwest TRM Review – 6/23/10
- Department of Energy Refrigerator Profile – Updated December 2009

**TRM Review Actions:**
- 6/23/10 Rec. # 11 – Revise savings to be consistent with ENERGY STAR estimates. – Adopted with modifications on refrigerator figures based on DOE Refrigerator profile and the addition of bounty, recycle with new figures.
- 6/23/10 Rec. # 12 – Split the claimed savings by appliance. – Adopted.
- 6/23/10 Rec. # 14 – Revise demand savings values for ENERGY STAR appliances – Adopted.
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Split between ESH appliances
- Incorporation of three refrigerator categories (new, new with turn in, and bounty (turn in only))
- All ESH 313 kWh and 0.12 kW changed to:
  - New ES Refrigerator Only – 105 kWh, .017 kW
  - New ES Refrigerator with Turn-In – 822 kWh, .034 kW

**Measure Description:**
The replacement of standard Refrigerators for business locations.

Appliances must comply with:
- Energy Star

*Refrigerators* – ENERGY STAR refrigerators utilize improvements in insulation and compressors.

**Baseline Efficiencies:**
Baseline energy usage based on 2009 Energy Star Information for the appliances are as follows:

| | Demand Baseline (kW) | Energy Baseline (kWh) | Notes |
|---|---|---|---|
| Non ES Qualifying Refrigerator | | 537 | 19.0-21.4 Top Freezer |

**High Efficiency:**

The high efficiency case Energy Star energy usage based on 2009 Energy Star Calculator Information and DOE Refrigerator Market Profile for the appliances is as follows:

| | Demand High Efficiency (kW) | Energy High Efficiency (kWh) | Notes |
|---|---|---|---|
| ES Qualifying Refrigerator | | 435 | 19.0-21.4 Top Freezer |

**Energy Savings:**

Energy Star Appliance Gross Savings before operational adjustments:

| | Demand Savings (kW) | Energy Savings (kWh) |
|---|---|---|
| ES Refrigerator | 0.017 | 105 |
| ES Refrigerator with Turn-In | 0.034 | 822 |

Energy Star Appliance Net Savings operational adjustments:

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.0 |
| Demand Coincidence Factor (cf) | 1.0 |

## Savings Algorithms

**Energy Star Refrigerator and Turn In Refrigerator - Single and Multi Family Residential Home**

| Opportunity | | Energy Usage | | |
|---|---|---|---|---|
| New Non-ENERGY STAR | | 540 | | Table 2 |
| New ENERGY STAR Refrigerator | - | 435 | | Table 2 |
| | | 105 | kWh/Year | Table 1 |
| #1 - Purchase of ENERGY STAR Refrigerator | | 105 | | Table 1 |
| #2 - Removal of Old Unit from Service (off the grid) | + | 717 | | Table 1 |
| #1 + #2 = Purchase ES and Recycle old unit | | 822 | kWh/Year | |

| | Energy Usage | Ratio | Contribution | | |
|---|---|---|---|---|---|
| Post-1993 Refrigerator | 640 | 55% | 354.54 | | Table 3 |
| Pre-1993 Refrigerator | 1,131 | 45% | 504.46 | | Table 3 |
| | | | 859 | kWh/Year | |

**Table 1**

## Energy Savings Opportunities for Program Sponsors

| Opportunity | Annual Savings | | | |
|---|---|---|---|---|
| | Per Unit | | Aggregate U.S. Potential | |
| | kWh | $ | MWh | $ million |
| **1. Increase the number of buyers that purchase ENERGY STAR qualified refrigerators.**<br>• 9.3 million units were sold in 2008.<br>• 70 percent were not ENERGY STAR.<br>• 6.5 million potential units per year could be upgraded. | 105 | 11.64 | 675,928 | 75 |
| **2. Decrease the number of units kept on the grid when new units are purchased.**<br>• 8.7 million primary units were replaced in 2008.<br>• 44 percent remained in use, whether they were converted to second units, sold, or given away.<br>• 3.8 million units are candidates for retirement every year. | 717 | 79.53 | 2,746,062 | 305 |
| **3. Decrease the number of second units.**<br>• 26 percent of households had a second refrigerator in 2008.<br>• 29.6 million units are candidates for retirement. | 859 | 95.28 | 25,442,156 | 2,822 |
| **4. Replace pre-1993 units with new ENERGY STAR qualified models.**<br>• 19 percent of all units in use in 2008 were manufactured before 1993.<br>• 27.3 million total potential units are candidates for targeted replacement. | 730 | 81 | 19,946,440 | 2,212 |

Sources: See endnote 10.

**Table 2**

## Energy and Cost Comparison for Upgrading to ENERGY STAR

| Purchase Decision | New Non-ENERGY STAR Qualified Refrigerator | New ENERGY STAR Qualified Refrigerator |
|---|---|---|
| Annual Consumption | 540 kWh | 435 kWh |
| | $60 | $48 |
| Annual Savings | – | 105 kWh |
| | – | $12 |
| Average Lifetime | 12 years | 12 years |
| Lifetime Savings | – | 1,260 kWh |
| | – | $140 |
| Price Premium | – | $30 - $100 |
| Simple Payback Period | – | 3-9 years |

Note: Calculations based on shipment-weighted average annual energy consumption of 2008 models. An ENERGY STAR qualified model uses 20 percent less energy than a new non-qualified refrigerator of the same size and configuration.

Source: See endnote 10.

**Table 3**

## Energy and Cost Comparison for Removing a Second Refrigerator from the Grid

| Fate of Unit | Post-1993 Unit | | Pre-1993 Unit | |
|---|---|---|---|---|
| | Remains on the Grid | Removed from the Grid | Remains on the Grid | Removed from the Grid |
| Annual Consumption | 640 kWh | – | 1,131 kWh | – |
| | $71 | – | $125 | – |
| Annual Savings | – | 640 kWh | – | 1,131 kWh |
| | – | $71 | – | $125 |
| Average Lifetime* | 6 | – | 6 | – |
| Lifetime Savings* | – | 3,840 kWh | – | 6,788 kWh |
| | – | $426 | – | $753 |
| Removal Cost | – | $50 - $100 | – | $50 - $100 |
| Simple Payback Period | – | 1-2 years | – | <1 year |

*Assumes unit has six years of functionality remaining.

Sources: See endnote 10.

**Operating Hours**
Refrigerators = 8,760 hours per year

**Loadshape**
TBD

**Freeridership/Spillover Factors**
TBD

**Demand Coincidence Factor**
NA

**Persistence**
NA

**Lifetime**
14 years

**Measure Costs and Incentive Levels**

Residential Measure Costs and Incentive Levels

| Description | Unit Incentive | Incremental Cost HECO DSM Docket 2006 | Average Incremental Cost Energy Star 2009 |
|---|---|---|---|
| ES Refrigerator | $50 | $ 60.36 | $ 65 |
| ES Refrigerator w/turn in | $125 | | $130* |

***Estimated value**

**Component Costs and Lifetimes Used in Computing O&M Savings**
TBD

**Reference Tables**
None

# 12.9 Energy Awareness, Measurement and Control Systems

## 12.9.1 Condominium Submetering Pilot

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Description:**

**Equipment Qualifications:**
This program is to assist master-metered condominiums and their Association of Apartment Owners (AOAO) efforts to reduce energy consumption and implement the current submetering proposal as one that will insure both equity and fairness in allocating energy costs as well as encouraging energy conservation through direct feedback of personal energy use to tenants.

The combination of billing submeters, along with education, peer group comparisons and special equipment offerings, will assist the tenant achieve significant energy conservation and efficiency.

**Requirements:**
- The metering system must remain in place and billing to occur for a period of at least five (5) years or a pro-rated portion of the incentive will be recovered by Hawaii Energy. Provide Hawaii Energy with energy meter data for analysis purposes.
- A joint educational and monitoring program will be undertaken with AOAO to assist in the verification of savings and development of an ongoing energy incentive offering for other condominiums in Hawaii.

**Baseline**

The base case is no submetering

| Building Types | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| Condominium | 1.50 | 7,200 |

**High Efficiency**

The high efficiency case is with submetering

| Building Types | Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Condominium | 1.38 | 6,480 |

**Energy and Demand Savings:**

| Building Types | Gross Customer Savings (kW) | Gross Customer Savings (kWh/year) |
|---|---|---|
| Condominium | 0.12 | 720 |

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.00 |
| Demand Coincidence Factor (cf) | 1.00 |

| Building Types | Net Customer Savings (kW) | Net Customer Savings (kWh/year) |
|---|---|---|
| Condominium | 0.12 | 720 |

It is expected there will be at least 10% reduction in energy usage and 8% reduction in peak demand during (5PM – 9PM), however, there is no minimum reduction in electrical use to be required by AOAO to retain the incentive.

## Savings Algorithm:

| **Submetering (Condominium)** | | | | |
|---|---|---|---|---|
| Average Tenant Energy Usage | | 600 | kWh per home per month | |
| | x | 12 | | |
| Baseline Household Energy Usage | | 7,200 | kWh per Year | |
| Energy Reduction | | 10.0% | | |
| Actively Informed Household Energy Usage | | 6,480 | kWh per Year | |
| Baseline Household Energy Usage | | 7,200 | kWh per Year | |
| Actively Informed Household Energy Usage | - | 6,480 | kWh per Year | |
| Gross Customer Level Energy Savings | | 720 | kwh per Year | |
| | x | 1,000 | Watts per kW | |
| | ÷ | 8,760 | Hours per Year | |
| Average 24/7 Demand Reduction | | 82 | Watts | |
| Gross Customer Level Energy Savings | | 720 | kwh per Year | |
| Persistance Factor | x | 1.0 | | |
| Net Customer Level Savings | | 720 | kwh per Year | |
| Submetering Energy Savings | | 720 | kWh / Year Savings | |
| Baseline Household Demand | | 1.50 | kW | HECO 2008 Load Study |
| Peak Demand Reduction | | 8.00% | | |
| Actively Informed Household Demand | | 1.38 | kW | |
| Baseline Household Demand | | 1.50 | kW | |
| Actively Informed Household Demand | - | 1.38 | kW | |
| Gross Customer Demand Savings | | 0.120 | kW | |
| Gross Customer Demand Savings | | 0.120 | kW | |
| Persistance Factor | x | 1.00 | | |
| Coincidence Factor | x | 1.00 | | |
| | | 0.120 | kW | |
| Whole House Metering Demand Savings | | 0.12 | kW Savings | |

## Incentives/Incremental Cost

- $150 per unit metered, payable to the AOAO for distribution to owners on a percentage of ownership basis to comply with condominium regulations.
- Incentive payment will be made upon billing individual tenants.
- Incentive payment cannot exceed 50% of total project cost.
- The payment of the incentive will be based on the AOAO securing the approval, installing and utilizing the submeters for billing purposes.

| Description | Incentive | Incremental Cost |
|---|---|---|
| Condominium Submeter | $250 | $750 |

## 12.9.2 Small Business Submetering Pilot

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: October 3, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Description:**

**Equipment Qualifications:**

This program is to assist master-metered small businesses to reduce energy consumption that will insure both equity and fairness in allocating energy costs as well as encouraging energy conservation through direct feedback of personal energy use to business tenants.

The combination of billing submeters, along with education, peer group comparisons and special equipment offerings, will assist the tenant achieve significant energy conservation and efficiency.

**Requirements:**

- The metering system must remain in place and billing to occur for a period of at least five (5) years or a pro-rated portion of the incentive will be recovered by Hawaii Energy. Provide Hawaii Energy with energy meter data for analysis purposes.

- A joint educational and monitoring program will be undertaken with the businesses to assist in the verification of savings and development of an ongoing energy incentive offering for other condominiums in Hawaii.

**Baseline**

The base case is no submetering

| Building Types | Demand Baseline (kW) | Energy Baseline (kWh/year) |
|---|---|---|
| Small Business | 3.00 | 10,800 |

**High Efficiency**

The high efficiency case is with submetering

| Building Types | Efficient Case (kW) | Efficient Case (kWh/year) |
|---|---|---|
| Small Business | 2.76 | 9,720 |

**Energy and Demand Savings:**

| Building Types | Gross Customer Savings (kW) | Gross Customer Savings (kWh/year) |
|---|---|---|
| Small Business | 0.24 | 1,080 |

| Operational Factor | Adjustment Factor |
|---|---|
| Persistence Factor (pf) | 1.00 |
| Demand Coincidence Factor (cf) | 1.00 |

| Building Types | Net Customer Savings (kW) | Net Customer Savings (kWh/year) |
|---|---|---|
| Small Business | 0.24 | 1,080 |

It is expected there will be at least 10% reduction in energy usage and 8% reduction in peak demand during (5PM – 9PM), however, there is no minimum reduction in electrical use to be required to retain the incentive.

**Savings Algorithm:**

| Small Business Submetering | | | |
|---|---|---|---|
| Average Tenant Energy Usage | | 900 | kWh per business per month (Schedule G) |
| | x | 12 | |
| Baseline Business Energy Usage | | 10,800 | kWh per Year |
| Energy Reduction | | 10.0% | |
| Actively Informed Business Energy Usage | | 9,720 | kWh per Year |
| Baseline Business Energy Usage | | 10,800 | kWh per Year |
| Actively Informed Business Energy Usage | - | 9,720 | kWh per Year |
| Gross Customer Level Energy Savings | | 1,080 | kwh per Year |
| | x | 1,000 | Watts per kW |
| | ÷ | 8,760 | Hours per Year |
| Average 24/7 Demand Reduction | | 123 | Watts |
| Gross Customer Level Energy Savings | | 1,080 | kwh per Year |
| Persistance Factor | x | 1.0 | |
| Net Customer Level Savings | | 1,080 | kwh per Year |
| Submetering Energy Savings | | 1,080 | kWh / Year Savings |
| Baseline Business Demand | | 3.00 | kW |
| Peak Demand Reduction | | 8.00% | |
| Actively Informed Business Demand | | 2.76 | kW |
| Baseline Business Demand | | 3.00 | kW |
| Actively Informed Business Demand | - | 2.76 | kW |
| Gross Customer Demand Savings | | 0.240 | kW |
| Gross Customer Demand Savings | | 0.240 | kW |
| Persistance Factor | x | 1.00 | |
| Coincidence Factor | x | 1.00 | |
| | | 0.240 | kW |
| Small Business Demand Savings | | 0.24 | kW Savings |

**Incentives/Incremental Cost**

- Incentive payment will be made upon billing individual tenants.
- Incentive payment cannot exceed 50% of total project cost.

| Description | Incentive | Incremental Cost |
|---|---|---|
| Condominium Submeter | $250 | $750 |

# 13 (CBEEM) Custom Business Energy Efficiency Measures

## 13.1 Customized Project Measures

### 13.1.1 Customized Project Measures

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Measure life > 5 years has $0.08/kWh incentive and a $100/kW day-peak demand incentive

**Description:** The Custom project measure is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

| Measure Life | Reduction in Energy Use Incentive | Evening Peak Demand Reduction (5:00 p.m. to 9:00 p.m. weekdays) | Day Peak Demand Reduction (12:00 p.m. to 2:00 p.m. weekdays) | First Year Energy Savings (kWh) | Demand Savings (kW) |
|---|---|---|---|---|---|
| < 5 years | $0.05 /kWh | $125 / kW | *$100 / kW | | |
| > 5 years | $0.08 /kWh | $125 /kW | *$100 /kW | | |

**Program Requirements:**
- Approval is required prior to the start of work on any customized project.
- Total resource benefit ratio is greater than or equal to 1.
- Incremental simple payback greater than one year or six months for LED projects.

| Requirements for Non ENERGY STAR® LED Lamps | |
|---|---|
| • Five year manufacturer warranty or three year manufacturer warranty with LM79 and LM80 (1,000 hour) tests | • UL Listed |

**Energy and Demand Savings:**

All assumptions, data and formulas used in the calculations must be clearly documented. Standard engineering principles must be applied, and all references cited. Energy saving calculations shall also reflect the interactive effects of other simultaneous technologies to prevent the overstatement of the actual savings. Proposed base and enhanced cases must be performed by a qualified person or firm. In some cases, a professional engineer may be required to provide verification of the analysis.

**Savings Algorithms**

Gross energy and demand savings estimates for custom projects are calculated using engineering analysis and project-specific details. Custom analyses typically include a weather dependent load bin analysis, whole building energy model simulation, or other engineering analysis and include estimates of savings, costs, and an evaluation of the project's cost-effectiveness.

**Baseline Efficiency**

The baseline efficiency case assumes compliance with the efficiency requirements as mandated by the Hawaii State Energy Code or industry accepted standard practice.

**High Efficiency**

The high efficiency scenario is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective and pass total resource benefit and have a payback greater than or equal to 1.

**Persistance Factor**
PF = 1 since all custom projects require verification of equipment installation.

**Incentives**

- Incentives is limited to 50% of incremental costs.
- Installations are subject to inspection for up to 5 years. Removal will be cause for incentive forfeiture.

## 13.1.2 Customized Project Measures – American Recovery & Reinvestment Act (ARRA)

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Measure life > 5 years has $0.08/kWh incentive and a $100/kW day-peak demand incentive

**ELIGIBILITY**
Government and non-profit organization energy efficiency projects that are not already ARRA funded.

| Measure Life | Reduction in Energy Use Incentive | Evening Peak Demand Reduction (5:00 p.m. to 9:00 p.m. weekdays) | Day Peak Demand Reduction (12:00 p.m. to 2:00 p.m. weekdays) | First Year Energy Savings (kWh) | Demand Savings (kW) |
|---|---|---|---|---|---|
| < 5 years | $0.05 /kWh | $125 / kW | *$100 / kW | | |
| > 5 years | $0.08 /kWh | $125 /kW | *$100 /kW | | |
| **Total Project Cost** | **Reduction in Energy Use Incentive** | **Evening Peak Demand Reduction Incentive (5:00 p.m. to 9:00 p.m. weekdays)** | **Day Peak Demand Reduction Incentive (12:00 p.m. to 2:00 p.m. weekdays)** | | |
| | | | | | |
| **Incentive Program** | | **Incentive Amount** | **% of Total Project Cost** | | |
| Custom (PBF) | | | | | |
| Supplemental Custom (ARRA) | | | | | |
| **Total** | | | **25%** | | |

*** HVAC application only**

**Requirements for Customized Incentives**

- Program approval is required prior to the start of work on any customized project.
- Total resource benefit ratio that is greater than 1
- Incremental simple payback greater than one year or six months for LED projects
- SEP and Hawaii Energy incentive limited to 25% of total project cost
- **Hawaii Energy custom incentives limited to 50% of incremental costs**
- **Total projects cost must exceed $60,000**
- **Installations are subject to inspection for up to five years. Removal will be cause for incentive forfeiture.**

| Requirements for Non ENERGY STAR® LED Lamps | |
|---|---|
| • **Five year manufacturer warranty or three year manufacturer warranty with LM79 and LM80 (1,000 hour) tests** | • **UL Listed** |

**PROCESS**

1. Call to discuss project with us.
2. Submit completed application and work sheet.
3. Provide supporting information:
   ● Layouts ● Energy Models ● Drawings ● Technical attachments ● Vendor literature

**Energy and Demand Savings:**

All assumptions, data and formulas used in the calculations must be clearly documented. Standard engineering principles must be applied, and all references cited. Energy saving calculations shall also reflect the interactive effects of other simultaneous technologies to prevent the overstatement of the actual savings. Proposed base and enhanced cases must be performed by a qualified person or firm. In some cases, a professional engineer may be required to provide verification of the analysis.

**Savings Algorithms**

Gross energy and demand savings estimates for custom projects are calculated using engineering analysis and project-specific details. Custom analyses typically include a weather dependent load bin analysis, whole building energy model simulation, or other engineering analysis and include estimates of savings, costs, and an evaluation of the project's cost-effectiveness.

**Baseline Efficiency**

The baseline efficiency case assumes compliance with the efficiency requirements as mandated by the Hawaii State Energy Code or industry accepted standard practice.

**High Efficiency**

The high efficiency scenario is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective and pass total resource benefit and have a payback greater than or equal to 1.

**Energy Savings**

Hawaii Energy will be allowed to claim credit for the fraction of the energy and demand savings and total resource benefits that is proportional to the share of customer incentive cost paid with PBFA funds.

**Persistance Factor**

PF = 1 since all custom projects require verification of equipment installation.

**Incentives**

- SEP and Hawaii Energy incentive limited to 25% of total project cost
- Total project cost must exceed $60,000

## 13.1.3 Target Cost per kWh Request Proposals

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

# 14 (BESM) Business Energy Services and Maintenance

## 14.1 Business Direct Installation

### 14.1.1 Small Business Direct Lighting Retrofits

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
The program targets customers within the small business market. Typically this market has limited time and expertise within their organizations to research lighting technology options, obtain financing and contract with lighting contractors to replace their older less efficient lighting technologies. The Small Business Lighting Retrofit provides a "Turnkey" program consisting of audits, fixed pricing, installation by participating Hawaii Energy contractors and 4 month financing of lighting retrofits.

**Program Requirements:**
Small Business Customers receiving eclectic power under a Schedule "G" rate, or are similar to Schedule "G" but are under master-metered accounts, are eligible under this program.

## Savings Algorithms

### Small Business Direct Install Lighting Retrofit Pilot Program
### Summary Sheet

| | |
|---|---|
| Business Name: | |
| Contact Name: | |
| Address: | |
| | |
| Phone: | |
| Fax: | |
| Email: | |

| | |
|---|---|
| Contractor Name: | |
| Auditor Name: | |
| Address: | |
| | |
| Phone: | |
| Fax: | |
| Email: | |

| Total Watts Saved | Energy Savings | Energy Cost Savings | Hawaii Energy Participating Contractor NTE Pricing | Hawaii Energy Cash Incentive | Net Customer Cost | Simple Payback | 4 Month Monthly Payment | Monthly Savings % of Payment |
|---|---|---|---|---|---|---|---|---|
| 1,323 W | 3,324 kWh/yr. | $ 776 / yr. | $ 2,300 | $ 833 | 1,467 | 23 | 367 | 18% |

| Step 1 | |
|---|---|
| f2 | |
| Oahu | Island of Project Location |
| $ 0.234 /kWh | 2010 "G" Marginal Cost of Electricity |

| Measure Code | Existing Technology | New Technology | Total Units (Step 2) | M-F Hours per Day (Step 3) | Sat. Hours per Day | Sun. Hours per Day | Annual Hours of Operation | Wkdays Hours on between 5 and 9 p.m. (Step 4) | On-Peak Fraction | Total Watts Saved | Energy Savings | Energy Cost Savings | Hawaii Energy Participating Contractor NTE Pricing | Hawaii Energy Cash Incentive | Net Customer Cost | Simple Payback | 6 Month Monthly Payment | Monthly Savings % of Payment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (each) | | | | (hrs/year) | (hrs) | (%) | (Watts) | (kWh/Year) | ($/year) | ($) | ($) | ($) | (Months) | ($/month) | (%) |
| | | | a | b1a | b1b | b2a | b3 = b1*b2*(365/7) | c | c2 =c / 4 | d = a x o | e = b x (d/1000) | f = e x f2 | g = a x p | h = a x q | i = a x (p-q) | j = (i/f) x 12 | k = i /6 | l = (f/12)/k |
| 8L1-4L2 | 8 ft. 1 Lamp F96 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 75 | $ 62 | $ 13 | 6 | $ 2.24 | 100% |
| 8L2-4L2 | 8 ft. 2 Lamp F96 | 4 ft. 2 lamp F25/28 H | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 57 | 143 | $ 33 | $ 84 | $ 53 | $ 31 | 11 | $ 5.17 | 54% |
| 8L2HO-4L2R | 8 ft. 2 Lamp F96 HO | 4 ft. 2 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 85 | $ 27 | $ 58 | 26 | $ 9.67 | 23% |
| 8L2HO-4L4 | 8 ft. 2 Lamp F96 HO | 4 ft. 4 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 138 | $ 53 | $ 85 | 19 | $ 14.17 | 32% |
| 4L4-4L4 | 4 ft. 4 Lamp F40 | 4 ft. 4 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 83 | $ 51 | $ 32 | 7 | $ 5.33 | 84% |
| 4L4-4L2R | 4 ft. 4 lamp F40 | 4 ft. 2 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 27 | $ 38 | 17 | $ 6.33 | 35% |
| 4L3-4L3 | 4 ft. 3 lamp F40 | 4 ft. 3 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 69 | 173 | $ 40 | $ 74 | $ 38 | $ 36 | 11 | $ 6.00 | 56% |
| 4L3-4L2R | 4 ft. 3 lamp F40 | 4 ft. 2 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 27 | $ 38 | 17 | $ 6.33 | 35% |
| 4L2-4L2 | 4 ft. 2 lamp F40 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 35 | $ 27 | $ 8 | 4 | $ 1.33 | 168% |
| 4L1-4L1 | 4 ft. 1 lamp F40 | 4 ft. 1 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 23 | 58 | $ 13 | $ 30 | $ 14 | $ 16 | 14 | $ 2.67 | 42% |
| 4L4-4L4 | 4 ft. 4 lamp F32 | 4 ft. 4 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 83 | $ 34 | $ 49 | 11 | $ 8.17 | 55% |
| 4L4-4L2 | 4 ft. 4 lamp F32 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 53 | $ 12 | 5 | $ 2.00 | 112% |
| 4L3-4L3 | 4 ft. 3 lamp F32 | 4 ft. 3 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 69 | 173 | $ 40 | $ 74 | $ 26 | $ 48 | 14 | $ 8.00 | 42% |
| 4L3-4L2 | 4 ft. 3 lamp F32 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 25 | $ 40 | 18 | $ 6.67 | 34% |
| 4L2-4L2 | 4 ft. 2 lamp F32 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 35 | $ 27 | $ 8 | 4 | $ 1.33 | 168% |
| 4L1-4L1 | 4 ft. 1 lamp F32 | 4 ft. 1 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 23 | 58 | $ 13 | $ 35 | $ 9 | $ 26 | 23 | $ 4.33 | 26% |
| 1L400-4L6 | HID Pendant 1 lamp 400W | 4 foot 6 lamp F25/T8 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 138 | 345 | $ 81 | $ 360 | $ 76 | $ 284 | 42 | $ 47.33 | 14% |
| 1L250-4L4 | HID Pendant 1 lamp 250W | 4 foot 4 lamp F25/T8 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 330 | $ 51 | $ 279 | 62 | $ 46.50 | 10% |
| 1L175-4L4 | HID Pendant 1 lamp 175W | 4 foot 4 lamp F25/T8 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 330 | $ 51 | $ 279 | 62 | $ 46.50 | 10% |
| UBL2-2L2 | 4 ft. U-Bend 2 lamp FB40 | 2 ft. 2 lamp F17 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 32 | 80 | $ 19 | $ 40 | $ 22 | $ 18 | 12 | $ 3.00 | 52% |
| UBL2-2L2R | 4 ft. U-Bend 2 lamp FB40 | 2 ft. 2 lamp F17 L, Reflector | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 27 | 68 | $ 16 | $ 50 | $ 30 | $ 20 | 15 | $ 3.33 | 39% |
| 100-23 | 100 Watt Incandescent | 23 Watt CFL | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 23 | 58 | $ 13 | $ 10 | $ 4 | $ 6 | 5 | $ 1.00 | 112% |
| 75-19 | 75 Watt Incandescent | 19 Watt CFL | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 19 | 48 | $ 11 | $ 8 | $ 4 | $ 4 | 4 | $ 0.67 | 139% |
| 60-13 | 60 Watt Incandescent | 13 Watt CFL | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 13 | 33 | $ 8 | $ 6 | $ 4 | $ 2 | 3 | $ 0.33 | 190% |
| Exit | 40W Incandecent | 2 Watt LED | 1 | 24 | 24 | 24 | 8,760 | - | 0% | 2 | 18 | $ 4 | $ 75 | $ 38 | $ 37 | 109 | $ 6.17 | 6% |
| OverHeight | Cost Adder for Fixtures above or out of the reach of a 10' Ladd | | 0 | | | | | | | | | | $ - | | $ - | | | |
| | | | | | | | | | | 1,323 W | 3,324 kWh/yr. | $ 776 / yr. | $ 2,300 | $ 833 | $ 1,467 | 23 | $ 366.86 | 18% |

**WORKBOOK INPUTS**

| Measure Code | Existing per Unit Watts | Unit New Watts | Unit Watts Saved | Hawaii Energy Participating Contractor Pricing | Hawaii Energy Cash Incentive | Public Benefit Fee Investment |
|---|---|---|---|---|---|---|
| | (Watt/unit) | (Watt/unit) | (Watt/unit) | ($/unit) | ($) | ($/kWh) |
| | m | n | o = m-n | p | q | r |
| 8L1-4L2 | 85 | 46 | 39 | $ 75 | $ 62 | $ 0.53 |
| 8L2-4L2 | 142 | 57 | 85 | $ 84 | $ 53 | $ 0.37 |
| 8L2HO-4L2R | 170 | 46 | 124 | $ 85 | $ 27 | $ 0.23 |
| 8L2HO-4L4 | 170 | 92 | 78 | $ 138 | $ 53 | $ 0.23 |
| 4L4-4L4 | 168 | 92 | 76 | $ 83 | $ 51 | $ 0.22 |
| 4L4-4L2R | 168 | 46 | 122 | $ 65 | $ 27 | $ 0.23 |
| 4L3-4L3 | 126 | 69 | 57 | $ 74 | $ 38 | $ 0.22 |
| 4L3-4L2R | 126 | 46 | 80 | $ 65 | $ 27 | $ 0.23 |
| 4L2-4L2 | 84 | 46 | 38 | $ 35 | $ 27 | $ 0.23 |
| 4L1-4L1 | 42 | 23 | 19 | $ 30 | $ 14 | $ 0.24 |
| 4L4-4L4 | 112 | 92 | 20 | $ 83 | $ 34 | $ 0.15 |
| 4L4-4L2 | 112 | 46 | 66 | $ 65 | $ 53 | $ 0.46 |
| 4L3-4L3 | 84 | 69 | 15 | $ 74 | $ 26 | $ 0.15 |
| 4L3-4L2 | 84 | 46 | 38 | $ 65 | $ 25 | $ 0.22 |
| 4L2-4L2 | 56 | 46 | 10 | $ 35 | $ 27 | $ 0.23 |
| 4L1-4L1 | 28 | 23 | 5 | $ 35 | $ 9 | $ 0.16 |
| 1L400-4L6 | 475 | 138 | 337 | $ 360 | $ 76 | $ 0.22 |
| 1L250-4L4 | 300 | 92 | 208 | $ 330 | $ 51 | $ 0.22 |
| 1L175-4L4 | 225 | 92 | 133 | $ 330 | $ 51 | $ 0.22 |
| UBL2-2L2 | 84 | 32 | 52 | $ 40 | $ 22 | $ 0.27 |
| UBL2-2L2R | 84 | 27 | 57 | $ 50 | $ 30 | $ 0.44 |
| 100-23 | 100 | 23 | 77 | $ 10 | $ 4 | $ 0.07 |
| 75-19 | 75 | 19 | 56 | $ 8 | $ 4 | $ 0.08 |
| 60-13 | 60 | 13 | 47 | $ 6 | $ 4 | $ 0.12 |
| Exit | 40 | 2 | 38 | $ 75 | $ 38 | $ 2.17 |
| OverHeight | | | | $ 8 | | |
| | | | | | | 0 |

## 14.2 Business Design, Audits and Commissioning

### 14.2.1 Central Plant Optimization Competition Program

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Description:**
This program is designed to improve building operations through a systematic approach of installing critical metering, performing retro-commissioning activities to identify and optimize system operations, and then measuring and sharing results.

**Claimed Savings**
Energy and Demand savings (100%) will be claimed upfront and 50% payment of claimed energy savings will be paid at $0.10/kWh upon implementation (1 month after start of Operational Period).

**Adjustment of Incentive Funding**

- **Return of Incentive Funds for Decreased Energy Savings**
  If overfunded, customer shall return the difference between the actual and estimated claimed energy saving to the Program.

- **Additional Funding for Increased Energy Savings**
  If underfunded, payment will be made to customer (up to 100% of investment).

**Process**

A baseline energy usage will be determined based on both metering and engineering calculations. Post meter installation review along with spot measurements will be conducted.

Initial Meeting
Application
Preliminary Systems Review

- Consultant Price Proposal
- Consultant Perform Systems Review
    - Consultant Provide Metering and Commissioning Plan

Metering and Commissioning Plan

- Approve Metering Plan
- Approve Metering Budget
- Metering Installation
- Design/Oversight/Test Metering/Base Meter Readings – 2 weeks

System Commissioning Plan

- Approve Commissioning Plan
- Investigation
- Analysis/Documentation
- Field Commissioning/Tuning
- Development of Sequence of Operations
- Recommend Operational Improvements
- Recommended System Upgrades
- Maintenance and Operations Plan
- Operational Training
- System Commissioning Budget

Final Metering and Commissioning Report & Documentation Submittal

Operational Performance Period

- Start Operation Period (after commissioning, training)
    - Estimated Performance Assessment 1 – (1 month after start of Operational Period)
    - Estimated Performance Assessment 2 – (6 month after start of Operational Period)
    - Estimated Performance Assessment 3 – (End of Operational Period)
- End Operational Period (1 – year after start of operational period)
- Review Savings Achievement

## Central Plant Optimization Competition Process and Project Review Worksheet

| Deliverable | Action | Customer Cost | Incentive Rate | Committed Incentive | Set Aside Incentive | |
|---|---|---|---|---|---|---|
| **Initial Meeting** | Scope review, Program review | | | | | |
| **Application** | | | | | | |
| **Preliminary Systems Review** | Price Proposal | $ - | 50% | $ - | | *Payment 1* |
| | Perform Systems Review | | | | | |
| **Metering and Commissioning Plan** | Approve Metering Plan | | | | | |
| | Metering Budget | $ - | | | | |
| | Metering Installation | $ - | | | | |
| | Design/Oversight/Test Metering/Base Meter Readings-2 Weeks | $ - | 100% | | $ - | *Payment 2* |
| | | $ - | | | | |
| **System Commissioning Program** | Approve Commissioning Plan | | | | | |
| | Investigation | $ - | 50% | | $ - | |
| | Analysis /Documentation | $ - | 50% | | $ - | |
| | Field Commissioning / Tuning | $ - | 50% | | $ - | |
| | Development of Sequence of Operations | $ - | 50% | | $ - | |
| | Recommend Operational Improvements | $ - | 50% | | $ - | |
| | Recommended System Upgrades | $ - | 50% | | $ - | |
| | Maintenance and Operations Plan | $ - | 50% | | $ - | |
| | Operational Training | $ - | 50% | | $ - | |
| | System Commissioning Budget | $ - | | | $ - | *Payment 3* |
| | Final Report & Documentation | | | | | |
| **Operational Performance Period** | Start Operational Period (after commissioning, training) | | | | | |
| | | | | | **Incentive** $ 0.10 | *Multiply Est. Performance Assessments by Incentive to achieve potential savings* |
| | | | | | Potential Savings | |
| | Estimated Performance Assessment **1** (1mo after start of Operational Period) | #REF! | 50% | | **#REF!** | *Payment 4* |
| | Estimated Performance Assessment **2** (6mo after start of Operational Period) | #REF! | 25% | | **#REF!** | *Payment 5* |
| | Estimated Performance Assessment **3** (End of Operational Period) | #REF! | 25% | | **#REF!** | *Payment 6* |
| | Potential Savings per Year | #REF! | 100% | | #REF! | |
| | End Operational Period (1 - year after start of operational period) | | | | | |
| | Review Savings Achievement | | | | | |

**Incentives and Responsibilities:**

| Incentive | Amount | Responsibilities |
|---|---|---|
| Commissioning Contract | 50% incentive up to $0.20 per sq. ft. | • Preliminary Systems Review<br>• Metering Plan<br>• Development of Sequence of Operations<br>• Operational Improvements<br>• System Upgrade Improvements<br>• Maintenance and Operations Plan<br>• Operational Training<br>• Owner commitment to participate in the Optimization Competition |
| Metering System | 100% incentive for approved metering equipment and data collection systems | • Access to performance data for five years.<br>• Owner commitment to perform operational and system upgrade recommendations with less than 2 year paybacks up to the cost of the metering incentive within two years or forfeit metering incentive |
| Energy Reduction | $0.10 per kWh saved for one year | • 50% upon implementation<br>• 25% for performance at sixth month<br>• 25% for performance at one year |

*Total incentives not to exceed customer cost.

## 14.2.2 Building Engineer Challenge

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

### 14.2.3 Cooling Tower Optimization

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

### 14.2.4 Decision Maker – Real Time Submetering

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

## 14.2.5 Package & Split Annual Tune-Up

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- Recalculated energy savings by building type as recommended by EM&V review comments (Feb 2011 comments)

**Description:**
- Demonstrate the benefits of tune-ups
- Educate customer on savings potential
- Utilize the Participating Contractors to contact the customers and have them arrange for the service work
- Participating Contractors will use the Hawaii Energy PTAC/Split AC Maintenance Checklist to inspect and perform the pre and post conditions of their maintenance work
- Participating Contractor's invoice must show that checklist requirements have been met and signed by the servicing technician
- Customers can have 2 incentives per location annually
-

**Energy and Demand Savings:**

| Building Type | Demand Savings (kW/ton) | Energy Savings (kWh/ton) |
|---|---|---|
| All Commercial | 0.055 | 325 |
| Misc. Commercial | 0.033 | 325 |
| Cold Storage | 0.055 | 558 |
| Education | 0.022 | 320 |
| Grocery | 0.093 | 558 |
| Health | 0.071 | 453 |
| Hotel/Motel | 0.065 | 325 |
| Misc. Industrial | 0.055 | 453 |
| Office | 0.055 | 540 |
| Restaurant | 0.082 | 363 |
| Retail | 0.065 | 285 |
| Warehouse | 0.049 | 558 |

**Incentives:**

| Description | Unit Incentive | Incremental Cost |
|---|---|---|
| Package and Split Annual Tune Up | $ 100.00 | $ 400.00 |

## 14.2.6 Energy Study

Measure ID:
Measure Code:

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Description:** The Energy Study is an indirect impact product that offers Hawaii businesses with analysis services to identify energy saving opportunities. The goal of the energy study is to provide a method for commercial and industrial customers to learn how their business uses energy today and to identify measures that will help them save energy and reduce operating costs in the future. The focus is on a customer's core energy efficiency opportunities.

**Program Requirements:**
- Program approval is required prior to the start of work on the energy study
- The program reserves the right to review all materials that result from a program-supported study including, but not limited to, final reports, consultant recommendations, and metered data
- The study must be performed by a qualified person or firm. A brief summary of the consultant's qualifications should be submitted with the application. In some cases, a professional engineer may be required to provide verification of the analysis
- At any time, customers may contact program staff to discuss a project, get assistance in preparing an application, or with any program-related questions

**Energy and Demand Savings:**

All assumptions, data and formulas used in energy efficiency calculations must be clearly documented. Standard engineering principles must be applied, and all references cited. Energy saving calculations shall also reflect the interactive effects of other simultaneous technologies to prevent the overstatement of the actual savings.

**Savings Algorithms**

Gross energy and demand savings estimates for energy studies are calculated using engineering analysis and project-specific details. Energy study analyses typically include estimates of savings, costs, and an evaluation of the cost-effectiveness of potential projects/upgrades.

**Energy Study**

The Energy Study shall include the following information and be presented in the following format:

1) Executive Summary
   a) Energy Conservation Measures (ECMs) Proposed
   b) Summary of Baseline and Enhanced Case Assumptions
   c) Actionable Recommendations in "loading order."
2) Technical Information and Analysis
   a) Energy Consumption Analysis
      i) Two years of billing data (weatherized and compared to some pertinent operating metric)
   b) Description of the project
   c) Proposed Energy Conservation Measures (ECM)
      i) Descriptive Name
      ii) Schematic System Drawing
      iii) Current Peak Demand (kW), Energy Usage (kWh), Effective Full Load Run Hours
      iv) Proposed Peak Demand (kW), Energy Usage (kWh), Effective Full Load Run Hours
      v) % Change for above
      vi) Estimated Installation Cost
      vii) Project timeline
      viii) Measure Life
      ix) Simple Payback
   d) Base case information
      i) Short term/spot baseline thermal, fluid, and electrical measurements for major equipment to be changed with ECMs
      ii) Permanent metering data (This metering will qualify for additional cost assistance)
      iii) Sizing/Performance Reviews (Pump Curves, Cooling Bin Data etc.)
   e) Enhanced case information
      i) How will performance be measured in the future.
      ii) Description of where energy savings occurs (lower run time, more efficient operations etc.)
   f) Estimated energy and demand savings associated with your proposed project
      i) Applicable figures and tables
      ii) Simple payback period and/or life cycle costs
   g) Estimated costs including design, materials, and installation
3) Appendix
   a) Raw and Analyzed Data (Cooling Models, Field Data, Pictures, Metering Data etc.)
   b) Building Plans (Mechanical, Electrical Schedules, Layouts etc.)

**Incentives**

- Incentives are limited to 50% of the cost of the study up to $15,000

### 14.2.7 Design Assistance

Measure ID:
Measure Code:

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- 12/22/11 – Program requirement changed to require project be in planning or initial design phase.

**Description:** Design Assistance is available to building owners and their design teams to encourage the implementation of energy efficient building systems. Considering energy efficiency during the initial phases of planning and design greatly increase the feasibility of implementation. Incentives for energy efficiency are project-specific and offered as upfront assistance for additional costs incurred during the design phase. The long-term benefits include energy use reduction for the state of Hawaii and a reduction in operating costs, equipment lifecycle improvement for building owners, and improved comfort for building users.

**Program Requirements:**
- Application with written pre-approval from Hawaii Energy
- Project in planning or initial design phase
- Total resource benefit ratio greater than or equal to 1

**Energy and Demand Savings:**
A base case and enhanced case model must be produced with a clear comparison. All assumptions, data, and formulas used in energy efficiency calculations must be clearly documented. Standard engineering principles must be applied, and all references cited. Energy saving calculations shall also reflect the interactive effects of other simultaneous technologies to prevent the overstatement of actual savings. Proposed base and enhanced cases must be performed by a qualified person or firm. In some cases, a professional engineer may be required to provide verification of the analysis.

**Savings Algorithms**
Gross energy and demand savings estimates for design assistance are calculated using engineering analysis and project-specific details. Custom analyses typically include a weather dependent load bin analysis, whole building energy model simulation, or other engineering analysis and include estimates of savings, costs, and an evaluation of the project's cost-effectiveness.

**Baseline Efficiency**
The baseline efficiency case assumes compliance with the efficiency requirements as mandated by the Hawaii State Energy Code or industry accepted standard practice.

**High Efficiency**

The high efficiency scenario is specific to each project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on comparing a base case analysis and enhanced cased analysis on equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The energy efficiency measures must be proven cost-effective, pass total resource benefit, and have a payback greater than or equal to 1.

**Persistence Factor**

PF = 1 since all custom projects require verification of equipment installation.

**Incentives**

- Incentive applications are processed on a first-come, first-serve basis
- Incentives are limited to a maximum of $15,000

## 14.2.8 Energy Project Catalyst

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

## 14.2.9 Technology & Project Demonstration Assistance

Measure ID:
Measure Code:

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Description:** The Technology and Product Demonstration incentive program seeks emerging technologies that are past the "proof-of-concept" stage and are ready to be demonstrated in an industrial or commercial setting. The objective is to produce proven technical and economic performance data from these demonstrations, which could facilitate the successful deployment of the technologies into the Hawaii marketplace.

**Program Requirements:**
- Proposals should reflect a comprehensive understanding of the current state of technologies in the chosen area and must provide clear market connections for the proposed technology and potential benefits to electricity ratepayers in Hawaii
- Applicants must propose a team with demonstrated capabilities to successfully complete technology development projects
- Projects must advance state-of-the-art technologies that are not adequately covered by the competitive U.S. market
- After a successful demonstration at an industrial or commercial site, there must be plans for a 1-2 year time frame to commercially deploy the demonstrated technology
- Applicants should address plans for gaining customer acceptance, market development, and deployment in their proposals

**Incentives**
- Though the program expects to pay an incentive of approximately $1.00 per kWh saved all applications will be considered on an individual basis and its merit.

# 15 (BHTR) Business Hard to Reach

## 15.1 Energy Efficiency Equipment Grants

### 15.1.1 Community and Grass Roots Project Support

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- n/a

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**Savings Algorithms**

## 15.1.2 Small Business Direct Installation

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Description:** This program provides small business owners with an economical, quick and easy switch to more energy efficient lighting. The program is designed to address the needs of small business owners and help them overcome the barriers of time, trust and technical knowledge to make lighting technology changes.

**Requirements:** Schedule G

## Savings Algorithms

### Small Business Direct Install Lighting Retrofit Pilot Program
### Summary Sheet

| | |
|---|---|
| Business Name: | |
| Contact Name: | |
| Address: | |
| | |
| | |
| Phone: | |
| Fax: | |
| Email: | |

| | |
|---|---|
| Contractor Name: | |
| Auditor Name: | |
| Address: | |
| | |
| | |
| Phone: | |
| Fax: | |
| Email: | |

| Total Watts Saved | Energy Savings | Energy Cost Savings | Hawaii Energy Participating Contractor NTE Pricing | Hawaii Energy Cash Incentive | Net Customer Cost | Simple Payback | 4 Month Monthly Payment | Monthly Savings % of Payment |
|---|---|---|---|---|---|---|---|---|
| 1,323 W | 3,324 kWh/yr. | $ 776 / yr. | $ 2,300 | $ 833 | 1,467 | 23 | 367 | 18% |

| Step 1 | |
|---|---|
| f2 | |
| Oahu | Island of Project Location |
| $ 0.234 /kWh | 2010 "G" Marginal Cost of Electricity |

| Measure Code | Existing Technology | New Technology | Total Units | M-F Hours per Day | Sat. Hours per Day | Sun. Hours per Day | Annual Hours of Operation | Wkdays Hours on between 5 and 9 p.m. | On-Peak Fraction | Total Watts Saved | Energy Savings | Energy Cost Savings | Hawaii Energy Participating Contractor NTE Pricing | Hawaii Energy Cash Incentive | Net Customer Cost | Simple Payback | 6 Month Monthly Payment | Monthly Savings % of Payment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Step 2 | Step 3 | | | | Step 4 | | | | | | | | | | |
| | | | (each) | | | | (hrs/year) | (hrs) | (%) | (Watts) | (kWh/Year) | ($/year) | ($) | ($) | ($) | (Months) | ($/month) | (%) |
| | | | a | b1a | b1b | b2a | b3 = b1*b2*(365/7) | c | c2 =c / 4 | d = a x o | e = b x (d/1000) | f = e x f2 | g = a x p | h = a x q | i = a x (p-q) | j = (i/f) x 12 | k = i /6 | l = (f/12)/k |
| 8L1-4L2 | 8 ft. 1 Lamp F96 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 75 | $ 62 | $ 13 | 6 | $ 2.24 | 100% |
| 8L2-4L2 | 8 ft. 2 Lamp F96 | 4 ft. 2 lamp F25/28 H | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 57 | 143 | $ 33 | $ 84 | $ 53 | $ 31 | 11 | $ 5.17 | 54% |
| 8L2HO-4L2R | 8 ft. 2 Lamp F96 HO | 4 ft. 2 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 85 | $ 27 | $ 58 | 26 | $ 9.67 | 23% |
| 8L2HO-4L4 | 8 ft. 2 Lamp F96 HO | 4 ft. 4 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 138 | $ 53 | $ 85 | 19 | $ 14.17 | 32% |
| 4L4-4L4 | 4 ft. 4 Lamp F40 | 4 ft. 4 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 83 | $ 51 | $ 32 | 7 | $ 5.33 | 84% |
| 4L4-4L2R | 4 ft. 4 lamp F40 | 4 ft. 2 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 27 | $ 38 | 17 | $ 6.33 | 35% |
| 4L3-4L3 | 4 ft. 3 lamp F40 | 4 ft. 3 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 69 | 173 | $ 40 | $ 74 | $ 38 | $ 36 | 11 | $ 6.00 | 56% |
| 4L3-4L2R | 4 ft. 3 lamp F40 | 4 ft. 2 lamp F25/28 N, Reflct. | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 27 | $ 38 | 17 | $ 6.33 | 35% |
| 4L2-4L2 | 4 ft. 2 lamp F40 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 35 | $ 27 | $ 8 | 4 | $ 1.33 | 168% |
| 4L1-4L1 | 4 ft. 1 lamp F40 | 4 ft. 1 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 23 | 58 | $ 13 | $ 30 | $ 14 | $ 16 | 14 | $ 2.67 | 42% |
| 4L4-4L4 | 4 ft. 4 lamp F32 | 4 ft. 4 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 83 | $ 34 | $ 49 | 11 | $ 8.17 | 55% |
| 4L4-4L2 | 4 ft. 4 lamp F32 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 53 | $ 12 | 5 | $ 2.00 | 112% |
| 4L3-4L3 | 4 ft. 3 lamp F32 | 4 ft. 3 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 69 | 173 | $ 40 | $ 74 | $ 26 | $ 48 | 14 | $ 8.00 | 42% |
| 4L3-4L2 | 4 ft. 3 lamp F32 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 65 | $ 25 | $ 40 | 18 | $ 6.67 | 34% |
| 4L2-4L2 | 4 ft. 2 lamp F32 | 4 ft. 2 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 46 | 115 | $ 27 | $ 35 | $ 27 | $ 8 | 4 | $ 1.33 | 168% |
| 4L1-4L1 | 4 ft. 1 lamp F32 | 4 ft. 1 lamp F25/28 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 23 | 58 | $ 13 | $ 35 | $ 9 | $ 26 | 23 | $ 4.33 | 26% |
| 1L400-4L6 | HID Pendant 1 lamp 400W | 4 foot 6 lamp F25/T8 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 138 | 345 | $ 81 | $ 360 | $ 76 | $ 284 | 42 | $ 47.33 | 14% |
| 1L250-4L4 | HID Pendant 1 lamp 250W | 4 foot 4 lamp F25/T8 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 330 | $ 51 | $ 279 | 62 | $ 46.50 | 10% |
| 1L175-4L4 | HID Pendant 1 lamp 175W | 4 foot 4 lamp F25/T8 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 92 | 230 | $ 54 | $ 330 | $ 51 | $ 279 | 62 | $ 46.50 | 10% |
| UBL2-2L2 | 4 ft. U-Bend 2 lamp FB40 | 2 ft. 2 lamp F17 N | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 32 | 80 | $ 19 | $ 40 | $ 22 | $ 18 | 12 | $ 3.00 | 52% |
| UBL2-2L2R | 4 ft. U-Bend 2 lamp FB40 | 2 ft. 2 lamp F17 L, Reflector | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 27 | 68 | $ 16 | $ 50 | $ 30 | $ 20 | 15 | $ 3.33 | 39% |
| 100-23 | 100 Watt Incandescent | 23 Watt CFL | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 23 | 58 | $ 13 | $ 10 | $ 4 | $ 6 | 5 | $ 1.00 | 112% |
| 75-19 | 75 Watt Incandescent | 19 Watt CFL | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 19 | 48 | $ 11 | $ 8 | $ 4 | $ 4 | 4 | $ 0.67 | 139% |
| 60-13 | 60 Watt Incandescent | 13 Watt CFL | 1 | 8 | 8 | 0 | 2,503 | - | 0% | 13 | 33 | $ 8 | $ 6 | $ 4 | $ 2 | 3 | $ 0.33 | 190% |
| Exit | 40W Incandecent | 2 Watt LED | 1 | 24 | 24 | 24 | 8,760 | - | 0% | 2 | 18 | $ 4 | $ 75 | $ 38 | $ 37 | 109 | $ 6.17 | 6% |
| OverHeight | Cost Adder for Fixtures above or out of the reach of a 10' Ladd | | 0 | | | | | | | | | | $ - | | $ - | | | |
| | | | | | | | | | | 1,323 W | 3,324 kWh/yr. | $ 776 / yr. | $ 2,300 | $ 833 | $ 1,467 | 23 | $ 366.86 | 18% |

**WORKBOOK INPUTS**

| Measure Code | Existing per Unit Watts | Unit New Watts | Unit Watts Saved | Hawaii Energy Participating Contractor Pricing | Hawaii Energy Cash Incentive | Public Benefit Fee Investment |
|---|---|---|---|---|---|---|
| | (Watt/unit) | (Watt/unit) | (Watt/unit) | ($/unit) | ($) | ($/kWh) |
| | m | n | o = m-n | p | q | r |
| 8L1-4L2 | 85 | 46 | 39 | $ 75 | $ 62 | $ 0.53 |
| 8L2-4L2 | 142 | 57 | 85 | $ 84 | $ 53 | $ 0.37 |
| 8L2HO-4L2R | 170 | 46 | 124 | $ 85 | $ 27 | $ 0.23 |
| 8L2HO-4L4 | 170 | 92 | 78 | $ 138 | $ 53 | $ 0.23 |
| 4L4-4L4 | 168 | 92 | 76 | $ 83 | $ 51 | $ 0.22 |
| 4L4-4L2R | 168 | 46 | 122 | $ 65 | $ 27 | $ 0.23 |
| 4L3-4L3 | 126 | 69 | 57 | $ 74 | $ 38 | $ 0.22 |
| 4L3-4L2R | 126 | 46 | 80 | $ 65 | $ 27 | $ 0.23 |
| 4L2-4L2 | 84 | 46 | 38 | $ 35 | $ 27 | $ 0.23 |
| 4L1-4L1 | 42 | 23 | 19 | $ 30 | $ 14 | $ 0.24 |
| 4L4-4L4 | 112 | 92 | 20 | $ 83 | $ 34 | $ 0.15 |
| 4L4-4L2 | 112 | 46 | 66 | $ 65 | $ 53 | $ 0.46 |
| 4L3-4L3 | 84 | 69 | 15 | $ 74 | $ 26 | $ 0.15 |
| 4L3-4L2 | 84 | 46 | 38 | $ 65 | $ 25 | $ 0.22 |
| 4L2-4L2 | 56 | 46 | 10 | $ 35 | $ 27 | $ 0.23 |
| 4L1-4L1 | 28 | 23 | 5 | $ 35 | $ 9 | $ 0.16 |
| 1L400-4L6 | 475 | 138 | 337 | $ 360 | $ 76 | $ 0.22 |
| 1L250-4L4 | 300 | 92 | 208 | $ 330 | $ 51 | $ 0.22 |
| 1L175-4L4 | 225 | 92 | 133 | $ 330 | $ 51 | $ 0.22 |
| UBL2-2L2 | 84 | 32 | 52 | $ 40 | $ 22 | $ 0.27 |
| UBL2-2L2R | 84 | 27 | 57 | $ 50 | $ 30 | $ 0.44 |
| 100-23 | 100 | 23 | 77 | $ 10 | $ 4 | $ 0.07 |
| 75-19 | 75 | 19 | 56 | $ 8 | $ 4 | $ 0.08 |
| 60-13 | 60 | 13 | 47 | $ 6 | $ 4 | $ 0.12 |
| Exit | 40 | 2 | 38 | $ 75 | $ 38 | $ 2.17 |
| OverHeight | | | | $ 8 | | |
| | | | | | | 0 |

## 15.2 Landlord, Tenant, AOAO Measures

### 15.2.1 Energy Hero Landlord

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- n/a

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Measure Description:**
TBD

**Baseline Efficiencies:**
TBD

**High Efficiency:**
TBD

**Energy Savings:**
TBD

**<u>Savings Algorithms</u>**

# 16 Addendum

## 16.1 Residential

## 16.2 Commercial

### 16.2.1 LED Product Customized Process

Measure ID: See Table 7.3 (TBD)
Measure Code: LED - Custom

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**
- Illuminating Engineers Society (IES) LM79 /LM80
- ENERGY STAR LED Website http://www.energystar.gov/index.cfm?c=ssl.pr_why_es_com

**TRM Review Actions:**
- 10/5/11 – Currently Under Review.

**Major Changes:**
- n/a

**Description:** Light Emitting Diodes (LED) are a lighting technology that utilizes solid-state technology to produce light, opposed to fluorescent or incandescent lighting sources. In general, LED technology will provide energy levels 15% of a comparable incandescent lamp (15W to a 100W equivalent).
LED lighting projects (Fixtures and Lamps) are handled under a customized incentive basis.

**Equipment Qualifications:** The program has developed minimum qualifications as a measure to protect the
consumers who are purchasing LED products and insure energy savings potential and persistence.

- *Power and Photometric Measurements:* IES LM79 testing performed and results submitted and understood by the customer. Provides color temperature and power input vs. light output data.
- *Lumen Maintenance:* IES LM80 testing performed and results submitted and understood by the customer. Provides % lumen maintenance over operating hours. (If not available at time of project than product requires a 5 year warranty)
- *Safety:* UL listed products. UL number provided with application.
- *Warranty Protection:* Minimum 3 year warranty with clear description of how warranty is executed.

or

- Energy Star Listing (http://www.energystar.gov/index.cfm?fuseaction=iledl.display_products_html)
  and for all projects
- *Program Persistence Requirement:* Acknowledge that the lamps must be in place for a period of 5
  years. If replaced with higher usage technologies the rebate will be required to be refunded.

- *Purchaser Due Diligence:* Customers are informed to utilize third-party education such as the US DOE
  Calipers reports (http://www1.eere.energy.gov/buildings/ssl/caliper.html)

**Payback Qualifications:** For LED products the payback requirements are allowed to be six months or greater.
This is 6 months lower than the standard customized payback requirement of 1 year or greater. The TRB/TRC must be greater than 1.

**Energy and Demand Savings:** A simple worksheet is utilized to compare pre and post lighting configurations. The existing lamp counts, wattage (with ballasts as appropriate) and operating hours are used to determine the existing "base case" energy usage. The "enhanced case" is then determined using the same information for the proposed LED technology.

A review is performed to insure LED wattages are in the expected range for the equivalent light output of the existing technology.

| | |
|---|---|
| **Project:** | Customer Name |
| **Application Number:** | 2CBEEM111111 |
| **Date:** | 12/16/2010 |
| **Techology Type:** | F32 T8 to LED |
| **Input by:** | Kimo Kilowatt |

**Existing / Base**

| Location | Fixture Type | Fixture Qty | Lamps Per Fixture | Lamp Wattage | Total Wattage | M - F Hours of Operation | Sat. Hours of Operation | Sun. Hours of Operation | Annual Hours of Operation | Peak Demand Hours | Peak Demand kW | Total Demand Max kW | Annual Energy kWh/Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Campus Upper Building | T8 F32 | 1 | 190 | 29 | 5,510 | 12 | 4 | - | 3,337 | 2.0 | 2.8 | 5.5 | 18,388 |
| | | | | | - | | | | - | | - | - | - |
| | | | | | - | | | | - | | - | - | - |
| | | | | | - | | | | - | | - | - | - |
| | | | | | | | | Total | 834 | 2.0 | 2.8 | 5.5 | 18,388 |

Notes:

**Retrofit / Enhanced**

| Location | Fixture Type | Fixture Qty | Lamps Per Fixture | Lamp Wattage | Total Wattage | M - F Hours of Operation | Sat. Hours of Operation | Sun. Hours of Operation | Annual Hours of Operation | Peak Demand Hours | Peak Demand kW | Total Demand Max kW | Annual Energy kWh/Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Campus Upper Building | LED | 1 | 190 | 14 | 2,660 | 12 | 4 | 0 | 3,337 | 2 | 1 | 2.7 | 8,877 |
| | | | | | | | | | - | | | | |
| | | | | | | | | Total | 1,669 | 2.0 | 1.3 | 2.7 | 8,877 |
| | | | | | | | | | | Reduction Percentage | | -52% | -52% |

Notes:

**Project Summary**

| | |
|---|---|
| Average Energy Savings Per Year | 9510.86 kWh/Year |
| Demand Savings | 1.43 kW |

**Cost Breakdown**

| | |
|---|---|
| Material Cost | $7,990 |

## 16.2.2 Refrigeration – Vending Misers

Measure ID: See Table 7.3 (TBD)
Measure Code:

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2010
End date: TBD

**Referenced Documents:**

(1) USA Technologies Energy Management Product Sheets (2006). http://www.usatech.com/energy_management/energy_productsheets.php. Accessed 9/1/09.

**TRM Review Actions:**

- n/a

**Measure Description**

Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on the following algorithms and assumptions:

$\Delta$kWh = (kWrated)(Hours)(SAVE)
$\Delta$kW = $\Delta$kWh/ Hours

Where:

kWrated = Rated kW of connected equipment. See Table below for default rated kW by connected equipment type.
Hours = Operating hours of the connected equipment: default of 8,760 hours
SAVE = Percent savings factor for the connected equipment. See table below for values.

**Vending Machine and Cooler Controls Savings Factors(1)**

| Equipment Type | $kW_{RATED}$ | SAVE (%) | $\Delta$kW | $\Delta$kWh |
|---|---|---|---|---|
| Refrigerated Beverage Vending Machines | 0.40 | 46 | 0.184 | 1612 |

**Baseline Efficiency**

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated
snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

**High Efficiency**

The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

**Hours**
It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual
operating hours of 8,760.

**Measure Life**
5 Years

**Incentive**
$50/unit

## 16.2.3 Refrigeration – ECM Evaporator Fan Motors for Walk-in Coolers and Freezers

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2011
End date: June 30, 2012

**Referenced Documents:**

- 2007 Arkansas Deemed Savings Quick Start Programs
  http://www.aepefficiency.com/oklahoma/ci/downloads/Deemed_Savings_Report.pdf

**TRM Review Actions:**

- 10/5/11 – Currently Under Review.

**Major Changes:**

- n/a

**Measure Description:**
An electronically commutated motor (ECM) is a fractional horsepower direct current (DC) motor used most often in commercial refrigeration applications such as display cases, walk-in coolers/freezers, refrigerated vending machines, and bottle coolers. ECMs generally replace shaded pole (SP) motors and offer at least 50% energy savings. Analysis efforts summarized in this report focused on the most prevalent use of ECMs – refrigeration, where motor sizes are typically listed in watts (10-140 W).

**Measure/Technology Review**
Five of the primary data sources reviewed for this effort contained data for ECMs in refrigeration and HVAC applications. The NPCC study gave savings estimates for upgrading a CAV box single speed motor to an ECM. The other four studies gave wide ranging savings and cost data for compressor, condenser, and evaporator fan motors. KW Engineering completed a study for PacifiCorp in October of 2005 regarding the market for ECMs in walk-in refrigerators (kW Engineering, 2005). This study included the market share in each state for refrigeration ECMs as well as cost and energy savings data. These values for energy and demand savings are given in Table 1 below.

**Table 1**

| Measure Information Available | Resource | Application | Annual Energy Savings[1] (kWh/unit) | Demand Savings[1] (kW/unit) |
|---|---|---|---|---|
| Yes | Ecotope 2003 | Small Evaporator Fan ECM | 200 | - |
| Yes | PG&E 2003 | Evaporator Fan | 673 | 0.077 |
| Yes | Stellar Processes 2006 | Small Evaporator Fan ECM | 200 | - |
| No | Xcel Energy 2006 | | | |
| No | Quantec 2005 | | | |
| No | DEER | | | |
| No | KEMA 2006 | | | |
| Yes | CEE | Evaporator Fan – Freezer<br>Condenser Fan – Freezer<br>Compressor Fan – Freezer<br>Evaporator Fan – Refrigerator<br>Condenser Fan – Refrigerator<br>Compressor Fan - Freezer | 115<br>141<br>985<br>294<br>141<br>690 | 0.013<br>0.016<br>0.112<br>0.034<br>0.016<br>0.079 |
| No | Energy Star | | | |
| No | RTF | | | |
| Yes | NPCC 2005 | CAV Box | 517 | 0.397 |
| Yes | kW Engineering 2005 | Evaporator Fan | 734 | 0.084 |

[1] Savings values reflect gross savings at the customer meter

**Baseline Efficiencies:**
The standard motor type for this application is a shaded pole (SP) motor. Table 2 contains the baseline annual energy consumption and demand for ECM equivalent SP motors.

Table 2 (Baseline Efficiency)

| Measure | Annual Energy Consumption | Demand |
|---|---|---|
| Shaded Pole (SP) motor | 18 kWh/W | 0.002 kW/W |

**Minimum Requirements/High Efficiency**
Any ECM up to 1 hp in size will meet the minimum requirements for both retrofit and new construction installations. Table 3 contains the estimated annual energy consumption, demand, and cost for the ECM application.

Table 3 (High Efficiency)

| Measure | Annual Energy Consumption | Demand |
|---|---|---|
| ECM | 8.7 kWh/W | 0.001 kW/W |

**Energy Savings:**

| Annual Energy Savings | Demand Savings |
|---|---|
| 9.3 kWh/W | 0.001 kW/W |

**<u>Savings Algorithms</u>**

Deemed demand and energy savings should be calculated by the following formulas for Refrigeration applications:

kW savings = Rated Wattage x (kW/W pre - kW/ W post)

kWh savings = Rated Wattage x (kWh/W pre – kWh/W post)

Where:

Rated Wattage = Rated Wattage of the electronically commutated motor

kW /W pre = Demand of the existing electronically commutated motor. If unavailable, demand listed in Table 2 should be used

kW /W post = Demand of the new electronically commutated motor. If unavailable, demand listed in Table 3 should be used

kWh /W pre = Annual energy consumption of the existing electronically commutated motor. If unavailable, annual energy consumption listed in Table 2 should be used

kWh /W post = Annual energy consumption of the new electronically commutated motor. If unavailable, annual energy consumption listed in Table 3 should be used

**Lifetime**

DEER – 15 years

**Measure Costs and Incentive Levels**

$85 per motor and controller set

# Attachment H

# PY2011 Print & Online Media Coverage Highlights

# Hawaii's Forest City Military Communities Launch Energy Smart Initiative

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A/A/A/

E|#Judfh#Khz#Ohg/#Mlqw#Edvh#Shduo#Kdueru0Klfndp#Sxeolf#Diidluv#

PEARL HABOR, Hawaii (NNS) -- Hawaii's Energy Smart Initiative was launched by state and military leadership during a ceremony at the Navy's Catlin Park neighborhood, May 29.

Joint Base Pearl Harbor-Hickam Commanding Officer Capt. Jeffrey James, Hawaii Lt. Gov. Brian Schatz, Marine Corps Base Hawaii Commanding Officer Col. Brian Annichiarico, Forest City Military Communities and Hawaii Energy took part in the ceremony.

"The Energy Smart Initiative represents the state of Hawaii's first large-scale effort in transforming two entire residential communities to achieve an energy-efficient lifestyle," Schatz said. "I applaud each and everyone involved in this project as it will serve as a wonderful model for others to follow."

Hawaii Energy is the energy efficiency and conservation program for Hawaii, Honolulu, and Maui counties. The program is in alignment with the Department of Defense and Department of the Navy's energy conservation initiatives to reduce dependence on foreign oil and other fossil fuels and to curb the overuse of electricity.

"In addition to the rising cost, America's dependence on foreign oil poses a significant threat to national security," James said. "I encourage every household to participate in the Energy Smart Initiative and help conserve energy. Reducing electricity consumption helps to secure our energy interests locally and nationally, and improves our security posture."

James said the military is leading change and recognized a Navy family at Catlin Park that lives in the first "net zero" energy home aboard Joint Base Pearl Harbor-Hickam.

Senior Chief Information Systems Technician (SS)Benjamin Daniels, assigned to Naval Submarine Training Center Pacific, and his family of four became the first "energy-smart ambassadors" to share and lead an energy-efficient lifestyle in their community.

The Daniels' home is equipped with rooftop photovoltaic panels, triple insulation, solar, and energy smart appliances.

"We've done a lot of research online to further reduce our energy consumption," said Ronalee Daniels.

Their average monthly consumption has been under 900 kilowatt hours for their 1,900 square-foot home, she said.

"It forces you to take a look at your energy bill. More importantly, when military families leave Public Private Venture housing, their good energy habits can put money back into their accounts," said James.

Through the Energy Smart Initiative, Hawaii Energy and Forest City expect to achieve a minimum 1.3 million kilowatt energy reduction per year. With Hawaii residents paying the highest electricity rates in the nation, Forest City military family residents will contribute to significant energy and financial savings and provide a large contribution to helping the state of Hawaii achieve its clean energy goals.

"Forest City Military Communities and the Navy and Marine Corps are truly leading by example through this initiative," said Ray Starling, Hawaii Energy Program manager. "The best way for Hawaii to achieve its energy efficiency goals is one community at a time."

By participating in the Energy Smart Initiative, Forest City residents will learn about three easy ways to become more energy efficient. The goal of the initiative is to have residents decrease their electricity consumption every month and quite possibly earn a rebate.

"We are excited about partnering with Hawaii Energy to help our resident's, and our communities operate more energy efficiently," added Will Boudra, Forest City vice president. "By helping build energy smart communities, Forest City residents can not only save money, they will aid in the energy security of our state and our nation."

Forest City Military Communities, in partnership with the Department of the Navy, manages, maintains and revitalizes neighborhoods on and around military bases in Hawaii, including Joint Base Pearl Harbor-Hickam, Marine Corps Base Hawaii, and neighboring installations.

For more information, visit www.navy.mil, www.facebook.com/usnavy, or www.twitter.com/usnavy.

For more news from Commander, Navy Region Hawaii, visit www.navy.mil/local/cnrh/.



UHODWHG#SKRWRV#

Download High Resolution#

111013-N-OF713-003 PEARL HARBOR, Hawaii (Oct. 13, 2011) Members of the Naval Facilities Engineering Command Hawaii energy team assist military and civilian personnel from Commander Navy Region Hawaii attending the Building Energy Manager Energy Awareness Fair at Joint Base Pearl Harbor-Hickam. (U.S. Navy photo/Released)

October 19, 2011

UHODWHG#FRQWHQW#

Arizona Memorial hosts Battle of Midway Wreath-Laying Ceremony - 6/4/2012

Navy in Hawaii Marks 70th Anniversary of Battle of Midway - 6/1/2012

Armed Services YMCA Conducts Preschool Graduation - 5/23/2012

Hawaii Surface Navy Association Remembers West Loch Disaster - 5/21/2012

Qdy|#Vrfldo#Phgld#

Wr#vljq#xs#iru#xsgdwhv#ru#wr#dffhvv#|rxu#vxevfulehu# suhihuhqfhv/#sohdvh#fdfn#rq#wkh#hqyhorsh#lfrq#lq#wkh#sdjh# khdghu#deryh#ru#fdfn#here.#

# Pacific submarine community honor war heroes

**Story and photos by MC2 (SW/AW/SCW) Ronald Gutridge**

*Commander Submarine Force U.S. Pacific Fleet Public Affairs Office*

The Pearl Harbor Submarine Park and Parche Memorial at Joint Base Pearl Harbor-Hickam was the setting for a Memorial Day ceremony held May 28 as retired and active duty submariners and guests gathered to pay tribute to the World War II submarines on "eternal patrol" and all those service members who defended the country.

The ceremony opened with the parading of the colors as the Pacific Fleet Band performed the National Anthem followed by the ceremony invocation by Chaplain Cmdr. Steven Moses, Commander Submarine Force, U.S. Pacific Fleet Force.

A roll call was announced, consisting of a tolling of the bell for each submarine lost and a presentation of a special lei to the USS Growler (SS 215), the Hawaii chapter of U.S. Submarine Veterans of WWII designated state submarine lost in WWII.

Photo illustration

(Left) The Joint Base Pearl Harbor-Hickam Regional Ceremonial Guard Honors and Ceremonies Detachment stands ready to perform the 21-gun salute during the Memorial Day ceremony held May 28 at the Pearl Harbor Submarine Park and Parche Memorial. (Center) Guest speaker, Adm. Cecil Haney Commander, U.S. Pacific Fleet, reflects on the World War II submarines on "eternal patrol." (Right) Retired submarine veteran Master Chief (SS) John Dugan of the U.S. Submarine Veterans, Inc. places a lei on the plaque of each World War II submarine during the ceremony.

Adm. Cecil Haney, commander of U.S. Pacific Fleet and guest speaker, reflected on the World War II submarines on "eternal patrol" and the sacrifice and heroism of their crews as well as all the submariners who have followed their paths.

"Today, as we gather at this unique submarine memorial park, we observe the plaques of these lost boats and their heroic Sailors. We recognize those lost in the sub service during WWII. We recognize the importance of their sacrifice and the legacy they have bestowed upon us," said Haney.

"For it was through their effort and ultimately their sacrifice that our submarine force has become what it is today, a formidable force capable of protecting the very nation that they gave their lives to defend. Today we have gathered to honor and remember not only those brave men of the submarine force who paid the ultimate price in service to our country, but all who gave their lives throughout the history of our grateful nation," Haney said.

The conclusion of the ceremony included the Joint Base Pearl Harbor-Hickam Regional Ceremonial Guard Honors and Ceremonies Detachment performing a 21-gun salute and the playing of Taps by Musician 1st Class Justin Skorupa from U.S. Pacific Fleet Ceremonial Band.

Memorial Day is a federal holiday observed annually in the U. S. on the last Monday of May. Formerly known as Decoration Day, it originated after the American Civil War to commemorate the Union Soldiers who died in the Civil War. By the 20th century, Memorial Day had been extended to honor all who have died in all wars.

# Hawaii Federal Fire Department pays tribute to fallen

**MC2 Tiarra Fulgham**

*Navy Public Affairs Support Element West, Detachment Hawaii*

Personnel from Federal Fire Department (FFD) Hawaii held a wreath-laying ceremony May 29 at the USS Arizona Memorial to commemorate Memorial Day.

The event was the second wreath-laying ceremony that FFD has held at the memorial.

"We decided to do this annually – laying a wreath – on this particular memorial for remembering not only those that lost their lives on the Arizona, but also those that lost their lives in the many wars around the United States," said FFD Fire Chief Glen DeLaura.

U.S. Navy photo by MC2 Tiarra Fulgham

Members of the Federal Fire Department participate in a wreath-laying ceremony at the USS Arizona Memorial.

FFD Fire Inspector Angela Sanders gave some insight to the important of holding the wreath laying at the memorial, explaining that she wanted people to remember the true meaning of Memorial Day and honor it as it should be.

"Memorial Day is a time to honor those who have lost their lives to serve and protect our great nation. Memorial Day has been ignored by too many of us, and we often do not observe the day as it should be," Sanders said.

"I believe the true meaning of Memorial Day is when we actively remember our ancestors, our family members, our loved ones, our neighbors and our friends who have given the ultimate sacrifice," she said.

The phrase "Protecting Those Who Defend America" was placed across a ceremonial wreath that was presented and displayed at the memorial. The ceremony ended with personnel of the FFD scattering flower petals off the memorial into the waters beneath it.

"Protecting Those Who Defend America is our motto at the Federal Fire Department, and because of those brave individuals we are proud to display this on our trucks and within our hearts. To those who lost their lives and served on the Arizona, you have truly given the ultimate sacrifice, and for that you will never be forgotten. Thank you," Sanders said.

# JBPHH civil engineers conduct PRIME BEEF exercise at Bellows

**Staff Sgt. Nathan Allen**

*15th Wing Public Affairs*

The 647th Civil Engineer Squadron from Joint Base Pearl Harbor-Hickam brought the "bull" to Bellows Air Force Station, Hawaii from May 21 to 25 to practice their ability to respond to contingency operations worldwide.

In times of crisis or military need, base engineer emergency force, or PRIME BEEF, teams deploy to austere locations and provide runways, water supply facilities, electricity, housing and other essential facilities to support joint and coalition forces worldwide.

During the recent exercise, Airmen from all career fields within the Civil Engineer Squadron were brought together to perform a task, regardless of their individual Air Force specialty code—a dynamic synonymous with the real-world demands of a PRIME BEEF team.

"On a deployment, all you have out there is each other," said Tech. Sgt. William DeGuzman, a 647th CES structural craftsman. "This exercise really sets the tone to make people more comfortable with working together and doing whatever needs to be done, even if it's outside of your specialty."

While Airmen participating in PRIME BEEF largely put their specialties aside to accomplish tasks, there is still individual career field value to be garnered from the event, according to Airman 1st Class Raymart De Asis, 647th CES contract inspector.

U.S. Air Force photo by 2nd Lt. Jessica Rowe

Airmen from the 647th Civil Engineer Squadron at Joint Base Pearl Harbor-Hickam, lay asphalt May 23 at Bellows Air Force Station as part of the squadron's Prime BEEF exercise.

"Being able to get out of the office and learn the work behind what we inspect is really nice," De Asis explained.

Likewise, the most important purpose of this exercise may be exposing new civil engineers to the correlation between the exercise and real-world deployments, said Tech. Sgt. Robert Finton, 647th CES pavement construction equipment craftsman.

"It's very beneficial to people who haven't been deployed," he said. "It ensures we remain a highly mobile contingency unit."

The work of PRIME BEEF teams can be seen throughout U.S. military history in countries like Lebanon, Germany, Cuba, Vietnam, Thailand, Korea, the Federated States of Micronesia and domestically in recovery efforts for natural disasters, including Hurricane Camille in 1969 and Hurricane Agnes in 1972.

# Hawaii Energy and Forest City Military Communities launch Energy Smart Initiative

**Story and photo by Grace Hew Len**

*Joint Base Pearl Harbor-Hickam Public Affairs*

Capt. Jeffrey James, commander of Joint Base Pearl Harbor-Hickam, joined Hawaii Lt. Gov. Brian Schatz, Marine Corps Base Hawaii commanding officer Col. Brian Annichiarico, Forest City Military Communities and Hawaii Energy as they launched Hawaii's Energy Smart Initiative during a ceremony at the Navy's Catlin Park neighborhood May 29.

"The Energy Smart Initiative represents the state of Hawaii's first large-scale effort in transforming two entire residential communities to achieve an energy-efficient lifestyle," Schatz said. "I applaud each and everyone involved in this project as it will serve as a wonderful model for others to follow."

Hawaii Energy is the energy efficiency and conservation program for Hawaii, Honolulu and Maui coun-

Capt. Jeffrey James congratulates Senior Chief Information Systems Technician (SS) Benjamin Daniels of Naval Submarine Training Center Pacific, wife Ronalee and son Brenden, who were selected as the first "Energy Smart ambassadors" at Forest City Military Communities. The family lives at Catlin Park in the neighborhood's first "net zero" energy home.

ment with the Department of Defense and Department of the Navy's energy conservation initiatives to reduce dependence on foreign oil and other fossil fuels and to curb the overuse of electrici-ty.

cost, America's dependence on foreign oil poses a significant threat to national security," James said. "I encourage every household to participate in the Energy Smart Initiative and help conserve energy. Reducing electricity

our energy interests locally and nationally and improves our security posture."

James said the military is leading change and recognized a Navy family at Catlin Park that lives in the first "net zero" energy home at Joint Base Pearl Harbor-Hickam. Providing deckplace leadership, Chief Benjamin Daniels, assigned to Naval Submarine Training Center Pacific, and his family of four became the first "Energy Smart ambassadors" to share and lead an energy-efficient lifestyle in their community. The Daniels' home is equipped with rooftop photovoltaic panels, triple insulation, solar and energy smart appliances.

"We've done a lot of research online to further reduce our energy consumption," said Ronalee Daniels. Their average monthly consumption has been under 900 kilowatt hours for their 1,900 square-foot home, she said.

James said conservation is about preserving the bottom line. "It forces you to

bill. More importantly, when military families leave PPV housing, their good energy habits can put money back into their accounts."

Through the Energy Smart Initiative, Hawaii Energy and Forest City expect to achieve a minimum 1.3 million kilowatt energy reduction per year. With Hawaii residents paying the highest electricity rates in the nation, Forest City military family residents will contribute to significant energy and financial savings and provide a large contribution to helping the state of Hawaii achieve its clean energy goals.

"Forest City Military Communities and the Navy and Marine Corps are truly leading by example through this initiative," said Ray Starling, Hawaii Energy Program manager. "The best way for Hawaii to achieve its energy efficiency goals is one community at a time."

By participating in the Energy Smart Initiative, Forest City residents will

to become more energy efficient. The goal of the initiative is that residents will decrease their electricity consumption every month and quite possibly earn a rebate.

"We are excited about partnering with Hawaii Energy to help our resident's and our communities operate more energy efficiently," added Will Boudra, Forest City vice president. "By helping build energy smart communities, Forest City residents can not only save money, they will aid in the energy security of our state and our nation."

Forest City Military Communities, in partnership with the Department of the Navy, manages, maintains and revitalizes neighborhoods on and around military bases in Hawaii, including Joint Base Pearl Harbor-Hickam, Marine Corps Base Hawaii and neighboring installations.

For more information about the Energy Smart Initiative, Forest City or Hawaii Energy, visit HawaiiEnergy.com/ForestCi

Attachment H
Page 2 of 131

# NEWS BRIEFS

### Authorized headphone running areas

The following are authorized areas on the base to wear headphones while walking or running.

1. The Nuupia Ponds trail, starting from the no noise sign near the back gate and ending at the water cooler across from Kahuna's Bar and Grill
2. The recreation trail, starting across from Regimental Motorpool and ending next to Fort Hase Beach.
3. The K-Bay track and Camp H.M. Smith track
4. All authorized beach areas
5. All recreational trails aboard Camp H.M. Smith

Please refer to http://www.mcbh.usmc.mil/g1/adjutant/pubs/Policy/CO_Statement_Headphones.pdf for the commanding officer's headphones policy.

### Active duty service members, dependents offered free entry to national parks

In appreciation of the U.S. military, the National Park Service is now issuing an annual pass offering free entrance to all 397 national parks for active duty service members and their dependents. Eligible patrons can pick up a pass at the entrance station to Hawaii Volcanoes. They must show a current, valid military identification card to obtain their pass. The passes are good for one year from the month obtained. This military version of the America the Beautiful National Parks and Federal Recreational Lands Pass also permits free entrance to sites managed by the U.S. Fish and Wildlife Service, the Bureau of Land Management, the Bureau of Reclamation, and the U.S. Forest Service. The pass is also available at these locations. For details visit http://www.nps.gov/findapark/passes.htm.

### 3rd Street closure from E Street to G Street

All base personnel should take note that a large portion of 3rd Street will be completely closed to vehicle traffic (24/7) until July 27. The affected area is from E Street near Pless Hall to the stoplight at G Street in front of Federal Fire Department. The closure is necessary to completely regrade and repave 3rd Street. Motorists destined for western areas of the base must detour via 5th Street or Mokapu Road. Inbound base traffic from H-3 on G Street will be permitted to turn left into the Marine Mart during this time. Access to the Marine Mart and PMO will also be available via the Water Reclamation Facility service road near D Street. Call Philip Lum at 257-6900 for details.

### Important phone numbers

| | |
|---|---|
| On-Base Emergencies | 911 |
| Child Protective Service | 832-5300 |
| Fraud, Waste, Abuse & EEO | 257-8852 |
| Pothole & Streetlight Repair | 257-2380 |
| Base Information | 449-7110 |
| MCB Hawaii Chaplain | 257-3552 |
| DEERS | 257-2077 |

Hawaii Marine

www.mcbh.usmc.mil

| | |
|---|---|
| Commanding Officer | Col. Brian P. Annichiarico |
| Base Sergeant Major | Sgt. Maj. Robert E. Eriksson |
| Public Affairs Officer | 1st Lt. Diann Olson |
| Public Affairs Chief | Gunnery Sgt. Matthew O. Holly |
| External Media Chief | Staff Sgt. Brian Tuthill |
| Internal Media Chief/ Managing Editor | Sgt. Skyler Tooker |
| Press Chief | Sgt. D.R. Cotton |
| Public Affairs Administration | Kaye McCarthy |
| Community Relations | Sgt. Danny H. Woodall |
| Media NCO | Cpl. Vanessa American Horse |
| Photojournalist | Christine Cabalo |
| Photojournalist | Kristen Wong |
| Graphic Artist | Jay Parco |
| Combat Correspondent | Sgt. Scott Whittington |
| Combat Correspondent | Cpl. Colby Brown |
| Combat Correspondent | Lance Cpl. James A. Sauter |

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*Hawaii Marine, Box 63062, Building 216,*
*MCB Hawaii, Kaneohe Bay, Hawaii 96863*
*E-Mail: HawaiiMarineEditor@gmail.com*
*Fax: 257-2511, Phone: 257-8837*

# Officers graduate from distance education program

Lance Cpl. James A. Sauter | Hawaii Marine

Lt. Gen. Duane D. Thiessen, commanding general of U.S. Marine Corps Forces, Pacific and guest speaker, talks to the graduates of the Command and Staff Distance Education Program and the Expeditionary Warfare School Distance Education Program during a ceremony at the Base Theater, May 17.

# Reduce use, increase energy savings


Cpl. Colby Brown | Hawaii Marine

Hawaii civilian and military residents including Hawaii Lt. Gov. Brian Schatz, Col. Brian P. Annichiarico, commanding officer, Marine Corps Base Hawaii and Navy Capt. Jeffrey W. James, commanding officer, Joint Base Pearl Harbor-Hickam attend the launch of Hawaii's Energy Smart Initiative, Tuesday at Navy military housing near JBPHH. In the background is Navy Chief Petty Officer Benjamin Daniels' [*third from left*] house, which has used net-zero energy since 2011. His house is a model of a goal in the program to reduce excess energy usage and promote the use of reuseable energy. "It's important to make an operation like this work," said Ray Starling, program manager, Hawaii Energy. "The way we do that, before any modifications are completed, is to develop everyday habits that save energy and promote a decrease in energy usage. Modifications to net-zero houses include photovoltaic solar panels, central air and energy smart appliances."

# A new way to decontaminate

Cpl. Colby Brown | Hawaii Marine

Marines attending an introductory class to the M26 Joint Service Transportable Decontamination System prepare the system for use here, Wednesday. The M26 is replacing the M17 Lightweight Decontamination System. The M17 has been in use for more than 25 years. The new system also couples with a consolidation of decontamination systems. There are more than 900 M17 systems and less than 175 M26 systems, which will be fully fielded at division level units by June. "There is a production base for the M26," said Master Gunnery Sgt. Eugene Champion, a projects officer, Chemical Biological Radiological and Nuclear, Marine Corps System's Command. "With the M17 I can't even buy parts because the production of them has been stopped. The M26 has a better system base and the concept of maintenance is completely different." Old M17 systems are planned to be de-militarized and sold on the open market.

# Project targets military homes' power use

## The Hawaii Energy Smart Initiative aims to change behavior and cut electricity use

By Alan Yonan Jr.

POSTED: 01:30 a.m. HST, May 30, 2012



Dennis Oda / doda@staradvertiser.com
Marine Col. Brian Annichiarico, left, watched Chief Petty Officer Benjamin Daniels shake hands with Navy Capt. Jeffrey James at Tuesday's "Energy Smart Initiative" news conference at the Catlin Park neighborhood. Standing next to Daniels were his wife, Ronalee, son, Brenden, and stepson, Erron Hayden. Forest City Vice President Will Boudra, right, looked on.

Officials have set their sights on Hawaii's military housing for a new program they hope will cut energy waste and save the government nearly a half-million dollars a year in electricity costs.

The Hawaii Energy Smart initiative unveiled Tuesday will focus on behavioral changes to save energy that will complement existing programs that reduce electricity consumption with hardware solutions such as photovoltaic panels, solar water heating and high-efficiency appliances.

The goal of the initiative is to reduce electricity use by 1.3 million kilowatt-hours annually in roughly 6,700 military households through basic steps such as using air conditioning more sparingly, properly setting water heater timers and using advanced power strips to stop "phantom" energy use.

The kilowatt-hour target works out to an energy-use reduction of 1.5 percent.

The program, set in 36 neighborhoods mostly on Oahu, is the state's first large-scale effort to transform entire communities to "achieve an energy-efficient lifestyle," said Lt. Gov. Brian Schatz. The housing is operated by Forest City Military Communities, a private-sector provider. If successful, the initiative could serve as a model for the broader community, he said.

The key to getting program participants to change their energy-use behavior will be education and repeatedly supplying them with information about how to save leasing office. Then someone from our leasing office takes them to see the house, and they hear it again," Boudra said.

"The next time it will be when they contact our management office. They'll hear it again when our maintenance people come to the house. We will get the message to them over and over again," he said.

The Hawaii Energy Smart Initiative builds on a program launched last year that for the first time charged tenants of military housing for overuse of electricity and rewarded them for underuse.

Residents are required to pay for consumption that is more than 20 percent above the average usage for that group of similar homes. Residents who conserve more than 20 percent below the average usage will have the opportunity to receive a credit or rebate.

electricity, said Will Boudra, vice president of development at Forest City.

Hawaii Energy, the state's main energy efficiency program, has been training Forest City staff on how to articulate the message to the tenants in military housing.

"The first time we see a military resident is when they come to look for a house, and they hear the message from our

6,700

Households participating in Hawaii Energy Smart Initiative

1.3 million

Projected number kilowatt hours of electricity saved annually under the initiative

$423,800

Projected savings at today's price of 32.6 cents per kilowatt hour

$4 billion

Amount Hawaii spends on imported oil annually

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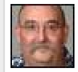
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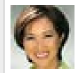
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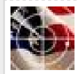
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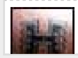
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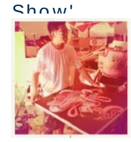
PULSE


Honolulu Zoo announces 'Wildest Show'


PICS: 'Bacardi Pool Party' at the Marriott


Five-0 Redux: To the villains we love to hate


Freestyle: Pancho Abalos mines history for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PICS: 'Memorial Day All-Nighter' at Hickam


PICS: 'Dance or Die' at Nextdoor

This Week in TGIF
Calendar of Events
More Entertainment Coverage

# Honolulu Museum of Art gets more than $346,000 in energy rebates

Published: 5/30 5:47 pm

Updated: 5/30 5:51 pm

Saving energy can be rewarding, just ask the folks who work at the Honolulu Museum of Art.

Wednesday, the museum was awarded more than 346-thousand dollars in rebates for saving energy.The savings are just beginning

"This energy conservation program will save about 900,000 kilowatt hours annually," said Miles Kubo of Energy Industries. "And this at thirty cents, that's about $270,000 a year."

Honolulu Academy of Art Director Stephan Jost said the savings can be used for education programs.
"We can use it for curatorial projects," Jost added. "We can do it for mission related things. If we haven't done this project we would be looking at cutting our education programs. And because we did it we don't have to."

Governor Abercrombie was also on hand to recognize the savings. Money for the rebate comes from the Hawaii energy program.

# Nrkdod#vwxghqwv#ohduq#hqhuj|#frqvhuydwlrq

Thursday, May 17th, 2012

Special to NHN

Click to see slideshow

Kohala Elementary School's weekly "Parent Hour," on May 9, featured Hawaii energy educator, Helen Wai. Parents, grandparents, and fifth graders learned what they can do to make a difference in cutting electric usage, in cutting costs, and in becoming energy efficient. Electric water heaters, old refrigerators and other appliances that are replaced with energy star products not only save energy, but also have an added bonus of receiving cash incentives and energy rebates. Wai also demonstrated the energy usage difference between Compact Fluorescent Lamps (CFLs) versus incandescent bulbs. She also encouraged participants to unplug printers, chargers, televisions and other items when not in use.

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80°F
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NOW

# Talk Story with Kathryn Raethel Raethel of Castle Medical Center

## President and CEO, Castle Medical Center

BY STACY YUEN HERNANDEZ

The first woman to lead the full-service medical facility in Kailua discusses Castle's renovations, green efforts and open-heart-surgery program.

Photo: David Croxford

**Castle is undergoing a $26 million renovation. What's changing?**

Over the last 10-plus years, we've been renovating older areas of the hospital. We've done most of our inpatient areas. Now we're renovating the operating suites, ambulatory surgery facility, and expanding our emergency department from 18 beds to 26. We'll be putting imaging services off the front lobby and creating an outpatient imaging center that's much more outpatient-friendly and easily accessible. We expect the entire renovation project to be complete, probably, by the end of 2013.

**Where did funding come from?**

All of our capital funding comes out of our corporate structure (Castle is owned and operated by a national nonprofit, Adventist Health). But it's based on our earnings and our ability to contribute. For the first time in its history, Castle is completely debt-free.

**How is that possible in these tough economic times, and in light of closures of other medical facilities on Oahu?**

We are careful in our use of resources, whether those resources are capital or people. About half of our expenses are actually labor expenses, so we try to be really cautious.

We don't understaff, we don't underspend, but we're not wasteful. We've been good at that for a long time.

**How will hospital services be affected during the renovation?**

There will be some disruption, but hopefully not much. We'll work in phases. For example, we'll phase in our emergency and imaging departments so we don't have to close the services down. There's a lot of pre-planning work that goes into it to make sure that we've anticipated what we need to do in advance of a phase.

**What can patients expect once the renovation is complete?**

They can expect a beautiful, more functional facility. We'll have two much more distinct entries. Right now the emergency entry has become the primary portal of entry. And we don't want that. So the front lobby area will become the primary point of entry for nonemergency, visitors, outpatient procedures and registration. It's my intent for the front lobby to be very beautiful. It's old and dated and probably looks like how it originally looked back in the day. It will be more modern and much more user-friendly.

We will be upgrading some of our services. Our imaging services will be improved and there will be improved access to mammography. Ultrasound services will be improved and upgraded and, of course, the operating rooms will be much more functional.

We are also creating an area in the emergency department, specifically for our behavioral-health population, which has been an issue over the years. It will be better suited in caring for these patients in their acute phases before they are admitted.

**In February, Castle received a $647,000 check from Hawaii Energy as incentive funding provided by the American Recovery & Reinvestment Act. How did this come about?**

That was in the works for a couple of years. We worked with Hawaii Energy and they evaluated our entire campus and areas where we could improve our consumption of energy. We ended up replacing some cooling towers, chillers and all the lighting throughout the entire facility to be more energy efficient. It cost us about $2.3 million. We received $647,000 back through state and federal matching funds and we expect to now save about $200,000 a year in energy costs.

**What other efforts has CMC made to "go green?"**

We've been on a "going green" journey for several years. Our associates came up with ideas at first and challenged us to be more energy-friendly. Some of the things we've done: We have 20 bike lockers for our associates to bike to work and keep their bikes secure. We've also done quite a bit in our cafeteria with biodegradable utensils and biodegradable packaging. No Styrofoam. We've done a recycling effort to make sure we capture all of those bottles and cans. We don't care who takes them, some of our housekeepers take them, others take them for projects. We just want to get those out of the waste.

**How has the closure of Hawaii Medical Center East and West affected CMC and other medical facilities?**

All the hospitals on this island are feeling the effects of the closure of the two facilities, but I think it is truly remarkable the way everyone's working together collaboratively to accommodate all those patients. There are a lot more transfers between hospitals to try to ease the burden.

**The medical center is in the process of starting up an open-heart-surgery program. How did this come about?**

We requested approval from the state earlier this year to start the program. A surgeon from Hawaii Medical Center East, who was displaced by its closure, asked us if we were interested in doing that. We submitted our (Certificate of Need) application to the state in January and we finished hearings in February. The program is now approved and we are in the process of hiring appropriate personnel and renovating the ORs. We hope to perform our first cases this year.

TODAY'S EDITORIAL

# Experts ready to help you

It is always a joy to meet bright people who are passionate about their jobs.

Last Thursday, we had the good fortune to meet two such people who are connected with Hawaii Energy, the state's experts in conservation and efficiency programs. Walter Enomoto and Malama Minn came by in response to a little piece written here about a Home Energy Report we received from their organization.

First of all, the purpose of Hawaii Energy is to educate the populace about ways to conserve electricity — and get them to implement them. They have a lot of practical tips that can help us reduce energy consumption and lessen the state's dependence on imported oil.

In an editorial here a couple of weeks ago, we referred to ourselves as the Energy Inefficient, citing our Home Energy Report as proof. That report, if you'll recall, said we used 22 percent more energy than our average neighbor and double the power of efficient neighbors.

Walter and Malama had a ton of tips and suggested a visit to their website — Hawaii Energy.com/HomeEnergyReport — for even more tips and to further personalize the report by inputting more information about our home. You can learn a lot on the site about the neighbors you were compared to, also.

Some of the tips they gave us Thursday included such items as Vampire Electricity — power that is drawn by some appliances even when turned off. The use of a smart power strip or unplugging the device when not in use can stop these vampires from sucking your wallet dry.

Walter also asked if we had animals. When we replied yes, he suggested vacuuming the condenser coils at the bottom of our refrigerator. He said animal fur can clog them and make them inefficient. Malama referred to this condition as the Cat Culprit.

In any event, there are tons of tips at HawaiiEnergy.com/HomeEnergyReport. We'd suggest you visit the site. Hawaii Energy will show you how to cut your electric consumption — and save money every month on your utility bill.



■ *Editorials reflect the opinion of the publisher.*

# Save Money & Electricity for You & Your Friends by Taking Hawaii Energy's *3 CFL Challenge*

***Derrick Sonoda***
**Outreach & Marketing Manager, Hawaii Energy**

At Hawaii Energy, the conservation and efficiency program for Hawaii, Honolulu and Maui counties, we care about sustainability and the environment. Specifically, we are concerned by the fact that Hawaii residents pay the highest rates for electricity in the country. Our mission is to lessen the burden this causes on Hawaii's residents. We are here to help residents save money by conserving energy and living more efficiently. We do this in two ways: by providing rebates on energy-efficient products, and by empowering residents and businesses through outreach and education.

On the outreach and education front, we recently introduced our *3 CFL Challenge,* where we encourage residents to replace three more old-fashioned bulbs with energy-saving compact fluorescent lights (CFLs), and tell three others to do the same! As an added incentive for taking the *Challenge*, we have increased the instant cash-back rebate on ENERGY STAR® qualified CFLs at participating retailers for a limited time to help everyone cope with the high electricity prices.

Replacing just three more incandescent bulbs with CFLs is one of the easiest and most cost-effective things residents can do to save money. Now is definitely the time for everyone in Hawaii to switch to CFLs, and there are three great reasons I can think of for doing so; savings, style and safety!

By replacing three or more frequently used incandescent light bulbs with CFLs, savings can reach $100 a year for the average household in Hawaii, based on Oahu energy rates. CFLs use 75 percent less energy and last nearly ten times as long as traditional incandescent light bulbs. In most homes, the most frequently used fixtures are the ones located in the kitchen, living room, bathroom and outside.

For those who value style over savings, CFLs now offer everyone a greater variety of sizes, shapes and shades of white lighting. The incandescent bulb really hasn't changed all that much since Thomas Edison patented it back in 1879. More than 130 years later the familiar bulbs still use the same technology, and still waste a whole lot of energy.

CFLs are also the smart choice for those that are health conscious and environmentally friendly. Incandescent light bulbs are responsible for burning more oil and thus contribute a greater amount of pollution into our environment than CFLs.

By taking the *3 CFL Challenge,* residents can help ensure that this is a much more energy-efficient year for us all. The campaign's goal of half a million CFLs would collectively save an estimated $8 million from residential electric bills in the first year alone.

Please visit our web site or connect with us directly to learn about all of our programs and incentives. There are several ways we can work with residents and businesses to help them conserve energy.

Visit us at HawaiiEnergy.com, or call 537-5577 (Oahu) or 1-877-231-8222 (toll-free). We look forward to working on your behalf, and with you, to help reduce our dependence on foreign oil.

*Sarah McCann*

*Maile Alsup*

*Oahu resident Derrick Sonoda is the Outreach & Marketing Manager at Hawaii Energy. Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by SAIC under contract with the Hawaii Public Utilities Commission serving the islands of Hawaii, Lanai, Maui, Molokai and Oahu. Hawaii Energy offers cash rebates and other incentives to residents and businesses to help offset the cost of installing energy-efficient equipment. In addition to rebates, the program conducts education and training for residents, businesses and trade allies to encourage the adoption of energy conservation behaviors and efficiency measures. The program plays an important role in helping to achieve Hawaii's goal of reducing total electric energy usage by 30 percent or 4.3 billion kWh by 2030.*

Honolulu Weekly



COVER STORY CONTINUED

# Recognizing Green Schools

BY DEBBIE MILLIKAN | APR 18, 2012

3

From worms eating food waste at Hokulani Elementary to the Science Learning Center at Mililani High School to the aquaponics of Kalani High School, schools all over Hawaii are incorporating environmental education and practices into their curriculum. The collective impact can bring huge savings, as our schools are the state’s third largest energy consumer and produce heaps of waste. More than that, schools of course grow future citizens, and can provide children’s best resource for learning to malama ‘aina and our natural resources.

Green schools have been sprouting nationwide for more than a decade, seeded by parents’ desires for farm-fresh cafeteria food, teachers’ interest in including sustainability in every academic subject, children’s love of hands-on learning and the outdoors, and administrators’ motivation to save energy, hence money. Now, all of this is becoming officially adopted.

**Green Ribbon Awards**

In November 2010, Hawaii’s Department of Education (HIDOE) created a policy that

## This week

### How Green is our Hawaii?

From farmers in the ahupua‘a valleys who used and recycled every precious drop of water on its way to the sea, to fishermen who set kapus when species were spawning, to children riding ti leaves on a muddy slope or simply rolling down a grassy hill, to body surfers in a glassy wave, Hawaii has a long heritage of tapping into renewable energy, not just for work and sustenance, but for joy and play. As we roll down the home stretch to the 42nd Earth Day, April 22, what a joy to celebrate the planet and its resources: clean air, clean water, forests, farms and, most of all, our keiki and generations to come.

### Letter from the Publisher

This year has proven once again that we cannot rely on our legislators and officials to produce progressive laws and policies for our Islands. There have been discouraging attempts to turn some of our state’s very best farmland into subdivisions.

### Recognizing Green Schools

From worms eating food waste at Hokulani Elementary to the Science Learning Center at Mililani High School to the

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Talk Back

**Jennaclo** Wow this article is very eye opening, "90% of all the rivers and streams in the US are contaminated with...
Patents on Life · 13 hours ago

**Ken Conklin** My friend, kumu hula Al Barcarse, spent many years working with students at King Intermediate School in Kane'ohe to...
Recognizing Green Schools · 17 hours ago

**GATORMIKE** Brudda WesT IS the best local Roots/Beats /Stylin DJ in Da Isles and I miss being able to see him live
Westafari · 19 hours ago

**Autumn Rose** Dave, my sympathies. This is what I do to reduce my electricity use, but these may not work for big families. Only...
Sticking it to us · 23 hours ago

**NonsenseDad aka D** That's my dude! Plus, y'all don't know he is a "baller"! Give'em a ball & a basket and watch him do his thang. Glad...
Westafari · 1 day ago

states, “HIDOE has a fundamental responsibility to educate students about sustainability and to model sustainability”. And the current school year (2011-2012) marks the first in which the US Department of Education (DOE) will give Green Ribbon Awards to recognize 50 schools nationwide for efforts to save energy, feature environmentally sustainable learning spaces, offer environmental education and boost community engagement. It’s part of a broader US DOE effort to identify and promote practices proven to result in improved student engagement, academic achievement, graduation rates, and workforce preparedness, as well as a government-wide goal to increase energy independence.

Names of the first crop of Green Ribbon Schools will be released on April 23.

### Vetting applicants for awards

Questions on a 15-page intensive application gauged a school’s progress towards three Green Ribbon School “Pillars”:

1) The school has a “net zero” environmental impact

2) The school environment has a “net positive” impact on the health and performance of students and staff

One-hundred percent of the school’s graduates are environmentally and sustainability literate

Applicants were assigned points for meeting targets, and representatives of Hawaii Energy, US Green Building Council (USGBC) Green Schools, Kokua Hawaii Foundation, and the Hawaii Association of Independent Schools tallied the scores.

Hawaii DOE Assistant Superintendent Randy Moore was tasked with evaluating the applications and nominating four. If that sounds daunting, so was the application. “A number of questions required detailed information on energy usage and environmental curriculum,” Moore says. But the nine schools that filled it out took it in stride. “Schools reported that completing the application was itself a learning experience and will heighten student and adult environmental awareness,” Moore adds. As science teacher Bill Wiecking of Hawaii Preparatory Academy puts it, “The process helped us to realize we could be doing better”.

### The nominees

Hawaii’s four Green Ribbon Schools nominees demonstrated progress towards the three pillars but in different and unique ways. Each had a variety of strong points. In addition, Kalani High and Kahuku High and Intermediate, were also recognized by HIDOE for their efforts in energy conservation and environmental sustainability.

### ‘Ewa Makai Middle School (EMMS)

Hawaii’s first “green” school, the stunning facilities at ‘Ewa Makai Middle School (EMMS), which opened in January 2011, meet LEED® Gold standards for energy-efficient and building with sustainable materials and healthy indoor air. But perhaps EMMS’s proudest achievement was the student-initiated introduction of Senate resolution SCR33, which requests that all public schools in Hawaii commit to implementing at least five “Green Hawaii” initiatives. The suggested ideas range from composting to conservation and recycling, and it’s suggested that these projects can help to raise needed school funds. “This resolution will not only impact the ‘Ewa community, but could positively affect all public schools statewide,” says ‘Ewa Makai’s student activities coordinator Vanessa Kealoha who leads a group of 15 students to

aquaponics of Kalani High School, schools all over Hawaii are incorporating environmental education and practices into their curriculum. The collective impact can bring huge savings, as our schools are the state’s third largest energy consumer and produce heaps of waste.

#### Greening Your Child’s School

Of course, this doesn’t mean literally painting your kid’s school green. But it does beg the question: What really is a green school?

#### Green School Resources

RESOURCES Department of Environmental Services, Opala Learning Center Provides educational tools for school recycling projects and programs. Holds a Discover Recycling Event for teachers (next event is Saturday, Sept.

#### Deep Green: Kamehameha and Punahou Schools

Kamehameha and Punahou Schools both sit mauka of the Honolulu plain, high in the Kapalama hills and in the lap of Manoa Valley, respectively. With the still-verdant Koolau watershed at their backs, and facing sea views spliced by skyscrapers, both campuses provide ideal platforms for contemplating what damage we have done to our island environment–and how we might still save it.

#### Hawaiian Island Sustainability

How can we tell if an island is sustainable or not? All islands are net importers, meaning residents depend on external resources to survive, so they tend to be implement green initiatives at the school. All that led by 7th and 8th graders.

### Hawaii Preparatory Academy

Hawaii Preparatory Academy on the Big Island incorporated LEED building standards into the design of their Energy Lab. In response to a 2007 student-led GoGreen movement, the Energy Lab functions as a net-zero energy, fully sustainable building dedicated to the study of alternative energy. "[We] got the students involved in the metrics and the measuring of things, like how much energy the campus uses. They can see something and say that's not right," Wiecking says. For example, when he and his students made their campus assessments, they found that the dorms were using diesel fuel to generate heating. Now Wiecking and his students are creating a plan for 2015 that addresses sustainable issues beyond energy, such as quality of life, transportation, food, water and waste.

As in 'Ewa, more important than the buildings is what goes on inside. For senior student, Mariko Thorbecke, 19, Energy Lab has been life changing, "Two years ago, I wouldn't have thought of a career in engineering." Now she's planning a career as a control systems engineer for renewable energy technologies, and plans to attend a prestigious engineering college. "Understanding sustainability through hands-on approaches makes it more personal, unlike from textbooks." Real-life application of renewable energy technologies, (a recent project involved students compared the efficiency of several of-the-shelf wind turbines) are what make this program especially unique.

### Pahoa High and Intermediate School

Science teacher Nancy Iaukea focuses her teaching at Pahoa School on real-world service learning projects such as recycling and composting in order to instill students with a sense of responsibility for the environment. "It's exciting because the whole school is involved," she says, "All of the students and staff are involved in energy savings, for example. The Belkin Energy Meter Lab went home with students and staff allowing them to measure household energy usage." The school has a Green Club that has been instrumental in moving the school toward a green standard and created a 30-second PSA and 14-minute documentary on waste reduction and recycling, both of which were aired statewide on public television. The school-wide effort is what earned Pahoa their Green Ribbon status. Principal Darlene Bee agrees, "I believe that our teachers are the inspiration for our students' high achievements. I am privileged to work with such talented teachers and students."

### Waikiki Elementary School

Spirited parents and teachers at Waikiki School started Project Green 2007, and immediately began a recycling program and planted gardens at the school. In 2011, the school went further with their green commitments by hiring a sustainability and garden educator. Students meet regularly to discuss topics such energy conservation, food miles, and to work in the gardens. "I think the gardening class is really good for our school, because it reminds us that gardening and saving energy for the school helps everybody," says 6th grade student Hannah Mayo. "And it means we don't have to eat processed food anymore," chimes in 5th grader Janice Lei. In fact, one of the goals of the green program at Waikiki is to assure that all students have access to fresh, real foods that they grow themselves. To that end, students are selected each week to fill a box of fresh produce from the farm–anything they want. The only requirement is that they write down their original recipes and create a unique, often humorous title. "One of the strengths of Waikiki's farm program is it's connection with the community," says 4th grade teacher John Melton who has started a culinary


less sustainable compared to a self-sufficient continent.

Not All Business
Going green doesn't just mean you've met all the requirements on the Department of Business, Economic Development and Tourism (DBEDT) State Energy Office's checklist. In reality, it means these businesses have made a commitment to Hawaii, and to themselves, to make a difference–to stop polluting our 'aina and over-exhausting our resources.

Sustainability 101
*Even institutions of higher education are hard at work to secure our sustainable future, by offering curriculum and degrees in sustainability. The University of Hawaii at Manoa and Hawaii Pacific Univeristy are no longer just preparing students to be proficient in one discipline, but rather teaching them to be environmentally responsible citizens who can make a difference in most any field he or she may choose.*

Hawaii Made Me Green
Since arriving in the Islands five years ago, I've realize just how precious and irreplaceable the 'aina truly is. And instead of sucking the life out of it, I decided to transform my habits to resonate with a more sustainable mantra–a process that has benefitted Hawaii *and* my pocketbook.

Rail: Not A Done Deal
Don't let anyone tell you otherwise. Just as destiny is not manifest, the Honolulu rail is not a done deal.

Bonny Billy Blend

program at the school with volunteer Dave Caldiero, chef de cuisine of Town. “I’d like to open their eyes to the possibilities and show them just how simple it is to cook,” says Dave. “It’s important because these kids are the ones who are going to make the changes.”

What next? “It is my hope that the schools who completed the application share their experience and knowledge with each other,” says Chris Parker, Chair of USGBC Hawaii Green Schools, “The application was a great self-evaluation and an opportunity for us all to see what areas could use more support.”

Clearly, Hawaii is up for the challenge.



## COMMENTS

We often print online comments in our “Letters to the Editor” section of *Honolulu Weekly*. While submitted letters are often edited for length and clarity, online comments we use are printed entirely as they are written for the website. If you do not wish for your comment to be used in *Honolulu Weekly* print issues, please write **“Don’t Print”** at the end of your comment. For questions, e-mail editorial@honoluluweekly.com. Thank you!

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COMMENTS REDACTED

Sort by popular now

Moments before I’m scheduled to speak with folk luminary Will Oldham via phone, my new recorder breaks. In lieu of finding a quite, peaceful nook in Chinatown to record the conversation aloud, I find myself hunkered down in a barren sushi restaurant bathroom, listening to Oldham’s weathered warble bouncing off of the paint-chipped walls.

### The Progressive

Rep. Heather Giugni is a fresh face in the Hawaii State Legislature, having been appointed by Gov.

### MARKET MUST CEASE

Last week the Haleiwa Farmers’ Market received a notice to vacate and cease using a small plot of land alongside Kamehameha Highway, land they have been leasing from the Department of Transportation (DOT) on a month-to-month basis since April 2009. About a year ago, DOT proposed the idea of a more lengthy yearly lease instead.

### Still Almost Standing

The *Paul Berry v. State of Hawaii DCCA/RICO, Ansaldo Honolulu JV* hearing in Circuit Court consumed some 50 minutes on April 13, with Judge Patrick Border presiding.

### Land Laws

Washington Place, the final home of Queen Liliuokalani, was the site of a momentous occasion April 11. Amidst a smiling crowd of attendees, including members of the Hawaiian community and politicians, Gov.

### HART Docs

Daniel Grabauskas, HART’s new executive director and CEO officially took office April 9,

# Local Briefs

April 8, 2012
The Maui News



Bulb swap set for Kihei Safeway Saturday

KIHEI - People can swap their old incandescent bulbs for new, energy-efficient CFL lights at an event Saturday.

Cadets and senior members of the Civil Air Patrol will swap one CFL for each incandescent bulb turned in, even if the old bulbs are burned out. The event will run from 10 a.m. to 4 p.m. at the Kihei Safeway in the Piilani Village Shopping Center.

The Kihei Composite Squadron of the Civil Air Patrol is sponsoring the event in partnership with Hawaii Energy and the Blue Planet Foundation.

CFLs use 75 percent less energy than traditional bulbs.

*****

'Bulb Blitz' to be held at Upcountry sites

Exchanges of regular light bulbs for CFL bulbs, sponsored by the Upcountry Rotary Club, will be held Upcountry this month.

Blue Planet Foundation of Hawaii has donated 1,000 13-watt (60-watt equivalent) CFL bulbs in an effort to "green" Maui, a news release about the trade days said.

In the "Maui Bulb Blitz," incandescent bulbs may be traded, one for one, for a free CFL bulb. CFL bulbs last seven times longer than incandescent ones.

Maui Bulb Blitzes are set for:

* Saturday, April 21 and 28, Upcountry Farmers Market in the Kulamalu Town Center, 7 to 9 a.m.

* April 20, Makawao's 3rd Friday Street Fair, 6 to 9 p.m.

* April 28, Food Drive at Pukalani Longs Drug Store, 8 a.m. to 5 p.m.

For more information, call 573-9260.

*****

Snyder, Blackburn to speak to AARP

KIHEI - The president of the Mana'olana Pink Paddlers and a retired public safety official will speak Monday at the AARP South Maui chapter meeting at the Kalama Heights Retirement Community.

Gloria Snyder will speak about her group of cancer survivors and supporters who love to paddle in Hawaiian outrigger canoes.

Joseph Blackburn, who is a candidate for the County Council, is a retired policeman, fireman and safety director at Maui Electric Co.

He will speak on fire safety and what to do in case of emergency.

The meetings start at 10 a.m. Senior citizens age 50 and older may join the chapter for an annual fee of $10.

For more information, contact Jeannie Kaiser, president of the AARP South Maui Chapter, at 875-2069.

*****

Drug, alcohol abuse workshops offered

WAILUKU - A free workshop aimed at helping people with their drug or alcohol addictions, sponsored by The Beacon House, will be held Mondays through June 21 from 6:30 to 8 p.m. in Wailuku.

Debbie Bayer, licensed marriage and family therapist and addiction specialist and interventionist, will present the workshop at 270 Hookahi St., No. 305.

The gathering is free, but those attending need to RSVP with Bayer by calling (808) 234-9838.

The Beacon House, located on the Monterey Peninsula in California, is an addiction treatment center for adult men and women. For more information, go to the website www.|beaconhouse.org.

*****

BHS Project Grad mandatory meeting set

WAILUKU - A mandatory parent and student meeting for Baldwin High School's Project Graduation attendees has been set for April 18 and 21.

Only one of the two meetings needs to be attended. The April 18 meeting begins at 6 p.m. and the April 21 meeting at 9 a.m.

Both meetings will be in the Baldwin High School Multipurpose Room.

The next general meeting of the group will be at 6:30 p.m. Tuesday in the Baldwin Multipurpose Room.

*****

Cerebral Cafe focuses on global health

KAHULUI - "Health Care Global Lessons" will be the topic of Tuesday's Cerebral Cafe at the University of Hawaii Maui College Class Act Restaurant.

A CNN special report by Fareed Zakaria will be the focal point of the discussion, showing how other nations manage their health care. There are lessons to be learned from Great Britian, Switzerland and Taiwan, a news release about the gathering said. "You'll learn just how expensive U.S. health care can be - for comparatively low-quality returns, and finally, what we need to do to fix our system."

The group meets from 9:30 a.m. to 1 p.m. There is a $20 cost that includes a three-course lunch.

To register, go online at cerebralcafe55@aol.com.

*****

Volunteers needed for March For Babies

WAILUKU - Volunteers are still needed for Saturday's Maui March For Babies at the War Memorial Gym from 7 to 10 a.m.

Volunteers are needed to help with aid stations, serve as route marshals, assist in the food line, and join breakdown tasks at the end of the event.

Interested individuals or groups are asked to contact march Coordinator Jeff Rogers by email at jr3maui@yahoo.com or by phone at 214-2839.

The event is held by the March of Dimes, which helps moms have full-term pregnancies and funds research into problems that threaten the health of babies.

*****

Royal Hawaiian Guard topic of talk

KAHULUI - Paulo Faleafine Jr., founder and executive director of the Royal Hawaiian Guard, will speak to the Rotary Club of Maui meeting on Thursday at the University of Hawaii Maui College.

Faleafine will discuss 19th-century Hawaii and its monarchs and religion and cultural change.

"Understanding Hawaii's past will ensure Native Hawaiian cultural resilience and prove critical to the success of Native Hawaiian youth," Faleafine said in a news release. "We will glimpse the 19th century through the life story of Her Majesty Queen Keopuolani and the evolution of the Royal Guards through that period."

Then, he will explore today's Royal Hawaiian Guard, its correlation to the past and its mission for the future."

The Rotary Club of Maui meets at noon at the Class Act Restaurant. The public is welcome. The cost to attend is $20.

*****

Hypnotherapist to discuss 'messages'

KIHEI - A hypnotherapist will discuss "Hidden Messages" at the breakfast meeting of the Rotary Club of Kihei Sunrise on Wednesday at the Five Palms Restaurant at the Mana Kai Maui Resort.

Wendy MacDonald will explain how hidden messages encourage people to feel, think or do what the other people or organizations want. In this interactive presentation, MacDonald will discuss three forms of hidden messages, and the audience will have the opportunity to craft and deliver their own hidden message.

She opened her first business in 1982 and is currently enjoying semiretirement on Maui, keeping an active but small practice.

The meeting begins at 7:30 a.m. The public is invited.

The cost of the breakfast is $22.

For more information, contact club President Jane Emery at (831) 539-3005 or go to the club's website at www.kiheirotary.org.

*****

Doorway Into Light to hold workshop

A workshop titled "Living an Awakened Life" by Doorway Into Light will be offered Saturday at Makawao Union Church Hall from 11 a.m. to 5 p.m.

Ram Dass, an author, speaker and former Harvard professor; Dale Borglum, the founder and executive director of the Living and Dying Project in California; and Bodhi Be, founder and executive director of Doorway Into Light, will speak.

Doorway Into Light is a nonprofit organization offering services, support and education in the field of end-of-life-care and after-death care.

The cost is $65.

For more information, contact Be by phone at 573-8334 or by email at bodhi@doorwayintolight.org or go to www.doorwayintolight.org.

# Current Affairs

By making some simple adjustments and additions to your home, you can conserve energy, live more efficiently and lower your bills. "Hawaii residents pay more than anyone else in the nation for electricity and fuel," says Eric Carlson, principal of RevoluSun. "It's up to us to make better use of our renewable resources, work together to reduce our dependence on imported fossil fuels and plan for increased security and independence."

Article by Tom Kunz & Andy Beth Miller

**Issue Date:** (Fri) April 6, 2012

## 1. Start simply by investing in CFL bulbs.

Updating incandescent light bulbs to newer, compact fluorescent lights (CFLs) is one of the easiest, most basic upgrades a homeowner can make. Although choosing CFLs is a simple, small switch, the savings really add up. An ENERGY STAR® CFL uses 75 percent less energy than an incandescent bulb to produce the same amount of light. Plus, it lasts up to eight times longer. For a limited time, Hawaii Energy is offering a $1.40 rebate on qualified CFLs purchased at participating retailers, including City Mill.

SAVINGS: By replacing three or more frequently used incandescent light bulbs with CFLs, savings can reach $100 a year for the average household in Hawaii, based on Oahu energy rates. (Source: hawaiienergy.com)

FOR MORE INFORMATION: hawaiienergy.com

DID YOU KNOW? CFLs work better in open fixtures that allow air flow.

(Source: energystar.gov)

## 2. Seal the deal with new windows.

Installing ENERGY STAR® windows is a smart upgrade for any Hawaii homeowner looking for dramatic results. Mark McKinstry, sales manager at Windows Hawaii, suggests window brands such as Anlin, Milgard, Marvin and Monte Verde. "The most eco-friendly aspect of these windows, particularly Anlin, is the energy-efficiency aspect," McKinstry says. "These windows exceed ENERGY-STAR® requirements by 45 percent and are a 100-percent improvement over regular glass in terms of heat efficiency." When compared side by side, homes with Anlin windows showed a 33-percent reduction in annual energy costs. These savings are attributed to the ingenious energy coating that reflects heat, as well as to the airtight seal created by a custom, cam-lock system.

SAVINGS: Replacing single-pane windows with ENERGY STAR® windows can save you more than $500 a year. (Source: energystar.gov)

FOR MORE INFORMATION: windows-hawaii.com

DID YOU KNOW? Besides being energy efficient, Anlin windows from Windows Hawaii block 95 percent of harmful UV rays from entering your home, protecting furnishings from fading.





## Videos

Need professional advice for your next home remodeling project? Get to know the local experts in our online video gallery.

Watch Now>>

## Resource Guide

### 3. Reduce harmful runoff with permeable pavers.

Perfect for hardscape surfaces such as driveways, pool decks and lanai, Futura Stone's permeable-paver system reduces excess storm-water runoff and acts as a natural method of filtration, preventing the accumulation of toxins, harmful chemicals and pollutants that often tend to collect and cause erosion over time. This eco-friendly system is aesthetically pleasing, adds value and will last for years.

SAVINGS: This permeable paver system reduces runoff of pollutants.

FOR MORE INFORMATION: futurastonehawaii.com

DID YOU KNOW? Due to impervious surfaces such as pavement and rooftops, a typical city block generates more than five times more runoff than that of a woodland area of the same size. (Source: epa.gov)

### 4. Chill out with super-efficient A/C.

If you must use air conditioning, make sure it's as efficient as possible. Air-conditioner efficiency is expressed by the Seasonal Energy Efficiency Ration (SEER) rating. The higher the rating, the more energy-efficient the system will be. ENERGY STAR®-qualified central air conditioners have a minimum SEER rating of 14. If you have a home and the current system is 10 to 15 years old, you likely have a system that ranges from 6.0 to 10.0.

Nonqualified A/C systems operate on a single speed, wastefully blasting cold air all at once. This results in fluctuating temperatures and high operation costs. Switching to a two-stage compressor system, such as the Infinity Series from Carrier Hawaii, allows a consistent, steady temperature to be maintained, reducing energy usage and expense. The Infinity Series is one of the most energy-efficient A/C products available, with SEER ratings of up to 21.0 and energy savings of up to 56 percent.

SAVINGS: Save up to $121 each year and do your part for Mother Earth by making the switch from a standard-efficiency air conditioner to the Infinity Series, which uses only environmentally sound Puron® refrigerant.

FOR MORE INFORMATION: LGHawaii.com

DID YOU KNOW? Over an air conditioner's lifetime, only one-fourth of the total cost is for the purchase of the A/C unit. The rest is for the energy to operate it.

(Source: Alliance to Save Energy)

### 5. Cool your room while heating your water.

The GeoSpring hybrid water heater from Servco Home & Appliance Distribution combines energy-saving heat-pump technology with traditional electric elements using a fraction of the energy. The integrated compressor and evaporator use a fan to draw in ambient heat from surrounding air to heat refrigerant. The heated refrigerant then runs through coils that wrap all the way to the bottom, transferring heat into the water tank. This innovative process creates the same amount of hot water as a traditional electric water heater, while reducing your heating expenses. Lori Matsushige of Homeowners Design Center highly recommends the water heater for her clients. "I have one in my house. I only wish we had put it in the living room instead, because the garage is now way cooler than the house," she jokes. Matsushige says she has trimmed about 30 percent from her electric bill since making the switch.
"Plus you don't have to worry about cloudy days or leaks.
I love it."

Savings: GE's hybrid water heater can save the average household $325 per year.
For more information: geappliances.com

DID YOU KNOW? A refrigerator, dishwasher, clothes washer and dryer combined use less energy than a standard water heater. (Source: energystar.gov)

### 6. Build on this eco-friendly option.

Autoclaved Aerated Concrete (AAC) from AAC-Pacific is a lightweight, precast building material that simultaneously provides structure and insulation and is resistant to both fire and mold. AAC products include blocks, lintels, wall, floor and roof panels. AAC—which has been produced for more than 80 years but has only been used in Hawaii for the past five—offers considerable advantages over other construction materials, one of the most important of which is very low environmental impact. AAC's excellent thermal efficiency sharply reduces the need for cooling in buildings.

SAVINGS: AAC is manufactured using natural and recycled content. The manufacturing process results in a nontoxic and emission-free block.

FOR MORE INFORMATION: aac-pacific.com

DID YOU KNOW? The construction of a typical 2,000-foot, wood-frame building uses more than 50 trees. An AAC building of the same size will use only 13 cubic yards of raw materials, 70 percent to 80 percent of which is sand. (Source: aac-pacific.com)

## 7. Pump up savings on your pool.

For homeowners with pools, it is incredible how quickly maintenance costs can add up. One way to save money and still keep a clean, comfortable pool is by buying a smaller pump with higher efficiency, and using it less frequently. "Switching to an energy-efficient pool pump is one of the best upgrades a homeowner can make," says Joe Saturnia of Island Pacific Energy. When upgrading your pool pump, Clifton Crawford of C & J Contracting recommends the Jandy Pro Series, the Hayward Series and the Pentair Series.

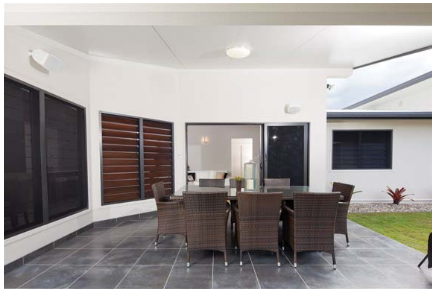
SAVINGS: A homeowner with an average-size pool (containing 15,000 to 20,000 gallons of water), can expect to save at least $1,200 per year by switching to an energy-efficient pump.

FOR MORE INFORMATION: candjcontracting.com

DID YOU KNOW? Pool pumps often run for time spans that are longer than necessary. Try reducing your filtration time to six hours per day. If the water doesn't appear clean, increase the time in half-hour increments until it does. (Source: energysavers.gov)

## 8. Screen out the heat.

Windows can play a major role in the cooling of your home. For ventilation and security, try the ForceFIELD security screen from Breezway Louver Windows, which keeps cool air in the home. For example, when a home is being passively cooled (meaning no A/C), and a normal insect screen is being used, the screen will, on average, block 30 percent to 40 percent of the air. By contrast, the ForceFIELD screen allows 93-percent ventilation. Also, the screen is made of marine-grade stainless steel, providing homeowners with both security and hurricane-level protection.



SAVINGS: ForceFIELD security screens dramatically decrease air-conditioning costs by allowing you to safely leave your windows open throughout the day and night.

FOR MORE INFORMATION: breezway.com/hawaii

DID YOU KNOW? When installed outside the window, the ForceFIELD security screen shades the window glass, reducing solar heat buildup by more than 50 percent.

## 9. Consider These Shutters and Save.

A Hawaii household can greatly reduce energy usage by simply cutting down on the amount of heat lost or absorbed through windows. By installing energy-efficient shutters, Island homes can stay warmer on chilly nights and cooler during the sun-filled days. The Tropical Polymer Shutter Insulating System from Island Shutters Inc. provides as much as three times the insulation of typical wooden shutters.

SAVINGS: Shutters significantly reduce energy costs and make the home atmosphere more comfortable and eco-friendly.

FOR MORE INFORMATION: islandshuttersinc.com

DID YOU KNOW? The eco-friendly Tropical Polymer Shutter Insulating System is made of completely nontoxic materials.

## 10. Pick PV.

A photovoltaic (PV) system utilizes solar panels to convert sunlight into electricity. Due to the state's growing demand for renewable energy sources, the installation of these solar-powered systems has increased significantly in recent years. This current explosion of solar companies in Hawaii makes it more important than ever to do your homework before choosing a PV provider. "It is important to shop around to at least three contractors," says James Whitcomb of Haleakala Solar. "Check references and the DCCA (Department of Commerce and Consumer Affairs) record of the prospective companies and make a value decision based on price and references." For more information, go to Hawaii.gov/dcca.
There are many PV products from which to choose. Among the most efficient PV panels available commercially are RevoluSun's E20/327 panels, producing up to double the amount of power of standard, conventional systems. RevoluSun also offers the E18 series 225 AC solar panel, a perfect option for shady roofs or multihip typically found in Hawaii.

Another option is the CertainTeed Apollo solar shingle from RSI Supply, a division of Allied Building Products. The shingle is designed to integrate with asphalt roofing shingles and installs directly on new or existing roofs. The efficiency is comparable to traditional systems but in a much smaller package.
In addition to durable Kyocera solar modules, Pacific Islands Construction also offers a five-year maintenance program in order to make sure the system is consistently operating at peak efficiency. "These systems are a large investment," says Dennis Swart of Pacific Islands Construction. "Homeowners need to protect that investment by having it maintained."

SAVINGS: Mike Benes, sales manager at Hawaiian Island Solar, says upgrading to a PV system at an average $30,000 gross cost, ($10,000 net cost after tax credits) saves approximately $2,000 per year and completely pays for itself in four to six years.

FOR MORE INFORMATION ON TAX CREDITS FOR PV: hawaiienergy.com

DID YOU KNOW? Hawaii is the ninth-largest state for solar PV systems.
(Source: Interstate Renewable Energy Council)

## 11. Keep it easy and breezy with efficient fans.

One of the most beneficial upgrades to a Hawaii home is the installation of energy-efficient ceiling fans to keep home temperatures (and costs) down during hot days. For maximum savings, opt for an ENERGY-STAR®-approved ceiling fan, which circulates up to 15 percent more air than an average fan. Hawaii Energy offers a $40 rebate on the purchase of ENERGY-STAR®-approved ceiling fans. Most of these fans only use as much power as a 100-watt light bulb. Benes also recommends a solar-powered attic-vent fan. These fans cool the home and reduce A/C costs, all with the power of the sun. Hawaii Energy offers $50 rebates on solar attic fans.

SAVINGS: When used effectively, fans can make an environment feel up to eight degrees cooler and can reduce A/C costs by up to 40 percent.

FOR MORE INFORMATION: hawaiianislandsolar.com and hawaiienergy.com

DID YOU KNOW? ENERGY-STAR®-qualified ceiling fans with lights are at least 50 percent more efficient than conventional fan/light units, saving $165 in energy costs during the fan's lifetime. (Source: energystar.gov)

## 12. Lessen the load with led lights.

Light-Emitting Diode (LED) lights are energy-efficient lights that illuminate without increasing the energy bill. "LED lighting is the buzz word in lighting right now," says Kyle Kamakura of Dial Electric. "They are extremely energy efficient, low maintenance and are green relative to comparable products." In fact, LED lights last 35 to 50 times longer than incandescent lighting and about two to five times longer than fluorescent. One-hundred percent recyclable, LEDs are also Earth-friendly in that they contain absolutely no toxic materials. They are also highly durable since they do not have breakable glass like most bulbs. Plus, they do not require a warm-up time to perform. Overall, LEDs are one of the most practical choices for maximum efficiency when it comes to lighting a home.

SAVINGS: LEDs can reduce annual lighting energy costs by 50 percent to 90 percent.

FOR MORE INFORMATION: Dial Electric: 845-7811

DID YOU KNOW? With a life expectancy of up to 100,000 hours, LEDs last longer than any other type of

Attachment H
Page 23 of 131

bulb. (Source: greenlightingsolutionsinc.com)

## 13. Cooling starts at the top.

One of the most important factors in keeping a home cool is the roof, since most of the heat enters through there. A great option from Aluminum Shake Roofing is the Country Manor Aluminum Shake, which is 100-percent recyclable and the most temperature-conscious roofing system on the market. The roof, which is coated with an infrared reflecting Kynar paint, is designed specifically to keep your home cool.

SAVINGS: An eco-friendly aluminum roof can eliminate the need for air conditioning, saving thousands of dollars on your electric bill.

FOR MORE INFORMATION: aluminumshakeroofing.com

DID YOU KNOW? The Country Manor Aluminum Shake roof, which has been installed in Hawaii for more than 23 years, is fabricated from 95 percent post-consumer recycled aluminum.

## 14. Green Financing Makes Upgrades easier.

Not sure if you have enough cash to go green? There are financing options that make it easier than ever to make your home more eco-friendly. HawaiiUSA Federal Credit Union offers a green-home-improvement-loan program with a term of up to 15 years. It's a perfect option for homeowners who lack sufficient equity to cover the initial investment of a PV system. The program is limited to owner-occupied residences only. First Hawaiian Bank's EnergySmart program provides full financing for your solar water heating or PV system. To qualify for this program, you must use one of First Hawaiian's participating contractors. "Both of these programs have been very popular," says Derek Wong, vice president of credit products. "Even our employees, who are very financially savvy by nature, are calling me about how to enroll. It's a good deal."

Savings: Green loans and similar financing programs make home-energy upgrades such as solar water heaters and PV possible even for homeowners who lack sufficient equity to cover the initial investment.
For more information: hawaiiusafcu.com and fhb.com

Did you know? Hawaii is No. 1 in the U.S. in solar water heaters per capita. Estimates show that Hawaii residents own more than 144,000 solar water heaters, which is 25 percent of all solar-water heating systems in the U.S. (Source: hawaiienergy.com)

## 15. Don't Wait for Hot Water to Warm Up.

The ChiliPepper is a small but powerful hot-water pump that mounts under your sink. At the touch of a button, the pump clears all of the existing cool water from your hot-water pipes, moving it to the cold-water pipes. The hot water is then pumped unimpeded from your water heater to your sink or shower, so you don't have to waste water waiting for the shower to heat up. Plus, you feel good every time you shower knowing you're practicing water and energy conservation. "It's the most energy-efficient water product we sell," says Glenda Anderson of Details International. "It's just outstanding."

SAVINGS: A typical family of four can save more than 12,000 gallons of water per year. Plus, the ChiliPepper costs less than $3 per year in electricity to operate.

FOR MORE INFORMATION: The ChiliPepper is available for $200 plus shipping from Details International. Call 521-7424.

DID YOU KNOW? Cutting just two minutes per shower could save up to $139 per year.
(Source: HECO)

## 16. Switch to a solar water heater and bathe in the savings.

Of all the appliances in the home, electric water heaters consume the most energy. By replacing an outdated, energy-guzzling model with a solar water heater, you can reduce your water-heating costs by up to 90 percent. EnergyPro Hawaii carries the Heliodyne® solar water heater system, which lets you recoup your investment in as little as four years. "Heliodyne has been producing solar panels for about 30 years, so they've refined the technology quite well," says James Wells, solar manager for EnergyPro Hawaii.

SAVINGS: Select a participating solar contractor—such as EnergyPro Hawaii—through Hawaii Energy and receive up to $750 in Hawaii Energy rebates as well as state and federal tax credits. With the money you'll save on your electric bill, your solar water-heating system will pay for itself within four to five years.

FOR MORE INFORMATION: hawaiienergy.com

DID YOU KNOW? Installing a qualified solar water heater will reduce your energy usage by almost 2,500 kWh per year and prevent 4,000 pounds of carbon dioxide from entering the atmosphere annually. This is the equivalent of not driving your car for four months every year. (Source: epa.gov)

WHERE TO GET IT

AAC-Pacific
2829 Awaawaloa St., Unit W
356-8788
aac-pacific.com

Aluminum Shake Roofing
5 Sand Island Access Rd., #108
847-8885
aluminumshakeroofing.com

Breezway Louver Windows
99-1451 Koaha Pl., Suite 1
484-5999
breezway.com

C & J Contracting
32 Kainehe St.
261-3508
candjcontracting.com

Carrier Hawaii
2060 Lauwiliwili St.

677-6339
lghawaii.com

City mill
eight locations on oahu
660 N. Nimitz hwy.
533-3811
citymill.com

Details International
560 N. Nimitz Hwy., #104
521-7424
details-international.com

Dial Electric &
Lighting Gallery
2240 C Kalaupalena St.
845-7811

ENERGYPRO HAWAII
825 Halekauwila St.
596-2890
energyprohawaii.com

First Hawaiian Bank
844-4444 (Oahu)
fhb.com

Futura Stone of Hawaii
2333 Alahao Pl, Unit 1F
841-7433
futurastonehawaii.com

Haleakala Solar
2700 S. King St., Honolulu
955-0050
70 E. Kaahumanu Ave., Kahului
808-871-4059
haleakalasolar.com

Hawaii Energy
1132 Bishop St., Suite 1800
537-8577
877-231-8222
hawaiienergy.com

Hawaii Home Expo
2933 Koapaka St.
836-3449
hawaiihomeexpo.com

Hawaiian Island Solar
Waimanalo
261-9740
hawaiianislandsolar.com

HawaiiUSA Federal
Credit Union
1226 College Walk
(800) 379-1300
hawaiiusafcu.com/home.aspx

Homeowners Design Center
1030 Kohou St.., Suite 201
847-0216
homeownersdesign.com

Island Pacific Energy
521 Ala Moana Blvd., Suite 211
377-6401

Island Shutters Inc.
1031 Lauia St.
690-8182
islandshuttersinc.com

Lighthouse Solar
783-0357
lighthousesolar.com

Pacific Islands Construction
1732 Kalani St., Unit 4
841-7756
pacificislandsconstruction.net

R&R Solar Supply
922 Austin Lane, Bldg. D
842-0011
randrsolar.com

RevoluSun
1600 Kapiolani Blvd., #1700
748-8888
revolusun.com

RSI Supply, a division of Allied Building Products
1081 Makepono St.
630-3360 or 1-877-870-7887
rsihawaii.com

Servco Home & Appliance Distribution
2841 Pukoloa St.
564-2493
servcoappliance.com

Windows Hawaii
94-480 Akoki St., Suite 4
NorthWestExteriors.com

LANAI TODAY
ISSUE 5, VOLUME 4 - NEWS FOR AND ABOUT THE RESIDENTS OF LANAI - APRIL 2012

# It's a SNAP! Hawaii's new food stamp program

Do you need help to feed your family? Have you been juggling your household income and putting off paying a bill because you needed to buy food instead? In today's economy, many Lanai families are struggling to buy food, even with both parents working!

If you've ever applied for food stamps, you've probably been scared off by the 11-page form the State of Hawaii's Dept. of Human Services requires. People may also have hesitated to apply because they may have thought it is only for those who are receiving welfare benefits. In the past, the applications often took months to be processed and it was embarrassing to have to continually call a caseworker to see what was happening to it.

Here's good news! The Salvation Army has been assisting Hawaii families with SNAP, Supplemental Nutritional Assistance Program, the new Hawaii Food Stamp program. There's no shame in wanting to provide your children with nutritional, healthy food, and it's a snap to complete the application when there's a helpful person to guide you through the form.

On the first Monday of each month, Salvation Army Outreach Coordinator Pastor Dan Merritt comes to Lanai and residents can meet him at the Lanai Baptist Church to fill out the form.

Applicants need to bring these items with them:

- Birth certificates of each person in the household
- Social Security cards for each person
- A photo ID of the applicant
- A rental lease agreement or a mortgage bill
- Utility bills: electric, water/ sewer, telephone, gas for cooking
- Proof of income: Last two pay stubs and /or last quarter GE Tax filing form
- Bank Statements, proof of social security or any other income
- Disabled or senior citizens need to bring their receipts for any medical expenses, including medical insurance premiums and medications.

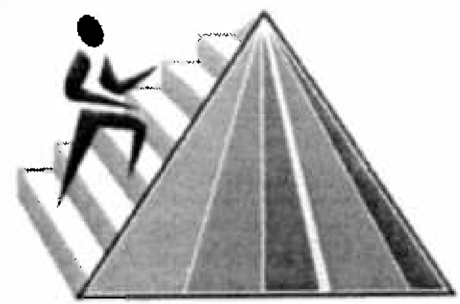
After the form is completed, it is stamped with the red Salvation Army logo, which shows the State's Dept. of Human Services clerks all of the required information has been verified. On Maui, Pastor Dan said, applicants usually receive their EBT cards on the same day it is turned in!

Another change that has occurred is instead of working with an individual case-worker, applicants are assigned to teams. In the past, if your case-worker was out sick or on vacation, you were out of luck and had to wait until he returned.

Take advantage of the Salvation Army's free and confidential service. It's all part of the outreach programs they provide for citizens across the United States.

If you have questions about the SNAP application process or want to do a pre-qualification screening before Pastor Dan Merritt's monthly trip, contact him at 268-2760.


On April 2, Pastor Dan Merritt was on Lanai with SNAP Outreach Co-ordinator Kimberly Jennings, who recently joined the Salvation Army and is in training with him before she is assigned to Molokai. Pastor Art Bingham provides transportation to the Lanai Baptist Church for him each month.



**IT'S A SNAP!**

## This Month

Page 10 & 11
Spring Wind Quintet

Page 13
Country Fair

Page 20
Kite Day

# Hawaii Energy Offers Free Workshops

The conservation and efficiency program helps residents look for ways to save money on their electric bills.

Hawaii Energy, the conservation and energy efficiency program for Hawaii, Honolulu and Maui counties, is offering free workshops called "Sharing the Aloha." The financial literacy and energy efficiency workshops are presented by Helen Wai, a professional instructor on financial literacy throughout the State of Hawaii for over 10 years.

Hawaii Energy welcomes communities on Lanai that are interested in the workshops. For more information or to schedule a workshop, please contact Helen at 1-808-479-2330 (direct); toll-free at 1-877-231-8222; or itsyourmoney@hawaii.rr.com.

***Who Should Attend?***

People who are looking for ways to reduce their monthly expenses on electricity and water. People who care about the future of Hawaii.

***Workshop Agenda***

Who is Hawaii Energy? Learn about how to save electricity and get rebates when purchasing energy-saving appliances, lighting and water heating. Learn about other outreach offerings and partnerships happening in your community. Receive a free energy-saving advanced power strip just for attending (limit one per household, while supplies last)

***About Hawaii Energy***

Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by SAIC under contract with the Hawaii Public Utilities Commission, serving the islands of Hawaii, Lanai, Maui, Molokai and Oahu. Hawaii Energy offers cash rebates and other incentives to residents and businesses to help offset the cost of installing energy efficient equipment. In addition to rebates, the program conducts education and training for residents, businesses and trade allies to encourage the adoption of energy conservation behaviors and efficiency measures. The program plays an important role in helping to achieve Hawaii's goal of reducing total electric energy usage by 30 percent or 4.3 billion Kwh by 2030. For more information, visit www.HawaiiEnergy.com.

# Saving electricity, one bulb at a time

On Wednesday, March 14, Kalono Ferreira and Kala Aila of Pono Energy Solutions, an approved participating contractor for Hawaii Energy to install energy efficient measures for small businesses in Hawaii, came to Lanai to speak to business owners and non-profit organizations about a program they are bringing to Lanai.

The "Small Business Direct Install Lighting Retrofit Program" is designed to address the needs of small business owners to overcome the barriers of time, trust and technical knowledge to make lighting technology changes. Under the program, Pono Solutions will retrofit existing lighting fixtures in small businesses with energy efficient solutions and invoice Hawaii Energy for the installation price. The businesses will not pay for the installation of any energy efficiency measures that are within the scope of the program.

The program is expected to have a big impact on improving the lighting for participating businesses and will help Hawaii achieve energy independence, which will improve our local economy and environment.

Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by SAIC under contract with the Hawaii Public Utilities Commission serving the islands of Hawaii, Lanai, Maui, Molokai, and Oahu.

If Kalono Ferreira and Kala Aila were unable to meet you at your business during their three-day stay on Lanai, *Lanai Today* has applications available for the program. Kalono's email contact is:kalono@pono-solutions.com or phone (808)234-9176.

Kalono explains how the program works to Rick Gonsalves at the Lanai Napa Auto Store.

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[ BY CHARLOTTE WOOLARD ]

# Green Momentum

## Planting the seeds for a sustainable small business

Liane Fu wanted to shave kilowatt-hours off of the electric bill at The Wine Stop, but even with the projected savings, she couldn't justify committing more than $50,000 for a photovoltaic system to be installed on the roof of her small O'ahu shop. The investment didn't make sense, not only because of the capital required, but also because Liane doesn't own the King Street building.

It's the kind of challenge that many small business owners face in Hawai'i, where the highest energy costs in the nation cut into profit margins. "Everybody knows that they need to reduce overhead," says Derrick Sonoda, director of operations at Hawaii Energy, a conservation group that is working with businesses served by Hawaiian Electric Co. "But they don't know what they need to do. Larger businesses have people in place to work on these things. Small business guys are just lost."

A growing number of organizations are working to change that. Small businesses account for more than 96 percent of Hawai'i establishments, and more than half of those companies employ fewer than five people—a critical demographic as the state moves toward its sustainability goals. "There is a lot of opportunity out there," Sonoda says.

His advice to small business owners: Reach out to your community. Talk story with your peers. Join the dialogue.

### A NEIGHBORHOOD SOLUTION

Liane's wine and beer boutique sits one block from KYA Sustainability Studio, where Sean Connelly and his colleagues spend a good part of the day working with the State Department of Transportation to reduce the environmental impact of the Honolulu International Airport. The consultancy also has developed an in-house sustainability initiative called the McCully Mile, an effort to support businesses and schools in close proximity to its office. "We reach out in our neighborhood," Sean says.

Sean talked to Liane about her challenges, and that conversation put an energy overhaul in motion. KYA connected her with a Hawaii Energy program designed to give qualifying small business owners a free energy audit and lighting retrofit. Energy Industries, a local company that helps businesses reduce their electric bills, performed the analysis, suggesting cost-saving upgrades to everything from the refrigeration system to the paint on the roof.

Liane worked with the owner of The Wine Stop building to change the color of the roof, and in November KYA helped the shop



Attachment H


Photo courtesy of Kanu Hawaii


Photo courtesy of The Wine Stop

***ABOVE: An energetic team of employees and volunteers from Kanu Hawaii get excited for the Carrotmob at Kale's Natural Foods. BELOW: KYA Sustainability Studio and other supporters hosted The Wine Stop's Carrotmob, which raised $7,000 in four hours and helped to finance the shop's energy-efficient upgrades.***

organize the state's first Carrotmob. The social media-driven phenomenon originated in San Francisco and employs positive incentive—the carrot, not the stick—as an agent of change. Shoppers flood a business during a period when the owner has pledged a percentage of sales to support a socially responsible initiative.

The Wine Stop raised $7,000 in four hours, enough to pay for changes that, in conjunction with the lighting retrofit and repainted roof, are projected to reduce the shop's annual electricity use by about 24 percent.

"We socialize," Liane says. "That's how a lot of business is done in Hawai'i."

## A MARKET ADVANTAGE

Conversation plays a central role in building sustainability into your business operations, says Lynn VanLeeuwen, a Big Island-based green business coach and author of *The Green CEO*. She recommends opening the discussion to vendors, employees and other stakeholders. "It gives you the ability to align with partners and leverage your resources so you can get more accomplished," she says.

An ongoing dialogue with customers has helped Ed Kenney shape the path of his Town and Downtown @ the HiSAM restaurants. The chef has made his name with menus that feature local ingredients and feed dollars into Hawai'i's agricultural industry. He hesitates, however, to brag about sustainability measures: "There's so much greenwashing," he says.

Pepper him with questions while he's eating a breakfast sandwich at the bar of his Kaimuki restaurant, though, and you will learn that he just upgraded the lighting and completed a remodel that incorporates sugarcane fiber. Out back, worms quietly convert the restaurant's scraps into compost for an elementary school garden.

The ideas behind these projects often come



Attachment H


***LEFT: Honorees of the Hawaii Green Business Program receive ipu awards made from recycled glass. RIGHT: Steve Hunt and his wife Janine accepted Kilauea Lakeside Estate's third award from the Hawaii Green Business Program at a ceremony in March.***

from customers, Ed says: "The restaurant exists to build community, so it's got a constituency. I kind of put all of these ideas in files, and then I refer back to them."

The emphasis on local ingredients and other sustainable practices does increase costs, but it fits a social enterprise model that considers not just profits but also impact on the community and the environment, Ed says. "Our profit margin is probably lower than other restaurants, but we don't judge our business by one part of the pie."

Ed gives that business model credit for the continued growth that his restaurants experienced during an economic downturn that shuttered many kitchens.

Businesses that have incorporated sustainability initiatives often report that kind of positive byproduct, says Shanah Trevenna, president of the Sustainability Association of Hawaii. "[These measures] increase market share and customer loyalty and decrease employee turnover, in addition to the obvious benefits of saving money and giving back to Hawai'i," she says.

## STARTING POINTS

The tough economy has driven many businesses to investigate conservation strategies, says Gail Suzuki-Jones, an analyst in the energy office of the Department of Business, Economic Development and Tourism. The high cost of electricity in Hawai'i makes energy improvements a logical starting place for most business owners, she said. Practical investments such as adding power strips or phasing in Energy Star appliances can provide quick return on investment.

"Energy is the main way we can improve the bottom line," she says.

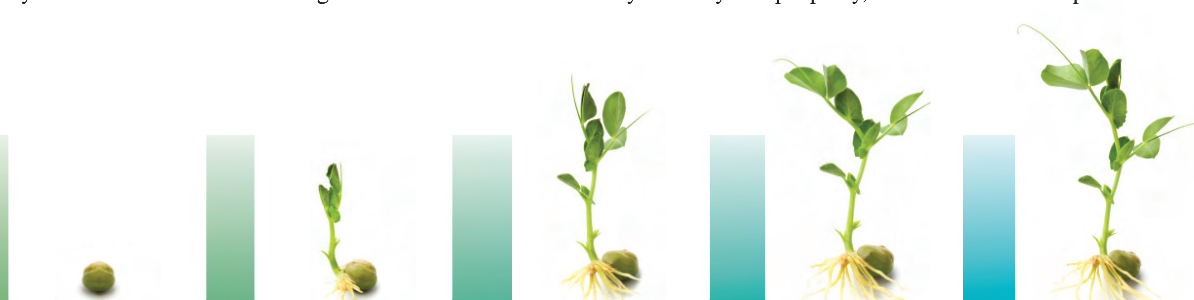
Gail helps coordinate the Hawaii Green Business Program, a multi-departmental effort that supports and recognizes businesses that are working to increase the sustainability of daily operations. More than 60 Hawai'i companies have completed the program, which begins with a self-assessment and includes free site checks and consultations.

The program largely has focused on hotels and restaurants, but this year will expand its outreach and actively recruit participants in the small business community, Gail says: "Locally owned small businesses deserve attention. The challenges are significant."

Participation focuses not on mandating specific change, but on finding solutions that make financial sense for individual business owners, Gail says. The program benefits both novices and also experts like Steve Hunt, owner of the Kaua'i luxury vacation property Kilauea Lakeside Estate.

Steve understands environmental development. He taught the subject at the University of California-Los Angeles and, since the 1980s, has focused on ingraining its principles into the property, which donates all profits to charity.

## STEP BY STEP



- Start the conversation. Talk to your employees, your vendors and other stakeholders in your business. Be open to their ideas. Find out what your neighbors are doing.
- Reach out. Organizations that are working to support small businesses have formed a tight-knit community. Tap into one resource, and you'll find yourself connected to many.
- Start with an audit. Measure energy and water use or waste production to identify areas that can be improved. Outside auditors provide a list of action items.
- Create a focus. You don't have to tackle the entire list right away. "Even large organizations have to pick areas to start," says Lynn VanLeeuwen, green business coach.
- Celebrate your successes. Perfection will always be elusive, so make note of even the smallest advances. It will keep up morale and could seed new ideas.
- **Share your story. You might inspire a neighbor.**



Attachment H



***TOP: The young consultants of KYA Sustainability Studio; Tamara, Ross, Vance, Sean & Amy. BOTTOM: A presentation at a green hotel forum for the Hawaii Green Business Program.***

Solar panels provide energy and have taken the accommodations almost completely off the grid. Strategic landscaping limits water consumption and runoff, and an on-site compost system nourishes the soil.

But Steve still has participated in the program three times. "When it comes to green and sustainable, no one really knows everything that is going on," he says. "We network. We get involved with our neighbors. We've been doing it for over 30 years, and it's an ongoing proposition."

### INNOVATIVE THINKING

Of course, progression has as much to do with financial realities as it does with networking. At The Wine Stop, Liane raised enough money to implement only some of the upgrades recommended by Energy Industries. The shop's transformation, particularly of its air conditioning system, will take time. "You have to do small steps to move in that direction," she says.

A growing number of organizations are working to help companies envision outside-the-box change and raise capital for implementation. KYA continues to support its neighborhood businesses and is sharing the social media channels that it developed for The Wine Stop event with other organizations.

One of those organizations, Kanu Hawaii, tapped into those channels last December. The group of young activists, best known for organizing an annual Eat Local challenge, is now leveraging its 15,000-member list to promote positive change for Hawai'i businesses. "We've built a community in Hawai'i who have bought into the idea of a personal commitment to change and sustainability," says James Koshiba, executive director. "That includes using their collective voice and their collective consumer power to influence."

Kanu's first Carrotmob took place at Kale's Natural Foods in Hawai'i Kai and generated $1,600 for waste reduction projects. The money will help offset the cost of storefront recycling bins and a new service to divert cardboard from the landfill.

"There are a lot of people who are willing to help businesses," James says. "If you reach out, they will help."





Attachment H

# GET CONNECTED

These Hawai'i groups represent a slice of the community that promotes sustainable business practices.

*Hawaii Energy helps businesses increase their energy-efficiency through free audits and lighting retrofits.*

*The Department of Environmental Services offers waste management and recycling education.*

### Department of Environmental Services

The solid waste division offers a Tour de Trash that shows us how businesses like Gyotaku Japanese Restaurant manage waste. The 2012 Green Business Recycling tour is full, but you can get on the waiting list and also access the virtual tour online. To receive an early alert when a new tour is announced, sign up for the WasteLine e-newsletter.

808.768.3200
opala.org

### Hawaii Energy

Hawaiian Electric Co. rate-payers fund this program, which helps offset the cost of electrical upgrades. A new initiative offers free audits and lighting retrofits to small businesses in the Schedule G rate class. The program not only reduces electric bills through energy-efficient lighting, but also leaves behind a list to seed future upgrades.

808.537.5577
hawaiienergy.com

### Hawaii Green Business Program

The statewide program has focused largely on hotels and restaurants but this year turns its attention to small business. Applicants complete industry-specific checklists developed for Hawai'i businesses, receive a free site visit and enter a tiered program that recognizes sustainable change over time. The website features success stories and other resources.

gsuzuki@dbedt.hawaii.gov
energy.hawaii.gov

### Kanu Hawaii

Organizers are working to effect change in the business community. Kanu will put together Carrotmobs that help businesses reduce waste, purchase local foods and increase energy efficiency. Kanu also operates kanuvalues.com, a group-buying platform which spotlights companies that embrace positive social and environmental practices.

808.206.8446
kanuhawaii.org

### Kona-Kohala Chamber of Commerce

The Kuleana Green Business Program recognizes Chamber businesses that are working to build sustainable operations. Applicants fill out an application and are rated on a spectrum of engagement, ranging from new participants to outstanding leaders. Like most accreditation systems in Hawai'i, the tiered approach encourages businesses to commit to change over time.

kona-kohala.org
808.329.1758

### KYA Sustainability Studio

The consultancy offers an educational series focused on sustainable business practices. Classes will be offered at Honolulu Community College ($200), and custom programs also can be arranged. KYA engages local businesses through its McCully Mile program and shares the social media channels that it developed for the state's first Carrotmob.

808.949.7770
thekyastudio.com

### Malama Kaua'i

This nonprofit developed a green business map that complements its community outreach and buy-local campaigns. Businesses interested in sustainable operations can join the Green Business Program, a tiered effort developed specifically for Kaua'i ($150). The organization also promotes members on a Malama Kaua'i radio show and is exploring group-buying options.

808.828.0685
malamakauai.org

### Sustain Hawaii

The Hawai'i arm of the popular North American network of socially responsible businesses known as the Business Alliance for Local Living Economies, or BALLE, focuses on the creation of a sustainable economy. Big Island chapter Hawaii Alliance for a Local Economy, or HALE, produces a green map and organizes workshops.

sustainhawaii.org
bigisle.sustainhawaii.org

### Sustainability Association of Hawaii

The association officially launched in April, but its all-islands leadership team already had developed conference programming focused on sustainable business practices for DBEDT. The group will build its membership and develop educational outreach; visit the website to learn more about their upcoming events and initiatives.

business@sahawaii.org
sahawaii.org

### Sustainable Living Institute of Maui

The Institute engages entrepreneurs interested in learning about sustainable practices or launching businesses in the green sector. Courses cover everything from developing green messages to minimizing your carbon footprint. Visit the website to learn more about Maui College courses, workshops and pau hana presentations.

808.984.3379
sustainablemaui.org

# Leeward Job Fair Highlights Clean Energy Sector



*Submitted by Leeward Community College*
*Wednesday, March 28th, 2012, 9:30am*

Topics: Business, Environment, Events


Hawaii Energy, the conservation and efficiency program for Hawaii, Honolulu and Maui counties, has teamed up with Leeward Community College (Leeward CC) and University of Hawaii West Oahu for the 10th Annual Leeward Career, College and Job Fair taking place April 4, 2012 from 9:00 a.m. to 1:00 p.m. on the Pearl City campus. Through Hawaii Energy's sponsorship, this year's event will focus on "Clean Energy Connections," which are clean energy career and training opportunities for attendees and participants. As part of its sponsorship, Hawaii Energy is encouraging residents and employers from all sectors to mark their calendars and participate in the event.

The job fair will provide a venue for employers and career programs to distribute information while also giving attendees the opportunity to explore and ask questions in a welcoming environment. Event organizers are anticipating participation from more than 70 employers and 30 college programs, and attendance of nearly 2,000 job seekers. The purpose of the job fair is to provide access to college programs and employment opportunities from local businesses for both students and the general public.

"Conservation and efficiency are no longer just buzzwords reserved for environmentalists, they are now a growing part of business vernacular," stated Hawaii Energy Transformational Outreach Specialist Malama Minn. "The individuals and businesses that will play a critical role in shaping our future are those that understand conservation and efficiency. I applaud the University of Hawaii System for taking a leadership role in bringing employers and employees together under this theme, because they are providing those that participate in the job fair with a definite advantage in the marketplace."

The clean energy sector in Hawaii, which conservation and efficiency are a major component of, is a major growth area. To put this into perspective, the State Department of Labor and Industrial Relations' Hawaii Green Jobs Initiative identifies 11,145 current positions related to the clean energy sector and projects a 26 percent increase in 2012. With this, Hawaii ranks third in the nation in clean energy job growth.

"As we celebrate our 10th year, we are keeping an eye on the future, and that future is clean energy," stated Sandy Hoshino, Job Prep Coordinator at Leeward Community College. "We envision a day when a majority of the jobs in Hawaii, no matter the task, will be influenced by the conscious use and conservation of energy in some form or fashion. That's why, for the first time ever, we are partnering with Hawaii Energy to help employers and employees make that clean energy connection."

To capture a majority of these and other upcoming job opportunities locally, Hawaii residents should plan on attending the 10th Annual Career, College and Job Fair. For more information regarding the job fair, residents and employers are encouraged to visit www.leeward.hawaii.edu/jobs-events.

About Hawaii Energy
Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by SAIC under contract with the Hawaii Public Utilities Commission, serving the islands of Hawaii, Lanai, Maui, Molokai and Oahu. Hawaii Energy offers cash rebates and other incentives to residents and businesses to help offset the cost of installing energy-efficient equipment. In addition to rebates, the program conducts education and training for residents, businesses and trade allies to encourage the adoption of energy conservation behaviors and efficiency measures. The program plays an important role in helping to achieve Hawaii's goal of reducing total electric energy usage by 30 percent or 4.3 billion kWh by 2030. For more information, visit HawaiiEnergy.com.

About Leeward Community College
As one of the seven community colleges in the University of Hawaii system, Leeward Community College provides access to higher education and plays an important role in workforce development in Leeward and Central O'ahu. The College focuses on students, teaching, learning, and responsiveness to community needs. With courses in more than 100 subject areas, Leeward CC offers a comprehensive curriculum for immediate entry into the workforce or for transfer towards a baccalaureate degree. Leeward Community College, with diverse student population and experienced and caring faculty, has provided access, affordability, and a high quality education to the people of Hawaii since 1968.

Topics: Business, Environment, Events

## Top Pearl City Stories

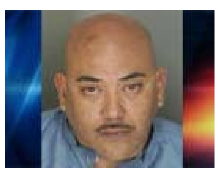
*News*

Arson suspected in deadly Pearl City fire

*Community Spirit*


Pearl City High School and Hawaii Meth ...

*News*



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ARTICLE ARCHIVES

HAWAII LAND BLOG — ENVIRONMENT, ENERGY AND SUSTAINABILITY { *Stay on top of news from mauka to makai.*



# Energy Efficiency Ads Not Short on Humor



Getting Hawaii residents to be more energy efficient isn't the easiest of tasks.

But employees of Hawaii Energy, the state's energy efficiency program, don't give up easily. They've taken their message to the airwaves.

Here are a couple of their ads, produced by Wall-to Wall Studios.

Posted by Sophie Cocke on 03/26/2012 at 3:25PM HST (18 hours ago)

# Leeward job fair highlights clean energy sector

March 23, 2012 | Kristen Bonilla | 0 Comments

Thousands are expected to attend the 10th Annual Leeward Career, College and Job Fair on April 4.

Leeward Community College and the University of Hawai i—West O ahu will host the 10th Annual Leeward Career, College and Job Fair on Wednesday, April 4, 9 a.m.–1 p.m. on Leeward's Pearl City campus.

Event organizers are anticipating participation from more than 70 employers and 30 college programs, and attendance of nearly 2,000 job seekers. The purpose of the job fair is to provide access to college programs and employment opportunities from local businesses for both students and the general public.

Through Hawai i Energy's sponsorship, this year's event will focus on "Clean Energy Connections," which are clean energy career and training opportunities for attendees and participants. Hawai i Energy is the conservation and efficiency program for Hawai i, Honolulu and Maui counties.

The clean energy sector in Hawai i, which conservation and efficiency are a major component of, is a major growth area. The Hawai i State Department of Labor and Industrial Relations' Hawai i Green Jobs Initiative identifies 11,145 current positions related to the clean energy sector and projects a 26 percent increase in 2012. With these figures, Hawai i ranks third in the nation in clean energy job growth.

"Conservation and efficiency are no longer just buzzwords reserved for environmentalists, they are now a growing part of business vernacular," stated Hawai i Energy Transformational Outreach Specialist Malama Minn. "The individuals and businesses that will play a critical role in shaping our future are those that understand conservation and efficiency."

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See the Career, College and Job Fair website for a complete list of participating employers and colleges.

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## Related stories

- Modern Oedipus takes Leeward campus stage
- Board approves new five-year tuition schedule

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EcoGreenHotel News

# Viewpoint: Hawaii Energy Working to Reduce Energy Use

At Hawaii Energy, the conservation and efficiency program for Maui, Hawaii and Honolulu counties, we also are not happy about the fact that Hawaii residents pay the highest rates for electricity in the country.

The purpose of our program is to help consumers save money by conserving energy and living more efficiently. We do this in two ways: by providing rebates on energy-efficient products and by empowering consumers through outreach and education.

On the outreach and education front, we introduced our Home Energy Reports to 62,000 residential electric utility customers on Maui, Lanai, Molokai and the Big Island on Jan. 16.

The goal of the reports is to help reduce energy use and not to judge households. It's understandable that some people may have circumstances that make it difficult to reduce a home's energy use. We aim to provide a wide range of ideas that can address the various needs of participating households.

The reports provide detailed information regarding energy use, along with personalized tips on how families can improve energy efficiency. The reports' anonymous comparisons are based on homes of similar square footage and room count from public records. To further optimize the Home Energy Reports, participants can visit Hawaii Energy's website to update their profiles.

Although not a solution to all of our energy-related problems, we know the reports work. We first piloted the reports with the Ewa Plain area on Oahu in May 2011. To date, that has yielded more than $200,000 in electricity cost savings, with more savings anticipated.

As an employee of Hawaii Energy and resident of Maui, I encourage people with questions or feedback to connect with us directly.

Read Full Story at: http://bit.ly/A0BeYt

Source: Hawaiienergy.com

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ENERGY STAR PARTNER

"EcoGreenHotel believes hotels and resorts benefit financially by continually improving their management of energy resources, and the environment benefits from reduced levels of related pollution. We are proud to offer services and products that can assist businesses who have committed to the goals of ENERGY STAR."

Honolulu Star-Advertiser

Monday, March 19, 2012 80.0°F












# Leeward Community College hosts job fair April 4

By Star-Advertiser Staff

POSTED: 01:38 p.m. HST, Mar 19, 2012



Leeward Community College and University of Hawaii at West Oahu will hold the 10th Annual Career, College and Job Fair April 4 on the Leeward Community College campus.

The job fair runs from 10 a.m. to 2 p.m. and is free to students and the general public. It is the largest job fair in Leeward Oahu, attracting more than 1,500 job seekers annually.

This year's event is sponsored by Hawaii Energy, the state's main energy efficiency program. There will be booths offering job seekers and students information about careers and training opportunities in the energy sector.

There is a registration fee of $75 for employers, colleges and other organizations that want to reserve space at the event. The fee includes one 6-foot table, two chairs, a wireless internet connection, free parking and lunch.

To register online go to http://www.leeward.hawaii.edu/jobs-events. For more information, call 455-0240.






## BREAKING NEWS

- Leeward Community College hosts job fair April 4 - 01:38 p.m.
- State reaches $15.4M settlement over deaths of 2 hikers in 2006 - 01:29 p.m.
- Lava flows inch toward the ocean from Puu Oo vent - 12:32 p.m.
- Man killed in wrong-way driver crash on Nimitz is identified - 11:39 a.m.
- 2 men receive 8-year prison terms for abducting teenager in 2010 - 11:16 a.m.
- Wendy's takes No. 2 spot from Burger King - 11:00 a.m.
- Oahu-bound flight with engine trouble diverted to San Francisco - 10:38 a.m.
- Hawaii island man dies after being pulled out of Wailuku River - 10:17 a.m.
- Skydivers say balloon pilot saved their lives before crash - 09:19 a.m.
- Report: Manning negotiating to join Broncos - 07:01 a.m.

Honolulu Star Advertiser

Wednesday, April 04, 2012    78.0°F









# Rebate for CFL bulbs raised to $1.40 from $1 each

By Star-Advertiser Staff

POSTED: 06:35 a.m. HST, Mar 15, 2012
LAST UPDATED: 06:36 a.m. HST, Mar 15, 2012



The state's main energy efficiency program has boosted the instant rebate for compact florescent light bulbs to $1.40 from $1 for a limited time to encourage residents to replace their old incandescent bulbs.

A household can as much as $100 a year by swapping out the old bulbs with CFLs, said Ray Staring, Hawaii Energy Program manger. CFLs use 75 percent less energy than incandescent bulbs and last nearly 10 times longer, he said.

Hawaii Energy administers the energy conservation and efficiency program for Honolulu, Hawaii and Maui counties. The program is funded mainly through a fee paid by electric utility customers.

In addition to the CFL rebate, Hawaii Energy is funding a Blue Planet Foundation program that allows residents on Maui and Hawaii island to trade their incandescent bulbs for CFLs.





## BREAKING NEWS

- Police seeking suspect on mo-ped in 2 attempted kidnapping cases - 03:37 p.m.
- Man arrested for allegedly rummaging through fire-ravaged house - 03:35 p.m.
- Motorcyclist killed in Hawaii island crash - 02:24 p.m.
- White residue on spoon found in Whitney Houston's room, autopsy report says - 02:06 p.m.
- Blood-alcohol level of Makaha crash suspect double legal limit - 01:36 p.m.
- Little Brown Bat captured at airport tests negative for rabies - 12:10 p.m.
- Hilo Peeping Tom suspect charged for restroom recordings - 10:48 a.m.
- Honolulu man accused of trying to run down police officer has theft record - 09:28 a.m.
- Shark warning signs removed from North Shore beaches - 07:57 a.m.
- Hawaii gas prices rise to record - 05:25 a.m.

# Hawaii Land Blog — Environment, Energy and Sustainability — Mar. 12-18

*By Sophie Cocke* | *03/12/2012*

Sophie Cocke/Civil Beat

Welcome to Civil Beat's live blog about Hawaii land, environment, energy and sustainability.

- To read a complete archive of this blog, click here.
- To view and participate in the discussion, scroll down to the bottom of the page.
- To make sure you're getting the latest updates, hold down the SHIFT key and click on the refresh icon in your browser.

## Hawaii Land Blog — Environment, Energy and Sustainability

### Orange Shirts Winning

It's been a battle of the orange shirts verses green shirts at hearings before the LUC.

Save Oahu Farmlands in green. Pro-Hoopili in orange. On Thursday the orange shirts triumphed as union members and DR Horton supporters crowded the hearing room at the start of testimony against Hooplili.

Hoopili supporters gather outside hearings at the Land Use Commission.

### Hoopili Case Resumes

Former governors will testify today against the Hoopili development. Stay tuned for Civil Beat's coverage.

### Reducing Hawaii's Energy Use One Light Bulb at a Time

Hawaii Energy, the state's conservation program, is challenging local residents to change out at least three incandescent lightbulbs for CFL's.

> By replacing three or more frequently used incandescent light bulbs with CFLs, savings can reach $100 a year for the average household in Hawaii, based on Oahu energy rates. CFLs use 75 percent less energy and last nearly ten times as long as traditional incandescent light bulbs.

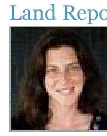
For more information on the Three CFL Challenge go to www.hawaiienergy.com.

### Want a Job in Biodiesel?

Pacific Biodiesel is nearing completion of its much anticipated biodiesel plant on the Big Island that will be capable of processing 5.5 million gallons of fuel a year. And the company is looking for workers.

About the Author

Sophie Cocke
Land Reporter-Host



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> Pacific Biodiesel will hold a job fair on Saturday March 24, 2012 from 8:30 am to noon at the new biodiesel plant site in Shipman Business Park in East Hawai`i. The event is open to the public and all interested parties are encouraged to stop by and apply.
>
> The initial list of positions to be filled includes Facility Manager, Administrative Assistant, Plant Operators, Shift Managers and Shipping/Receiving Agents. Applications will be available at the event for completion on site.

## Kauai Could Get $10 Million Coffee Processing Facility

*To read a complete **archive** of this blog, click here.*

Change Begins With A Question.™ *What questions about Hawaii land and energy do you have for our team? Share them below.*

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Discussion

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# "Bulb Blitz" Challenge Reaches Maui

March 6th, 2012 · No Comments · Comments Via Facebook (2) · Business



CFL light bulbs. Courtesy of Hawaii Energy.

By Sonia Isotov

Hawaii Energy, the conservation and efficiency program for Hawaii, Honolulu and Maui counties has been encouraging residents to take its Three CFL Challenge.

The challenge involves replacing a minimum of three or more old-fashioned incandescent light bulbs with energy-saving compact fluorescent lights (CFLs).

In addition to instant rebates and other incentives, Hawaii Energy is funding Blue Planet Foundation to bring its signature CFL exchange program to residents on Maui and Hawaii Island. Being called the "Maui Bulb Blitz" and "Big Island Bulb Blitz," the CFL exchanges will allow residents to trade energy draining incandescent bulbs for CFLs.

"We are excited about partnering with Hawaii Energy to expand Blue Planet's CFL program to Maui and Hawaii Island," said Blue Planet Executive Director Jeff Mikulina, in a written statement. "Neighbor island residents pay some of the highest electricity rates in the country, and they stand to benefit most from adopting smart efficiency solutions like energy-saving CFLs."

As an added incentive for taking the challenge, Hawaii Energy has increased the instant cash-back rebate on ENERGY STAR qualified CFLs at participating retailers for a limited time to help everyone cope with the high electricity prices.

CFL light buls. Courtesy of Hawaii Energy.

"Replacing just three more incandescent bulbs with CFLs is one of the easiest and most cost effective things residents can do to save money," said Ray Starling, Hawaii Energy Program Manager, in a written statement. "Now is definitely the time for everyone in Hawaii to switch to CFLs, and there are three great reasons I can think of for doing so; savings, style and safety!"

By replacing three or more frequently used incandescent light bulbs with CFLs, savings can reach $100 a year for the average household in Hawaii, based on Oahu energy rates. CFLs use 75% less energy and last nearly ten times as long as traditional incandescent light bulbs. In most homes, the most frequently used fixtures are the ones located in the kitchen, living room, bathroom and outside.

"CFLs are probably the biggest revolution in light bulb technology in over 100 years, and they really have come a long way since they were first introduced," stated Marion Philpotts-Miller, Partner and Principal Designer at Philpotts Interiors.

"CFLs now are available in many hues and color temperatures and a variety of different shapes and sizes. With so many options, you can really get creative with how you use CFLs."

CFLs are also the smart choice for those that are health conscious and environmentally friendly. Incandescent light bulbs contain lead, and because incandescent bulbs consume more energy, they are responsible for a greater amount of pollution associated with electricity generation, including the release of trace amounts of mercury, sulfur dioxide and nitrogen oxide into the surrounding environment.

"By taking the Three CFL Challenge, residents can help ensure that this is a much more energy efficient year for us all," stated Derrick Sonoda, Hawaii Energy Marketing and Outreach Manager. "The campaign's goal of half a million CFLs would collectively save an estimated $8 million from residential electric bills in the first year alone."

For more information regarding the Hawaii Energy Three CFL Challenge and other offers, please visit www.HawaiiEnergy.com.



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**Tags:** blue planet foundation · CFL · CFL exchange programs · energy savings · Hawaii Energy · incandescent light bulbs · light bulbs

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10:28 pm - February 23, 2012 — Updated: 10:30 pm - February 23, 2012

# State sends letters about energy consumption

BY COLIN M. STEWART | STEPHENS MEDIA

HILO — "Am I wasting more electricity than my neighbors?"

That's the question Hawaii Energy, the state conservation and efficiency program administered by the Public Utilities Commission, hopes Big Island residents will be asking themselves over the next year.

The impetus for that question will be a personalized mailing — dubbed "Home Energy Reports" — that the group began sending on Jan. 23 to 31,000 homes on Hawaii Island, as well as 31,000 combined on Lanai, Maui and Molokai. A total of four reports will be sent to the same randomly selected households over the course of a year, said Hawaii Energy Residential Program Leader Larry Newman.

"It's a highly scientific approach based on experimental design," he said.

The mailings to the neighbor islands — costing a total of $400,000 — constitute an expansion of a pilot program that began on Oahu in May, Newman said. Electricity consumers were informed about how their energy usage measured up to that of their neighbors who live in similarly sized homes with similar usage requirements. In much the same way that neighbors may get competitive about whose grass is greener, Hawaii Energy administrators aimed to essentially stir up a new way for electricity consumers to keep up with the Joneses, he explained.

"Evidence shows that one of the key ways to reduce energy use is to provide homes with information about their usage and offer suggestions on what they can do to save," he said.

Between May and January 2012, program administrators have estimated resultant energy savings among the Oahu pilot program participants of almost 1.2 million kilowatt hours, totaling about $400,000 Newman said.

"In general, each person may see a reduction in usage in the neighborhood of 1.5 to 2 percent," he said. "But when you spread that across 15,000 people, 2 percent of that group is significant."

The mailings show consumers a simple graph that charts their kilowatt hour energy consumption for the past month, and compares it to the average usage of 99 anonymous nearby homes of a similar size and construction type. Households are ranked from 1 to 100, with 1 using the least amount of energy and 100 using the most. The reports also show a graph representing the average kilowatt hour usage of the most efficient 20 percent of their neighbors.

The reports also contain tips on how households can save energy and money, said Ray



Starling, Hawaii Energy program manager.

"Customers that receive Home Energy Reports will be empowered to take actions that help them save energy and money," he said.

Hawaii Energy has estimated that the expansion of the program to the Neighbor Islands could save more than 3.3 million kilowatt hours, or the equivalent of more than $1.3 million in electricity costs, through January 2013.

For more information on the program, visit HawaiiEnergy.com.

cstewart@hawaiitribune-herald.com

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1:10 am - February 24, 2012 — Updated: 1:20 am - February 24, 2012

# Power hogs put on notice

By COLIN M. STEWART

Tribune-Herald staff writer


*Hawaii Energy is sending out neighbor comparison home energy reports that provide a look at the difference between your electricity usage and your neighborsÃ electricity usage. -- HOLLYN JOHNSON/Tribune-Herald*

"Am I wasting more electricity than my neighbors?"

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For more information on the program, visit www.HawaiiEnergy.com.

Email Colin M. Stewart at cstewart@hawaiitribune-herald.com.

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# Oahu hospital receives $650,000 to install energy efficient equipment

THE ASSOCIATED PRESS
First Posted: February 17, 2012 - 9:01 am
Last Updated: February 17, 2012 - 9:02 am



HONOLULU — An Oahu hospital is receiving nearly $650,000 to partially cover the cost of installing energy efficient air conditioning equipment and lighting.

Hawaii Energy presented Castle Medical Center in Kailua with a check this week.

> **Castle CEO Kathryn Raethel says the hospital wouldn't have been able to complete the project as quickly if it hadn't received the incentive funds.**

The money covers more than 25 percent of the $2.3 million Castle spent to install the new equipment. Castle CEO Kathryn Raethel says the hospital wouldn't have been able to complete the project as quickly if it hadn't received the incentive funds.

The money comes from public benefits fees paid by Hawaiian Electric customers and from $6 million in stimulus funds the federal government gave to Hawaii Energy to provide incentives for energy efficiency.

Hawaii Energy promotes energy efficiency in Honolulu, Maui and Hawaii counties. It's paid for by utility customers.



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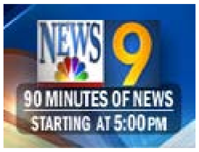



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Updated: 9:02 a.m. Friday, Feb. 17, 2012 | Posted: 9:01 a.m. Friday, Feb. 17, 2012

# Oahu hospital gets $650K to be energy efficient



The Associated Press

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# Oahu hospital gets $650K to be energy efficient



Published: 2/17 4:59 am

Updated: 2/17 5:10 am

Images

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# HAWAII NEWS NETWORK

Tuesday, March 06, 2012



## Oahu hospital gets $650K to be energy efficient

Posted on February 17, 2012



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See the original article at: KHON2 Developing Stories

Honolulu Star-Advertiser
Tuesday, February 21, 2012 81.0°F









# Castle energy upgrade largest to benefit from state program

A $647,637 rebate cut the hospital's cost for improving cooling and lighting systems

By Alan Yonan Jr.

POSTED: 01:30 a.m. HST, Feb 16, 2012



Officials at Castle Medical Center said they expect to cut their electricity bill by nearly $200,000 a year after upgrading cooling and lighting systems in the largest project ever undertaken under the state's main energy efficiency program.

Castle received about $650,000 in rebates from Hawaii Energy, which uses funds from Hawaiian Electric Co. ratepayers and the federal government to encourage energy efficiency.

The rebates reduced the cost of the project to about $2 million from $2.6 million, according to Hawaii Energy. At current electric rates Castle will save $190,530 a year, enough to recover costs in about 10 years, according to Hawaii Energy.

"Without the incentive funding Castle Medical Center would not have been able to complete this project as soon as we did," said Kathryn Raethel, president and chief executive officer of the hospital.

The new cooling and lighting systems were designed and installed by Honolulu-based Energy Industries. The company replaced Castle's old chillers and cooling towers with new models that are 40 percent to 50 percent more efficient, said Duane Ashimine, executive vice president and chief technology officer of Energy Industries.

The state-of-the-art compressors used in the cooling system feature magnetic drive technology that eliminates the need for ball bearings and lubrication. Such "frictionless" systems can operate much more efficiently than traditional models, Ashimine said.

The lighting system overhaul included more efficient bulbs and sensors to turn off lights automatically in areas that aren't in use, he said.



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- Man and woman charged in robbery of man on Hawaii island - 03:07 p.m.
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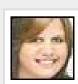
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"Upgrading the lighting provided great savings. It will pay for itself in less than two years," Ashimine said.

Gov. Neil Abercrombie and the three members of the Public Utilities Commission attended a ceremony Tuesday during which medical center officials were presented with a check for $647,637.

"Partners like Castle Medical Center are key to helping our state reach the goal of 70 percent clean energy by 2030," Abercrombie said.

The bulk of the project's cost, $527,069, was paid for with federal stimulus money. The balance of $120,568 came from the Public Benefits Fund, which is generated from a charge on HECO bills. Residential customers pay about six-tenths of a cent per kilowatt-hour into the fund, while commercial customer pay about three-tenths of a cent per kilowatt-hour.



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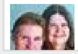
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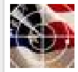
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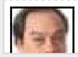
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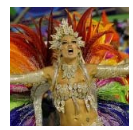
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HAWAII LAND BLOG — ENVIRONMENT, ENERGY AND SUSTAINABILITY { *Stay on top of news from mauka to makai.*

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# Castle Medical Center Awarded Funds for Energy Efficiency

Castle Medical Center has been awarded $647,637 in federal and state funding for energy efficiency upgrades that it completed last year. Most of the funds are from the federal stimulus package.

According to Hawaii Energy:

> All together, the project will save Castle Medical Center an estimated 635,100 kilowatt hours (kWh) annually, which equates to $190,530 in savings based on $0.30 per kWh.
>
> “Without the incentive funding, Castle Medical Center would not have been able to complete this project as soon as we did,” said Kathryn Raethel, President and CEO of Castle Medical Center. “The total cost of our project was $2.3 million. With the 25 percent incentive, we were able to make this happen before the end of 2011.”

Posted by Sophie Cocke on 02/14/2012 at 2:44PM HST (2 weeks ago)

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# It pays to be energy efficient for Castle Medical Center

Pacific Business News by Duane Shimogawa, Reporter
Date: Tuesday, February 14, 2012, 1:45pm HST

**Duane Shimogawa**
Reporter - *Pacific Business News*
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... the installation of green energy projects and efficiency.

The latter usually doesn't get much ink or air time, mostly because it's not as visible as a towering wind turbine or a land-engulfing solar farm.

But on Tuesday, the investment in energy efficiency had something to show — to the tune of $647,637.

Hawaii Energy, the ratepayer-funded conservation and efficiency program, presented a check in that amount to Castle Medical Center for the Kailua hospital's extensive efficiency measures.

Honolulu's Energy Industries, an energy project developer focused on efficiency and renewable solutions, was the project developer.

It installed an energy management system integrating qualifying energy efficiency air conditioning and lighting systems.

Two 450-ton water-cooled chillers were replaced with significantly more energy-efficient chillers and the center's aging cooling towers were replaced with two 450-ton cooling towers.

The Windward Oahu hospital also replaced old lighting with more efficient alternatives.

All together, the project will save Castle Medical Center an estimated 635,100 kilowatt hours annually, which equates to $190,530 in savings based on 30 cents per kilowatt hour.

The majority of the incentive was made available via American Recovery and Reinvestment Act stimulus funds received by the state Department of Business, Economic Development and Tourism.

As part of the Recovery Act of 2009, the federal government allotted nearly $40 million for Hawaii's energy-related programs.

Hawaii Energy received a little more than $6 million of those funds to provide incentives for energy-efficient programs for utility customers served on the Big Island and Oahu and in Maui County.

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Duane Shimogawa covers energy, real estate and economic development for Pacific Business News.

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# Castle Medical Center gets thousands for going green



Published: 2/14 8:00 pm

Updated: 2/14 8:01 pm

Images


Castle Medical Center spent more than 2 million dollars to "go green"...and is now getting some of that money back.

Hawaii energy presented a check to castle for more than 647-thousand dollars.

The hospital invested millions to replace old lighting and air conditioning systems with more energy efficient options.

"This equates to about almost $200,000 in annual savings monies that will go back to help us be able to deliver the highest quality health care to our windward community going forward," says Kathryn Raethel, Castle Medical Center Pres./CEO.

Hawaii energy is tasked with providing rebates for energy conservation.

The money for Castle and several similar projects came from the federal stimulus dollars awarded to the state.

# Hawaii Energy + you

Hawaii Energy, the state's Energy Conservation and Efficiency Program, funded by ratepayers for the benefit of ratepayers, lists numerous reasons to put forth the effort to secure rebates.

- Oil costs are felt at the pump and at the plug. Increases in world oil prices cause transportation-related costs to go up. But Hawaii's dependence on oil to generate electricity creates a direct increase in electrical costs.
- 2008 was a wake-up call year that signified how quickly and deeply Hawaii businesses are affected by $140 per barrel oil prices. Building owners need to make it a priority to identify and address how they use energy and what they can do to address future price escalation.
- Electrical energy costs are often one of the top operating costs for any building owner. This means that controlling electrical energy usage can be a great source of contributions to a building's bottom line. It can be more profitable and cost effective to reduce energy usage and associated expenses than to spend on actions that attempt to increase top line revenue.

Even more so today, perceptive building owners and managers have an eagle eye on controllable costs. It is good to save energy and reduce expenses but it is also favorable to the bottom line when buildings can do both and get a rebate also. And, with a rebate that positively affects future energy costs.

**Rebates through Hawaii Energy:**

- Design Assistance
- Energy Studies
- HVAC Fan VFD/HVAC Pump VFD
- Inverter Variable Refrigerant Flow (IVRF) Air
- Lighting
- Motors
- Packaged or Split AC System
- Refrigerator
- Solar Water Heating
- Submetering
- Vending Miser
- Water-cooled Chiller
- Window Films

Interested businesses may click on an energy rebate area and a small description pops up along with a link a more detailed explanation and a fillable form. This program has been effective from July 2011. According to Hawaii Energy, all programs are currently funded. Their fiscal year ends June 30, however the company expects funding to continue. Of course, the down side for many of the programs reviewed is the documentation needed to secure approval and the length of time it takes to receive the rebate.

Visit the website: *http://www.hawaiienergy.com/59/for-your-business* for more information.



Attachment H
Page 58 of 139

# Northern Notes 1-26

Thursday, January 26th, 2012

Composting workshop offered Feb. 18

Click to see slideshow

The Hawaii County Department of Environmental Management is sponsoring a Composting Workshop in Waimea from 10 a.m. to noon Feb. 18 at Waimea Country School. The cost for the two-hour workshop is $10 per person and includes a free composting bin for those who attend the complete session.

To register or for more information, email ann_hassler@yahoo.com or call 937-1100. Composting bins may not be immediately available after the completion of the workshops. If this happens, vouchers for future composters may be distributed to qualified attendees. Vouchers may be redeemed according to the terms of the voucher or the directions of your instructor.

Free tax prep offered to residents

Appointments are now being made for free tax preparation for low-moderate income residents/families and seniors with simple taxes. The free service is provided by the AARP Foundation in conjunction with the Internal Revenue Service. The service will open Feb. 3 and run from 9 a.m. to 1 p.m. every Monday and Friday throughout tax season (except Feb. 20) ending April 16 at Tutu's House. To schedule an appointment or ask questions, call (808) 388-6645.

Federal and state tax returns will be prepared by volunteers who have donated their time and skills to serve their community. All returns will be filed electronically, with a few exceptions. After scheduling an appointment, prepare a tax packet that will include the following items:

c Picture identification (driver's license, passport, etc.)

c Social security cards for yourself, spouse and all dependents

c Copy of last year's income tax return

c W-2 forms from each employer

c Unemployment compensation statements

c SSA-1099 if paid social security benefits

c All 1099 forms, 1099-INT, 1099- DIV, 1099-B, etc. showing interest and/or dividends, and documentation showing original purchase price of sold assets

c 1099-MISC showing any miscellaneous income

c 1099-R if received a pension or annuity

c All forms showing income tax or estimated tax payments paid

c Dependent care provider information (name, address, ID number or social security number of care provider and amounts paid)

c Any other forms or statements received applicable to tax situation

c A copy or voided check showing bank account number so refund can be deposited directly into bank account.

Waikoloa Car Show seeking entrants, vendors

The Waikoloa Lions Club is hosting its "Island Fever" car show Feb. 18 at the Waikoloa Elementary School. The organization is looking for entrants and



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vendor food and craft booths that would like to participate.

The car show will be open to the public from 11 a.m. to 3 p.m. The Lions expect more than 100 of the island's coolest classic, vintage, hot rod and custom cars and trucks to be on display. The vehicles will be judged and awarded trophies in several categories.

There will be lots of fun for the entire family with prizes, raffles, and tee shirts for sale.

The event will feature live music, quality craft booths, delicious food, prizes, raffles and T-shirts for sale. The event is a fundraiser for the Waikoloa Lions Club; proceeds will go to help the community events and programs the club supports.

For show information and vehicle entries, contact Don at 883-1501 or email donraye@prodigy.net. For vendor food and craft booths, contact Sue at 989-0215 or sue.mccord@gmail.com.

Governor seeking applicants for boards, commissions

The Office of the Governor is reminding interested individuals who are looking to serve the public to consider service on a board or commission. Applications are being accepted for service on numerous boards and commissions including the Hawaii Tourism Authority, Emergency Medical Services Advisory Committee and the Island Burial Councils.

Members of the public may apply themselves or recommend qualified applicants via hawaii.gov/gov.

The Office of the Governor oversees more than 160 boards and commissions established by the state constitution, statutes or executive orders.

Vacancies include seats on boards and commissions focusing on a cross-section of interests and industries, including: aerospace, alternative medicine, environment, cosmetology, civil defense, economic development, corrections, culture and the arts, education, festivals, health and human services, medical education, pest control, physical therapy, private detectives, public housing, small business, state parks, taxation, technology, tourism, voter registration and wastewater treatment.

More information, including a complete list of vacancies and application instructions, is posted at hawaii.gov/gov/about/boards-commissions.html.

Community fund grants available

The Kukio Community Fund of the Hawaii Community Foundation is now accepting proposals from nonprofit organizations for projects that benefit West Hawaii residents. Deadline for submissions is Feb. 3.

The Kukio Community Fund is interested in proposals that seek to reduce youth risk-taking behaviors and increase positive social development through a variety of ways, including: Extracurricular activities; interaction with adult role models; opportunities for exploration of new interests; academic support; developing new friendships; and opportunities for leadership and building self-esteem.

The Request for Proposal Guidelines (RFP) can be downloaded from Hawaii Community Foundation's website at hawaiicommunityfoundation.org. The average grant range is $1,000 to $5,000. Proposals must be postmarked by Feb. 3 and mailed to the Hawaii Community Foundation Oahu office: 827 Fort Street Mall, Honolulu, Hawaii 96813.

Hawaii Energy offers free energy-saving workshop

Hawaii Energy, the energy efficiency and conservation program serving Hawaii, Honolulu and Maui counties, has partnered with Waimea Community Association to offer a free energy-saving community workshop to Big Island residents to help reduce their electric bill. The workshop will be held from 5:15 to 7 p.m. Feb. 2 at the Waimea School cafeteria.

The workshop will offer ways to save money on the electric bill to keep "lights on," as well as information on how to get rebates from Hawaii Energy when purchasing energy-saving appliances, lighting and water heating. Light refreshments will be served.

Attendees will receive free energy-saving advanced power strips (while supplies last, limited to one per household). It is expected to be a "standing room only" event, so please come early. For information on rebates, visit HawaiiEnergy.com.

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Star Advertiser

Monday, January 23, 2012 67.0°F











# Newswatch

For Monday, January 23, 2012

By Star-Advertiser staff

POSTED: 01:30 a.m. HST, Jan 23, 2012



## Hawaii island hit by pair of earthquakes

A magnitude-5.0 earthquake shook Hawaii island at 4:36 p.m. Sunday.

The epicenter of the quake was roughly 10 miles south of Fern Forest and 11 miles southeast of Volcano.

Joe Lopez, 70, said he felt a "pretty good jolt" from the quake. Lopez, who was at home in the Kaumana area of Hilo, said the quake rattled his house and sent books and other items tumbling to the floor.

A magnitude-3.0 earthquake was recorded in the same area about 10 minutes later.

## Reports offer tips on saving energy, money

Hawaii Energy will send reports to electric utility customers on four islands with information to help people save energy and money.

The reports will go out to 62,000 households on Molokai, Maui, Lanai and Hawaii island starting today. The households will receive four reports through June.

The reports will rank a household's energy use with 99 anonymous nearby homes of similar size and construction. They will suggest ways people can save money and energy.

Hawaii Energy is a conservation and energy efficiency program paid for by electric utility customers. It is administered by Science Applications International Corp. under a contract from the Hawaii Public Utilities Commission.

## Study on food in space seeks 6 volunteers

A study on Hawaii island next year will help determine the menu on a future flight to Mars.





## Latest News/Updates

Couple to be sentenced for exploiting smuggled Filipino immigrants - 06:13 a.m.

Man charged with murder, sex assault in 1989 cold case - 06:08 a.m.

Fire burns old Kona Bakery building in Kealakekua - 05:29 a.m.

Brothers reunited in Japan after 6

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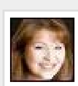

TheBuzz
Luxury Row courts Chinese via online language feature

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Researchers from the University of Hawaii at Manoa and Cornell University are looking for six people to live in a module for 120 days, West Hawaii Today reports.

The volunteers will be paid $25 a day and get a bonus upon completion. Candidates should be between the ages of 21 and 65.

UH associate professor Kim Binsted, a co-investigator for the NASA-funded project, said several sites are being considered on the Mauna Loa side of Saddle Road.

"There's been a lot of anecdotal evidence that there's some change in the way people taste things in space," Binsted said.

Applications, due by Feb. 29, are available at manoa.hawaii. edu/hi-seas.



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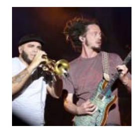
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This Week in TGIF

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Maui News Mon Jan 23 A5

# Hawaii Energy to send out use reports

HONOLULU (AP) — Hawaii Energy will send reports to electric utility customers on four islands with information to help people save energy and money.

The reports will go out to 62,000 households on Molokai, Maui, Lanai and the Big Island starting today. The households will receive four reports through June.

The reports will rank a household's energy use with 99 anonymous nearby homes of similar size and construction. The reports will also suggest ways households can save energy and money on their electricity bills.

The initiative expands on a pilot program that began on Oahu last May.

Hawaii Energy is a conservation and energy efficiency program that is paid for by electric utility customers. It is administered by Science Applications International Corp. under a contract from the Hawaii Public Utilities Commission.

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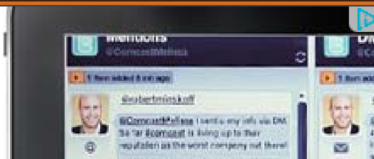

# Hawaii electricity consumers on 4 islands to receive energy use reports to promote efficiency

THE ASSOCIATED PRESS
First Posted: January 22, 2012 - 2:01 pm
Last Updated: January 22, 2012 - 2:01 pm



HONOLULU — Hawaii Energy will be sending reports to electric utility customers on four islands that with information to help people save energy and money.

The reports will go out to 62,000 households on Molokai, Maui, Lanai and the Big Island starting Monday. The households will receive four reports through June.

The reports will rank a household's energy use with 99 anonymous nearby homes of similar size and construction. The reports will also suggest ways households can save energy and money on their electricity bills.

The initiative expands on a pilot program that began on Oahu last May.

Hawaii Energy is a conservation and energy efficiency program that is paid for by electric utility customers. It is administered by Science Applications International Corp. under a contract from the Hawaii Public Utilities Commission.





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ian Home Lands parcel in Anahola on the island's northeast side. The project is expected to generate enough power to supply 3,600 homes. Solar generating capacity either planned or installed on Kauai totals 20 megawatts.

"When the project is successfully developed, KIUC will have more PV concentration than any utility in the U.S.," said David Bissell, KIUC president and CEO.

Most of KIUC's generation still comes from fossil fuels, but the consumer-owned company has worked to expand its portfolio of renewable technologies. The utility has a combined 17 megawatts of photovoltaic and biomass-fired generation projects under power purchase agreements. About 35 megawatts of hydropower projects are being considered, according to KIUC.

## Mobi boosts service with Kaneohe cell site

Hawaii-based Mobi PCS has activated a new cell site near Windward City Shopping Center in Kaneohe, where it also has a retail location. The site provides enhanced street and in-building coverage throughout the area, including Hoomaluhia Botanical Garden, Kaluapuhi Neighborhood Park and Castle High School, as well as along William Henry Road, the company said. Mobi's voice network handles an average of 1.5 million calls each day, and the company boasts a dropped-call rate of less than 0.8 on Oahu.

## Hawaiian Air reservations now 24 hours

Hawaiian Airlines has expanded its reservations call center to 24 hours a day in response to its growing network of service. Customers can call 1-800-367-5320 to book flight reservations and seek information.

## Jobless claims at 352,000, fewest since 2008

**WASHINGTON >>** The number of people seeking unemployment benefits plummeted last week to 352,000, the fewest since April 2008. The decline added to evidence that the job market is strengthening.

Applications fell 50,000, the biggest drop in the seasonally adjusted figure in more than six years, the Labor Department said Thursday. The four-week average, which smoothes out fluctuations, dropped to 379,000. That's the second-lowest such figure in more than three years.

## Google profit disappoints as ad prices sink

**SAN FRANCISCO >>** Google's money-making machine mis-

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**Eric K. Yeaman**

The Queen's Health Systems has named Hawaiian Telcom President and Chief Executive Officer **Eric K. Yeaman** chairman of its board of trustees. Elected to the board were **Maenette Benham, Diane Cecchettini, Lyle Y. Harada** and **Stanley M. Kuriyama**.

Yeaman succeeds **Dr. Naleen N. Andrade**, who is retiring from the system's boards and its affiliates, the Queen's Medical Center and Molokai General Hospital.

★★★

The Battleship Missouri Memorial has chosen **Bonnie B. Hilory** as the memorial's vice president of

# HECO customers reduce use of power through program

By **Alan Yonan Jr.**
ayonan@staradvertiser.com

The company running Hawaiian Electric Co.'s energy efficiency program says it will expand an initiative that helped residential utility customers in Ewa trim electricity bills by showing them how their power usage compared with their neighbors'.

Nearly 15,000 HECO customers who participated in the pilot program cut their bills by a total of $245,625 from May through October, or just under $3 per customer per month, according to Hawaii Energy.

In addition to offering energy-saving tips such as upgrading to more efficient appliances and taking shorter showers, the initiative provides utility customers with a "Home Energy Report" that ranks them against 99 anonymous neighbors living in homes of similar size and construction type. A rank of 1 indicates the lowest energy use, while 100 indicates the highest.

The report also includes a graph showing a customer's energy consumption over time compared with all neighbors and the most efficient neighbors.

THE IDEA behind the Home Energy Report is to make customers more aware of how much electricity they use and encourage them to make behavioral changes to reduce their consumption, according to Hawaii Energy officials. Households with lower scores are encouraged to share their energy-saving ideas with those who have higher scores.

The initiative will be expanded to 62,000 randomly selected households in Hawaii and Maui counties beginning next week. The selected households will receive four reports through June.

"Evidence shows that one of the key ways to reduce energy use is to provide homes with information about their usage and offer suggestions on what they can do to save," said Larry Newman, residential program leader for Hawaii Energy. "Based on the success of the Ewa Plain Home Energy Reports pilot and similar projects across the country, we expect the expanded initiative to generate significant savings for those on Hawaii island, Lanai, Maui and Molokai."

The expanded program is expected to cut energy use by more than 3.3 million kilowatt-hours, or the equivalent of more than $1.3 million, based on an average cost of 40 cents per kilowatt-hour.

Hawaii Energy is a customer-funded conservation and efficiency program administered by Science Applications International Corp. SAIC subcontracted Virginia-based Opower to produce the Home Energy Reports.

"Using cutting-edge behavioral science and patent-pending analytics, the Opower platform enables utilities to provide targeted energy data and advice to each customer," the company says on its website.

## Blog » PBN biz blog



# New Hawaii Energy program will detail home energy usage

Pacific Business News by Duane Shimogawa, Reporter
Date: Friday, January 20, 2012, 2:33pm HST - Last Modified: Friday, January 20, 2012, 2:55pm HST

**Duane Shimogawa**
Reporter - *Pacific Business News*
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As I checked my mailbox Thursday night, there was an envelope with a happy-faced Hawaii Energy logo, and I couldn't figure how it arrived at my home mailbox instead of at work, considering I'm the energy reporter at PBN.

Then as I started reading the first of five pieces of paper, I quickly realized that it was actually meant for my personal mailbox.

Hawaii Energy, a ratepayer-funded conservation and efficiency program under contract with the state Public Utilities Commission, announced a new program, which will begin on Monday.

On that day, Home Energy Reports will be mailed to about 62,000 randomly selected



manager for Hawaii Energy, said in the letter that these reports will provide households with information about trends in their energy use, offer insight into how their energy consumption compares with similar homes in the area and suggest tips on how to save electricity.

While the push for more renewables is usually at the forefront and get the most attention in Hawaii, improving efficiency is a key aspect in getting the state to reach its energy goals.

Hawaiian Electric Co. recently unveiled a television commercial blitz, featuring its executive vice president Robbie Alm, who talks about the push for renewables, along with an explanation of why rates are so high and continue to rise.

These commercials were followed, more recently, by lessons from other HECO associates on improving efficiency.



If both Hawaii Energy and HECO are making these bold moves, don't you think we should as well?

I'll certainly think about it, the next time I flip the switch on my A/C.

And being one of the 62,000 people to receive energy reports should provide some perspective on what needs improvement.

> Duane Shimogawa covers energy, real estate and economic development for Pacific Business News.

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

URL: SHERIE CHAR

*(page 1 of 8)*

### What energy experts are saying about Hawaii's 2012 business energy outlook

Photo: Courtesy of Sunetric

Being green and turning your company into an energy-efficient organization is no longer just a fashion statement or the latest trend. It’s becoming the new way that allows Hawaii’s businesses to save money and reduce our state’s dependence on imported oil.

This newly adapted lifestyle and business decision to be green can influence financial budgets and operating expenses. Rising energy costs have clearly affected the success and failure of Hawaii’s businesses over the years. It’s no surprise to see an increasing number of households and companies invest in photovoltaic (PV) systems to lower their utility bills.

“Hawaii is first in the nation in solar water heaters per capita,” says Hawaii Governor Neil Abercrombie. “We are second in photovoltaic capacity and second in energy savings power purchase agreements per capita.”

As business owners strive to make the transition to become energy efficient, there has been a tremendous growth in the clean energy industry. New innovations have been developed by companies to help business owners switch to renewable energy alternatives.

“We need to keep moving toward the Hawaii Clean Energy Initiative’s goal of 70 percent

PROMOTION

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

URL: SHERIE CHAR

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**The Importance of Energy Independence**

"In 2011 alone, investments in clean energy statewide reached $1.2 billion, bringing in 11,000 new jobs."
—Mark Glick, energy administrator, DBEDT

"The Hawaii Clean Energy Initiative has generated a great deal of awareness regarding the importance of energy independence for Hawaii," says energy administrator Mark Glick, of the state Department of Business, Economic Development and Tourism (DBEDT). "It has also spurred the growth of an industry that represents billions of dollars to the local economy, and that positions us as a major player in the global business arena."

Since the Hawaii Clean Energy Initiative started in 2008, the first net-zero housing development has opened, PV panels were installed on a state building—saving $300 a month in energy costs—and the first public charging station for electric vehicles in Hawaii has been built.

"We also reduced electric consumption in state government by 2.8 percent from 2009, saving the state more than $20 million in energy costs," says Abercrombie. "Clean energy is not just a matter of energy security and a means of protecting the environment, it is good for business. It provides a critical boost to our economy by attracting investments from companies around the globe while benefiting local entrepreneurs."

This has resulted in a boom in new company formation, which has led to the creation of clean energy jobs, making Hawaii third in the nation in clean energy job growth.




“In 2011 alone, investments in clean energy statewide reached $1.2 billion, bringing in 11,000 new jobs,” says Glick. “In terms of year-on-year growth, it is the fastest growing sector in Hawaii.”

Preliminary estimates put investments in clean energy statewide at $1.2 billion in 2011, about twice the amount from the year before. Anecdotally, homegrown ventures like Sopogy are now exporting their technologies to other parts of the world, says Glick. Maui-based Pacific Biodiesel, currently the only commercial biofuel producer in the state, now has 12 facilities on the Mainland and Japan. At the Big Island’s Natural Energy Laboratory (NELHA), Cellana, which harvests algae to create biofuels and other products, has attracted more than $100 million in investment capital and grants.

Right now, DBEDT is tracking project activity from 66 proposed renewable energy projects, says Glick, all of which have the potential to add an additional 500 MW of capacity to Hawaii’s grid. This represents billions of dollars in additional investments.

“As Gov. Abercrombie said, ‘By working together with our community members, businesses and government agencies, we can solidify Hawaii’s position as an international leader in clean energy,’” says Glick. “From an international perspective, we are branding Hawaii as a test bed for the Asia-Pacific region.”


“Clean energy is not just a matter of energy security and a means of protecting the environment, it is good for business.”
—Neil Abercrombie, governor of Hawaii

This has already played well at DBEDT’s recent Asia Pacific Clean Energy Summit, and is further evidenced by the number of Asia-Pacific public and private sector groups that are seeking to establish relationships in Hawaii.

When DBEDT held a Hawaii China Energy Forum in conjunction with APEC delegates in 2011, Gov. Abercrombie seized the moment by securing an agreement with the China Council for Promotion of International Trade to pursue clean energy opportunities with the potential to tap into China’s estimated $1.54 trillion green investments planned for the next 15 years.

A week later, Gov. Abercrombie and President Hideo Hato of Japan’s New Energy and Industrial Technology Development Organization, signed a Memorandum of Agreement to develop a $37 million advanced first-of-its-kind smart grid demonstration project on Maui. The multi-million dollar project is aimed at improving integration of variable renewable resources, such as solar and wind power, and preparing the electric system for widespread adoption of electric vehicles.

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"We must pursue these partnerships to grow our renewable energy capacity while cutting our energy demand even further," says Abercrombie. "Once we have completed our retrofit of state buildings, the next phase of our plan is to retrofit our airports, harbors and highways while continuing to encourage the same efforts by businesses and homeowners."

Hawaii's emerging clean energy economy will only grow in 2012, allowing our state to become one step closer to achieving energy independence.

Photo: istockphoto.com

"We are already making progress, but reaching our 2030 goal will help us become more economically stable, by keeping an estimated $6 billion in state that would otherwise go toward foreign oil investments," notes Glick. "It will also counter-balance our reliance on tourism and the military, adding one more leg for our economy to stand on."

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clean energy by 2030, through energy efficiency and the development and implementation of renewable energy sources," says Abercrombie. "Energy efficiency is the most cost-effective effort for all energy users."

To help Hawaii's businesses become energy efficient, Hawaii Business magazine has developed this guide featuring valuable tips from some of the best energy experts in our community. Learn how your business can benefit and save money by using clean, renewable energy today.

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

URL: SHERIE CHAR

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**Breaking Our Dependence on Oil**

"Hawaii's Clean Energy Initiative is geared to break our dependence on oil as a state," says Scott Seu, vice president of energy resources at Hawaiian Electric Co. "The price of oil is so volatile and expensive that when the price of fossil fuel rises, it greatly impacts our customers' electricity bills, the cost of gasoline, air fares and many other goods and services."

As imported oil prices continue to increase, it's becoming a challenge for businesses to manage and budget for unpredictable energy costs. For businesses to be successful, they need more control over these costs, says Seu.

"It makes a lot of sense for businesses to use more renewable energy in order to help their overall financial viability," he says. "Energy is a huge part of one's operating costs. Businesses can also benefit from promoting themselves as being clean and green."

It's equally important for Hawaii's utilities to switch to renewable energy instead of using oil. Using renewable energy at stable prices will help stem the impact of volatile and increasing oil prices on electric bills. From an environmental perspective, Hawaii can use clean technologies to reduce its carbon footprint. From a business perspective, there is a huge potential for the development of new clean energy industries in Hawaii.

Hawaiian Electric has been contributing to Hawaii's renewable energy transition by partnering with businesses to develop a diverse portfolio of renewable resources including solar, wind, biofuels, geothermal, waste-to-energy and

“It makes a lot of sense for businesses to use more renewable energy in order to help their overall financial viability.”
—Scott Seu, vice president of energy resources, Hawaiian Electric Co.

biomass.

With the 30-megawatt Kahuku Wind farm in operation, wind power is now helping to meet the energy needs of customers on Oahu. Other wind farms are serving Maui and Hawaii Island. Additional wind projects on Oahu’s North Shore and on Maui are in development.

By working with solar providers, Hawaiian Electric has been honored as one of the top 10 utilities nationwide for solar watts added per customer in 2010. All four Hawaii utilities are in the top 10 for total solar watts per customer. And it continues to work toward adding more solar power.

“On the biofuel front, the Campbell Industrial Park generating station has been operating successfully on 100 percent biodiesel for more than a year now,” says Seu. “As far as we know, it’s the only commercial power plant that operates on 100 percent biodiesel in the world.”

In 2011, Hawaiian Electric also tested biofuel at Kahe Power Plant on Oahu, which now uses the refined petroleum residue called low sulfur fuel oil.

“We blended different amounts of biofuel with our normal fuel at Kahe,” he says. “Eventually, we were able to use 100 percent biofuel. The results showed us that this change reduced our emissions.”

Photo: istockphoto.com

Maui Electric Co. also recently conducted tests using biodiesel in one of its generating units usually fired on petroleum diesel.

“Whether it’s at Hawaiian Electric or on Maui Electric, our goal is to become green with our existing power plants by using sustainable biofuel,” Seu said.

Hawaiian Electric has also partnered with the Hawaii Department of Transportation to jointly develop a biofuel-powered emergency generating power plant at Honolulu International Airport which will be available to send power to the grid when there is no emergency. Maui-based Pacific Biodiesel has been contracted to produce and supply the local biofuel.

“In addition to our power plant projects, we’re seeking new utility-scale projects to deliver



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renewable energy to Oahu," he says. "We are welcoming proposals from all different renewable technologies, including wind and solar farms. We are looking at all options, including how we can expand geothermal on the Big Island."

As Hawaiian Electric continues to work with developers of projects that produce renewable energy, the company wants to build energy management systems to help customers attain a better sense of how electricity is being used.

And the utility continues to provide practical information to customers about how they can help manage their electric bills.

"We're all in this together," says Seu. "Depending on imported oil is not really a viable option for our state in the long run. We have to work together with Hawaii's businesses and residents, and move forward to pursue a diversity of clean energy alternatives."

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

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**Engaging with Renewable Energy**

"There are a couple of ways a business can engage with renewable energy," says Mark Duda, principal for RevoluSun. "The most common is if they're trying to offset their own energy consumption with renewable energy that they make themselves."

"Solar is simply more affordable ... the overall installation cost is about half of what it was four years ago."
—Mark Duda, principal, RevoluSun

More and more businesses in Hawaii have been doing their part in reducing our state's dependence on imported oil by installing PV systems. With the recent introduction of the feed-in tariffs (FIT) for commercial PV owners on the grid, there is an innovative business opportunity to make money.

"If property owners qualify and participate in the FIT process, and make energy that they don't use, they can sell it directly to the grid," says Duda. "They can sell it to the utility company for resale to other companies at a predetermined rate."

Engaging with renewable energy is also now financially accessible to Hawaii's companies than ever before.

"Solar is simply more affordable than the alternative of buying power from the utility," he says, "The prices have come down to the point




Photo: Courtesy of Revolusun

where the overall installation cost is about half of what it was four years ago."

With the introduction of attractive financial incentives and rebates, companies like RevoluSun are helping customers lock in savings by investing in solar.

"There are two overwhelming reasons why Hawaii's businesses should use clean, renewable energy," he says. "The first reason is that companies will typically save a substantial amount of money on their energy costs over the life of the system. Determining future energy costs is one of the biggest problems for businesses buying power that's made from oil. With renewable energy, businesses will be able to know what the cost is going forward."

The second reason, says Duda, is because it is important for businesses to help get the state off of imported oil as its primary fuel source.

"By working together, we can help to make our state much more economically competitive," he says. "We try to align the interest of everyone involved in the transaction, so you have as many people benefiting from a solar energy project as possible."

RevoluSun enables Hawaii's businesses to harness the power of renewable energy to make their business more sustainable.

"If you know what your operating costs will be, and you've lowered them, you're going to be better at executing at your core business," says Duda. "Your company won't be blindsided by power costs that are way outside of budget, or costs that you literally can't plan for."

While RevoluSun helps as many businesses as possible to make the transition from imported oil to clean, renewable energy, Duda is also president of the Hawaii Solar Energy Association (HSEA), which is actively working at the Hawaii Public Utilities Commission and State Legislature to continue the policy support for the solar industry.

"At HSEA, we spend a lot of time on different types of work force development efforts, whether it's through the community colleges or different programs that are being established through the City and County," says Duda.

The solar industry in Hawaii is one of the few industries that's bucking the overall recession.

"2011 was the biggest year for Hawaii's solar industry, but I think 2012 will be even

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bigger because the interest in clean, renewable energy is continuing to really grow," says Duda. "We want to thank Hawaii's businesses and residential customers as well for recognizing the potential of solar energy to meet their needs, both from an economic and an environment-sustainability perspective."

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

URL: SHERIE CHAR

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**Achieving Exceptional Cost Savings**

Hawaii businesses pay the highest utility rates in the nation. Unlike other states, electricity rates are tied to the price of oil and may double over the next decade.

Solar power makes sense, but starting with efficiency is king when it comes to saving businesses money. There are but a few Hawaii companies addressing both efficiency and renewable energy generation. Energy Industries is one of the largest.

"By adding renewable energy into the mix, Hawaii'sbusinesses can reduce their payments for utilities."
—Miles Kubo, chief operating officer, Energy Industries Corp.

"For businesses in Hawaii, energy is a huge expense," says Miles Kubo, chief operating officer for Energy Industries Corp. "Most are significantly overpaying for energy wasted through inefficiency. By eliminating waste, businesses can reduce expenses and increase net profits."

Energy Industries specializes in energy-efficiency and renewable energy for commercial, industrial and institutional sectors. Headquartered in Honolulu, it provides a full range of energy management solutions here, in California, Washington, Oregon, Idaho and Guam.

Photo: Courtesy of Energy Industries Corp.

Energy Industries recently completed an energy overhaul of Castle Medical Center that is estimated to save over 1,000,000 kilowatt hours annually, and will result in several hundred-thousand dollars of cost savings for the hospital each year.

Energy Industries retrofits outdated building systems so companies eliminate inefficient equipment and consume less energy. Comprehensive retrofits include air conditioning systems, lighting, boilers, pumps, motors and other technologies. The company specializes in hospitality, commercial, health care and industrial markets. They also work with nonprofits to conserve and produce energy.

Energy Industries designs and installs PV systems to complement energy efficiency programs, further reducing a company's use of grid power.

In conjunction with the retrofit, our technical team, headed by Duane Ashimine, designs a PV system that is right-sized for the business needs and reduces reliance on grid power, said Kubo.

"By adding renewable energy into the mix, Hawaii's businesses can reduce their payments for utilities, which in turn helps the utility company meet the growing demand from new construction," he says. "This also helps the environment by reducing fossil fuels needed to power the state."

Energy Industries helps both corporate and nonprofit clients take advantage of incentive programs and navigate financing for power purchase agreements (PPAs). Typically, a private investor owns the PV system at the nonprofit organization's location and uses the tax benefits; then, sells the power to the nonprofit at a discounted price below utility company rates.
Energy Industries recently worked with Easter Seals Hawaii and Bishop Museum to set up PPAs. The Bishop Museum PV system is expected to save the nonprofit organization more than $750,000 over the 20-year period.

"Energy Industries makes sure each energy conservation measure is right for the facility, vetting out questionable technologies," says Kubo. "We combine efficiency and renewable energy measures that routinely outperform standard PV projects."

Energy Industries' founder Darren Kimura also founded Sopogy, a concentrated solar thermal technology that was incubated in Energy Laboratories, the research and development division of the Energy Industries family of businesses.

Energy Industries offers a range of energy programs that are self-funding, where energy savings pay for capital improvements and the cost of financing. These include auditing, design/engineering, construction, monitoring/verification, rebate acquisition and financial



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analysis for equipment financing.

"This one-stop offering makes it possible for our clients to implement complicated energy retrofits projects without having to coordinate with a dozen or more consultants and vendors," says Kubo. "We make it as convenient as possible for our customers."

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

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**Ambassadors of Energy**

"Gas is the most direct source of energy other than the sun," says Jeffrey Kissel, president and chief executive officer for The Gas Co. "It is an energy-efficient, environmentally friendly source of power. Gas, for the purpose that we use it, is the straightest line in the energy spectrum."

Hawaii's small and large businesses have relied on The Gas Co.'s expertise since 1904. Restaurants and laundry-service businesses use gas for cooking and drying clothes at a high volume, while most of Hawaii's luxurious hotels and resorts use gas to heat swimming pools and spas. Condominiums and apartment buildings rely on The Gas Co. to help provide hot water for showers and baths for its residents.

"We really have one of the best group of employees serving our customers, and we are extremely proud of them," says Kissel. "We consider every one of them as an ambassador for energy. Ask our employees any question and they will gladly help them get the answers."

As an ambassador of energy, The Gas Co. is making it simple for businesses to sign up for gas. There are programs that help to subsidize installations, offer installation discounts and provide assistance with purchasing Energy Star® appliances. Despite Hawaii's challenging economy, Kissel says there has been an increase in customers.

"We've actually had more and more people choose to use gas, even seeing an increase during the recession, because of its efficiency," he says. "Gas, itself, is a much lower carbon source of energy that we have in Hawaii other than solar energy."



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The Gas Co. produces synthetic natural gas (SNG) in Hawaii from byproducts of imported petroleum through a refining process.

"It doesn't require us to import any additional petroleum," says Kissel. "That's why we say it's the cleanest and best source of energy next to the sun."

Another added benefit: Gas stays on even during a power outage.

"When we had the earthquake in 2006, and Waikiki was in the dark, the tiki torches kept burning," says Kissel. "It was actually a safety benefit to the public."

The Gas Co. also helps businesses that want to use renewable energy, but don't have the space to install PV systems.

"For example, in Waikiki, we're able to deliver our renewable source of energy to all of our customers anywhere, regardless of whether they have rooftop access to solar," says Kissel. "We're developing diverse sources of gas energy that are both renewable and sustainable, so that we can help Hawaii move away from its dependence upon petroleum."

"Gas, itself, is a much lower carbon source of energy that we have in Hawaii other than solar energy."
— Jeffrey Kissel, president and chief executive officer, The Gas Co.

Another way The Gas Co. is helping Hawaii become more energy independent is by producing hydrogen for General Motors' hydrogen-powered fuel cell vehicles.

"We're making our hydrogen fuel at a cost which is competitive with gasoline so we can diversify our sources of energy for our transportation needs, as well as our gas needs," he says. "We already have the infrastructure in our pipelines so we can distribute this fuel throughout the Honolulu metropolitan area."

The first 20 vehicles are in Hawaii right now as part of the pilot project. Full-scale production is scheduled to commence about 2015.

In addition to the partnership with General Motors, The Gas Co. is supporting Hawaii's clean energy future by converting non-food grade oils and animal fat to natural gas, propane and other fuels.

"We use the liquid fuels to power our production plant, and we put the natural gas and the propane into our system so our customers can use it," he says.

Kissel believes that energy is one of the most important pillars supporting our community.

"We believe that a great society invests in health care, education and infrastructure, and energy is a critical component of infrastructure," he says. "Our new initiatives for 2012 will deliver our product at or below the current price of petroleum. We're hoping that what we do actually slows down the rate of increase in energy cost in Hawaii, and ultimately reverses it."

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

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**A Peace-of-Mind Purchase**

"We find that businesses decide to make renewable energy upgrades for various reasons," says Alex Tiller, chief executive officer of Sunetric. "Nine times out of 10, the reason is based on an economic decision."

With Hawaii's increasing energy prices, many business owners are looking for innovative ways to save money so they can efficiently operate their companies and become sustainable.

"Sustainability is a powerful word," notes Tiller. "It has to do with the environment, but it also has to do with running your business in an efficient manner, so that it's sustainable. At Sunetric, each of us tries to live our lives in a sustainable way. It is one of our guiding principles."

As the largest locally owned and operated full-service renewable energy firm in Hawaii, Sunetric specializes in residential and commercial PV systems. From consultation, design and engineering to permitting, financing and installation, Sunetric does it all.

"Customers expect to have a peace-of-mind purchase," says Tiller. "At Sunetric, we stand behind our work and walk our customers through




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the economics up front. We explain what types of financing options and packages are available, and make introductions as necessary or help obtain the financing for them. What differentiates Sunetric from a vast majority of other companies is that we actually build our own systems."

"If you have high electricity bills, switching over to solar is theeasiest way to affect your company's bottom line."
— Alex Tiller, chief executive officer, Sunetric

When Sean and Beth-Ann Mullen started Sunetric in 2004—before state and federal tax incentives existed—they believed in sustainability as a lifestyle goal.

"They were pioneers who really drove the market in Hawaii," says Tiller. "Sunetric plans on being here for the long run to provide its customers with quality construction."

"We also came out with the first power purchase agreement product for nonprofits," says Tiller. "Otherwise, nonprofit organizations wouldn't be able to install a PV system. If you don't pay taxes, you can't get tax incentives."

With no up-front cost, PPAs are a very attractive option for business owners. Sunetric installs and maintains the PV system on your property, and sells the electricity produced at a significant discount versus current utility rates—typically 20 percent or more savings.

"This is definitely an innovation in the solar market," stated Tiller. "We like to do a lot of innovative things, even in the way we build our systems from an engineering standpoint and an efficiency perspective."


Photo: istockphoto.com/hemera

Tiller says that solar panels rarely break, which also adds to a business owner's peace of mind. Unlike windmills, solar technology does not have any moving parts.

"Solar is very discreet, very low profile and it comes with very low-maintenance requirements," he says. "As the installer and maintenance specialist, we know that there is very little servicing required—less than 1 percent. That's how we can pass on the savings to our customers."

The feed-in tariff system is another innovative program that allows people to effectively drive revenue from parts of their business that they never had before.

"Your roof now has the ability to generate more revenue than it could before," he says. "The business owners who are taking the time to do the math realize that it's the best investment that they can make for their company. We don't have to convince people of the value of solar anymore."

"If you have high electricity bills, switching over to solar is the easiest way to affect your company's bottom line," says Tiller. "Such changes can make an immediate and predictable difference. We'd love if you hire Sunetric, but regardless if you choose us or if you hire another company, you should do it and take advantage of the savings."

Just like the booming clean energy industry, Sunetric is on a very rapid growth development. In November 2011, Sunetric opened new offices in Denver, Pittsburgh and Washington, D.C.

"It's the reverse brain drain," he says. "You hear about people leaving Hawaii to go to these other places, but not us. We want to stay based out of Hawaii and start bringing work to Hawaii. We've built thousands of projects, and we believe we can share our experience, expertise and affect the national and the global market for energy right out of this great state."

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# Business Energy Guide 2012

## Making the Transition Helping Hawaii's Businesses Become Energy Efficient

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**Making Smarter Business Decisions**

"We help residents and business owners who use electricity—from large resorts to the shave ice stands," says Derrick Sonoda, marketing and outreach manager of Hawaii Energy. "We're here to help everyone."

"Hawaii Energy is funded by everyone who has an electric utility account," he says. "A small portion of electricity revenue, roughly equal to 1.5 percent, goes to the program to help meet our state's goal of reducing our dependence on imported oil by 2030."

"We're constantly enhancing our incentives offerings to helpHawaii's businesses conserve energy." —Derrick Sonoda, marketing and outreach manager, Hawaii Energy

Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by SAIC under contract with the Hawaii Public Utilities Commission, serving Honolulu, Hawaii and Maui counties.

"We offer incentives and education to motivate businesses to change out their old energy hogs such as refrigerators, lights, air conditioners, pumps and other equipment to energy-saving replacements," he says.

One of Hawaii Energy's new offering is an incentive to install submetering for condominiums and stores within office building and hotels.





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"If you don't measure it, you can't manage it. Smaller stores, like those around Waikiki, might not have individual electric meters so they don't know how much energy they are using," Sonoda says. "Submetering rewards the stores that do a great job saving energy with lower bills, while identifying the others we need to help. Studies show that installing submeters reduces usage between 10 to 20 percent."

For buildings with enclosed parking, Hawaii Energy offers a new incentive for garage demand ventilation control on fresh air fans.


Photo: istockphoto.com

"These fans are operating at full speed, 24/7, regardless of need, which wastes electricity," he says. "By installing smart sensors, you can reduce the amount of energy used by activating fans only when necessary to maintain air quality."

Many businesses have second-hand refrigerators that use two to three times more electricity to operate than a new Energy Star® model. To operate a 20-year-old refrigerator, it costs about $380 on Oahu, $420 on Maui, $490 on Hawaii Island, and $555 on Molokai and Lanai in electricity every year. Hawaii Energy offers businesses a $50 rebate when they trade in an old refrigerator for a new Energy Star® unit; residents can get a $125 rebate.

Hawaii needs everyone's help to reduce our state's dependence on imported oil.

"If businesses can't afford their high electricity costs, they may have to close or downsize. Both of which hurts the economy," says Sonoda. "We're constantly enhancing our incentives offerings to help Hawaii's businesses conserve energy."

**Department of Business, Economic Development and Tourism (DBEDT) – Hawaii State Energy Office**
**(808) 587-3807**
**www.energy.hawaii.gov**

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## SPONSOR SPOTLIGHT

# HAWAII ENERGY

The NEED Project and Hawaii Energy have teamed up to bring energy education resources to teachers and students in Hawaii. The partnership will provide training to 200 local educators, reaching approximately 16,000 students on the islands on Lanai, Hawaii, Maui, Molokai, and Oahu. Attendees will receive hands-on classroom materials which will assist them in teaching about energy and energy efficiency in their schools. Educational grants will be available to educators and extra-curricular clubs interested in educating their local communities on energy efficiency and conservation. NEED looks forward to holding the first Hawaii Energy Education workshops on Oahu and Hawaii in December!

Hawaii Energy is the state energy conservation and efficiency program implemented to help reduce Hawaii's dependence on foreign oil. The mission of Hawaii Energy is to educate, encourage and incentivize the ratepayers of Hawaii to invest in conservation behaviors and efficiency measures to reduce Hawaii's dependence on imported fuels. For more information on Hawaii Energy, visit www.hawaiienergy.com.

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# Top Ranking

Hawai'i is ranked 12th in energy efficiency for a second year, according to the American Council for an Energy-Efficient Economy's (ACEEE) 2011 State Scorecard. The annual scorecard, now in its fifth edition, presents a comprehensive ranking of states based on metrics capturing best practices and effective leadership in energy efficiency policy and program implementation.

The scorecard compares each state's energy-efficiency policies in six ways: utility and public benefits programs and policies, transportation policies, building energy codes, combined heat and power, state government initiatives and appliance efficiency standards. Tied with Maine and Colorado, Hawai'i scored 26.5 out of a total 50 possible points; a two-point improvement over last year.

"Thanks to the efforts of a number of organizations and individuals, Hawai'i has been making significant improvements in adopting energy efficiency over the last few years," said Ray Starling, Hawaii Energy program manager. "In 2009, when the Hawaii Public Utilities Commission awarded SAIC the contract to manage Hawaii Energy, Hawaii ranked 19th and now we are 12th. The report is an important tool to measure our progress in a number of areas and is a good reminder that energy efficiency is an abundant resource that is equally as important as renewable energy in meeting Hawaii clean energy mandates."

One area where Hawai'i really shined was in the amount of electricity the state actually saved. Hawai'i ranked third in terms of overall energy savings, and 10th for its energy efficiency program and policies. Conversely, the state scored zero points in the natural gas category because there is no natural gas service for customers. As such, the state was unable to earn the additional four points that were available in the category, which would have helped elevate the state to a top ten ranking overall.

Hawai'i's success in the ACEEE rankings reflects that the state has moved forward on its statutory mandate, the energy efficiency portfolio standard, to achieving 30 percent energy efficiency by 2030. To view the ACEEE report in its entirety, go to http://aceee.org/research-report/e115.



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HAWAII NEWS

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Posted: Monday, October 31st, 2011 7:42 AM HST

## Hawaii 12th in energey efficiency rating

By Associated Press

Hawaii ranked 12th in energy efficiency for a second year, in a national scorecard ranking according to the American Council for an Energy-Efficient Economy.

The annual scorecard, now in its fifth edition, ranks states six different ways based on things such as state programs and public benefits programs, as well as building energy codes and government incentive programs.

Hawaii ranked third in terms of overall energy savings, and tenth for its energy efficiency program and policies. In 2009 Hawaii ranked 19th in the scorecard.

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**Hawaii Scores In Energy Efficiency Ranking**

## *Ranked 12th Among States; Third In Total Energy Savings*

POSTED: 11:31 am HST October 27, 2011

**HONOLULU** -- Hawaii is ranked twelfth in energy efficiency for a second year, according to the American Council for an Energy-Efficient Economy's 2011 State Scorecard.

The annual scorecard, now in its fifth edition, presents a comprehensive ranking of states based on metrics capturing best practices and effective leadership in energy efficiency policy and program implementation.

The scorecard compares each state's energy-efficiency policies in six ways: utility and public benefits programs and policies, transportation policies, building energy codes, combined heat and power, state government initiatives and appliance efficiency standards.

Tied with Maine and Colorado, Hawaii scored 26.5 out of a total 50 possible points; a two-point improvement over last year.

One area where Hawaii really shined was in the amount of electricity the state actually saved.

Hawaii ranked third in terms of overall energy savings, and tenth for its energy efficiency program and policies.

But, the state scored zero points in the natural gas category because there is no natural gas service for customers.

As such, the state was unable to earn the additional four points that were available in the category, which would have helped elevate the state to a top ten ranking overall.

The state has a plan on achieving 30 percent energy efficiency by 2030.

# Replacing old appliances and get a rebate - Bounty Program



*Posted: Oct 28, 2011 8:27 AM*
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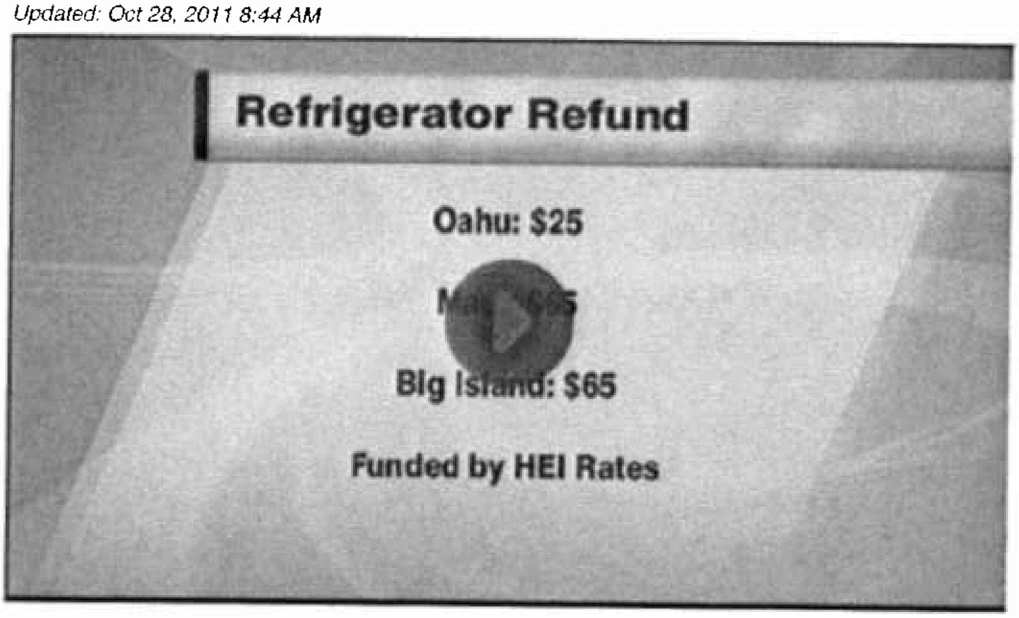

(HawaiiNewsNow) - I promised you information about your refrigerator. Older appliances use more electricity, so it makes a lot of sense for everybody if you can replace your old appliance with a new one. Derek Sunoda is here from Hawai'i Energy. That sounds generic but it's a very specific operation, so let's start by having you explain what it is.


It's the group that's involved with getting everyone to be energy efficient and conserve electricity.

Does it take money from the electric bills?

It takes a small portion of it and cuts it into this program, so we can do good things, and the good things that we're here to explain today is called the "Bounty Program". What we realize, working with so many households around the state, is we love our refrigerators and our freezers. We love them so much, we never want to give them up, then we collect them. We collect them almost like collectibles, and a family can have anywhere from just one to like four or five, six or seven, the largest one I know, this older lady had eight units in her house.



The one in your carport probably is mostly just keeping the same food cold for a really long, long time. But apart from, that the newer appliances, no matter how many they are, don't use as much power.

Exactly. They can use two to three times less power, just depending on how old your unit is and the condition that it is. So what we're trying to do is make sure that these units get off the grid.

How much are you offering if somebody gets with the program and replaces an older inefficient unit?

On Oahu it's going to be $25 that we offer the rebate. On the neighbor islands, it's $65 for Hawai'i and Maui. We're going to be coming soon to the other two islands, but for those three major islands we offer this service.

The hard part about getting rid of the old ones isn't really how much money we will give you. It's more the service of getting rid of them. So many people, the kids have moved out, they don't have access to a truck. They don't want to bother anybody. So we've made it really simple.

Don't have a vehicle to take it to recycle? No Problem. Hawaii Energy will make arrangements for a pickup.

You call Hawai'i Energy and say "hey, I want to get rid of my extra or old fridge or freezer" and we'll send the trucking service over there.

Where can somebody go for more information?

We want you to go to HAWAII ENERGY or call us on Oahu, call 537-5577, and on the neighbor islands we have a toll free number, 1-877-231-8222.

*Categorized* | **Business, Energy**

# Hawaii ranks 12th in United States in energy efficiency

Posted on 7:59 am, Friday, October 28, 2011. Tags: american council for an energy-efficient economy, energy efficiency, ray starling



MEDIA RELEASE

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Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by SAIC under contract with the Hawaii Public Utilities Commission, serving the islands of Hawaii, Lanai, Maui, Molokai and Oahu. Hawaii Energy offers cash rebates and other incentives to residents and businesses to help offset the cost of installing energy efficient equipment.

In addition to rebates, the program conducts education and training for residents, businesses and trade allies to encourage the adoption of energy conservation behaviors and efficiency measures.

The program plays an important role in helping to achieve Hawaii's goal of reducing total electric energy usage by 30 percent or 4.3 billion kWh by 2030.

— Find out more:
www.HawaiiEnergy.com

http://aceee.org/research-report/e115

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Posted: Friday, October 21st, 2011 7:02 AM HST

# Bounty Program offering money for old refrigerators or freezers

By 67AM KPUA News

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program is offering a new Bounty Program, giving cash to people who turn in old inefficient refrigerators or freezers.

Starting this week through June 2012 or as long as funds are available, the Bounty Program will pick up and recycle old working refrigerators or freezers for free and pay $65 cash for them.

Incentives are available on a first-come, first-served basis to electric utility account holders, with a limit of one refrigerator and one freezer per household.

For more info call toll free 1-877-231-8222.

# Hawaii Energy To Pay Cash for Old Refrigerators

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program, has announced it will pick up and recycle old working refrigerators or freezers for free and pay cash for eliminating those old units. Households on Hawaii Island and Maui will get $65, and those on Oahu will get $25. Those old “energy hogs” cost households $380 a year in energy costs on Oahu, $420 on Maui and $490* on Hawaii Island. The goal of the Bounty Program is to eliminate old, inefficient refrigerators or freezers. Twenty-year-old refrigerators can use two to three times more electricity than new ENERGY STAR® models.

“Many homes have older refrigerators in their garage using up a lot of electricity. It takes a lot of effort to properly dispose of these appliances, which are costing hundreds of dollars to operate every year,” said Ray Starling, Hawaii Energy Program Manager. “Our Bounty Program makes it easy, and incentivizes electric utility customers to surrender old, but operational refrigerators and freezers to save money, and contribute to reducing Hawaii’s dependence on imported oil. All that people need to do is call us, and we take care of the rest.”

To participate in the Bounty Program, on Oahu call 537-5577, and on Maui and Hawaii Island call toll free 1-877-231-8222. The Bounty Program is offered through June 22, 2012, or as long as funding lasts. Incentives are available on a first-come, first-served basis to electric utility account holders, with a limit of one refrigerator and one freezer per household. The appliances must be full size (at least 14 cubic feet) and currently in use to qualify. Some restrictions may apply, call for more information.

Hawaii Energy has two other refrigerator offers. Residents can receive a $50 rebate when they purchase a new ENERGY STAR® refrigerator (with a minimum size of 16 cubic feet and price of $600 or less). Or, if they purchase a new ENERGY STAR refrigerator and recycle the old working refrigerator, residents can get a $125 rebate with Hawaii Energy’s “Trade-up for Cool Cash” offer.

For more information on these and other Hawaii Energy offers, go to http://www.hawaiienergy.com/.

# Hawaii Energy offers to haul off old working refrigerators

POSTED: 12:18 p.m. HST, Oct 19, 2011

By Star-Advertiser staff

Residents on Oahu, Maui and Hawaii island can have their old working refrigerators hauled away for free and receive a cash rebate under a new “Bounty Program” launched Wednesday by Hawaii Energy.

Hawaii Energy, which administers the state’s energy conservation program, is offering rebates of $25 on Oahu and $65 on the other islands for working refrigerators and freezers that meet program criteria.

“Many homes have older refrigerators in their garage using up a lot of electricity. It takes a lot of effort to properly dispose of these appliances, which are costing hundreds of dollars to operate every year,” said Ray Starling, Hawaii Energy program manager.

The program will run through June 22, 2012, or as long as funding lasts. Incentives are available on a first-come, first-served basis to electric utility account holders, with a limit of one refrigerator and one freezer per household.

The appliances must be full size (at least 14 cubic feet) and currently in use to qualify. Some restrictions may apply. For more information call 537-5577 on Oahu, and (877) 231-8222 on Maui and Hawaii island.

Hawaii Energy has two other refrigerator offers. Residents can receive a $50 rebate when they purchase a new Energy Star refrigerator with a minimum size of 16 cubic feet and price of $600 or less. Or, if they purchase a new Energy Star refrigerator and recycle the old working refrigerator, residents can get a $125 rebate.

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# Hawaii residents can cash-in on old refrigerators and freezers

Posted on 10:57 am, Wednesday, October 19, 2011. Tags: conservation, hawaii energy



MEDIA RELEASE

**Hawaii residents can get CASH plus Free hauling and recycling for their old refrigerator or freezer from Hawaii Energy**

HONOLULU, October 19, 2011— Hawaii Energy, the ratepayer-funded energy conservation and efficiency program, wants to help residents achieve energy savings in their homes by incentivizing them to turn in old refrigerators or freezers, and to use compact fluorescent lights (CFLs).

Starting today, Hawaii Energy will pick up and recycle old working refrigerators or freezers for free and pay cash for eliminating those old units. Oahu households will receive $25, and Maui and Hawaii Island households will get $65. Those old "energy hogs" cost households $380 a year in energy costs on Oahu, $420 on Maui and $490* on Hawaii Island. This offer is coming soon to Molokai and Lanai.

The goal of the Bounty Program is to eliminate old, inefficient refrigerators or freezers. Twenty-year-old refrigerators can use two to three times more electricity than new ENERGY STAR® models.

"Many homes have older refrigerators in their garage using up a lot of electricity. It takes a lot of effort to properly dispose of these appliances, which are costing hundreds of dollars to operate every year," said Ray Starling, Hawaii Energy Program Manager. "Our Bounty Program makes it easy, and incentivizes electric utility customers to surrender old, but operational refrigerators and freezers to save money, and contribute to reducing Hawaii's dependence on imported oil. All that people need to do is call us, and we take care of the rest."

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**Additional Hawaii Energy Refrigerator Offers**

Hawaii Energy has two other refrigerator offers. Residents can receive a $50 rebate when they purchase a new ENERGY STAR® refrigerator (with a minimum size of 16 cubic feet and price of $600 or less). Or, if they purchase a new ENERGY STAR refrigerator and recycle the old working refrigerator, residents can get a $125 rebate with Hawaii Energy's "Trade-up for Cool Cash" offer.

**$1 Instant CFL Rebate Program**

Hawaii Energy offers a $1 instant rebate for each compact fluorescent light (CFL) residents purchase at participating retailers. By replacing just ten old-fashioned incandescent bulbs with CFLs, households can save $100 to $140* a year on their electric bill. CFLs use 75 percent less energy to produce the same amount of light as incandescent bulbs. Switching to CFLs is a quick and easy way to start saving energy and money immediately. Instant rebates for money-saving CFLs are available at City Mill, Costco, Don Quijote, Home Depot, Longs Drugs/CVS, Lowe's, Safeway, Sam's Club and Wal-Mart.

For more information on these and other Hawaii Energy offers, go to www.HawaiiEnergy.com

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You might be interested in:

1. Cash incentives for Energy Star refrigerators
2. Cash reward for turning in old appliances
3. Hawaii Energy program offers $250 rebates for Maui and Hawaii County residents

COMMENTS REDACTED

FOREST CITY
RESIDENTIAL MANAGEMENT

October
November
December
2011

# COMMUNITY NEWSLETTER

## Contact Information

### Management Team:

**John Pampalone**
Resident Services Manager
(MCB Hawaii)

**Inez Corenevksy**
Resident Services Manager
(Manana & Camp Smith)

**Tatiana Quong**
Relocation Services Manager
(MCB Hawaii, Manana & Camp Smith)

**Barbie Quinones**
Assistant Resident Services Manager
(MCB Hawaii)

### Websites:

**Forest City Marines Hawaii**
www.fcmarineshawaii.com

**Conservice**
www.militaryutilities.com

### K-Bay MCB Hawaii:

**Resident Services Office**
808.839.8700

**Relocation Office**
808.839.8720

**Maintenance Office**
808.833.HELP (4357)

### Manana/Camp Smith:

**Resident Services Office**
808.839.8750

**Maintenance Office**
808.839.HELP (4357)

### Other Important Numbers:

**Emergency**
808.257.9111

**Military Information**
808.449.7110

**Military Police**
808.257.2103

# A Boo-tiful Halloween!

It was a scary but sweet Halloween at Forest City this year.

Droves of cute characters, beautiful princesses, and terrifying creatures of the night were among the groups who descended on our offices in search of treats. Fortunately, we were able to scare up some goodies for our frightful visitors.

Thanks to everyone who stopped by to share the Halloween spirit. Here are pictures of a few of our favorite trick-or-treaters.

**Above:** The Flintstones
(L-R) Nicholas, Sophia, Lauren, & Stephen O'Loughlin

Minnie Mouse & Monster (Brooklynn & Landon Stevenson)
Strawberry Shortcake (Emilee Laffolette)

Pumpkin (Mackenzie McMurry)

Little Devil (Ian Latham)

Knight (Isaac Ealy)

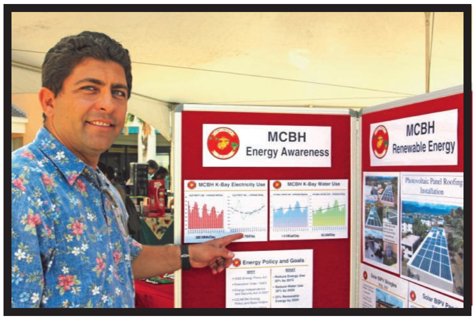
Halloween Kitty
(Victoria Kinzer)

Princess Jasmin
(Sophia Malecki)

Batman (Carson Ezell) & Hula Girl
(Madison Rose Martinez)

Dog the Bounty Hunter
(Talon Lynch)

# Energy Awareness Fair




Use your power wisely.

That was the message behind the 2011 Energy Awareness Fair held at the Mokapu Mall on October 20th. Representatives from various MCB Hawaii conservation programs were on hand to provide information on ways the base is working to conserve energy and how you can help. The Energy Awareness Fair also included organizations promoting energy efficient appliances and solar panels.

Currently, MCB Hawaii spends over 2 million dollars per month for electricity. This has helped justify the expense of upgrading systems and exploring innovations that can help conserve energy. Not only do these programs save money in the long term, they also help reduce Hawaii's dependence on fossil fuels shipped from the Mainland and abroad.

Forest City was one of the companies providing information and treats at the fair. Forest City handed out candy, crayons and coloring pages and did a drawing for smart powerstrips (a $40 value).

Eighteen lucky winners received 6-outlet advanced powerstrips which reduce the amount of standby/phantom power consumed by the electronic devices plugged into them. Phantom loads from electronics that are turned off account for 5% of the average electric bill. The powerstrips were donated by Hawaii Energy as part of their energy conservation and efficiency program promoting a greener future for Hawaii.

**Pictured:**

**Above Left:** Dragos Oprescu, Resource Efficiency Manager MCB Hawaii, explains some of the energy initiatives underway at MCB Hawaii.

**Above:** Barbie Quinones and Justin Allen from Forest City offer residents a chance to win smart powerstrips.

# Malama Ka 'Aina

Malama Ka `Aina Week was held Oct 24 - 28th.

"Malama Ka 'Aina" is a Hawaiian term meaning "caring for the land". Hawaiians traditionally worked to maintain a balance between people and their environment. Malama Ka 'Aina Week helps to bring this important concept to the forefront and provide ways for each of us to help care for the land here in paradise.

To help residents "get their green on" in celebration of Malama Ka 'Aina Week, residents were invited to pick up grass seed from our offices or our Self-Help Warehouse. Various groups on the base and throughout Hawaii organized beach cleanups and other activities during the week to care for the land.

# This-N-That

## Things You Should Know

### Box Tops for Mokapu

Forest City's K-Bay office is collecting Box Tops for Education for Mokapu Elementary School. Drop off your box tops today and help our local school buy supplies.

Forest City's employees have already donated 90 box tops.

### Happy Thanksgiving!

In honor of one of our favorite holidays, we'll be launching a little coloring/drawing contest for keiki to say "thanks!" to our residents.

Stay tuned for more details as we get further into November.

### Resident Surveys

Thank you for sending in your resident satisfaction survey. We greatly appreciate the time and effort you put into completing the survey and returning it. Surveys were submitted by 38.5% of our residents.

We take your feedback very seriously so we'll be reviewing your comments and ratings to identify ways we can serve you better.

# An ENERGY STAR appliance trade-in program

WHAT IS HUI UP?

*Hui Up!* is a community-based Blue Planet program that provides an opportunity for Hawai'i residents to become more energy-efficient via an appliance trade-in program. *Hui Up!* was developed to help overcome cost barriers and allow everyday residents to realize the benefits of clean energy. As Jeff puts it: "This is about the power of community. By working together to reduce their energy use, Moloka'i residents were able to leverage volume purchasing to drive down the refrigerator price. *Hui Up!* was designed to harness this community approach to make smart energy choices."

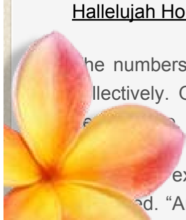
hui UP! powered by blue planet FOUNDATION

Our partner on-the-ground is Sust'AINAble Moloka'i, the group that has made the program a reality. After a successful CFL campaign in 2010, they gauged the public interest, collected sign-up sheets, handled the administrative tasks, coordinated student energy monitoring training sessions, brought together local partners, scheduled pick-ups and drop-offs, distributed all relevant information, and continue to rally the community.

"Hui Up! helps create 'community' in several ways," explained Sust'AINAble Molokai's executive director Emillia Noordhoek. "There's this collective drive to become more energy self-sufficient, there's a sharing of information, and with the students involved, there's an understanding that what we're doing is creating a better tomorrow for our community."

In cooperation with Alu Like's Hoala Hou program for at-risk youth, they also developed an educational component, whereby students visited each household to conduct an energy assessment. Using hand-held energy monitors, annual energy usage and costs were calculated, and the students shared the results with the residents.

"The refrigerator that I have out here, when the Hui Up! people came and did the assessment with their little gizmo, it was one hundred dollars a month just for that one refrigerator!" shared Hui Up! participant Capt. Clayton Chingof Hallelujah Hou Fishing. "I had no clue. The estimate for the new one is a fourth of that."



he numbers were eye-opening: They discovered that each household would save around $550 a year, or $31,000 llectively. Over the next 10 years, they will displace 1,560 barrels of oil and 700 tons of greenhouse gases. In the [illegible] these 56 families will save more than $310,000 in energy costs. How's that for the power of community!

expensive for everything here because we're so isolated," Leilani Chow, one of the student leaders, d. "And the environment is really important to us because we're on a small island, and this is all the space we get, so we have to do as much as we can to take care of it."

Capt. Ching chimed in, echoing the notion of community responsibility, saying, "My thinking is that oil is not forever. And everybody has to do their
part to do what they can, to be a part of the whole puzzle."

Hawaii Energy committed toward the purchase of each refrigerator: American Recovery and Reinvestment Act (ARRA) funds directed by the Department of Business, Economic Development and Tourism (DBEDT), State Energy Office provided $200 and the Public Benefits Fee provided the remaining $50 for each rebate.

"We're really excited to be one of the partners in the Hui Up program," said Derrick Sonoda, director of operations at Hawaii Energy. "Neighbor island residents and businesses pay the highest rates in the nation for electricity and the Molokai community has been really receptive and eager to participate, so we want to do as much as we can to help

- F.A.Q
- Hui UP Application
- Hui UP Video



- News Link
- Photos
- Uncategorized
- Video

- Video
- Video – Moriah Jenkins
- Molokai model makes news to India! A Model for Change?
- Video – Molokai CFL Project Official Webisode Now Available!
- News – Molokai residents see the light: swap out incandescent bulbs for CFLs (ProudGreenHome.com)

them reduce their usage and save money."

Other community partners without which *Hui Up!* would not be possible include: Servco Home and Appliance Distribution, Maui Economic Opportunity, Kuha'o Business Center, Alu Like/Ho'ala Hou, Makoa Trucking, and Refrigerant Recycling.

Moloka'i residents had the choice of purchasing an 18.3 cu ft refrigerator for $250 or a 25.2 cu ft refrigerator for $750, a tremendous discount off retail prices for appliances that they would have otherwise had to purchase and ship in from off-island. The group buy is a continuation of the community-driven energy efficiency initiative that Blue Planet launched in 2010, during which island residents successfully replaced 36,000 incandescent bulbs with CFLs. The campaign saves the community $6.5 million over the bulbs' lifetimes.

How does it work?

After completing the application form, you will be contacted by the Blue Planet Youth Team to schedule a home visit to measure your energy consumption. In addition to providing energy-saving tips, the youth team will determine the estimated energy savings possible via refrigerator trade-in and other appliance upgrades. You will be notified if your household is chosen to participate in the Hui Up program.

A limited number of predetermined models will be made available to program participants. These candidates will be asked to make a good-faith, non-refundable deposit. The bulk order will be placed once all deposits are confirmed.

Delivery will take an estimated 4-6 weeks once the refrigerators are ordered. We will dispose of your old electric refrigerator upon trade-in. Please contact Emillia Noordhoek of SustAinable Molokai at emillia@sustainablemolokai.org with any concerns.

Interested applicants: Please fill out the form below, contact us at huiup@blueplanetfoundation.org or send applications to Emillia Noordhoek of SustAINAble Molokai at 808-216-3663 or emillia@sustainablemolokai.org.

Note: The refrigerator you are replacing must be electric-powered. Propane-powered refrigerators are not eligible for this program.

Due to overwhelming demand, your request will be placed in our wait list. However, we encourage you to list your name and as soon as space opens up, we will contact you about completing your application.

Community Partners

Name *

First

Last

Address -- Note: This program is for Moloka'i Residents Only *

Street Address

Address Line 2

City

Hawaii

State

Zip Code

Number of people living at this address *

Number of bedrooms

Number of bathrooms

Average monthly electricity bill

Email

Phone

What is your household's annual income?

- Less than $25,000
- $25,000 - $40,000
- $41,000 - $55,000
- More than $55,000

Website

http://

How many refrigerators do you own? Please list model, year, size.

| | |
|---|---|
| GE ENERGY STAR 18.2 Cu.Ft.<br>Top-Freezer Refrigerator<br>Uses 335 kWh per year.<br>Price:$250 (after rebate)<br>More Information (pdf) | GE ENERGY STAR 25.3 Cu.Ft.<br>Side-by-Side Refrigerator with Dispenser<br>Uses 578 kWh per year.<br>Price:$750 (after rebate)<br>More Information (pdf)<br>This model is no longer available. |

Why do you want to participate in Hui UP?

Submit



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Web Site by Christopher Green Design

Honolulu Star Advertiser





# THE GREEN LEAF

« Hawaii Conservation Conference in August

## Molokai residents "hui up" for energy-efficient fridges

July 26th, 2011
By Nina Wu

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Molokai residents were able to swap clunker fridges for more energy-efficient models this morning as part of the Blue Planet Foundation's "Hui Up! program" coordinated by Sust'AINable Moloka'i. Photo Courtesy of Blue Planet Foundation.

Molokai residents this morning lined up at Kaunakakai Regional Park to swap their old, clunker refrigerators for ENERGY STAR models at a significant discount price negotiated by the Blue Planet Foundation.

The options: An 18.3 cubic unit fridge for $250 or 25.2 cubic unit fridge for $750.

The newer, energy-efficient fridges are expected to save 56 households an average of $550 a year each, according to the foundation, which is close to $31,000 collectively.

It's all part of the foundation's "Hui up! program," which is being coordinated by Sust'AINable Moloka'i. The goal was to help overcome cost barriers (shipping fridges to Molokai requires logistics).

The same group helped shepherd the CFL and incandescent light bulb swap throughout Molokai households last year — some 36,000 incandescent bulbs were replaced with CFLs.

Queen Lili'uokalani Chidren's Center purchased fridges for two households.

The fridge swap started at 7 a.m. this morning and continues until 7 p.m.

Each Hui Up! participant also receives a Belkin Conserve Insight Energy Use Monitor.

Students from Alu LIke's Hoala Hou program for at-risk youth were trained to assess household energy use on Molokai in three training sessions earlier this year. The students will measure Hui Up! homes with the new fridges, and compare the energy usage to the old fridges.

Hui Up! is a program run by the Blue Planet Foundation in partnership with Hawaii Energy (which provided a $250 rebate for the purchase of energy-efficient fridges), Servco Home and Appliance Distribution and Maui Economic Opportunity. Financing for the rebates came from the DBEDT's energy office and American Recovery and Reinvestment Act (ARRA) funds.

**Posted in Energy | No Comments »**

## Leave a Reply

Name (required)

Mail (will not be published) (required)

Website

Submit Comment

August 1, 2011 - 8:46 AM



# Molokai residents get a generous discount

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Published: 7/26 6:47 am
Updated: 7/26 6:49 am

Video Images

Good opportunity here as sixty households on Molokai will be getting brand new refrigerators today at significantly reduced prices through an energy conservation program put together by the Blue Planet Foundation and Sustainable Molokai. A bulk purchase of energy-efficient refrigerators was made and the recipients could save as much as 150-thousand-dollars in electricity costs over the next five years. Molokai households getting the new appliances will also get energy use monitors to see how much they save.

## Top Photo Galleries


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Celebrities-Males


Around the World - Monday

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## Wake Up 2day

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Style 'N 2 - locally made accessories
Ask A Specialist: World Breast Feeding Week
National Night Out hits streets tomorrow
KPD still looking for missing Koloa woman
More Wake Up 2day

## Most Popular

Eight month-old puppy brutally attacked in Waianae for no reason
Diver killed after being hit by boat in waters off Lanai
Kahuku community crushed over latest football controversy
TRAFFIC ALERT: Full closure H-1 freeway, west bound direction
Kahuku football head coach put on indefinite leave
President Obama: Debt deal reached



## Associated Press Video

Attachment H
Page 113 of 131

# Be Green 2: "Hui Up" program

Reported by: Kirk Matthews
Email: kmatthews@khon2.com



Published: 7/26 5:24 pm
Updated: 7/26 5:46 pm



Energy conservation can take place in small steps, and that is the case on the friendly isle of Molokai.

Some months back, a program was started to replace incandescent bulbs with CFL's on Molokai.

"We started off last year in Molokai changing out lots of light bulbs, energy-efficient light bulbs. So the concept of "Hui Up" is again bringing the community together and everyone working together," said Francois Rogers from the Blue Planet Foundation.

Yes, the name of the group is "Hui Up" and their ambition is moving up.

"So this year we decided we should change out refrigerators with Energy Star appliances to reduce energy," said Rogers.

And why did Blue Planet pick Molokai for this experiment?

"Because Molokai does pay one of the highest electricity rates possibly in the nation and we always want to focus on how can we reduce the energy consumption by providing ways and means of doing that," said Rogers.

By some standards, this is a modest project - with the help of Servco, getting 60 residents to change to Energy Star refrigerators.

"I think our ultimate goal is that they all save money instantly because of changing out the refrigerators, the old refrigerators. And then again, it is saving electricity - conservation always the key," said Rogers.

We mentioned Servco, but there are lots of partners with Blue Planet in this venture.

"Our biggest partner is sustainable Molokai who is doing most of the groundwork right now in Molokai. They're working with the students, the residents to make this happen. We do have other partners for funding purposes - DBED AARA energy office who's helping with funding," said Rogers.

Savings for consumers means savings for us all.

"First of all, I think conservatively, I think we could look at five years at the life of the refrigerator - even longer of course. But if you've got the first five years, I think the 60 plus residents who are receiving this will save about 150 thousand in total costs," said Rogers.

Students will play a big part in the Hui Up program, monitoring the energy savings of Molokai residents taking part in the program.



Attachment H
Page 115 of 131

Posted by: Catharine Tagged in: energy efficiency

It's like Christmas in July: Today, our first group of *Hui Up!* participants on Moloka'i picked up their brand-new, ENERGY STAR refrigerators at Kaunakai Regional Park. A total of 56 high-efficiency refrigerators were delivered to the island, a mix of 18.2 cu ft and 25.3 cu ft models that were made available for purchase at $250 and $750, respectively. The volume discount (a la Groupon) negotiated by Blue Planet received enormous interest, and we hope to have a third container ordered in the coming weeks.

What is this *Hui Up!,* you ask? ...

***Hui Up!*** is a community-based Blue Planet program that provides an opportunity for Hawai'i residents to become more energy-efficient via an appliance trade-in program. *Hui Up!* was developed to help overcome cost barriers and allow everyday residents to realize the benefits of clean energy. As Jeff puts it: "This is about the power of community. By working together to reduce their energy use, Moloka'i residents were able to leverage volume purchasing to drive down the refrigerator price. *Hui Up!* was designed to harness this community approach to make smart energy choices."

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Learn More

The Honolulu Theater put on a show about sustainability.  We were there.

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The numbers were eye-opening: They discovered that each household would save around $550 a year, or $31,000 collectively. Over the next 10 years, they will displace 1,560 barrels of oil and 700 tons of greenhouse gases. In the next decade, these 56 families will save more than $310,000 in energy costs. How's that for the power of community!

"It's really expensive for everything here because we're so isolated," Leilani Chow, one of the student leaders, explained. "And the environment is really important to us because we're on a small island, and this is all the space we get, so we have to do as much as we can to take care of it."

Capt. Ching chimed in, echoing the notion of community responsibility, saying, "My thinking is that oil is not forever. And everybody has to do their part to do what they can, to be a part of the whole puzzle."

Hawaii Energy committed toward the purchase of each refrigerator: American Recovery and Reinvestment Act (ARRA) funds directed by the Department of Business, Economic Development and Tourism (DBEDT), State Energy Office provided $200 and the Public Benefits Fee provided the remaining $50 for each rebate.

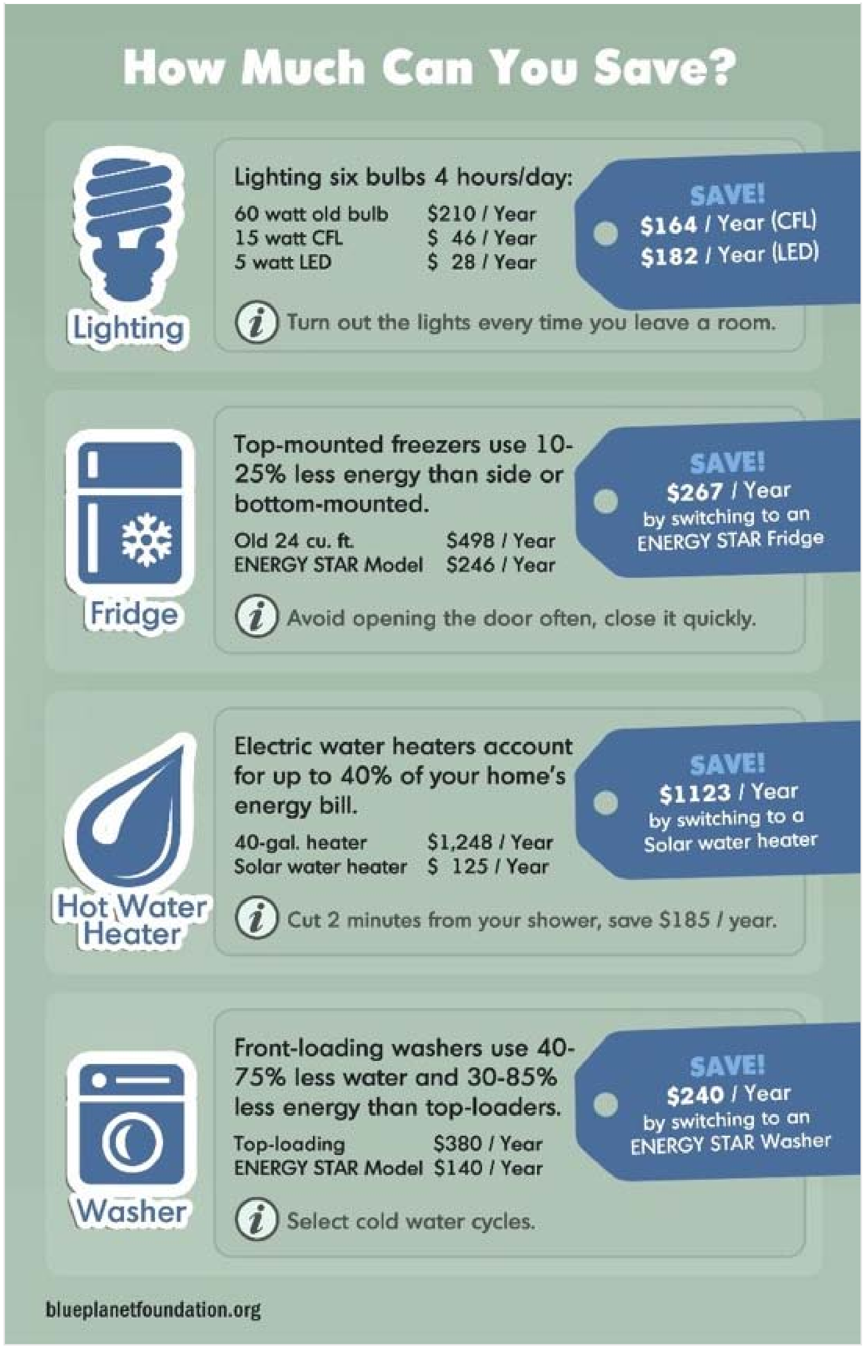
"We're really excited to be one of the partners in the Hui Up program," said Derrick Sonoda, director of operations at Hawaii Energy. "Neighbor island residents and businesses pay the highest rates in the nation for electricity and the Molokai community has been really receptive and eager to participate, so we want to do as much as we can to help them reduce their usage and save money."

Other community partners without which *Hui Up!* would not be possible include: Servco Home and Appliance Distribution, Maui Economic Opportunity, Kuha'o Business Center, Alu Like/Ho'ala Hou, Makoa Trucking, and Refrigerant Recycling.

Moloka'i residents had the choice of purchasing an 18.3 cu ft refrigerator for $250 or a 25.2 cu ft refrigerator for $750, a tremendous discount off retail prices for appliances that they would have otherwise had to purchase and ship in from off-island. The group buy is a continuation of the community-driven energy efficiency initiative that Blue Planet launched in 2010, during which island residents successfully replaced 36,000 incandescent bulbs with CFLs. The campaign saves the community $6.5 million over the bulbs' lifetimes.

More photos and footage from the refrigerator pick-up in Kaunakakai coming soon. In the meantime, check out this energy efficiency packet that can help you start saving energy--and money--right away.

*** DID YOU KNOW? ***

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## Molokai News Archives



# Hui Up Program brings Molokai energy efficient refrigerators

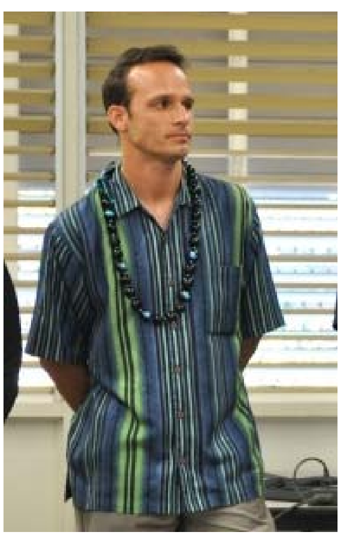
Posted on July 22, 2011 by molokainews

A volunteer from the Hui Up Program tests a refrigerator for energy use.

**Blue Planet Foundation News Release**

Replacing an old refrigerator with an energy-efficient model can reduce electricity bills by as much as $500 a year.

Molokai residents will discover this on Tuesday, July 26, as the first participants in the Hui Up Program, orchestrated by Blue Planet Foundation and Sust'AINAble Molokai, pick up their brand new Energy Star refrigerators at Kaunakakai Regional Park from 8 a.m. to 7 p.m.



Francois Rogers, Special Projects Director at the Blue Planet Foundation, was instrumental in bringing 36,000 CFL bulbs to Molokai. For his efforts, he was honored by the Hawaii Board of Education when it visited Molokai last year. He is now helping bring new Energy Star refrigerators here in the Hui Up Program.

Through Hui Up, Molokai residents have the opportunity to trade in their old refrigerators for Energy Star models at a significantly discounted volume purchase price negotiated by Blue Planet. These first 60 households may save as much as $150,000 in energy costs collectively over the next five years.

Each Hui Up participant also receives a Belkin Conserve Insight Energy Use Monitor that contributes to the program's educational component.

Blue Planet and the Kuha'o Business Center in Kaunakakai hosted three training sessions on Molokai to teach students how to assess household energy use. Under the guidance of Sust'AINAble Molokai, working with Alu Like's Hoala Hou program, students measured the energy consumption of the old refrigerators in Hui Up! homes. They will return in October to assess the difference with the new refrigerators.

The group buy is a continuation of the community-driven energy efficiency initiative that Blue Planet launched in 2010, during which island residents successfully replaced 36,000 incandescent bulbs with CFLs. The campaign saves the community $6.5 million over the bulbs' lifetimes, simultaneously displacing 24,000 barrels of oil and 16,000 tons of carbon pollution.

Hui Up is made possible by program partners Hawaii Energy, State of Hawai'i Department of Business, Economic Development, and Tourism (DBEDT) State Energy Office, American Recovery and Reinvestment Act (ARRA) funds, Servco Home and Appliance Distribution, and Maui Economic Opportunity, Inc. Special thanks to Makoa Trucking for delivery and pick-up services.



Filed under: Business, News, Sustainability

« OHA supports state recognition for Native Hawaiians

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**From the Pacific Business News:**
**http://www.bizjournals.com/pacific/print-edition/2011/07/22/program-gives-homeowners-incentives-to.html**

# Program gives homeowners incentives to use less energy

**Premium content from Pacific Business News - by Linda Chiem, Pacific Business News**

Date: Friday, July 22, 2011, 12:00am HST

**Related:**

Environment, Energy

The growing use of energy-saving appliances among Hawaii homeowners is raising the profile of a state program that pushes for more "green" practices at home by offering incentives and rebates.

Between July 1, 2009, and June 30, 2011, **Hawaii Energy** helped the state save over 165 million kilowatt hours of electricity by issuing $12.8 million in rebates and incentives through its portfolio of residential programs, said **Larry Newman**, residential program leader.

Hawaii Energy is the state's ratepayer-funded energy-conservation and efficiency program administered by Science Applications International Corp., based in McLean, Va.

In early 2009, the state Public Utilities Commission awarded SAIC a four-year contract to manage and expand the energy-efficiency rebate program previously overseen by **Hawaiian Electric Co.**

The two-year savings were enough to power nearly 21,000 homes annually and reduced Hawaii's dependence on imported oil by more than 280,000 barrels of oil, Newman said.

Currently, there is just one state law that actually requires the use of a type of renewable energy at home — the use of a solar water heating system for all new single-family residential construction. The law took effect Jan. 1, 2010.

That means Hawaii residents are taking it upon themselves to buy Energy Star appliances or deploy other energy-saving practices at home — no doubt motivated largely by a desire to save money on their mounting electricity bills.

As a result, a host of Hawaii businesses, ranging from energy auditors and solar contractors to appliance retailers, are benefiting from Hawaii Energy's new and expanded initiatives.

"A lot of people aren't doing it just on the heels of the law that most new homes get solar water heaters ..." said **Jeff Mikulina**, executive director of Blue Planet Foundation. "We have pretty good incentives, but our state's electricity prices are the main driver."

Hawaii Energy issues rebates for energy-efficient appliances that range from $40 for ceiling fans and $125 for refrigerators to $750 for solar water heating systems.

Hawaii Energy is funded by a monthly fee that shows up on electric bills as the public benefits fund, or PBF, surcharge that now averages about $1.92 per ratepayer.

“People are very interested in what they can do to be more energy-efficient, in what kind of rebates are available,” said **H. Ray Starling**, program manager for Hawaii Energy. “And some of the things out there do not cost very much and are just about doing things a little smarter.”

Also, new legislation is designed to expand the use of renewable energy in the home.

Gov. **Neil Abercrombie** last week signed into law House Bill 1520, which directs the Public Utilities Commission to look into developing an “on-bill financing” program that would allow Hawaii residents to pay the upfront costs of solar power installations through their electric bills.

With on-bill financing, homeowners or renters could pay for the installations over time, making them more affordable, proponents of the measure say.

“If this partnership can come together as envisioned ... we can determine whether and how an on-bill financing program can be designed so that more people can participate in Hawaii’s clean-energy future,” Abercrombie said in a prepared statement. “Working together, we can advance our clean-energy goals with the kind of urgency and determination that these times demand.”

**Renewable energy at home:**
**What’s required?**
**Hawaii Revised Statutes 196-6.5:** Solar water heater system required for new single-family residential construction. No building permit shall be issued for a single-family dwelling that does not include a solar water heater system.

*For a list of residential rebates and incentives, visit: www.hawaiienergy.com*

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# LED Switch at Pacific Whale Foundation to Save $50,000

July 21st, 2011 · Comments (0) · Featured, Maui News

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By Wendy Osher

The Pacific Whale Foundation on Maui has made an energy saving move by switching 246 conventional lights to energy-efficient LED lighting. The changes were made at its offices and Ocean Stores in Ma'alaea and Lahaina.

Pacific Whale Foundation employee Tara McBarnett replaces an old halogen bulbs with a new energy efficient LED light bulbs at Pacific Whael Foundation's Ocean Store in Ma'alaea.

The move is expected to cut the organization's energy use by more than 15,000 kwh per year, and prevent nearly 25,000 pounds of $CO_2$ from entering the atmosphere annually.

The LED bulbs were provided free to Pacific Whale Foundation through the state's Hawaii Energy "Lighting the Future" program. The program works to encourage energy conservation and efficiency measures. The projects under the program are aimed at reducing Hawaii's dependence on imported oil.

Hawaii Energy selected Toshiba as its partner in providing this LED offering to qualifying Hawaii small businesses and nonprofit organizations.

According to Hawaii Energy, LED light bulbs reduce lighting electricity costs by up to 75 percent. The energy savings per year for each halogen bulb replaced by an LED bulb, is estimated at up to $78.

Pacific Whale Foundation expects to save about $50,000 per year with the new lights. "It's a win-win for the environment and for Pacific Whale Foundation," said Tapani Vuori, Regional Manager and Retail Buyer at Pacific Whale Foundation. "Because our Ocean Stores raise money for our research, education and conservation programs, this cost reduction step should equate to greater funds for these programs."

"As an organization, Pacific Whale Foundation is always

Photo courtesy Pacific Whale Foundation.

looking for ways to become greener and more energy efficient," said Greg Kaufman, President of Pacific Whale Foundation.



Pacific Whale Foundation won the "Investing in the Environment" Award from Island Business Magazine in 1988, for its many eco-friendly innovations and practices.

"Our corporate culture encourages staff to step forward with their conservation and energy saving ideas," said Kaufman. "Tapani Vuori spearheaded the move to the LED lights. Other staff have helped us find other ways to reduce our carbon footprint. Being more eco-friendly is an extremely important focus at Pacific Whale Foundation."

*** Supporting information courtesy the Pacific Whale Foundation.



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**Tags:** Greg Kaufman · Hawaii Energy · hawiai energy · led hawaii · lighting the future · Pacific Whale Foundation · tapani vuori

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# A bright idea

**What a concept: Energy efficiency is within your power**

**By Vicki Viotti**

POSTED: 01:30 a.m. HST, Jul 17, 2011



One of the most worrisome things about life in Hawaii is its cost, and yet it's hard to get people to act on one of its principal drivers: the price they pay for energy. That, said James Koshiba, may be because they feel it's beyond their control.

"Most of the time we talk about energy in terms of big ideas or policies, wind, geothermal," he said. "There's very little conversation about the individual responsibility for building a more sustainable Hawaii, and yet that responsibility is enormous. Household electricity use and personal transportation, they're the lion's share of what we use."

People have heard all the statistics about how dependent we all are on oil. They cringe when they watch prices tick up on signs posted outside gas stations. But mostly they shrug when asked what they intend to do about it. "What can we do?" would be a typical reply.

Trying to counter the consumers' general sense of powerlessness is what's behind the Energy Challenge, a monthlong campaign to urge a reduction in energy use by 25 percent (combining electricity, synthetic natural gas, liquid petroleum gas or gasoline), basing the comparison on the utility bills and gasoline receipts for June.

It's sponsored by Kanu Hawaii (kanuhawaii.org), the nonprofit organization where Koshiba works as executive director. Kanu is primarily a volunteer network of people trying to weave "sustainability," that buzz word favored by government types, into their real lives. Kanu's modus operandi consists of an annual series of personal challenges oriented around different problems confronting the state. Reducing household and business rubbish, supporting locally grown food, building stronger relationships with neighbors, and engaging with government are among the current targets Kanu tries to hit.

Somehow, Koshiba acknowledged, Kanu has had an easier time drawing participants to those challenges than this one: About 400 had signed on to participate at some level about a week into the July campaign, instead of the thousand or two planners had hoped to see.

"It's hard for people to wrap their head around it," he said. "We don't have an emotional connection to it like we do our food."

Kanu tries to break it down for participants each week. The action for Week 1 is the audit: getting a grip on the current reality of how much energy they



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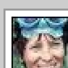
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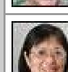
Kokua Line
June Watanabe

consume. There are options ranging from easy ("I will learn how to properly read and understand my utility bills") to hard ("I will buy a home energy monitor through KanuValues and report back to our data tracking hub").

Those who signed on at the start (just after the July 4 holiday) will have finished two challenges, including last week's close encounter with the energy hogs among their household appliances. They were asked to ratchet down their hot-water heater by at least 5 degrees and look for other ways to save.

Today marks the start of the Week 3 Transportation Challenge, in which they can check for fuel efficiency in their car — inflating tires, emptying the trunk, clearing air filters, that kind of stuff. But the ultimate push is to "dump the pump" and use alternative transportation for the whole week. Koshiba, lucky enough to live and work in Kaimuki, has vowed to walk to the office for as much of the challenge as possible.

Finally the campaign ends with participants committing to make an "outreach" effort — talking to friends about conservation at one end of the spectrum to creating a video or other digital presentation to be uploaded to the Kanu site.

There are ways throughout the campaign for sharing the pain and tips, as the case may be. Among those journaling about the experience, not surprisingly, are staff members such as Olin Lagon, director of Kanu social ventures whom Koshiba calls the "Gadget Guy." His blog lists a number of energy-saving gizmos such as a "smart power strip" that turns off energy to devices that are switched off.

People rarely keep track of the energy they're wasting, Lagon said.

"You can't manage what you can't measure," he said. "Think about all the conversations people have about their cell phone service — 'I can add this service, but I can save money if I go with this company.' But we don't do that with energy.

"We're just clueless on what's causing our bills to be what they are."

Consumers often need sweeteners to persuade them to change their habits. The challenge offers rewards to the most successful energy misers, including a solar water heater, a lighting retrofit to cut energy waste and various gift certificates.

Incentives work on an ongoing basis, of course, which is what occupies Derrick Sonoda on a full-time basis. Sonoda is director of operations for Hawaii Energy, the company under contract to the Public Utilities Commission to run the state's conservation and efficiency programs, and he's on the team helping Kanu with the challenge.

The Legislature appropriates funds for rebates and other programs aimed at encouraging the purchase of solar heaters, photovoltaic (PV) cells and other devices that curb Hawaii's collective use of fossil fuels. The money is held by the PUC, but Hawaii Energy gets the payments out to qualifying consumers.

But there's an educational mission as well.

"What we do at Hawaii Energy is we would like people to start paying attention to oil prices," Sonoda said. "Hawaii is the only state that generates 78 percent of its electricity from oil.

"We kind of remind people, it's not just the lights and the air conditioning that uses energy, it's everything. If you go to your doctor, you're using electricity, with all the equipment there, which also had to be brought in to Hawaii.

"When you buy a spam musubi, everything that was involved in making that spam musubi is dependent on oil," he added. "People might say, 'I put PV on my house.' Yes, you did that, but what about your neighbor?"

Not everyone can afford to install costly devices, even with the rebates, but there are many ways to make do with less.

"Conserving electricity, instead of doing PV, is something everyone can do," Sonoda said.

Koshiba said he realized the prevailing attitude is that Americans have become so accustomed to energy consumption at lavish levels that fossil-fuel electricity must be replaced, kilowatt for kilowatt, by renewable energy at the same levels. That proposition seems utterly daunting.

"Most decisions are being based on the assumption that people aren't going to change," he said. "We want to challenge that assumption: If we expect the worst of people that's what we'll get."

Kanu devotees are unapologetically idealistic, but they see a reason to expect progress toward that ideal. Concern about energy gluttony has expanded over the decades from environmental circles to the larger community, Koshiba said, and he wants to see that continue.

"In the past we haven't thought of this as a moral issue, we've always framed this as an environmental issue," he said. "But it really is our responsibility to the next generation.

"When you elevate it to that level, that's where big social shifts happen."

**BETTER LATE THAN NEVER**

Anyone who wants to join the Kanu Hawaii Energy Challenge 2011 already in progress can still do so by clicking the link about midway down the home page (kanuhawaii.org). Some pointers for the journey:

» A home energy audit is a good way to see how you compare with your neighbors. Two online calculator sites are offered, the Home Energy Saver Program from the U.S. Department of Energy (hes.lbl.gov/consumer/) and the Hohm Program from Microsoft (www.microsoft-hohm.com). Simply entering your zip code in the Microsoft tool will give you a community average.



Further Review
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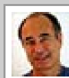
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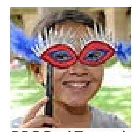
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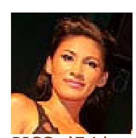
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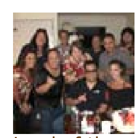
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» From the main portal (www.kanuhawaii.org/challenge/details/?id=14), check out some of the reading links on the right, including downloadable logs for tracking how you're doing with your appliances. Or, from the main page, go to the bottom link, then click onto "share your story" to blog or video post.

» You can dredge up scary facts, too, including this one: A DVR can cost about $100 annually to run. Every hour you use appliances, the money flows out: 74 cents for the water heater, 52 cents for the clothes dryer, 25 cents for the stove.



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# Sovereign Councils of the Hawaiian Homelands Assembly

**Greetings and Welcome to the SCHHA Website!**



## Council closes 13 loans under the Hawaii Energy Hot Water Cool Rates Program

**FOR IMMEDIATE RELEASE:**

July 13, 2011

Honolulu, Hawaii – The Council for Native Hawaiian Advancement (CNHA) closes 13 loans worth $84,500 under Hawaii Energy, Conservation and Efficiency Program's (HE) Hot Water, Cool Rates Program that ended on July 1st. In November 2010, CNHA became a participating lender, and was able to access $1,000 in rebates to be applied towards the interest of solar water heating system loans for its borrowers. These rebates gave CNHA the ability to reduce interest from 6% to 3%, reducing the monthly payments to families, to a low rate of $52 a month (for a $5,500 system amortized over a 10-year period).

"If you want to receive a noticeable reduction to your utility bill, the installation of a solar water heater is the way to go," comments Lilia Kapuniai, CNHA Vice President and Community Services Manager. "Families that are receiving grants and loans through our Homestead Energy Program have seen a near 20% reduction in their monthly utility bill. This is great, when you consider the low monthly payments compared against the benefits gained."

Since 2009, CNHA's Homestead Energy Program (HEP) has provided grants and loans up to $6,500 to families that reside in homestead communities across the State, for the purpose of purchasing and installing solar water heating systems. To date, 137 systems have been installed and 43 systems are in the pipeline – a total economic impact of $1,025,496.

"HEP grants and loans were made possible with the support of our funders – the State of Hawaii Department of Business, Economic Development and Tourism, the State of Hawaii Department of Hawaiian Home Lands, First Nations Oweesta Corporation, the Blue Planet Foundation, and Hawaii Energy," states Kapuniai. "We are focused on making sure Hawaiian communities are not the last households to get off the grid or significantly reduce their energy costs."

On July 8th, the CNHA Board of Directors approved the establishment of a loan product specially designed to fund the purchase and installation of Photovoltaic Systems in homestead communities. CNHA plans to officially launch that product by the end of July.

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### Slideshow

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Hawaii Energy is the state energy conservation and efficiency program implemented to help reduce Hawaii's dependence on foreign oil. The organization's mission is to educate, encourage and give incentives to Hawaii's ratepayers and to try and change conservation behaviors and efficiency measures to help Hawaii's energy obstacles. Hawaii energy incentives include the Government Supplemental Customized Customer Incentive and the Energy Star Residential Incentives

CNHA and its Homestead Energy Program (HEP) has taken full advantage of the generous incentive available to all Hawaii residents and assisted 13 families ($13,000 worth of incentives) in taking advantage of the interest buy down program. HEP provides grants and loans to qualified Hawaiian Homelands beneficiaries to install energy efficient solar water heaters. To date the program has helped homesteaders install over 135 solar units, helping Hawaii's dependency on foreign oil and reducing personal household utility bills

CNHA is a national network of Native Hawaiian Organizations, providing assistance in accessing capital and technical resources, and is a policy voice on issues important to Native Hawaiian communities. Its mission is to enhance the well-being of Hawaii through the cultural, economic, and community development of Native Hawaiians. For more information about CNHA please contact us at 808.596.8155, toll-free at 1.800.709.2642, by e-mail at **info@hawaiiancouncil.org**, or visit our website at **www.hawaiiancouncil.org**.

###

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