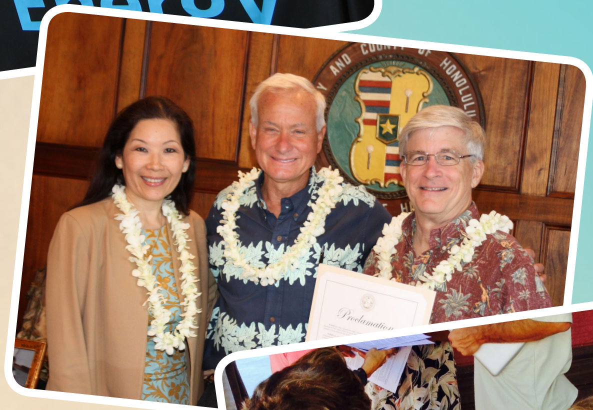

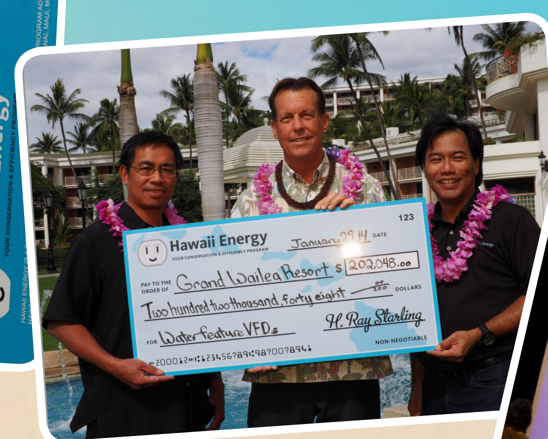

ANNUAL REPORT

Program Year 2013

July 1, 2013 - June 30, 2014

Hawaii Energy
YOUR CONSERVATION & EFFICIENCY PROGRAM

leidos

Annual Report

Program Year 2013

July 1, 2013 – June 30, 2014

This report was submitted to the Hawaii Public Utilities Commission
on November 21, 2014 by:

Hawaii Energy (Leidos Engineering)
Public Benefits Fee Administrator
1132 Bishop Street, Suite 1800
Honolulu, Hawaii 96813

Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by Leidos Engineering, LLC under contract with the Hawaii Public Utilities Commission serving the islands of Hawaii, Lanai, Maui, Molokai and Oahu.

A full report with attachments is available at www.hawaiienergy.com/information-reports.

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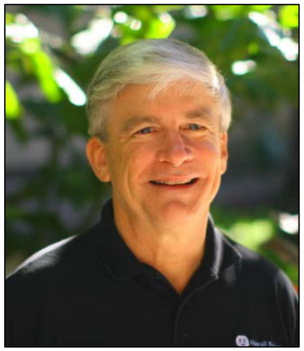
A MESSAGE FROM THE PROGRAM DIRECTOR



On behalf of the entire Hawaii Energy Team, we are proud to submit our Program Year 2013 (PY13) Annual Report, covering July 1, 2013 through June 30, 2014 and highlighting our fifth year as Hawaii's Public Benefits Fee Administrator (PBFA).

This has been another successful and progressive year for energy efficiency in Hawaii. As detailed in this Report, Hawaii Energy's efficiency programs for PY13 will deliver 1.75 billion kWh in lifetime energy savings to the electric grid system at a total program cost of 1.8¢ per kWh (total program costs / total system kWh benefit). This, in turn, will save an estimated equivalent of 2.6 million barrels of oil and 1.5 million tons of greenhouse gas emissions. And, at an average electric utility price of 32.8¢ per kWh, customers will save approximately $517 million on their electric bills over the life of the installed efficiency measures. These figures continue to show the exceptional cost-effectiveness of investing in energy efficiency and why ***efficiency* continues to be Hawaii's premier electric grid resource,** over fossil and renewables.

In addition to meeting our PY13 kWh savings goals at a very attractive cost for our customers, Hawaii Energy made further organizational restructuring and team additions to better facilitate the development and implementation of forward-looking strategies and innovative new measures. We also continued to enhance our customer engagement and build on existing collaborative relationships with our industry allies, Contract Manager, M&V Contractor, Hawaii Public Utilities Commission (PUC) and government leaders. Together, these efforts will help ensure that Hawaii Energy continues to provide best-in-class energy conservation and efficiency programs as required for Hawaii's changing energy future.

Operationally in PY13, Hawaii Energy continued its aggressive engagement with hard-to-reach residential and business customers on neighbor islands; helped more underserved small businesses participate with our Direct Install Lighting Program; accelerated facility-wide LED retrofit, benchmarking and metering programs for Hawaii's large buildings; and continued development of multi-island opportunities to assist water and wastewater operations with energy efficiency upgrades and practices, including publication of a Water & Wastewater Best Practices Manual for Hawaii.

Most significantly this Program Year, Hawaii Energy (as PBFA) designed and built the intake infrastructure and process to support the PUC's bold On-Bill Financing (OBF) initiative, which is expected to be a catalyst for giving all Hawaii electricity consumers a real opportunity to participate directly in the benefits of Hawaii's clean energy future. And at the end of our Program Year, we were quite pleased to be informed of the PUC's intention to extend our PBFA contract for a third year, until December 31, 2016. This convergence of our team's continued service and proven capability as PBFA, along with the PUC's new initiatives, an encouraging market potential study released this year and the strong working relationships we have established thus far promise transformational advances in Hawaii's clean energy progress going forward.

Finally, this Report caps five years of progressive transition from the original legacy rebate program to an innovative, responsive and effective energy efficiency program today that is providing much needed leadership and expertise in accelerating Hawaii's clean energy future.

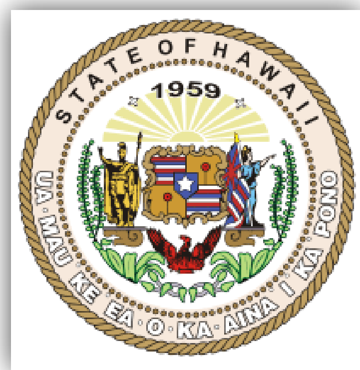
Respectfully submitted,

H. Ray Starling

H. Ray Starling
Program Director

BACKGROUND

Program Origins



In 2006, the Hawaii Legislature (see Hawaii Revised Statutes §269-121 through 269-124) authorized the PUC to transfer the existing demand-side management (DSM) surcharge collected by Hawaii's electric utilities to a third-party administrator that would be contracted by the PUC. The transferred surcharge would be called the Public Benefits Fee and would be used by the contracted third-party administrator (the Public Benefits Fee Administrator or the PBFA) to manage and deliver energy-efficiency and demand-side management programs and services under the oversight of the PUC.

By Decision & Order # 23258 (Docket No. 2005-0069) dated February 13, 2007, the PUC announced it would establish a Public Benefits Fund to promote the development of programs and services that increase energy efficiency, reduce electricity consumption and demand, and ultimately decrease Hawaii's dependence on imported fossil fuels. In 2008, the PUC took further actions to direct the Hawaiian Electric Companies to begin collecting a Public Benefits Fee (PBF) surcharge.

On September 18, 2008, the PUC issued a competitive Request for Proposal (RFP) soliciting proposals and pricing for a Program Administrator for the Hawaii Energy Efficiency Program. Science Applications International Corporation (SAIC) submitted a proposal and was subsequently selected to negotiate a contract with the PUC. As a result of those negotiations, a contract was signed on March 3, 2009 between the PUC and SAIC whereby SAIC would become Hawaii's first PBFA and would operate the Hawaii Energy Efficiency Program until December 31, 2013 (with a possible extension until December 31, 2016 at the discretion of the PUC). The initial two-year budget of the contract was $38.4M, followed by a second two-year budget of $67.2M. For both contracts, 70% of the contract value was designated for direct incentives in the form of direct cash incentives or services.

The complete Program Historical Summary (2009 - 2012) is provided in Attachment G.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Current Year Program Overview

PY13 – Expansion of Program Reach and Harvesting Results from Prior Years Program Assistance

In our fifth year, Hawaii Energy pushed harder than ever to drive the effectiveness of the PBFA investments.

Expanding Reach

- Expanded Water & Wastewater industry assistance and used this as a model to expand our impact to other targeted sectors.
- Providing Program communications, not only through traditional advertising, but through innovative Transformational efforts such as Internet memes and low-cost PR efforts.

Harvesting Longer-Term Efforts

- AOAO submetering projects are a long-lead effort and are continuing to grow to project fruition.
- Large LED projects in which Hawaii Energy engages as a valued partner for participants are often more valuable than the technology and incentives alone.
- The SWH Tune-Up piloted in PY11 was evaluated for efficacy and launched with great success.
- Program improvements to SBDIL can be used to further monitor and refine existing programs

Tuning Programs to Meet Market Conditions

- Hawaii Energy modified the Small Business Direct Install Lighting (SBDIL) program to increase cost effectiveness by restricting T8 retrofits to T12 baselines. By making this modification, the program hopes to grow the SBDIL Contractors from 10 in PY13 to potentially 23 in PY14. In addition, the program continued to refine the automated tools and speed payment for the contractors, as well as played a critical role in dispute resolution for technical and construction performance. The challenge remains to continue to modify the program to both keep the contractors financially interested in participation and keep the SBDIL project costs a competitive part of the measure portfolio.
- The Water and Wastewater program was successful this year in rolling out our *Water & Wastewater Energy Management Best Practices Handbook* (available online at www.hawaiienergy.com/water-and-wastewater). This manual was customized for Hawaii and was coordinated with the release of the *State of Hawaii Water Commission's Training and Water Loss Manual* and training sessions. In addition, Hawaii Energy was engaged across State, Federal and County agencies to assist in the research and discussion of administrative solutions to barriers of project implementation and operational changes. One project can have the potential to save between 7,200,000 kWh and 21,000,000 kWh and $2 - 5 million dollars per year starting in 2014 depending on the outcome of permitting rules put into place at the end of this year. To encourage treatment facility lighting projects in the specialized industrial environment, Hawaii Energy assisted in the selection of LED replacement fixtures for a Maui County wastewater facility resulting in better light quality and quicker restrike to allow the fixtures to be turned off. The project outlined the need to address the challenges of fixture accessibility and awareness of the availability of LED purpose built fixture offerings.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Making Investments

- *People* – PY13 saw the organization reach full staffing levels to help the Program better engage with customers, HECO and up-and-coming energy and efficiency coordination efforts in PY14 (EV, DR, Smart Grid, Codes and Standards).
- *Technology* – Created OBF Web tools, data exchange services and Contractor Administration services that will be leveraged for new Energy Efficiency program offerings.
- *Data* – The program expanded its efforts in data analysis for market segmentation in order to provide valuable information and attract engagement with potential participants. Hawaii Energy purchased facility information data from Hawaii Information Systems (HIS) that incorporated information in Tax Map Key (TMK) and in Multiple Listing Services (MLS) data on properties. This data was correlated with the electrical usage histories and Geographic Information Systems (GIS) data to provide benchmark information for Hawaii. This information will be used to target and engage market segments with greater focus and effectiveness.
- *Spending Time with Customers* – The program drove major LED lighting projects by engaging with potential customers and lighting professionals, providing technical evaluation and following site procurement actions to ensure any hurdles were corrected with incentives, coordination or other Program assistance. Additional savings were achieved beyond the LED efficiency by application of networked controls with daylight and occupancy detection. The success of exterior lighting projects drove participants to follow their success with interior lighting retrofits and allowing their sites to be used as references for lighting manufacturers and retrofit professionals.
- Expanded the residential programs by leveraging the expertise and customer base of existing assistance programs.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Residential Programs

Residential portfolio spent $9,230,037 (97% of target), and achieved 71,239,576 kWh savings (99% of target), 9,493 kW peak demand savings (96% of target) and $68,617,110 in Total Resource Benefit (94% of target).

Implementation	Achievement
Created the Bounty **Rid-A-Fridge program** in partnership with the Hawaii Foodbank (Oahu), The Maui Food Bank and The Food Basket (Hawaii Island).	Over $3,000 was donated to the participating food banks through this program
Continued to **diversify measure portfolio** away from CFLs.	277,589 LEDs in PY13, an increase of 310% from PY12.
Extended the **Solar Water Heating Grant partnership** to include both Hawaii Community Economic Opportunity Council (HCEOC) and the Maui Economic Opportunity, Inc.	A total of 52 solar water heating systems were installed for "in-need" homes on Maui and Hawaii Island.
Expanded the **Peer Group Comparison program** to 57,500 additional households on Oahu.	132,500 recipient households receiving customized energy saving tips and month-to-month tracking progress on their electricity usage.
Grew **Solar Water Heating program trade ally base** to 89 Participating Contractors	2,185 systems
	Launched co-op advertising program for solar water heating participating contractors to receive advertising funds. Four (4) contractors participated and a total of $6,000 was reimbursed for their advertising.
Released and refined a **Solar Water Heating Tune-Up Program** based on feedback from the PY11 Tune-Up Pilot.	The Tune-Up program far surpassed expectations rebating 826 tune-ups performed in four months.
Collaborated on **Hui Up** with Blue Planet Foundation and Sust`AINAble Molokai to coordinate efforts to help residents exchange and recycle their old, inefficient refrigerators for heavily rebated ENERGY STAR® refrigerators.	Distributed 220 refrigerators to "in-need" households in Molokai through the Hui Up program.
Launched **bi-monthly residential e-newsletter** highlighting the program, res offers and rebates.	Grew opt-in list of engaged subscribers to 9,000 emails. Average open rate was 35%, which is the number of recipients who viewed the email.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Business Programs

Business portfolio spent $11,194,615 (96% of target), and achieved 55,765,938 kWh savings (77% of target), 7,294 kW peak demand savings (89% of target), and $87,925,661 in Total Resource Benefit (83% of target).

Implementation	Achievement
Increased incentive for **Electrically Commutated Motors (ECM)** with a push to increase awareness for this promising measure.	Successfully drove a large resort property to install ECMs in all 1,300 guestrooms and receive a $72,050 incentive.
Developed new incentive for large energy-efficient **Uninterruptible Power Supply (UPS)** systems.	A Higher Education Data Center received $55,575 incentive for the installation of a new UPS system achieving significant savings produced by the 8,760 hour per year operation, 413,000 kWh per year and 47 kW.
Harvested the results from years of work in the **Condo Submetering** program promoting equitable distribution and created direct financial responsibility of electrical consumption.	11 more condo and apartment complexes totaling 2,364 units. The largest project resulted in an $111,000 incentive for the submetering of 740 dwelling units reducing their energy consumption by over 179,000 kWh/year and demand by 21 kW.
Drove major **LED Exterior Lighting** projects with technical and financial assistance.	• $455,489 incentive motivated a large retail mall to do a LED replacement of old metal halide fixtures throughout the parking structure achieving cost savings of $702,000 per year, 2,679,000 kWh per year and 201 kW. • $43,786 incentive to the County of Hawaii for converting 857 of their low pressure sodium streetlights to LED streetlights saving $145,000, 360,000 kWh/year and reduced demand by 55 kW.
Assisted in **Innovative and Specialized Retrofits**	$91,484 incentive for the installation of a high efficiency rotary plastic bottle blower used to inflate plastic blanks inside of a shape mold. The old machine exhausted the compressed air after each bottle was pressed into the mold. The new machine recaptures compressed air, substantially reducing energy consumption by 600,000 kWh a year.
Continued success in **Commercial Water Pumping Improvements**	A $202,048 incentive to a Maui resort hotel for the installation and redesign of all of their water pumps on their pools and water features expected to save over 1,000,000 kWh per year and reduce demand by about 140 kW, saving the resort over $300,000 per year.
Refined **Direct Install program**	545 small businesses and restaurants were served, providing annual energy savings to these customers of over 4.5 million kwh.
Launched **quarterly business e-newsletter** highlighting the program, business offers and rebates.	Grew opt-in list of engaged subscribers to over 700 emails. Average open rate was 40%, which is the number of recipients who viewed the email.
Highlighted the successes of local businesses that have utilized the program and received incentives for their energy efficiency efforts by promoting them through **check presentations.**	A total of seven (7) local businesses were featured in check presentations and a monthly *Hawaii Business Magazine* ad. First program year where we brought public relations in-house. This enabled us to promote the program more efficiently and effectively to the local media.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Transformational Programs

Through the expertise and collaboration of Hawaii Energy and its subcontractors throughout PY13, the Transformational Program met and exceeded its goals for the Program Year.

Implementation	Achievement
"Sharing the Aloha" community workshop expansion with the addition of sessions held at large employers such as resorts, hospital and non-profits.	Achieved a new high of 3,101 attendees.
Memes – Worked with Kanu Hawaii to develop and distribute various energy-saving topics in the form of "memes," an item in the form of an image, video, phrase, etc., that is spread via the Internet and often altered in a creative or humorous way.	• In three months, memes resulted in 614,542 social media views of which 19,394 people took the next step and engaged in an action to read more, share, comment, view video, etc. • This approach to engage through social media, bring energy efficiency to new viewers, will be used to drive future participation of Hawaii Energy's offerings.
Pay it Forward - Piloted an offering with Kanu Hawaii to teach people how to use a simple mechanical plug timer to save energy by controlling "vampire loads" and then get those participants to help others do the same.	• Reached over 20,000 Hawaii residents via email and social media and got 1,035 responses. • Written installation instructions based on Hawaii-styled phrasing and photos produced the best install rates. • Photos of the installed plug timers provided verifications. • 38% posted their experience on social media.
Expanded Professional Training with the introduction of online recorded workshops providing participants from all islands access to training.	Achieved a new high of 1,336 participants.
The **Building Operator Certification (BOC)** courses had success in improving the recruitment of an appropriate audience.	51 well-qualified participants. The training was so effective that employers specifically requested an offering of BOC Level 2.
Followed the advice from the Teacher Advisory Board to allow educators to hold Energy Expos at their schools inviting the community to learn about conservation and efficiency from student-led NEED.org activities.	Reached 338 teachers through energy workshops, enriching the education of over 18,000 students.
Orchestrated a major press conference on September 19, 2013 with the Hawaii National Guard.	The conference generated significant media coverage. It was held in recognition of the Hawaii National Guard's efforts to reduce energy consumption and become more energy-efficient. Featured speakers were Governor Neil Abercrombie, Major General Darryll D.M. Wong and Hawaii Energy Program Director Ray Starling.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

On-Bill Financing Program

Hawaii Energy provided the PUC with OBF program development support focused on: Program Management, Contractor Management, IT Solutions, and Marketing & Outreach. Hawaii Energy also worked closely with the other program entities - HECO and AFC First (Finance Program Administrator) - on process and IT system design issues, as well as the OBF Working Group on refining program parameters.

PY13 involved the development of numerous deliverables in support of the Program Administration role and final program parameters will be finalized upon the Investor selection and the late 2014 launch date.

Significant activities in PY13 included the following:

Program Management

- Development of the Program Administrator Operations Plan to define processes for customer and contractor eligibility, completion of energy assessments, and assessment criteria for submitted projects.
- Support to PUC staff on the development of the OBF Program Manual.
- Provided issue papers and presentations to facilitate discussions and to drive recommendations for program development.

Contractor Management

- Development of all Energy Assessment and project submission forms.
- Development of contractor training materials, training plan and the contractor-driven application process.
- Gathered industry feedback through several interactive sessions with solar water heater contractors and suppliers.

IT Support

- Create OBF information website to provide customer-facing information on the program.
- Built OBF contractor portal to provide an online project submission, tracking and approval tools.
- Interface with AFC First for rapid, cost effective web-based service solutions for processing project applications.
- Development of solar water heating and residential air conditioning estimated energy savings calculators.

Marketing & Outreach

- Presented Marketing & Outreach Plan discussing specific actions for supporting a contractor-centric marketing approach along with Hawaii Energy's direct engagement of specific hard-to-reach market segments.
- Outlined OBF marketing brochures to support customer education and engagement through both contractor driven marketing and Hawaii Energy outreach efforts.

Achievements

- The Program invested a total of $32,049,855 to deliver 1,749,955,694 kWh (system-level) over the measure lives resulting in a cost per kWh of $0.0183.
- Delivered $20,424,652 in incentives driving customer bill savings of $49,510,256 annually and over $517,191,593 over the life of the measures installed. See **Table 1** for details of customer energy cost savings by island and rate tariff.
- A first year Program level savings of 127,007,811 kWh.
- Diversified portfolio away from reliance on CFLs by 15.4%, while increasing LEDs by 191%.

Table 1
Customer Energy Cost Savings by Island

First-Year Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Total**	**kWh - 1st yr**	**Avg. Cost $/kWh***
Oahu	$19,903,830	$1,179,897	$5,909,233	$6,712,143	$2,627,466	$28,041	$36,360,610	112,806,380	$0.322
Hawaii	$4,791,090	$233,647	$743,796	$750,702	$0	$164,026	$6,683,261	16,363,022	$0.408
Maui	$4,005,836	$134,740	$469,202	$1,741,015	$0	$0	$6,350,792	16,829,320	$0.377
Molokai	$56,573	$2,012	$0	$0	$0	$0	$58,585	118,838	$0.492
Lanai	$21,635	$35,372	$0	$0	$0	$0	$57,007	114,701	$0.497
Total	**$28,778,964**	**$1,585,668**	**$7,122,231**	**$9,203,860**	**$2,627,466**	**$192,068**	**$49,510,256**	**146,232,261**	**$0.338**
Customer Lifetime Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Total**	**kWh - Lifetime**	**Avg. Cost $/kWh***
Oahu	$152,749,397	$15,787,155	$82,461,537	$95,484,969	$45,208,173	$346,144	$392,037,376	1,254,377,140	$0.31254
Maui	$28,864,153	$1,899,151	$7,210,337	$25,963,686	$0	$0	$63,937,328	172,473,649	$0.37071
Hawaii	$34,303,853	$3,243,438	$10,095,406	$9,942,227	$0	$2,460,394	$60,045,317	149,762,891	$0.40094
Molokai	$589,520	$29,306	$0	$0	$0	$0	$618,826	1,254,686	$0.49321
Lanai	$57,537	$495,209	$0	$0	$0	$0	$552,746	1,092,020	$0.50617
Total	**$216,564,460**	**$21,454,260**	**$99,767,280**	**$131,390,882**	**$45,208,173**	**$2,806,538**	**$517,191,593**	**1,578,960,387**	**$0.32755**

*Average per kWh customer electric cost based on actual participants' total bill energy costs for calendar year 2013.

Lessons Learned

The Business Program successfully integrated interns to support post-inspections for the Small Business Direct Install Program. This provided interns with valuable exposure to the energy efficiency industry while expanding the Program's capacity. This resource also provided better customer feedback to help the Program improve this offering in PY14 while building awareness of the Program throughout the small business community.

The Residential Program encouraged participation from new lighting manufacturers and retailers, both small and large, by simplifying the application process. Program representatives engaged lighting participants via phone and on the ground at retail locations. This resulted in a number of new lighting products being rebated throughout PY13.

The Transformational Program focused on improving the learning experience for all workshop participants through the thoughtful selection of well-qualified attendees and through extending the reach of our offerings across the five islands. With all programs, mindful attention was given to cost-effectively scale the offerings to reach more people, with particular attention to island equity and hard to reach communities. An important enhancement for the coming year is to deepen the learning through repeated contact with targeted customers, offering advanced training opportunities, and piloting new programs to further reach and encourage improved energy engagement across the state.

Significant Event(s)

The Business Program maintains a full calendar of meetings and events, both large and small that educate prospective participants on the many energy efficiency opportunities their businesses and facilities provide. The team also engaged professional associations throughout the year and is meeting often with technology vendors to stay current on new technologies, present Program developments and solicit ideas and feedback. While over seventy events were reported throughout the year, this is but a fraction of the Business Programs engagement with the business community and the vendors that support them.

In PY13, the Residential Program hosted eight (8) solar water heating contractor meetings. These meetings had a total audience of almost 200 people. They served as an opportunity to present Participating Contractors with Hawaii Energy's new initiatives, like the Cooperative Marketing program, and gather feedback regarding current industry trends in solar water heating.

A significant event for the Transformational Program was the University of Hawaii (UH) and Hawaii Energy "Energy Solutions Leadership Reception" that took place on May 8th, 2014. This event engaged keynote speaker and Hawaii Energy trainer, Mark Jewell, with an assembled group of approximately fifty leaders that included members of the UH Board of Regents, UH system and campus administrators, and facilities managers. It was an important engagement with a large, state institution that has helped to catalyze momentum to develop a comprehensive energy efficiency strategy for the University.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Program Objectives

In addition to the PBFA Contract requirements and performance award goals, the Program's broader objectives for PY13 included:

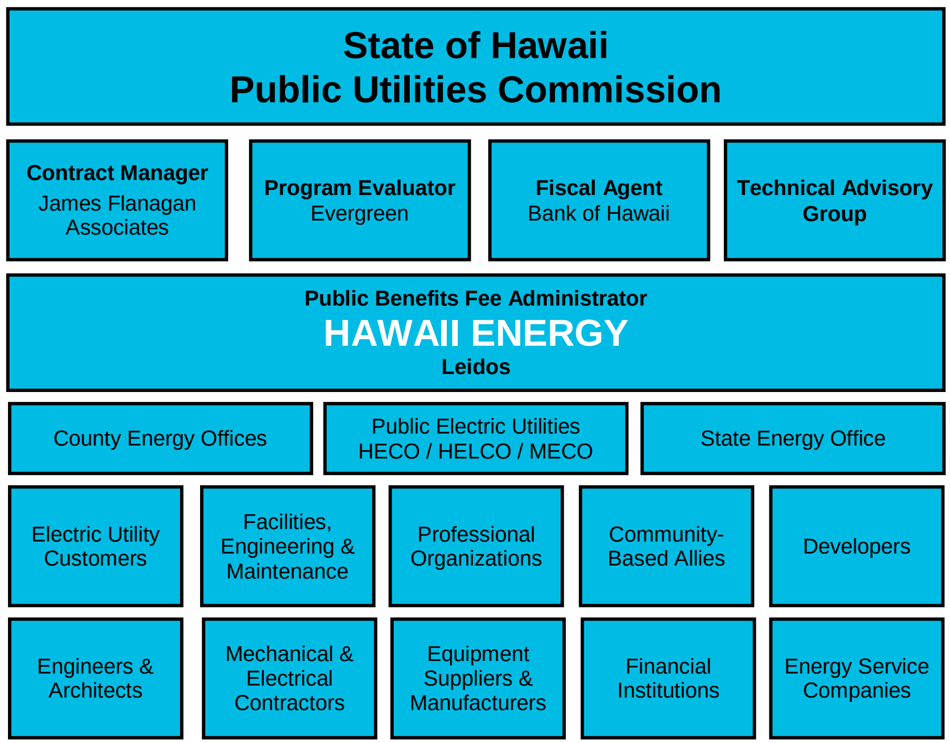
- Reduce the State's demand for electricity, and by doing so, decrease the State's dependence on imported fuel.
- Expand the Program's outreach to the neighbor islands and other hard-to-reach constituents.
- Support the Hawaii Clean Energy Initiative and related efforts aimed at improving Hawaii's energy sustainability.
- Leverage strategic agencies and allies as "force multipliers" to extend the Program's outreach.
- Serve as one of the State's critical leaders, advocates and sources of information for energy conservation and efficiency efforts.
- Explore new innovative strategies in energy conservation and efficiency.
- Evolve the Program to affect behavior change through transformational programs, peer comparisons and enhanced information to increase personal awareness of energy consumption, as well as traditional cash incentives for implementing energy efficiency measures.
- Reach out to small businesses on a more individualized basis to enhance their viability as a going concern during the current economic downturn.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Oversight and Support

During PY13, the PBFA collaborated with a wide variety of support organizations and oversight entities. These oversight entities were comprised of the PUC, Contract Manager (James Flanagan Associates), Program Evaluator (Evergreen Economics), Fiscal Agent (Bank of Hawaii) and a Technical Advisory Group (TAG). The TAG is made up of local energy stakeholders who provide their expertise, technical guidance and support to ensure success of the Program. Together with the Program's supportive trade allies and community groups, Hawaii Energy continually worked to improve the accountability, functionality, offerings, efficiency and cost-effectiveness of the Program. Program oversight and support operatives are shown in **Figure 1**.

Figure 1 – Program (PBFA) Oversight and Support Organizations



PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

The foundation of the Program's organization is a core team of Leidos professionals in Honolulu, supported by off-site staff of uniquely skilled professionals throughout Leidos' organization nationwide. The Program also has a number of key subcontractors that together round out the Hawaii Energy team. These key subcontractors are:

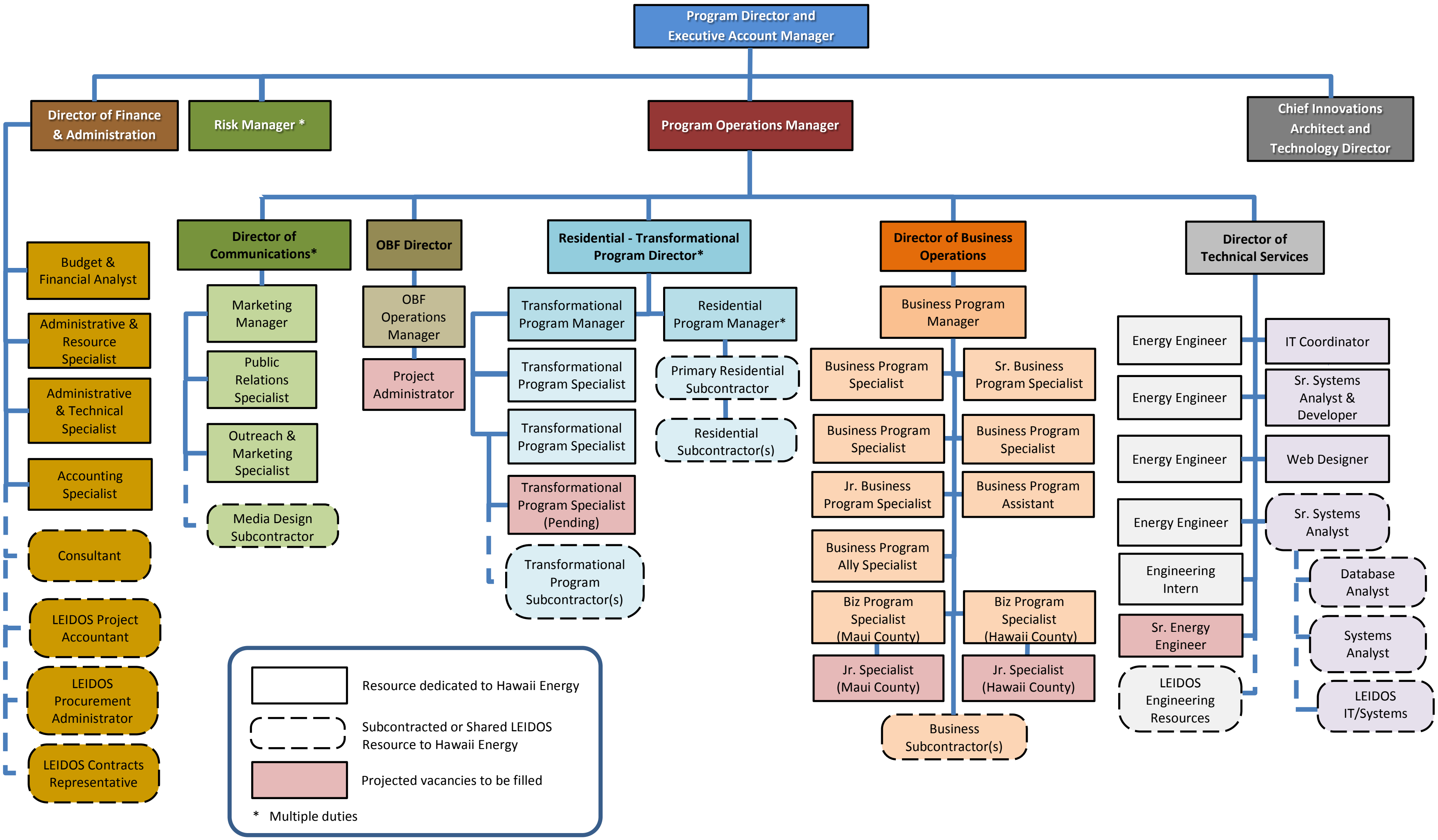
- **Association of Energy Engineers (AEE) –** Provided technical training for Certified Energy Managers and Certified Energy Auditors.
- **Blue Planet Foundation –** Conducted Molokai Hui Up 3.0 (refrigerator trade-up program).
- **EEFG, Inc. –** Provided education, training, coaching and analysis to help energy users and service providers realize and express the true value of improving energy efficiency.
- **Helen N. Wai, LLC –** Provided training to assist communities and organizations in the areas of financial literacy and energy efficiency.
- **Home-Tech –** Provided solar water heating systems and commercial equipment inspections on Hawaii Island.
- **Honeywell –** Provided customer service and administrative functions to support the residential programs and provides check processing services for both residential and business incentive programs.
- **JN Plumb Tech –** Provided solar water heating systems and commercial equipment inspections on the islands of Lanai, Maui and Molokai.
- **Kanu Hawaii –** Provided transformational messaging and Pay-It-Forward (timer lending initiative) implementation support.
- **Kupu –** Provided energy efficiency interns for Program through Rewarding Internships for Sustainable Employment (RISE) program.
- **National Energy Education Development (NEED) Project –** Provided training for teachers to understand and be better able to teach energy efficiency in K-12 schools.
- **Opower –** Provided peer group comparison Home Energy Reports to residences in Maui County, Hawaii County and select parts of Honolulu County.
- **University of Hawaii Outreach College –** Provided technical training for building operators through their existing Continuing Education programs.
- **Wall-to-Wall Studios –** Provided online and advertising creative design services and media placement.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Program Organization

The Program's organization at the end of PY13 (including pending hires) is shown in the chart below:

Figure 2 – Program Organizational Chart
(as of June 30, 2014)



PERFORMANCE INDICATOR RESULTS

Program Performance Indicators and Related Targets

Overview

The following Performance Indicators were established in the PBFA Contract in order to set measureable performance targets that meet the PUC's objectives and to provide the basis for financial incentives as a reward for superior performance in achieving explicit Program goals. The Performance Indicators for PY13 are:

1. Cumulative Annual Electric Energy Savings (Program Level)
2. Peak Demand (Program Level)
3. Total Resource Benefit (Program Level)
4. Market Transformation
5. Island Equity (Broad Participation)

Table 2 defines the minimum, target and maximum award levels for each Performance Indicator used to measure the Program's performance.

Details of each indicator and its related target follow.

Table 2
Performance Indicators

Indicator		Minimum	Target	Maximum
First Year Energy Reduction (kWh)		106,212,107	141,616,143	155,777,757
Peak Demand Reduction (kW)		13,366	17,821	19,603
Utility Cost Avoidance (TRB)		$132,760,481	$177,013,974	$194,715,371
Market Transformation	Behavior Modification	13,500	18,000	n/a
	Professional Development	750	1,000	n/a
	Technical 'Know-How'	1,500	2,000	n/a
Island Equity	Honolulu County	59.0%	73.8%	n/a
	Hawaii County	10.3%	12.9%	n/a
	Maui County	10.7%	13.4%	n/a

PERFORMANCE INDICATOR RESULTS

Performance Indicator #1: Cumulative Annual Electric Energy Savings (Program Level)

Target: 141,616,143 kWh

Annual Electric Energy Savings directly benefit the State's goal of achieving energy independence by reducing the consumption of imported fossil fuels in proportion to the fossil-fueled units used to serve this load. The program participants directly benefit through lower electricity costs.

The Program Level Energy Savings Target of 141,616,143 kWh currently equates to 1,595,492 MMBTUs or avoided use of 260,782 bbls of liquid fossil fuels in Hawaii, see **Table 3**.

Table 3
Estimation of Potential Fossil Fuel Avoidance

Potential Barrels (BBLs) of Fossil Fuels Avoided in PY13				
Annual Program Level Energy Savings Target		141,616,143	kWh/Yr.	
Average Program Attribution to System Level Impact	÷	81%		
System Level Gross Generation Energy Impact		**174,834,744**	kWh/Yr.	
Est. 2013 Electrical Generation Source Distribution				
Renewable Energy Sold		1,304,525,000	kWh/Yr.	13.7%
Fossil-Fuel Energy Sold	+	8,242,675,000	kWh/Yr.	86.3%
Total Energy Sold		9,547,200,000	kWh/Yr.	
System Level Gross Generation Energy Impact		174,834,744	kWh/Yr.	
% System Average Fossil-Fuel Generation	x	86.3%		
Reduction Target Impact in Fossil Fuel-Generation		150,945,406	kWh	
Energy Avoided into Generators				
Fossil-Fuel Energy Generated		150,945,406		
Avg. System Generating Heat Rate	x	10,570	BTU/kWh	
Energy Required for Fossil-Fueled Electricity Production		1,595,492,938,099	BTU/Yr.	
Generation Liquid Fossil Fuel Mix				
Energy in BBL of Low Sulfur Fuel Oil		6,200,000	BTU/BBL	79.0%
Energy in BBL of #2 Fuel Oil (Diesel)		5,860,000	BTU/BBL	19.0%
Energy in BBL of Naptha		5,335,500	BTU/BBL	2.0%
Average System BTU/BBL		6,118,110	BTU/BBL	100.0%
Energy Required for Fossil-Fueled Electricity Production		1,595,492,938,099	BTU/Yr.	
Average System BTU/BBL	÷	6,118,110	BTU/BBL	
Number of Barrels of Fossil-Fuel Avoided		260,782	BBLs/Yr.	
Number of Barrels of Fossil-Fuel Avoided		260,782	BBLs/Yr.	
Potential Cost per BBL for Fossil Fuels	x	$125	per BBL	
Potential Fossil Fuel Cost Savings to State		$32,597,750	per year	
Potential Green House Gas Equivalencies Avoided in PY13				
System Level Gross Generation Energy Impact		174,834,744	kWh/Yr.	
Green House Gas Reduction* (www.epa.gov/egrid)				
Energy in kWh		**174,834,744**	kWh/year	
Energy in MWh		174,835	MWh/year	
CO2 - Carbon Dioxide		152,239	Tons/Year	
CH4 - Methane		9	Tons/Year	
N2O - Nitrous Oxide		2	Tons/ Year	
Green House Gas Equivalencies**				
Less Passenger Vehicles		25,381		
Less miles/year driven (avg passenger vehicle)		287,041,601		
Wind turbines installed		33		
Acres of US forest CO2 sequestered in one year		98,818		
Reduction Comparison to PV and SWH (Hawaii Energy)				
Rooftop PV Panels (300W) to offset same energy usage		406,897		
Solar Water Heating Systems to offset same energy usage		84,666		

*Power Profiler - HICC - Oahu - Excel tool and Website:
http://oaspub.epa.gov/powpro/ept_pack.charts
** EPA's Greenhouse Gas Equivalencies Calculator:
http://www.epa.gov/cleanenergy/energy-resources/calculator.html

PERFORMANCE INDICATOR RESULTS

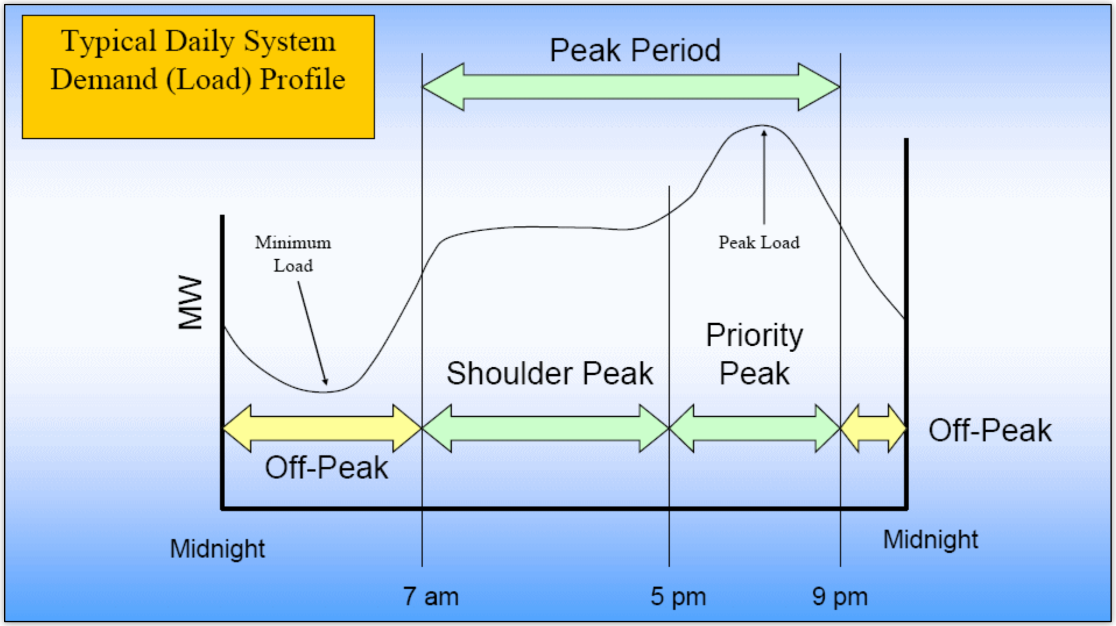
Performance Indicator #2: Peak Demand Savings

Target: 17,821 kW

Peak Demand Reduction is focused on reducing the electrical load during the traditional peak demand period between 5:00 p.m. and 9:00 p.m. on weekdays, as illustrated in **Figure 3**. System Demand Load is typically highest when humid nights increase air conditioner usage in addition to the normal evening water heating loads. This system peak load is used to plan the requirements for additional generation capacity. Reducing the load reduces the cost to the utility customer by deferring the need for an additional unit of generation. Aggressive peak load reductions and load shifting technologies may allow for the retirement of less efficient generation units as more renewable generation is available.

Program participants benefit from lower electrical costs and all customers benefit from the avoided cost to provide additional units of generation to meet increasing electrical peak demand. The target of 17,821 kW is equivalent to the power required to operate 4,642 water heaters at 4 kW each.

Figure 3 – Typical Daily System Demand (Load) Profile



PERFORMANCE INDICATOR RESULTS

Performance Indicator #3: Total Resource Benefit (TRB)

Target: $177,013,974

The Total Resource Benefit (TRB) is the estimated total net present value (NPV) of the avoided cost for the utility from the reduced lifetime demand (kW) and energy (kWh) from energy efficiency projects and measures. The utility costs were determined using average avoided cost data for installed capacity to meet demand and cost to produce energy that was provided by HECO IRP4 and adjusted under the advice of the Contract Manager. Average annual avoided cost for capacity and energy for calendar year 2013 escalated for a 20-year period was the basis for the analysis. The TRB incorporated avoided transmission and distribution costs into the avoided energy and capacity costs. The time value of money is represented by a discount rate of 6%. The discount rate is used to convert all costs and benefits to a "net present value" for comparing alternative costs and benefits in the same year's dollars.

Table 4 provides an example of the TRB calculation as if a hypothetical project consisted of a single measure with a nine (9) year life achieving the program demand (kW) and energy (kWh) targets. In the implementation of specific Program measures, individual calculations are done for each measure then summed together to determine the Program's TRB result.

Table 4
Example of the TRB Calculation using Look Up Table

	Life	Discount Rate							kW Target	kWh Target		Project Cost
	8	6%							25.0	25,000		$ 45,000
			Utility Avoided Cost		NPV for each Year		Cumulative NPV		TRB			
Year	Measure Life	NPV Multiplier	$/kW/yr.	$/kWh/yr.	$/kW/yr.	$/kWh/yr.	$/kW/yr.	$/kWh/yr.	Capacity Benefit	Energy Benefit	Total Resource Benefit	TRB/TRC Ratio
2013	1	1.00	$ 353	$ 0.104	$ 353	$ 0.1037	$ 353	$ 0.1037	$ 8,830	$ 2,592	$ 11,422	0.25
2014	2	0.94	$ 371	$ 0.109	$ 350	$ 0.1027	$ 703	$ 0.2064	$ 17,570	$ 5,160	$ 22,730	0.51
2015	3	0.89	$ 383	$ 0.112	$ 340	$ 0.1000	$ 1,043	$ 0.3064	$ 26,081	$ 7,660	$ 33,741	0.75
2016	4	0.84	$ 386	$ 0.113	$ 324	$ 0.0953	$ 1,368	$ 0.4016	$ 34,188	$ 10,041	$ 44,229	0.98
2017	5	0.79	$ 388	$ 0.114	$ 307	$ 0.0902	$ 1,675	$ 0.4919	$ 41,866	$ 12,297	$ 54,162	1.20
2018	6	0.75	$ 389	$ 0.114	$ 291	$ 0.0854	$ 1,965	$ 0.5773	$ 49,135	$ 14,432	$ 63,567	1.41
2019	7	0.70	$ 392	$ 0.115	$ 276	$ 0.0812	$ 2,242	$ 0.6584	$ 56,042	$ 16,461	$ 72,503	1.61
2020	8	0.67	$ 391	$ 0.115	$ 260	$ 0.0763	$ 2,502	$ 0.7348	$ 62,538	$ 18,369	$ 80,907	1.80
2021	9	0.63	$ 395	$ 0.116	$ 248	$ 0.0727	$ 2,749	$ 0.8075	$ 68,728	$ 20,187	$ 88,915	1.98

PERFORMANCE INDICATOR RESULTS

Performance #4: Market Transformation

Target: Two Tasks in each of the Four Categories

Transformational efforts are those that involve education, training and other legislative support activities that may not result in direct quantifiable energy savings. The focus of this year's target is to develop community partnerships to leverage their reach and expertise in delivering energy education to specific "hard-to-reach" communities and industries. These efforts contribute to development of an infrastructure and mindset that will result in societal changes and increased energy savings in the future.

Figure 4 provides a summary of the Market Transformation programs for PY13.

Figure 4 – Summary of Transformational Programs

Energy Literacy in Hard-to-Reach Communities: Sharing the Aloha		**Behavior Modification**
Energy Efficiency Literacy at Scale – Messaging		
Energy Efficiency Literacy at Scale – Devices and Pay-It-Forward		
2nd Annual Hawaii Sustainability in Higher Education Summit		
Hui Up 3.0 – Energy Literacy in Hard-to-Reach Communities		
Energy Education in the Schools - NEED	Basic Energy Workshop	**Professional Development**
	Building Science Workshop	
	Teacher Advisory Board	
Kupu – R.I.S.E. (Rewarding Internships for Sustainable Employment)		
Facilities Degree Program at the University of West Oahu		
Hui Up 3.0 – Green Workforce Development		
Energy Efficiency Sales Professional Training	The Efficiency Sales Professional Boot Camp	
	Learning to S.E.E. (Sell Efficiency Effectively)	
	Financial Analysis of Energy Efficiency	
Using Efficiency to Build Your Business	Finding Your Focus	
	Getting Efficiency Projects Approved	
Boosting Your Competitiveness	Taking Control of Your Energy Use	
	Making Efficiency Happen	
Water and Wastewater Training and Best Practices Handbook		**Technical Knowledge and Training**
Certified Energy Manager CEM), Energy Manager in Training (EMIT)		
Building Operator Certification (BOC©) Workshops		

PERFORMANCE INDICATOR RESULTS

Performance #5: Island Equity (Broad Participation)

Target: +/- 20% of each County's contribution to the PBF

The Island Equity target is intended to promote the equitable participation in the Program among the counties. For PY13, "equitable" would achieve the goal that for every dollar contributed to the PBF, a dollar would be returned to its county of origin through rebates, incentives, training and other Program initiatives.

Table 5 lists the results of the PY13 contributions to the PBF by island.

Table 5
Contributions to PBF by Island

Island	Residential Program Investment	Business Program Investment	PBFA Investment	%
Hawaii	$3,061,860	$2,548,359	$5,610,219	12.9%
Lanai	$60,177	$67,237	$127,414	0.3%
Maui	$2,883,051	$2,670,209	$5,553,260	12.7%
Molokai	$81,112	$72,062	$153,174	0.4%
Oahu	$12,780,054	$19,424,182	$32,204,236	73.8%
Totals	$18,866,254	$24,782,050	$43,648,303	100.00%

County	Residential Program Investment	Business Program Investment	PBFA Investment	%
Hawaii	$3,061,860	$2,548,359	$5,610,219	12.9%
Maui	$3,024,340	$2,809,509	$5,833,849	13.4%
Oahu	$12,780,054	$19,424,182	$32,204,236	73.8%
Totals	$18,866,254	$24,782,050	$43,648,303	100.00%

PERFORMANCE INDICATOR RESULTS

Performance Award for Achieving Targets

Under the PBFA Contract, Program Performance Awards are provided from a "performance pool" created through a holdback of $55,708 from each monthly invoice (prior to tax) for Leidos work performed. A total of $668,500 was withheld over the PY13, which equates to $700,000 once tax is applied. Leidos, as the PBFA, has the ability to earn the $700,000 by achieving 100% of the performance indicator targets, or a portion thereof based on the percentage of targets met. If the PBFA exceeds its targets, up to an additional $133,000 could be awarded.

The maximum performance award potential for PY13 is $833,000 as shown in **Table 6**.

Table 6
Potential Performance Awards

Indicator	Minimum	Target	Maximum	Weight	Target
First Year Energy Reduction	75% $ 183,750	100% $ 245,000	123.8% $ 303,188	35%	$ 245,000
Peak Demand Reduction	75% $ 26,250	100% $ 35,000	123.8% $ 43,313	5%	$ 35,000
TRB NPV of Utility Cost Avoidance	75% $ 210,000	100% $ 280,000	123.8% $ 346,500	40%	$ 280,000
Market Transformation	100% $ 70,000	100% $ 70,000	100% $ 70,000	10%	$ 70,000
Broad Participation "Island Equity"	80% $ 56,000	100% $ 70,000	100% $ 70,000	10%	$ 70,000
If all indicator metrics meet this level:	**Minimum**	**Target**	**Maximum**		
Performance Award Potential is:	560,000	700,000	833,000		

PERFORMANCE INDICATOR RESULTS

Performance Award Claim Summary

The Program's Performance Award Claim for PY13, is $616,981.24 (including tax) or 88.4% of the Program's potential target performance awards.

The Program's Performance Award Claim Summary based on the Program's Net Savings Impacts (kWh, kW and TRB), Market Transformation and Island Equity results are contained in **Table 7**.

Table 7
Performance Claim Summary

Indicator	Target	Results	% of Target	Award Claim
First Year Energy Reduction (kWh)	141,616,143	127,007,811	89.7%	$219,727.17
Peak Demand Reduction (kW)	17,821	16,787	94.2%	$32,968.34
TRB NPV of Utility Cost Avoidance ($)	$177,013,974	$156,542,771	88.4%	$247,618.73
Market Transformation				
Behavior Modification	18,000	23,297	129.4%	$23,334.00
Professional Development	1,000	1,336	133.6%	$23,333.00
Technical 'Know-How'	2,000	223	11.2%	$0.00
Island Equity				
Honolulu County	73.8%	71.7%	97.2%	
Hawaii County	12.9%	13.2%	102.6%	$70,000.00
Maui County	13.4%	15.1%	112.8%	
Performance Award Claim				**$616,981.24**

Technical Know-How was a new target area for the Transformational Program in PY13. Given the Program's limited experience in this sector, the original target goals applied were not attainable within the existing market. The Program has taken these lessons learned into account for PY14 and modified the target goals accordingly.

The tables on the subsequent pages provide the detailed calculations for each metric following the guidelines in Attachment C in the PBFA Contract.

PERFORMANCE INDICATOR RESULTS

Cumulative Annual Electric Energy Savings (Program-Level) Award Claim: $219,727.17

The Program Energy Reduction was 127,007,811 kWh, which was 90% of the target of 141,616,143 kWh in the award claim of $219,727.17. This award is calculated from $183,750 for meeting the minimum level and $35,977.17 for the remaining savings of 20,795,704 kWh awarded at a rate of $0.001730/kWh achieved beyond the minimum.

See calculations in **Table 8** for details.

Table 8
Energy Reduction Award Claim Summary

Cumulative Annual Electric Energy Savings	**Minimum**		**Target**	**Maximum**			
Energy Award Potential	$183,750.00		$245,000.00	$303,188.00			
	75%		100%	123.8%			
Energy Reduction Goals (kWh)	106,212,107		141,616,143	155,777,757			
	75%		100%	110%			
Incentive Calculation	**Meet Minimum**		**Target – Minimum**	**Maximum – Target**		**Total**	
Pool Award Potential	$183,750.00		$61,250.00	$58,188.00		$303,188.00	Max
Energy Goal Pools (kWh)	106,212,107	÷	35,404,036	14,161,614	/kWh	155,777,757	kWh
Award Amount / Rate ($/kWh)	$183,750.00		$0.00	$0.00			
Energy Achievement (kWh)	106,212,107		20,795,704	-		127,007,811	kWh
Award Amount / Rate ($/kWh)	$183,750.00	x	0.00173	0.004109	/MWh		
Energy Achievement Award Calculation	$183,750.00		$35,977.17	-		$219,727.17	Calculated
						$219,727.17	**Award Claim**

PERFORMANCE INDICATOR RESULTS

Peak Demand Savings Award Claim: $32,968.34

The Combined Peak Demand Reduction was 16,787 kW, which was 94% of the target savings level resulting in an award claim of $32,968.34. This award is calculated from $26,250 for meeting the minimum level and $6,718.34 for the remaining savings of 3,421 kW awarded at a rate of $1.96/kW achieved beyond the minimum.

See calculations in **Table 9** for details.

Table 9
Demand Reduction Award Claim Summary

Combined Annual Electric Demand Savings	Minimum		Target	Maximum		Total	
Demand Reduction Award Potential	$26,250.00		$35,000.00	$43,313.00			
	75%		100%	123.8%			
Demand Reduction Goals (kW)	13,366		17,821	19,603	kW		
	75%		100%	110%			
Incentive Calculation	**Meet Minimum**		**Target – Minimum**	**Maximum – Target**		**Total**	
Pool Award Potential	$26,250.00		$8,750.00	$8,313.00		$43,313.00	Max
Demand Goal Pools (kW)	13,366	÷	4,455	1,782		19,603	kW
Award Amount / Rate ($/kW)	$26,250.00		$1.96	$4.66	/kW		
Demand Savings Achievement (kW)	13,366		3,421	-		16,787	kW
Award Amount / Rate ($/kW)	$26,250.00	x	$1.96	$4.66	/kW		
Demand Savings Achievement Award Calculation	$26,250.00		$6,718.34	-		$32,968.34	Calculated
						$32,968.34	**Award Claim**

PERFORMANCE INDICATOR RESULTS

Total Resource Benefit (TRB) Award Claim: $247,618.73

The TRB achievement of $156,542,771 NPV is 88.4% of the target amount between the minimum and target level. This award claim of $247,618.73 is calculated from $210,000 for meeting the minimum level and $37,618.73 for the remaining 13.4% awarded at a rate of $2,800/percent achieved beyond the minimum level.

See calculations in **Table 10** for details.

Table 10
TRB Award Claim Calculation

TRB Target Metrics	Minimum		Target	Maximum			
TRB Award Potential	$210,000		$280,000	$346,500			
TRB Goals Pools in Metrics	75%		100%	123.8%			
TRB Goals	$132,760,481		$177,013,974	$212,416,769		NPV of Utility Benefits	
	75%		100%	110%			
Incentive Calculation	**Meet Minimum**		**Target – Minimum**	**Maximum – Target**		**Total**	
Pool Award Potential	$210,000		$70,000	$66,500		$346,500	Max
TRB Goal Pools in Metrics	75%	÷	25%	10%		120%	
Award Amount / Rate ($/%)	$210,000		$2,800	$3,325	/%		
TRB Achievement						$156,542,771	
TRB Goals						$177,013,974	
TRB Savings Achievement	75%		13.4%	-		88.4%	
Award Amount / Rate ($/%)	$210,000	x	$2,800	$3,325	/%		
TRB Energy Achievement Award Calculation	$210,000		$37,618.73	-		$247,618.73	Calculated
						$247,618.73	**Award Claim**

PERFORMANCE INDICATOR RESULTS

Market Transformation Award Claim: $46,667.00

The Market Transformation claim of $46,667.00 is based on exceeding the target of two Annual Plan Transformational Tasks: Behavior Modification and Professional Development. See **Table 11** for details.

Table 11
Market Transformation Award Claim Calculation

Category	Minimum	Minimum Award	Target	Target Award (Min < Achieved < Target)	Rate	Achievement	Met	Award Claim
Behavior Modification	13,500	$17,500	18,000	$23,334	$0.7713	23,297	Yes	$23,334
Professional Development	750	$17,500	1,000	$23,333	$0.0429	1,336	Yes	$23,333
Technical 'Know-How'	1,500	$17,500	2,000	$23,333	$0.0857	223	No	$0
Total								**$46,667**

PERFORMANCE INDICATOR RESULTS

Island Equity (Broad Participation) Award Claim: $70,000

The Program achieved the targeted percentages of island equity this performance period.

See calculations in **Table 12** for details.

Table 12 Island Equity Award Claim Calculation									
County	PY13 PBF Contribution	PBF Contribution %	Target	Minimum to Meet Target	PY13 Total Incentives	% Accomplished	% of Target	Met Minimum	Award Claim
Honolulu	$ 32,204,236	73.8%	>80%	59.0%	$ 16,327,168	71.7%	97.2%	Yes	
Hawaii	$ 5,610,219	12.9%	>80%	10.3%	$ 3,001,097	13.2%	102.6%	Yes	
Maui	$ 5,833,848	13.4%	>80%	10.7%	$ 3,430,037	15.1%	112.8%	Yes	
Total	$ 43,648,303	100.0%			$ 22,758,302	100.0%			
									$70,000

Incentives and Transformational Spent vs. Budget $				
County	Budgeted	Accomplished	% of Budget	% Accomplished
Honolulu	$ 17,292,924	$ 16,327,168	94.4%	71.7%
Hawaii	$ 3,012,557	$ 3,001,097	99.6%	13.2%
Maui	$ 3,132,640	$ 3,430,037	109.5%	15.1%
Total	**$ 23,438,121**	**$ 22,758,302**	**97.1%**	**100.0%**

Incentives and Transformational Spent Actual $			
County	Incentives	Transformation	Total Accomplished
Honolulu	$ 15,138,549	$ 1,188,619	$ 16,327,168
Hawaii	$ 2,484,915	$ 516,182	$ 3,001,097
Maui	$ 2,801,188	$ 628,849	$ 3,430,037
Total	**$ 20,424,652**	**$ 2,333,650**	**$ 22,758,302**

BUDGET PROGRESSION & EXPENDITURES

PY13 Annual Plan Budget

Pursuant to the Program's approved PY13 Annual Plan, the Program's initial budget for the program year was $33.4M, comprised of $19.7M in Incentives, $11.6M in Non-Incentives, and $2.2M in Transformational Incentives. As detailed in **Table 13** approximately 45% of the budget was allocated to Residential Programs and 55% to Business Programs, consistent with the prior Program Year.

Table 13
PY13 Annual Plan Budget

Activity	Non-Incentive	Incentive	Total
RESIDENTIAL PROGRAMS			
REEM	2,591,084	7,504,500	10,095,584
CESH	40,486	25,000	65,486
RESM	121,457	540,000	661,457
RHTR	121,457	801,939	923,396
Total Residential Programs	**2,874,484**	**8,871,439**	**11,745,923**
Residential Market Evaluation	242,914	0	242,914
Residential Outreach	931,171	0	931,171
Total Residential Services and Initiatives	**4,048,569**	**8,871,439**	**12,920,008**
BUSINESS PROGRAMS			
BEEM	1,286,545	4,295,800	5,582,345
CBEEM	989,650	1,060,000	2,049,650
BESM	692,755	4,645,069	5,337,824
BHTR	544,308	842,000	1,386,308
Total Business Programs	**3,513,258**	**10,842,869**	**14,356,127**
Business Market Evaluation	296,895	0	296,895
Business Outreach	1,138,098	0	1,138,098
Total Business Services and Initiatives	**4,948,251**	**10,842,869**	**15,791,120**
Total Residential and Business Services and Initiatives	**8,996,820**	**19,714,308**	**28,711,128**
TRANSFORMATIONAL PROGRAMS			
Residential Transformational Programs	0	985,715	985,715
Business Transformational Programs	0	1,204,763	1,204,763
Total Transformation Services and Initiatives	**0**	**2,190,478**	**2,190,478**
Total Supporting Services	**2,091,908**	**0**	**2,091,908**
Total Tax on Non-Incentive	**489,517**	**0**	**489,517**
Estimated Contractor Costs	**11,578,245**	**21,904,786**	**33,483,031**

Budget Reallocations

New to PY13 were changes in the Program's process to request reallocation of funds. In PY13 the program was given discretion to reallocate funds within certain areas without a formal contractual request. Funds were allowed to be moved within each of the Operations & Management areas (Residential and Business) and within each of the Incentive areas (Residential and Business). As a result, there was only one official reallocation during PY13. There were, however, internal budget transfers. Specifics of the reallocation and internal transfers are detailed in **Table 14** and described below.

Table 14
Budget Progression 7/1/13-6/30/14

	PY13 Annual Plan Budget	R1 Reallocation (dated 10/21/13; eff. 1/2014)	R1 Budget	Bus Inc Transfer (11/2013)	PY13 Budget (as of 11/2013)	Bus T&M Transfer (4/2014)	PY13 Budget (as of 5/2014)	Incentive Transfers (6/2014)	Bus O&M Transfers (6/2014)	PY13 Budget (as of 6/2014)	Res/Bus O&M Transfers (8/2014)	PY13 Budget (as of 8/2014)
Residential Programs												
Operations & Management												
REEM	2,591,084	(464,555)	2,126,529		2,126,529		2,126,529			2,126,529	205,000	2,331,529
CESH	40,486	(6,731)	33,755		33,755		33,755			33,755	(12,000)	21,755
RESM	121,457	(20,194)	101,263		101,263		101,263			101,263	(27,000)	74,263
RHTR	121,457	114,824	236,281		236,281		236,281			236,281	(60,000)	176,281
Total Residential Programs	2,874,484	(376,656)	2,497,828		2,497,828		2,497,828			2,497,828	106,000	2,603,828
Residential Market Evaluation	242,914	(6,633)	236,281		236,281		236,281			236,281	(110,000)	126,281
Residential Outreach	931,171	(289,837)	641,334		641,334		641,334			641,334	4,000	645,334
Total Residential Non-Incentives	4,048,569	(673,126)	3,375,443		3,375,443		3,375,443			3,375,443	-	3,375,443
Residential Incentives												
REEM	7,504,500	701,197	7,985,697		7,985,697		7,985,697	220,000		8,205,697		8,205,697
CESH	25,000	-	25,000		25,000		25,000			25,000		25,000
RESM	540,000	50,000	690,000		690,000		690,000	(100,000)		590,000		590,000
RHTR	801,939	(130,197)	791,742		791,742		791,742	(120,000)		671,742		671,742
Subtotal Residential Incentives	8,871,439	621,000	9,492,439		9,492,439		9,492,439	-		9,492,439		9,492,439
Residential Transformational	985,715	69,000	1,054,715		1,054,715		1,054,715			1,054,715		1,054,715
Total Residential Incentives	9,857,154	690,000	10,547,154		10,547,154		10,547,154			10,547,154		10,547,154
Total Residential Programs	**13,905,723**	**16,874**	**13,922,597**		**13,922,597**		**13,922,597**			**13,922,597**		**13,922,597**
Business (C&I) Programs												
Operations & Management												
BEEM	1,286,545	(291,393)	1,155,152		1,155,152	(200,000)	955,152		40,000	995,152	8,000	1,013,152
CBEEM	989,650	42,948	742,598		742,598	250,000	992,598		40,000	1,032,598	41,500	1,074,098
BESM	692,755	49,842	742,597		742,597		742,597			742,597	(30,000)	712,597
BHTR	544,308	(49,243)	495,065		495,065		495,065			495,065	(31,500)	463,565
Total Business Programs	3,513,258	(247,846)	3,135,412		3,135,412	50,000	3,185,412		80,000	3,265,412	(2,000)	3,263,412
Business Market Evaluation	296,895	(170,618)	206,277		206,277		206,277		(80,000)	126,277	(6,000)	120,277
Business Outreach	1,138,098	(404,245)	783,853		783,853	(50,000)	733,853			733,853	8,000	741,853
Total Business Operations & Management	4,948,251	(822,709)	4,125,542		4,125,542	-	4,125,542		-	4,125,542	-	4,125,542
Business Incentives												-
BEEM	4,295,800	625,000	4,520,800		4,520,800		4,520,800	400,000		4,920,800		4,920,800
CBEEM	1,060,000	2,988,026	2,573,026	1,000,000	3,573,026		3,573,026	475,000		4,048,026		4,048,026
BESM	4,645,069	(2,866,525)	3,253,544	(1,000,000)	2,253,544		2,253,544	(475,000)		1,778,544		1,778,544
BHTR	842,000	12,500	1,254,500		1,254,500		1,254,500	(400,000)		854,500		854,500
Subtotal Business Incentives	10,842,869	759,001	11,601,870		11,601,870		11,601,870	-		11,601,870		11,601,870
Business Transformational	1,204,763	84,334	1,289,097		1,289,097		1,289,097			1,289,097		1,289,097
Total Business Incentives	12,047,632	843,335	12,890,967		12,890,967		12,890,967			12,890,967		12,890,967
Total Business Programs	**16,995,883**	**20,626**	**17,016,509**		**17,016,509**		**17,016,509**			**17,016,509**		**17,016,509**

Table 14
Budget Progression 7/1/13-6/30/14 (cont'd)

	PY13 Annual Plan Budget	**R1 Reallocation** (dated 10/21/13; eff. 1/2014)	**R1 Budget**	**Bus Inc Transfer** (11/2013)	**PY13 Budget** (as of 11/2013)	**Bus T&M Transfer** (4/2014)	**PY13 Budget** (as of 5/2014)	**Incentive Transfers** (6/2014)	**Bus O&M Transfers** (6/2014)	**PY13 Budget** (as of 6/2014)	**Res/Bus O&M Transfers** (8/2014)	**PY13 Budget** (as of 8/2014)
Subtotal Non-Incentive (Prior to Tax)	11,088,728	(1,495,835)	9,592,893		9,592,893		9,592,893			9,592,893		9,592,893
Less Performance Incentives (Prior to Tax) [1]	(700,000)	31,500	(668,500)		(668,500)		(668,500)			(668,500)		(668,500)
Subtotal Non-Incentive Less Performance Incentive (PI)	10,388,728	(1,464,335)	8,924,393		8,924,393		8,924,393			8,924,393		8,924,393
Total Tax on Non-Incentive Without PA	489,517	(69,000)	420,517		420,517		420,517			420,517		420,517
Performance Incentive (Inclusive of Tax)	700,000	-	700,000		700,000		700,000			700,000		700,000
Subtotal Non-Incentives	11,578,245	(1,533,335)	10,044,910		10,044,910		10,044,910			10,044,910		10,044,910
Subtotal Residential and Business Customer Incentives	19,714,308	1,380,001	21,094,309		21,094,309		21,094,309			21,094,309		21,094,309
Subtotal Transformational Incentives	2,190,478	153,334	2,343,812		2,343,812		2,343,812			2,343,812		2,343,812
Subtotal Estimated Contractor Costs	**33,483,031**		**33,483,031**		**33,483,031**		**33,483,031**			**33,483,031**		**33,483,031**
Performance Awards in Excess of Target Levels	133,000		133,000		133,000		133,000			133,000		133,000
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels	**33,616,031**		**33,616,031**		**33,616,031**		**33,616,031**			**33,616,031**		**33,616,031**

[1] This line is updated in R1 to reflect the amount of Performance Incentives excluding taxes, consistent with how Performance Incentives are withheld in the monthly invoices.

[2] These differences correspond to the change per Footnote 1, net of the resulting (69,000) change in the "Total Tax on Non-Incentive Without PI" line item.

PORTFOLIO FIFTH YEAR IMPACTS

Reallocation (R1)

The PY13 reallocation effective January 2014 was to update the budget such that Incentives comprised 70 percent of the program year budget and Non-Incentives comprised 30 percent (i.e., a "70/30 split"). In addition, a tax adjustment was made to the "Performance Incentives (Prior to Tax)" line item. The detailed changes were as follows:

- Transferred $1,533,335 (inclusive of taxes) from Residential and Business Operations Non-Incentives to Residential and Business Program Incentives.
- The "Performance Incentives (Prior to Tax)" line item was adjusted to reflect the amount of Performance Incentives (PI) excluding taxes, or $668,500. Historically, this line has reflected $700,000, representing total PI including taxes. However, PI withholding on monthly invoicing has been prior to taxes, and thus this change more accurately reflected this line item as well as taxes captured in other Non-Incentive line items.

Internal Budget Transfers

During the course of PY13, there were five internal budget transfers to meet changing operational needs. The transfers were as follows:

- **November 2013** – Transferred $1M of Incentive funds from BESM to CBEEM.
- **April 2014** – Transferred $200K of Business O&M funds from BEEM and $50K from Business Outreach to CBEEM.
- **June 2014** (Reflected in May Monthly Report) - Transferred Business O&M funds as follows: $80K from Business Evaluation to BEEM ($40K) and CBEEM ($40K).
- **June 2014** (Reflected in May Monthly Report) - Transferred Incentive funds as follows: $100K from RESM and $120K from RHTR to REEM; $475K from BESM to CBEEM and $400K from BHTR to BEEM.
- **August 2014** – Various O&M funds transfers. Residential transfers as follows: FROM - CESH ($12K), RESM ($27K), RHTR ($60K), and Residential Evaluation ($110K); TO - REEM $205K and Residential Outreach $4K. Business transfers as follows: FROM - BESM ($30K), BHTR ($31.5K), and Business Evaluation (6K); TO -BEEM 18K, CBEEM 41.5K, Business Outreach 8K.

PORTFOLIO FIFTH YEAR IMPACTS

Portfolio Expenditures

Throughout the year, the Program was diligent in reviewing operational needs and leveraging funding to drive program value. At year-end, the Program had utilized 97% of budgeted Incentives, 99% of budgeted O&M (including holdback amounts) and 99% of budgeted Transformational Incentives. Details of final PY13 expenditures and unspent funds by program categories are shown in **Table 15**. Specific discussions related to each Residential and Business program are provided within those respective sections.

Table 15
Program Expenditures and Unspent Funds

	Total Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
Residential Programs					
Ops and Management					
REEM[5]	2,329,403.41	2,331,529.00	99.91%	2,125.59	0.09%
CESH[5]	19,819.48	21,755.00	91.10%	1,935.52	8.90%
RESM[5]	74,042.06	74,263.00	99.70%	220.94	0.30%
RHTR[5]	175,671.65	176,281.00	99.65%	609.35	0.35%
Total Residential Programs	2,598,936.60	2,603,828.00	99.81%	4,891.40	0.19%
Residential Evaluation[5]	123,724.09	126,281.00	97.98%	2,556.91	2.02%
Residential Outreach[5]	644,817.24	645,334.00	99.92%	516.76	0.08%
Total Residential Non-Incentives	**3,367,477.93**	**3,375,443.00**	**99.76%**	**7,965.07**	**0.24%**
Residential Incentives					
REEM[3,6]	8,180,045.59	8,205,697.00	99.69%	25,651.41	0.31%
CESH	2,765.97	25,000.00	11.06%	22,234.03	88.94%
RESM[3]	555,000.00	590,000.00	94.07%	35,000.00	5.93%
RHTR[3]	492,225.25	671,742.00	73.28%	179,516.75	26.72%
Subtotal Residential Incentives	9,230,036.81	9,492,439.00	97.24%	262,402.19	2.76%
Residential Transformational	1,051,054.23	1,054,715.00	99.65%	3,660.77	0.35%
Total Residential Incentives	**10,281,091.04**	**10,547,154.00**	**97.48%**	**266,062.96**	**2.52%**
Total Residential Programs	**13,648,568.97**	**13,922,597.00**	**98.03%**	**274,028.03**	**1.97%**
Business (C&I) Programs					
Programs Ops and Management					
BEEM[2,4,5]	1,012,647.67	1,013,152.00	99.95%	504.33	0.05%
CBEEM[2,4,5]	1,073,736.77	1,074,098.00	99.97%	361.23	0.03%
BESM[5]	712,364.09	712,597.00	99.97%	232.91	0.03%
BHTR[5]	463,075.29	463,565.00	99.89%	489.71	0.11%
Total Business Programs	3,261,823.82	3,263,412.00	99.95%	1,588.18	0.05%
Business Evaluation[4,5]	120,134.59	120,277.00	99.88%	142.41	0.12%
Business Outreach[2,5]	741,730.02	741,853.00	99.98%	122.98	0.02%
Total Business Non-Incentives	**4,123,688.43**	**4,125,542.00**	**99.96%**	**1,853.57**	**0.04%**
Business Incentives					
BEEM[3,6,7]	4,872,145.62	4,920,800.00	99.01%	48,654.38	0.99%
CBEEM[1,3]	4,025,952.57	4,048,026.00	99.45%	22,073.43	0.55%
BESM[1,3,6]	1,596,607.59	1,778,544.00	89.77%	181,936.41	10.23%
BHTR[3]	699,909.68	854,500.00	81.91%	154,590.32	18.09%
Subtotal Business Incentives	11,194,615.46	11,601,870.00	96.49%	407,254.54	3.51%
Business Transformational	1,282,595.52	1,289,097.00	99.50%	6,501.48	0.50%
Total Business Incentives	**12,477,210.98**	**12,890,967.00**	**96.79%**	**413,756.02**	**3.21%**
Total Business Programs	**16,600,899.41**	**17,016,509.00**	**97.56%**	**415,609.59**	**2.44%**

Table 15 Program Expenditures and Unspent Funds (cont'd)					
	Total Expenditures	**R1 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
Total Services and Initiatives	**30,249,468.38**	**30,939,106.00**	**97.77%**	**689,637.62**	**2.23%**
Total Supporting Services	**2,050,771.50**	**2,091,908.00**	98.03%	**41,136.50**	**1.97%**
Subtotal Non-Incentives (Prior to Tax)	9,541,937.86	9,592,893.00	99.47%	50,955.14	0.53%
Less Performance Incentives (Prior to Tax)	(668,500.32)	(668,500.00)		0.32	
Subtotal Non-Incentive Less Performance Incentives (PI)	8,873,437.54	8,924,393.00		50,955.46	
Total Tax on Non-Incentive Without PI	418,116.38	420,517.00		2,400.62	
Performance Incentives (Inclusive of Tax)	0.00	700,000.00		700,000.00	
Subtotal Non-Incentives Billed	9,291,553.92	*10,044,910.00*	92.50%	753,356.08	7.50%
Subtotal Residential & Business Customer Incentives	20,424,652.27	*21,094,309.00*	96.83%	669,656.73	3.17%
Subtotal Transformational Incentives	2,333,649.75	*2,343,812.00*	99.57%	10,162.25	0.43%
Subtotal Customer &Transformational Incentives	22,758,302.02	*23,438,121.00*	97.10%	679,818.98	2.90%
Subtotal Estimated Contractor Costs	***32,049,855.94***	***33,483,031.00***	**95.72%**	**1,433,175.06**	**4.28%**
Performance Awards in Excess of Target Levels		133,000.00			
Total Estimated Contractor Costs (including Performance Awards in Excess of Target Levels)		**33,616,031.00**			

On-Bill Financing Program

In PY13, the Program contract was amended to include funding for the On-Bill Financing (OBF) Program. The OBF budget and deliverables were described in the OBF proposal attached to Supplemental Contract #5 (as revised on May 31, 2013). OBF budget and PY13 expenditures are detailed in **Table 16**. Although numerous OBF deliverables were developed in PY13, delays outside of Program control resulted in program launch being pushed back to late 2014. As a result, at year-end, the OBF Program had utilized 39% of its allotted funds. A more detailed discussion on the OBF program can be found in the Program Overview.

Table 16
OBF Program Expenditures and Unspent Funds

	Total Expenditures	Budget	Percent Spent	Unspent	Percent Unspent
Program Design & Development					
Design & Development					
Operations	431,356.89	963,242.00	45%	531,885.11	55%
IT/Data Management	147,665.00	-	-	(147,665.00)	-
Marketing	9,343.75	-	-	(9,343.75)	-
General & Administrative	40,597.50	107,026.00	38%	66,428.50	62%
Total Program Design & Development	**628,963.14**	**1,070,268.00**	**59%**	**441,304.86**	**41%**
Program Startup & Implementation					
Deliverable #6: Draft Contractor Materials & Processes					
Program Management	80,565.00	53,910.00	149%	(26,655.00)	-49%
Finance & Risk Management	15,672.50	17,100.00	92%	1,427.50	8%
Marketing & Communications	13,917.50	46,575.00	30%	32,657.50	70%
Operations	115,815.00	159,431.00	73%	43,616.00	27%
IT	-	-	-	-	-
Program Consultants	8,259.06	18,750.00	44%	10,490.94	56%
Other Direct Costs	-	40,000.00	-	40,000.00	100%
Total Deliverable #6:	**234,229.06**	**335,766.00**	**70%**	**101,536.94**	**30%**
Deliverable #7: Data Exchange & Application Automation					
Program Management	66,720.00	38,790.00	172%	(27,930.00)	-72%
Finance & Risk Management	15,443.75	17,100.00	90%	1,656.25	10%
Marketing & Communications	10,376.25	46,575.00	22%	36,198.75	78%
Operations	20,733.75	53,144.00	39%	32,410.25	61%
IT	365,849.69	372,750.00	98%	6,900.31	2%
Program Consultants	2,746.10	6,250.00	44%	3,503.90	56%
Other Direct Costs	-	60,000.00	-	60,000.00	100%
Total Deliverable #7:	**481,869.54**	**594,609.00**	**81%**	**112,739.46**	**19%**
Total Program Startup & Implementation	**716,098.60**	**930,375.00**	**77%**	**214,276.40**	**23%**
Program Launch & Ramp Up					
PUC Approvals, Program Launch & Administration					
Program Management	-	130,938.00	-	130,938.00	100%
Finance & Risk Management	-	31,400.00	-	31,400.00	100%
Marketing & Communications	-	58,478.00	-	58,478.00	100%
Operations	-	206,578.00	-	206,578.00	100%

PORTFOLIO FIFTH YEAR IMPACTS

Table 16
OBF Program Expenditures and Unspent Funds

	Total Expenditures	Budget	Percent Spent	Unspent	Percent Unspent
IT	-	177,170.00	-	177,170.00	100%
Program Consultants	-	30,000.00	-	30,000.00	100%
Other Direct Costs	-	150,000.00	-	150,000.00	100%
Subtotal PUC Approvals, Program Launch & Administration	**-**	**784,564.00**	**-**	**784,564.00**	**100%**
Deliverable #8: Program Elements					
Program Management	134,645.00	65,963.00	204%	(68,682.00)	-104%
Finance & Risk Management	23,151.25	18,840.00	123%	(4,311.25)	-23%
Marketing & Communications	4,673.75	42,182.00	11%	37,508.25	89%
Operations	152,408.75	102,547.00	149%	(49,861.75)	-49%
IT	230,550.00	221,463.00	104%	(9,087.00)	-4%
Program Consultants	9,479.45	10,000.00	95%	520.55	5%
Other Direct Costs	4,380.70	45,000.00	10%	40,619.30	90%
Total Deliverable #8:	**559,288.90**	**505,995.00**	111%	**(53,293.90)**	-11%
Deliverable #9: PA Receives Customers and Inquiries					
Program Management	-	52,375.00	-	52,375.00	100%
Finance & Risk Management	-	12,560.00	-	12,560.00	100%
Marketing & Communications	-	11,696.00	-	11,696.00	100%
Operations	-	82,631.00	-	82,631.00	100%
IT	-	44,293.00	-	44,293.00	100%
Program Consultants	-	10,000.00	-	10,000.00	100%
Other Direct Costs	-	30,000.00	-	30,000.00	100%
Total Deliverable #9:	**-**	**243,555.00**	**-**	**243,555.00**	**100%**
Deliverable #10: Contractor Training					
Program Management	-	12,600.00	-	12,600.00	100%
Finance & Risk Management	-	0.00	-	0.00	0%
Marketing & Communications	-	4,600.00	-	4,600.00	100%
Operations	-	21,400.00	-	21,400.00	100%
IT	-	-	-	-	-
Program Consultants	-	-	-	-	-
Other Direct Costs	-	25,000.00	-	25,000.00	100%
Total Deliverable #10:	**-**	**63,600.00**	**-**	**63,600.00**	**100%**
Total Program Launch & Ramp Up	**559,288.90**	**1,597,714.00**	**35%**	**1,038,425.10**	**65%**
Budget Reserve (prior to tax)		**1,271,142.00**	**-**	**1,271,142.00**	**100%**
Prog. Design & Development Billed	*628,963.14*	*1,070,268.00*	*59%*	*441,304.86*	*41%*
Prog. Startup & Implementation Billed	*716,098.60*	*930,375.00*	*77%*	*214,276.40*	*23%*
Program Launch & Ramp Up Billed	*559,288.90*	*1,597,714.00*	*35%*	*1,038,425.10*	*65%*
OBF Program Total *(prior to reserve & tax)*	***1,904,350.64***	***3,598,357.00***	***53%***	***1,694,006.36***	***47%***
OBF Budget Reserve	-	1,271,142.00	-	1,271,142.00	100%
Total Tax on OBF program	89,733.01	229,451.00	39%	139,717.99	61%
OBF Program Total (inclusive of reserve & tax)	**1,994,083.65**	**5,098,950.00**	**39%**	**3,104,866.35**	**61%**

PORTFOLIO FIFTH YEAR IMPACTS

Introduction

There are three levels of energy and demand savings shown in this Report. The three levels are used to show how energy and demand savings are credited at the customer's meter (Customer Level Savings), at the utility system generation level (System Level Savings) and at the PBFA Contract level (Program Level Savings).

1. **Customer Level Savings (Gross at Meter)** – This savings figure is the gross change in energy consumption at the customer meter that results directly from Program-promoted actions taken by Program participants. The savings are determined by direct metering, engineering calculations, or measurement and verification of prior installations of the particular savings measure. This is the savings level defined in the Program's Technical Resource Manual (TRM).

2. **System Level Savings (Gross Generated)** – This savings figure is realized at the utility system level and includes the transmission, distribution and generation station energy losses between the end-use customer and the utility generating units. System Level Savings has been termed Gross Level Savings in previous reports.

3. **Program Level Savings (Net Generated)** – This savings figure shows the amount of energy reductions determined to be directly attributed to PBFA Program actions by separating out the impacts that are a result of other influences, such as consumer self-motivation or free-riders. Free-riders are ratepayers or participants who received an incentive and/or education from the Program, but the incentive and/or education did not play a role in their decision to purchase the savings measure. These ratepayers would have taken action or purchased the energy-efficient item regardless of the incentive and therefore, Program Level Savings removes their participation.

PORTFOLIO FIFTH YEAR IMPACTS

Portfolio Energy and Demand Savings

Program Energy Savings for PY13 were:

- **First Year** – 127,007,831 kWh
  (56.1% in Residential and 43.9% in Business programs)

- **Lifetime** – 1,367,592,053 kWh
  (40.6% in Residential and 59.4% for Business programs)

The difference in percentage contributions between first year and lifetime savings remains due to the relative weight of CFLs and the Peer Group Comparison in the residential portfolio. These measures have relatively short measure lives (6 years and 1 year, respectively) as compared to longer lived measures in the business portfolio this year, bolstered by the LEDs having 15 year measure lives. Residential measures have an average measure life of 7.8 years in PY13 up from 7.0 years in PY12, while business measures have an average measure life of 14.6 years in PY13 up from 13.5 years in PY12.

Program Peak Demand reduction for PY13 was:

- Peak Demand – 16,786 kW (56.5% from Residential and 43.5% from Business)

The following tables provide a summary of the Residential and Business programs in the context of their level of activity, incentives, energy-saving impacts and cost effectiveness at the Program, System and Customer levels.

- **Table 17**: Cumulative Annual Electric Energy Savings (Program Level) by Budget Category

- **Table 18**: Cumulative Annual Electric Energy Savings (System Level) by Budget Category

- **Table 19:** Cumulative Annual Electric Energy Savings (Customer Level) by Budget Category

PORTFOLIO FIFTH YEAR IMPACTS

Table 17 Cumulative Annual Electric Savings (Program Level) by Budget Category								
Program	Apps Processed	Quantity of Energy Efficient Equipment (Units)	Incentives ($)	Demand Impact (kW)	First Year Energy Impact (kWh 1st Yr)	Lifetime Energy Impact (kWh - Life)	First Year Impact Cost ($/kWh)	Lifetime Impact Cost ($/kWh)
BEEM	2,150	118,085	$4,872,146	3,868	26,941,496	382,247,212	$0.181	$0.013
CBEEM	312	310	$4,025,953	2,799	22,539,657	338,108,258	$0.179	$0.012
BESM	1,297	16,878	$1,596,608	287	3,872,686	57,650,739	$0.412	$0.028
BHTR	719	11,371	$699,910	340	2,412,099	33,769,391	$0.290	$0.021
Business Totals	**4,478**	**146,644**	**$11,194,615**	**7,294**	**55,765,938**	**811,775,599**	**$0.201**	**$0.014**
REEM	37,170	2,979,267	$8,180,046	9,463	67,307,632	498,831,420	$0.122	$0.016
RESM	7	925	$555,000	0	3,758,500	54,419,569	$0.148	$0.010
RHTR	271	364	$492,225	23	166,211	2,418,371	$2.961	$0.204
CESH	3	3	$2,766	7	9,531	142,961	$0.290	$0.019
Residential Totals	**37,451**	**2,980,558**	**$9,230,037**	**9,493**	**71,241,873**	**555,816,454**	**$0.130**	**$0.017**
Total	**41,929**	**3,127,202**	**$20,424,652**	**16,787**	**127,007,811**	**1,367,592,053**	**$0.161**	**$0.015**

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive $)	Driven Investment Ratio (TRC/Incentive $)	Benefit Test (TRB/TRC)
BEEM	$43,581,303	$41,347,861	8.9	8.5	1.1
CBEEM	$34,914,212	$23,355,756	8.7	5.8	1.5
BESM	$5,549,055	$2,180,652	3.5	1.4	2.5
BHTR	$3,881,091	$701,956	5.5	1.0	5.5
Business Totals	**$87,925,661**	**$67,586,224**	**7.9**	**6.0**	**1.3**
REEM	$64,087,162	$41,289,807	7.8	5.0	1.6
RESM	$4,217,883	$4,866,600	7.6	8.8	0.9
RHTR	$276,077	$541,443	0.6	1.1	0.5
CESH	$35,988	$14,341	13.0	5.2	2.5
Residential Totals	**$68,617,110**	**$46,712,192**	**7.4**	**5.1**	**1.5**
Total	**$156,542,771**	**$114,298,416**	**7.7**	**5.6**	**1.4**

PORTFOLIO FIFTH YEAR IMPACTS

Table 18
Cumulative Annual Electric Savings (System Level) by Budget Category

Program	Apps Processed	Quantity of Energy Efficient Equipment (Units)	Incentives	Demand Impact (kW)	First Year Energy Impact (kWh 1st Yr)	Lifetime Energy Impact (kWh - Life)	First Year Impact Cost ($/kWh)	Lifetime Impact Cost ($/kWh)
BEEM	2,150	118,085	$4,872,146	5,153	35,888,612	509,477,962	$0.136	$0.010
CBEEM	312	310	$4,025,953	3,737	30,085,040	451,351,640	$0.134	$0.009
BESM	1,297	16,878	$1,596,608	302	4,068,857	60,577,834	$0.392	$0.026
BHTR	719	11,371	$699,910	345	2,442,526	34,195,364	$0.287	$0.020
Business Totals	**4,478**	**146,644**	**$11,194,615**	**9,537**	**72,485,035**	**1,055,602,800**	**$0.154**	**$0.011**
REEM	37,170	2,979,267	$8,180,046	11,986	85,211,384	631,958,430	$0.096	$0.013
RESM	7	925	$555,000	0	4,085,326	59,151,706	$0.136	$0.009
RHTR	271	363	$492,225	30	207,525	3,022,818	$2.372	$0.163
CESH	3	3	$2,766	10	14,663	219,940	$0.189	$0.013
Residential Totals	**37,451**	**2,980,558**	**$9,230,037**	**12,025**	**89,518,897**	**694,352,894**	**$0.103**	**$0.013**
Total	**41,929**	**3,127,202**	**$20,424,652**	**21,563**	**162,003,933**	**1,749,955,694**	**$0.126**	**$0.012**

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive $)	Driven Investment Ratio (TRC/Incentive $)	Benefit Test (TRB/TRC)
BEEM	$58,080,792	$ 41,347,861	11.9	8.5	1.4
CBEEM	$46,613,026	$ 23,355,756	11.6	5.8	2.0
BESM	$5,832,686	$ 2,180,652	3.7	1.4	2.7
BHTR	$3,932,983	$ 701,956	5.6	1.0	5.6
Business Totals	**$114,459,487**	**$ 67,586,224**	**10.2**	**6.0**	**1.7**
REEM	$81,193,765	$ 41,289,807	9.9	5.0	2.0
RESM	$4,584,654	$ 4,866,600	8.3	8.8	0.9
RHTR	$347,263	$ 541,443	0.7	1.1	0.6
CESH	$55,365	$ 14,341	20.0	5.2	3.9
Residential Totals	**$86,181,047**	**$ 46,712,192**	**9.3**	**5.1**	**1.8**
Total	**$200,640,534**	**$ 114,298,416**	**9.8**	**5.6**	**1.8**

PORTFOLIO FIFTH YEAR IMPACTS

Table 19
Cumulative Annual Electric Savings (Customer Level) by Budget Category

Program	Apps Processed	Quantity of Energy Efficient Equipment (Units)	Incentives	Demand Impact (kW)	First Year Energy Impact (kWh 1st Yr)	Lifetime Energy Impact (kWh - Life)	First Year Impact Cost ($/kWh)	Lifetime Impact Cost ($/kWh)
BEEM	2,150	118,085	$ 4,872,146	4,650	32,384,625	459,775,086	$ 0.150	$ 0.011
CBEEM	312	310	$ 4,025,953	3,368	27,113,732	406,688,692	$ 0.148	$ 0.010
BESM	1,297	16,878	$ 1,596,608	273	3,670,914	54,643,824	$ 0.435	$ 0.029
BHTR	719	11,371	$ 699,910	312	2,204,837	30,867,719	$ 0.317	$ 0.023
Business Totals	**4,478**	**146,644**	**$ 11,194,615**	**8,603**	**65,374,109**	**951,975,321**	**$ 0.171**	**$ 0.012**
REEM	37,170	2,979,267	$ 8,180,046	10,826	76,979,115	570,796,055	$ 0.106	$ 0.014
RESM	7	925	$ 555,000	0	3,676,004	53,225,715	$ 0.151	$ 0.010
RHTR	271	363	$ 492,225	27	189,581	2,761,515	$ 2.596	$ 0.178
CESH	3	3	$ 2,766	9	13,452	201,780	$ 0.206	$ 0.014
Residential Totals	**37,451**	**2,980,558**	**$ 9,230,037**	**10,863**	**80,858,152**	**626,985,065**	**$ 0.114**	**$ 0.015**
Total	**41,929**	**3,127,202**	**$ 20,424,652**	**19,466**	**146,232,261**	**1,578,960,387**	**$ 0.140**	**$ 0.013**

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive $)	Driven Investment Ratio (TRC/Incentive $)	Benefit Test (TRB/TRC)
BEEM	$ 52,413,317	$ 41,347,861	10.8	8.5	1.3
CBEEM	$ 42,003,037	$ 23,355,756	10.4	5.8	1.8
BESM	$ 5,261,744	$ 2,180,652	3.3	1.4	2.4
BHTR	$ 3,550,906	$ 701,956	5.1	1.0	5.1
Business Totals	**$ 103,229,004**	**$ 67,586,224**	**9.2**	**6.0**	**1.5**
REEM	$ 73,315,817	$ 41,289,807	9.0	5.0	1.8
RESM	$ 4,125,327	$ 4,866,600	7.4	8.8	0.8
RHTR	$ 317,200	$ 541,443	0.6	1.1	0.6
CESH	$ 50,792	$ 14,341	18.4	5.2	3.5
Residential Totals	**$ 77,809,136**	**$ 46,712,192**	**8.4**	**5.1**	**1.7**
Total	**$ 181,038,140**	**$ 114,298,416**	**8.9**	**5.6**	**1.6**

See Attachment H for a chart comparing the Program's kWh benefits and cost effectiveness at the Program, Customer and System levels.

PORTFOLIO FIFTH YEAR IMPACTS

Savings at Customer and Program Levels

Program Level Savings translate from Program participants (customers) achieving first-year savings based upon the energy efficiency measures they purchased or otherwise installed.

First-year Customer Energy Savings was 146,232,261 kWh per year (1.6% of 2013 utility sales), while Customer Peak Demand Savings was 19,466 kW (1.3% of 2013 utility sales). This does not reflect Peak Demand Savings for the customer as it may not coincide with their actual measured peak demand used for billing purposes. The utility reported non-coincident peak demand across all islands of 1,535,000 kW.

The following tables provide summaries of cumulative energy savings and peak demand savings in the context of program budget categories and island, specifically:

- **Table 20**: Energy (kWh) Reduction by Impact Level and by Island
- **Table 21**: Demand (kW) Reduction by Impact Level and by Island
- **Table 22**: Energy (kWh) Reduction by Impact Level and by Program
- **Table 23**: Demand (kW) Reduction by Impact Level and by Program

PORTFOLIO FIFTH YEAR IMPACTS

Table 20 Energy Impacts (kWh) by Impact Level and Island					
Island	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
Hawaii Island	16,363,022	9.0%	17,835,694	78.8%	14,053,209
Lanai	114,701	9.6%	125,667	89.0%	111,888
Maui	16,829,320	10.0%	18,505,521	77.8%	14,395,401
Molokai	118,838	9.6%	130,199	81.7%	106,332
Oahu	112,806,380	11.2%	125,406,852	78.4%	98,340,981
Total	**146,232,261**	**10.8%**	**162,003,933**	**78.4%**	**127,007,811**
Percent of Customer Level Savings			111%		87%

Table 21 Demand Impacts (kW) by Impact Level and Island					
Island	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
Hawaii Island	2,265	9.0%	2,469	78.8%	1,946
Lanai	7	9.6%	8	83.0%	6
Maui	2,362	10.0%	2,597	77.4%	2,011
Molokai	7	9.6%	8	80.7%	6
Oahu	14,825	11.2%	16,481	77.8%	12,817
Total	**19,466**	**10.8%**	**21,563**	**77.8%**	**16,787**
Percent of Customer Level Savings			111%		86%

PORTFOLIO FIFTH YEAR IMPACTS

Table 22 Energy Impacts (kWh) Impact Level and Program					
Program	**Customer Level Savings**	**System Losses**	**System Level Savings**	**Net-to-Gross Ratio**	**Program Level Savings**
Business Programs	**65,374,109**	**10.9%**	**72,485,035**	**76.9%**	**55,765,938**
BEEM	32,384,625	10.8%	35,888,612	75.1%	26,941,496
CBEEM	27,113,732	11.0%	30,085,040	74.9%	22,539,657
BESM	3,670,914	10.8%	4,068,857	95.2%	3,872,686
BHTR	2,204,837	10.8%	2,442,526	98.8%	2,412,099
Residential Programs	**80,858,152**	**10.7%**	**89,518,897**	**79.6%**	**71,241,873**
REEM	76,979,115	10.7%	85,211,384	79.0%	67,307,632
CESH	13,452	9.0%	14,663	65.0%	9,531
RESM	3,676,004	11.1%	4,085,326	92.0%	3,758,500
RHTR	189,581	9.5%	207,525	80.1%	166,211
Total	**146,232,261**	**10.8%**	**162,003,933**	**78.4%**	**127,007,811**
Percent of Customer Level Savings			111%		87%

Table 23 Demand Impacts (kW) by Impact Level and Program					
Program	**Customer Level Savings**	**System Losses**	**System Level Savings**	**Net-to-Gross Ratio**	**Program Level Savings**
Business Programs	**8,603**	**10.9%**	**9,537**	**76.5%**	**7,294**
BEEM	4,650	10.8%	5,153	75.1%	3,868
CBEEM	3,368	10.9%	3,737	74.9%	2,799
BESM	273	10.8%	302	95.0%	287
BHTR	312	10.7%	345	98.5%	340
Residential Programs	**10,863**	**10.7%**	**12,025**	**78.9%**	**9,492**
REEM	10,826	10.7%	11,986	79.0%	9,463
CESH	9	9.0%	10	65.0%	7
RESM	0	0.0%	0	0.0%	0
RHTR	27	9.4%	**30**	78.1%	23
Total	**19,466**	**10.8%**	**21,563**	**77.8%**	**16,787**
Percent of Customer Level Savings			111%		86%

PORTFOLIO FIFTH YEAR IMPACTS

CFLs & LEDs – Market Shift Continues Toward LEDs

The Program reduced its dependency on CFLs in PY13. There were 1,501,579 Residential and Business CFLs incentivized, this is 15.4% reduction from the 1,775,226 CFLs in PY12. CFL and LED savings remain a significant contributing measure to the Program as shown in **Table 24**.

The combined Residential and Business CFL and LED impact was a lower percentage of the portfolio, now 52% of the energy reduction achieved and 55% of the demand.

Table 24
CFL & LED Statistics

CFL

County Comparison	Business	Residential	Total	%
Honolulu	2,254	1,128,297	1,130,551	75.3%
Hawaii	641	196,769	197,410	13.1%
Maui	175	173,443	173,618	11.6%
Total	**3,070**	**1,498,509**	**1,501,579**	**100.0%**

Cost-Effectiveness	Business	Residential	Total
CFL Incentives	$13,945	$1,772,755	$1,786,701
CFL kWh 1st Year	349,959	47,590,167	47,940,126
1st Yr $/kWh	$0.04	$0.04	$0.04
CFL kWh Lifetime	2,707,243	285,541,003	288,248,246
Lifetime $/kWh	$0.005	$0.006	$0.006

Energy Comparison	Business	Residential	Total
CFL Program kWh	349,959	47,590,167	47,940,126
LED Program kWh	13,463,313	4,177,364	17,640,677
Portfolio kWh	55,765,938	71,241,873	127,007,811
% of Energy	1%	67%	38%
% of Energy	24%	6%	14%

LED

County Comparison	Business	Residential	Total	%
Honolulu	50,849	174,336	225,185	63.0%
Hawaii	9,493	61,521	71,014	19.9%
Maui	9,311	51,793	61,104	17.1%
Total	**69,653**	**287,650**	**357,303**	**100.0%**

Cost-Effectiveness	Business	Residential	Total
LED Incentives	$2,043,296	$1,569,831	$3,613,127
LED kWh 1st Year	13,463,313	4,177,364	17,640,677
1st Yr $/kWh	$0.152	$0.376	$0.205
LED kWh Lifetime	185,163,121	62,660,455	247,823,575
Lifetime $/kWh	$0.011	$0.025	$0.015

Demand Comparison	Business	Residential	Total
CFL Program kW	39	6,555	6,594
LED Program kW	1,920	760	2,680
Portfolio kW	7,294	9,493	16,787
% of Demand	1%	69%	39%
% of Demand	26%	8%	16%

PORTFOLIO FIFTH YEAR IMPACTS

CFL counts dropped by 15.4% compared to PY12 participation numbers whereas LEDs have increased 191%. LEDs will continue to increase their role in the Program-achieved savings. See **Table 25** for details.

Table 25 Impact of Change in CFL Savings Values			
Lamp Count			
Program Year	**Business**	**Residential**	**Total**
PY2009	77,100	1,004,830	1,081,930
PY2010	60,080	1,738,553	1,798,633
PY2011	81,235	1,841,842	1,923,077
PY2012	11,898	1,763,328	1,775,226
PY2013	3,070	1,498,509	1,501,579
First Year kWh			
Program Year	**Business**	**Residential**	**Total**
PY2009	4,099,193	52,054,220	56,153,413
PY2010	4,985,218	45,779,857	50,765,075
PY2011	12,892,740	53,790,929	66,683,669
PY2012	1,784,176	51,753,273	53,537,449
PY2013	349,959	47,590,167	47,940,126
Average kWh Savings Per Lamp			
Program Year	**Business**	**Residential**	**Total**
PY2009	53	52	52
PY2010	83	26	28
PY2011	159	29	35
PY2012	150	29	30
PY2013	114	32	32

In PY13, the average kWh savings per lamp reflects an updated Net-To-Gross value implemented based on feedback from the Evaluation Measurement & Verification (EM&V) team.

PORTFOLIO FIFTH YEAR IMPACTS

Measure Contribution toward Savings Impacts

In PY13, the Program incentivized over 68 measures in 19 different measure categories. High Efficiency Lighting and High Efficiency HVAC accounted for the greatest savings impact and High Efficiency Water Heating was the third most impactful measure category. **Table 26** provides a summary of all measure categories and their respective energy impact for PY13.

- **#1 Contributor - High Efficiency Lighting** – 65% first year (down from 67% in PY12) and 56% lifetime energy savings (up from 50% in PY12). CFLs, LEDs and then T8LW lighting contributed the most toward the Program as they are the most cost-effective measures a customer can implement. LEDs have increased to the second single measure contributor at 17,640,677 kWh/year behind CFLs at 47,940,126 kWh/year.

- **#2 Contributor - High Efficiency HVAC** - 11% first year and 16% lifetime energy savings. Customized Chiller Plant and Prescriptive Chillers contributed 72% of this category.

- **#3 Contributor – High Efficiency Water Heating Measures** - 4% first year (steady from 4% in PY12) and 5% lifetime energy savings (down from 6% in PY12).

Table 26
Contribution by Measure Category in Order of Lifetime Energy Impact

Rank	Category	Apps	%	Measure Quantity	Program Demand (kW)	%	Program Energy (kWh 1st Year)	%	Program Energy (kWh - Life)	%	Incentives	%	Lifetime Cost ($/kWh)
1	High Efficiency Lighting	22,385	53.4%	1,921,382	11,276	67.2%	82,876,478	65.3%	771,427,918	56.4%	$8,709,316	42.6%	$0.011
2	High Efficiency HVAC	392	0.9%	1,389	1,994	11.9%	14,199,360	11.2%	222,773,658	16.3%	$3,183,154	15.6%	$0.014
3	High Efficiency Water Heating	2,618	6.2%	2,543	1,102	6.6%	5,265,031	4.1%	73,722,392	5.4%	$2,808,524	13.8%	$0.038
4	Energy Star Business Equipment	6,354	15.2%	6,858	197	1.2%	4,671,684	3.7%	65,403,574	4.8%	$800,135	3.9%	$0.012
5	Building Envelope Improvements	63	0.2%	61	369	2.2%	2,238,295	1.8%	56,397,393	4.1%	$454,699	2.2%	$0.008
6	Codes and Standards	7	0.0%	925	0	0.0%	3,758,500	3.0%	54,419,569	4.0%	$555,000	2.7%	$0.010
7	High Efficiency Motors	82	0.2%	4,846	238	1.4%	1,694,348	1.3%	26,984,634	2.0%	$501,777	2.5%	$0.019
8	High Efficiency Water Pumping	279	0.7%	278	187	1.1%	1,773,114	1.4%	24,338,562	1.8%	$328,576	1.6%	$0.014
9	Energy Awareness, Measurement and Control Systems	150	0.4%	1,176,987	732	4.4%	6,285,799	4.9%	16,657,501	1.2%	$1,800,991	8.8%	$0.108
10	High Efficiency Air Conditioning	3,720	8.9%	4,730	382	2.3%	1,269,930	1.0%	14,646,877	1.1%	$285,905	1.4%	$0.020
11	High Efficiency Appliances	4,985	11.9%	5,084	119	0.7%	925,136	0.7%	11,460,294	0.8%	$328,927	1.6%	$0.029
12	Custom Project	3	0.0%	3	19	0.1%	600,464	0.5%	11,431,610	0.8%	$111,073	0.5%	$0.010
13	Commercial Industrial Processes	19	0.0%	39	89	0.5%	518,299	0.4%	7,774,484	0.6%	$207,250	1.0%	$0.027
14	High Efficiency Industrial Equipment	7	0.0%	7	9	0.1%	253,583	0.2%	4,353,273	0.3%	$41,437	0.2%	$0.010
15	Data Center Measures	1	0.0%	1	39	0.2%	345,108	0.3%	4,141,294	0.3%	$55,575	0.3%	$0.013
16	Residential Design	826	2.0%	826	24	0.1%	209,851	0.2%	1,049,254	0.1%	$123,900	0.6%	$0.118
17	Energy Efficiency Equipment Grants	4	0.0%	1,221	11	0.1%	121,733	0.1%	608,666	0.0%	$11,955	0.1%	$0.020
18	Maintenance	4	0.0%	4	0	0.0%	1,099	0.0%	1,099	0.0%	$200	0.0%	$0.182
19	Other	4	0.0%	0	0	0.0%	0	0.0%	0	0.0%	$130	0.0%	$0
20	Business Design, Audits and Commissioning	18	0.0%	17	0	0.0%	**0**	0.0%	0	0.0%	$84,003	0.4%	$0
21	Accounting Record	8	0.0%	1	0	0.0%	0	0.0%	0	0.0%	$32,126	0.2%	$0
	Total	**41,929**	**100%**	**3,127,202**	**16,787**	**100%**	**127,007,811**	**100%**	**1,367,592,053**	**100%**	**$20,424,652**	**100%**	**$0.015**

PORTFOLIO FIFTH YEAR IMPACTS

Energy Impacts by Rate Schedule

Program Level impacts (first year) were greatest in the Residential Rate Schedule "R" with 68,852,918 kWh or 54.2% of savings, of which 72% was realized on Oahu. The Oahu Residential rate class provided the greatest savings of 50,102,519 kWh per year of all the rate schedules (39% of PY13 total kWh). A summary of Program energy impacts by rate schedule is provided in **Table 27.**

Table 27
Program Energy Impact (kWh) by Rate Schedule

Island	R	G	J	P	DS	F	Total	%
Hawaii	9,714,221	495,222	1,684,554	1,824,209	0	335,003	14,053,209	11.1%
Lanai	39,653	72,235	0	0	0	0	111,888	0.1%
Maui	8,893,431	305,135	1,070,811	4,126,024	0	0	14,395,401	11.3%
Molokai	103,093	3,238	0	0	0	0	106,332	0.1%
Oahu	50,102,519	3,345,889	17,075,611	19,625,281	8,118,543	73,136	98,340,981	77.4%
Total	**68,852,918**	**4,221,720**	**19,830,977**	**25,575,514**	**8,118,543**	**408,138**	**127,007,811**	**100.0%**
Percent	54.2%	3.3%	15.6%	20.1%	6.4%	0.3%	100.0%	

Demand impact had similar results with the Residential Rate schedule customers providing 9,366 kW or 55.8% of the demand savings. Oahu Residential Rate Customers provided the greatest savings of 6,806 kW of all the rate schedules (40% of PY12 total kW). A summary of Program Level demand impacts by rate schedule is provided in **Table 28**.

Table 28
Program Demand Impact (kW) by Rate Schedule

Island	R	G	J	P	DS	F	Total	%
Hawaii	1,342	61	225	267	-	51	1,946	11.6%
Lanai	5	1	-	-	-	-	6	0.0%
Maui	1,208	39	179	585	-	-	2,011	12%
Molokai	6	-	-	-	-	-	6	0.0%
Oahu	6,806	242	2,146	2,496	1,115	11	12,817	76.4%
Total	**9,366**	**344**	**2,551**	**3,348**	**1,115**	**62**	**16,787**	**100%**
Percent	55.8%	2.0%	15.2%	19.9%	6.6%	0.4%	100.0%	

PORTFOLIO FIFTH YEAR IMPACTS

Program Level Energy Impacts by Program and Rate Class

Table 29 shows Business and Residential program energy contributions by rate class.

- **# 1 Contributor - Residential Energy Efficiency Measures (REEM) within the Residential Rate Schedule "R"**
  66,672,058 kWh (52% of total program)
  The top three contributors toward this value were residential CFLs, Peer Group Comparison and LEDs.

- **# 2 Contributor - Business Energy Efficiency Measures (BEEM) within the Business Large Customer Rate Schedule "P"**
  13,030,582 kWh (10% of total program)
  Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects. Schedule "P" savings were dominated by high performance lighting at 53% of savings in the category. The lighting technologies were led by LED and T8 LW retrofits.

Table 29
Program Energy Impact (kWh) by Rate Class

Program	R	G	J	P	DS	F	Total	%
Business Programs	**121,867**	**3,824,842**	**18,342,639**	**25,572,446**	**7,496,006**	**0**	**408,138**	**55,765,938**
BEEM	14,937	855,270	10,323,870	13,030,582	2,716,836	0	0	26,941,496
CBEEM	21,243	441,412	6,031,275	10,858,419	4,779,170	0	408,138	22,539,657
BESM	3,414	2,158,929	592,672	1,117,671	0	0	0	3,872,686
BHTR	82,273	369,231	1,394,822	565,774	0	0	0	2,412,099
Residential Programs	**68,731,051**	**396,879**	**1,488,337**	**3,069**	**622,537**	**0**	**0**	**71,241,873**
REEM	66,672,058	9,968	0	3,069	622,537	0	0	67,307,632
CESH	9,531	0	0	0	0	0	0	9,531
RESM	1,886,718	383,444	1,488,337	0	0	0	0	3,758,500
RHTR	162,745	3,466	0	0	0	0	0	166,211
Total	**68,852,918**	**4,221,720**	**19,830,977**	**25,575,514**	**8,118,543**	**0**	**408,138**	**127,007,811**
Percent	**54.2%**	**3.3%**	**15.6%**	**20.1%**	**6.4%**	**0.0%**	**0.3%**	**100.0%**

PORTFOLIO FIFTH YEAR IMPACTS

Program Level Demand Impacts by Program and Rate Class

Table 30 shows Business and Residential program demand contributions by rate class.

- **# 1 Contributor - Residential Energy Efficiency Measures (REEM) within the Residential Rate Schedule "R"**
  9,322 kW (56% of total program)
  The top three contributors toward this value were Residential CFLs, Peer Group Comparison and LEDs.

- **# 2 Contributor - Business Energy Efficiency Measures (BEEM) within the Business Large Customer Rate Schedule "P"**
  1,873 kWh (11% of total program)
  Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects. Schedule "P" savings were dominated by high performance lighting at 53% of savings in the category. The lighting technologies were led by LED and T8 LW retrofits.

Table 30
Program Demand Impact (kW) by Rate Class

Program	R	G	J	P	DS	F	Total	%
Business Programs	**15**	**341**	**2,551**	**3,348**	**976**	**62**	**7,294**	**43.5%**
BEEM	2	102	1,445	1,873	447	0	3,868	23.0%
CBEEM	4	68	880	1,256	529	62	2,799	16.7%
BESM	1	124	26	137	-	-	287	1.7%
BHTR	9	48	200	82	-	-	340	2.0%
Residential Programs	**9,351**	**3**	**-**	**-**	**139**	**-**	**9,493**	**56.5%**
REEM	9,322	2	-	-	139	-	9,463	56.4%
CESH	7	0	-	-	-	-	7	0.0%
RESM	0	0	-	-	-	-	0	0.0%
RHTR	23	1	-	-	-	-	23	0.1%
Total	**9,372**	**344**	**2,546**	**3,348**	**1,115**	**62**	**16,787**	**100.0%**
Percent	55.8%	2.0%	15.2%	19.9%	6.6%	0.4%	100.0%	

PORTFOLIO FIFTH YEAR IMPACTS

Customer Level Energy Impacts by Program and Rate Class

Table 31 shows Business and Residential program energy contributions by rate class.

- **# 1 Contributor - Residential Energy Efficiency Measures (REEM) within the Residential Rate Schedule "R"**
  76,224,725 kWh (52% of total program)
  The top three contributors toward this value were Residential CFLs, Peer Group Comparison and LEDs.

- **# 2 Contributor - Business Energy Efficiency Measures (BEEM) within the Business Large Customer Rate Schedule "P"**
  15,707,361 kWh (10% of total program)
  Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects. High performance lighting led by LED and T8 LW retrofits were the top contributors to this category.

Table 31
Customer Energy Impact (kWh) by Rate Class

Program	R	G	J	P	DS	F	Total	%
Business Programs	**121,610**	**3,947,961**	**21,466,736**	**30,344,733**	**8,994,969**	**498,100**	**65,374,109**	**44.7%**
BEEM	18,098	1,028,070	12,372,491	15,707,361	3,258,605	0	32,384,625	22.1%
CBEEM	25,478	530,236	7,261,953	13,061,601	5,736,364	498,100	27,113,732	18.5%
BESM	3,280	2,052,369	555,538	1,059,727	0	0	3,670,914	2.5%
BHTR	74,754	337,286	1,276,754	516,044	0	0	2,204,837	1.5%
Residential Programs	**78,269,511**	**390,666**	**1,455,211**	**3,494**	**739,270**	**0**	**80,858,152**	**55.3%**
REEM	76,224,725	11,626	0	3,494	739,270	0	76,979,115	52.6%
CESH	13,452	0	0	0	0	0	13,452	0.0%
RESM	1,845,883	374,910	1,455,211	0	0	0	3,676,004	2.5%
RHTR	185,451	4,130	0	0	0	0	189,581	0.1%
Total	**78,391,121**	**4,338,627**	**22,921,947**	**30,348,227**	**9,734,239**	**498,100**	**146,232,261**	**100.0%**
Percent	**53.6%**	**3.0%**	**15.7%**	**20.8%**	**6.7%**	**0.3%**	**100.0%**	

PORTFOLIO FIFTH YEAR IMPACTS

Customer Level Demand Impacts by Program and Rate Class

Table 32 shows Business and Residential program demand contributions by rate class.

- **# 1 Contributor – Residential Energy Efficiency Measures (REEM) within the Residential Rate Schedule "R"**
  10,659 kW (54% of total program)
  The top three contributors toward this value were Residential CFLs, Solar Water Heating and Peer Group Comparisons.

- **# 2 Contributor – Business Energy Efficiency Measures (BEEM) within the Business Large Customer Rate Schedule "P"**
  2,258 kWh (11% of total program)
  Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects. LED, T8 and VFD Pumps were the top contributors to this category.

Table 32
Customer Demand Impact by Rate Class

Program	R	G	J	P	DS	U	F	Total	%
Business Programs	**15**	**365**	**3,001**	**3,974**	**1,171**	**0**	**76**	**8,603**	**44.2%**
BEEM	2	122	1,733	2,258	536	0	0	4,650	23.9%
CBEEM	4	81	1,060	1,511	635	0	76	3,368	17.3%
BESM	0	118	24	130	0	0	0	273	1.4%
BHTR	9	44	184	75	0	0	0	312	1.6%
Residential Programs	**10,695**	**3**	**0**	**0**	**165**	**0**	**0**	**10,863**	**55.8%**
REEM	10,659	2	0	0	165	0	0	10,826	55.6%
CESH	9	0	0	0	0	0	0	9	0.0%
RESM	0	0	0	0	0	0	0	0	0.0%
RHTR	26	1	0	0	0	0	0	27	0.1%
Total	**10,710**	**369**	**3,001**	**3,974**	**1,336**	**0**	**76**	**19,466**	**100.0%**
Percent	55.0%	1.9%	15.4%	20.4%	6.9%	0.0%	0.4%	100.0%	

PORTFOLIO FIFTH YEAR IMPACTS

Energy Efficiency Portfolio Standard (EEPS) Impacts

2014 Energy Efficiency Potential Study

The PUC contracted with EnerNOC Utility Solutions Consulting to conduct an independent evaluation of energy efficiency (EE) market potential in the State of Hawaii from 2013-2030. This study identifies the potential energy savings that can be achieved by contributing entities toward the goals outlined in the EEPS.

The Executive Summary of the report can be found at:
http://puc.hawaii.gov/reports/energy-reports/attachment/state_of_hi_potential_study_final/

The following are the key findings and figure excerpted from the report.

Key Findings

The purpose of the study was to assess whether the State is on track to meet the EEPS goals by 2030. As shown in Figure ES-1, this study concludes it is **highly** likely that the **EEPS** goals can be met through a combination of interventions:

- **Energy-efficiency programs** like those being delivered by Hawai'i Energy [the Public Benefits Fee Administrator (PBFA)][1] and Kauai Island Utility Cooperative (KIUC)
- **Existing appliance standards and building codes** that are already in place or "on the books" for the next five years. Federal, state and local codes and standards taking effect on or after January 1, 2009 count toward EEPS goals. Savings from these existing codes and standards are substantial and reflect the federal Energy Independence and Security Act of 2007 (EISA) lighting standard and several federal appliance standards that were established since the EEPS goal was set in 2008.
- **Economic potential** is the amount of cost-effective potential remaining after appliance standards and building codes are taken into consideration. In addition to savings that can be gained through future EE programs, economic potential also includes savings that result from changes in manufacturing practices as a result of agreements with ENERGY STAR or energy efficiency agencies (most notable for consumer electronics) and savings from early adopters that purchase energy-efficient appliances or equipment **outside** of programs. While these latter two categories, (savings from manufacturing practices and from early adopters) are not directly attributed to energy efficiency programs offered by KIUC or the PBFA, the savings are significant. If a method can be developed to measure the savings from these categories in the future, it might be appropriate to count these savings toward the EEPS goal.

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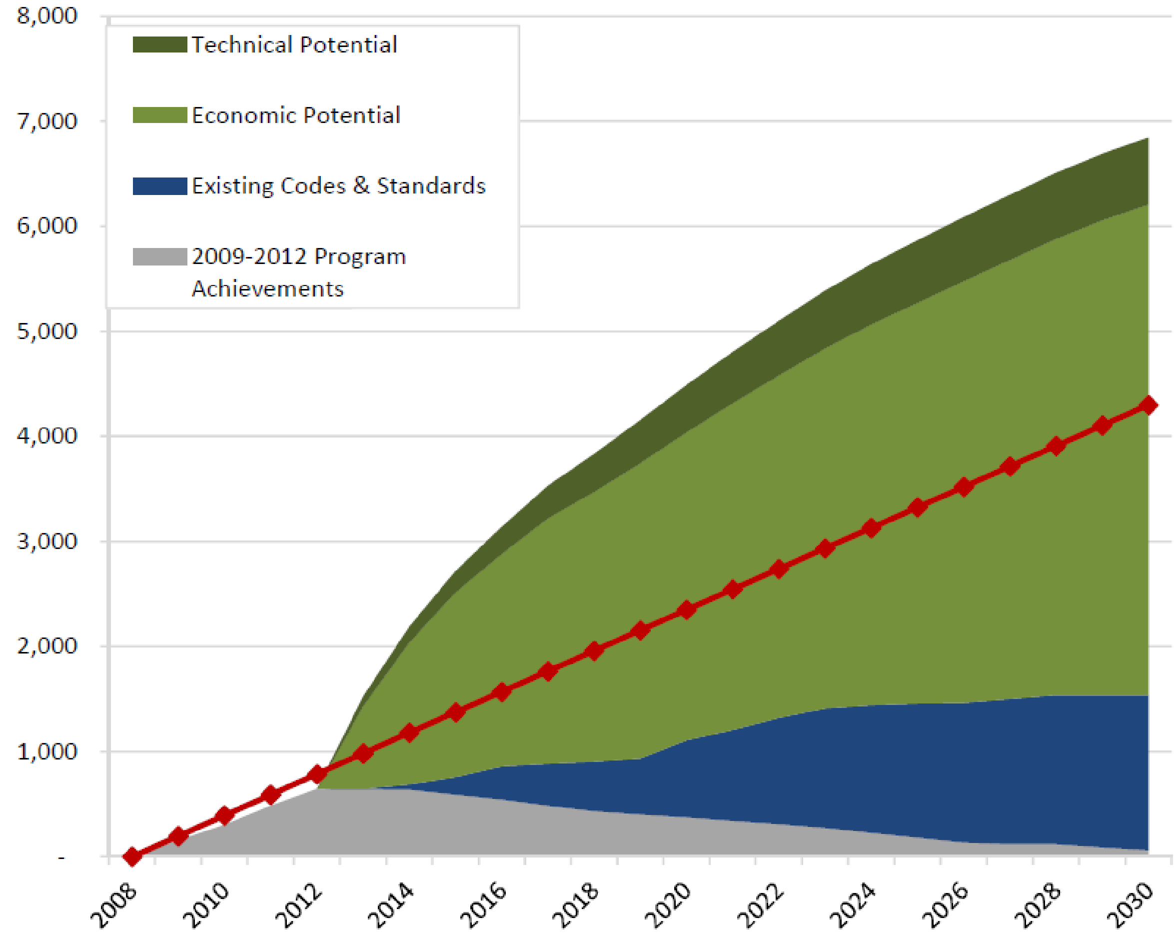
Figure ES-1 shows the year-by-year potential savings from the interventions against the EEPS goal. This study was grounded in 2012 and estimates potential savings for 2013 through 2030. For 2009–2012, program savings estimates developed outside this study were used and are assumed to decay over time. The study estimates that cost-effective cumulative energy efficiency potential in 2030 is 6,210 GWh, or about 144% of current EEPS goals. This indicates that the while the EEPS goals are aggressive, it is likely they can be met cost-effectively.

Figure ES-1 Potential Savings Estimates Compared to the EEPS Goal (GWh)



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Application of Fifth Year Energy Savings towards EEPS Goal

The targeted goal of the EEPS is a 4,300 GWh reduction from the expected usage in 2030. This "slice of savings" will be the result of many actions, including energy efficiency retrofits, increased appliance standards, product improvements (to meet consumer demands for longer battery lives and less environmental impact), building codes, behavior change and much more. Hawaii Energy will capture many of these actions through our programs and services.

As measures and actions are put into place, each will start to provide an annual energy savings. These savings will be provided each year until the device or action is replaced with a new one that provides at least the same energy reduction that will maintain the savings. For simplicity this year, we have decided to show the savings as forever persistent and assume first year savings will last forever.

Figure 5 projects the results of the current program performance level impacts being achieved each year. Hawaii DSM program operations began in 1996; however, **Figure 5** depicts the yearly DSM performance from 2008 - 2013 and adds the current PY13 impacts as if they will be achieved each year into the future. The result is that 3,476 GWh, or 80% of the goal is potentially achieved (purple line).

The difference between actual electricity sales (green line) and the Program's cumulative impact (light blue line) has increased to nearly 1,000 GWhs since the inception of DSM programs (blue area).

The sales of energy on each island are also provided for scale and reduction opportunity identification. The last piece of information added this year is a demonstration of the estimated annual energy consumption of 100,000 electric vehicles (based on 2013 technology, energy use of 8 kWh/day).

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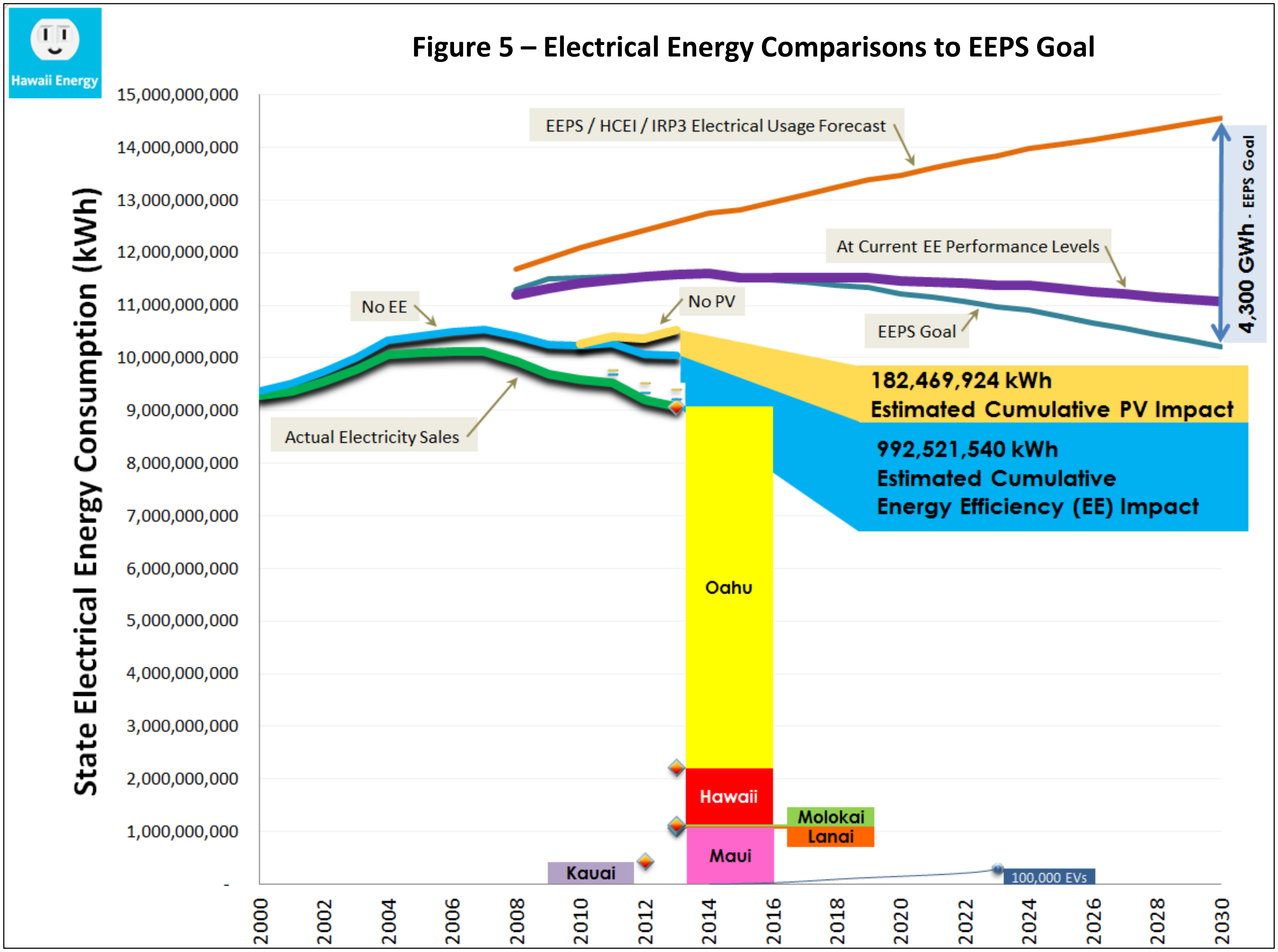
Figure 5 – Electrical Energy Comparisons to EEPS Goal



PORTFOLIO FIFTH YEAR IMPACTS

Cumulative Impacts of Energy Efficiency (EE) and Non-Utility Photo-Voltaic (PV) Installations

Figure 6 shows Hawaii GDP economic activity, cumulative impact of the actions and measures supported by DSM programs, and estimated roof top PV contribution, visualized as light green, light blue, and yellow lines respectively. The light blue line is calculated by adding the cumulative energy savings for each year of EE activity to the Hawaii GDP predicted energy consumption. Similarly, PV cumulative impact is also added to show it has made significant increases over the past four years, providing a Hawaii Energy-estimated 182 GWh reduction in electrical energy sales. The remaining undefined impacts are predictably market-driven. The Program will investigate these reductions in PY14 utilizing the PUC 2014 Energy Efficiency Potential Study and Program-purchased benchmarking data. Areas of review will include appliance and device sales, energy code compliance, customer-driven efficiency and other consumer actions.

It can also be seen that electrical sales (dark green line) flatlined from around 2004 until the 2008 economic downturn, when sales actually started to decline. Much of the 2004 to 2008 stagnation may be attributed to improved consumer and business electronics (e.g. the transition from cathode ray tube (CRT) screens to flat panel displays), as well as rapid adoption of improved consumer appliances, high efficiency lighting (CFLs and T8). Although the GDP has since recovered to pre-2008 levels, expected energy sales have continued to decrease, which may be attributed to: 1) the dramatic improvements in air conditioning technologies (e.g. inverter-driven variable capacity and oil-free compressor units) and 2) the maturation and cost-effectiveness of LED technology.

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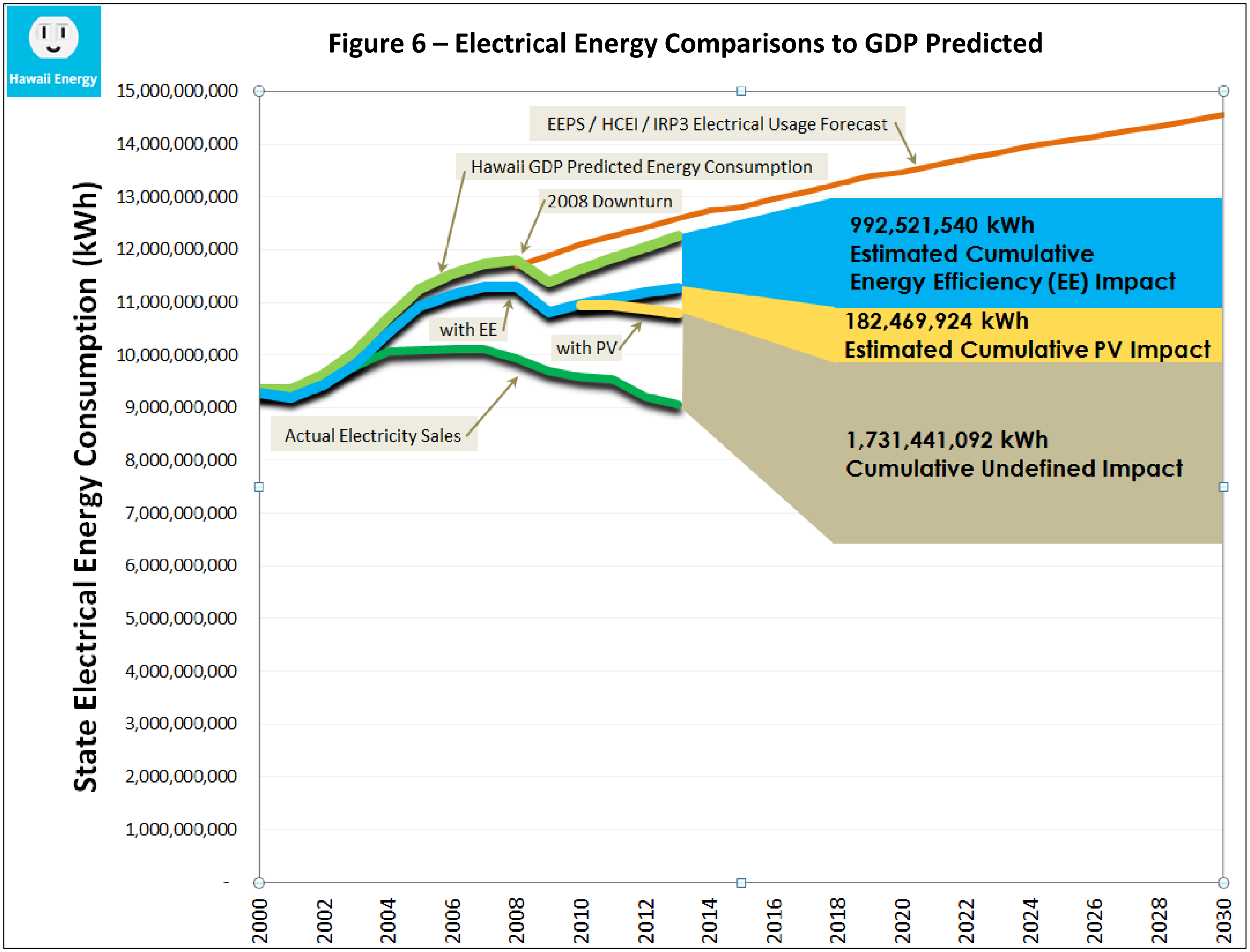

PORTFOLIO FIFTH YEAR IMPACTS

Portfolio Impacts Relative to Load

Tables 33, 33a and 34 show the Program and Customer Level Impacts as compared to PY13 electricity sales.

Customer level savings were equivalent to 1.6% of the 2013 annual energy usage and 1.3% of the peak demand for the utility customers.

Oahu had both the largest energy and demand reductions and the largest percentage of load with energy at 1.6% and demand at 1.3%.

Table 33
Energy Impacts vs. Sales

Island	2013 kWh Generated*	Customer Level Savings	% of Sales	Program Level Savings	% of Sales
Hawaii	1,159,100,000	16,362,200	1.4%	14,053,209	1.2%
Lanai	27,300,000	114,701	0.4%	111,888	0.4%
Maui	1,141,300,000	16,829,153	1.5%	14,395,401	1.3%
Molokai	32,100,000	118,838	0.4%	106,332	0.3%
Oahu	7,187,300,000	112,804,032	1.6%	98,338,408	1.4%
Total	**9,547,100,000**	**146,228,924**	**1.5%**	**127,005,238**	**1.3%**
kWh Sales**					
Total	9,069,500,000	146,228,924	1.6%	127,005,238	1.4%

* HEI 2013 10K Report - net generated and purchased power

** Total Sales in 10K reported only for Total

Table 33a
HECO Sales vs. Generated

HECO Consolidated Operating Statistics	kWh/Yr	%
Net Generated and Purchased	9,547,100,000	100.0%
Sales	9,069,500,000	95.0%
System Losses and Use	477,600,000	5.0%

Table 34
Demand Impacts vs. Sales

Island	2013 kW Peak*	Customer Level Reduction	% of Peak	Program Level Reduction	% of Peak
Hawaii	190,200	2,265	1.2%	1,946	1.0%
Lanai	5,000	7	0.1%	6	0.1%
Maui	190,300	2,362	1.2%	2,011	1.1%
Molokai	5,400	7	0.1%	6	0.1%
Oahu	1,144,000	14,825	1.3%	12,816	1.1%
Total	**1,534,900**	**19,466**	**1.3%**	**16,785**	**1.1%**

* Reported HEI 2010 10K Report (non-coincident and non-integrated)

PORTFOLIO FIFTH YEAR IMPACTS

Portfolio Total Resource Benefit (TRB) and Total Resource Cost (TRC)

TRB

The utilities' total avoided cost of all saved energy and capacity avoided is called the Total Resource Benefit (TRB). The total Program portfolio had a net TRB of $156,542,771. Table 38 shows the measures and their relative contributions. The top three measures provided 78% of the TRB value. They are: High Efficiency Lighting, High Efficiency HVAC and High Efficiency Water Heating.

- *High Efficiency Lighting* – The largest contributor to the TRB at $92,922,942 (59.4%). CFLs alone had a 38% first year energy impact contribution to the Program, despite a short six (6) year useful life and low unit savings number. CFLs were the greatest contributor to the TRB at $38,451,943 (24.6%).

- *High Efficiency HVAC* – The second measure to offer significant contribution at $24,520,860 (15.7%) was High Efficiency HVAC.

- *High Efficiency Water Heating* – The third largest measure contributing to the TRB at $9,836,876 (6.3%) was High Efficiency Water Heating.

TRC

Total Resource Cost is the customer's project or incremental cost to purchase and install the energy-efficient equipment or make operational changes above what would have been done anyway. PY13 Program Savings were achieved with an estimated TRC of $114,298,416, compared to $56,213,606 in PY12.

The largest customer investments were High Efficiency Air Conditioning at $22,966,459 (20.1%), followed by LEDs at $20,145,278 (17.6%) and Solar Water Heaters at $20,145,278 (31.3%). See **Table 35** for details.

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Table 35 Measure Portfolio Total Resource Benefit and Costs (TRB & TRC)														
Category	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st Year)**	**%**	**Program Energy (kWh - Life)**	**%**	**Average Measure Life (Years)**	**TRB/ TRC**	**Total Resource Benefit (TRB)**	**%**	**Total Resource Cost (TRC)**	**%**	**Incentives**	**%**
High Efficiency Lighting	11,276	67.2%	82,876,478	65.3%	771,427,918	56.4%	9.3	3.0	$92,992,942	59.4%	$30,759,266	26.9%	$8,709,316	42.6%
High Efficiency HVAC	1,994	11.9%	14,199,360	11.2%	222,773,658	16.3%	15.7	0.8	$24,520,860	15.7%	$30,618,454	26.8%	$3,183,154	15.6%
High Efficiency Water Heating	1,102	6.6%	5,265,031	4.1%	73,722,392	5.4%	14.0	0.6	$9,836,876	6.3%	$17,653,257	15.4%	$2,808,524	13.8%
Energy Star Business Equipment	197	1.2%	4,671,684	3.7%	65,403,574	4.8%	14.0	0.8	$5,826,176	3.7%	$7,505,784	6.6%	$800,135	3.9%
Building Envelope Improvements	369	2.2%	2,238,295	1.8%	56,397,393	4.1%	25.2	1.3	$4,688,072	3.0%	$3,647,323	3.2%	$454,699	2.2%
Codes And Standards	0	0.0%	3,758,500	3.0%	54,419,569	4.0%	14.5	0.9	$4,217,883	2.7%	$4,866,600	4.3%	$555,000	2.7%
High Efficiency Motors	238	1.4%	1,694,348	1.3%	26,984,634	2.0%	15.9	0.6	$2,981,992	1.9%	$5,304,312	4.6%	$501,777	2.5%
High Efficiency Water Pumping	187	1.1%	1,773,114	1.4%	24,338,562	1.8%	13.7	1.5	$2,593,597	1.7%	$1,736,624	1.5%	$328,576	1.6%
Energy Awareness, Measurement And Control Systems	732	4.4%	6,285,799	4.9%	16,657,501	1.2%	2.7	0.8	$2,192,163	1.4%	$2,911,516	2.5%	$1,800,991	8.8%
High Efficiency Air Conditioning	382	2.3%	1,269,930	1.0%	14,646,877	1.1%	11.5	1.1	$2,558,198	1.6%	$2,244,428	2.0%	$285,905	1.4%
High Efficiency Appliances	119	0.7%	925,136	0.7%	11,460,294	0.8%	12.4	0.4	$1,325,594	0.8%	$3,655,022	3.2%	$328,927	1.6%
Custom Project	19	0.1%	600,464	0.5%	11,431,610	0.8%	19.0	0.7	$858,657	0.5%	$1,246,133	1.1%	$111,073	0.5%
Commercial Industrial Processes	89	0.5%	518,299	0.4%	7,774,484	0.6%	15.0	1.0	$935,627	0.6%	$926,962	0.8%	$207,250	1.0%
High Efficiency Industrial Equipment	9	0.1%	253,583	0.2%	4,353,273	0.3%	17.2	0.7	$334,972	0.2%	$510,830	0.4%	$41,437	0.2%
Data Center Measures	39	0.2%	345,108	0.3%	4,141,294	0.3%	12.0	2.0	$467,236	0.3%	$228,000	0.2%	$55,575	0.3%
Residential Design	24	0.1%	209,851	0.2%	1,049,254	0.1%	5.0	0.5	$137,556	0.1%	$293,366	0.3%	$123,900	0.6%
Energy Efficiency Equipment Grants	11	0.1%	121,733	0.1%	608,666	0.0%	5.0	6.2	$74,178	0.0%	$11,955	0.0%	$11,955	0.1%
Maintenance	0	0.0%	1,099	0.0%	1,099	0.0%	1.0	0.3	$192	0.0%	$556	0.0%	$200	0.0%
Business Design, Audits And Commissioning	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$145,796	0.1%	$84,003	0.4%
Accounting Record	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$32,096	0.0%	$32,126	0.2%
Total	**16,787**	**100%**	**127,007,811**	**100%**	**1,367,592,053**	**100%**	**10.8**	**1.4**	**$156,542,771**	**100%**	**$114,298,279**	**100%**	**$20,424,522**	**100%**

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TRC Test

The societal cost test of the TRB/TRC provides a metric of how much "return on investment" is provided by:

- Saving energy versus creating it (kWh reductions)
- Avoiding the need for increased power plant capacity (Peak kW reductions)

The TRB/TRC ratio of 1.4 indicates that society is getting a 1.4 times return (or 140%) on their investment. Currently this does not include the benefits of avoided transmission and distribution costs or any "externalities" that bring benefit to society, such as reductions in air and water emissions. Refer to **Tables 36-37** for details under TRB/TRC.

Table 36
TRC Measure Values

Measure	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
Delamping	390	2.3%	2,770,696	2.2%	38,789,745	2.8%	14.0	25.9	$4,464,301	2.9%	$172,464	0.2%	$155,653	0.8%
CFL	6,556	39.1%	47,600,431	37.5%	285,684,692	20.9%	6.0	25.6	$38,451,943	24.6%	$1,499,500	1.3%	$1,773,747	8.7%
Central Plant Optimization	0	0.0%	237,328	0.2%	2,373,281	0.2%	10.0	9.4	$202,322	0.1%	$21,508	0.0%	$21,508	0.1%
Water Cooler Timer	11	0.1%	121,733	0.1%	608,666	0.0%	5.0	6.2	$74,178	0.0%	$11,955	0.0%	$11,955	0.1%
Custom Lighting	11	0.1%	264,507	0.2%	3,679,197	0.3%	13.9	6.0	$326,111	0.2%	$54,544	0.0%	$47,755	0.2%
T8 Low Wattage	896	5.3%	8,142,725	6.4%	113,998,152	8.3%	14.0	3.7	$12,207,548	7.8%	$3,278,092	2.9%	$2,012,237	9.9%
Water Heating - Heat Recovery	63	0.4%	154,775	0.1%	1,547,747	0.1%	10.0	3.5	$311,607	0.2%	$89,924	0.1%	$32,070	0.2%
Whole House Fans	175	1.0%	350,530	0.3%	6,925,129	0.5%	19.8	3.0	$1,263,546	0.8%	$422,937	0.4%	$29,925	0.1%
High Performance Windows	218	1.3%	1,700,722	1.3%	51,021,667	3.7%	30.0	2.7	$3,797,188	2.4%	$1,392,080	1.2%	$289,605	1.4%
Water Heating - Heat Pump	5	0.0%	13,954	0.0%	139,539	0.0%	10.0	2.6	$26,006	0.0%	$9,900	0.0%	$2,780	0.0%
Data Center Technologies	39	0.2%	345,108	0.3%	4,141,294	0.3%	12.0	2.0	$467,236	0.3%	$228,000	0.2%	$55,575	0.3%
Pool Pump	0	0.0%	4,682	0.0%	70,225	0.0%	15.0	2.0	$6,804	0.0%	$3,374	0.0%	$1,125	0.0%
Demand Control Ventilation	296	1.8%	2,194,502	1.7%	29,958,758	2.2%	13.7	1.9	$3,410,984	2.2%	$1,763,984	1.5%	$478,707	2.3%
VFD Applications	584	3.5%	3,048,497	2.4%	39,505,093	2.9%	13.0	1.7	$5,144,622	3.3%	$2,973,679	2.6%	$477,981	2.3%
EMS	268	1.6%	2,103,174	1.7%	33,688,454	2.5%	16.0	1.7	$3,607,287	2.3%	$2,153,704	1.9%	$377,447	1.8%
LED	2,680	16.0%	17,640,677	13.9%	247,823,575	18.1%	14.0	1.4	$28,746,347	18.4%	$20,145,278	17.6%	$3,613,127	17.7%
Commercial Lighting	716	4.3%	6,595,503	5.2%	88,813,752	6.5%	13.5	1.4	$9,196,094	5.9%	$6,411,988	5.6%	$1,144,781	5.6%
Motors	104	0.6%	508,494	0.4%	9,196,828	0.7%	18.1	1.4	$1,109,578	0.7%	$820,665	0.7%	$89,552	0.4%
Submetering	181	1.1%	1,407,274	1.1%	11,258,191	0.8%	8.0	1.3	$1,446,849	0.9%	$1,140,823	1.0%	$354,600	1.7%
Window Film	128	0.8%	480,719	0.4%	4,807,187	0.4%	10.0	1.3	$773,548	0.5%	$594,459	0.5%	$110,263	0.5%
Refrigeration	3	0.0%	142,201	0.1%	2,037,038	0.1%	14.3	1.3	$166,524	0.1%	$123,805	0.1%	$21,557	0.1%
Custom	299	1.8%	3,029,047	2.4%	46,104,917	3.4%	15.2	1.1	$4,668,813	3.0%	$4,329,256	3.8%	$654,076	3.2%
Lighting Controls	24	0.1%	213,421	0.2%	2,045,601	0.1%	9.6	1.1	$225,525	0.1%	$197,732	0.2%	$36,005	0.2%
Metering	0	0.0%	720	0.0%	2,881	0.0%	4.0	1.1	$360	0.0%	$342	0.0%	$151	0.0%
Water Pumping	41	0.2%	383,440	0.3%	5,751,603	0.4%	15.0	1.0	$597,193	0.4%	$581,191	0.5%	$49,440	0.2%
Efficiency Inside Home Design	0	0.0%	3,758,500	3.0%	54,419,569	4.0%	14.5	0.9	$4,217,883	2.7%	$4,866,600	4.3%	$555,000	2.7%
Custom - VFD Air Compressor	6	0.0%	31,221	0.0%	312,215	0.0%	10.0	0.9	$43,854	0.0%	$50,284	0.0%	$5,459	0.0%

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Table 36 TRC Measure Values (cont'd)														
Measure	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st Yr)**	**%**	**Program Energy (kWh - Life)**	**%**	**Average Measure Life (Yrs)**	**TRB/TRC**	**Total Resource Benefit (TRB)**	**%**	**Total Resource Cost (TRC)**	**%**	**Incentives**	**%**
Refrigerator	200	1.2%	4,747,662	3.7%	66,467,270	4.9%	14.0	0.8	$5,921,231	3.8%	$7,661,273	6.7%	$897,390	4.4%
Room Occupancy Sensors	18	0.1%	223,423	0.2%	1,763,190	0.1%	7.9	0.8	$198,644	0.1%	$242,779	0.2%	$65,688	0.3%
Water Heating - Solar Water Heater	947	5.6%	4,220,862	3.3%	61,365,095	4.5%	14.5	0.6	$8,295,539	5.3%	$14,367,793	12.6%	$2,658,038	13.0%
Peer Group Comparison	551	3.3%	4,819,509	3.8%	4,819,509	0.4%	1.0	0.6	$694,074	0.4%	$1,254,271	1.1%	$1,254,271	6.1%
Ceiling Fan	58	0.3%	514,051	0.4%	2,570,257	0.2%	5.0	0.6	$335,705	0.2%	$588,490	0.5%	$126,980	0.6%
High Efficiency - Air Conditioner	934	5.6%	5,895,272	4.6%	103,052,437	7.5%	17.5	0.5	$11,425,850	7.3%	$22,966,459	20.1%	$1,878,294	9.2%
Solar Thermal Water Heating	45	0.3%	202,332	0.2%	3,034,978	0.2%	15.0	0.5	$408,653	0.3%	$778,722	0.7%	$116,750	0.6%
Custom - Energy Star TV Monitor	7	0.0%	34,580	0.0%	518,696	0.0%	15.0	0.5	$67,999	0.0%	$148,363	0.1%	$6,247	0.0%
ECM	133	0.8%	1,185,854	0.9%	17,787,806	1.3%	15.0	0.4	$1,872,414	1.2%	$4,483,733	3.9%	$412,310	2.0%
Heat Pump Water Heaters	66	0.4%	912,021	0.7%	9,120,206	0.7%	10.0	0.4	$965,899	0.6%	$2,742,089	2.4%	$126,068	0.6%
Custom - Compressor	0	0.0%	80,161	0.1%	2,004,020	0.1%	25.0	0.4	$124,594	0.1%	$336,741	0.3%	$14,421	0.1%
Clothes Washer	106	0.6%	780,258	0.6%	9,363,094	0.7%	12.0	0.3	$1,112,662	0.7%	$3,316,181	2.9%	$217,100	1.1%
Solar Attic Fans	3	0.0%	90,392	0.1%	451,959	0.0%	5.0	0.3	$47,920	0.0%	$166,314	0.1%	$9,600	0.0%
Cool Roof Technologies	23	0.1%	56,854	0.0%	568,538	0.0%	10.0	0.1	$117,336	0.1%	$1,660,783	1.5%	$54,824	0.3%
Energy Study	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$145,796	0.1%	$84,003	0.4%
Benchmark Metering	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$101,061	0.1%	$101,061	0.5%
Total	**16,787**	**100%**	**127,007,811**	**100%**	**1,367,592,053**	**100%**	**10.8**	**1.4**	**$156,542,771**	**100%**	**$114,298,416**	**100%**	**$20,424,652**	**100%**

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Table 37 Total vs. Incremental Measure Cost			
Measure	**Measure Total Cost ($)**	**Measure Incremental ($)**	**Difference ($)**
Solar Water Heater	$14,899,949.38	$14,899,949.38	-
Chiller	$9,778,736.18	$1,955,747.24	$7,822,988.94
Refrigerator - Trade In	$7,014,174.59	$2,104,252.38	$4,909,922.21
LED	$5,743,220.35	$5,743,220.35	-
Package Unit AC	$5,156,579.65	$1,031,315.93	$4,125,263.72
Commercial Lighting	$4,980,461.49	$1,245,115.37	$3,735,346.12
Design	$4,810,200.00	$1,202,550.00	$3,607,650.00
VRF AC	$4,384,770.00	$2,192,385.00	$2,192,385.00
HVAC	$4,304,564.15	$1,076,141.04	$3,228,423.11
Clothes Washer	$3,316,181.48	$663,236.30	$2,652,945.18
EC Motor - Refrigeration	$3,033,832.36	$3,033,832.36	-
Heat Pump Water Heaters	$2,435,660.48	$487,132.10	$1,948,528.38
Cool Roof Technologies	$1,660,783.00	$415,195.75	$1,245,587.25
Windows	$1,392,080.28	$348,020.07	$1,044,060.21
EC Motors - Fan Coil Units	$1,331,015.29	$1,331,015.29	-
Custom Equipment	$1,246,132.96	$311,533.24	$934,599.72
Condominium Submetering Pilot	$1,140,823.09	$1,140,823.09	-
Equipment Controls - Building	$1,038,589.26	$259,647.32	$778,941.95
Demand Control Kitchen Ventilation (DCKV)	$926,961.95	$926,961.95	-
VFD - AHU	$885,064.65	$221,266.16	$663,798.49
VFD - Pumps Non HVAC	$823,641.17	$205,910.29	$617,730.88
CEE Tier 1 Listed Premium Efficiency Motors	$813,384.50	$40,669.23	$772,715.28
Equipment Controls - HVAC	$602,999.00	$150,749.75	$452,249.25
Ceiling Fans	$588,650.11	$117,730.02	$470,920.09
Domestic Water Booster Packages	$581,190.67	$435,893.00	$145,297.67
Demand Ventilation Control - AC	$568,378.00	$142,094.50	$426,283.50
VFD - Chilled Water/Condenser Water	$482,331.00	$120,582.75	$361,748.25
Window Tinting	$467,304.46	$116,826.12	$350,478.35
Whole House Fans	$422,936.51	$422,936.51	-
Air Compressor	$387,024.98	$96,756.25	$290,268.74
VFD - Pool Pump Packages	$336,159.03	$336,159.03	-
Heat Pump	$304,224.23	$304,224.23	-
Solar Water Heating Tune-up	$293,366.17	$293,366.17	-
Garage Demand Ventilation Control	$268,644.40	$67,161.10	$201,483.30

Table 37 Total vs. Incremental Measure Cost (cont'd)			
Measure	Measure Total Cost ($)	Measure Incremental ($)	Difference ($)
Refrigerators w/Recycling	$262,405.47	$78,721.64	$183,683.83
VFD - Cooling Tower Fan	$252,276.00	$63,069.00	$189,207.00
Data Center Technologies	$228,000.00	$57,000.00	$171,000.00
Refrigerator - Under $600	$216,224.18	$43,244.84	$172,979.34
Equipment Controls - Bi-Level Lighting	$197,732.07	$49,433.02	$148,299.05
Solar Attic Fans	$166,314.30	$166,314.30	-
ENERGY STAR® - TV	$148,362.61	$37,090.65	$111,271.96
Refrigeration	$123,804.56	$30,951.14	$92,853.42
Refrigerator - HUI UP	$111,384.00	$33,415.20	$77,968.80
Equipment Controls - Central Plant	$102,987.39	$25,746.85	$77,240.54
Water Heating	$99,823.51	$24,955.88	$74,867.63
Energy Study	$90,207.40	$45,103.70	$45,103.70
Equipment Controls	$80,222.00	$20,055.50	$60,166.50
Equipment Controls - Lighting	$43,470.00	$10,867.50	$32,602.50
Pool VFD Controller Pumps	$34,988.54	$27,990.83	$6,997.71
VFD - Exhaust Fan	$25,000.00	$6,250.00	$18,750.00
Custom Lighting	$8,837.80	$2,209.45	$6,628.35
VFD - Fans - Non HVAC	$3,333.00	$833.25	$2,499.75
T12 to T8 with Electronic Ballast	$627.86	$627.86	-
Maintenance - AC	$555.75	$555.75	-
Metering - Home Energy	$341.95	$68.39	$273.56
Totals	**$88,616,913.00**	**$44,164,904.00**	**$44,452,009.00**

Island Equity

The Island Equity target is based on incentive dollars spent as compared to the contribution of each County towards the Public Benefits fund. In PY13, the Program invested in both Hawaii and Maui counties in two direct install programs:

- Hard-to-Reach Residential Solar Water Heating, a partnership with the Hawaii Community Economic Opportunity Council (HCEOC) and Maui Economic Opportunity (MEO).
- Direct Installation Lighting Program in small businesses and restaurants.
- The impact of the actual incentive distributed within each County are as follows:
- PY11 = 66% of incentive funds in Honolulu, 16% in Hawaii and 18% in Maui counties.
- PY12 = 64% of incentive funds in Honolulu, 23% in Hawaii and 13% in Maui counties.
- PY13 = 74% of incentive funds in Honolulu, 14% in Hawaii and 13% in Maui counties as shown in **Table 38**.

Table 38
Program Level Island Equity by Business and Residential

County	Island	kWh Sales	%	Business Energy Reduction	% of Business Savings	% of Sales	Residential Energy Reduction	% of Residential Savings	% of Sales	Total Energy Reduction	% of Total Savings	% of Sales
Honolulu	Oahu	6,858,535,760	75.7%	45,848,361	82.2%	0.7%	52,492,620	73.7%	0.8%	98,340,891	77.4%	1.4%
Hawaii	Hawaii	1,076,103,574	11.9%	4,338,192	7.8%	0.4%	9,715,017	13.6%	0.9%	14,053,209	11.1%	1.3%
Maui		1,130,176,957	12.5%	5,578,962	10%	0.5%	9,034,659	12.7%	0.8%	14,613,622	11.5%	1.3%
	Lanai	25,325,948	0.3%	75,649	0.1%	0.3%	36,239	0.1%	0.1%	111,888	0.1%	0.4%
	Maui	1,075,502,905	11.9%	5,500,075	9.9%	0.5%	8,895,327	12.5%	0.8%	14,395,401	11.3%	1.3%
	Molokai	29,348,104	0.3%	3,238	0%	0%	103,093	0.1%	0.4%	106,332	0.1%	0.4%
Total		**9,064,816,291**	**100%**	**55,765,516**	**100%**	**0.6%**	71,242,295	**100%**	**0.8%**	**127,007,811**	**100%**	**1.4%**

PY13 Customer Level Island Equity by Business and Residential

County	Island	kWh Sales	%	Business Energy Reduction	% of Business Savings	% of Sales	Residential Energy Reduction	% of Residential Savings	% of Sales	Total Energy Reduction	% of Total Savings	% of Sales
Honolulu	Oahu	6,858,535,760	75.7%	53,614,168	82.0%	0.8%	59,192,212	73.2%	0.9%	112,806,380	77.1%	1.6%
Hawaii	Hawaii Island	1,076,103,574	11.9%	5,079,846	7.8%	0.5%	11,283,176	14.0%	1.0%	16,363,022	11.2%	1.5%
Maui		1,130,176,957	12.5%	6,679,523	10.2%	0.6%	10,383,337	12.8%	0.9%	17,062,860	11.7%	1.5%
	Lanai	25,325,948	0.3%	72,675	0.1%	0.3%	42,026	0.1%	0.2%	114,701	0.1%	0.5%
	Maui	1,075,502,905	11.9%	6,602,906	10.1%	0.6%	10,226,414	12.6%	1.0%	16,829,320	11.5%	1.6%
	Molokai	29,348,104	0.3%	3,941	0.0%	0.0%	114,897	0.1%	0.4%	118,838	0.1%	0.4%
Total		**9,064,816,291**	**100.0%**	**65,373,536**	**100.0%**	**0.7%**	**80,858,725**	**100.0%**	**0.9%**	**146,232,261**	**100.0%**	**1.6%**

Reported total sales by county in HEI's 2012 10k Annual Report filed with the Securities and Exchange Commission.

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Table 39 provides the breakout of incentive spending by Island by Rate Schedule. The residential rate schedule "R" is the highest single rate schedule receiving incentives at 42%. The next highest is rate schedule "P" with 24%.

Table 39
Island Incentive Spending by Rate Schedule

Island	R	G	J	P	DS	F	Total	%
Hawaii	$1,593,522	$199,975	$307,069	$335,609	$0	$48,741	$2,484,915	12.2%
Lanai	$70,380	$48,142	$0	$0	$0	$0	$118,522	0.6%
Maui	$1,329,310	$98,205	$273,367	$828,692	$0	$0	$2,529,574	12.4%
Molokai	$125,029	$25,871	$2,222	$0	$0	$0	$153,122	0.7%
Oahu	$5,451,420	$1,054,399	$3,044,396	$3,743,483	$1,827,362	$11,460	$15,132,519	74.1%
Total	**$8,569,661**	**$1,426,592**	**$3,627,053**	**$4,907,784**	**$1,827,362**	**$60,201**	**$20,424,652**	**100.0%**
Percent	**42.0%**	**7.0%**	**17.8%**	**24.0%**	**8.9%**	**0.3%**	**100.0%**	

Table 40 shows the island equity by program budget category. In total, energy-saving achievement was distributed as follows:

- PY11 = 79% in Honolulu, 11% in Hawaii and 10% in Maui counties.
- PY12 = 73% in Honolulu, 14% in Hawaii and 13% in Maui counties.
- PY13 = 77% in Honolulu, 11% in Hawaii and 12% in Maui counties.

Table 40
Island Equity Energy Savings by Program Budget Category (kWh)

Program	Hawaii Island/ County	Lanai	Maui	Molokai	Maui County	Oahu / City & County of Honolulu	Total	%
Business Programs	**4,338,192**	**75,649**	**5,500,075**	**3,238**	**5,578,962**	**45,848,783**	**55,765,938**	**43.9%**
BEEM	2,483,066	-	3,222,791	2,768	3,225,559	21,232,871	26,941,496	21.2%
CBEEM	1,057,817	-	1,990,755	470	1,991,225	19,490,616	22,539,657	17.7%
BESM	424,705	75,464	188,437	-	263,902	3,184,079	3,872,686	3.0%
BHTR	372,605	185	98,092	-	98,277	1,941,217	2,412,099	1.9%
Residential Programs	**9,715,017**	**36,239**	**8,895,327**	**103,093**	**9,034,659**	**52,492,197**	**71,241,873**	**56.1%**
REEM	9,648,404	36,239	8,755,595	28,300	8,820,134	48,839,093	67,307,632	53.0%
CESH	9,531	-	-	-	-	0	9,531	0.0%
RESM	-	-	107,692	-	107,692	3,650,807	3,758,500	3.0%
RHTR	57,082	-	32,039	74,793	106,833	2,297	166,211	0.1%
Total	**14,053,209**	**111,888**	**14,395,401**	**106,332**	**14,613,622**	**98,340,981**	**127,007,811**	**100%**
%	11.1%	0.1%	11.3%	0.1%	11.5%	**77.4%**	**100%**	

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Table 41 shows island equity by incentive dollars spent and the resulting customer bill savings. In aggregate, ratepayers realized a $45,054,796 reduction in their bills in PY12.

Table 41 Island Equity Incentives by Program Budget Category								
Program	Hawaii Island / County	Lanai	Maui	Molokai	Maui County	Oahu / City & County of Honolulu	Total	%
Business Programs	**$876,838**	**$49,013**	**$1,198,069**	**$3,243**	**$1,250,296**	**$9,061,452**	**$11,188,501**	**54.8%**
BEEM	$416,514	$0	$583,288	$675	$583,963	$3,865,669	$4,866,146	23.8%
CBEEM	$172,610	$0	$379,453	$69	$379,522	$3,473,821	$4,025,953	19.7%
BESM	$193,544	$48,637	$203,521	$0	$252,118	$1,150,906	$1,596,608	7.8%
BHTR	$94,171	$376	$31,806	$2,500	$34,692	$571,057	$699,910	3.4%
Residential Programs	**$1,608,077**	**$69,509**	**$1,331,505**	**$149,879**	**$1,550,892**	**$6,071,068**	**$9,230,037**	**45.2%**
REEM	$1,341,661	$69,509	$1,156,810	$68,799	$1,295,117	$5,543,268	$8,180,046	40.1%
CESH	$2,766	$0	$0	$0	$0	$0	$2,766	0.0%
RESM	$0	$0	$28,200	$0	$28,200	$526,800	$555,000	2.7%
RHTR	$263,650	$0	$146,495	$81,080	$227,575	$1,000	$492,225	2.4%
Total	**$2,484,915**	**$118,522**	**$2,529,574**	**$153,122**	**$2,801,188**	**$15,132,519**	**$20,418,537**	**100%**
%	12.2%	0.6%	12.4%	0.7%	13.7%	**74.1%**	**100.0%**	

*Reference **Table 1** - PY13 Customer Energy Cost Savings (page 13)

Impacts

For PY13, Hawaii Energy's Business program achieved savings of 55,765,938 kWh (first year) and 7,294 kW savings with $11,194,615 in incentives. In relative terms, 54.8% of Hawaii Energy's incentives captured 43.9% of kWh (first year) and 43.5% of kW demand first year savings, respectively, with a Total Resource Benefit to Cost ratio of 1.3.

Table 42 provides a detailed breakdown by program with a closer look at each program to follow. For PY13, Hawaii Energy's Business program realized results by continuing to offer programs, services, measures and related incentives to address opportunities in the marketplace and accelerate the adoption of energy-efficient technologies.

Table 42
Business Program Impacts Summary

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
BEEM	118,085	3,868	53.0%	26,941,496	48.3%	382,247,212	47.1%	14.2	1.1	$43,581,303	49.6%	$41,347,861	61.2%	$4,872,146	43.5%
CBEEM	310	2,799	38.4%	22,539,657	40.4%	338,108,258	41.7%	15	1.5	$34,914,212	39.7%	$23,355,756	34.6%	$4,025,953	36.0%
BESM	16,878	287	3.9%	3,872,686	6.9%	57,650,739	7.1%	14.9	2.5	$5,549,055	6.3%	$2,180,652	3.2%	$1,596,568	14.3%
BHTR	11,371	340	4.7%	2,412,099	4.3%	33,769,391	4.2%	14	5.5	$3,881,091	4.4%	$701,956	1.0%	$699,920	6.3%
Total	**146,644**	**7,294**	**100.0%**	**55,765,938**	**100.0%**	**811,775,599**	**100.0%**	**14.6**	**1.3**	**$87,925,661**	**100.0%**	**$67,586,224**	**100.0%**	**$11,194,615**	**100.0%**

A number of the Program's offers are highlighted below as examples of driving energy efficiency projects through productive collaboration with customers, manufacturers, facility management firms, consultants and contractors that produced impressive results.

Central Plant Optimization Program

This complex offer was phased out in PY12 due to poor cost effectiveness, complexities of installation and mixed energy savings results. In PY13 we completed the evaluation phase of the three projects that were completed under this offer. The Queens Medical Center project produced an annual savings of 687,013 kWh and 112.2 kW. The property at 677 Ala Moana produced an annual savings of 224,717 kWh and 65 kW. Hale Pau Hana is an AOAO on Maui. We executed a variant of the central plant optimization on their solar thermal hot water system. The project produced an annual savings of 27,820 kWh and 0 kW due to peak period hot water requirements.

BUSINESS PROGRAM

Condominium Submetering

Requiring significant effort by Program Specialists to assist condominium boards and condominium and apartment residents to save energy, the continuation of this program in PY13 saw eleven additional successful installations of submetering at major condominium or apartment complexes. In total, Hawaii Energy paid out $354,600 in incentives for the installation of submeters on 2,364 individual units. These facilities are expected to save more than 181 kW in demand reductions and approximately 1.4 million kWh in annual tenant energy usage.

Central Chiller Plant Benchmarking Program

The Central Plant Benchmarking Program was continued in PY13. The intent of the program is to incentivize certain large local facility operators to install the metering necessary to monitor performance of their chilled water plants. With accurate, real-time operational and efficiency information, building engineers and managers are able to make smarter decisions related to operations, maintenance and capital investment in their facility. For example, a large resort on Hawaii Island installed benchmark metering and was able to determine that their newly-purchased chiller was not performing as efficiently as expected. As a result, they are collaborating with the chiller contractor and Hawaii Energy to resolve the problem. For engineers at Hawaii Energy, having access to real-time and trend data for a variety of applications is an invaluable resource.

Small Business Direct Install Lighting (SBDIL)

This offer provided full-cost lighting retrofits to 449 small businesses and restaurants to achieve 69,106,803 kWh - Life in customer level savings. The $1,903,806 of PBFA funds invested into these projects are now producing over $2,202,612 in annual savings for these businesses. This is a 116% annual Internal Rate of Return (IRR) and will achieve over $30.8 M in lifetime cost savings. In PY13 the cost effectiveness of this program increased significantly due to the elimination of the T8 to low-wattage T8 retrofits and concentration on T12 to T8 conversions.

BUSINESS PROGRAM

Expenditures

The Hawaii Energy commercial team continued its focus beyond the BEEM and CBEEM Program in PY13, with the hard-to-reach sector (BHTR) and Business Energy Service and Maintenance (BESM).

See **Table 43** for the detailed expenditures.

Table 43
Business Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
Business (C&I) Programs					
Business Programs Operations & Management					
BEEM	$1,012,647.67	$1,013,152.00	99.95%	$504.33	0.05%
CBEEM	$1,073,736.77	$1,074,098.00	99.97%	$361.23	0.03%
BESM	$712,364.09	$712,597.00	99.97%	$232.91	0.03%
BHTR	$463,075.29	$463,565.00	99.89%	$489.71	0.11%
Total Business Programs	$3,261,823.82	$3,263,412.00	99.95%	$1,588.18	0.05%
Business Evaluation	$120,134.59	$120,277.00	99.88%	$142.41	0.12%
Business Outreach	$741,730.02	$741,853.00	99.98%	$122.98	0.02%
Total Business Non-Incentives	**$4,123,688.43**	**$4,125,542.00**	**99.96%**	**$1,853.57**	**0.04%**
Business Incentives					
BEEM	$4,872,145.62	$4,920,800.00	99.01%	$48,654.38	0.99%
CBEEM	$4,025,952.57	$4,048,026.00	99.45%	$22,073.43	0.55%
BESM	$1,596,607.59	$1,778,544.00	89.77%	$181,936.41	10.23%
BHTR	$699,909.68	$854,500.00	81.91%	$154,590.32	18.09%
Subtotal Business Incentives	$11,194,615.46	$11,601,870.00	96.49%	$407,254.54	3.51%
Business Transformational	$1,282,595.52	$1,289,097.00	99.50%	$6,501.48	0.50%
Total Business Incentives	**$12,477,210.98**	**$12,890,967.00**	**96.79%**	**$413,756.02**	**3.21%**
Total Business Programs	**$16,600,899.41**	**$17,016,509.00**	**97.56%**	**$415,609.59**	**2.44%**

Business Trade Allies

Background

Trade allies include product manufacturers, wholesale and retail suppliers, equipment contractors, architects, engineers and electricians. These individuals and companies are those on the front lines directly responsible for energy efficiency measures being sold, designed, financed, installed, commissioned and maintained. By working with them, the Program is successful in uncovering opportunities for partnerships with trade allies that leverage resources to promote energy conservation and efficiency.

Trade Ally Program Feedback

Hawaii Energy incorporates trade ally perspectives and concerns in the program planning process to establish well-supported, effective strategies. Developing a successful relationship with these industry leaders attracts other groups over time. Industry groups are one way Hawaii Energy incorporates the views of representatives of key trade groups. By sharing insights and experiences on different technology and equipment performance with the trade allies, the Program's knowledge and awareness of different market segments are enhanced, thus helping to influence customer's energy-saving decisions. See **Table 44** for details.

Ongoing Training

To be on the cutting edge of the conservation and efficiency field, Hawaii Energy provides ongoing training and support for the trade allies. Hawaii Energy has developed a strong training program for lighting and HVAC contractors, mechanical contractors, architects and engineers participating in its business incentive program. Educational and promotional workshops are conducted to influence commercial purchase decisions.

In PY13, Hawaii Energy successfully launched its water cooler timer offer for businesses. Free timers were provided to businesses and installed directly by the water cooler timer vendor and water delivery companies. 500 timers were distributed to the Navy and 3,000 were distributed and installed at local businesses through property management companies. This offer provided energy savings of 202.5 kWh/year per timer with a cost effectiveness of $.074/kWh. Due to the success of this offer, the program has decided to expand this offer to our residential market in PY14.

Table 44 Business Project Sources						
Trade Allies	Measures	Customer Level Demand Savings (kW)	Customer Level Energy Savings (kWh 1st Yr)	Customer Level Energy Savings (kWh - Life)	Cumulative Customer Level Energy Savings	Incentives
Energy Industries	700	1,231	9,044,315	127,874,472	17.7%	$1,182,174
Direct From Applicants	223	833	5,946,505	77,051,444	10.7%	$1,121,479
Island Palm Communities (Actus Lend Lease)	19	324	2,716,673	68,150,879	9.5%	$464,183
EMCC	518	305	2,876,624	41,374,234	5.7%	$908,796
Sylvania Lighting Services	133	432	2,942,594	40,212,534	5.6%	$226,105
Clear Blue Energy Corp.	15	390	2,853,626	38,424,862	5.3%	$379,570
WSP Group	7	148	2,051,271	30,387,645	4.2%	$263,027
Chelsea Group	8	209	1,766,579	28,810,160	4.0%	$383,715
Johnson Controls	29	285	1,582,451	27,798,598	3.9%	$480,151
Trane	18	152	1,579,540	27,093,003	3.8%	$214,692
Hawaii Energy	27	158	1,325,535	18,238,610	2.5%	$202,239
Aquatic Energy Solutions	1	141	1,229,863	17,218,082	2.4%	$202,048
PSIG	29	286	1,149,917	17,014,928	2.4%	$143,271
Pono Energy Solutions	631	14	1,100,235	15,526,073	2.2%	$541,078
Albert Chong Associates	8	121	1,068,838	14,963,725	2.1%	$114,333
Paradise Lighting	288	147	1,057,103	13,360,015	1.9%	$325,444
Capitol Light	22	94	640,567	9,498,758	1.3%	$52,575
Forest City	3	39	433,534	9,351,498	1.3%	$72,576
Gexpro	1	66	580,000	8,700,000	1.2%	$250,000
Correa Electric, LLC	44	62	333,814	4,673,402	0.6%	$87,275
Wesco Distribution Inc.	8	31	172,686	4,470,526	0.6%	$23,929
Dorvin D. Leis	10	144	402,460	4,353,804	0.6%	$52,995
Melink Corporation	11	47	277,782	4,166,723	0.6%	$85,850
Mattos Electric, LLC	112	47	270,273	3,783,824	0.5%	$116,293
Pioneer Electric	11	37	251,542	3,283,728	0.5%	$33,475
Team Going Green	7	28	217,249	3,188,774	0.4%	$22,193
Briteswitch, LLC	7	32	218,153	3,092,500	0.4%	$37,725
Noresco	1	20	175,042	2,625,630	0.4%	$23,503
Loeb Lighting Services, Inc.	8	24	166,399	2,495,984	0.3%	$11,430
AMM Electrical & Lighting Maintenance, LLC	45	19	163,280	2,285,914	0.3%	$48,396
King's Kustom Tinting	3	60	226,429	2,264,290	0.3%	$46,210
Magnum Energy Solutions, LLC	1	19	206,133	2,061,330	0.3%	$24,804
Air Central, Inc.	3	19	135,211	2,028,171	0.3%	$59,943
Real Win Win	13	21	138,412	1,934,658	0.3%	$21,923
Global Energy & Lighting	1	19	132,241	1,851,374	0.3%	$15,583
M. Watanabe Electrical Contractor, Inc.	1	9	53,035	1,803,190	0.3%	$7,499
Remaining Sources	*1,019*	*460*	*3,065,755*	*39,200,744*	*5.4%*	*$565,236*
Totals	**3,985**	**6,470**	**48,551,668**	**720,614,087**	**100.0%**	**$8,811,715**

Business Energy Efficiency Measures (BEEM) Program

Objective

The objective of this program is to acquire electric energy and demand savings through customer installations of standard, known energy efficiency technologies by applying prescriptive incentives in a streamlined application process. Measures incentivized through BEEM include:

- High Efficiency Lighting
- High Efficiency HVAC such as water-cooled chiller, variable refrigerant flows (VRF) and packaged & split systems
- CEE Premium Efficiency Motors
- High Efficiency Water Heating
- Variable Frequency Drives (VFDs) connecting to pool pumps, chilled water pumps, condenser water pumps and air handling units
- Window Tinting
- Cool Roof Technology
- ENERGY STAR® Refrigerator

The Courtyard Marriott Waikiki Beach received an incentive check of $119,385 for the completion of several energy-saving installations to reduce their hotel's electricity usage. They installed split air-conditioning systems, a variable frequency drive for the pool pump, LED lamps in guest corridors and air-conditioning energy management control systems in their 400 guestrooms. Through these efforts, the hotel is estimated to save approximately $190,000 in electricity costs or 625,000 kWh per year.

BUSINESS PROGRAM

Accomplishments

ENERGY STAR® LED Lamps

Advancement in the number of LED products available and listed by ENERGY STAR® and an adjustment to the program this year to allow other listings such as DesignLights Consortium® and Lighting Facts® lead to another increase in the number of LED lamps installed in Program Year 2013. This LED offering achieved energy savings of 6,368,728 kWh this past year or 23.6% of the total BEEM program energy savings. In addition to increasing the usage of LEDs, the offering encouraged customers to upgrade their lighting controls by providing higher incentives for dimmable LED lamps. With dimmable LED lamps customers can achieve even more energy savings.

Ilikai Apartment Building received an incentive check of $153,000 for the installation of a submetering system for their building. They are estimated to save approximately $270,000 and 995,000 kWh per year. Submetering raises awareness, reduces energy use and can help save money on electric bills. By fairly allocating the cost of electricity used, it encourages occupants to conserve energy in each of their units.

Condominium Submetering

The offering was designed to ensure fairness when allocating energy costs among dwellings, as well as to encourage energy conservation through direct feedback and financial responsibility for personal energy use. For AOAOs, submetering presented a great opportunity to eliminate their largest variable cost: energy. This program was initially developed in PY10 and has gained significant momentum since the first projects were completed in PY11. In total, 2,364 submeters were installed on individual apartments and condominium units in PY13 resulting in 1,407,274 kWh first year energy savings. This was an increase in savings from this measure by more than ten times over the previous year.

Impacts

For PY13, the BEEM Program achieved savings of 26,941,496 kWh (first year) and 3,868 kW savings with $4,872,145.62 in incentives. In relative terms, 23.9% of Hawaii Energy's incentives captured 21.2% kWh (first year) and 23.0% kW of the demand first year savings for PY13. **Table 45** provides further details.

- **# 1 Contributor to BEEM – LED Lamps (23.6%)**
  LED lamps were the largest contributor to the BEEM Program savings with energy (first year) and demand savings of 6,368,728 kWh and 885 kW, respectively.

- **# 2 Contributor to BEEM – T12 to T8 Lighting (14.8%)**
  T12 to T8 low wattage lighting was the second largest contributor to the BEEM Program savings with energy (first year) and demand savings of 3,988,380 kWh and 532 kW, respectively.

Table 45 BEEM Program Impacts								
Category	Units	Program Demand (kW)	%	Program Energy (kWh First Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)
LED	59,280	885	22.9%	6,368,728	23.6%	92,617,583	24.2%	14.5
Chiller	36	464	12.0%	2,916,216	10.8%	58,324,320	15.3%	20.0
T12 To T8 With Electronic Ballast	25,673	532	13.8%	3,988,380	14.8%	55,837,316	14.6%	14.0
Delamping With Reflectors	7,936	295	7.6%	2,108,322	7.8%	29,516,509	7.7%	14.0
Package Unit AC	790	192	5.0%	1,528,287	5.7%	22,924,306	6.0%	15.0
VRF AC	301	108	2.8%	1,007,506	3.7%	15,112,583	4.0%	15.0
T8 To T8 Low Wattage	6,201	116	3.0%	1,059,734	3.9%	14,836,280	3.9%	14.0
EC Motors - Fan Coil Units	4,117	91	2.3%	795,242	3.0%	11,928,637	3.1%	15.0
Condominium Submetering Pilot	2,364	181	4.7%	1,407,274	5.2%	11,258,191	2.9%	8.0
Delamping	1,718	95	2.5%	662,374	2.5%	9,273,236	2.4%	14.0
VFD - Chilled Water/Condenser Water	54	224	5.8%	826,293	3.1%	8,262,931	2.2%	10.0
Demand Control Kitchen Ventilation (DCKV)	39	89	2.3%	518,299	1.9%	7,774,484	2.0%	15.0
VFD – AHU	171	170	4.4%	480,154	1.8%	7,202,311	1.9%	15.0
EC Motor – Refrigeration	705	42	1.1%	390,611	1.4%	5,859,169	1.5%	15.0
Domestic Water Booster Packages	13	41	1.1%	383,440	1.4%	5,751,603	1.5%	15.0
Heat Pump Water Heaters	35	18	0.5%	569,462	2.1%	5,694,620	1.5%	10.0
Window Tinting	48	128	3.3%	480,719	1.8%	4,807,187	1.3%	10.0
Refrigerators W/Recycling	399	11	0.3%	271,226	1.0%	3,797,160	1.0%	14.0
Refrigerator - Trade In	322	9	0.2%	220,014	0.8%	3,080,198	0.8%	14.0
Solar Water Heater	5	65	1.7%	122,256	0.5%	1,833,842	0.5%	15.0
Sensors	3,209	17	0.4%	220,407	0.8%	1,739,062	0.5%	7.9
HID Pulse Start Metal Halide	368	10	0.3%	77,997	0.3%	1,091,952	0.3%	14.0
Water Cooler Timer (H2off)	1,221	11	0.3%	121,733	0.5%	608,666	0.2%	5.0
Compact Fluorescent Lighting (CFL)	2,387	23	0.6%	199,289	0.7%	597,866	0.2%	3.0
Cool Roof Technologies	6	23	0.6%	56,854	0.2%	568,538	0.1%	10.0
Pool VFD Controller Pumps	12	3	0.1%	34,321	0.1%	514,809	0.1%	15.0
Clothes Washer	246	6	0.1%	42,171	0.2%	506,054	0.1%	12.0
Bounty - Refrigerator / Freezer	19	1	0.0%	13,499	0.1%	188,988	0.0%	14.0
CEE Tier 1 Listed Premium Efficiency Motors	19	7	0.2%	12,283	0.0%	184,248	0.0%	15.0
VFD - Exhaust Fan	2	5	0.1%	11,798	0.0%	176,977	0.0%	15.0
Refrigerator - Under $600	134	2	0.0%	11,729	0.0%	164,200	0.0%	14.0
Ceiling Fans	229	4	0.1%	31,611	0.1%	158,057	0.0%	5.0
Whole House Fans	3	1	0.0%	2,509	0.0%	50,177	0.0%	20.0
VFD - Pool Pump Packages	1	0	0.0%	488	0.0%	4,880	0.0%	10.0
Maintenance - AC	1	0	0.0%	269	0.0%	269	0.0%	1.0
Accounting Record	1	0	0.0%	0	0.0%	0	0.0%	0
Recycler Cost	20	0	0.0%	0	0.0%	0	0.0%	0
Total	**118,085**	**3,868**	**100%**	**26,941,496**	**100%**	**382,247,212**	**100%**	**14.2**

Table 45 (cont'd) BEEM Program Impacts							
Category	TRB/TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
LED	3.7	$10,361,697	23.8%	$2,802,947	6.8%	$709,209	14.6%
Chiller	0.5	$6,198,225	14.2%	$12,720,361	30.8%	$752,575	15.4%
T12 To T8 With Electronic Ballast	4.1	$6,334,973	14.5%	$1,534,708	3.7%	$565,321	11.6%
Delamping With Reflectors	21.4	$3,391,546	7.8%	$158,720	0.4%	$132,215	2.7%
Package Unit AC	0.5	$2,494,082	5.7%	$5,486,772	13.3%	$494,528	10.2%
VRF AC	0.5	$1,579,116	3.6%	$3,440,789	8.3%	$449,202	9.2%
T8 To T8 Low Wattage	4.3	$1,584,595	3.6%	$372,060	0.9%	$75,592	1.6%
EC Motors - Fan Coil Units	0.9	$1,259,893	2.9%	$1,449,815	3.5%	$352,300	7.2%
Condominium Submetering Pilot	1.3	$1,446,849	3.3%	$1,140,823	2.8%	$354,600	7.3%
Delamping	78.1	$1,072,755	2.5%	$13,744	0.0%	$23,438	0.5%
VFD - Chilled Water/Condenser Water	2.4	$1,353,307	3.1%	$569,371	1.4%	$88,080	1.8%
Demand Control Kitchen Ventilation (DCKV)	1.0	$935,627	2.1%	$926,962	2.2%	$207,250	4.3%
VFD – AHU	1.3	$1,205,474	2.8%	$939,985	2.3%	$51,813	1.1%
EC Motor – Refrigeration	0.2	$612,521	1.4%	$3,033,832	7.3%	$59,925	1.2%
Domestic Water Booster Packages	1.0	$597,193	1.4%	$581,191	1.4%	$49,440	1.0%
Heat Pump Water Heaters	0.2	$537,132	1.2%	$2,437,864	5.9%	$73,868	1.5%
Window Tinting	1.3	$773,548	1.8%	$594,459	1.4%	$110,270	2.3%
Refrigerators W/Recycling	1.3	$337,373	0.8%	$262,405	0.6%	$49,875	1.0%
Refrigerator - Trade In	0.9	$273,826	0.6%	$321,308	0.8%	$40,250	0.8%
Solar Water Heater	3.3	$389,182	0.9%	$117,973	0.3%	$31,424	0.6%
Sensors	0.8	$194,890	0.4%	$234,479	0.6%	$64,360	1.3%
HID Pulse Start Metal Halide	1.1	$123,429	0.3%	$107,456	0.3%	$12,610	0.3%
Water Cooler Timer (H2off)	6.2	$74,178	0.2%	$11,955	0.0%	$11,955	0.2%
Compact Fluorescent Lighting (CFL)	33.4	$79,702	0.2%	$2,387	0.0%	$4,868	0.1%
Cool Roof Technologies	0.1	$117,336	0.3%	$1,660,783	4.0%	$54,824	1.1%
Pool VFD Controller Pumps	1.4	$49,878	0.1%	$34,989	0.1%	$8,325	0.2%
Clothes Washer	0.3	$60,152	0.1%	$192,044	0.5%	$12,300	0.3%
Bounty - Refrigerator / Freezer	18.1	$16,713	0.0%	$925	0.0%	$925	0.0%
CEE Tier 1 Listed Premium Efficiency Motors	1.0	$43,234	0.1%	$41,635	0.1%	$3,175	0.1%
VFD - Exhaust Fan	1.3	$32,753	0.1%	$25,000	0.1%	$1,500	0.0%
Refrigerator - Under $600	0.3	$19,779	0.0%	$73,884	0.2%	$6,675	0.1%
Ceiling Fans	0.5	$20,619	0.0%	$41,101	0.1%	$8,265	0.2%
Whole House Fans	3.4	$9,249	0.0%	$2,744	0.0%	$225	0.0%
VFD - Pool Pump Packages	0.3	$431	0.0%	$1,475	0.0%	$150	0.0%
Maintenance - AC	0.3	$46	0.0%	$142	0.0%	$50	0.0%
Accounting Record	0.0	$0	0.0%	$10,098	0.0%	$10,098	0.2%
Recycler Cost	0.0	$0	0.0%	$675	0.0%	$675	0.0%
Total	**1.1**	**$43,581,303**	**100%**	**$41,347,861**	**100%**	**$4,872,146**	**100%**

BUSINESS PROGRAM

Expenditures

The Program distributed nearly all BEEM operation and incentive budgets due to the popularity and demand for the program's offerings. See **Table 46** for details.

Table 46 BEEM Program Expenditures					
	Expenditures	**R1 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
BEEM Operations	$1,012,647.67	$1,013,152.00	99.95%	$504.33	0.05%
BEEM Incentives	$4,872,145.62	$4,920,800.00	99.01%	$48,654.38	0.99%
Total BEEM	**$5,884,793.29**	**$5,933,952.00**	**99.17%**	**$49,158.71**	**0.83%**

Ko'oloa'ula is a low income housing development located in Ewa Beach, Oahu accommodating larger, multi-generational families. They made many energy-saving upgrades including installing exterior lighting, adding occupancy sensors and installing ENERGY STAR® refrigerators and ceiling fans in the units. The property is expected to save an estimated 195,776 kWh each year and received a $34,955 incentive, which helped them to fund additional improvements including in the community playground for children.

BUSINESS PROGRAM

Customized Business Energy Efficiency Measures (CBEEM) Program

Objective

The objective of this program is to provide a custom application and approval process for participants to receive incentives for installing non-standard energy efficiency technologies. The commercial and industrial custom incentives enable customers to invest in energy efficiency opportunities related to manufacturing processes and other technology measures that may require calculations of energy savings on a case-by-case basis for specific, unique applications.

Custom incentives are available for all energy-savings opportunities that are not already covered by the prescribed incentives and are not limited to a certain list of measures. Some examples of custom technologies include, but are not limited to, energy management systems, exhaust ventilation control systems, high performance lighting, low emissivity glass and HVAC controls.

Accomplishments

ENERGY STAR® LED Fixtures

In PY13 both the quality and availability of LED products continued to increase, leading to more products being listed by ENERGY STAR®. In addition, the program began accepting listings from other rating agencies as certification of quality and eligibility for inclusion in the program. By accepting product listing by other rating agencies like DesignLights Consortium® and Lighting Facts® greatly increased to number and types of LED fixtures that could be installing in the CBEEM program. This led to a significant increase in savings in the program from LED fixtures.

Commercial Lighting

In addition to LED lighting fixtures, the CBEEM program was also successful in promoting innovative commercial lighting projects like bi-level fluorescent lighting for stairwell and hallways. Typically these areas, for safety reasons, have been illuminated with fluorescent fixtures that were on at full power 24 hours per day, 365 days per year. Today with occupancy controls and bi-level fixtures, these lamps can be powered at levels around 20% when not occupied, still providing some lighting for the area, and powered on at full power when any occupancy is detected. Studies have found that typical stairwells in apartment complexes are occupied less than 10% of the time, thereby generating significant saving in the non-occupied times.

Aloha Petroleum, the largest independent gasoline marketer in Hawaii, received an incentive check for $41,352 for the installation of energy-efficient LEDs at 17 gas stations on Oahu. The new lights provide a warmer ambience and help increase visibility while customers pump their gas. They are expected to save an estimated 292,437 kWh annually; equivalent to saving $88,290 in electricity costs.

BUSINESS PROGRAM

Impacts

For PY13, the CBEEM Program achieved savings of 22,539,657 kWh (first year) and 2,799 kW savings with $4,025,953 in incentives. In relative terms, 19.7% of Hawaii Energy's incentives captured 16.7% kWh (first year) and 17.7 % kW of the demand first year savings for PY12. **Table 47** provides a detailed breakout of the program.

- **#1 Contributor to CBEEM – Commercial Lighting (24.7%)**
  Commercial Lighting was the largest contributor to CBEEM Program savings with energy (first year) and demand savings of 5,566,295 kWh and 648 kW, respectively.

- **#2 Contributor to CBEEM – LED Lighting (23.6%)**
  LED technologies were the second largest contributor to CBEEM Program savings with energy (first year) and demand savings of 5,310,645 kWh and 799 kW, respectively.

Chaminade University currently serves over 2,800 students throughout a 65-acre campus, which is shared with St. Louis School and the Marianist Center of Hawaii. The university is working in phases to complete an energy-efficient retrofit on all of their exterior lighting, but recently replaced 77 old, inefficient lamps with new LEDs. With their exterior lighting on 12 hours a day, every day, this retrofit reduced their lighting usage by 73% and is estimated to save them $6,380 per year. For this project, Chaminade received a $3,170 incentive from Hawaii Energy.

Table 47
CBEEM Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh – Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
Commercial Lighting	66	648	23.2%	5,566,295	24.7%	73,571,897	21.8%	13.2	1.6	$7,914,647	22.7%	$5,009,209	21.4%	$969,427	24.1%
LED	162	799	28.5%	5,310,645	23.6%	67,570,383	20.0%	12.7	1.5	$7,876,251	22.6%	$5,350,980	22.9%	$862,957	21.4%
Windows	7	218	7.8%	1,700,722	7.5%	51,021,667	15.1%	30.0	2.7	$3,797,188	10.9%	$1,392,080	6.0%	$289,605	7.2%
HVAC	8	299	10.7%	3,029,047	13.4%	46,104,917	13.6%	15.2	1.1	$4,668,813	13.4%	$4,329,256	18.5%	$654,076	16.2%
VFD - Pumps Non HVAC	5	137	4.9%	1,245,254	5.5%	17,142,760	5.1%	13.8	2.2	$1,845,172	5.3%	$823,641	3.5%	$238,922	5.9%
Demand Ventilation Control - AC	8	124	4.4%	795,546	3.5%	11,933,196	3.5%	15.0	2.4	$1,389,845	4.0%	$568,378	2.4%	$130,470	3.2%
Custom Equipment	3	19	0.7%	600,464	2.7%	11,431,610	3.4%	19.0	0.7	$858,657	2.5%	$1,246,133	5.3%	$111,073	2.8%
Equipment Controls - Building	6	77	2.8%	751,678	3.3%	10,301,265	3.0%	13.7	1.5	$1,099,050	3.1%	$749,553	3.2%	$129,972	3.2%
Garage Demand Ventilation Control	5	84	3.0%	880,657	3.9%	10,251,078	3.0%	11.6	4.0	$1,085,512	3.1%	$268,644	1.2%	$140,987	3.5%
CEE Tier 1 Listed Premium Efficiency Motors	5	97	3.5%	496,211	2.2%	9,012,580	2.7%	18.2	1.4	$1,066,344	3.1%	$779,030	3.3%	$86,377	2.1%
Equipment Controls - HVAC	6	67	2.4%	542,077	2.4%	8,037,350	2.4%	14.8	1.3	$874,540	2.5%	$662,999	2.8%	$100,953	2.5%
VFD - Cooling Tower Fan	4	37	1.3%	310,939	1.4%	4,831,330	1.4%	15.5	2.0	$513,610	1.5%	$252,276	1.1%	$50,252	1.2%
Data Center Technologies	1	39	1.4%	345,108	1.5%	4,141,294	1.2%	12.0	2.0	$467,236	1.3%	$228,000	1.0%	$55,575	1.4%
Air Compressor	3	6	0.2%	111,382	0.5%	2,316,235	0.7%	20.8	0.4	$168,448	0.5%	$387,025	1.7%	$19,880	0.5%
Chiller	2	26	0.9%	131,718	0.6%	2,058,246	0.6%	15.6	1.1	$256,456	0.7%	$241,000	1.0%	$39,189	1.0%
Equipment Controls - Bi-Level Lighting	5	24	0.9%	213,421	0.9%	2,045,601	0.6%	9.6	1.1	$225,525	0.6%	$197,732	0.8%	$36,005	0.9%
Refrigeration	4	3	0.1%	142,201	0.6%	2,037,038	0.6%	14.3	1.3	$166,524	0.5%	$123,805	0.5%	$21,557	0.5%
Water Heating	2	68	2.4%	168,729	0.7%	1,687,287	0.5%	10.0	3.4	$337,613	1.0%	$99,824	0.4%	$34,850	0.9%
Solar Water Heater	3	11	0.4%	57,885	0.3%	1,018,945	0.3%	17.6	0.3	$123,649	0.4%	$361,965	1.5%	$31,337	0.8%
Equipment Controls	1	0	0.0%	55,279	0.2%	552,793	0.2%	10.0	0.6	$47,126	0.1%	$80,222	0.3%	$7,956	0.2%
Energy Star - TV	1	7	0.3%	34,580	0.2%	518,696	0.2%	15.0	0.5	$67,999	0.2%	$148,363	0.6%	$6,247	0.2%
Equipment Controls - Lighting	1	5	0.2%	28,575	0.1%	285,751	0.1%	10.0	0.9	$38,840	0.1%	$43,470	0.2%	$4,873	0.1%
Custom Lighting	1	2	0.1%	11,949	0.1%	143,389	0.0%	12.0	2.0	$17,243	0.0%	$8,838	0.0%	$2,049	0.1%
VFD - Fans - Non HVAC	1	0	0.0%	9,295	0.0%	92,950	0.0%	10.0	2.4	$7,924	0.0%	$3,333	0.0%	$1,364	0.0%
Total	**310**	**2,799**	**100%**	**22,539,657**	**100%**	**338,108,258**	**100%**	**15.0**	**1.5**	**$34,914,212**	**100%**	**$23,355,756**	**100%**	**$4,025,953**	**100%**

BUSINESS PROGRAM

Expenditures

The Program distributed nearly all CBEEM operation and incentive budgets due to the popularity and demand for the Program offerings, in particular the growth in LED lighting solutions. See **Table 48** for details.

Table 48 CBEEM Program Expenditures					
	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
CBEEM Operations	1,073,736.77	1,074,098.00	99.97%	361.23	0.03%
CBEEM Incentives	4,025,952.57	4,048,026.00	99.45%	22,073.43	0.55%
Total CBEEM	**5,099,689.34**	**5,122,124.00**	**99.56%**	**22,434.66**	**0.44%**

Located in Kapolei, Pacific Allied Products is a plastics manufacturing company that took steps to become more energy-efficient. Through the installation of a new high-speed bottle blower, they received a $91,484 incentive check and they are estimated to save more than $148,000 in electricity costs or 601,560 kWh annually. The bottle blower inflates plastic bottles by capturing and recycling excess air which then helps to save electricity. For example, the amount of electricity required to produce 1,000 half-liter bottles of water can be reduced by 43%.

BUSINESS PROGRAM

Business Energy Service and Maintenance (BESM) Program

Objective

The objective of this program was to help target sectors that are currently underserved such as retail and small businesses. Additionally, this program conducted a more aggressive outreach effort to lighting and electrical contractors by offering training, education, promotional materials and frequent communications on program updates.

Accomplishments

Small Business Direct Install Lighting (SBDIL)

This offering targeted small businesses that have limited time and expertise to research lighting technology options, secure financing and hire contractors to replace their older, less efficient lighting technologies. This offering provided full energy-efficient lighting retrofits to small businesses in Hawaii, Honolulu and Maui counties. Small business customers that were either (1) a Schedule "G" rate class or (2) under master-metered accounts were eligible for this offer.

In the SBDIL program, Trade Allies recruited small businesses to participate, performed audits and executed the retrofits. This direct installation grant approach achieved first year customer level energy savings of 2,590,083 kWh in PY13, excluding the impacts from the SBDIL specifically for restaurants. Demand savings from this program in PY13 was 122 kW.

With the high electricity costs in Maui, it was a no-brainer for Teri Edmonds, owner of local shoe boutique, If the Shoe Fits, to participate in Hawaii Energy's Free Small Business Direct Install Lighting Program. The lighting in her 13-year old Wailuku store was retrofitted with a mixture of energy-saving LEDs and CFLs. In addition to the 80% reduction in lighting energy use, the store has experienced improved lighting performance and lower cooling costs due to less heat from the lighting. If the Shoe Fits is expected to save an estimated 4,176 kWh or $1,336 in electricity costs per year.

Central Plant Optimization Program

This complex offer was phased out in PY12 due to poor cost effectiveness, complexities of installation and mixed energy savings results. It was replace by our Central Plant Benchmark metering initiative. In PY13 we completed the evaluation phase of the three projects that were completed under this offer. The Queens Medical Center project produced an annual savings of 687,013 kWh and 112.2 kW. The property at 677 Ala Moana produced an annual savings of 224,717kWh and 65 kW. Hale Pau Hana is an AOAO on Maui. We executed a variant of the central plant optimization on their solar thermal hot water system. The project produced an annual savings of 27,820 kWh, but 0 kW due to peak period hot water requirements.

Central Chiller Plant Benchmarking Program

The Central Chiller Plant Benchmarking Incentive continued in PY13. It was designed to encourage business customers to install a central chiller plant metering and data logging system that will provide real-time data and trend data. This data reflects actual tons of cooling and measured efficiency in kW per ton. Many large commercial facilities, such as hotels and multi-level office buildings, lack information to determine whether their chiller plant is running efficiently or not. The new metering equipment makes it possible for the customer to understand the current operational and performance metrics of their Chiller plants and allows them to set meaningful energy efficiency goals and track progress towards those goals. Real-time and trend data is also available to engineers at Hawaii Energy via web interface, so that Hawaii Energy may increase its knowledge base and benchmark data related to typical chiller performance for various businesses on Oahu and the neighbor islands. Hawaii Energy incentivizes 100% of the equipment and installation and in turn has access to the data for five years after the project is complete. This will allow Hawaii Energy to not only benchmark performance but also track energy efficiency improvements directly influenced by data received from this program. A total of two projects were started and completed in PY13, with a total incentive expenditure of $182,685.

For the last four years, the Four Seasons Resort Maui has been on an energy efficiency journey that has included the entire retrofit and upgrade of their central chiller plant (left) and other electrical equipment. A Building Automation System was also installed to monitor and control the environment and ensure the operational performance of the facility. The BAS system already helped identify an underground hot water leak and fine-tuned the waste heat recovery and storage system. It will also provide benchmarks on all equipment so that peak performance levels can be maintained in the future. Through their efforts, the Four Seasons Resort Maui received an incentive of $347,000 from Hawaii Energy. They are expected to save an average of more than 2.7 million kWh per year and approximately $810,000 annually in energy cost savings.

BUSINESS PROGRAM

Impacts

For PY13, the BESM Program achieved energy savings of 3,872,686 kWh (first year), an increase of 9% from the previous program year. Demand savings for the program in PY13 was 287 kW with $1,596,568 in incentives. In relative terms, 7.8% of Hawaii Energy's incentives captured 3.0% kWh (first year) and 1.7% kW of the demand first year savings for PY13, but this program reached customers that would not otherwise have participated in the energy efficiency programs. **Table 49** provides a detailed breakout of the program.

- **#1 Contributor to BESM – Small Business Direct Install Lighting (70.8%)**
  Small Business Direct Install Lighting offer was comprised of T8/T8LW, LED, CFL and Custom Lighting incentives and was the largest contributor to the BESM Program with energy (first year) and demand savings of 2,741,582 kWh and 128 kW, respectively.

Table 49
BESM Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh – Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
T12 To T8 With Electronic Ballast	9,014	88	30.7%	1,808,447	46.7%	25,318,253	43.9%	14.0	2.9	$2,298,830	41.4%	$796,154	36.5%	$796,154	49.9%
Central Plant Optimization	4	119	41.3%	991,954	25.6%	17,320,495	30.0%	17.5	5.0	$1,783,325	32.1%	$353,776	16.2%	$76,358	4.8%
LED	4,870	73	25.3%	786,231	20.3%	11,007,228	19.1%	14.0	5.2	$1,125,576	20.3%	$217,458	10.0%	$217,458	13.6%
Custom Lighting	196	0	0.0%	127,993	3.3%	1,791,897	3.1%	14.0	4.5	$139,802	2.5%	$30,766	1.4%	$30,766	1.9%
T8 To T8 Low Wattage	1,758	2	0.8%	75,091	1.9%	1,051,279	1.8%	14.0	0.6	$90,027	1.6%	$143,005	6.6%	$143,005	9.0%
Compact Fluorescent Lighting (CFL)	346	4	1.4%	65,876	1.7%	922,263	1.6%	14.0	19.4	$87,168	1.6%	$4,498	0.2%	$4,498	0.3%
CFL	61	1	0.3%	10,264	0.3%	143,689	0.2%	14.0	14.1	$13,993	0.3%	$991	0.0%	$991	0.1%
LED Refrigerated Case Lighting	30	1	0.3%	6,831	0.2%	95,636	0.2%	14.0	1.0	$10,334	0.2%	$10,750	0.5%	$10,750	0.7%
Energy Study	17	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$145,796	6.7%	$84,003	5.3%
Installation Cost - Ladders	579	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$2,901	0.1%	$2,901	0.2%
Accounting Record	0	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$21,998	1.0%	$22,038	1.4%
Central Plant Benchmarking	2	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$427,558	19.6%	$182,685	11.4%
VRF AC	1	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$25,000	1.1%	$25,000	1.6%
Total	**16,878**	**287**	**100%**	**3,872,686**	**100%**	**57,650,739**	**100%**	**14.9**	**2.5**	**$5,549,055**	**100%**	**$2,180,652**	**100%**	**$1,596,608**	**100%**

Expenditures

The Program had a material surplus in the BESM incentive budgets due to a conservative reallocation of funds to BESM in October (effective in January) to accommodate anticipated Small Business Direct Install Lighting projects on all islands.

See **Table 50** for details.

Table 50
BESM Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
BESM Operations	712,364.09	712,597.00	99.97%	232.91	0.03%
BESM Incentives	1,596,607.59	1,778,544.00	89.77%	181,936.41	10.23%
Total BESM	**2,308,971.68**	**2,491,141.00**	**92.69%**	**182,169.32**	**7.31%**

Business Hard-To-Reach (BHTR) Program

Objective

The objective of this program was to help targeted geographies and demographics that have been traditionally underserved such as retail, restaurants and other small businesses. Additionally, this program conducted more aggressive outreach to lighting and electrical contractors with training, promotional materials and frequent communications on program updates.

Accomplishments

Direct Install Restaurant Lighting Retrofit

This offering targeted restaurants that have limited time and expertise to research lighting technology options, secure financing and hire contractors to replace their older, less efficient lighting technologies. This offering provided full energy-efficient lighting retrofits to restaurants in Hawaii, Honolulu and Maui counties at no cost to the customer. Trade allies recruited small businesses to participate, performed audits and executed the retrofits. This direct installation approach achieved first year customer level energy savings of 2,336,257 kWh. Demand savings for the customers for PY13 was 350 kW.

Impacts

For PY13, the BHTR Program achieved savings of 2,412,099 kWh (first year) and 340 kW savings with $699,920 in incentives. In relative terms, 3.4% of the PBFA's incentives captured 1.9% kWh (first year) and 2.0% kW of the demand first year savings for PY13. **Table 51** provides the detailed measures contributing to this program.

Table 51
BHTR Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh – Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
LED	5,290	163	47.9%	988,288	41.0%	13,836,034	41.0%	14.0	7.1	$1,676,453	43.2%	$234,670	33.4%	$234,670	33.5%
T12 To T8 With Electronic Ballast	2,860	100	29.6%	850,748	35.3%	11,910,478	35.3%	14.0	5.3	$1,297,643	33.4%	$242,845	34.6%	$241,345	34.5%
T8 To T8 Low Wattage	2,326	57	16.7%	360,325	14.9%	5,044,546	14.9%	14.0	3.2	$601,480	15.5%	$189,320	27.0%	$190,820	27.3%
Custom Lighting	339	9	2.6%	135,618	5.6%	1,898,651	5.6%	14.0	10.4	$181,139	4.7%	$17,358	2.5%	$17,358	2.5%
Compact Fluorescent Lighting (CFL)	276	11	3.1%	74,530	3.1%	1,043,425	3.1%	14.0	33.6	$120,418	3.1%	$3,588	0.5%	$3,588	0.5%
LED Refrigerated Case Lighting	21	0	0.1%	2,590	0.1%	36,257	0.1%	14.0	0.5	$3,958	0.1%	$8,252	1.2%	$8,252	1.2%
Installation Cost - Ladders	250	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$1,250	0.2%	$1,250	0.2%
Other	0	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$137	0.0%	$137	0.0%
Accounting Record	9	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$4,536	0.6%	$2,490	0.4%
Total	**11,371**	**340**	**100%**	**2,412,099**	**100%**	**33,769,391**	**100%**	**14.0**	**5.5**	**$3,881,091**	**100%**	**$701,956**	**100%**	**$699,910**	**100%**

Small Business Direct Install Lighting Program – Customer-Level Impacts

Customers participating in the SBDIL program should save over $2,202,612 in operating expenses per year. Over the life of the lighting measures installed, the customers are expected to save over $30,836,561. This is money that they can invest into business driving more job growth and profitability. See **Table 52** for further details.

The restaurant projects saw greater savings due to their longer hours of operation and more frequent change from incandescent to LED technology. The program cost-effectiveness of this program increased significantly in PY13 due to the elimination of the T8 to low-wattage T8 retrofits and concentration on T12 conversions.

Table 52
SBDIL Customer Level Impacts by Island

	Hawaii	Lanai	Maui	Molokai	Oahu	Total	Program Cost/ kWh
SBDIL – Lighting Retrofits							
Customers	55	7	22	0	248	332	
Measures	187	52	95	0	971	1,305	
kW Reduction	37	1	8	0	76	122	
kWh - First Year	375,445	62,644	165,276	0	1,986,718	2,590,083	**$0.462**
kWh - Life	5,256,232	877,009	2,313,866	0	27,814,049	36,261,157	**$0.033**
Incentives	$175,214	$48,646	$61,997	$0	$912,529	$1,197,386	
SBDIL – Restaurant Lighting							
Customers	16	1	7	0	93	117	
Measures	76	2	33	0	549	660	
kW Reduction	75	0	7	0	268	350	
kWh - First Year	372,970	171	77,852	0	1,885,264	2,336,257	**$0.302**
kWh - Life	5,221,583	2,390	1,089,927	0	26,393,693	32,707,593	**$0.022**
Incentives	$96,207	$376	$28,094	$0	$580,752	$705,429	
Total							
Customers	71	8	29	0	341	449	
Measures	263	63	128	0	1520	1974	
kW Reduction	112	2	15	0	344	472	
kWh - First Year	748,415	72,675	243,128	0	3,871,982	4,936,200	**$0.386**
kWh - Life	10,477,816	1,017,453	3,403,793	0	54,207,742	69,106,803	**$0.028**
Incentives	$271,420	$49,013	$90,092	$0	$1,493,281	$1,903,806	
Financial Benefits							
Average "G" Rate	$0.46	$0.51	$0.41	$0.51	$0.34	$0.45	
Annual Savings	$344,877	$37,044	$98,610	$0	$1,333,472	$2,202,612	
Lifetime Savings	$4,828,282	$518,616	$1,380,544	$0	$18,668,604	$30,836,561	
Simple Payback (years)	0.8	1.3	0.9	0	1.1	0.9	
IRR	127%	76%	109%	0%	89%	116%	

Expenditures

The Program had a material surplus in the BHTR incentive budget due to a significant backlog of committed projects in the Small Business Direct Install Lighting projects on all islands.

See **Table 53** for details.

Table 53
BHTR Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
BHTR Operations	463,075.29	463,565.00	99.89%	489.71	0.11%
BHTR Incentives	699,909.68	854,500.00	81.91%	154,590.32	18.09%
Total BHTR	**1,162,984.97**	**1,318,065.00**	**88.23%**	**155,080.03**	**11.77%**

Impacts

For PY13, Hawaii Energy's Residential program achieved savings of 71,241,873 kWh (first year) and 9,493 kW savings with $9,230,037 in incentives. In relative terms, 45% of Hawaii Energy's incentives captured 56% of and 56.5% of kWh (first year) and kW savings, respectively. See **Table 54**.

Table 54
Residential Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
REEM	2,979,267	9,463	99.7%	67,307,632	94.5%	498,835,552	89.7%	7.4	1.6	$64,087,162	93.4%	$41,289,807	88.4%	$8,180,046	88.6%
RESM	925	0	0.0%	3,758,500	5.3%	54,419,569	9.8%	14.5	0.9	$4,217,883	6.1%	$4,866,600	10.4%	$555,000	6.0%
RHTR	363	23	0.2%	166,211	0.2%	2,418,371	0.4%	14.6	0.5	$276,077	0.4%	$541,443	1.2%	$492,225	5.3%
CESH	3	7	0.1%	9,531	0.0%	142,961	0.0%	15.0	2.5	$35,988	0.1%	$14,341	0.0%	$2,766	0.0%
Total	**2,980,558**	**9,493**	**100%**	**71,241,873**	**100%**	**555,816,454**	**100%**	**7.8**	**1.5**	**$68,617,110**	**100%**	**$46,712,192**	**100%**	**$9,230,037**	**100%**

RESIDENTIAL PROGRAM

Expenditures

In PY13 the program successfully distributed 97.2% of residential incentive funds reaching 99% of the first year kWh target and 96% of the kW savings target. The year ended with a total incentive spend of $9,230,037 leaving only a small surplus of $266,063. Residential Energy Efficiency Measures (REEM), which represents the backbone of the residential portfolio, utilized 99.7% of its budget. Residential Energy Services & Maintenance (RESM) was also particularly successful this year as, with the economy rebounding, many new construction projects that did not get completed in PY12 hit in PY13. Similar to PY12, the modest budget for Customized Solutions for the Home (CESH) played a small role in role in PY13.

The Residential Hard-to-Reach program executed 52 solar water heating system direct install projects on Hawaii Island and Maui. Additionally, together with the Transformational team, the Residential Hard-to-Reach program funded the Hui Up refrigerator trade up on Molokai. Through collaboration with local community agencies the team identified a number of similar worthy opportunities to be implemented during Program Year 14. Despite a year of significant program activity, the Residential Hard-to-Reach budget closed PY13 with a $180k or 27% surplus. See **Table 55** for details.

Table 55
Residential Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
Residential Programs					
Residential Program Operations and Management					
REEM	$2,329,403.41	$2,331,529.00	99.9%	$2,125.59	0.09%
CESH	$19,819.48	$21,755.00	91.10%	$1,935.52	8.90%
RESM	$74,042.06	$74,263.00	99.70%	$220.94	0.30%
RHTR	$175,671.65	$176,281.00	99.65%	$609.35	0.35%
Total Residential Programs	$2,598,936.60	$2,603,828.00	99.81%	$4,891.40	0.19%
Residential Evaluation	$123,724.09	$126,281.00	97.98%	$2,556.91	2.02%
Residential Outreach	$644,817.24	$645,334.00	99.92%	$516.76	0.08%
Total Residential Non-Incentives	**$3,367,477.93**	**$3,375,443.00**	**99.76%**	**$7,965.07**	**0.24%**
Residential Incentives					
REEM	$8,180,045.59	$8,205,697.00	99.69%	$25,651.41	0.31%
CESH	$2,765.97	$25,000.00	11.06%	$22,234.03	88.94%
RESM	$555,000.00	$590,000.00	94.07%	$35,000.00	5.93%
RHTR	$492,225.25	$671,742.00	73.28%	$179,516.75	26.72%
Subtotal Residential Incentives	$9,230,036.81	$9,492,439.00	97.24%	$262,402.19	2.76%
Residential Transformational	$1,051,054.23	$1,054,715.00	99.65%	$3,660.77	0.35%
Total Residential Incentives	**$10,281,091.04**	**$10,547,154.00**	**97.48%**	**$266,062.96**	**2.52%**
Total Residential Programs	**$13,648,568.97**	**$13,922,597.00**	**98.03%**	**$274,028.03**	**1.97%**

Residential Trade Allies

Background

The residential trade allies include product manufacturers, wholesalers, retailers and contractors. These companies range from global entities to local proprietorships and all play a vital role in the Program's success. Some are on the front lines selling energy-efficient products, while others are behind the scenes delivering appliances and recycling those which have been replaced. In all, Hawaii Energy continued to enjoy the support of almost 200 unique companies playing a role in driving energy efficiency in the residential market. See **Table 56** for additional details on trade ally activity.

Trade Ally Program Outreach and Feedback

Hawaii Energy solicits feedback on a daily basis when contractors call in for work orders, or when the Program delivers applications to retailers. As a result, we have enhanced our trade ally experience across all programs by introducing a *Participation Application*, further streamlining the participation process. We also improved our Program communications to participants by tailoring the delivery method to the target recipient. The Program enhanced web site resources to encourage self-service, sent direct emails, utilized standard USPS letter mailings and increased phone contact with authorized principals/points of contact. Program representatives also engaged in multiple retail and commercial events with our partners in order to spread the word about Hawaii Energy offerings.

Ongoing Quality Assistance

In PY13, the Residential program continued to enhance the quality of programs offered through trade allies. Dovetailing on the success of the solar water heating contractor quarterly score cards initiated in PY12, in PY13 the Program began featuring top performers in the Hawaii Energy residential e-newsletter. These efforts continue to keep quality at the forefront of our participating contractor's attention. The Program actively coaches contractors experiencing challenges that arise from time to time, which continues to be well received.

Table 56 Residential Trade Ally Projects						
Trade Allies	Measures	Customer Level Demand Savings (kW)	Customer Level Energy Savings (kWh 1st Yr.)	Customer Level Energy Savings (kWh - Life)	Cumulative Customer Level Energy Savings (%)	Incentives
Costco	1,035,973	4,740	33,273,534	232,496,205	42.5%	$2,267,247
Home Depot	454,604	2,268	16,927,456	114,510,771	20.9%	$801,371
Pacific Sustainable Building Science	719	0	3,194,640	47,919,600	8.8%	$431,400
Sears	3,868	136	2,184,824	29,343,998	5.4%	$404,123
City Mill	97,255	449	3,167,226	21,766,315	4.0%	$196,077
Lowes	43,796	281	2,439,083	21,557,684	3.9%	$238,307
Walmart	79,394	397	2,882,002	17,292,013	3.2%	$76,889
Sam's Club	39,691	196	1,413,282	8,688,255	1.6%	$42,586
Island Cooling, LLC	378	188	378,208	7,442,645	1.4%	$28,300
Best Buy	724	22	393,019	5,379,078	1.0%	$66,200
D.R. Horton	206	0	481,364	5,306,115	1.0%	$123,600
Navy Exchange (NEX)	870	26	386,822	5,198,796	1.0%	$68,850
Safeway	13,518	68	490,290	2,944,876	0.5%	$13,018
OK TV & Appliance	235	8	189,539	2,644,650	0.5%	$28,925
Longs/CVS	10,212	51	370,696	2,224,174	0.4%	$9,861
Discomart	214	8	137,004	1,840,296	0.3%	$21,950
Hamai Appliance - Maui	193	7	129,273	1,770,774	0.3%	$20,525
Remaining Allies	20,347	311	1,739,531	18,298,963	3.3%	$370,169
Residential Program Totals	**1,802,197**	**9,156**	**70,177,793**	**546,625,209**	**100.0%**	**$5,209,397**

RESIDENTIAL PROGRAM

Residential Energy Efficiency Measures (REEM) Program

Objective

This program consisted of five major initiatives including:

- High Efficiency Water Heating
- High Efficiency Lighting
- High Efficiency Air Conditioning
- High Efficiency Appliances
- Energy Awareness, Measurement and Controls Systems

The largest offer, involving CFLs, was administered through indirect upstream incentives to customers via lighting distributors and manufacturers. Second to the CFL offering was the Peer Group Comparison program, which was expanded to an additional 57,500 households on Oahu. The third largest offer in PY13 was LEDs, which saw a unit increase of over 200% from PY12.

In summary, rounding out the top three initiatives for first year kWh savings were CFLs, Peer Group Comparison and LEDs. This demonstrates a visible shift in the program as in PY12, the second and third largest offerings were Solar Water Heating and Refrigerator Trade-In, respectively.

Impacts

For PY13, the REEM program achieved savings of 67,307,632 kWh (first year) and 9,463 kW savings with $8,180,046 in incentives. In relative terms, 89% of Residential program incentives captured 94.5% and 99.7% of kWh (first year) and kW savings, respectively. See **Table 57** for details. The three largest contributors were:

- **#1 Contributor to REEM – CFLs (70.7%)**

  CFLs were the largest contributor to the REEM Program savings with energy (first year) and demand savings of 47,590,167 kWh and 6,555 kW, respectively. In terms of first year energy savings, the reliance on CFLs dropped approximately 3% with CFLs accounting for 70.7% of REEM savings in PY13 down from 74% in PY12. The overall unit count of CFLS decreased by 272,000 from PY12 resulting in an absolute savings reduction of about 8%.

- **#2 Contributor to REEM – Peer Group Comparison (7.2%)**

  The Peer Group Comparison Home Energy Report program was the second largest contributor to the REEM Program in terms of first year energy savings. In PY13 the program expanded to an additional 57,500 homes on Oahu resulting in a total of 132,500 recipient households in the program. Despite the expansion, the program contributed 4,819,509 kWh in first year savings, a reduction of over one million kWh from PY12.

- **#3 Contributor to REEM – LEDs (6.2%)**

  LEDs were the third largest contributor to the REEM Program savings with energy (first year) and demand savings of 4,167,833 and 753, respectively. This performance was an increase of over 300% from PY12. Moreover, with a measure life of 15 years, LEDs contribute over 12% of REEM lifetime energy savings.

Table 57 REEM Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
CFL	1,498,509	6,555	69.3%	47,590,167	70.7%	285,541,003	57.2%	6.0	25.7	$38,437,950	60.0%	$1,498,509	3.6%	$1,772,755	21.7%
LED	287,647	753	8.0%	4,167,833	6.2%	62,517,494	12.5%	15.0	0.7	$7,656,090	11.9%	$11,505,880	27.9%	$1,567,065	19.2%
Solar Water Heater	2,185	872	9.2%	3,912,723	5.8%	58,690,849	11.8%	15.0	0.6	$7,837,507	12.2%	$13,920,761	33.7%	$2,173,700	26.6%
Refrigerator - Trade In	5,371	160	1.7%	3,863,029	5.7%	54,082,404	10.8%	14.0	0.7	$4,806,131	7.5%	$6,692,742	16.2%	$671,375	8.2%
Clothes Washer	4,096	100	1.1%	738,087	1.1%	8,857,040	1.8%	12.0	0.3	$1,052,510	1.6%	$3,124,137	7.6%	$204,800	2.5%
Whole House Fans	396	173	1.8%	348,021	0.5%	6,874,953	1.4%	19.8	3.0	$1,254,297	2.0%	$420,193	1.0%	$29,700	0.4%
Peer Group Comparison	1,174,452	551	5.8%	4,819,509	7.2%	4,819,509	1.0%	1.0	0.6	$694,074	1.1%	$1,254,271	3.0%	$1,254,271	15.3%
VRF AC	588	143	1.5%	310,447	0.5%	4,631,883	0.9%	14.9	0.9	$897,779	1.4%	$1,051,981	2.5%	$117,600	1.4%
Bounty - Refrigerator / Freezer	359	11	0.1%	268,863	0.4%	3,764,084	0.8%	14.0	18.1	$332,900	0.5%	$18,370	0.0%	$18,370	0.2%
Heat Pump	261	48	0.5%	342,559	0.5%	3,425,586	0.7%	10.0	1.4	$428,767	0.7%	$304,224	0.7%	$52,200	0.6%
Ceiling Fans	3,313	55	0.6%	482,440	0.7%	2,412,201	0.5%	5.0	0.6	$315,086	0.5%	$547,389	1.3%	$118,715	1.5%
VFD - Pool Pump Packages	258	10	0.1%	134,637	0.2%	1,346,369	0.3%	10.0	0.4	$142,877	0.2%	$326,984	0.8%	$38,700	0.5%
Solar Water Heating Tune-Up	826	24	0.3%	209,851	0.3%	1,049,254	0.2%	5.0	0.5	$137,556	0.2%	$293,366	0.7%	$123,900	1.5%
Solar Attic Fans	192	3	0.0%	90,392	0.1%	451,959	0.1%	5.0	0.3	$47,920	0.1%	$166,314	0.4%	$9,600	0.1%
Refrigerator - Under $600	267	4	0.0%	24,509	0.0%	343,128	0.1%	14.0	0.3	$41,458	0.1%	$143,280	0.3%	$13,315	0.2%
Room Occupancy Sensors	166	1	0.0%	3,016	0.0%	24,128	0.0%	8.0	0.5	$3,754	0.0%	$8,300	0.0%	$1,328	0.0%
Metering - Home Energy	2	0	0.0%	720	0.0%	2,881	0.0%	4.0	1.1	$360	0.0%	$342	0.0%	$151	0.0%
Maintenance - AC	3	0	0.0%	829	0.0%	829	0.0%	1.0	0.4	$146	0.0%	$414	0.0%	$150	0.0%
Recycler Cost	376	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$12,350	0.0%	$12,350	0.2%
Total	**2,979,267**	**9,463**	**100%**	**67,307,632**	**100%**	**498,835,552**	**100%**	**7.4**	**1.6**	**$64,087,162**	**100%**	**$41,289,807**	**100%**	**$8,180,046**	**100%**

RESIDENTIAL PROGRAM

Expenditures

In PY13, the Program utilized 99.7% of available incentive funds, realizing a small surplus of only $25,651.41. Among the mix of measures in the PY13 plan, the Solar Water Heating Tune-Up offer was originally planned for the Residential Energy Services and Maintenance (RESM) program but was in fact charged to REEM funds, further contributing to the distribution of almost the entire budget.

See **Table 58** for details.

Table 58
REEM Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
REEM Operations	$2,329,403.41	$2,331,529.00	99.91%	$ 2,125.59	0.09%
REEM Incentives	$8,180,045.59	$8,205,697.00	99.69%	$25,651.41	0.31%
Total REEM	**$10,509,449.00**	**$10,537,226.00**	**99.74%**	**$27,777.00**	**0.26%**

Overall Accomplishments

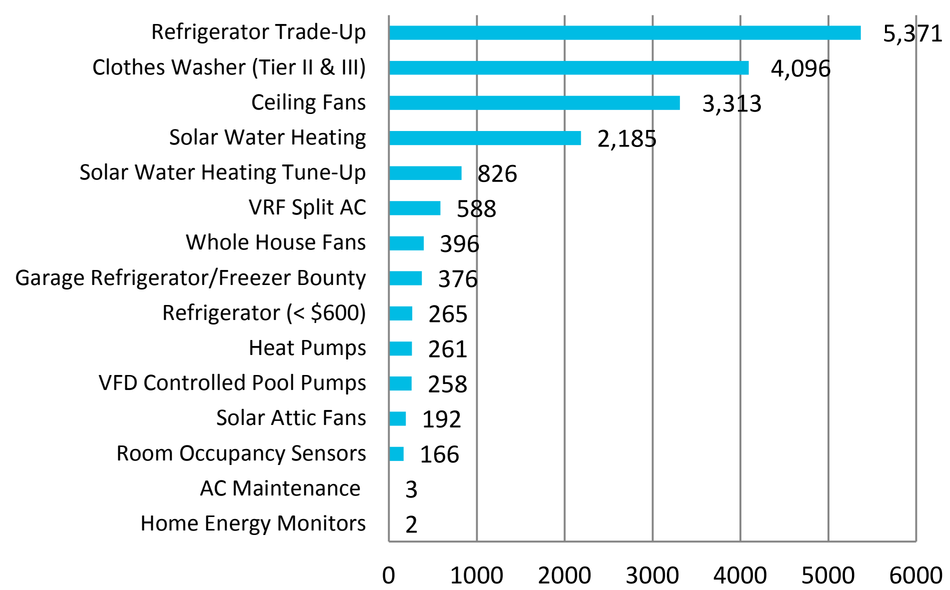
Popular Offerings

Figure 7 summarizes the participation of REEM incentives by measure.

Quality Customer Support

During PY13, Hawaii Energy's residential call center handled over 12,663 customer calls ranging from, "What kind of refrigerator should I buy?" to, "What is the difference in solar technologies offered to heat to my water?", and "What can we do to lower our monthly utility bill?" We saw that 989 of the customers calling were concerned about their energy usage related to the Peer Group Comparison (Opower Home Energy Report), although a few opted out of the report (less than 1 percent). Most were pleased with the reports and were very interested in looking at decreasing their usage. The call center team was able to manage the coverage of these calls while maintaining an eight (8) second average answer rate with less than 1% abandonment rate for all customer calls.

Figure 7 - REEM Rebated Units



RESIDENTIAL PROGRAM

"As a retired, blind person, I live on a very modest, fixed income in a small, one-bedroom apartment. The only way I can seem to keep up with the ever-growing cost of living is to find ways to lower or cut my expenses. **Thanks to the Hawaii Energy Home Energy Reports, I've become more aware of my electricity usage compared to my neighbors.** *It became very clear that there was room for improvement and especially cost savings. So, I set out to make changes in my home to become more energy-efficient.*

At its highest, my electric bill was as high as $128 a month and my ranking was 28 out of 100 neighbors. After taking some steps to save energy such as replacing my old appliances with ENERGY STAR® models and reducing phantom loads by using power strips for my electronics, my electric bill dropped to as low as $83 a month. I cut my bill by about 35% and my ranking moved up to as high as 8 out of 100 neighbors.

What's especially great is my kids are the ones who read my electric bill and the Home Energy Reports to me each month, so they are learning first-hand how going green can not only help save money, but also the environment.

This isn't the end of my energy-saving journey. I now plan to replace my water heater with a more energy-efficient tankless water heater and reduce my AC usage by installing ENERGY STAR® ceiling fans and a security screen door. I'm also making more of an effort to cook, do laundry an even take showers during off-peak hours. I would love to lower my bill even more and I know my kids would love to see their dad move up to #1!"

- K. Okazaki
Mililani Mauka resident

Customer Experience Management

The Program continued to successfully utilize its Customer Experience Management (CEM) tool, Medallia, for a fourth year. This software generates an automated customer email survey for the ENERGY STAR® rebate and Solar Water Heating program participants. In PY13, the Program sent out over 7,500 surveys to gauge customer experience with Hawaii Energy. With a response rate of over 33%, the overall satisfaction rating averaged 9.2 out of 10 in areas of field service, rebate satisfaction and willingness to recommend Hawaii Energy offerings. In PY13, Hawaii Energy logged only six (6) complaints, which is down from eight (8) complaints PY12 and 29 in complaints in PY11. For the most part, complaints revolved around customer perception issues and at the end of the calls the customers left with a better understanding of the Program's value.

Accomplishments by Incentive Offering

High Efficiency Water Heating (HEWH)

For PY13, the HEWH program achieved a savings of 4,465,133 kWh (first year) and 944 kW savings with $2,349,800 in incentives. In relative terms, 28.7% of REEM incentives captured 6.6% and 10% of kWh (first year) and kW savings, respectively.

HEWH - Solar Water Heating (SWH)

Instant Rebate and Interest Buy-Down Program – With 2,185 solar thermal systems installed and incentivized either directly or through participating lenders, the Program saw a steady performance in PY13. Solar water heating was the fourth largest contributor to the REEM Program savings with energy (first year) and demand savings of 3,912,723 kWh and 872 kW, respectively. At the close of the year, the Program had 89 participating contractors.

The solar interest buy-down option, known as "Hot Water, Cool Rates," continued to remain a selling tool for the Program's participating contractors, however, when given the option, customers typically opt for a no-financing solution. Additionally, the popularity of photovoltaics (PV), despite the recommended loading order (i.e., solar water heating first, PV second), continues to overshadow the potential of solar water heating.

Solar Water Heating Inspections – 85% of installations were inspected in PY13. The Program uses an algorithm to select systems to be inspected based on a number of factors including first-pass rates, however, inspections will also be conducted on an as-requested basis. This has helped to lower administration costs, while not sacrificing quality.

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Heat pump water heaters reached 87% of target with 261 units rebated. While about 18% less units were rebated than in PY12, this technology still represents as a viable option for smaller households. See **Table 59** for details of the High Efficiency Water Heating offers.

Table 59 REEM High Efficiency Water Heating Program Impacts															
Category	**Units**	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st Yr.)**	**%**	**Program Energy (kWh - Life)**	**%**	**Average Measure Life (Yrs)**	**TRB/ TRC**	**Total Resource Benefit**	**%**	**Total Resource Cost ($)**	**%**	**Incentives**	**%**
Solar Water Heater	2,185	872	92.3%	3,912,723	87.6%	58,690,849	92.9%	15.0	0.6	$7,837,507	93.3%	$13,920,761	95.9%	$2,173,700	92.5%
Heat Pump	261	48	5.1%	342,559	7.7%	3,425,586	5.4%	10.0	1.4	$428,767	5.1%	$304,224	2.1%	$52,200	2.2%
Solar Water Heating Tune-Up	826	24	2.6%	209,851	4.7%	1,049,254	1.7%	5.0	0.5	$137,556	1.6%	$293,366	2.0%	$123,900	5.3%
Total	**3,272**	**944**	**100%**	**4,465,133**	**100%**	**63,165,689**	**100%**	**14.1**	**0.6**	**$8,403,830**	**100%**	**$14,518,352**	**100%**	**$2,349,800**	**100%**

See **Table 60** for details on solar water heating systems installed by island and **Table 61** for solar water heating system installations listed by participating contractor.

Table 60 Solar Water Heating System Installations by Island									
Category	**Units**	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st yr.)**	**%**	**Lifetime Energy (kWh)**	**%**	**Incentives $**	**%**
Hawaii Island	246	97	11%	436,395	11%	6,545,922	11%	**246,000**	11%
Lanai	1	0.4	0%	1,652	0%	24,773	0%	**1,000**	0%
Maui	280	111	13%	499,685	13%	7,495,268	13%	**280,000**	13%
Oahu	1,658	663	76%	2,974,717	76%	44,620,753	76%	**1,646,700**	76%
Total	**2,185**	**872**	100%	**3,912,448**	100%	**58,686,716**	100%	**2,173,700**	100%

Table 61
Solar Water Heating System Installations by Participating Contractor

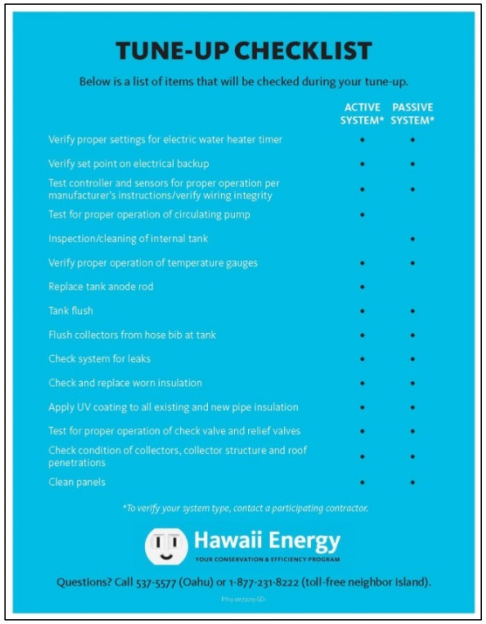
	Contractor	% TOTAL		Contractor	% TOTAL
1	EYC Electric	17.29%	30	Commercial Plumbing, Inc.	0.48%
2	Poncho's Solar Service - Oahu	10.65%	31	Apollo Solar	0.43%
3	Solar Help Hawaii	8.09%	32	Bonterra Solar Services	0.43%
4	Alternate Energy - Oahu	5.88%	33	Poncho's Solar Service - Big Island	0.39%
5	Haleakala Solar - Maui	5.35%	34	Sun King - Oahu	0.34%
6	Drainpipe Plumbing & Solar	3.76%	35	Royal Flush Plumbing	0.29%
7	C&J Solar Solutions	3.56%	36	Hi-Tech Plumbing Corporation	0.24%
8	Hawaiian Island Solar, Inc.	3.56%	37	Knight's Plumbing, Inc.	0.24%
9	Energy Unlimited, Inc.	3.47%	38	Professional Electrical Hawaiian Contractors	0.24%
10	True Green Solar, LLC	3.42%	39	Williams Plumbing	0.24%
11	Haleakala Solar - Oahu	2.89%	40	Pacific Islands Construction	0.19%
12	Maui Pacific Solar, Inc.	2.84%	41	Risource Energy Renewable Systems, LLC	0.19%
13	Keith Shigehara Plumbing, Inc.	2.79%	42	Qualified Plumbing	0.14%
14	Grand Solar	2.26%	43	Red Opae Plumbing	0.14%
15	Hi-Power Solar, LLC	2.22%	44	South Pacific Plumbing, LLC	0.14%
16	Island Solar Service, Inc. - Oahu	2.02%	45	Built To Last Plumbing	0.10%
17	Sonshine Solar Corp.	2.02%	46	Calvin's Plumbing	0.10%
18	RT's Plumbing, Inc	1.64%	47	Indie Plumbing & Solar	0.10%
19	Hawaiian Solar & Plumbing	1.54%	48	Larry's Plumbing & Solar, Inc.	0.10%
20	Affordable Solar Contracting	1.49%	49	21st Century Technologies HI - Maui	0.05%
21	M. Torigoe Plumbing, Inc.	1.35%	50	Ahi, Inc.	0.05%
22	Sun King - Maui	1.25%	51	Five M Plumbing	0.05%
23	21st Century Technologies HI - Oahu	0.96%	52	Johnson's Plumbing Inc	0.05%
24	Solar Aide Company	0.96%	53	Kihei Plumbing	0.05%
25	Alternate Energy - Maui	0.92%	54	Perrin Plumbing, LLC	0.05%
26	Giant Solar, LLC	0.87%	55	Solar Engineering & Contracting - Oahu	0.05%
27	Allen's Plumbing - Maui	0.77%	56	Sunny Solutions, Inc.	0.05%
28	Solar Services Hawaii	0.63%	57	TNH Plumbing	0.05%
29	Kona Solar Service, LLC	0.53%	58	W Contracting, Inc. DBA Energypro Hawaii	0.05%
				TOTAL	**100.00%**

Participating Contractor Meetings

Hawaii Energy continued to meet with its network of Participating Contractors on Oahu, Maui and Hawaii islands. These half-day sessions provided a forum to update contractors on Program results, introduce new programs like the Solar Water Heating Tune-Up and give an opportunity for honest and open dialogue aimed to improve the Program. This year, the agenda was broadened from solar to all of the Program's residential offerings and the upcoming On-Bill Financing programs.

Solar Water Heating Tune-Up Program

The PY13 Solar Water Heating Tune-Up program provided a $150 rebate to help offset the cost of maintenance for existing solar hot water systems. This program was carefully designed using input from the PY11 Tune-Up Pilot and included a key maintenance checklist to address system performance and longevity. The new offer also streamlined the application process for the contractors. This Tune-Up program far surpassed the initial expectation of 150 rebates, closing out the program year with 826 in total.



TUNE-UP CHECKLIST

Below is a list of items that will be checked during your tune-up.

	ACTIVE SYSTEM*	PASSIVE SYSTEM*
Verify proper settings for electric water heater timer	•	•
Verify set point on electrical backup	•	•
Test controller and sensors for proper operation per manufacturer's instructions/verify wiring integrity	•	•
Test for proper operation of circulating pump	•	
Inspection/cleaning of internal tank		•
Verify proper operation of temperature gauges	•	•
Replace tank anode rod	•	
Tank flush	•	•
Flush collectors from hose bib at tank	•	•
Check system for leaks	•	•
Check and replace worn insulation	•	•
Apply UV coating to all existing and new pipe insulation	•	•
Test for proper operation of check valve and relief valves	•	•
Check condition of collectors, collector structure and roof penetrations	•	•
Clean panels	•	•

*To verify your system type, contact a participating contractor.

Hawaii Energy
YOUR CONSERVATION & EFFICIENCY PROGRAM

Questions? Call 537-5577 (Oahu) or 1-877-231-8222 (toll-free neighbor island).

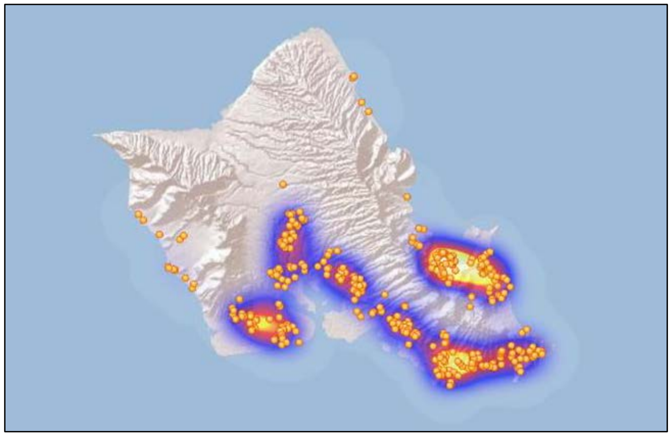
Data from the PY13 Solar Tune-Up program is still being analyzed but based on participating contractor feedback there were a few key takeaways, including: (1) the Tune-Up program contributed to more program participation at a time of the year when the industry is historically slow; and (2) the use of Hawaii Energy's co-branded marketing materials helped increase customers' awareness about the importance of solar water heating system maintenance and care.

For Hawaii Energy, the Tune-Up provided an opportunity to collect data on system condition and overall performance. For instance, although it is generally recognized that one of the primary causes of unrealized energy savings from solar water heating is the misuse of system timers, the Program had not performed any quantitative analysis to validate this. The initial Tune-Up data review showed that 28% of timers were either not functioning or not in use. These findings confirm what was previously suspected and, as a result, the Program is now planning for an increased educational campaign surrounding timers in PY14.

Additionally, findings from the Tune-Up program indicated that 60% of all anode rods were in fair or poor condition. As this is a common failure point with solar hot water systems, the Tune-Up required anode rod replacement plays an important role in decreasing the chance of early system failure. Contractors also documented that 87% of the systems serviced were in "Good" or "Excellent" condition, only 4% of systems had existing leaks, and five systems serviced were over 30 years old.

The Program utilized geographic information systems (GIS) mapping tools to analyze the location of PY13 Tune-Up participants in comparison with the PY11 pilot. Interestingly, the concentration of tune-ups performed shifted from the majority of participation taking place on neighbor islands in PY11 to higher concentrations in windward Oahu in PY13. In PY14 we will be further analyzing overall system condition with available solar data to assess system performance in the hottest sun zones.

These observations are important as they allow Hawaii Energy to better evaluate the accuracy of the existing Program Standards and Specifications and identify areas that need to be addressed. Initial results were presented to contractors at the bi-annual Contractor Meetings, which led to a number of additional requests for data analysis from contractors.



The above heat map shows the concentration of Tune-Up participants. Orange points show participant locations. Blue areas reflect lower density, red is medium density and yellow areas show the highest concentration of tune-ups performed.

High Efficiency Lighting

For PY13, the High Efficiency Lighting Program achieved savings of 51,758,000 kWh (first year) and 7,308 kW savings with $3,339,820 in incentives. In relative terms, 40.8 % of REEM incentives captured 76.9% of kWh (first year) and 77.2% kW savings, respectively.

The program moderated the volume of CFLs to a level of 1.5M (down from 1.7M) while maintaining an average incentive of $1.18. PY13 saw the LED market make even greater strides in qualifying products for the residential market. The 287,647 rebated units reflect an increase of 320% over PY12.

Much effort was spent maintaining program participation with both manufacturers and retailers gained in PY12. Hawaii Energy was also able add many additional partners to our team in PY13. Among the larger manufacturers, Cree and Westinghouse joined the mix. The Program also recruited some smaller niche manufacturers such as Green Creative, Satco, Energy Mad and Light Bulb Source along with a few other distributors/retailers that work in the hardware, grocery and direct-to-consumer lighting markets. Feedback showed that increased retailer education along with the proper selection of lighting products really drives customer adoption.

See **Table 62** for details.

Table 62
REEM High Efficiency Lighting Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
CFL	1,498,509	6,555	89.7%	47,590,167	91.9%	285,541,003	82.0%	6.0	25.7	$38,437,950	83.4%	$1,498,509	11.5%	$1,772,755	53.1%
LED	287,647	753	10.3%	4,167,833	8.1%	62,517,494	18.0%	15.0	0.7	$7,656,090	16.6%	$11,505,880	88.5%	$1,567,065	46.9%
Total	**1,786,156**	**7,308**	**100%**	**51,758,000**	**100%**	**348,058,496**	**100%**	**6.7**	**3.5**	**$46,094,040**	**100%**	**$13,004,389**	**100%**	**$3,339,820**	**100%**

High Efficiency Air Conditioning

For PY13, the High Efficiency Air Conditioning Program achieved savings of 1,231,299 kWh (first year) and 375 kW savings with $275,615 in incentives. This represents a 140% increase in savings from PY12. In relative terms, 3.4% of REEM incentives captured 1.8% and 4.0% of kWh (first year) and kW savings, respectively.

For PY13, the program held multiple meeting with major manufacturers and distributors as a means to gather feedback on their experience with current and historical Hawaii Energy rebate offerings. This intelligence gathering allowed the Program to better gauge the in the energy efficiency space within the AC market. It also provided an opportunity for dialogue regarding the deemed savings for applications in residential air conditioning, thus allowing better analysis of program cost effectiveness. These conversations were integral in the design of the Window AC Trade-Up and VRF program modifications to be implemented in PY14.

Solar Attic Fans and Whole House Fans, introduced in PY10, continued to show steady demand.

See **Table 63** for details.

Table 63
REEM High Efficiency Air Conditioning Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Whole House Fans	396	173	46.3%	348,021	28.3%	6,874,953	47.8%	19.8	3.0	$1,254,297	49.9%	$420,193	19.2%	$29,700	10.8%
VRF AC	588	143	38.2%	310,447	25.2%	4,631,883	32.2%	14.9	0.9	$897,779	35.7%	$1,051,981	48.1%	$117,600	42.7%
Ceiling Fans	3,313	55	14.6%	482,440	39.2%	2,412,201	16.8%	5.0	0.6	$315,086	12.5%	$547,389	25.0%	$118,715	43.1%
Solar Attic Fans	192	3	0.9%	90,392	7.3%	451,959	3.1%	5.0	0.3	$47,920	1.9%	$166,314	7.6%	$9,600	3.5%
Total	**4,489**	**375**	**100%**	**1,231,299**	**100%**	**14,370,996**	**100%**	**11.7**	**1.2**	**$2,515,082**	**100%**	**$2,185,876**	**100%**	**$275,615**	**100%**

High Efficiency Appliances

For PY13, the High Efficiency Appliances Program achieved savings of 5,029,125 kWh (first year) and 284 kW savings with $958,910 in incentives. In relative terms, 11.7% of REEM incentives captured 7.5% and 3.0% of kWh (first year) and kW savings, respectively. Since PY09, Hawaii Energy has continued to expand its retail community to Hawaii and Maui counties, with a current total over 200 retail participants. This includes many new independently owned retailers along with all of the “big box” retailers in the State. Hawaii Energy’s Trade Ally Team regularly visited all retailers throughout the program year to keep them current on rebate levels, promotions and to ensure proper display of Hawaii Energy’s Point-of-Purchase (POP) collateral. Throughout the program year, retailers were regularly updated via emails and phone calls.

RESIDENTIAL PROGRAM

As ENERGY STAR® products become more common (and non-ENERGY STAR® models become less available), the Program has continued to curtail rebate offerings for some common ENERGY STAR® products. In order to moderate demand and manage the available PBF funds, the Program continued to offer the Refrigerator Trade-Up program in four (4) batches throughout PY13 and secured 3,863,029 kWh savings from this offer, reflecting 77% of the High Efficiency Appliance Program. This performance was consistent with PY12 in both scale and contribution to the REEM portfolio. The ENERGY STAR® clothes washer and VFD Controlled Pool Pump offers held steady in PY13 with 4,096 and 258 units, respectively.

Garage Refrigerator/Freezer Bounty Program – In PY13, the Refrigerator/Freezer Bounty Program was updated with the creation of Rid-A-Fridge to Fight Hunger, a partnership between Hawaii Energy and the local food banks. As an enhancement to the Bounty program, which offers a rebate to customers who unplug and recycled a working refrigerator and/or freezer, Rid-A-Fridge allows customers to donate their rebate directly to their local food bank by simply checking a box on their application. At the conclusion of PY13 almost $3,000 had been donated to food banks on Oahu, Maui and Hawaii Island.

See **Table 64** for details.

Table 64
REEM High Efficiency Appliances Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr.)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Refrigerator - Trade In	5,371	160	56.2%	3,863,029	76.8%	54,082,404	79.1%	14.0	0.7	$4,806,131	75.4%	$6,692,742	64.9%	$671,375	70.0%
Clothes Washer	4,096	100	35.3%	738,087	14.7%	8,857,040	13.0%	12.0	0.3	$1,052,510	16.5%	$3,124,137	30.3%	$204,800	21.4%
Bounty - Refrigerator/Freezer	359	11	3.7%	268,863	5.3%	3,764,084	5.5%	14.0	18.1	$332,900	5.2%	$18,370	0.2%	$18,370	1.9%
VFD - Pool Pump Packages	258	10	3.4%	134,637	2.7%	1,346,369	2.0%	10.0	0.4	$142,877	2.2%	$326,984	3.2%	$38,700	4.0%
Refrigerator - Under $600	267	4	1.4%	24,509	0.5%	343,128	0.5%	14.0	0.3	$41,458	0.7%	$143,280	1.4%	$13,315	1.4%
Recycler Cost	376	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$12,350	0.1%	$12,350	1.3%
Total	**10,727**	**284**	**100%**	**5,029,125**	**100%**	**68,393,024**	**100%**	**13.6**	**0.6**	**$6,375,876**	**100%**	**$10,317,864**	**100%**	**$958,910**	**100%**

Energy Awareness, Measurement and Control Systems

For PY12, the Energy Awareness, Measurement and Control Systems Program achieved savings of 4,823,246 kWh (first year) and 551 kW savings with $1,255,750 in incentives. In relative terms, 15.4 % of REEM incentives captured 7.2% and 5.8% of kWh (first year) and kW savings, respectively.

Peer Group Comparison – In PY13, Hawaii Energy expanded the Home Energy Report program to include an additional 57,500 households on Oahu resulting in a total of 132,500 participating households at the close of the program year. The Home Energy Report consists of an outbound mailer measuring a home's energy use against 99 homes in their peer group (i.e., similar sized home and demographics). Initial calls from new customers responding to mailings ranged from general inquiries about the program to anger (e.g., save paper, privacy, low ranking). This was the expected outcome of the mailers, which are designed to elicit a strong response followed by behavioral changes. Customers were shown how to log in to their account and enter information specific to their home, followed by a discussion of how they could save money. Typically during the call, customers decided to continue their participation in the program. Hawaii Energy continues to maintain the lowest attrition rate nationwide with the Peer Group Comparison report. In all, 4,819,509 kWh savings came from this offer, reflecting 99.9% of the Energy Awareness and Control System program.

Room Occupancy Sensors – Despite a relatively strong start for room occupancy sensors through upstream distribution channels, the program suffered from a premature cancellation when the sole participating retailer ended the offering due to their internal program restructuring.

Whole House Energy Metering – Hawaii Energy soft-launched this offer with a variable rebate in PY10. Although there has been low participation over the last few years, the Program is further researching the available technologies and devising a strategy to increase targeted participation for PY14.

See **Table 65** for details.

Table 65
Energy Awareness Measurement and Control Systems Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr.)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Peer Group Comparison	1,174,452	551	99.9%	4,819,509	99.9%	4,819,509	99.4%	1.0	0.6	$694,074	99.4%	$1,254,271	99.3%	$1,254,271	99.9%
Room Occupancy Sensors	166	1	0.1%	3,016	0.1%	24,128	0.5%	8.0	0.5	$3,754	0.5%	$8,300	0.7%	$1,328	0.1%
Metering - Home Energy	2	0	0.0%	720	0.0%	2,881	0.1%	4.0	1.1	$360	0.1%	$342	0.0%	$151	0.0%
Total	**1,174,620**	**551**	**100%**	**4,823,246**	**100%**	**4,846,518**	**100%**	**1.0**	**0.6**	**$698,188**	**100%**	**$1,262,913**	**100%**	**$1,255,750**	**100%**

Custom Energy Solutions for the Home (CESH)

This incentive category provided a measure of flexibility within the prescriptive portfolio to accommodate unforeseen market opportunities with budgetary and unit cost targets to provide financial efficacy guidance to the Program and allies who champion these opportunities.

In PY13, the program rebated three custom lighting proposals for specialized residential LED lighting applications. All other opportunities were addressed through the other programs (e.g., REEM, RESM and RHTR). As the market continues to evolve in PY14, the Program anticipates increased activity for this incentive category.

See **Table 66** and **67** for details.

Table 66
CESH Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr.)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
LED	3	7	100.0%	9,531	100.0%	142,961	100.0%	15	2.5	$35,988	100.0%	$14,341	100.0%	$2,766	100.0%
Total	**3**	**7**	**100.0%**	**9,531**	**100.0%**	**142,961**	**100.0%**	**15**	**2.5**	**$35,988**	**100.0%**	**$14,341**	**100.0%**	**$2,766**	**100.0%**

A modest amount of time was spent reviewing a few inquiries involving the PY13 expenditures. See **Table 67** for more detail.

Table 67
CESH Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
CESH Operations	$19,819.48	$21,755.00	91.10%	$ 1,935.52	8.90%
CESH Incentives	$ 2,765.97	$25,000.00	11.06%	$22,234.03	88.94%
Total CESH	**$22,585.45**	**$46,755.00**	**48.31%**	**$24,169.55**	**51.69%**

Residential Energy Services & Maintenance (RESM) Program

Objective

The Residential Energy Services and Maintenance program targets ally-driven service offerings to enhance energy savings persistence and bootstrap fledgling energy services businesses trying to secure a toehold in Hawaii. For PY13, the RESM Program achieved savings of 3,758,500 kWh (first year) and with $555,000 in incentives specifically for the Efficiency Inside Home Design Program. The Solar Water Heating Tune-Up, while originally budgeted for the RESM program, was charged under REEM during PY13.

Accomplishments

Residential Design and Audit Programs – Efficiency Inside Home Design

Introduced in PY10, this program requires energy modeling to make comparisons between energy code-compliant designs and enhanced designs. Since this program's inception, Efficiency Inside has given Hawaii Energy the unprecedented opportunity to dive into the key characteristics of home energy use in Hawaii. Hawaii Energy has also established and maintained a productive relationship with a number of developers, modeling and testing consulting firms. In PY13, 925 homes were modeled across 13 communities, including one on Maui.

This approach has demonstrated the following progress the last four years:

- PY10: Collaboration with Home Energy Rating System (HERS) raters to develop program measurements and verification;
- PY11 and PY12: Gathering of data about home construction techniques and standard operation; recruitment of developers to participate in home energy design; and
- PY13: Use of utility data to determine actual home energy usage and compare with as-designed specifications.

In PY13 the Program was able to combine Efficiency Inside collected data with actual home energy usage data, and perform enhanced analysis. Some preliminary findings show:

- Homes are constructed such that they will consume up to 17% less energy than a baseline code built home ("baseline code" being IECC 2006 with solar water heating).
- Non-PV homes in the Ewa plain use on average 580-680 kWh/month, which is slightly less than, but in line with the Kapolei average of 705 kWh/month for a non-PV home.
  - The Program estimates that air conditioning could account for up to 68% of these new home's energy usage; and that
  - Many homes show no sign of energy usage from air conditioning.
- Air conditioning drives home energy usage in hotter Hawaii climates.
  - **Figure 8** displays monthly energy costs for 67 new homes of the exact same model and neighborhood.

- **Figure 9** shows 3 charts of estimated home energy use breakdowns corresponding to the Average use, Above Average use, and Maximum use circles in Figure 8.

Figure 8

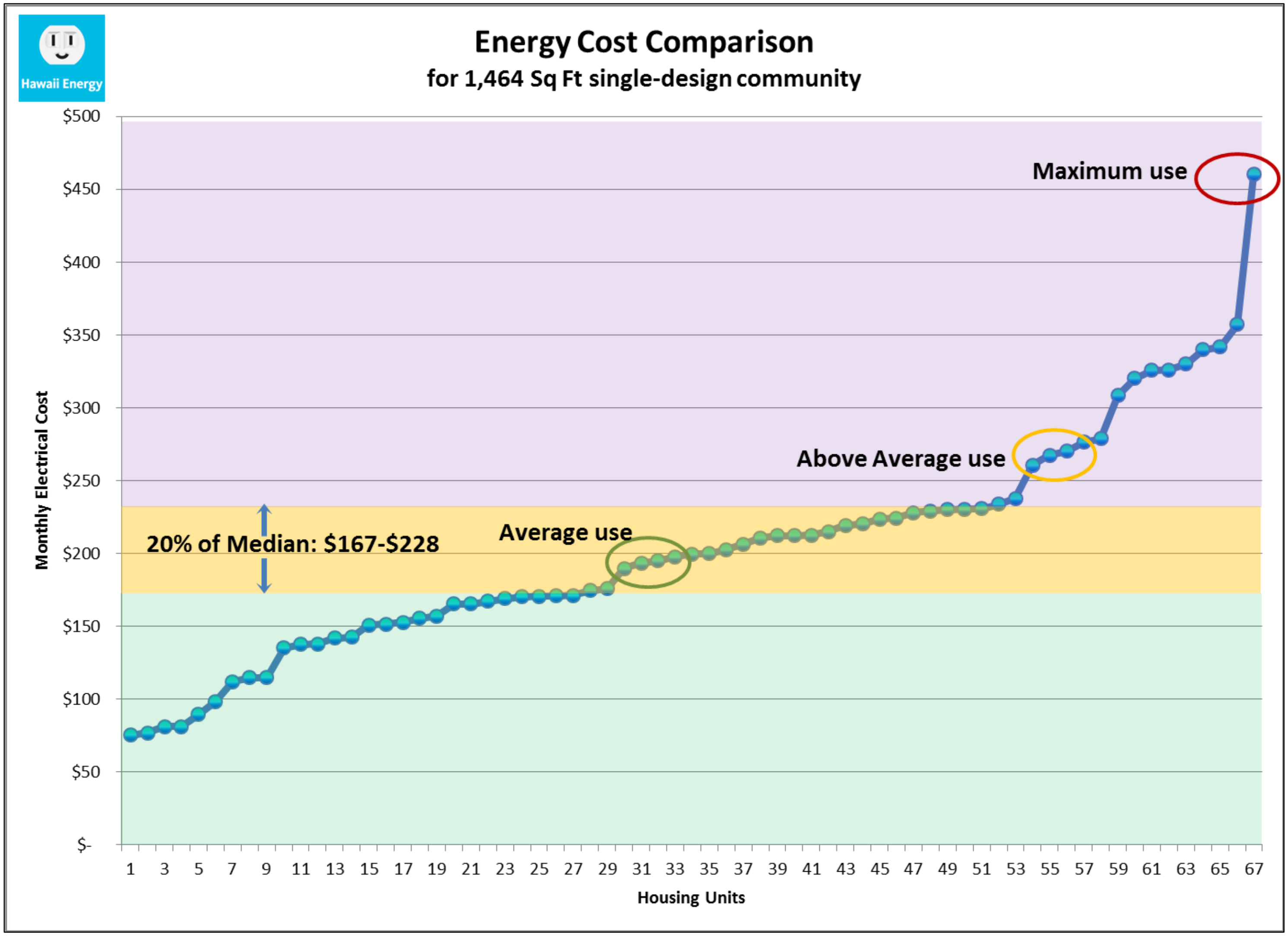
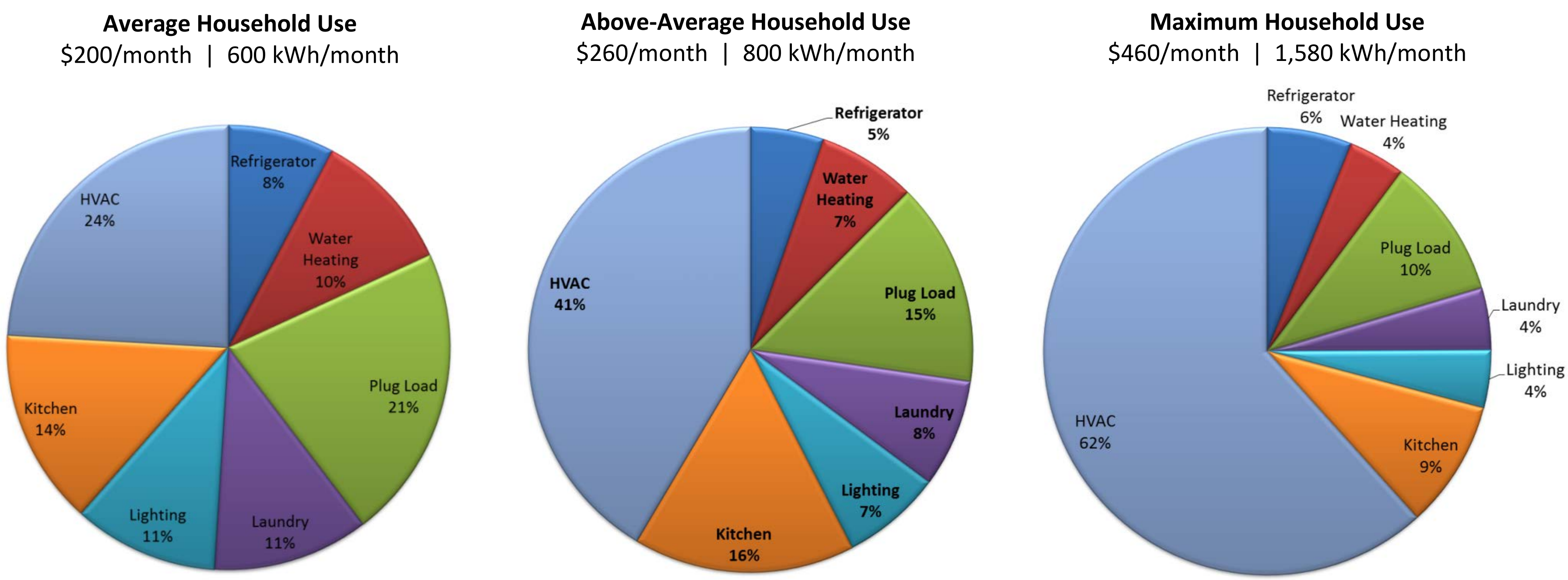


Figure 9 – Evolution & Comparisons of Residential Electricity Use



Hawaii Energy analyzed utility billed energy use. Knowing the installed appliances and estimating typical usage, air conditioning consumption could be reasonably calculated.

A high energy-using home could have up to 62% of their energy going toward air conditioning. Unaccounted users such as electric vehicles would lower this, but total would remain significant around 55%.

The Hawaii Energy Program has also gained the following insight:

- The Energy Policy Act forbids requiring equipment efficiencies higher than those cited in the Act, which is currently 13 SEER for residential air conditioning. However, some forward thinking builders in Hawaii outfit new homes through this program with much higher efficiency units in the 16 SEER range.
- HERS raters are suggesting the next steps for new construction home design:
  - Right-size air conditioning using Manual J and verifying compliance via 3rd party assessment; and
  - Increase building tightness.
- Net-Zero homes are being built with the following conditions:
  - Constructed with 1 kW PV installed; and
  - EV-ready

RESIDENTIAL PROGRAM

In PY14, the traditional Efficiency Inside program will come to a close with just 100 home incentives remaining. The Program plans to use the data gathered over the last four years to work more closely with developers and residents, and provide data in a meaningful way that will encourage behavioral changes in energy usage. It will also explore Demand Response and SmartGrid programs that will provide usage information to the residents allowing them to be better informed and encouraging energy management.

Impacts

For details, see **Table 68**.

Table 68 RESM Program Impacts															
Category	**Units**	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st Yr.)**	**%**	**Program Energy (kWh - Life)**	**%**	**Average Measure Life (Years)**	**TRB/TRC**	**Total Resource Benefit**	**%**	**Total Resource Cost**	**%**	**Incentives**	**%**
Design	925	0	0.0%	3,758,500	100.0%	54,419,569	100.0%	14.5	0.9	$4,217,883	100.0%	$4,810,200	100.0%	$555,000	100.0%
Total	**925**	**0**	**100.0%**	**3,758,500**	**100.0%**	**54,419,569**	**100.0%**	**14.5**	**0.9**	**$4,217,883**	**100.0%**	**$4,810,200**	**100.0%**	**$555,000**	**100.0%**

Expenditures

In PY13, the Efficiency Inside Home Design program spent $555,000, 99.7% of the incentive budget.

See **Table 69** for details.

Table 69 RESM Program Expenditures					
	Expenditures	**R1 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
RESM Operations	$74,042.06	$74,263.00	99.70%	$220.94	0.30%
RESM Incentives	$555,000.00	$590,000.00	94.07%	$35,000.00	5.93%
Total RESM	**$629,042.06**	**$664,263.00**	**94.70%**	**$35,220.94**	**5.30%**

Residential Hard-To-Reach (RHTR) Program

Objective

The Residential Hard-To-Reach program seeks to secure various projects among geographies and demographics that have been traditionally underserved. This incentive category specifically addresses landlord/tenant barriers through direct installation of energy saving technologies.

Accomplishments

Solar Water Heater – Direct Install

In PY12 the Program worked with Hawaii County Economic Opportunity Council to install 169 solar water heating systems for “in need” families. It was determined that by collaborating on this project with the Program providing funding for solar water heating systems, HCEOC could extend its grant to help more families in other ways. For PY13 the program expanded its reach and collaborated with Maui Economic Development (MEO) to work with their identified hard-to-reach residents. At the conclusion of PY13, the Program had fully-funded a total of 52 solar water heating systems, 19 on Maui and 33 on Hawaii Island.

Molokai Hui Up

During PY13, Hawaii Energy partnered with the Blue Planet Foundation and Sust‘AINAble Molokai to execute a Hui Up on Molokai. The Residential Hard-To-Reach program supported this initiative with a $250 incentive for a new ENERGY STAR® refrigerator for 220 households.

RESIDENTIAL PROGRAM

Impacts

During PY13 Hawaii Energy built on PY12 successes and continued to provide resources through major solar water heating grants and the refrigerator trade up program, Hui Up. Residential Hard-to-reach (RHTR) resources target traditionally underserved demographics. For PY13, Hawaii Energy's program achieved savings of 166,211 kWh (first year) and 23 kW savings with $492,225 in incentives. In relative terms, 5% of Hawaii Energy's residential incentives captured 0.2% of kWh (first year) and kW savings.

See **Table 70** for details.

Table 70
RHTR Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Solar Water Heater	52	20	86.8%	91,418	55.0%	1,371,263	56.7%	15.0	0.4	$183,026	66.3%	$410,645	75.8%	$411,145	83.5%
Refrigerator - Hui Up	211	3	13.2%	74,793	45.0%	1,047,108	43.3%	14.0	0.9	$93,051	33.7%	$105,948	19.6%	$56,230	11.4%
Refrigerator - Hui Up (Molokai)	100	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$24,850	4.6%	$24,850	5.0%
Total	**363**	**23**	**100%**	**166,211**	**100%**	**2,418,371**	**100%**	**14.6**	**0.5**	**$276,077**	**100%**	**$541,443**	**100%**	**$492,225**	**100%**

Expenditures

See **Table 71** for detailed expenditures and unspent funds.

Table 71
RHTR Program Expenditures

	Expenditures	R1 Budget	Percent Spent	Unspent	Percent Unspent
RHTR Operations	$175,671.65	$176,281.00	99.65%	$609.35	0.35%
RHTR Incentives	$492,225.25	$671,742.00	73.28%	$179,516.75	26.72%
Total RHTR	**$667,896.90**	**$848,023.00**	**78.76%**	**$180,126.10**	**21.24%**

TRANSFORMATIONAL PROGRAM

Introduction

In PY13, the Transformational program expanded its residential and business-related efforts to support three key areas, specifically: (1) Behavior Modification, (2) Professional Development and (3) Technical Knowledge and Training. An emphasis was placed on green workforce development and energy literacy through education in schools, households and communities at large. The underlying intent of these offerings is to transform the market through various means that will lead to gains through energy efficiency and conservation within three to five years. Through the expertise and collaboration of Hawaii Energy staff and subcontractors throughout PY13, the Transformational Program met and exceeded most of its goals and addressed some additional priorities that were recognized throughout the Program Year. See **Table 72** for details on Transformational achievements.

Table 72
Transformational Achievements

	Participants	
Category	**Achieved**	**Goal**
Behavior Modification	23,297	18,000
Helen Wai	3,101	
Kanu – Messaging	19,394	
Kanu – Devices	300	
UH Sustainability Summit	297	
Hui Up – BPF	205	
Energy Videos - BPF	N/A	
Professional Development	1,336*	1,000
The NEED Project	338	
RISE - Kupu Hawaii	6	
UHWO - IFMA	N/A	
Hui Up - SMI	12	
EEFG	980*	
Technical Training	223*	2,000
CEM - AEE	48	
BOC - UHMOC & SLIM	51	
W&WW Training	124*	

*Number of participants differs from value that was previously reported in PUC Monthly reports due to new information presented after June report was submitted.

TRANSFORMATIONAL PROGRAM

Behavior Modification

Energy Literacy in Hard-to-Reach Communities

"Sharing the Aloha" Workshops – A Free Community Workshop with Helen N. Wai

For islanders living at or below Hawaii's average income level, the apparent inability to control high electricity costs, let alone understanding energy, is a cause of great frustration. To address this, Hawaii Energy once again subcontracted Helen N. Wai because of her experience and success in providing face-to-face financial literacy instruction and guidance to Hawaii's rural, low-income and Native Hawaiian-American families and communities over the past 15 years. Helen is Native Hawaiian, her family has been living on Hawaiian Homestead lands in Nanakuli, Oahu for generations, and she is well regarded by the local community, giving her credibility and access far beyond what Hawaii Energy would otherwise have.

In PY13, 3,101 participants attended 104 "Sharing the Aloha" workshops throughout the islands. Classes were augmented to address energy efficiency and enhanced with a complimentary energy-saving item for each participant. This free item encouraged participation and also helped attendees save energy.

Throughout PY13, the need for energy education in new venues was increasingly apparent. Individuals in the targeted demographics typically have multiple jobs, an extended family and children to care for, and therefore are not able to attend regularly scheduled community workshops. To address this barrier to participation, the Program began providing workshops at the residents' place of employment during lunch times. These workshops were held for employees of hotels, resorts, supermarkets, hospitals, colleges and labor unions.

New this year, "Sharing the Aloha" did a joint community outreach event on Wednesday, May 28, 2014 at Office of Hawaiian Affair's (OHA) Kulana Oiwi Halau on Molokai. The event followed the Maui County's small business conference held at the nearby University of Hawaii (UH) Maui College – West Molokai campus. The target audience was small local businesses owners, families, past Hawaii Energy participants, as well as individuals interested in learning how to reduce their electric bills. The collaboration was successful, boasting an attendance of 124 people at this event.

Throughout the program year, Hawaii Energy received many positive emails and phone calls from workshop participants. Many of the participants felt empowered by the information and greatly appreciated Helen's presentation, primarily because her compassion and use of local terms and phrases made it more relatable to their everyday lives.

About two years ago, we held a Sharing the Aloha workshop at the Kona Coast Resort for our employees. Because of the energy-saving information we learned at the workshop, the Resort Manager and I used a Belkin Conserve Insight Monitor to measure how much energy the four drink machines on our property used. They were each costing us $100 a month to operate! We removed three of the drink machines and replaced the fourth with a new ENERGY STAR® machine. We're estimated to save about $3,600 annually!"

Rhonda Brown
Assistant Resort Manager
Kona Coast Resort

TRANSFORMATIONAL PROGRAM

Energy Efficiency Literacy at Scale – Kanu Hawaii

Messaging

Hawaii Energy recognizes that the socioeconomic and cultural diversity in Hawaii presents a unique challenge for promoting energy efficiency and conservation. It often requires personal connections, relatable examples, pictures, or simple cultural phrases to capture and retain the public's attention and interest.

To help address this unique challenge, Kanu Hawaii was once again subcontracted to take on the following tasks: (1) educate/inspire action to save and conserve energy and (2) encourage sharing their experience with friends and family. Kanu Hawaii was selected because of its vision related to the above challenge and its mission to "empower people to build more environmentally sustainable, compassionate, and resilient communities rooted in personal commitments to change." Kanu Hawaii is an ideal partner for Hawaii Energy due to its appreciation for Hawaii's unique way of life, its compassion for helping underserved families and its highly effective use of social media messaging tools.

In PY12, Kanu Hawaii worked with Hawaii Energy to identify ten (10) meaningful energy-saving activities relevant to Hawaii families and create messaging to communicate the value of these behaviors. Kanu Hawaii's interaction with a diverse set of communities identified the following energy saving opportunities to address: fans, air conditioners, entertainment centers, electric water heaters, showers and baths, refrigerators, kitchen appliances, clothes washers, power strips, and video games systems. A series of memes (defined as "an idea, behavior, or style that spreads from person to person within a culture") were created by Kanu reflecting a sense of Hawaii's culture that identifies energy-saving activities in an attractive, relatable way. Once a person sees the meme in a printed document, webpage, blog or presentation, they are presented with additional information in infographics and/or videos that further explain the value of new behaviors that when adopted can result in energy savings.

In PY13, Kanu Hawaii built upon this foundation and created additional energy-saving memes, along with infographics and videos. They also produced energy education curriculum for adults and activity and coloring books for children. Both highlighted the creative energy-saving messages specifically designed for Hawaii's diverse population. Kanu's design approach made messages attractive and appealing to draw people in and motivate them to learn more about saving energy.

Kanu Hawaii tested the newly developed memes' "attractiveness" using Facebook to create discussions and engagements. In less than three months, Kanu had 614,572 social media views of which 19,394 people engaged (took action) using the newly created memes.

Devices

Since the Program began focusing on transformational programs, it became clear that many electric ratepayers lack access to simple energy-saving devices (e.g. timers, advanced power strips, etc.). For those that do, the standard instructions that accompany these devices are often difficult to understand leading to incorrect use or no use at all. Therefore, Kanu Hawaii was subcontracted to implement a carefully designed a 300-participant pilot that would overcome some known barriers and provide access to a simple device, while ensuring its proper use. With the findings, Hawaii Energy could develop subsequent offers that would be more likely to succeed, especially among hard to reach sectors.

Hawaii Energy and Kanu Hawaii chose a simple timer as the best energy conservation measure to pilot.

Access to this simple device was addressed by an innovative Pay-It-Forward model developed by Kanu Hawaii. The foundation of the Pay-It-Forward model is to provide a simple, satisfying and successful customer experience that will lead the customer to share their experience with others. Key to the customer's experience was the set of instructions provided with the timer. To maximize the Program's learnings, three subgroups were established, each receiving different instructions. The first group received the manufacturer's instructions; the second group received printed Kanu-developed instructions, while the third group received a Kanu-produced video with their timer. Each of the three groups was further divided into two groups: one receiving a timer with factory-set pins (e.g. on 24/day), while the other received a Kanu-set timer, which was preset to be off during the overnight hours. Kanu Hawaii successfully recruited 300 participants, divided into six (6) test groups that were then sent a package of two timers (one to use and one to Pay-It-Forward) and the instructions.

Kanu created special instructions to help participants understand and take action to curb energy consumption by using the device. Some of the key elements of the Kanu Hawaii produced printed instructions included a Hawaii-styled narrative, simple images and highlights to overcome confusion, suggested common household items with vampire loads and in general a "home-grown" or small business-like feel that was more welcoming.

Participants of the Kanu "Pay-It-Forward" project received two timers to help them reduce the energy usage for a single device in their home
After trying the device on their own, they were encouraged to pass the second timer to a family member or friend and show them how to save energy using it.

Kanu's video instructions featured Kanu staff demonstrating the setting and installation of the timer on an appropriate device.

The project was successful in a number of ways. The Program engaged participants from all islands and received valuable feedback, testimonials and pictures verifying correct installations. Hawaii Energy and Kanu learned that localized meme-based instructions (e.g. infographic) were the most successful tool in overcoming barriers to proper installation and use. And overall, participants had a positive experience resulting in 75% indicated they would Pay-It-Forward, meaning they would give their second timer to a friend and show them how to use it.

This pilot showed promise in developing an educational distribution model for low-cost energy-saving measures that can target the residential market. In the coming Program Year, Hawaii Energy intends to build upon this pilot as it continues to establish efficient ways to benefit the residential sector with low-cost conservation measures.

Second Annual Hawaii Sustainability in Higher Education Summit

University of Hawaii 10-Campus System, Hawaii Pacific University, Brigham Young University-Hawaii and Chaminade University

Hawaii Energy made a conscious effort to develop strong relationships within the University of Hawaii (UH) system in PY13. One aspect of this was continuing the financial and technical support for the University of Hawaii Sustainability in Higher Education Summit. The first event, held in PY12, exceeded its key intended outcomes and expectations, which included: (1) refining the draft UH System Sustainability Policy and (2) providing an opportunity for building cross campus collaborations by sharing insights and best practices. The 2nd Annual University of Hawaii Sustainability in Higher Education Summit was a three-day conference that took place March 13th - 15th, 2014 at the University of Hawaii Windward Community College in Kaneohe. Hawaii Energy was a gold sponsor for this event and participated in panel discussions.

The Summit was attended by 297 participants, including representatives from the University of Hawaii 10-campus system, invited guests and higher education colleagues at Hawaii Pacific University, Brigham Young University-Hawaii, and Chaminade University. The Summit's goal was to continue statewide higher education sustainability strategy, establish sustainability goals, share best practices and build long-term relationships to support campus efforts to move from vision to action in energy efficiency and broader sustainability efforts.

TRANSFORMATIONAL PROGRAM

Marketing and Logistics Support for Residential Energy Literacy in Hard-to-Reach Communities

The Hui Up program continued into its third year, sending youth interns into residents' homes and educating them about energy efficiency opportunities.

Hui Up 3.0 with Blue Planet Foundation and Sust`AINAble Molokai

Based on previous success achieved on Molokai and Lanai, Hawaii Energy subcontracted Blue Planet Foundation and Sust`AINAble Molokai (see *Professional Development*) to launch another round of Hui Up, the refrigerator exchange program, on Molokai. In addition to the refrigerator exchange, the Program added an educational component for energy efficiency and conservation by funding Sust`AINAble Molokai to have their youth interns provide participants with a simple home energy assessment.

Blue Planet Foundation focused on effectively marketing this opportunity to Molokai residents, recruiting eligible participants and handling the logistical and fiduciary components involved in the refrigerator exchange. This resulted in 220 participant households exchanging their old, inefficient refrigerator for a new ENERGY STAR® refrigerator to reduce their energy bill.

Energy Videos

Blue Planet Foundation

Hawaii Energy contracted with Blue Planet Foundation to produce two professional-quality videos introducing concepts surrounding energy use in small businesses and homes. The intention of the videos is to serve as an effective introduction to efficiency for these historically hard-to-reach business customers. These videos incorporated a local tone and style in order to most effectively communicate the message to Hawaii's small business and residential audience.

To the left are screen captures from the two energy videos created by Blue Planet Foundation. "Money Monster" (left) depicted some of the ways that small businesses tend to waste money in their facilities and "The Romero's" (right) featured Kehau and Mike Romero of Waianae, who shared their experience monitoring their home energy use and the positive changes they made as a result.

Professional Development

Energy Education in the Schools

The National Energy Education Development (NEED) Project

Hawaii Energy subsidized travel and registration costs for three teachers so they could attend the National Energy Conference for Educators in July 2013.

The National Energy Education Development (NEED) Project brings over 30 years of experience in energy education and has correlated their lessons and materials to Hawaii education standards. NEED programs are designed to practice student peer-to-peer teaching and cooperative learning. More importantly, NEED's student-directed activities empower students to take active roles in educating their peers, families and communities about energy issues and in identifying and solving the problems unique to their communities.

Throughout PY13, 338 teachers across Honolulu, Hawaii and Maui counties participated in NEED activities such as workshops, grants and development meetings. Major breakthroughs in penetration of the Hilo area of Big Island's population allowed us to surpass our goal of 275 teachers by 19%. These teachers were from 169 local schools and served a total of 18,738 students. Hawaii Energy now has a pool of teachers (contact list of 535 teachers) who they will continue to consult with and leverage to expand the energy education in the community.

The NEED Project workshops focused on developing a clear understanding of the science of energy and energy efficiency and conservation lessons for school, home and commercial applications. The two types of one-day workshops: Basic Energy Workshop and Building Science Workshop were offered to teachers providing training and curriculum materials for all grade levels and subject matter. Teachers were provided with professional development credits, a substitute reimbursement for their attendance, as well as energy learning kits to use in their classrooms. In addition, teachers who attended the NEED workshops were eligible for grants for up to $2,500 throughout the Program year for projects that build capacity in energy efficiency and conservation. Five (5) grants were awarded to teachers at local schools ranging from $500 to $2,500.

Hawaii Energy also had unprecedented success in the historically hard-to-reach Hilo area. In PY13, the Program was able to reach the Hilo market for educators by forming relationships with local resource teachers and principals and leveraging those relationships to generate interest and awareness of the importance of the energy education workshops. The average NEED workshop attendance for the Hilo area in previous years was approximately 15. In PY13, the Hilo workshop was the largest with 60 participants and a waiting list. There were many requests during and after the workshop for more information regarding energy-saving tips and recommendations as well as requests for additional workshops from attendees. Hawaii Energy will continue to engage and support these teachers and will offer a second-level workshop, Building Science, in PY14.

NEED teachers had the opportunity to delve deeper into the NEED curriculum at the annual National Energy Conference for Educators held in July 2013. For PY13, the Program subsidized the travel and cost of attendance for three (3) Hawaii NEED teachers to participate in this five-day conference. This trip allowed them to explore the NEED curriculum further with their peers from across the country and learn from well-seasoned NEED teachers as their facilitators. These three teachers have been very active in sharing and promoting the NEED curriculum and Hawaii Energy at community events and within their schools.

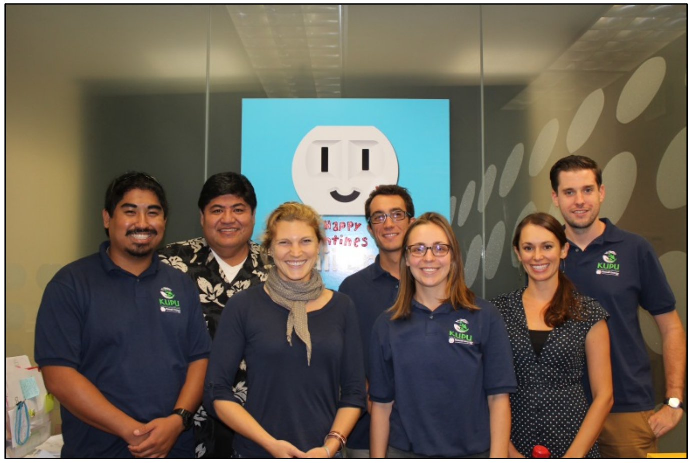
In June 2014, NEED and Hawaii Energy hosted their second annual Teacher Advisory Board (TAB) session. The TAB was comprised of ten (10) teachers who have participated in past NEED workshops. These teachers are highly motivated and have successfully implemented the NEED curriculum. The members of the second session were selected by Hawaii Energy and NEED staff to ensure that various types of schools from each island were represented. The TAB session, which was facilitated by both Hawaii Energy and NEED staff, served as a platform for teachers to discuss further developments that would support teachers in applying energy education in their curriculum. Hawaii Energy and NEED have taken these suggestions from the TAB meeting and have begun to integrate them into NEED curriculum and operations.

The TAB meeting was also used as an incubator for new ideas and initiatives. Based on feedback Hawaii Energy received from the third-party Measurement and Verification review, it was recognized that it would be beneficial for The NEED Project to have a more direct connection to the residential community with regard to energy education. The team worked with the TAB members to strategize about methods for effectively achieving energy savings in students' homes. It was mutually decided that the members of the TAB would pilot an Energy Expo with their students in the next academic year to involve parents and other community members in energy education. Two Energy Expos are already scheduled for PY14; these events will also serve as a platform to promote other Hawaii Energy offerings to ratepayers.

RISE (Rewarding Internships for Sustainable Employment)

Kupu Hawaii

The Program recognizes the need to prepare the next generation for green jobs and sees great value in green workforce development. Therefore, Hawaii Energy teamed up with the RISE Program operated by Kupu Hawaii to recruit, train and mentor six (6) interns for green workforce development. Through the RISE program, these college students and young professionals had paid internships working specifically in energy efficiency in the commercial, residential and agriculture sectors. These interns contributed to green initiatives with guidance and mentorship from Hawaii Energy and Kupu Hawaii staff. The interns supported Hawaii Energy's work in the field, performed market research on the agriculture sector, and worked with University of Hawaii (UH) staff on the Kukui Cup student dormitory energy challenge. In addition to their work in these sectors, interns attended Sustainability Seminar Series (S3) to build skills and their professional capacity, have access to rare insider opportunities to tour facilities, meet with leading experts in the State and nation, and keep abreast of current issues through networking, events and newsletters.



Although stationed on different islands, RISE interns gathered for several trainings in Honolulu to evaluate and discuss their experiences and learn new information about the Program.

Five (5) of the RISE interns worked with Hawaii Energy's Small Business Direct Install Lighting (SBDIL) program performing a total of 162 SBDIL post-inspections within Hawaii, Honolulu and Maui counties. They also conducted market research among contractors and participants in the Program to better understand their perceptions of the SBDIL program and Hawaii Energy. The interns produced a white paper and presented their findings and recommendations to Hawaii Energy at the end of the year. Recommendations included a request for a new data system for contractors and a need for better marketing and communication about the SBDIL program. These have all been considered and will be implemented in PY14.

One (1) intern oversaw the Kukui Cup program throughout the academic year. The Kukui Cup is a program to encourage the reduction of energy use in college student resident halls at the University of Hawaii at Manoa campus. The intern learned innovative behavior change techniques via "gamification", which involves social marketing, student activities and educational pedagogy. This intern produced a report and gave a presentation to Hawaii Energy staff on findings and recommendations for future implementations of the program. Findings suggest that leaders of the program needed to be involved for longer than one year in order to properly grow the program and have a lasting impact.

Four (4) of the interns performed market research on the local agriculture industry exploring energy efficiency opportunities in this sector. Although the agricultural sector is relatively small in Hawaii, their final presentation offered a number of ideas for Hawaii Energy to better engage farms and food manufacturers. Suggestions included additional technical workshops and website enhancements specifically for the agricultural sector among others.

Facilities Degree Program at the University of Hawaii West Oahu

University of Hawaii West Oahu & International Facility Management Association

In order to address the growing need for professional facilities management personnel, the International Facility Management Association (IFMA) Hawaii Chapter, University of Hawaii West Oahu (UHWO), and Hawaii Energy are collaborating on the creation of an innovative academic degree program that will prepare students for careers in facilities operation and management.

In PY13, Hawaii Energy provided the University of Hawaii Foundation with $20,000 to support the development of the UH West Oahu Bachelor of Applied Science (BAS) Concentration in Facilities Management. This funding was utilized to retain a local expert to consult on the development of the degree program in relation to various stakeholder priorities. This energy consultant is tasked with identifying key industry partners, collaborating with UHWO administrative and faculty personnel to identify course content, identifying experts to serve as lecturers, and creating a strategic rollout plan for the program including a 3 to 5-year budget. The energy industry expert consultant will also be researching IFMA program certification in order to complement UHWO's existing courses with new construction, energy, and engineering coursework to meet industry workforce needs.

Because of this promising start, the University Foundation was able to successfully leverage the funding to secure an award of $245,677 from the U.S. Office of Naval Research (ONR) to support the establishment of a STEM Center of Excellence and a BAS Concentration in Facilities Management program. In addition to the materials and equipment being purchased with the ONR grant, two UH West Oahu faculty members are currently researching the Facilities Management program curriculum in conjunction with the chosen energy industry consultant.

In PY14, Hawaii Energy plans to continue to support the development of this degree program through collaboration with the energy consultant, UHWO and IFMA Hawaii members. The Program plans to develop a three to five-year "Road Map" documenting the needed support from Hawaii Energy and the Hawaii IFMA Chapter that will be executed in parallel to UH West's degree development work.

Green Workforce Development and Residential Energy Literacy in Hard-to-Reach Communities

Hui-Up 3.0 with Sust`AINAble Molokai

Hawaii Energy subcontracted Sust`AINAble Molokai and Blue Planet Foundation (see *Behavior Modification*, page 120) to launch Hui Up 3.0 on Molokai, a refrigerator exchange program with an educational component to improve the energy literacy of participating households. The professional development and education aspects of this project were driven by Sust`AINAble Molokai, which recruited and trained a team of twelve (12) local youth to convey energy efficiency and conservation information, tips and practices to participating households. In addition to providing this in-home training, these youth performed 205 home energy assessments with a focus on plug loads, particularly focused on the refrigerators they encountered.

Energy Efficiency Sales Professional Training

EEFG® - Mark Jewell, President

Recognizing that educating energy conservation and efficiency sales and advocacy professionals could lead to broader Program participation, Hawaii Energy continued to subcontract Mr. Mark Jewell of Energy Efficiency Funding Group (EEFG) in PY13. EEFG is a training and education services firm based in California and its principal, Mr. Jewell worked in commercial real estate investment for over 15 years before becoming a nationally recognized expert on energy efficiency. In PY13, a total of 980 individuals participated in the following offerings.

Some of the more than 200 participants that attended Mark Jewell's workshops this program year.

The Hawaii Energy Workshop Series

In advance of the Hawaii Energy Workshop Series V (HEWS V) being offered, EEFG conducted an introductory webinar entitled, "Finding the Value in Efficiency" to which a total of 66 individuals subscribed. The webinar touched upon assessing energy-saving potential, calculating returns and securing approval for projects, while identifying which upcoming courses would provide more detail on each of the topics presented.

Later in PY14, EEFG offered eight (8) topics for the Series both in-person and on-demand, including:

1. Learning to S.E.E. (Sell Efficiency Effectively)
2. Financial Analysis for Energy Efficiency Projects - Beginning
3. Financial Analysis of Energy Efficiency Projects - Intermediate

4. Financial Analysis of Energy Efficiency Projects - Advanced
5. Taking Control of Your Energy Use
6. Making Efficiency Happen
7. Benchmarking Your Commercial Building and What's Next After Benchmarking?
8. Benchmarking as a Business

In general, these courses are intended to stimulate energy efficiency sales activity within Hawaii Energy's island territory, particularly among the medium-sized commercial customers, and to provide professional development to those selling energy-efficient equipment/services to that market. While the Program had only offered in-person courses in the past, the on-demand (online) series enabled professionals to participate despite travel constraints. Once registered, these participants have access to their chosen courses for one full year and is intended be a resource to apply lessons learned, while being able to return to the online courses for reinforcement. A total of 832 individuals participated in these courses, with 224 attending the in-person classes at the Double Tree Hilton Alana Waikiki Hotel on Oahu Island, while the balance of 608 registered for the on-demand courses.

Post-surveys for the Series were very positive and anecdotally implied that the Program could increase participation through Webinar versions of these courses. As expected, the majority of attendees plan to use the knowledge and skills gained from the course to increase efficiency/renewable utilization by their customer or client's facility.

The Efficiency Sales Professional Boot Camp

EEFG also offered the Efficiency Sales Professional ™ (ESP) Certificate Program, which is an intensive, six-day session including 48 hours of training on sales, energy efficiency, financial analysis, and personal productivity. This robust course included 24 learning modules teaching participants to find the highest valued targets and capture their attention, to map the decision-making chain and skillfully assess motivations, to concisely communicate value and artfully blend emotion and logic to neutralize objection to gain approval, and to replace myth with math and motivation to escape the clutches of simple payback period.

At Hawaii Energy direction, EEFG contacted highly valued local organizations to notify them of the Boot Camp and encourage their members to participate. Over the course of the Series, more than 50 relevant member organizations (e.g., BOMA, AIA, USGBC, and IFMA) were solicited to attend. Ultimately, 27 participants attended the certificate program during the week of May 5th at the Double Tree Hilton Alana Waikiki Hotel on Oahu Island.

Post-surveys revealed that both Mr. Jewell and the courses were extremely well-received and valued. Many attendees commented on the abundance of valuable practical course material alongside expressions of gratitude to have the opportunity to attend these high-level trainings at such an affordable cost.

Mark Jewell's Presentation to UH Board of Regents and Facilities Staff & Video Supplement

The University of Hawaii represents one of Hawaii's most significant energy consumers. On May 8, 2014, Mark Jewell delivered a keynote presentation at the Information Technology Center of the University of Hawaii Manoa Campus to an audience of 55 leaders and other important stakeholders in the

University's energy-related planning and projects. This event was a catalyst for more engagement with the UH System and Hawaii Energy leading into PY14.

EEFG also produced a reenactment of that keynote, a Vimeo-format video of approximately one hour using "green screen technology", featuring Jewell as the speaker with selected PowerPoint slides inserted as the background. This video will be used as an ongoing introduction to staff as Hawaii Energy continues working with UH.

Mark Jewell giving a special presentation to campus leaders and stakeholders at the University of Hawaii at Manoa

TRANSFORMATIONAL PROGRAM

Technical Training

Certified Energy Manager (CEM), Energy Manager in Training (EMIT) and Online Training

Association of Energy Engineers (AEE)

Since PY11, Hawaii Energy has worked with AEE to hold training seminars and certification programs in Hawaii. Objectives of the program were to strengthen the workforce in Hawaii, develop energy managers and improve their skills set, and to offer attendees the opportunity to gain the Certified Energy Manager (CEM) certification designation, which fosters their professional development.

In PY13, Hawaii Energy offered one subsidized AEE Online Training Course, *Developing an Energy Management Master Plan*, as part of our support to the water and wastewater sector, while also evaluating the effectiveness of the online delivery method. The purpose of this course was to introduce the concept of energy management master planning to water and wastewater operators and managers. This online training offered flexibility for people who have a limited amount of time and could not be away from the office. Nine (9) professionals completed the course. Hawaii Energy received a number of emails thanking the Program for these great online courses.

This year, in addition to in-person trainings like the one above, Hawaii Energy and AEE offered an online training course designed especially for water and wastewater professionals.

Hawaii Energy also offered an in-person CEM Preparatory Seminar. The five-day program was a great success. There were a total of 39 unique registrants, from utility employees to state employees to military personnel. Of the 39 participants, 17 received CEM certification and three (3) received the Energy Manager in Training (EMIT) certification and will be eligible for a CEM certificate once they have achieved requisite experience. Positive comments and feedback from the participants suggested that the course was very well-received. Each participant checked "Yes" when asked if they would recommend this training to others. With the diverse origins of the participants, Hawaii Energy anticipates the skills gained in the training will result in effective efficiency efforts in a variety of end-users.

Building Operator Certification (BOC©) Workshops

University of Hawaii at Manoa Outreach College & Sustainable Living Institute of Maui (SLIM)

Hawaii Energy partnered with the University of Hawaii at Manoa Outreach College and SLIM to bring the nationally recognized energy efficiency training and certification program, Level 1 Building Operator Certifications (BOC®), to those working in commercial building operations and maintenance on Maui and Oahu. The training and certification program was a great opportunity for commercial businesses to improve energy efficiency in their processes in order save money and become more sustainable over the long term. BOC graduates also save money for commercial and institutional buildings by improving the energy efficiency of lighting, heating and cooling systems, and by enabling operators to be proactive in complying with environmental regulations affecting facility operations and maintenance.

Topics covered in the training included:

a. Energy Efficient Operation of Building HVAC Systems
b. Measuring and Benchmarking Energy Performance
c. Efficient Lighting Fundamentals
d. HVAC Controls Fundamentals
e. Indoor Environmental Quality
f. Common Opportunities for Low-Cost Operational Improvement
g. Building Scoping for Operational Improvement

Students in one of the Oahu BOC training sessions get familiar with some of the tools used in energy

Three sets of BOC training and certifications were held in the Spring of PY13 – one (1) on Maui and two (2) on Oahu. Each BOC training consisted of eight (8) classes, which were covered within an eight (8) week period. For each participant, it was a total time commitment of about 74 hours, which included in-class exams and project assignments. Hawaii Energy provided funding for this training by heavily subsidizing the training costs to make it more affordable for qualified participants to attend. Qualified participants were defined as building engineers, HVAC technicians, electricians, maintenance workers, building managers and others involved in running or improving energy efficiency in a facility. As a result, a total of 51 participants received their Building Operator Certification.

Water and Wastewater Training and Best Practices Handbook Production

The water and wastewater initiative in PY13 focused on training and technical support in an effort to build momentum for energy efficiency in this sector. Hawaii Energy was very successful in engaging all the major water and wastewater operators on Oahu, Maui, and Hawaii Island. The Program provided energy and pump efficiency training for 124 operators and managers from the Honolulu Board of Water Supply (BWS), Oahu Environmental Services Wastewater division, Maui Department of Water Supply (DWS), and Maui County Environmental Management and Wastewater Reclamation Division. The Program also partnered with the Hawaii Commission on Water Resource Management to address water and wastewater operators on all islands about the importance of water loss control and the connection between water loss and wasted energy. On Maui, the Program produced and delivered a three-hour block of instruction for the SLIM-sponsored basic water and wastewater operator course given at UH Maui Campus. Despite continued engagement with Hawaii Island DWS and County of Hawaii Department of Environmental Management Wastewater Division the Program was unable to coordinate a training session in PY13. Training on Hawaii Island will remain a priority in PY14.

Most notably, Hawaii Energy produced and distributed the State's first "Water and Wastewater Energy Management Best Practices Handbook", which was developed with New York State Energy Research and Developmental Authority (NYSERDA) and Focus on Energy, Wisconsin's statewide energy efficiency and renewable resource program. The handbook is designed to assist operators, managers and financial decision-makers in making wise decisions with respect to energy efficiency within the water and wastewater sector. It includes industry-tested best practices and addresses benefits and limitations to each best practices and overall industry acceptance of the measures. The Handbook was completed towards the end of PY13 so distribution will continue into PY14.

MARKETING & OUTREACH

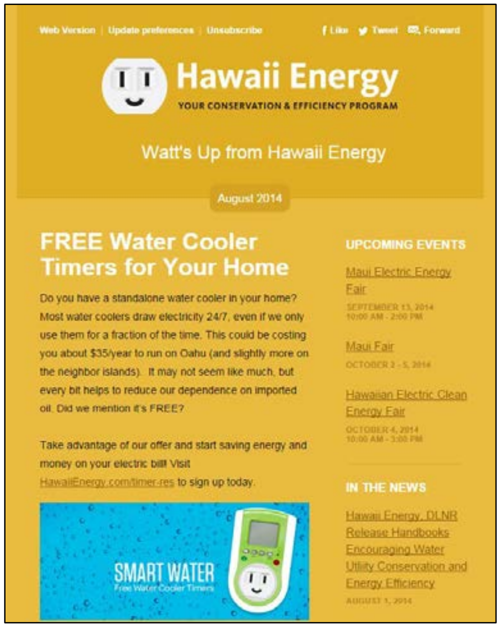
In PY13, the focus of the Program's marketing, outreach and communications efforts was to continue to increase awareness of Hawaii Energy and evolve our strategic endeavors to ensure consistency in branding and messaging. Our goals for PY13 included: (1) provide more comprehensive and integrated marketing and communications support to our residential, business and transformational offers; (2) bring public relations services in-house to more effectively communicate our program's initiatives; and (3) expand advertising strategy to leverage brand awareness to drive participation.

Below are just some of the marketing and communications highlights from PY13:

Marketing, Advertising and Promotions

Email Marketing

In PY13, the Program developed and launched a consistent email marketing plan to complement our current marketing efforts. It was important for the Program to integrate email marketing into its overall marketing and communications strategy to extend our audience reach and increase awareness. The benefits of email marketing include the ability to: (1) provide real-time and personalized messages; (2) send targeted marketing campaigns to one of three subscriber lists (i.e., residential, business and energy professionals) and (3) communicate with electric ratepayers more frequently.



Our email marketing plan included:

- Development of distribution plans for email marketing targeting each audience in support of Residential, Business and Transformational program goals;
- Creation of e-newsletter templates (i.e., residential, business and energy professionals);
- Development of three subscriber lists; and
- Development and maintenance of our email database to have quality subscriber lists.

As a result of our email marketing efforts, some highlights included:

- Developing a list of over 10,000 engaged email subscribers who have all opted in to receive email communications from us.
- Distributing email marketing messages monthly either via our bi-monthly residential e-newsletter, quarterly business e-newsletter or specialized messages promoting Transformational and program-wide efforts.
- Achieving an average open rate of 37.32% and an average click-through rate of 10.39% across all 16 email messages sent in PY13. Based on industry standards, both are above average open and click-through rates and can be attributed to our commitment to providing engaging and relevant information, maintaining a quality email list as well as providing targeted messages to segmented recipients.

MARKETING & OUTREACH

Advertising

Co-op Advertising

To extend the Program's residential solar water heating message and promote the instant $1,000 rebate, a co-op advertising program was developed and piloted in 2nd quarter of PY13. Solar water heating participating contractors were eligible to receive advertising funds from the Program to help offset the cost of their company's advertising in print publications, radio and TV. To qualify for funding, their advertising must include Hawaii Energy's logo and messaging. Participating contractors were eligible for reimbursements up to 50% of the cost of their ad, not to exceed $1,000 per program year per contractor.

Sample advertisements from contractors who took advantage of the Hawaii Energy's Co-op Advertising offer.

Although only four (4) solar water heating companies participated in the co-op advertising program and received reimbursements, the Program received positive feedback from the contractors for this initiative. Many of the contractors expressed interested in this program, but due to varying factors like advertising budgets already being committed, were unable to take advantage of the offer. As such, we've decided to continue our co-op advertising program in PY14.

Solar Water Heating Ad Campaign

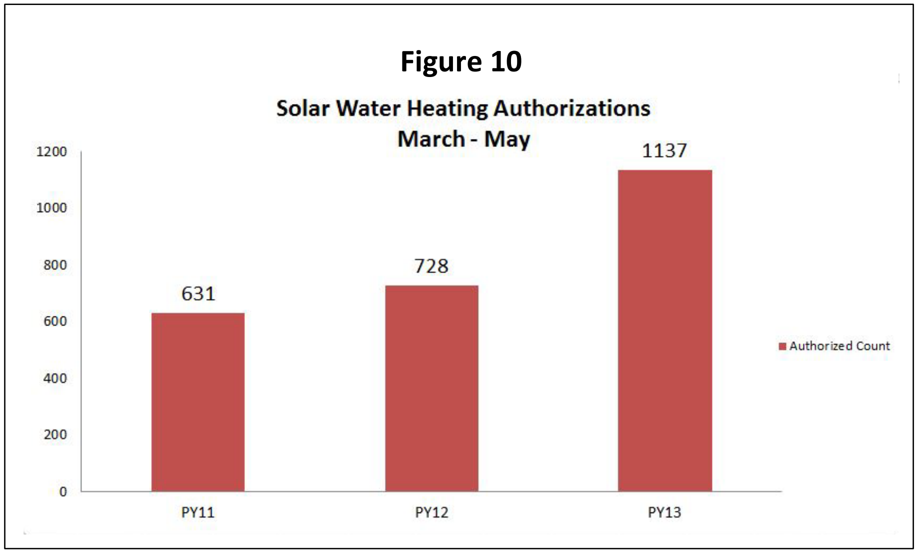
With the changes to the PV industry in the 2nd and 3rd quarter of PY13, it was an ideal time for the Program to further promote solar water heating.

The objectives for the PY13 advertising campaign, which ran for three months from March to May, were to:

1) Build on the brand equity from the PY12 ad campaign;
2) Increase awareness of the benefits of solar water heating;
3) Drive consumers online to learn how to get started as well as guide them through the purchasing process.

The advertising strategy was to continue with a mix of TV, online, radio and print advertising. As a part of the strategy, there was a more targeted focus on print and radio advertising on the neighbor islands since those mediums are primary sources for the community to get news. Overall, the portfolio of media purchased for this campaign yielded and estimated reach of 11.4 million, which helped to continue to convey our message and increase brand awareness. Reach is defined as the estimated number of readers or viewers reached in a given medium.

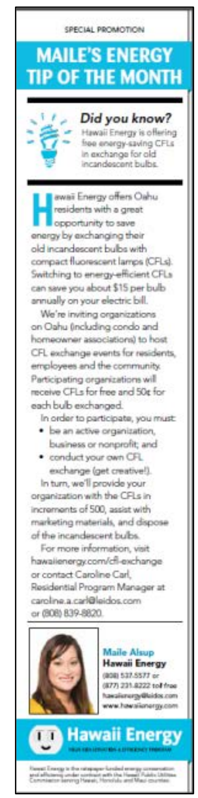
MARKETING & OUTREACH



The PY13 goal for solar water heating was to have 2,400 systems installed through the instant $1,000 rebate. In the two program years since the advertising campaign has been running, the Program has seen an 80.2% increase in solar water heating authorizations from March through May, which has been the timeframe of our media buys (see **Figure 10** at left).

Some highlights from the advertising campaign include:

- Reaching approximately 269,000 unique Facebook users and delivering 869,000 impressions.
- Driving over 3,000 customers to the solar water heating landing page via the banner ad campaign on a variety of targeted websites.



SPECIAL PROMOTION

MAILE'S ENERGY TIP OF THE MONTH

Did you know? Hawaii Energy is offering free energy-saving CFLs in exchange for old incandescent bulbs.

Hawaii Energy offers Oahu residents with a great opportunity to save energy by exchanging their old incandescent bulbs with compact fluorescent lamps (CFLs). Switching to energy-efficient CFLs can save you about $15 per bulb annually on your electric bill.

We're inviting organizations on Oahu (including condo and homeowner associations) to host CFL exchange events for residents, employees and the community. Participating organizations will receive CFLs for free and 50¢ for each bulb exchanged.

In order to participate, you must:

- be an active organization, business or nonprofit; and
- conduct your own CFL exchange (get creative!).

In turn, we'll provide your organization with the CFLs in increments of 500, assist with marketing materials, and dispose of the incandescent bulbs.

For more information, visit hawaiienergy.com/cfl-exchange or contact Caroline Carl, Residential Program Manager at caroline.a.carl@leidos.com or (808) 839-8820.

Maile Alsup
Hawaii Energy
www.hawaiienergy.com

Hawaii Energy

Broadened Advertising Strategy

Since the inception of the Hawaii Energy program, the advertising strategy had been focused on promoting specific residential rebates and offers with a limited advertising run. In order to increase awareness of the Hawaii Energy brand, it was important to broaden our advertising strategy to be more consistent and continuous. In PY13, messaging was focused on the overall program and the variety of rebates it offers.

- **Hawaii Business Magazine:** Launched our "Energy Tip of the Month" column (right), a monthly advertisement designed to attract attention like an editorial in the front "Trending Now" section of the publication. The column promoted the Program and our various incentives and rebates. In addition, we had a 1/3 page monthly ad placed in the Small Business section that highlighted a company that received an incentive. *Hawaii Business Magazine* reaches 81,000 business-minded readers and decision-makers each month.
- **Green Hawaii: A 32-Page Guide to Living a Greener Life** produced by *Hawaii Home + Remodeling Magazine*: We sponsored and helped to develop this special publication, which provided readers with ways to save energy and money through energy conservation and efficiency. *Green Hawaii* reached 110,000 people and appeared in the April issue of *Hawaii Home + Remodeling Magazine*, May issue of *Honolulu Magazine* and June issue of *Hawaii Business Magazine*. Along with this special publication, *Hawaii Home + Remodeling Magazine* sent out a Hawaii Energy-focused e-newsletter to over 6,000 monthly subscribers in April and May 2014. The Program also received 10,000 copies for distribution at community outreach events.

MARKETING & OUTREACH

- **KRTR 96.3 FM:** Launched radio advertising campaign with Summit Media Hawaii's KRTR 96.3 FM, which ran from April to June. This campaign included "Energy Saving Tips of the Day" spots during the afternoon drive time (3 - 8 p.m.), on-air DJ endorsements by Shawnee Hammer, monthly live radio interviews and placement of online ads on the KRTR website. KRTR is the top "at work" radio station on Oahu and reaches adults 25 - 54 years old and women 25 - 44 years old.

Direct Mail

Electric Bill Inserts

The Program designed inserts highlighting residential rebates (including CFLs and the Bounty offer) and business incentives. These inserts were included with the March and April bills for Hawaiian Electric, Hawaiian Electric Light Company and Maui Electric. The bill inserts reached 365,000 residential electric customers and 60,000 business electric customers per monthly insert.

Solar Water Heating Direct Mail

The Program developed and strategically distributed via mail a postcard-sized direct mail piece in May promoting residential solar water heating, its energy-saving benefits and the Hawaii Energy rebate to homeowners in Ewa Beach, Kapolei, Mililani and Waipahu with a household income of more than $75,000. Those Oahu neighborhoods were specifically chosen due to high PV saturation in those areas. The direct mail reinforced the message of solar water heating as a first step towards energy savings before or in addition to PV. A total of 20,389 mailers were sent out and the program received a significant lift in traffic to our solar water heating website page in the four days after the distribution of the direct mailer. We received on average 107 visits per day, up from an average of 30. A vanity URL (hawaiienergy.com/solarsavings) was used on the direct mail piece, which enabled us to track interest and engagement. This was the first time the Program ever used a direct mail strategy to reach an audience and promote an offer.

This three-panel direct mail piece was sent out in May 2014 as the last component to a program year-long push for the $1,000 solar water heating rebate.

MARKETING & OUTREACH

Social Media

Solar Water Heating Facebook Promotion

We wrapped up the Program's 10-week solar water heating Facebook promotion, which launched at the end of PY12. As a part of the promotion, Facebook users were asked to "like" the Hawaii Energy Facebook page and share how they would use the $600 savings they would have received if they had installed a solar water heating system. Contestants entered to win an energy-saving gift pack (valued at $50) and a winner was chosen weekly. This promotion substantially increased "likes" for the program Facebook page by over 50% with 1,171 likes. "Likes" are important in social media in that they indicate strong audience interest and engagement.

Energy-Saving Instagram Photo Contest

In PY13, we launched an Instagram account for Hawaii Energy. To increase our Instagram follows, we piloted the Program's first Instagram photo contest with the YMCA Healthy Kids Day event on April 12. Participants were asked to take a photo with one or more energy-saving devices displayed at the event and were eligible to win a gift basket. Ten (10) Instagram users entered the contest and we acquired 15 new followers. We later determined that there may have been more contest entries, but some contestants may not have made their Instagram newsfeed public, which resulted in us not being able to view their photos. The Program will continue to experiment with and refine social media engagement.

Our Solar Water Heating Facebook Contest (left) and Healthy Kids' Day Instagram Photo Contest (right) helped us further increase and engage with our social media following and build our e-newsletter subscription base.

MARKETING & OUTREACH

Public Relations

Public relations is the management of relationships between an organization and its various stakeholders through strategic communications. Hawaii Energy's public relations efforts have resulted in the development of solid, working relationships with the local news media, which has resulted in positive media coverage for the Program.

Throughout PY13, Hawaii Energy continued to strategically identify and leverage media opportunities to amplify ratepayer's awareness of and participation in Hawaii Energy as a program, as well as specific residential and business offerings. Public relations continues to be a critical component to the Program's integrated marketing strategy in order to establish credibility and build awareness through the news media.

The marketing and communications team expanded in PY13 to include the hiring of a Public Relations Specialist. Since the inception of the Program in 2008, we retained local subcontractors for our public relations services. As the Program continued to grow, we determined it would be more efficient and effective to bring these services in-house.

Results

Hawaii Energy generated a plethora of media coverage that spanned all news mediums including television, radio, newspapers, magazines, websites and trade publications.

The estimated cumulative reach of media coverage was calculated by multiplying the circulation/audience figures of each medium by three, which is a generally-accepted calculation method within the public relations industry. Cumulative reach was estimated at more than 8,601,868.

The total Publicity Value (PV) of media coverage is estimated at $237,770. Publicity Value is calculated by multiplying the Advertising Value Equivalency (AVE) by three, which is a factor generally accepted by the marketing industry. AVE is what the editorial coverage would cost if it were advertising space (print publications) or on-air time (television and radio).

Media Coverage Highlights

Generated media coverage is highlighted below and divided into categories. To read full stories secured throughout the year, please refer to the media coverage report in Attachment F.

Press Conference

On September 19, 2013, Hawaii Energy orchestrated a press conference with the Hawaii National Guard in recognition of their commitment to energy conservation and efficiency. The Hawaii National Guard completed a pilot program designed to reduce energy consumption. These programs and behavior modifications throughout the National Guard's 20-plus facilities, resulted in approximately 7% overall energy reduction with some of its facilities seeing up to a 23% reduction. Governor Abercrombie and Major General Darryll Wong of the Hawaii National Guard attended and spoke at the press conference.

MARKETING & OUTREACH

In PY12, Hawaii Energy sponsored a command-wide training program to introduce energy conservation practices and energy audit guidelines to approximately 132 National Guard staff. In turn, these staff members applied the training to the facilities where they worked and shared their knowledge with other facility occupants. Hawaii Energy provided the training in collaboration with Smart Sustainability Consulting, a Honolulu-based company, which specialized in occupant engagement through the identification and education of wasteful lighting and air conditioning practices with the goal of adopting institutional behavior change.

Program Director Ray Starling addresses the attendees at a press conference announcing the Hawaii National Guard's energy-saving initiatives in September 2014.

Several energy-saving opportunities were identified by the energy audits performed as part of the training. These ranged from space consolidation or optimization to no- and low-cost operational changes to large-scale capital improvement projects.

From January to March 2013, the National Guard worked on four energy efficiency retrofit projects that were estimated to save more than 257,000 kilowatt hours (kWh) per year the equivalent to more than $79,000 in electricity cost per year based on $0.31 per kWh (average kWh rate in 2012). Hawaii Energy presented a check for $21,361 in incentives to the National Guard for its various energy-saving initiatives.

These initiatives and energy efficiency measures included the following:

- *Interior De-Lamping* – Removed 1,195 fluorescent lamps throughout eight (8) facilities in excessively lit areas.
- *LED Retrofit* – Replaced 20 Metal Halide and 12 High Pressure Sodium exterior lamps with energy-efficient, UL qualified LEDs, which reduced energy consumption by 70 percent in Buildings 306/306a.
- *Water-Cooled Chiller & Variable Frequency Drive (VFD) Pumps* – Replaced existing A/C system with an energy-efficient, water-cooled chiller and added VFD technology to pumps and motors. Current data forecasts savings of 75,600 kWh per year in Buildings 306/306a.
- *Implementation of a Commander-Supported Energy Conservation Awareness Program* – The program encouraged all facility occupants to take personal responsibility for energy conservation in their workspace. This measure alone was estimated to have added greatly to the overall energy reduction realized throughout all facilities.

Stories about the press conference appeared on Hawaii News Now's evening newscast (CBS and NBC affiliate in Hawaii), its website HawaiiNewsNow.com and sister station website KFVE.com. Hawaii's ABC affiliate also pursued a story that aired on KITV News as well as the *Honolulu Star-Advertiser* (print and online).

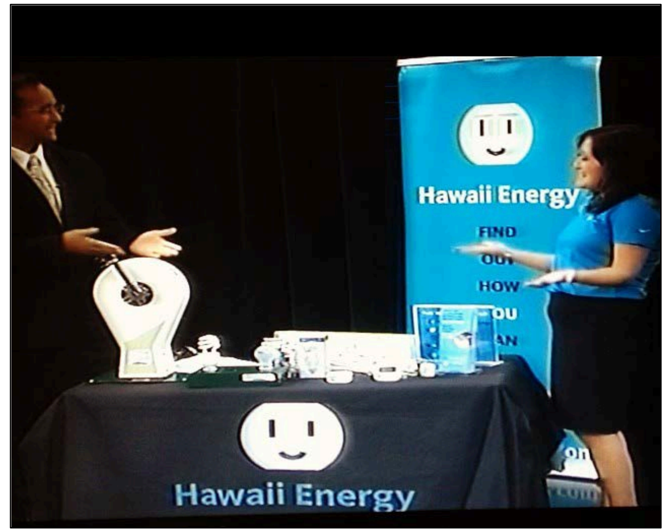
MARKETING & OUTREACH

Seasonal Stories

Hawaii Energy created additional opportunities to keep the importance of energy conservation and efficiency top-of-mind by developing seasonal stories ideas during Christmas and Earth Day.

Green Leaf Blog (*Honolulu Star-Advertiser*) pursued our story ideas about how to save energy during Christmas that included purchasing LED Christmas lights, keeping ovens and refrigerators closed and washing full loads of laundry when families visit. A similar story was also featured in Hawaiian Properties' monthly newsletter that was written for property managers at various condos around Oahu. Hawaii Energy also developed energy-saving tips geared toward families and children that appeared in *Maui Family Magazine*.

During Earth Day (April 22, 2014), Hawaii Energy was a guest on KHON's morning show "Wake Up 2Day", which featured low-cost tips to reduce energy consumption with conserve switches, smart strips and plug-in energy monitors as well as the importance of solar water heating.



Marketing Manager Maile Alsup represented Hawaii Energy on KHON2's morning show, "WakeUp2Day" to provide energy-saving tips in conjunction with Earth Day.

Energy-Saving Offers

Throughout PY13, the marketing and communications team turned each new or updated residential and business offer into an opportunity to be featured in the news. The process involved working closely with the residential and business teams to identify details of the offer, as well as its energy savings potential and cost benefits. In addition, to better prepare Hawaii Energy's call centers, the team developed frequently asked questions (FAQs) documents about these various offers.

To saturate awareness, our public relations efforts resulted in stories in various newspapers, trade publications, online news websites, blogs and radio interviews. Below is a sampling and brief description of the different offers and key media coverage.

Bounty Increase – Hawaii Energy doubled the rebate for its recycling program on Oahu to $50, giving added incentive to recycle their extra working refrigerators or freezers.

- Green Leaf Blog (*Honolulu Star-Advertiser*) – Double Rates for Rid-A-Fridge"
- *Pacific Business News* – "Hawaii Energy Doubles Rebate for Old Refrigerators"

Solar Water Heater Tune-Up – Residents had the limited-time opportunity to receive a $150 rebate for a "tune-up" or maintenance on their solar water heaters to check for wear and tear that could include leaks, corrosion or timer malfunction.

- *Honolulu Star-Advertiser* – "$150 Rebate Offered Toward Cost of Solar Water Heater Tune-Up"
- *Pacific Business News* – "This Industry's In Hot Water — That's a Good Thing"

LED Exit Signs – The Program initiated a limited-time business incentive of $40, doubling the program's standard incentive of $20, to replace old incandescent exit signs with new LED exit signs.

- Green Leaf Blog (*Honolulu Star-Advertiser*) – "Hawaii Businesses: Save Energy… Plus LED Exit Signs"
- *Hawaii News Now's Sunrise* (Morning Television Show)
- *Honolulu Star-Advertiser* – "Businesses Can Get Rebate for Converting to LED 'Exit' Signs"
- *Pacific Business News* – "Hawaii Businesses Can Turn Their Old Exit Signs Into Cash"
- *West Hawaii Today* – "Incentive Offered for Installing LED Signs"

Water Cooler Timers – The Program launched a business offering for free water cooler timers.

- *Building Management Hawaii* (Trade Publication) – "Time to Stay Cool" bylined article by Business Program Manager Keith Block
- *Honolulu Star-Advertiser* – "Free Water Cooler Timers Offered for Most Hawaii Businesses"
- *Pacific Business News* – "Hawaii Energy Offering Free Water Cooler Timers to Businesses"

Small Business Direct Install Lighting (SBDIL) – SBDIL was an existing offer that continued to be valuable for small businesses and restaurants to have Hawaii Energy-approved contractors replace old lighting with energy-efficient lighting at no cost to the customer.

- Green Leaf Blog (*Honolulu Star-Advertiser*)
- *Pacific Business News* – "Businesses Can Get Free Upgrades to Save Energy"
- *West Hawaii Today* – "Program Replaces Inefficient Lighting for Small Businesses"

Check Presentations

Hawaii Energy recognized and promoted businesses' energy-saving projects and their financial incentives received from the Program. There were a total of 11 check presentations with business ratepayers from various industries that included hotels, packaging companies and convenience stores/gas stations.

The company's executive teams and contractors that worked on the projects were invited for a photo opportunity on property. In turn, Hawaii Energy secured news coverage and photo placements in several media outlets.

MARKETING & OUTREACH

Pacific Beach Hotel received the largest hotel incentive in Hawaii Energy history – $308,145 for air conditioning system upgrades and the installation of an energy management system. They are estimated to save $280,000 per year in electricity costs.

Aloha Petroleum – The largest independent gasoline marketer and one of the biggest convenience store operators in Hawaii, received a $41,352 incentive for installing energy-efficient lighting at 17 of its gas stations on Oahu. The estimated annual savings toward electricity costs was $88,920.

- *Green Magazine* (Online Edition) – "Hawaii Energy Presents Check to Aloha Petroleum"
- *Pacific Business News* – "Aloha Petroleum Receives Incentive Check From Hawaii Energy"
- Petrolworld.com – "Aloha Petroleum Gets Incentives for Energy Efficiency"

Courtyard Marriott Waikiki Beach – The hotel received an incentive of more than $119,000 for installing an energy-efficient air conditioning system and LEDs. The hotel was projected to save approximately $190,000 a year on electricity costs.

- *Associated Press* – "Saving Energy Wins Waikiki Hotel More Than $119,000"
    - Picked up by HawaiiNewsNow.com, KFVE.com, Renewable Energy News, Seattle Post-Intelligencer
- *Hawaii News Now* (5 a.m. newscast)
- *Maui News* (Business/In Brief section)
- *Pacific Business News* – " Courtyard By Marriott Waikiki Beach Gets Money Back for Saving Energy"
- *West Hawaii Today* – "Saving Energy Wins Hotel More Than $119k"

Grand Wailea – The hotel installed new variable frequency drives and pump equipment designed to seamlessly adjust the water flow for its Wailea Canyon Activity Pool that included nine separate pools and various waterslides, white water rapids, whirlpool and the world's first "water elevator." The financial incentive was $202,048. The estimated annual cost savings toward electricity was $380,028.

- *Maui News* – "Grand Wailea Rewarded for its Energy Efficiency Efforts"
- *Maui TV News* – "Resort Receives 'Grand' Energy Incentive"

Hawaii Prince Hotel Waikiki and Golf Club – The 541-room hotel received a $150,000 incentive for upgrading its air conditioning system by replacing three old chillers with energy-efficient enhanced chillers for the entire property. The estimated annual energy savings was $288,000.

- *Green Magazine* (Online Edition) – "Hawaii Energy Presents $150,000 Incentive Check to the Hawaii Prince Hotel Waikiki and Golf Club for a New Energy-Efficient Air Conditioning System"

- *Pacific Business News* – "Hawaii Energy Gives $150,000 to Hawaii Prince Hotel Waikiki for Upgrading AC System"

Pacific Allied Products – Incentive for $91,484 to a Kapolei-based plastics manufacturing company for installing a high-speed bottle blower to inflate plastic bottles that captures and recycles excess air to help save electricity. The estimated annual energy savings was $148,000.

- *Midweek* (Print & Online Editions) – "Hawaii Energy Supports Pacific Allied Products"

Pacific Beach Hotel – Received the largest incentive check of any hotel since inception of the Hawaii Energy program at $308,145 for air conditioning system upgrades and for the installation of an energy management system. The estimated annual electricity cost savings was $280,000.

- *Hotel Business* – "Pacific Beach Hotel Earns $308K for Energy Program"
- *Pacific Business News* – "Pacific Beach Hotel Gets Largest Energy Incentive Check of Any Hawaii Hotel"

Public Relations Support of Transformational Offers

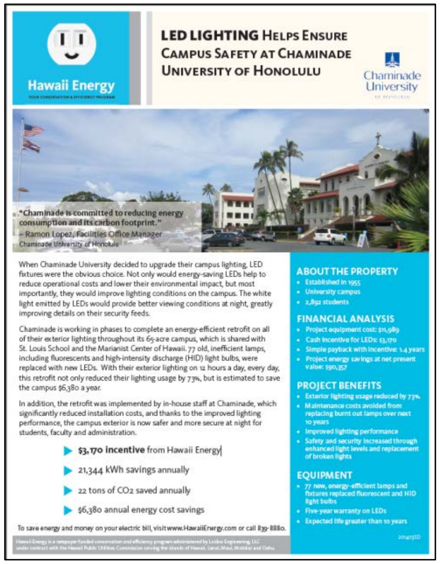
The marketing and communications team amplified awareness about a transformational offering for energy professionals called "Creating Value with Energy Efficiency Spring Workshop Series." The five-day workshop was conducted by a nationally-recognized energy efficiency expert named Mark Jewell and designed specifically for industry professionals (i.e., electrical contractors, architects, engineers) and vendors responsible for pursuing expense-reducing capital projects. Media coverage included a guest interview on Hawaii Public Radio's popular talk show "The Conversation" that aired during the morning drive-time hours. Additional media coverage included an online story in the *Pacific Business News*.

Another transformational offering that the marketing and communications team helped promote were the NEED (National Energy Education Development) Project workshops. These free workshops held on Hawaii Island, Molokai and Oahu were aimed at educating teachers about how to teach energy efficiency to Kindergarten to 12th grade students. Teachers received training, curriculum materials, energy kits (valued between $300 and $400) to use with their students and were eligible to apply for Hawaii Energy Education Grants up to $2,500 and a scholarship to attend NEED's annual National Energy Conference for Educators. In order to secure attendance, flyers were distributed through schools, social media content was developed and calendar listings were secured in *Midweek*. There was also post media coverage about one of the workshops held in Kaneohe featured in *Midweek*'s community newspaper called *Midweek Islander*.

MARKETING & OUTREACH

Case Studies

In order to show the benefits of Hawaii Energy and the incentives we offer, we began developing case studies on businesses who have successfully worked with the Program. These case studies enable us to showcase the details of their energy-saving projects and how energy efficiency has benefitted their business or organization. The case studies will be able to be used as a tool for our business specialists to provide to potential participants. Two (2) case studies were completed in PY13, which featured Chaminade University (right) and If the Shoe Fits, a small business direct install lighting participant. We will continue our case study development in PY14.



Hawaii Energy

LED LIGHTING HELPS ENSURE CAMPUS SAFETY AT CHAMINADE UNIVERSITY OF HONOLULU

Chaminade University

"Chaminade is committed to reducing energy consumption and its carbon footprint."
– Ramon Lopez, Facilities Office Manager
Chaminade University of Honolulu

When Chaminade University decided to upgrade their campus lighting, LED fixtures were the obvious choice. Not only would energy-saving LEDs help to reduce operational costs and lower their environmental impact, but most importantly, they would improve lighting conditions on the campus. The white light emitted by LEDs would provide better viewing conditions at night, greatly improving details on their security feeds.

Chaminade is working in phases to complete an energy-efficient retrofit on all of their exterior lighting throughout its 65-acre campus, which is shared with St. Louis School and the Marianist Center of Hawaii. 77 old, inefficient lamps, including fluorescents and high-intensity discharge (HID) light bulbs, were replaced with new LEDs. With their exterior lighting on 12 hours a day, every day, this retrofit not only reduced their lighting usage by 73%, but is estimated to save the campus $6,380 a year.

In addition, the retrofit was implemented by in-house staff at Chaminade, which significantly reduced installation costs, and thanks to the improved lighting performance, the campus exterior is now safer and more secure at night for students, faculty and administration.

- **$3,170 incentive** from Hawaii Energy
- 21,344 kWh savings annually
- 22 tons of CO_2 saved annually
- $6,380 annual energy cost savings

To save energy and money on your electric bill, visit www.HawaiiEnergy.com or call 839-8880.

ABOUT THE PROPERTY
- Established in 1955
- University campus
- 2,892 students

FINANCIAL ANALYSIS
- Project equipment cost: $11,989
- Cash incentive for LEDs: $3,170
- Simple payback with incentive: 1.4 years
- Project energy savings at net present value: $90,357

PROJECT BENEFITS
- Exterior lighting usage reduced by 73%
- Maintenance costs avoided from replacing burnt out lamps over next 10 years
- Improved lighting performance
- Safety and security increased through enhanced light levels and replacement of broken lights

EQUIPMENT
- 77 new, energy-efficient lamps and fixtures replaced fluorescent and HID light bulbs
- Five-year warranty on LEDs
- Expected life greater than 10 years

Weekly Online Talk Show

Hawaii Energy continued its sponsorship of the "Hawaii: The State of Clean Energy" online talk show produced and hosted by Jay Fidell of ThinkTech Hawaii. Hawaii Energy was featured each week during a 5-minute segment called the "Negawatt Moment with Hawaii Energy." The show was streamed live on Ustream.com on Wednesdays from 4 to 5 p.m. and re-aired on community access television station *Olelo*. Links to the archived shows, which appear on several different website including YouTube and Vimeo, can be found on the ThinkTech Hawaii website.

The talk show served as a forum for Hawaii Energy's staff to bring awareness to the latest residential, business and transformational rebates and incentives as well as practical energy conservation tips. The marketing and communications team conducted media training and developed talking points to prepare staff members for each interview.

"Sharing The Aloha" workshop facilitator Helen Wai made her first appearance on the "Hawaii: The State of Clean Energy" show this year, accompanied by Hawaii Energy team members Derrick Sonoda and Ray Starling.

Outreach

For PY13, the Program continued to build on its overall goals of: (1) partnering with local businesses and nonprofit organizations to further our conservation messaging efforts; (2) increasing our presence and participation at local events and expos in order to broaden our audience reach and (3) continuing to present our Program to a variety of organizations and groups.

Event Participation and Presentations

Throughout its fifth year, Hawaii Energy built upon a strong foundation of successful outreach events and explored several opportunities to reach new audiences and introduce our expanded offerings.

The Program's goal for community outreach event participation has always been to: (1) reach a wide-array of electric ratepayers; (2) to continue involvement in past outreach events that were deemed successful and (3) to find and participate in new outreach events. Community outreach participation is defined as the Program having a booth or table at an expo, conference, tradeshow, fair or festival and distributing Program-related information and giveaways. This program year, Hawaii Energy participated in 38 community outreach events with an estimated total attendance of 117,636 people. Of these events, 79% of them were in Honolulu County, 8% in Hawaii County and 13% in Maui County.

Several new events were added in PY13 in an effort to reach a wider audience. These included the Pacific Building Trade Expo, "Science Alive!" at the Bishop Museum and the Earth Day Festival at the University of Hawaii at Manoa.

In March and April, the Program also participated in three "open house" events hosted by Hawaiian Electric Company (HECO) in Pearl City, Moanalua and Kaimuki where HECO planned to pilot smart meters. Hawaii Energy staffed informational tables to engage attendees interested in energy conservation and efficiency.

In March, Hawaii Energy and Leidos Engineering, LLC jointly supported along with other sponsors the first-ever "Electric Utilities of the Future" conference hosted by the Maui Economic Development Board. The event brought together energy experts, business leaders and policymakers from across the nation and state to discuss Hawaii's progress towards clean energy.

In addition to community outreach event participation, the Program conducted 22 presentations to a variety of organizations providing information on Hawaii Energy, residential rebates and business incentives. Of these presentations, 9% were in Hawaii County, 77% in Honolulu County and 14% in Maui County. We were able to reach approximately 1,011 people through these efforts.

Table 73
Number of Program Events and Presentations

	Counties			Grand
	Hawaii	Honolulu	Maui	Total
Community Outreach Events	3	30	5	38
Presentations	2	17	3	22

Table 74
Estimated Reach of Outreach Events & Presentations

	Counties			Grand
	Hawaii	Honolulu	Maui	Total
Community Outreach Events	700	36,586	80,350	117,636
Presentations	150	900	61	1,011

MARKETING & OUTREACH

Partnerships

Honolulu Board of Water Supply

Hawaii Energy partnered once again with the Honolulu Board of Water Supply (BWS) to sponsor their annual Water Conservation Week Poster and Poetry Contests. This year's theme, "Conserve Water: No Effort is Too Small," invited Oahu students to consider how small conservation efforts can impact the overall preservation of our water supply, especially combined with other actions. More than 1,300 posters and 200 poems were submitted to the annual contests and the winners were selected based on the accuracy of information, originality, creativity and artistic or poetic ability, based on the student's age to convey the theme. 42 Oahu students from kindergarten to 12th grade were recognized and presented with awards at a ceremony held at the City and County of Honolulu's Mission Memorial Auditorium. Hawaii Energy was also included in all public relations efforts and the calendar that will highlight all of the winners and submissions for the poster and poetry contest.

Hawaii Energy sponsored the Honolulu Board of Water Supply's Water Conservation Week Poster & Poetry Contest and attended the awards ceremony in May.

"Rid-A-Fridge to Fight Hunger" Benefitting Food banks

The Program enhanced its "Bounty" refrigerator/freezer recycling offer this year by rolling out a campaign titled "Rid-A-Fridge to Fight Hunger." Residents who participated in the Bounty offer were given the option to donate the amount of their rebate ($50 on Oahu, $65 on neighbor islands) to their local food banks – Hawaii Foodbank on Oahu, Maui Food Bank on Maui and The Food Basket on Hawaii Island. Through this collaboration with the food banks, Hawaii Energy was able to refresh excitement for the Bounty offer and raise over $3,000 collectively for all three nonprofits.

In addition to adding this option to the standard rebate form, Hawaii Energy implemented extensive PR and marketing efforts through pre-existing distribution channels (e.g., radio spots, a press release, campaign-specific collateral distributed by refrigerator recyclers, posts to social media accounts, etc.) to ensure the most cost-effective promotion. Public relations coverage included a guest interview on Hawaii's most-watched television morning show, *Sunrise*, on Hawaii News Now, and stories in *Pacific Business News*, *Maui News* and *West Hawaii Today.*

This flyer was distributed to local refrigerator recyclers, who helped encourage donations to the food banks as they picked up old refrigerators.

MARKETING & OUTREACH

"Hui Up!"

Hawaii Energy continued its efforts to strengthen the community by working with Blue Planet Foundation to help Molokai residents lower the cost of their electric bills through a refrigerator exchange program called, "Hui Up!." The program offered residents to exchange their old refrigerators for energy-efficient models for just $250, which also included free pick-up and recycling of the old refrigerator and delivery of the new one.

Blue Planet and Hawaii Energy set up an information booth in Kaunakakai, the heart of the island, to speak with residents and encourage participation in the program. In addition, Blue Planet and Hawaii Energy went door-to-door to a handful of homes to interview residents and capture video footage to provide television stations for potential media coverage.

Hui Up! helped 220 households on Molokai purchase new energy-efficient refrigerators that were estimated to each save about $500 in electricity costs annually. Hawaii Energy secured television morning appearances on KITV News and KHON News (Fox affiliate). Print media coverage included the *Molokai Dispatch* and *Pacific Business News*.

As part of the Hui Up program, Hawaii Energy staff went to Molokai to assist residents with their refrigerator exchanges and provide information about other Hawaii Energy rebates.

KEY REPORTING ASSUMPTIONS

Technical Resource Manual (TRM)

All energy efficiency and conservation programs need to estimate the average amount of energy and demand that is saved for installations of standard measures. This allows an effective program to promote these standard measures across markets with an incentive amount that is appropriate for the amount of energy and/or demand that is typically saved. Hawaii Energy maintains these energy saving estimates in the Technical Resource Manual (TRM). The following describes how the TRM was developed and the key assumptions that were used in estimating the energy (kWh) savings and demand (kW) reduction impacts claimed by the Program. Changes are made from time to time at the recommendations of the Program Evaluator. Upon the end of each program year, a formal evaluation is conducted by the Program Evaluator whereby updates are implemented for the subsequent program year.

The TRM is intended to be a flexible and living document. New measures may be added as new program designs are implemented. These measures are often not yet characterized, so new information will be gathered through evaluations or research. Savings for current measures may change as the market evolves.

There are four main reasons to update TRM values:

- New Measure Additions – As new technologies become cost-effective, they will be characterized and added to the manual. In addition, new program delivery design may result in the need for new measure characterization.

- Existing Measure Updates – Updates will be required for a number of reasons; examples include: increase in the federal standard for efficiency of a measure; new information from field tests; altered qualification criteria; decrease in measure cost; or a new evaluation that provides a better value of an assumption for a variable. As programs mature, characterizations need to be updated to meet the changes in the market.

- Retiring Existing Measures – When the economics of a measure become such that it is no longer cost-effective or the free-rider rate is so high that it is not worth supporting, the measure shall be retired.

- Third-Party Measurement and Verification (M&V) Contractor TRM Review – Annually the M&V contractor will provide a review of the current TRM and make recommendations based on current market research and in-field savings verification of measures.

Description of the TRM

The TRM provides methods, formulas and default assumptions for estimating energy and peak demand impacts for measures and projects that receive financial incentives from Hawaii Energy. It is organized by program, end use and measure. It describes how the Program estimates energy savings from each measure. The PY13 TRM represents a total of 73 measures for both residential and commercial programs and is shown as Attachment E.

KEY REPORTING ASSUMPTIONS

Overview of the TRM Derivation

In the TRM, each measure includes a description of the typical baseline (average) energy use and the high efficiency energy use for that type of technology. The energy saved is typically the differential between the two. The energy use of the baseline technology may include some estimation of market status related to various types of older, less efficient equipment. The final savings values are compared against the previous evaluation studies performed for the Hawaiian Electric Companies' programs, as described in this report.

Data assumptions are based on Hawaii specific data, when and where available. Where Hawaii data was not available, data from neighboring regions is used where available and in some cases, engineering judgment is applied. Referenced data sources, in general order of preference, but not necessarily limited to, include:

- 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 Energy Efficiency Program Design Information (e.g. Efficiency Maine, Focus on Energy, etc.)
- CEUS – The California Commercial Building End-Use Survey
- Evergreen TRM Review/Report dated 6/20/13
- Evergreen – Third Party Evaluation NTG Recommendation Memo January 2013
- ENERGY STAR® Partner Resources
- Field verification of measure performance

The savings estimates for each measure were initially drawn from the KEMA Evaluation Report for 2005 through 2007 since this report was the most recent information available on specific markets. The values in this report were built upon previous evaluation reports and in-field measurements.

Since there were many measures that used "average" field measured data and no mathematical savings derivations, the calculation approach in the TRM attempted to develop these savings calculations based on typical measure characteristics. The primary use of the KEMA report values was to guide market assumptions, especially for the baseline energy use, to more accurately estimate the typical savings.

Customer level savings are based on many variables including: measure life, market sectors, base versus enhanced case, persistence and coincidence factors. Claimed savings were compared against other sources, such as savings values used in other jurisdictions and research documentation from KEMA, the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), the National Renewable Energy Laboratory (NREL) and other organizations.

Factors Determining Program Level Savings

Application of System Loss Factors

The amount of energy saved at a customer site is not equal to the amount saved at the electric utility plant supplying the energy to that site. There are system losses in generation, transmission and distribution of energy from the power plant to the site. This results in a larger savings at the power plant than at the customer site. To account for this larger impact on the system the "system loss factor" needs to be estimated. The system loss factors were provided by HECO, MECO and HELCO. They do not vary by measure, but by island, and are listed in **Table 75**.

Table 75
System Loss Factors

County System to Customer Energy Loss Factors		
Oahu	**Maui**	**Hawaii**
11.17%	9.96%	9.00%

The system loss factors were applied to the estimated Customer Level savings for each measure to calculate the impact on the system of a particular measure. The resulting System Level savings was used to estimate the overall impact to the reduced cost of not producing the saved energy. This "avoided cost" is the overall economic benefit and used within one of the primary cost benefit measures for the Program, called a Total Resource Cost (TRC) test.

Net-to-Gross Ratio

The Net-to-Gross (NTG) Ratio is used to adjust the System Level Energy savings to determine the energy saving that is attributed to the Program, or "Program Level Savings."

Program Level Savings are those directly attributed to Hawaii Energy actions by separating out the impacts that are a result of other influences, such as consumer self-motivation or free-riders. Free-riders are ratepayers or participants who received an incentive and/or education by the Program, but the incentive and/or education did not play a role in their decision to purchase or receive the savings measure.

Table 76
Net-To-Gross Factors

Program	Description	NTG
BEEM	Business Energy Efficiency Measures	0.75
CBEEM	Custom Business Energy Efficiency Measures	0.75
BESM	Business Services and Maintenance	0.95
BHTR	Business Hard-to-Reach	0.99
REEM	Residential Energy Efficiency Measures	0.79
CESH	Custom Energy Solutions for the Home	0.65
RESM	Residential Services and Maintenance	0.92
RHTR	Residential Hard-to-Reach	1.00
Composite NTG Ratio		**0.78**

New Program Net-to-Gross Values

The Third-Party Evaluator recommendations for Net-to-Gross values were adopted for the development of the PY13 Annual Plan and were based on verified PY12 results. These values recognize the differences in Program-driven savings between the various categories of measures. The evaluation can be found at www.hawaiienergy.com/information-reports. Hawaii Energy utilizes the combined Program total NTG ratio of 78%. The values used in PY13 are provided in **Table 76**.

Development of Avoided Costs

As described above, the primary overall economic benefit for the State is the avoided cost for the energy that is saved. The total avoided cost of all the energy that is saved is called the Total Resource Benefit (TRB). To estimate the TRB for individual measures or for the total savings for the Program, the cost per MWh supplied and the system capacity cost per kW need to be estimated into the future.

Proxy Avoided Cost Developed

The avoided cost that is used for PY13 is estimated using an extrapolation of the avoided energy data provided by HECO. The energy and capacity cost data from the first few years was then extrapolated over 20 years. **Table 77** shows this extrapolation. This table was deemed a reasonable 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 TRB (Total Resource Benefit).

Table 77
Utility Avoided Cost

		Discount Rate		
		6%	Utility Avoided Cost	
Year	Measure Life	NPV Multiplier	$/kW/yr.	$/kWh/yr.
2013	1	1	353.2	0.104
2014	2	0.94	370.6	0.109
2015	3	0.89	382.5	0.112
2016	4	0.84	386.2	0.113
2017	5	0.79	387.7	0.114
2018	6	0.75	389.1	0.114
2019	7	0.7	391.9	0.115
2020	8	0.67	390.7	0.115
2021	9	0.63	394.6	0.116
2022	10	0.59	398.3	0.117
2023	11	0.56	397.4	0.117
2024	12	0.53	401.4	0.118
2025	13	0.5	405.7	0.119
2026	14	0.47	409.3	0.120
2027	15	0.44	415.9	0.122
2028	16	0.42	423.3	0.124
2029	17	0.39	428.9	0.126
2030	18	0.37	433.9	0.128
2031	19	0.35	438.9	0.13
2032	20	0.33	443.9	0.132

CONCLUSION

As we conclude this PY13 Annual Report, the Hawaii Energy team would like to thank the PUC and the people of Hawaii for the opportunity and privilege to serve as your Public Benefits Fee Administrator over the past five years. We especially appreciate the confidence you have placed in us by extending our contract for a third additional year (through 2016) and directing that we expand the range of energy services being performed under the contract. This will allow us to make an even stronger contribution to Hawaii's clean energy efforts.

We also want to thank the PUC staff, our Contract Manager, subcontractors, allies, friends and constituents for all the support you have provided to help us develop the Program to this point of evolution. The Hawaii Energy Team is proud to have this unique opportunity to work with all of you in making such important advances in Hawaii's quest for long term sustainability.

As we begin our new program year, the Hawaii Energy Team pledges to continue our best efforts to serve the people of Hawaii and accelerate Hawaii's progress towards a 100% clean energy economy.

ATTACHMENTS

Attachment A: Acronym List

A list of the commonly used Hawaii Energy acronyms

Attachment B: PY13 Program Participation List

A report of Program impacts by program and measure, including gross, net, annualized and lifecycle savings.

Attachment C: PY13 Contract Renewal Proposal (Attachment S1A from Supplemental Contract No. 5)

The Performance Incentive Mechanism from the original PBFA contract is superseded by this Renewal Proposal (submitted May 1, 2013), which covers the changes implemented in Program Year 2013.

Attachment D: PY13 Annual Plan

The Program's annual plan, which provides Leidos' strategies and plans for administration and delivery of the Hawaii Energy portfolio for PY12 (July 1, 2012 to June 30, 2013). Through this plan, Hawaii Energy set forth overall strategies to increase program participation, maximize energy savings, and encourage the development of energy efficiency materials.

Attachment E: PY13 Technical Reference Manual

The Program's reference manual, which provides methods, formulas, and default assumptions for estimating energy and peak impacts of incentivized projects and measures. The reference manual is organized by program, end use and measure.

Attachment F: PY13 Media Coverage Report

The media coverage report contains highlights of print and online media coverage, which ranged from general population publications to localized media.

Attachment G: Program Historical Summary (2009 - 2012)

A summary of the Program's implementation methods, achievements, significant events and lessons learned for each year since the Program's inception.

Attachment H: Program, Customer and System Benefits Chart

A chart comparing the Program's kWh benefits and cost effectiveness at the Program, Customer and System levels.

Hawaii Energy

ACRONYM LIST (PY2013)

Revised: Oct. 22, 2014

ACRONYM	ACRONYM EXTENSION	COMMENTS
AC	Air Conditioner	
AEE	Association of Energy Engineers	
AHU	Air Handler Unit	
AIA	American Institute of Architects	
AOAO	Associations of Apartment Owners AOAO	
ARRA	American Recovery and Reinvestment Act	
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers	
BAS	Building Automation System	
BBLS	Barrels	
BEEM	Business Energy Efficiency Measures	
BESM	Business Energy Services & Maintenance	
BHTR	Business Hard to Reach	
BOC	Building Operator Certification	
BWS	Board of Water Supply	
C&I	Commercial and Industrial	
CA	California	
CBEEM	Custom Business Energy Efficiency Measures	
CEE	Consortium for Energy Efficiency	
CEM	Certified Energy Manager	
CEM	Customer Experience Management	
CESH	Custom Energy Solutions for the Home	
CEUS	Commercial End-Use Survey	
CFL	Compact Fluorescent Lamps	
DCKV	Demand Control Kitchen Ventilation	
DEER	Database for Energy Efficient Resources	
DIRLR	Direct Install Restaurant Lighting Retrofit	
DSM	Demand Side Management	
ECM	Electrically Commutated Motor	
EE	Energy Efficiency	
EEFG	Energy Efficiency Funding Group	
EEPS	Energy Efficiency Portfolio Standard	
EMCS	Energy Management Control System	
EMIT	Energy Manager in Training	
EM&V	Evaluation Measurement & Verification	

ACRONYM	ACRONYM EXTENSION	COMMENTS
ESP	Efficiency Sales Professional	
GF	Grandfathered	
GIS	Geographic Information Systems	
GWh	Gigawatt Hour	
HCEI	Hawaii Clean Energy Initiative	
HCEOC	Hawaii County Economic Opportunity Council	
HECO	Hawaiian Electric Company	
HELCO	Hawaii Electric Light Company	
HEWH	High Efficiency Water Heating	
HID	High Intensity Discharge	
HVAC	Heating Ventilation and Air Conditioning	
IECC	International Energy Conservation Code	
IFMA	International Facility Management Association	
IRR	Individual Rate of Return	
IT	Information Technology	
KIUC	Kauai Island Utilities Cooperative	
kW	Kilowatt	
kWh	Kilowatt Hour	
LED	Light Emitting Diode	
M	Million	
MECO	Maui Electric Company	
MEDB	Maui Economic Development Board	
MEO	Maui Economic Opportunity	
MM	Master Metered	
MMBTU	One Million British Thermal Unit	
MWh	Megawatt Hour	
NEED	National Energy Education Development Project	
NPV	Net Present Value	
NREL	National Renewable Energy Laboratory	
NTG	Net-to-gross	
O&M	Operations and Management	
OBF	On-Bill Financing	
OHA	Office of Hawaiian Affairs	
PBF	Public Benefits Fee	
PBFA	Public Benefits Fee Administrator	
PI	Performance Incentive	
POP	Point of Purchase	
PUC	Public Utilities Commission	
PV	Photovoltaic (PV)	
REEM	Residential Energy Efficiency Measures	
RESM	Residential Energy Services & Maintenance	
RFP	Request For Proposal	

ACRONYM	ACRONYM EXTENSION	COMMENTS
RHTR	Residential Hard to Reach	
RISE	Rewarding Internships for Sustainable Employment	
SAIC	Science Applications International Corporation	
SBDIL	Small Business Direct Install Lighting	
SEE	Sell Efficiency Effectively	
SEER	Seasonal Energy Efficiency Ratio	
SLIM	Sustainable Living Institute of Maui	
SSC	Smart Sustainability Consulting	
SWH	Solar Water Heating	
TAB	Teacher Advisory Board	
TAG	Technical Advisory Group	
TRB	Total Resource Benefit	
TRC	Total Resource Cost Ratio	
TRM	Technical Reference Manual	
UPS	Uninterruptible Power Supply	
UH	University of Hawaii at Manoa	
USGBC	United States Green Building Council	
VFD	Variable Frequency Drive	
VRF	Variable Refrigerant Flow	
YR	Year	

Attachment B

PY13 Program Participation List												
Program / Measure	**Units**	**Customer Level Demand (kW)**	**Customer Level Energy (kWh)**	**Program Level Demand (kW)**	**Program Level Energy (kWh)**	**Average Useful Life (Years)**	**Lifetime Resource Acquisition Cost ($/kWh-Life)**	**Program TRB**	**TRC**	**Average Customer Level kW/Unit**	**Average Customer Level kWh/Unit**
BEEM	**118,085**	**4,650**	**32,384,625**	**3,868**	**26,941,496**	**14.2**	**$0.013**	**$43,581,303**	**$41,347,861**	**0.039**	**274.2**
High Efficiency - Air Conditioner	1,128	921	6,566,991	765	5,452,278	17.7	$0.018	$10,271,469	$21,648,064	0.816	5,821.8
LED	59,280	1,066	7,669,901	885	6,368,728	14.5	$0.008	$10,361,697	$2,802,947	0.018	129.4
T8 Low Wattage	31,874	779	6,065,244	648	5,048,114	14.0	$0.009	$7,919,568	$1,906,768	0.024	190.3
Delamping	9,654	469	3,331,170	390	2,770,696	14.0	$0.004	$4,464,301	$172,464	0.049	345.1
ECM	4,823	160	1,424,531	133	1,185,854	15.0	$0.023	$1,872,414	$4,483,733	0.033	295.4
VFD Applications	238	483	1,621,197	401	1,348,373	11.9	$0.009	$2,635,039	$1,567,445	2.028	6,811.8
Submetering	2,364	210	1,637,607	181	1,407,274	8.0	$0.031	$1,446,849	$1,140,823	0.089	692.7
Demand Control Ventilation	39	108	629,287	89	518,299	15.0	$0.027	$935,627	$926,962	2.758	16,135.6
Refrigerator	894	27	623,053	23	516,468	14.0	$0.014	$647,691	$659,197	0.031	696.9
Water Pumping	13	49	460,565	41	383,440	15.0	$0.009	$597,193	$581,191	3.774	35,428.0
Heat Pump Water Heaters	35	22	696,575	18	569,462	10.0	$0.013	$537,132	$2,437,864	0.633	19,902.1
Window Film	48	155	584,600	128	480,719	10.0	$0.023	$773,548	$594,459	3.231	12,179.2
Water Heating - Solar Water Heater	5	79	147,657	65	122,256	15.0	$0.017	$389,182	$117,973	15.703	29,531.4
Room Occupancy Sensors	3,209	20	264,482	17	220,407	7.9	$0.037	$194,890	$234,479	0.006	82.4
Commercial Lighting	2,755	41	334,959	34	277,285	6.1	$0.016	$203,131	$119,856	0.015	121.6
Water Cooler Timer	1,221	13	146,003	11	121,733	5.0	$0.020	$74,178	$11,955	0.011	119.6
Cool Roof Technologies	6	27	68,530	23	56,854	10.0	$0.096	$117,336	$1,660,783	4.569	11,421.6
Clothes Washer	246	7	50,676	6	42,171	12.0	$0.024	$60,152	$192,044	0.028	206.0
Motors	19	9	14,732	7	12,283	15.0	$0.017	$43,234	$41,635	0.473	775.4
Ceiling Fan	229	4	38,243	4	31,611	5.0	$0.052	$20,619	$41,101	0.019	167.0
Pool Pump	2	0	5,615	0	4,682	15.0	$0.016	$6,804	$3,374	0.225	2,807.5
Whole House Fans	3	2	3,009	1	2,509	20.0	$0.004	$9,249	$2,744	0.500	1,003.0
CBEEM	**310**	**3,368**	**27,113,732**	**2,799**	**22,539,657**	**15.0**	**$0.012**	**$34,914,212**	**$23,355,756**	**10.866**	**87,463.7**
Commercial Lighting	69	801	7,401,181	667	6,166,759	13.8	$0.013	$8,773,304	$6,255,342	11.611	107,263.5
LED	162	963	6,404,787	799	5,310,645	12.7	$0.013	$7,876,251	$5,350,980	5.945	39,535.7
High Performance Windows	7	262	2,042,817	218	1,700,722	30.0	$0.006	$3,797,188	$1,392,080	37.471	291,831.0
Custom	8	361	3,643,242	299	3,029,047	15.2	$0.014	$4,668,813	$4,329,256	45.150	455,405.3
Demand Control Ventilation	13	249	2,011,669	208	1,676,203	13.2	$0.012	$2,475,357	$837,022	19.162	154,743.8
VFD Applications	10	210	1,894,140	173	1,565,488	14.1	$0.013	$2,366,706	$1,079,250	20.970	189,414.0
EMS	14	180	1,653,368	150	1,377,609	13.9	$0.013	$2,059,556	$1,536,244	12.849	118,097.7

Program / Measure	Units	Customer Level Demand (kW)	Customer Level Energy (kWh)	Program Level Demand (kW)	Program Level Energy (kWh)	Average Useful Life (Years)	Lifetime Resource Acquisition Cost ($/kWh-Life)	Program TRB	TRC	Average Customer Level kW/Unit	Average Customer Level kWh/Unit
CBEEM (continued)	**310**	**3,368**	**27,113,732**	**2,799**	**22,539,657**	**15.0**	**$0.012**	**$34,914,212**	**$23,355,756**	**10.866**	**87,463.7**
Motors	5	117	598,088	97	496,211	18.2	$0.010	$1,066,344	$779,030	23.380	119,617.6
Data Center Technologies	1	47	413,910	39	345,108	12.0	$0.013	$467,236	$228,000	47.300	413,910.0
High Efficiency - Air Conditioner	2	31	158,196	26	131,718	15.6	$0.019	$256,456	$241,000	15.450	79,098.0
Lighting Controls	5	29	256,417	24	213,421	9.6	$0.018	$225,525	$197,732	5.864	51,283.4
Refrigeration	4	3	170,663	3	142,201	14.3	$0.011	$166,524	$123,805	0.775	42,665.8
Custom - Compressor	2	0	96,142	0	80,161	25.0	$0.007	$124,594	$336,741	0.000	48,071.0
Water Heating - Heat Recovery	1	76	187,674	63	154,775	10.0	$0.021	$311,607	$89,924	76.400	187,674.0
Water Heating - Solar Water Heater	3	13	69,561	11	57,885	17.6	$0.031	$123,649	$361,965	4.427	23,187.0
Custom - Energy Star TV Monitor	1	9	42,610	7	34,580	15.0	$0.012	$67,999	$148,363	9.100	42,610.0
Custom - VFD Air Compressor	1	7	37,858	6	31,221	10.0	$0.017	$43,854	$50,284	7.330	37,858.0
Custom Lighting	1	2	14,489	2	11,949	12.0	$0.014	$17,243	$8,838	2.480	14,489.0
Water Heating - Heat Pump	1	6	16,920	5	13,954	10.0	$0.020	$26,006	$9,900	6.000	16,920.0
BESM	**16,878**	**273**	**3,670,914**	**287**	**3,872,686**	**14.9**	**$0.028**	**$5,549,055**	**$2,180,652**	**0.016**	**217.5**
T8 Low Wattage	10,772	86	1,782,497	90	1,883,538	14.0	$0.036	$2,388,857	$939,159	0.008	165.5
EMS	3	112	687,013	119	725,565	20.0	$0.009	$1,547,731	$617,461	37.433	229,004.3
LED	4,900	70	754,657	74	793,062	14.0	$0.021	$1,135,910	$228,208	0.014	154.0
Central Plant Optimization	1	0	224,718	0	237,328	10.0	$0.009	$202,322	$21,508	0.000	224,718.0
Custom Lighting	196	0	121,453	0	127,993	14.0	$0.017	$139,802	$30,766	0.000	619.7
Commercial Lighting	925	4	62,894	4	65,876	14.0	$0.032	$87,168	$29,397	0.004	68.0
Water Heating - Solar Water Heater	1	0	27,820	0	29,061	15.0	$0.006	$33,272	$41,305	0.000	27,820.0
CFL	61	1	9,861	1	10,264	14.0	$0.007	$13,993	$991	0.012	161.7
High Efficiency - Air Conditioner	1	0	0	0	0	0.0	$0.000	$0	$25,000	0.000	0.0
Benchmark Metering	1	0	0	0	0	0.0	$0.000	$0	$101,061	0.000	0.0
Energy Study	17	0	0	0	0	0.0	$0.000	$0	$145,796	0.000	0.0
SBDIL	0	0	0	0	0	0.0	$0.000	$0	$0	0.000	0.0
BHTR	**11,371**	**312**	**2,204,837**	**340**	**2,412,099**	**14.0**	**$0.021**	**$3,881,091**	**$701,956**	**0.027**	**193.9**
T8 Low Wattage	5,186	144	1,104,598	157	1,211,073	14.0	$0.025	$1,899,123	$432,165	0.028	213.0
LED	5,311	150	906,506	163	990,878	14.0	$0.018	$1,680,411	$242,922	0.028	170.7
Custom Lighting	283	8	113,971	9	124,565	14.0	$0.009	$169,066	$14,940	0.029	402.7
Commercial Lighting	582	10	79,762	11	85,583	14.0	$0.006	$132,491	$7,393	0.017	137.0
SBDIL	0	0	0	0	0	0.0	$0.000	$0	$0	0.000	0.0
Refrigerator	9	0	0	0	0	0.0	$0.000	$0	$4,536	0.000	0.0

Program / Measure	Units	Customer Level Demand (kW)	Customer Level Energy (kWh)	Program Level Demand (kW)	Program Level Energy (kWh)	Average Useful Life (Years)	Lifetime Resource Acquisition Cost ($/kWh-Life)	Program TRB	TRC	Average Customer Level kW/Unit	Average Customer Level kWh/Unit
REEM	**2,979,267**	**10,826**	**76,979,115**	**9,463**	**67,307,632**	**7.4**	**$0.016**	**$64,087,162**	**$41,289,807**	**0.004**	**25.8**
CFL	1,498,509	7,493	54,395,877	6,555	47,590,167	6.0	$0.006	$38,437,950	$1,498,509	0.005	36.3
LED	287,647	863	4,774,940	753	4,167,833	15.0	$0.025	$7,656,090	$11,505,880	0.003	16.6
Refrigerator	6,373	199	4,751,378	174	4,156,401	14.0	$0.012	$5,180,489	$6,866,742	0.031	745.5
Water Heating - Solar Water Heater	2,894	975	4,476,094	851	3,920,242	14.5	$0.038	$7,566,410	$13,435,905	0.337	1,546.7
Clothes Washer	4,096	115	843,776	100	738,087	12.0	$0.023	$1,052,510	$3,124,137	0.028	206.0
Whole House Fans	396	198	397,188	173	348,021	19.8	$0.004	$1,254,297	$420,193	0.500	1,003.0
Peer Group Comparison	1,174,452	632	5,534,682	551	4,819,509	1.0	$0.260	$694,074	$1,254,271	0.001	4.7
High Efficiency - Air Conditioner	591	164	355,542	143	311,276	14.9	$0.025	$897,925	$1,052,395	0.277	601.6
Heat Pump Water Heaters	261	55	392,283	48	342,559	10.0	$0.015	$428,767	$304,224	0.210	1,503.0
Solar Thermal Water Heating	117	54	241,605	45	202,332	15.0	$0.038	$408,653	$778,722	0.460	2,065.0
Ceiling Fan	3,313	63	553,772	55	482,440	5.0	$0.049	$315,086	$547,389	0.019	167.2
VFD Applications	258	12	154,026	10	134,637	10.0	$0.029	$142,877	$326,984	0.045	597.0
Solar Attic Fans	192	4	103,680	3	90,392	5.0	$0.021	$47,920	$166,314	0.020	540.0
Room Occupancy Sensors	166	1	3,453	1	3,016	8.0	$0.055	$3,754	$8,300	0.005	20.8
Metering	2	0	820	0	720	4.0	$0.052	$360	$342	0.007	410.0
Customized Project Measures	0	0	0	0	0	0.0	$0.000	$0	$-500	0.000	0.0
CESH	**3**	**9**	**13,452**	**7**	**9,531**	**15.0**	**$0.019**	**$35,988**	**$14,341**	**3.067**	**4,484.0**
LED	3	9	13,452	7	9,531	15.0	$0.019	$35,988	$14,341	3.067	4,484.0
RESM	**925**	**0**	**3,676,004**	**0**	**3,758,500**	**14.5**	**$0.010**	**$4,217,883**	**$4,866,600**	**0.000**	**3,974.1**
Efficiency Inside Home Design	925	0	3,676,004	0	3,758,500	14.5	$0.010	$4,217,883	$4,866,600	0.000	3,974.1
RHTR	**363**	**27**	**189,581**	**23**	**166,211**	**14.6**	**$0.204**	**$276,077**	**$541,443**	**0.075**	**522.3**
Water Heating - Solar Water Heater	52	24	107,381	20	91,418	15.0	$0.300	$183,026	$410,645	0.460	2,065.0
Refrigerator	311	3	82,200	3	74,793	14.0	$0.077	$93,051	$130,798	0.011	264.3

Program / Measure	Units	Customer Level Demand (kW)	Customer Level Energy (kWh)	Program Level Demand (kW)	Program Level Energy (kWh)	Average Useful Life (Years)	Lifetime Resource Acquisition Cost ($/kWh-Life)	Program TRB	TRC	Average Customer Level kW/Unit	Average Customer Level kWh/Unit
BEEM	118,085	4,650	32,384,625	3,868	26,941,496	14.2	$0.013	$43,581,303	$41,347,861	0.039	274.2
CBEEM	310	3,368	27,113,732	2,799	22,539,657	15.0	$0.012	$34,914,212	$23,355,756	10.866	87,463.7
BESM	16,878	273	3,670,914	287	3,872,686	14.9	$0.028	$5,549,055	$2,180,652	0.016	217.5
BHTR	11,371	312	2,204,837	340	2,412,099	14.0	$0.021	$3,881,091	$701,956	0.027	193.9

REEM	2,979,267	10,826	76,979,115	9,463	67,307,632	7.4	$0.016	$64,087,162	$41,289,807	0.004	25.8
CESH	3	9	13,452	7	9,531	15.0	$0.019	$35,988	$14,341	3.067	4,484.0
RESM	925	0	3,676,004	0	3,758,500	14.5	$0.010	$4,217,883	$4,866,600	0.000	3,974.1
RHTR	363	27	189,581	23	166,211	14.6	$0.204	$276,077	$541,443	0.075	522.3
Grand Total	**3,127,202**	**19,466**	**146,232,261**	**16,787**	**127,007,811**	**10.8**	**$0.015**	**$156,542,771**	**$114,298,416**	**0.006**	**46.8**

Hawaii Energy
Conservation and Efficiency Program
Hawaii Public Benefits Fee Administrator

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James Flanagan Associates (JFA)
C/O Hawaii Public Utilities Commission
465 South King Street, #103
Honolulu, Hawaii 96813

May 1, 2013

RE: Proposal for Supplemental Contract Terms Modifying the March 3, 2009 Hawaii Energy Efficiency Program Contract for the Period July 1, 2013 – June 30, 2014 ("Renewal Proposal")

On behalf of **Science Applications International Corporation, R.W. Beck and SAIC Energy, Environment, and Infrastructure, LLC** ("SAIC" or "Contractor"), and in response to the February 28, 2013 PBFA Contract Renewal Guidelines for Year 5 (PY2013) from James Flanagan Associates regarding guidelines for the Renewal Proposal ("Renewal Guidelines") at Appendix A, we are pleased to present SAIC's Renewal Proposal for modification of certain terms of the March 3, 2009 Hawaii Energy Efficiency Program Contract ("Program Contract") that will cover the period July 1, 2013 – June 30, 2014 ("Contract Renewal" or "Supplemental Contract"):

1. PY2013 PROPOSAL EXECUTIVE SUMMARY

Pursuant to a competitive bidding process, the Hawaii Energy Efficiency Program Contract was signed by the State of Hawaii and SAIC on March 3, 2009 ("Program Contract" or "Contract"). Under this Program Contract, SAIC assumed the new statutory role of Public Benefits Fee Administrator ("PBFA") for the state under the direct supervision and control of the Hawaii Public Utility Commission ("PUC" or "Commission") and the Contract Manager, James Flanagan Associates ("JFA"). The term of the Program Contract runs until December 31, 2013, with the possibility of a no-bid 3-year extension thereafter at the discretion of the Commission.

In its capacity as PBFA, SAIC also took over operations of the utility energy efficiency and demand-side management (DSM) programs operated by the Hawaiian Electric Companies on the islands of Oahu, Molokai, Lanai, Maui and Hawaii. Under SAIC as PBFA, the efficiency and DSM programs are now operated as *Hawaii Energy Conservation and Efficiency Programs* ("Hawaii Energy" or "Program").

The original Program Contract provided an operating budget and performance incentive goals for the first two program years running from July 1, 2009 to June 30, 2010 (PY2009) and from July 1, 2010 to June 30, 2011 (PY2010). However, the Contract left open to later negotiation the budgets and performance incentive goals for the remaining years under the Contract, as well as other related Contract terms as needed. This Renewal Proposal is intended to add to and/or modify the budget, performance incentive goals and other related Contract terms as needed for PY2013. The detailed Annual Plan for PY2013 which is derived from parameters established in this Renewal Proposal will be published not later than June 1, 2013 after approval by the PUC.

This Renewal Proposal does not include the budget or terms of an additional Scope of Work for development and administration of an On-Bill Financing (OBF) Program that will be added separately to the Program Contract.

2. SUMMARY BUDGET AND BUDGET BREAKOUT NUMBERS

Table 1 below shows a summary of the Program Budget and budget breakout numbers for PY2013 that result from the assumptions made in this Renewal Proposal. The detailed Program Budget and Impacts for July 1, 2013 – June 30, 2014 will be included in the Annual Plan for PY2013.

Table 1: Summary Budget

Hawaii Energy

Hawaii Energy - PY2013 ANNUAL PLAN
SUMMARY PROPOSED PROGRAM BUDGETS

PROGRAM BUDGET GUIDELINES

PBFA Contract Renewal Guidelines for Year 5

Program Year	2013
Period of Performance	7/1/13 to 6/30/14
PBFA Budget Allocation	$ 33,616,031.00

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
General Adminstrative and IT Costs	$ 2,190,479	6.5%	94%
Performance Award in Excess of Target*	$ 133,000	0.4%	6%
Total PBFA Administrative Costs	$ 2,323,479	6.9%	100%

Budget Item / Category		Total	Allocation Targets: Direct Incentives	Direct Implementation
		100%	70.0%	30.0%
Residential Program Cost Split	45%	$ 14,081,648	$ 9,857,154	$ 4,224,494
Business Program Cost Split	55%	$ 17,210,904	$ 12,047,633	$ 5,163,271
Total Direct Program Costs	100%	$ 31,292,552	$ 21,904,787	$ 9,387,765

Budget Item / Category		Direct Incentives	Res + Bus Incentives
Residential Direct Incentives	40.5%	$ 8,871,439	90%
Business Direct Incentives	49.5%	$ 10,842,869	$ 19,714,308
Transformational Incentives	10.0%	$ 2,190,479	
Total Program Direct Incentives	100.0%	$ 21,904,787	

Proposed Incentives and Operations Breakouts

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
Residential Incentives	$ 8,871,439.00	26%	40.5%
Business Incentives	$ 10,842,869.00	32%	49.5%
Transformation Incentives	$ 2,190,479.00	7%	10.0%
Total Incentives	$ 21,904,787.00	65%	100.0%
Administration / IT	$ 2,190,479.00	7%	19%
Direct Program Implementation Costs	$ 9,387,765.00	28%	81%
Total Operations	$ 11,578,244.00	34%	100%
Total Incentives	$ 21,904,787.00	65%	65%
Total Operations	$ 11,578,244.00	34%	34%
Total Award in Excess of Target*	$ 133,000.00	0%	0%
Total Budget	$ 33,616,031.00	100%	100%

* = This Incentive Award budget amount is not earned until performance is achieved.

These highlighted figures are key program metric percentages

3. SUMMARY IMPACT RESULTS EXPECTED FROM THIS RENEWAL PROPOSAL

Table 2 below shows a summary of savings impacts for PY2013 based on the proposed budget presented in Table 1. The detailed Program Budget and Impacts for July 1, 2013 – June 30, 2014 will be included in the Annual Plan for PY2013 to be published NLT June 1, 2013.

Table 2: Cost Effectiveness and Benefit Targets

Hawaii Energy - PY2013 ANNUAL PLAN
PROGRAM COST EFFECTIVENESS AND BENEFIT TARGETS

PROGRAM GUIDELINES (PROPOSED)

PBFA Contract Renewal Guidelines for Year 5 (PROPOSED)

Total Program Direct Incentives	$	19,714,308	
First Year Energy Reduction		141,616,143	kWh - Program Level
Peak Demand Reduction		17,821	kW on Peak 5 to 9 p.m. Weekdays
Total Resource Benefit	$	177,013,974	NPV of Utility Cost Avoidance Attributed to the PBFA

Derived Top Down Cost Effectiveness Metrics

Total Program Direct Incentives	$	19,714,308	
First Year Energy Reduction	÷	141,616,143	
Measure Cost Effectiveness - First Year	$	0.139	per kWh - Program Level
First Year Energy Reduction		141,616,143	
Average Measure Life	x	7.7	years (Derived from TRB using Target Guideline Values)
Lifetime Energy Savings		1,086,195,817	kWh - Program Level
Total Program Direct Incentives	$	19,714,308	
Lifetime Energy Savings	÷	1,086,195,817	
Measure Cost - Lifetime	$	0.018	per kWh - Program Level
Total Program Direct Incentives	$	19,714,308	
Avg. Incentive % of Incremental Cost	÷	25%	
TRC - Total Resource Cost	$	78,857,232	
TRB - Total Resource Benefit	$	177,013,974	
TRC - Total Resource Cost	÷ $	78,857,232	
Cost Effectiveness - TRB/TRC		2.2	
First Year Energy Reduction		141,616,143	kWh - Program Level
Estimated Average Net-to-Gross	÷	0.78	
First Year Energy Reduction		181,559,158	kWh First Year - System Level
First Year Energy Reduction		181,559,158	kWh First Year - System Level
County Generation and T&D Losses	÷	110.7%	
First Year Energy Reduction		163,951,904	kWh First Year - Customer Level
HCEI 2030 Energy Reduction Goal	÷	4,300,000,000	kWh/year
% Achievement towards HCEI 2030 Goal		3.8%	
		163,951,904	
Average Energy Cost	x $	0.36	per kWh
Participant Customer Energy Cost Savings	$	59,022,685	per year
Average Measure Life	x	7.7	
Participant Customer Energy Cost Savings	$	452,703,996	over lifetime of Equipment Investment

County Distribution Targets

PBFA Contribution by County for PY2012

Hawaii	Maui	Honolulu	Total
12.6%	13.0%	74.4%	100%

Program Level Targets by County

Hawaii	Maui	Honolulu	Total	
$ 2,484,003	$ 2,562,860	$ 14,667,445	$ 19,714,308	Incentives
12,745,453	14,161,614	114,709,076	141,616,143	kWh First Year - PL
$ 0.195	$ 0.181	$ 0.128	$ 0.139	Cost per kWh

Target Savings Contribution by County

Hawaii	Maui	Honolulu	Total
9.0%	10.0%	81.0%	100%

County Generation and T&D Losses

Hawaii	Maui	Honolulu	Average
9.0%	10.0%	11.2%	10.7%

New Net-to-Gross Factors

Program		Net-to-Gross
BEEM	Business Energy Efficiency Measures	0.75
CBEEM	Custom Business Energy Efficiency Measures	0.75
BESM	Business Services and Maintenance	0.95
BHTR	Business Hard to Reach	0.99
REEM	Residential Energy Efficiency Measures	0.79
CESH	Custom Energy Solutions for the Home	0.65
RESM	Residential Services and Maintenance	0.92
RHTR	Residential Hard to Reach	1.00
Effective Program Total Based on PY11 Portfolio Performance		0.78

4. PROPOSED PY2013 PERFORMANCE GOALS

The chart below shows **SAIC's Proposed Performance Goals** for PY2013 using the assumptions as referenced in this Renewal Proposal.

PY2013 Proposed Performance Goals								
				Performance Goals				
Performance Target Item		*Minimum*		*Target*		*Maximum*		
		75%		*100%*		110%		
First Year Energy Reduction		106,212,107		141,616,143		155,777,757	kWh	
Peak Demand Reduction		13,366		17,821		19,603	kW	
Total Resource Benefit	$	132,760,481	$	177,013,974	$	194,715,371	$	
Transformation		*Minimum*		*Target*				
Infrastructure Development		*Participation*		*Participation*				
Behavior Modification		13,500		18,000				
Professional Development		750		1,000				
Technical "Know How"		1,500		2,000				
Island Incentive Equity		*Minimum*		*Target*		*Maximum*		*Contribution*
		80%		100%				
County of Hawaii	$	1,987,202	$	2,484,003		n/a		12.6%
C&C Honolulu	$	11,733,956	$	14,667,445		n/a		74.4%
County of Maui	$	2,050,288	$	2,562,860		n/a		13.0%
Total			$	19,714,308				100.0%

5. PROPOSED PY2013 PERFORMANCE INCENTIVES

The chart below shows **SAIC's Proposed Performance Incentives** for PY2013 using the revised assumptions as referenced in this Renewal Proposal in conjunction with a continuation of the $700,000 per year payment holdback for performance incentives as provided for in the original 2009 Program Contract.

PY2013 Performance Incentives				
		Program Incentive Award		
Performance Target Item	***% of Target***	***Minimum***	***Target***	***Maximum***
		75%	*100%*	123.8%
First Year Energy Reduction	35%	$ 183,750	$ 245,000	$ 303,188
Peak Demand Reduction	5%	$ 26,250	$ 35,000	$ 43,313
Total Resource Benefit	40%	$ 210,000	$ 280,000	$ 346,500
Infrastructure development	10%	n/a	$ 70,000	$ 70,000
Island Incentive Equity	10%	n/a	$ 70,000	$ 70,000
Total			$ 700,000	$ 833,000
Potential Award for Performance in Excess of Targets				$ 133,000

PY2013 Transformational Program Goals/Incentives	Minimum Participation	Minimum Award	Target Participation	Target Award
Behavior Modification	13,500	$17,500	18,000	$23,334
Professional Development	750	$17,500	1,000	$23,333
Technical "Know How"	1,500	$17,500	2,000	$23,333
			Target Award	**$70,000**

6. SIGNIFICANT INCREASE IN TARGETED COST EFFECTIVENESS

As presented in Table 3 below, the PY2013 Renewal Guidelines present a significant increase in the targeted demand (+31%) and energy values (+54%) between PY12 and PY13 Targets. The Renewal Guidelines were formulated based on evaluated performance of PY2011. This program year exceeded expectations and came in under budget for numerous reasons as described in the following section. These circumstances are highly unlikely to be met again for PY2013, however, the target goals as proposed in Table 2 exceed goals for PY2011 and PY2012 by 23% and 18% respectively.

Table 3: Renewal Guidelines Relative to Past Performance

Program Year	Total Budget	Transformational Budget	Incentive Budget	Demand	Total Cost per kW	First Year Energy	First Year Total Cost per kWh
PY11 Target	$ 32,271,390	$ 2,194,455	$ 19,974,424	16,401	$ 1,968	108,500,425	$ 0.297
PY12 Target	$ 34,960,672	$ 2,377,326	$ 21,637,050	17,916	$ 1,951	115,588,084	$ 0.302
PY13 Target	$ 33,616,031	$ 2,190,479	$ 19,714,308	23,604	$ 1,424	178,403,201	$ 0.188
PY13 vs. PY12	-3.8%	-7.9%	-8.9%	31.7%	-27.0%	54.3%	-37.7%

	Average Measure Life	Lifetime Energy	Lifetime Total Cost per kWh
PY11 Target	8.0	868,003,400	$ 0.037
PY12 Target	8.0	924,704,672	$ 0.038
PY13 Target	7.7	1,373,704,648	$ 0.024
PY13 vs. PY12	-3.8%	48.6%	-35.3%

Program Year	Actual / Proposed Expenditures	CFL Count	CFL Energy Contribution	Actual Demand	Total Cost per kW	First Year Energy	First Year Total Cost per kWh
PY11 Actual	$ 25,741,826	1,923,077	66,683,669	17,260	$ 1,491	128,785,968	$ 0.200
PY13 Proposed	$ 33,616,031	1,516,100	50,913,130	17,821	$ 1,886	141,616,143	$ 0.237
PY13 vs. PY11	30.6%	-21.2%	-23.6%	3.3%		10.0%	18.8%

	Average Measure Life	Lifetime Energy	Lifetime Total Cost per kWh
PY11 Actual	8.5	1,094,680,728	$ 0.024
PY13 Proposed	8.0	1,132,929,144	$ 0.030
PY13 vs. PY11	-5.9%	3.5%	26.2%

Lifetime Total Program Cost PY11 Same as Target for PY12

7. UNUSUALLY HIGH PY2011 PERFORMANCE

There are a few items that cause the PY11 actual performance values not to be transferable to PY13. These actions/measures are:

- ***PY13 Significant Reduction in Program Reliance on CFLs***
  - 53% in PY11 to 39% of Program kWh in PY13
  - 1,923,077 lamps to 1,516,100 lamps

- ***Small Business Direct Installation Program that did not exist in PY11***
  - This program is large >$1.5M in PY13 and was over $2M in PY12.
  - The cost per kWh is running at $0.75 per kWh.

- ***Lower potential for CO Garage Projects that drove cost effective and multi-million kWh/year savings in PY11.***
  - PY12 reduced the incentive levels and capped the payment to 85% of project cost and stalled participation.
  - This level of opportunity is no longer as cost effectively available as the big hitters were captured in the first two years of the measure offer.

- ***Implementation of central plant metering and direct program site review and analysis assistance to targeted project development of large savings opportunities***
  - Central Plant Benchmarking of SWAC Office Buildings and Kona Coast Hotels to get kW/ton metering and commissioning/capital project justification based on the data.
  - Water and Wastewater program to provide metering for pump optimization, time-of-use, and demand response opportunities.

- ***Reduced Reliance on CFLs*** – It is recognized that CFLs are "mainstream" and that the program has steadily moved away from a reliance on this "one-trick" pony. The market still responds to low-cost subsidized CFLs, and there was concern last year that the rare-earth phosphor pricing was going to drive CFL prices up last year. This did not happen to the extent predicted and the CFL sales remained steady though at a lower level than PY11 which was a high year with a large push for the technology as well as grants that provide lamps for free for hard-to-reach customers.
  - PY13 proposed measure mix reduces the CFL contribution from 53% of first year energy to 39%. This is a 21% reduction from 1,841,842 lamps in PY11 to a total of 1,516,100 lamps in PY13 with a 9% increase in per kWh cost effectiveness.
  - The Program will maintain current level of reliance on CFLs in order to come close to the achieving aggressive savings targets.
  - Hawaii Energy will continue to closely work with the retailers and manufacturers to drive the incentive levels to the minimum required to maintain the conversion rates as the prices of the technology and education measures drive demand for the lamps. The preliminary results of the end-use survey work have identified many "sockets" still occupied by incandescent lights demonstrating the need to continue the education and support to achieve deeper penetration of the technology as LEDs come to the market and become the cost-effective technology.

8. PROPOSAL TECHNICAL DETAILS

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The targeted average measure life of 7.7 years is required to meet the assigned energy, demand and TRB goals. In reality the program is populated with measure lives that are bifurcated by the "Average" life with CFLs at 5 year lives and contributing tremendous savings, while longer life 14-20 year T8, Solar and AC projects provide long-lasting though smaller overall savings to the program at far higher acquisition costs.

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New Net-to-Gross Factors		
Program		**Net-to-Gross**
BEEM	Business Energy Efficiency Measures	0.75
CBEEM	Custom Business Energy Efficiency Measures	0.75
BESM	Business Services and Maintenance	0.95
BHTR	Business Hard to Reach	0.99
REEM	Residential Energy Efficiency Measures	0.79
CESH	Custom Energy Solutions for the Home	0.65
RESM	Residential Services and Maintenance	0.92
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iii) *Large Committed Projects* – There are several committed large business projects that were driven with the higher incentives and committed in PY12 that need to be accommodated in the PY13 budget. These projects drive the target cost-effectiveness required for the remainder of the business and residential measures to attempt to achieve the targeted energy savings goals.

The projects of significant note adding up to 40% of the PY13 budget plan are:

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% of Business Totals	40%	30%		35%	
Cost per kWh		$ 0.197		$ 0.013	

iv) *Small Business Direct Installation – Lighting (SBDIL)* – This program will be modified to eliminate full project cost incentives for Standard T8 to Low-wattage T8 and return them back to the standard prescriptive incentive levels. This move will markedly increase the cost effectiveness and drive the focus on businesses that for whatever the circumstances have not been able to get the T12s out of their facilities. The T12 to T8 retrofits will continue at full value incentives as well as ENERGY STAR® LED/CFL and LED Case lighting.

This action will help drive the cost effectiveness from $0.75/kWh (PY12 realized value) for all business types to $0.57 for Restaurants (better due to normally longer operating hours) and $0.46 for all Small Businesses.

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- <u>Educational and Training</u> – Programs to drive capabilities for the Building Operators and decision makers such as Building Operator Certification (BOC) training, International Facility Management Association (IFMA) local technical training seminars, Association of Energy Engineers (AEE) certification classes and testing for Certified Energy Managers (CEM) and Certified Energy Auditor (CEA), Energy Efficiency Funding Group (EEFG) Selling Energy Efficiency seminars.
- <u>Small Business and Residential Direct Install Measures</u> – Direct install and audit services from small local energy firms and community-based service organizations to provide energy audit and retrofits will expand beyond lighting.
- <u>Restaurant Exhaust Fan Demand Ventilation Control</u> – Direct install of exhaust fan demand ventilation control for small restaurants.
- <u>Central Plant Benchmark Metering</u> – Installation of plant kW per ton metering to assist in developing peer group comparison of plant efficiencies as well as to aid customer commissioning efforts and the evaluation of the sea water air conditioning development.

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The Program will continue to expand its outreach, education and training for both Maui and Hawaii counties and continue with direct-install efforts for small businesses and residents with enhanced solar and other targeted special incentive initiatives.

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xi) *Proposed New Avoided Cost Table for TRB* – Hawaii Energy will work with the Contract Manager and the Energy Efficiency Portfolio Standards (EEPS) Avoided Cost Subcommittee to determine proposed updated Utility Avoided Cost figures.

These new values will be used to determine new TRB values that are more reflective of the current benefits to the Utilities and passed on to their customers.

The new HECO IRP information just released this year and the historical monthly avoided cost numbers provided by the HECO companies will be used to determine the new values.

It is understood that the TRB goals will need to be adjusted when the new avoided costs are agreed upon.

9. PROPOSED TRANSFORMATIONAL PROGRAM INITIATIVES

Below are the three broad areas of Transformation Program initiatives proposed for PY2013. The Transformation Goals will be measured by the total number of operational contacts made in each of these areas during the year.

Behavior Modification

- Continue the "Sharing the Aloha" workshops with the residential sector and introduce a similar workshop for the small business sector;
- Introduce In-Home Energy Mentoring targeting hard-to-reach households; leveraging non-profits and interns for delivery;
- Launch conservation and efficiency lessons content through online channels; focus is socially, culturally and economically-relevant messaging that will resonate with local communities;
- Develop efficiency and conservation training workshops for business to deliver "in house" workshops by and for employees.

Professional Development

- Continue to provide teachers with energy literacy training; create teacher advisory group for Hawaii Energy to better engage teachers, administrators and the Hawaii Department of Education such that trained teachers can integrate energy-related curriculum into current standards and classroom time.
- Underwrite internship opportunities for nearly or recently graduated college students interested in a "green" career. Support will provide internships that provide experience in both residential and business sectors. Hawaii Energy will also support the University of Hawaii system as it develops a facility management degree program.
- Continue workforce development workshops targeting those already in the energy field and those professionals who are involved in the decision-making process for businesses to invest in energy efficiency and conservation projects.

Technical "Know How"

- Support professional trade organizations that provide technical training to existing workforce (i.e. IFMA, AEE, ASHRAE) and reduce the barriers to participation through limited sponsorship;
- Support programs and certifications offered through the University of Hawaii system (i.e. Building Operator Certification) and reduce the barriers to participation;
- Enhance the skills of local trade and professional services firms by offering training workshops in the latest technology by technical subject matter experts from around the United States.

10. ADDITIONAL NEW CONTRACT RENEWAL TERMS SUBMITTED IN THIS RENEWAL PROPOSAL

In addition to the forgoing, SAIC proposes that:

1. The Quarterly Reports required under the original 2009 Contract be dispensed with as they have proven to be unnecessarily duplicative and thus wasteful of time and ratepayer money.

2. The PUC exercise its authority under the 2009 Contract to extend the term of the Contract beyond December 31, 2013.

3. The PUC allow SAIC to move budget funds as needed within broad budget categories with approval of the Contract Manager as long as Residential and Business funds are not mixed, incentive funds are not used for non-incentive purposes and the 10% statutory limit on administrative costs is not violated.

4. The PUC add to the 2009 Contract the additional Scope of Work and budget proposed by SAIC under separate cover for the PUC's On-Bill Financing Program.

5. All other Contract Terms and Conditions not specifically referenced in this Proposal be left as they currently are under the 2009 Contract as amended.

SAIC and the Hawaii Energy Team appreciate the opportunity to make this proposal and advance energy conservation and efficiency efforts in Hawaii.

H. Ray Starling

H. Ray Starling, Hawaii Energy Program Director
SAIC Energy, Environment, and Infrastructure, LLC

May 1, 2013
DATE

Appendices:

A: February 28, 2013 PBFA Contract Renewal Guidelines for Year 5 (PY2013) from James Flanagan Associates on behalf of the PUC

B-1 through B-7: Summary of Budgets, Targets and Programs by Measure from PY2013 Annual Plan

Hawaii Energy

Your Conservation and Efficiency Program

Program Year 2013
Annual Plan

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.

TABLE OF CONTENTS

1.0 INTRODUCTION

On behalf of **SAIC, Energy Environment, & Infrastructure , LLC ("SAIC")** as the Hawaii Public Benefits Fee Administrator (PBFA), the PBFA's proposed Annual Plan for Program Year 2013 (PY13), July 1, 2013 – June 30, 2014, is presented below.

1.1 Annual Plan

This Annual Plan ("Plan") provides new strategies and a roadmap for administration and delivery of the Hawaii Energy *Conservation and Efficiency Program.* This Plan is for the fifth year of the Hawaii Energy Program and, therefore, will build upon the successes and lessons learned during the last four years.

With this new Plan, the PBFA will continue evolution of our overall strategies to increase program participation, maximize cost-effective energy savings, reduce dependence on imported fossil fuel and encourage expansion of energy efficiency, conservation and renewable energy measures throughout the islands.

As with last year, the PBFA will also continue to promote the Program's focus on individual behavior change, personal energy awareness and group cultural change regarding energy use and sustainability in Hawaii.

As the Program leveraged the increased budget last year there were significant advancements in targeted hands-on assistance to major sources of future energy savings for the State. These efforts provided energy metering and system reviews for targeted large usage customers.

As the Program Year evolves and these and other factors reveal their true impacts on the Program, the PBFA will revise efforts for the benefit of the overall Program goals, with the concurrence of the Contract Manager.

1.2 Key Factors Impacting and Actions Basis for Annual Plan

The following are some of the key factors and actions that have impacted the Annual Plan developed for PY13.

1.2.1 *Required Increase in Targeted Cost Effectiveness* – The increase in the targeted demand (+8%) and energy values (+20%) between PY12 and PY13 Targets drives the program decisions to a great extent putting pressure on lowering incentive levels and limiting the higher cost to serve "investment" such as benchmark metering efforts that do not immediately result in first year savings for the program.

- ***PY13 Significant Reduction in Program Reliance on CFLs***
    - 53% in PY11 to 39% of Program kWh in PY13
    - 1,923,077 lamps to 1,516,100 lamps

- ***Small Business Direct Installation Program (SBDIL)***
    - First Year for SBDIL $2.45M in PY12.
    - The PY12 cost per kWh is running at $0.59 per kWh

PY12 YTD	kWh Program	Incentive	Count	Cost per kWh
Business	3,294,910	$ 2,127,117	2,290	$ 0.65
Restaurant	827,912	$ 325,746	394	$ 0.39
SBDIL	4,122,821	$ 2,452,862	2,684	$ 0.59

    - To meet the portfolio budget this program will be:
        1. made smaller $1.3M in PY13
        2. remove T8 to LWT8s as a full cost incentive measure
        3. Targeting Cost Effectiveness of $0.52/kWh for PY13

- ***CO Garage Projects used to drive cost effective savings***
    - PY12 reduced the incentive levels from $0.18 to $0.14 this being the customer level portfolio average cost per kWh and capped the payment to 85% of project cost. This stalled participation.
    - For PY13 the program will adjust the level again to $0.12 per kWh and remove the project cost limit.

- ***Continue to support central plant metering and direct program site review and analysis assistance to targeted project development of large savings opportunities***
    - The program will limit the addition of new sites and concentrate on the analysis and use of the existing 13 metering sites of SWAC Office Buildings and Kona Coast Hotels to utilize the kW/ton metering and commissioning for capital project justification based on the data.
    - Water and Wastewater program to provide metering for pump optimization, time-of-use, and demand response opportunities.

1.2.2 *Reduced Reliance on CFLs* – It is recognized that CFLs are “mainstream” and that the program has steadily moved away from a reliance on this “one-trick” pony. The market still responds to low-cost subsidized CFLs, and there was concern last year that the rare-earth phosphor pricing was going to drive CFL prices up last year. This did not happen to the extent predicted and the CFL sales remained steady though at a lower level than PY11 which was a high year with a large push for the technology as well as grants that provide lamps for free for hard-to-reach customers.

PY13 proposed measure mix reduces the CFL energy contribution to the portfolio from 53% of first year energy to 39%. This is a 21% reduction from 1,923,077 lamps in PY11 to a total of 1,516,100 lamps in PY13 with a 9% increase in per kWh cost effectiveness.

CFL PY11	Residential	Business	Total	% of Portfolio
Incentive	$ 2,078,768	$ 124,733	$ 2,203,501	8.6%
Count	1,841,842	81,235	1,923,077	
$/kWh	$ 0.039	$ 0.010	$ 0.033	
kWh First Year	53,790,929	12,892,740	66,683,669	52%
kW	7,419	1,661	9,080	53%

CFL PY13	Residential	Business	Total	% of Portfolio	CFL Contribution Reduction		
Incentive	$ 1,500,000	$ 32,200	$ 1,532,200	4.6%	$ (671,301)	Incentive	-30%
Count	1,500,000	16,100	1,516,100		(406,977)	Count	-21%
$/kWh	$ 0.032	$ 0.010	$ 0.030		$ (0.003)	$/kWh	-9%
kWh First Year	47,618,159	3,294,972	50,913,130	36%	(15,770,539)	kWh First Year	-24%
kW	6,559	388	6,947	39%	(2,133)	kW	-23%

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It is understood that the TRB goals will need to be adjusted when the new avoided costs are agreed upon.

2.0 Outreach & Marketing Communications

2.1 Overview

Front and center, the overarching objective of the Program's Outreach & Marketing Communications (Marcom) is to increase active ratepayer participation in Hawaii Energy offerings (i.e., residential rebates, business incentives and transformational educational/training opportunities). During preparation for and continuously throughout the program year, specific objectives and tactics for each of the various channels of traditional and non-traditional Outreach & Marcom are strategized, developed, refined, executed and analyzed pre and post-execution to maximize reach and effectiveness.

For PY13, the Program will review and leverage successes and lessons learned to refine and enhance strategies and tactics already proven effective, as well as explore additional innovative, cost-effective and wide-reaching opportunities. Key objectives and strategies are highlighted below:

2.2 Key Objectives

Key PY13 objectives for the Program's Outreach & Marcom include continuing to:

- Generate awareness of what Hawaii Energy is and our role in the energy efficiency and conservation arena.
- Promote Hawaii Energy as the "partner" and "ally" for Hawaii, Honolulu and Maui county ratepayers as they consider and adopt conservation behaviors, and integrate energy-efficient equipment.
- Improve awareness, engagement and participation in Hawaii Energy's residential, business and transformational offerings.
- Promote a call-to-action by driving traffic to Hawaii Energy's website and call center for further information on Hawaii Energy offerings.

2.3 Outreach

The Program will expand our community outreach efforts to continue to bring awareness of Program rebates and offers to the general ratepayer population and business communities. A few highlights of our outreach efforts include:

- **Traditional Outreach** – The Program will continue to sponsor and/or participate in as many community and trade expo events as possible. Participation in these events will be determined based on factors including past history, audience, attendance and location. In addition, as appropriate, Program personnel will join and participate in professional organizations that are important for the Program to support as an active member, provided there is no actual or appearance of conflict of interest.

- **Outreach Through Community Allies & Organizations** - The Program will continue to seek and partner with organizations that share a common or similar objective of helping the community through environmental and/or sustainable efforts. In addition, the Program will further develop strong working relationships and partnerships with nonprofit organizations focused on health and human services to increase outreach with "hard-to-reach" populations.

- **Collaborate with Hawaii Businesses and Organizations** - Hawaii Energy will increase collaboration with private businesses to increase reach and distribution of easy-to-understand and apply information about efficiency and conservation.

2.4 Marketing Communications

Effectively leveraging and executing Marcom requires an in-depth knowledge of the pros and cons of all traditional and non-traditional channels at the strategic and practical hands-on execution level. The Program has this strong know-how and experience with key Marcom industry-recognized channels including those highlighted below in: (1) public relations; (2) website; (3) social media; (4) email marketing; (5) marketing collateral; (6) co-op marketing with trade allies; (7) direct mail; and (8) advertising.

A. <u>Public Relations</u>

For the Program, public relations encompasses: (1) media relations and (2) program positioning. Objectives include:

- Increase awareness and understanding of Hawaii Energy and the important role that it plays in helping ratepayers reduce electricity use in Hawaii.
- Position Hawaii Energy as the leader of or trusted resource for energy efficiency and conservation.
- Create understanding and confidence that energy efficiency and conservation actions can be done easily and effectively; and showcase the benefits of leading an energy-efficient lifestyle.
- Improve participation from "hard-to-reach" segments in Hawaii Energy offerings.
- Generate general ratepayer engagement and participation in Hawaii Energy offerings.
- Secure additional "third-party endorsements" of Hawaii Energy from the media, as well as key community leaders and stakeholders. For example, as appropriate, the Program would provide conservation tips and key Program rebate highlights to policymakers for consideration and inclusion in their communications with constituents (e.g., via newsletters, emails and town hall meeting announcements, presentations and/or collateral).
- Target one major media hit per month.
- Pitch case studies, success stories and human interest stories to the media and other mass, trade or community communication gatekeepers (e.g., professional organization newsletters), as well as incorporate into other appropriate medium including but not limited to website, social media and other program communications.

B. Website

In PY13, the Program will refine the new website, which is anticipated to be launched in Q4 of PY12. On a continuing basis, the Program will humanize and keep the website fresh with frequent updates and features including but not limited to highlights of photos and stories about community outreach events, trainings and success stories.

Additionally, we will focus on developing “responsive design” across all platforms. This will require additional HTML coding of the website to make it viewable and useable across smartphones and tablets. The structure of the site will be flexible and reformatted accordingly for better usability across different browser sizes, devices and platforms.

C. Social Media

With the growing prevalence of social media, the Program will continue to expand our brand presence, promote offerings and highlight success stories through various social media channels including but not limited to Facebook, Twitter and Instagram.

We will continue to connect with our social media followers by providing engaging and interactive content. In addition, we will continue to explore additional, innovative ways to keep the interest of our followers.

D. Email Marketing

In PY13, the Program will continue to develop and implement a robust email marketing system to support program communications, including but not limited to regularly occurring e-newsletters and event email blasts to opted-in “subscribers” of one of three general categories: (1) “residents” (i.e., general population ratepayer); (2) “businesses” (i.e., business entities); and (3) “energy professionals” (i.e., individuals and/or entities in the energy efficiency and/or conservation industry, such as solar water heating trade allies and vendors).

In addition, we will improve: (1) the ability to grow and maintain email audiences and (2) email marketing communications integration/sharing with web and social media communications.

E. Marketing Collateral

To support all Marcom and program objectives, as appropriate for the audience, the Program will continue to:

- Extend the Hawaii Energy identity and brand architecture into a distinctive, coordinated and effective collateral communications system.
- Develop a collateral system that supports the offering plans for the residential, business and transformational programs.
- Ensure that important information is written and organized in an easy-to-understand manner for strategic partners, trade allies and ratepayers.

F. Co-Op Marketing with Trade Allies

In PY13, the Program will continue to explore, create and refine co-op marketing opportunities with trade allies to include participating contractors, manufacturers and financial institutions as appropriate. This will enable us to partner with our allies, increase our brand awareness and maximize our marketing budget.

G. Direct Mail

The Program recognizes that segments of the population - due to geographic, socioeconomic and/or other factors - are still very traditional in their media consumption (e.g., preference for direct mail, hard copy collateral, and print and broadcast advertising). As such, the Program will explore and consider implementing targeted direct mail and other integrated marketing efforts to promote various rebates and energy efficiency measures to businesses and residential ratepayers.

H. Advertising

By way of summary, in recent program years, the Program developed and executed an annual short-run (i.e., mainly Q4 of each PY) advertising campaign as part of an integrated marketing campaign to promote a specific residential offering. In PY11, the campaign focused on CFLs, whereas PY12 focused on solar water heating.

In PY13, an advertising campaign – as part of an integrated marketing campaign - can be developed pending availability of budget and upon assessment and development of key, easy-to-grasp top offering(s) and call(s) to action from the residential, business and/or transformational programs for the mainstream population that consumes online, broadcast (i.e., radio, TV, online) and print (i.e., newspaper and magazines) media.

In conjunction with an advertising campaign, the Program will explore other advertising opportunities throughout the year to increase reach and awareness of Hawaii Energy offerings, as well as the Program's overall branding. We will also explore grassroots advertising media such as industry, trade and community publications and newsletters.

3.0 Transformational Actions

3.1 Overview

Market Transformation seeks to identify, assess and help overcome market barriers that stand in the way of people and business adopting energy efficiency technologies and practices. With limited resources, Hawaii Energy's transformational programs will strike a balance between creating new offers while supporting existing efforts in Hawaii, Honolulu and Maui counties.

With some key initiatives underway in the state to remove some significant market barriers such as financing energy efficiency (i.e. On-Bill Financing), Hawaii Energy will focus on changing behaviors among three major demographics: households beginning with underserved populations, workplace personnel and the technical workforce.

3.2 Key Objectives

The key objectives of the Transformational programs will be to:

- Support programs and initiatives that will have a direct impact in reducing energy consumption in the State within a five year period.
- Leverage the great work of others in the community in reaching target audiences by incorporating the Transformational initiatives as part of their missions.
- Strive to achieve sustainable transformational activity in the community, by which it may continue and evolve through support other than exclusively PBFA funding.

3.3 Behavior Modification

Hawaii Energy recognizes that the majority of the State's population struggles to understand energy usage in their daily lives. In working towards the goals of the Hawaii Clean Energy Initiative, the ignorance of energy consumption or "energy illiteracy" presents a significant impediment to progress, especially in the context of personal behavior and its impact on energy efficiency and conservation. Hawaii Energy holds the position that to affect behavior, the State's population must improve its "energy literacy", much the same way the general population has developed a basic literacy about nutrition to achieve better personal health (e.g. calories counting).

Behavior modification will be built upon the foundation of energy literacy. This began with the great work of Helen Wai, empowering people through Financial Literacy and Energy Efficiency Education. She will continue working with the hard-to-reach populations of Hawaii, Honolulu and Maui counties. The program will be developing an offering that will not only serve to develop future green employees through great internships, but will do so through an in-home mentoring program. This offer is envisioned to provide an educational experience to families while conducting a simple home energy assessment.

Hawaii Energy recognizes that developing an energy-literate population is a significant challenge that requires a long-term, sustainable approach. It is also paramount that strategies under consideration leverage the Program's limited financial and personnel resources, while achieving scale. Viable strategies that will be considered need to scale in ways that can reach thousands, if not tens (or hundreds) of thousands of people, based on a cost structure that has traditionally reached hundreds of people (i.e. conventional classroom education, tutoring, etc.). Such anticipated strategies are presumed to be based on Internet, mobile device technologies and social media. Hawaii Energy will also encourage the means for participants to gain energy literacy through practice and action in addition to acquiring the knowledge to do so.

The initial effort to achieve this scale with be through a pilot initiative that will produce and distribute lessons in energy efficiency and conservation through various means (i.e., video, infographics, images, etc.) using socially, culturally and economically-relevant messaging. The program will also develop an innovative distribution method to provide access to simple devices that can facilitate learning through discovery (e.g., understanding electricity consumption of a DVR by measuring it with a simple kWh monitor).

Finally, Hawaii Energy will develop a pilot initiative to bring in-office or at-the-workplace mentoring and education to raise energy literacy on the job. For some sectors (i.e., lodging and hospitality), a large number of employees can be accessed and the Program can provide energy literacy useful in the workplace and in the home. Initiatives under development include both hands-on engagement and facilitation by the Program, subcontractors and partners, but also in the form of packaged curriculum that can be offered through an employer and "brown bag" lunches.

3.4 Professional Development

Professional development is aimed at professionals who are either new to the working world, new to energy efficiency or both. The largest initiative will target education based upon NEED.org activities already underway. In the coming program year, Hawaii Energy will seek to recruit new teachers and make significant inroads with administrators and the

Department of Education in a “push/pull” strategy. Enthusiastic teachers want to bring energy efficiency content into the classroom. Hawaii Energy can help them “push” this agenda at the classroom level, at the discretion of each individual teacher. But for true success, Hawaii Energy will seek to engage school administrators and those at the DOE responsible for curriculum development to help integrate energy efficiency content into state education standards and curriculum. If successful, they will “pull” energy efficiency education into the classroom.

For those that may still be students or recent graduates, Hawaii Energy will support a number of internship opportunities. These internships will be offered for both residential and commercial opportunities that will provide a great educational and professional experience. Interns are anticipated to support in-home mentoring (residential energy assessments), supporting the administration of the Programs’ small business lighting participants as well as other needs under consideration.

For those in the workplace with significant business experience, but little if no knowledge of energy or energy efficiency, Hawaii Energy will seek to continue its offering of training opportunities with EEFG. This organization is adept at creating value at the intersection of energy management, real estate, finance, operations, sustainability, and professional selling. In addition to offering new online seminars, Hawaii Energy will look to maximize the value of this offer by ensuring the most qualified applicants are accepted to attend.

3.5 Technical “Know How”

Technical “know how” is focus on engineers, facility managers, architects and the like who have been around infrastructure and energy for a good part of the career, but need to enhance their technical skills. There are a number of opportunities with various companies and individuals Hawaii Energy will engage. The Program will also collaborate with industry including the local utility and professional organizations to ensure mutual needs are met without offing redundant classes. Hawaii Energy will also seek to maximize energy efficiency training that aligns with its planned portfolio of incentive offers. New this program year will be collaboration with the University of Hawaii to integrate curriculum for credit.

Hawaii Energy will address “rate class equity” by developing offers for residential, and large, medium and small businesses (G, J and P). This will be achieved by developing the right offer, marketing and/or stricter criteria to ensure we have attendees who will benefit the most.

- Behavior Modification will target ~70% to the residential ratepayer.
- Professional Development will target ~70% to the commercial ratepayer.
- Technical “Know How” will target 100% to the commercial ratepayer.

4.0 RESIDENTIAL PROGRAM STRATEGY & DETAILS

4.1 Overview

For PY13, Hawaii Energy will maintain programmatic changes adopted in PY12, specifically the incentive categories:

- Residential Energy Efficiency Measures (REEM) – This incentive category is the core of Hawaii Energy's residential portfolio and undergoes incremental developments responding to market conditions (i.e. retail pricing) and consumer need.

- Custom Energy Solutions for the Home (CESH) – This incentive category provides a measure of flexibility within the prescriptive portfolio to accommodate unforeseen market opportunities. The budget and unit cost targets provide financial efficacy guidance to the Program and allies who champion these opportunities.

- Residential Energy Services & Maintenance (RESM) - This incentive category targets ally-driven service offerings to enhance energy savings persistence and bootstrap fledgling energy services businesses trying to secure a toehold in Hawaii.

- Residential Hard-to-Reach (RHTR) – This incentive category will seek to secure various projects among geographies and demographics that have been traditionally underserved. Efforts in PY11 and PY12 to pierce the landlord/tenant barrier of installing SWH systems were unsuccessful despite enhanced incentive offers. However, geographic barriers are seen as an opportunity for PY13.

A summary listing of the new Residential Program offerings can be found in the table below followed by a brief summary of additions and changes. A detailed description of the Residential Program offerings follows in section 4.1 through 4.4. Appendix B contains a projection of potential energy savings for the planned programs.

Residential Programs

Program	Category	Measures
REEM	***Residential Energy Efficiency Measures***	
	High Efficiency Water Heating	
	High Efficiency Lighting	
	High Efficiency Air Conditioning	
	High Efficiency Appliances	
	Energy Awareness, Measurement and Control Systems	
CESH	***Custom Energy Solutions for the Home***	
	Target Cost Request for Proposals	
RESM	***Residential Energy Services & Maintenance***	
	Residential Direct Installation	
	Residential Design and Audits	
	Residential System Tune-Ups	
RHTR	***Residential Hard to Reach***	
	Energy Efficiency Equipment Grants	
	Landlord, Tenant, AOAO Measures	

4.1.1 *New Program Offerings of Residential Energy Efficiency Measures (REEM)*

High Efficiency Lighting

- LED Lighting – While not new to the residential portfolio, Hawaii Energy anticipates the availability of ENERGY STAR® certified products to surge, particularly for popular A19 bulbs, while retail prices fall, providing an attractive energy savings option to residential consumers. The Program will closely follow availability (rising) and pricing (decreasing) in order to maintain adequate incentive levels.

High Efficiency Appliances

- High Efficiency Pool Filtration Pump Systems – This is an incentive for residential pool pumping techonolgies that offer 40% to 60% savings when using newer pump technology including variable speed/flow controls, improved motors and pump designs.

- Hawaii Energy plans to continue all PY12 offers, while improving retail merchandising.

Energy Awareness, Measurement and Control Systems

- Peer Comparison – Hawaii Energy plans to continue the OPOWER Home Energy Report peer comparison program, which was expanded to the Neighbor Islands in PY11. The market for peer comparison initiatives is evolving in PY13 to include social media and consumer-based rewards programs. Hawaii Energy's strategy will look for ways to affect measurable energy savings through behavior change in both residential and transformational portfolios by evaluating the evolving options arising in the market.

While not new to the residential portfolio, the market approach to promoting the following offers will evolve, specifically:

- Whole House Energy Metering – Hawaii Energy will explore targeting specific high-use households to consider this measure, which will undergo a review of qualifications.

4.1.2 *New Program Offerings of Custom Energy Solutions for the Home (CESH)*

Target Cost per KWh Request for Proposals

- Custom Packaged Proposals – This program will target and encourage contractors, home auditors, and energy vendors to develop cost-effective projects that focus on high energy consumption homes. The program will be a call for projects that meet a total dollar per kWh savings target and allow the market to be creative in the actions and measures that achieve the targeted cost per kWh energy savings. The projects will use utility metered data and be sub-metered if required to ensure savings performance.

Residential Design and Audits

- Efficiency Inside Home Design – 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. It is expected that the best built homes will provide 20-30% reduction in energy consumption as compared to IECC 2006 code built homes. Net zero homes will provide 100% reductions.

Residential System Tune-Ups

- SWH System Tune-Up – Hawaii Energy will implement a seasonal offer based on the results of the Solar Tune-Up Pilot conducted in PY11 and complement the Solar Water heating marketing and incentive push in PY12.

4.1.3 *New Program Offerings of Residential Hard-to-Reach (RHTR)*

Energy Efficiency Equipment Grants

- Solar Water Heater (SWH) Incentive – Hawaii Energy will provide approximately 56 solar water heating systems (anticipated to be provided as a no cost service) for those hard-to-reach segments in the most need.

4.1.4 *Additional Residential Program Initiatives*

Program Promotion of Professional Recycling and Disposal – Hawaii Energy is continuing to expand program offerings that incentivize recycling and disposal to take less efficient appliances off the grid. Through these initiatives, we are also supporting local small businesses to handle the recycling or appropriate disposal. As LED lighting options continue to increase, Hawaii Energy will explore opportunities to expand CFL recycling options, particularly on the Neighbor Islands.

Point of Purchase (POP) Rebates – Hawaii Energy expanded the highly successful POP rebates of CFLs to other incentivized products. Hawaii Energy will continue to explore viable options to continue this offering that makes it easier for the customer to obtain their rebate and lead to greater penetration of consumers.

4.1.5 Residential Program Details Table of Contents. To follow, in Sections 4.2 through 4.6, is an overview summary of Residential Program Offerings followed by detailed descriptions and energy savings. The Overall Program Details are provided on the following page, preceding the individual Program summaries.

Program Category	**4.2 Residential Programs Overview** **Overview of All Categories**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers. • Solar Contractors, Plumbing Contractors and General Contractors • Architect and Engineers
Projected Impacts	Demand 9,616 kW Energy 69,544,319 kWh Incentive Budget $8,871,439 Cost per kWh $0.128 /kWh TRB $71,459,715
Technologies	**Incentivized Measures** — **Incentive Forecast** **Residential Energy Efficiency Measures** $7,504,500 **Custom Energy Solutions for the Home** $25,000 **Residential Energy Services & Maintenance** $540,000 **Residential Hard-to-Reach** $801,939 $8,871,439 • Solar Water Heating Systems $1,000 • Solar Water Heater Interest Buy Down $1,000 • Heat Pumps $200 • CFLs $ 1.00 • LED $7 • VRF Split System AC $200 • Ceiling Fans $35 • Solar Attic Fans $50 • Whole House Fans $75 • Refrigerator (<$600) $50 • Refrigerator with Recycling $125 • Garage Refrigerator/Freezer Bounty* $75 • Clothes Washers (Tier II / III) $50 • Pool VFD Controller Pumps $150 • Room Occupancy Sensors $5 • Peer Group Comparison $11.32/HH • Whole House Energy Metering $100 • Custom Packaged Proposals $0.25/kWh • Direct install $0.50/kWh

Program Category	4.2 Residential Programs Overview Overview of All Categories
	• Efficiency Inside Home Design $1,000 • Solar Water Heater Tune Up $150 • Solar Inspections (WAP) $95 • *Solar Water Heater (SWH) HTR Grant $10,039 • Energy Hero Gift Packs $40 • CFL Exchange(s) $2.50/bulb • *Custom SWH Proposals $0.30/kWh *New or expanded measures

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.1 High Efficiency Water Heating**
Target Market	• Homeowners, Landlords, Tenant, and Property Managers • Manufacturers, Distributors, Dealer, and Retailers • Solar Contractors, Plumbing Contractors, and General Contractors • Architect and Engineers
Impacts	Demand 1,124 kW Energy 5,194,420 kWh Incentive Budget $2,718,000 (14%) Cost per kWh $0.52 /kWh TRB $12,422,767
Technologies	**Incentivized** — Incentive — Units • Solar Water Heater (SWH) Incentive — $1000 — 2,400 • Solar Water Heater Interest Buydown — $1,000 — 258 • Heat Pumps — $200 — 300 **Under Review for Potential Incentives** • Peak demand reduction timers for water heaters • New manufacturers including select evacuated tubes (The following Solar Water Heater Systems budgets are included in the plan under the Landlord/Tenant, AOAO Measures. See section 4.6.2) • Custom SWH Proposals $0.30 / kWh 500,000 kWh *(equivalent to 484 systems) ***Total Solar Water Heating Systems*** ***$3,370,189*** ***(Total for REEM standard, buydown, custom and grants)***
Market Barriers	**General** • Large up-front cost • Strong demand for PV / Low awareness of cost-effective SWH • Trust and credibility of technology providers • Quality of system design, equipment and installation • Knowledge operation and maintenances of technologies **Owner Occupant** • Access to and/or understanding of financial options • Time between purchase and tax refunds (carrying cost)

<table>
<tr><td>Program Category</td><td>4.3 Residential Energy Efficiency Measures
4.3.1 High Efficiency Water Heating</td></tr>
<tr><td>Market Barriers (continued)</td><td>Landlords and Property Managers
• May not pay for electricity cost
• Reluctance to invest without a financial return
• Short term investment

Renters and Lessees
• Do not have the authority or responsibility for the hot water system
• Renter lease term shorter than simple payback</td></tr>
<tr><td>Description & Implementation Strategies</td><td>Solar Water Heating
<u>Solar Water Heater (SWH) Incentive</u>
The program will provide a $1000 rebate for solar hot water systems installed by qualified participating contractors. The process is:
• Customers contact a contractor from a list of participating contractors on Hawaii Energy’s website
• Contractor comes to the home, reviews site conditions, interviews the customer to analyze hot water usage then provides a written proposal for a complete installation; Contractor’s proposed sale price reflects the inclusion of the $1000 rebate
• Contractor fills out the Program’s system sizing form
• Contractor provides rebate form and helps customer to fill it out
• Contractor provides Hawaii Energy with building permit number
• Contractor installs solar water heating system
• Contractor reviews system operation and maintenance with customer
• Hawaii Energy will conduct sample post-installation inspections to make sure the systems have been installed properly
• Upon successful inspection, Hawaii Energy will rebate the contractor $1000

<u>Solar Water Heater Interest Buydown</u>
The program provides an incentive to buy down the interest charges for a solar water heater loan from a participating lending institution made on solar hot water systems that are installed by qualified participating contractors. This incentive will cover the loan interest up to a total maximum of $1,000. The process includes:
• The customer contacts a participating lender from a list of participating lenders on Hawaii Energy’s website
• The customer enters into a financing agreement with the lender that indicates the sale price, loan amount, interest component and the Hawaii Energy Incentive.
• The customer executes the “Standard” installation process</td></tr>
</table>

Program Category	4.3 Residential Energy Efficiency Measures 4.3.1 High Efficiency Water Heating
Description & Implementation Strategies (continued)	**Heat Pumps** Residential heat pump rebates are available at $200. 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. **Trade Allies** The program will conduct outreach with key allies including the Solar Technical Advisory Group, solar contractors, suppliers, government and housing agencies; financial institutions; and housing, apartment, and contractor associations. This team will promote the program, solicit feedback for more efficient program operation, and identify opportunities for implementation and coordination of efforts
Key Changes	• Contractor or customers may request the inspection if one is not selected to be done • Continual solicitation of new participating lenders to offer loan interest buy down incentive • Recognizing the growing product availability and sales efforts regarding residential heat pumps, increase educational efforts
Marketing Strategies	• Direct contact with participating solar contractors • Community event promotion of High Efficiency Water Heating • Comprehensive marketing initiative • Listing of participating contractors on our website • Integration with Home Energy Report (Peer Group Comparison)

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.2 High Efficiency Lighting**
Target Market	• Homeowners, Landlords, Tenants, and Property Managers • Manufacturers, Distributors, Dealers, and Retailers
Impacts	Demand 6,953 kW Energy 49,795,738 kWh Incentive Budget $2,550,000 (13%) Cost per kWh $0.051 /kWh TRB $44,508,241
Technologies	Incentive / Units CFLs $1.00 1,500,000 LED $7.00 150,000
Market Barriers	**General** • Lack of understanding about how energy is used in the home • Disposal concerns • Lack of understanding as to which technology is the most effective to reduce energy consumption • Product availability of specialty and dimmable LEDs within the customer shopping area **Owner Occupant** • Ability to self-install • Ability to find appropriate CFLs for fixture or ceiling fan • Disposal concerns • May not pay for electricity cost (condominiums) **Landlords and Property Managers** • No control over the hours used for lighting • May not pay for electricity cost • Reluctance to invest without a financial return • Short term investment **Renters and Lessees** • Do not have the authority or responsibility for the lighting fixtures • May not pay for electricity

Program Category	4.3 Residential Energy Efficiency Measures 4.3.2 High Efficiency Lighting
Description & Implementation Strategies	The CFL and LED rebates are offered through manufacture direct incentives which are provided as point of sale cost reductions. The process includes: • Distributors, retailers and manufacturers complete a Memorandum of Understanding (MOU) cooperative agreement in which they provide funds for the advertising, promotion for instant rebates for the CFL and LEDs to customers • Retailers signing the MOU agree to display signage showing the rebate has been provided by the Program, provide assistance in ordering and stocking qualifying products, and provide sales staff training • Retailers agree to promote consumer education, undergo staff training and follow proper procedures. • Retailers with the ability to track incentives using sales data are given the option for issuing rebates without the use of coupons, provided they can demonstrate the ability of providing accurate, timely data on point of purchase information by store by SKU **Trade Allies** The program is implemented through strong working relationships between the program, the major CFL/LED manufacturers and the national retailers. The participating CFL manufacturers are: GE, FEIT, Sylvania, TCP and Philips. Participating retailers include: Ace Hardware, City Mill, Costco, Don Quijote, Foodland, Home Depot, Longs Drugs/CVS, Lowes, Safeway, Sam's Club, Times and Wal-Mart who have all utilized their buying power to offer a better blend of quality, affordable CFLs across the State.
Key Changes	• Development and introduction of a custom lighting rebate offer targeting customers who engage with lighting designers and specialty shops. With a growing selection of EnergyStar® qualified specialty LED products, Hawaii Energy has a small but growing number of small businesses serving this clientele, with no option to benefit from lighting incentives. • Reducing incentive levels for LEDs particularly for new lower cost / higher lumen A19s. • Provide for increased recycling options for CFLs.
Marketing Strategies	• Significant focus on merchandising, including more requirements for in-store signage featuring Hawaii Energy brand and incentive amounts • Advertisements to explain how to select a CFL • Educational information online and in the media • Leverage allies to share CFL information and increase participation • Encourage an increase in selection of CFLs available • Social media

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.3 High Efficiency Air Conditioning**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers. • HVAC and General Contractors • Architect and Engineers
Impacts	Demand 171 kW Energy 916,140 kWh Incentive Budget $207,500 (1%) Cost per kWh $0.23 /kWh TRB $1,470,281
Technologies	(see table below)
Market Barriers	**General** • Lack of understanding of how energy is used in the home • Lack of information about product energy efficiency • Lack of understanding as to which are the most effective ways to reduce energy consumption **Owner Occupant** • Inability to self install • Existing air conditioning opening prevents the proper selection for energy savings • Home owner association rules **Landlords and Property Managers** • No control over the hours tenant/units use of air conditioning. • May not pay for electricity cost • Reluctance to invest without a financial return • Short term investment **Renters and Lessees** • Do not have the authority or responsibility for the HVAC system • May not pay for electricity

Technologies

	Units	Incentive
VRF Split System AC	400	$200
Ceiling Fans	3,000	$35
Solar Attic Fans	150	$50
Whole House	200	$75

Program Category	4.3 Residential Energy Efficiency Measures 4.3.3 High Efficiency Air Conditioning
Description & Implementation Strategies	The program will continue to provide prescriptive incentives to residential customers who purchase and install energy efficiency measures that meet or exceed ENERGY STAR® standards. The process includes: • The customer purchases a qualified high efficiency air conditioner, ceiling fan, solar attic fan or whole house fan. • The customer obtains an application through the program's website, in hard copy from Hawaii Energy, or through point of sale retailer displays. **Trade Allies** We will continue to build relationships with manufactures, distributors and dealers by offering workshop and events to train Allies on Hawaii Energy's offerings and processes while seeking input on how to create additional offerings and refinements to existing programs.
Key Changes	• Continue to encourage variable refrigerant flow (VRF) inverter split system units
Marketing Strategies	• Provide cost of ownership information on rebate application forms • Provide more information on the website explaining how to properly use HVAC systems • Advertise to explain how to select an HVAC system • Find organizations to assist with HVAC outreach • Integration with Home Energy Reports (Peer Group Comparison) • Social media

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.4 High Efficiency Appliances**
Target Market	• Homeowners, Landlords, Tenants, and Property Managers • Manufacturers, Distributors, Dealers and Retailers • Wholesalers and General Contractors • Architect and Engineers
Impacts	Demand 349 kW Energy 6,069,374 kWh Incentive Budget $1,157,500 (6%) Cost per kWh $0.19 /kWh TRB $7,778,404
Technologies	see table below
Market Barriers	**General** • Lack of understanding of how energy is used in the home • Lack of information about energy efficient products • Lack of understanding as to which are the most effective ways to reduce energy consumption • Lack of understanding of the importance of size and operation for energy savings • Large up-front cost **Owner Occupant** • Ability to self install • Home owner association rules • Availability of product when needed **Landlords and Property Managers** • No control over the hours of use • May not pay for electricity cost • Reluctance to invest without a financial return • Short term investment

Technologies

	Units	Incentive
Refrigerator (<$600)	400	$50
Refrigerator with Recycling	5,500	$125
Garage Refrigerator/Freezer Bounty	1,000	$75
Clothes Washer (Tier II / III)	6,000	$50
Pool VFD Controller Pumps	500	$150

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.4 High Efficiency Appliances**
Market Barriers (continued)	**Renters and Lessees** • Do not have the authority or responsibility for the appliances • May not pay for electricity
Description & Implementation Strategies	The program will continue to provide prescriptive incentives to residential customers who purchase and install energy efficiency measures that meet or exceed ENERGY STAR® standards. Hawaii Energy will explore point of purchase rebates for appliances this year. The process includes: • The customer purchases a qualified high efficiency appliance. • The customer obtains an application through the program's website, in hard copy from Hawaii Energy, or through point of sale retailer displays. **Implementation** We will continue to build relationships with manufacturers, distributors and dealers through store visits where we train allies on Hawaii Energy's offerings and processes while seeking input on how to create additional offerings and refinements to existing programs. We will leverage the relationships that were created with retailers across the State through the Trade Up for Cool Cash offering. We will work with Sears and Best Buy to explore point of purchase rebates that enable retailers to deduct the rebate at time of purchase.
Key Changes	• Expand Bounty offer to include Lanai (achieved May 2012) and Molokai • Pilot an Energy Star® Chest Freezer Trade-In offer for the neighbor islands, where reliance on fish and game is common • Formally launch Pool VFD Controller Pump offer • Continue to improve quality control and reporting of recyclers • Potential to count Water Utility energy savings from washing machine installations.
Marketing Strategies	• Provide point of purchase (POP) signage and information supported by quality control (merchandising) • Provide cost of ownership information on rebate application forms • More information on the website explaining good practices on how to use ENERGY STAR appliances • Advertising explaining how to select and use appliances for the best energy savings • Find organizations to assist with appliance outreach

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.5 Energy Awareness, Measurement and Control Systems**
Target Market	**General** • Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers
Impacts	Demand 460 kW Energy 4,081,781 kWh Incentive Budget $871,500 (4%) Cost per kWh $0.21 /kWh TRB $618,353
Technologies	Incentives / Units Room Occupancy Sensor: $5 / 500 Units Peer Group Comparisons: $11.32 / 75,000 Homes Whole House Energy Metering: $100 / 200 Units
Market Barriers	**General** • Awareness of technologies • Understanding of best application • Installation • Proper application of room occupancy sensors
Description & Implementation Strategies	**Room Occupancy Sensors** These sensors control the use of lighting in areas around the home with infrequent use such as laundry, storage, garage or spare areas. They are not intended for high use areas or CFLs. **Peer Group Comparison** Hawaii Energy plans to continue the Home Energy Report offered through OPOWER in the Ewa region on Oahu (which was formerly funded with ARRA) and across the neighbor islands (Hawaii, Maui, Lanai and Molokai). Our strategy will look for ways to affect measurable energy savings through behavior change. **Whole House Energy Metering Devices Mail-in Rebate** These devices collect energy data by induction and transmit the information to a display unit which can be carried anywhere throughout the house or viewed via the internet.

Program Category	4.3 Residential Energy Efficiency Measures 4.3.5 Energy Awareness, Measurement and Control Systems
Description & Implementation Strategies (continued)	**Implementation** The placement of Room Occupancy Sensors will be reliant on the Hawaii Energy Hero Audits, where a certified auditor will make specific recommendations. The rebate will enhance the likelihood of adoption for this measure. The Home Energy Report will be renewed with subtle refinements on participant selection, tips provided in the reports and specific promotions coordinated with our marketing and outreach initiatives. Particular attention will be given to customers who take the time to contact Hawaii Energy with concerns of the report's validity and/or desperate for help. It is foreseen that the Hawaii Energy Hero Audit will be of particular value to these customers. The Whole House Energy Metering offer will benefit from marketing to high use households, where visibility of how electricity is being used will lead to subsequent investments in energy efficiency.
Key Changes	• Integration of Hawaii Energy Hero Audit to drive adoption of Room Occupancy Sensors • Specific marketing of Whole House Energy Metering
Marketing Strategies	• Public relations and media opportunities stemming from Home Energy Reports.

Program Category	**4.4 Custom Energy Solutions for the Home** **4.4.1 Target Cost Request for Proposals**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers. • Mechanical and Solar Service Contractors
Impacts	Demand 72 kW Energy 71,955 kWh Incentive Budget $25,000 (<1%) Cost per kWh $0.35 /kWh TRB $155,891
Technologies	<u>**Incentive**</u> <u>**Units**</u> Custom Packaged Proposals $0.25 100,000 kWh
Market Barriers	There were previously no mechanisms to accept "customized" residential energy efficiency proposals.
Description & Implementation Strategies	**Custom Packaged Proposals** This program that will target the contractor / home auditors / energy vendors and encourage them to develop cost-effective projects that focus on high energy consumption homes. The program will be a call for projects that meet a total dollar per kWh savings target and allow the market to be creative in the actions and measures that achieve the targeted cost per kWh energy savings. The projects will use utility metered data and submetered if required to insure savings performance.
Key Changes	• New
Marketing Strategies	• Direct contact with participating energy professionals • Direct contact with Property Managers and AOAOs

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.1 Residential Direct Installation**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers. • Mechanical and Solar Service Contractors
Impacts	Demand 0 kW Energy 20,369 kWh Incentive Budget $10,000 (<1%) Cost per kWh $0.49 /kWh TRB $13,412
Technologies	<u>Incentive</u> <u>Units</u> TBD $0.50 20,000 kWh
Market Barriers	There are energy efficiency measures that are not supported by current industry and/or are new or unfamiliar with the public.
Description & Implementation Strategies	The use of a direct installation process can achieve energy savings at a higher than average program cost initially to evaluate the energy savings and program implementation results in order to develop either cost-effective direct install programs or to promote the successes and then transfer to the private sector for implementation. **TBD** Hawaii Energy will pursue additional residential direct install programs targeted at $0.50 per kWh.
Key Changes	• New
Marketing Strategies	• Direct contact with participating energy professionals • Direct contact with Property Managers and AOAOs

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.2 Residential Design**
Target Market	• Residential Home Developers
Impacts	Demand 204 kW Energy 1,120,284 kWh Incentive Budget \$500,000 (3%) Cost per kWh \$0.45 /kWh TRB \$2,128,743
Technologies	<u>**Incentive**</u> <u>**Units**</u> Efficiency Inside Home Design \$1,000 500 Homes
Market Barriers	**Home Developers** • Need to design and equip homes to respond to home buyer market forces • Homes are not competitive for sale in Hawaii if not designed with A/C • Prior prescriptive components were not typically developer installed.
Description & Implementation Strategies	**Efficiency Inside Home Design** • Based on the use of computer energy modeling programs to compare a code-built home to the developer's home design offerings • Modeling allows the developer maximum flexibility in designing their homes to dovetail with the existing federal tax credits and Energy Star® programs • Encourage interaction with the developer to maximize utilization of incentives through comparing model scenarios • Allow a limited number of developer constructing net-zero homes with PV systems to be considered as an efficiency measure. • Demonstrate to the home building industry the value of building above code leading to a more energy efficient and cost-effective home
Key Changes	• Implementation of an incentivized home audit is new.

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.2 Residential Design**
Marketing Strategies	**Efficiency Inside Home Design** • Direct contact with home developers and the BIA • Promotion of the participating developers in trade-publications such as the BIA, Parade of Homes, and Hawaii Home Remodeling and Design • Recognition of the awardees and description of the changes made to the homes on the Hawaii Energy website • Energy Hero Awards to be placed in the model homes and available for use in the developer's marketing materials

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.3 Residential System Tune-Ups**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers • Mechanical and Solar Service Contractors
Impacts	Demand 64 kW Energy 234,241 kWh Incentive Budget $30,000 (<1%) Cost per kWh $0.13 /kWh TRB $222,662
Technologies	<u>Incentive</u> <u>Units</u> Solar Water Heater Tune-Up $150 200 Tune-Ups
Market Barriers	**General** • Lack of awareness of need for maintenance • Resistance to engage unknown contractors
Description & Implementation Strategies	**Solar Water Heater Tune-up** • 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
Key Changes	• This program is being re-implemented from PY12
Marketing Strategies	• Direct contact with Solar Contractors • Provide collateral to Trade Allies offering this service • Distribute educational materials at community events, neighborhood board meetings and homeowners association meetings • Provide cost of ownership information on rebate application forms and benefits of ownership on our website

Program Category	**4.6 Residential Hard-to-Reach** **4.6.1 Energy Efficiency Equipment Grants**
Target Market	• Low income, physically isolated and traditionally underserved Residential Markets
Impacts	Demand 205 kW Energy 1,486,517 kWh Incentive Budget $651,939 (3%) Cost per kWh $0.44 /kWh TRB $1,439,520
Technologies	<u>**Incentive**</u> / <u>**Units**</u> Solar Inspections (WAP) — $95 — 50 Inspections Solar Water Heater (SWH) — $10,039 — 56 Systems Energy Hero Gift Packs — $40 — 250 Packs CFL Exchange — $2.50/Lamp — 30,000 Lamps
Market Barriers	• Customer lack of access to capital for energy improvements • Lack of understanding of energy efficiency benefits • Renter and Lessee reluctance to invest in property
Description & Implementation Strategies	• Work through state and local agencies serving the needs of low income families to identify qualified customers who will receive energy efficiency goods and services at no cost ("direct install") • Continue to work with community action organizations to develop and deliver program services for low-income customers to include direct install and delivery of appropriate energy saving technologies • Continue to provide solar hot water inspections for RLI solar grant recipients
Key Changes	• Increased focus and penetration of direct install and educational outreach • Implementation of an incentivized home audit is new.
Marketing Strategies	• Continue to target low-income and hard-to-reach customers through existing state and local agencies who service the needs of low income families • Develop working relationships with more community action and similar local groups to increase market penetration

Program Category	**4.6 Residential Hard-to-Reach** **4.6.2 Landlord/Tenant, AOAO Measures**
Target Market	• Associations of Apartment Owners • Landlord/Tenants
Impacts	Demand 16 kW Energy 553,500 kWh Incentive Budget $150,000 (1%) Cost per kWh $0.27 /kWh TRB $857,332
Technologies	<u>Incentive</u> <u>Units</u> Custom SWH Proposals $0.30/kWh 500,000 kWh
Market Barriers	• Lack of understanding of energy efficiency benefits • Renter and Lessee reluctance to invest in property
Description & Implementation Strategies	• <u>Custom SWH Proposals</u> – This measure is targeted for a central solar water heating system with the intention to provide solar water heating at a lower per unit cost by considering diversity in sizing and economies of scale in construction and sales.
Key Changes	• New • Will pursue implementation of pilot projects for heat pump water heaters to test cost effectiveness and market acceptance.
Marketing Strategies	• Direct contact with participating solar contractors • Community event promotion of High Efficiency Water Heating • Listing of participating contractors on our website • Print advertising and Social media

5.0 BUSINESS PROGRAM STRATEGY & DETAILS

5.1 Overview

For PY13, Hawaii Energy will maintain programmatic changes adopted in PY12, specifically these incentive categories:

- Business Energy Efficiency Measures (BEEM) – This category offers incentives for standard, known energy efficiency technologies in the form of prescriptive incentives in a streamlined application and grant award process.

- Custom Business Energy Efficiency Measures (CBEEM) – This category offers incentive for non-standard energy efficiency technologies often needed for commercial and industrial customers who need to invest in energy efficiency opportunities specific to unique project specific processes and designs, for example. Incentive award amounts are determined via calculations performed to quantify specific energy savings related to unique applications.

- Business Energy Service and Maintenance (BESM) – This incentive category focuses on developing viable projects through collaboration, competition and direct support in the form of expertise and/or equipment (i.e. metering).

- Business Hard-to-Reach (BHTR) - This incentive category aims to secure various projects among geographies and demographics that have been traditionally underserved such as retail, restaurants and other small businesses.

A summary listing of the new Business Program offerings can be found in the table below followed by a brief summary of additions and changes. A detailed description of the Business Program follows in sections 5.2 through 5.6. Appendix B contains a projection of potential energy savings for the planned programs.

Business Programs		
Program	Category	Measures
BEEM	**Business Energy Efficiency Measures**	
	High Efficiency Lighting	
	High Efficiency HVAC	
	High Efficiency Water Heating	
	High Efficiency Water Pumping	
	High Efficiency Motors	
	Commercial Industrial Processes	
	Building Envelope Improvements	
	Energy Star Business Equipment	
	Energy Awareness, Measurement and Control Systems	
CBEEM	**Custom Business Energy Efficiency Measures**	
	Customized Project Measures	
BESM	**Business Service and Maintenance**	
	Business Direct Installation	
	Business Design, Audits and Commissioning	
BHTR	**Business Hard to Reach**	
	Energy Efficiency Equipment Grants	
	Landlord, Tenant, AOAO Measures	

5.1.1 *New Program Offerings of Business Energy Efficiency Measures (BEEM)*

High Efficiency HVAC

- High Efficiency Chillers – The savings produced by high efficiency chillers is very specific for the location and the dependence of the "balance of system," pumps, controls etc. These incentives will be modified to encourage a methodical selection method and the savings calculated using modeling or spreadsheet analysis with appropriate system conditions (condenser water, flow rates, etc.). This offer will require kW/ton metering.

Commercial Industrial Process

- Waste Water – Wastewater facilities are 24/7 facilities that have specific technical requirements, high capital costs and long procurement process. This targeted program will target the two highest energy consumers in the plants, Air Systems & UV Lighting through process improvements. A list of private waste water facilities will be leveraged in targeting opportunities in PY13.

Sea Water Cooling

- Hawaii Energy will continue to support this evolving project in PY13 through metering and providing ad hoc resources as needed. The Program will pay incentives as directed in earlier proceedings upon installation and start up of the SWAC system.

5.1.2 *New Program Offerings of Customized Business Energy Efficiency Measures (CBEEM)*

Customized Project Measures

- No new program offering

5.1.3 *New Program Offerings of Building Energy Services and Maintenance (BESM)*

Business Design, Audits and Commissioning

- <u>Decision Maker: Real-Time Submeters</u> – There are individuals within business organizations who have influence over a large number of employees whose behavior within the work environment drive unnecessary energy consumption (e.g., leaving on lights, additional electronic equipment, etc.). This offer is the direct installation of a web-based electrical metering device. This metering will be monitored by the decision maker(s) within the organization to identify usage patterns and be the basis of peer group competitions within the organization.

5.1.4 *New Program Offerings of Business Hard-to-Reach (BHTR)*

Energy Efficiency Equipment Grants

- <u>Direct Install – Water Cooler Timers</u> – This program will utilize the Home & Office Delivery (HOD) water services providers to install digital timers on hot/cold water dispensers in order to save the stand-by losses in the cold and hot tanks during times that the systems are not being utilized.

Restaurant Targeted Participation Programs

- <u>Low Flow Spray Rinse Nozzles</u> – This measure was included to assist the program in driving up the cost effectiveness of the portfolio. This measure saves water first and then electricity in the form of lower water heating requirements. Hawaii Energy will engage with the water companies to jointly develop and promote this measure.

ENERGY STAR Commercial Kitchen Equipment

- <u>ENERGY STAR®Kitchen Equipment</u> – This program will focus on raising awareness of energy efficiency options when replacing equipment at end-of-life.

5.1.5 Business Program Details Table of Contents. To follow, in Sections 5.2 through 5. 5, is an overview summary of Residential Program Offerings followed by detailed descriptions and energy savings. The Overall Program Details are provided on the following page, preceding the individual Program summaries.

Program Category	5.2 All Business Programs Overview of All Business Programs
Target Markets	**Competitive Commercial** ○ Office Buildings ○ Retail **Governmental** ○ City ○ State ○ Federal **Industrial Sector** ○ Warehousing ○ Cold Storage ○ Water Pumping ○ Manufacturing **Multi-Site** ○ Convenience Stores ○ Restaurants **High Load Factor Customers** ○ Hospitals ○ Hotels ○ Super Markets ○ Data Centers **Multi-Family Commercial Rate** ○ AOAO ○ AOAO - Mixed Use
Projected Impacts	Demand 8,205 kW Energy 72,071,824 kWh Incentive Budget $ 10,842,869 Cost per kWh $0.150 /kWh TRB $105,553,489
Incentives	**Measure Categories** — **Incentives** 5.3 Business Energy Efficiency Measures $ 4,295,800 5.4 Custom Business Energy Efficiency Measures $ 1,060,000 5.5 Business Service and Maintenance $ 4,645,069 5.6 Business Hard-to-Reach $ 842,000 $ 10,842,869

Program Category	5.2 All Business Programs Overview of All Business Programs
Market Barriers	**General** • Lack of familiarity with availability of energy efficient technology and the vendors offering these services and products • Trust and creditability of technology providers • Unaware of business benefits of reducing exposure to cost of energy changes • High initial up-front cost • Life Cycle Cost vs. Simple Payback decision analysis • Need for a cash positive investment • Access to and/or understanding of financial options • Lack of knowledge of operation and maintenance of technologies **Landlords and Property Managers** • May not pay for electricity cost • Reluctance to invest without a financial return • Property is a short term investment **Renters and Lessees** • Do not have the authority or responsibility for the systems • Renter lease term shorter than simple payback for a measure
Description & Implementation Strategies	**Technology Based Categories** **High Efficiency Lighting, HVAC Water Heating Water Pumping Motors** **Building Envelope Improvements, Energy Star Business Equipment** The technology based incentives are provided for energy efficiency products that provide reliable energy savings for a wide array of customers. These incentives are developed to be based on fixed amounts per technology with performance adjustments to reflect the savings potential to ensure program cost-effectiveness set based on expected savings. Measures are selected and reviewed to determine that the energy savings can be reliably deemed, or calculated using simple threshold criteria.

Program Category	5.2 All Business Programs Overview of All Business Programs
Description & Implementation Strategies (continued)	The implementation process includes: • Program performs outreach and promotions to inform customers of incentive opportunities. • Customer selects and approves purchase and installation of energy efficiency measures • Customer sends in completed application forms with scheduling and supporting documentation • Customer provides evidence of installation and/or program will verify the installation Hawaii Energy processes the incentive on approved applications on an as-funds available basis **Energy Awareness, Measurement, and Control Systems** • Provide peer groups with Customized Hawaii specific Energy Use Intensity reports. These comparisons show their usage in comparison to their peers currently on an entire facility basis and as the program progresses we will disaggregate the comparisons down to the technologies "categories." • Provide self-assessment forms that the customer can complete on their own to identify potential savings. • Increase the use of incentives such as the Condominium Submetering that combine cash incentives with the requirement for educational components and the execution of audits to promote further energy savings activity in the facilities.
Key Changes	• Program baseline efficiency thresholds will be adjusted for new IEER AC ratings and review of efficiency levels as necessary to coincide with the adoption of IECC 2006 and IECC 2009 energy codes • Expand prescriptive selections for LED lamps that achieve ENERGY STAR status. • Chiller incentives based on kWh savings, Chiller selection model and kW/ton BTU metering. • Kitchen Exhaust Hood Incentive • Electronically Commutated Motors (ECM) for fan coil and evaporative fans. • Provide budget to match cofounded energy projects. This was developed with Hawaii Energy's work with HTDC (High Technology Development Corporation) to move projects in targeted industries. • ENERGY STAR Commercial Kitchen Equipment.

Program Category	5.2 All Business Programs Overview of All Business Programs
Marketing Strategies	• Web-based application forms will be advertised and made available to customers and their channel allies (lighting, cooling, motors, and controls). • Train and recruit program allies from various channels as program partners to enhance sales of their energy efficiency equipment • Maintain direct contact with key market players to understand the markets and decision points and to leverage their marketing resources to inform members • Email informational campaigns • Award and publish success of customer and ally partners to demonstrate highest level leadership in an effort to pull the market.

Program Category	**5.3 Business Energy Efficiency Measures** **BEEM Programs Overview**
Projected Impacts	Demand 4,967 kW Energy 37,044,804 kWh Incentive Budget $ 4,295,800 (22%) Cost per kWh $0.116 /kWh TRB $ 58,412,435
Incentives	see below

	Incentives
High Efficiency Lighting	$1,885,700
High Efficiency HVAC	$970,000
High Efficiency Water Heating	$826,200
High Efficiency Water Pumping	$99,900
High Efficiency Motors	$151,000
Commercial Industrial Processes	$125,000
Building Envelope Improvements	$73,000
Energy Star Business Equipment	$25,000
Energy Awareness, Measurement and Control Systems	$140,000

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.1 High Efficiency Lighting**
Projected Impacts	Demand 3,148 kW Energy 26,952,779 kWh Incentive Budget $ 1,885,700 (10%) Cost per kWh $0.07 /kWh TRB $39,278,297
Incentives	see below

Measure	Incentive	Units	
CFL	$2.00	16,100	Lamps
T12 to T8 (2&3 foot lamps)	$6.00	5,000	Lamps
T12 to T8 Low Wattage	$10.00	30,000	Lamps
T8 to T8 Low Wattage	$5.50	100,000	Lamps
Delamp	$7.50	5,000	Lamps Removed
Delamp/Reflector	$15.00	2,500	Lamps Removed
LED Refrigerated Case Light	$75.00	500	Lamps
ENERGY STAR LED			
-non-dimmable existing	$7.00	52,000	Lamps
-dimmable w/controls	$10.00	36,000	Lamps
-non-dimmable A19	$7.00	5,000	Lamps
-dimmable A19	$7.00	3,000	Lamps
LED Exit Signs	$20.00	1,000	Signs
HID Pulse Start	$40.00	400	Lamps
Sensors	$20.00	2,000	Sensors
Stairwell bi-level dimming fluorescent	$50.00	100	Fixtures

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC**
Projected Impacts	Demand 883 kW Energy 4,028,680 kWh Incentive Budget $ 970,000 (5%) Cost per kWh $0.241 /kWh TRB $8,248,653

Incentives

	Incentive	Units
Chillers – kW/ton meter and Chiller Curve Optimization	$0.15	1,500,000 kWh
VFD – HVAC Chilled Water / Condenser Water	$80	500 hp
VFD – HVAC AHU	$50	1,200 hp
Garage Active Ventilation Control	$0.12	1,000,000 kWh
Package Units	$200	500 Tons
VFR Split Systems - Existing	$300	1,000 Tons
VFR Split Systems – New Construction	$250	500 Tons

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.1 Chillers – kW/ton meter & Chiller Curve Optimization**
Projected Impacts	Demand 249 kW Energy 1,245,375 kWh Incentive Budget $ 225,000 (1%) Cost per kWh $0.18 /kWh TRB $2,954,561
Incentives	<u>**Incentive**</u> <u>**Units**</u> Chillers $0.15 1,500,000 kWh
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY The use of variable speed drives, oil-free magnetic bearings, large heat exchangers, lower condenser water and other modern design features, new chillers are 20-40% more efficient than older machines. Much of the savings is at part-load conditions where chillers operate the majority of the time. The chiller selection process is an important element prior to chiller purchase and the BTU metering will allow the optimization and maintenance of savings over time. TARGET AUDIENCE Who – Property Managers, Facilities Directors, Chief Engineers and Governmental Facilities Departments What – Large Commercial facilities INCENTIVE & TARGETED ECONOMICS The incentive directly rewards the expected energy reduction produced through careful selection and procurement of the machine. It is the intention that the incentive provide 100% of the cost premium to achieve these high efficiency levels. CUSTOMER QUALIFICATIONS Eligible chillers include centrifugal, screw, scroll and reciprocating compressors at 15% improvement over IECC 2006. APPLICATION PROCESS The following will be completed and submitted for review • Rebate Application , AC Chiller Rebate Worksheet • Chiller Equipment type (centrifugal, screw, reciprocating) • Retrofit or burnout • Integrated Part Load Value (IPLV) • Manufacturer and Model Number COMPLEMENTARY PROGRAMS: • Customized Project Measures • Central Plant Optimization

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.2 VFD – Chilled Water / Condenser Water** **5.3.2.3 VFD – AHU**
Projected Impacts	Demand 301 kW Energy 844,588 kWh Incentive Budget $ 100,000 (<1%) Cost per kWh $0.12 /kWh TRB $2,193,860
Incentives	**Incentive** / **Units** VFD – Chilled Water / Condenser Water $80 500 hp VFD – AHU $50 1,200 hp
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY The use of variable frequency drives to vary motor speeds to control flow in response to changes to loads provides significant savings in HVAC applications of supply, return and exhaust fans as well as chilled water and condenser water pumps. TARGET AUDIENCE Who – Property Managers, Facilities Directors, Chief Engineers and Governmental Facilities Departments, Mechanical Engineers and Contractors. What – All Commercial Facilities INCENTIVE & TARGETED ECONOMICS HVAC Fans (VFD): The offering of a prescribed $50 per fan HP controlled incentive for existing facilities. HVAC Pumps (VFD): The offering of a prescribed $80 per pump HP controlled incentive for existing facilities. CUSTOMER QUALIFICATIONS The application must have a load and system design and controls (two way valves, VAV boxes etc.) that respond to varying loads.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.2 VFD – Chilled Water / Condenser Water** **5.3.2.3 VFD – AHU**
Description & Implementation Strategies (continued)	APPLICATION PROCESS A HVAC Fan or Pump VFD rebate worksheet will be completed and submitted for review. • Require pre-notification before projects begin. • Existing equipment must not have a VFD. • The VFDs must actively control and vary the fan or pump speed. • Motor HP • Motor quantity

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.4 Garage Active Ventilation Control**
Projected Impacts	Demand 95 kW Energy 830,250 kWh Incentive Budget $ 120,000 (1%) Cost per kWh $0.14 /kWh TRB $847,131
Incentives	**<u>Incentive</u>** **<u>Units</u>** Garage Active Ventilation Control $0.12 1,000,000 kWh
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Enclosed parking garages that are mechanically ventilated 24/7 in order to remove the carbon monoxide (CO) created by gasoline powered vehicles. The ventilation systems are designed for maximum capacity conditions and there are opportunities to reduce both operating speed and fan runtimes during times of lower traffic periods to achieve fan energy savings of 60% to 90% with active CO monitoring systems control. The addition of Variable Speed Drives (VFDs) can also be incorporated if not already present. TARGET AUDIENCE Who - Property Managers & Private and Public Facilities Directors. Air Conditioning/Mechanical Contractors Facilities Maintenance Companies What – Office/Retail Buildings with mechanically ventilated parking garages. INCENTIVE & TARGETED ECONOMICS The $0.12/kWh incentive is directly provided to the metered savings resulting from the retrofit. APPLICATION PROCESS 1. A garage fan savings worksheet will be competed and submitted for review • Exhaust Fan/Motor Inventory • Map of Locations • Motor Horsepower & Runtimes • Sample set of fans must be spot metered to determine operating power consumption. 2. A pre/post inspection will be performed for systems totaling over 75 hp. This inspection may include metering of current fan horsepower. COMPLEMENTARY PROGRAMS: • High Efficiency Lighting – Induction / T8 / T5 / Occupancy Sensors /Timers

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.5 Package Units**
Projected Impacts	Demand 39 kW Energy 229,232 kWh Incentive Budget $ 100,000 (1%) Cost per kWh $0.44 /kWh TRB $423,308
Incentives	**<u>Incentive</u>** **<u>Units</u>** Package Units $200 500 Tons
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY The air-cooled package units are most often found in small commercial facilities as they are least first-cost and maintenance intensive of HVAC options to this market. The units are often roof-top mounted and feed constant volume distribution systems. The most cost effective opportunity to reduce energy consumption in these units are to replace them with the highest efficiency unit available and potentially convert at the same time to a VAV distribution system to increase both comfort and reduce cooling loads. A higher cost option is to convert to VRF split systems. TARGET AUDIENCE Who – Property Managers & Private and Public Facilities Directors. Air Conditioning/Mechanical Contractors, Mechanical Engineers What – Small Commercial facilities. INCENTIVE & TARGETED ECONOMICS The offering of prescriptive incentives based on the EER of the units starting at a 15% higher than IECC 2006 / ASHRAE 2004 standards. The incentives increase with higher efficiency levels. This level of incentive should eliminate the incremental difference between a standard efficiency unit. APPLICATION PROCESS 1. A prescriptive worksheet will be competed and submitted for review • Unit size, model, efficiency rating, operational hours • Map of Locations 2. A sample of sites have pre/post inspections COMPLEMENTARY PROGRAMS • Window Tinting • Package and Split AC Tune-Up • VRF Split Systems

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.6 VRF Split Systems - Existing Systems** **5.3.2.7 VRF Split Systems - New Construction**
Projected Impacts	Demand 199 kW Energy 879,235 kWh Incentive Budget $ 425,000 (3%) Cost per kWh $0.50 /kWh TRB $1,829,793
Incentives	**Incentive** **Units** VFR Split Systems – Existing Systems $300 1,000 Tons VFR Split Systems – New Construction $250 500 Tons
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY 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. A potential of 20 to 35% energy savings come 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. TARGET AUDIENCE Who – Property Managers & Private and Public Facilities Directors. Air Conditioning/Mechanical Contractors, Mechanical Engineers What – Commercial facilities. INCENTIVE & TARGETED ECONOMICS The offering of prescriptive incentives based on the tonnage of the VRF system. This level of incentive should reduce 25% of the incremental difference between a VRF and an alternative single or two-speed standard efficiency unit.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.6 VRF Split Systems - Existing Systems** **5.3.2.7 VRF Split Systems - New Construction**
Description & Implementation Strategies (continued)	APPLICATION PROCESS 1. A prescriptive worksheet will be completed and submitted for review • Unit size, model, efficiency rating, operational hours • Map of Locations 2. A sample of sites have pre/post inspections COMPLEMENTARY PROGRAMS • Window Tinting, Package and Split AC Tune-Up

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.3 High Efficiency Water Heating**
Projected Impacts	Demand 380 kW Energy 1,440,409 kWh Incentive Budget $826,200 (4%) Cost per kWh $0.574 /kWh TRB $3,774,728
Incentives	(see table below)

	Incentive	Units
Commercial Solar Water Heaters		
-Electric Resistance	$250	50 Tons
-Heat Pump	$100	100 Tons
Single Family Solar Water Incentive	$1,000	800 systems
Heat Pumps		
-Conversion – Electric Resistance	$120	20 Tons
Heat Pump Upgrade	$65	20 Tons

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.3 High Efficiency Water Heating** **5.3.3.1 Commercial Solar Water Heaters Electric Resistance** **5.3.3.2 Commercial Solar Water Heaters Heat Pump**
Projected Impacts	Demand 74 kW Energy 52,098 kWh Incentive Budget $22,500 (<1%) Cost per kWh $0.431 /kWh TRB $353,083
Incentives	<u>**Incentive**</u> <u>**Units**</u> Commercial Solar Water Heaters -Electric Resistance $250 50 Tons -Heat Pump $100 100 Tons
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Commercial solar water heaters can provide a renewable energy source of water heating. The systems can reduce electrical consumption for water heating by providing supplemental pre-heating all the way to 100% of the water heating needs limited by the hot water demand characteristic and the site's physical constraints on storage tank and panel locations. TARGET AUDIENCE Who – AOAOs, Property Managers, Private and Public Facilities Directors. Mechanical Contractors, Mechanical Engineers. What – Hotel, Condominium and Apartments & Government housing. INCENTIVE & TARGETED ECONOMICS The offering of a $250 / 12,000 BTU prescriptive incentive based on the derated installed capacity of the solar water heating system. The base system must have been electric resistance, heat pump or heat recovery off an electric chiller. Conversion to a gas backup system is permitted to eliminate any potential electrical demand from the system and allow quick peak recovery. The economic impact of this incentive will depend on the ability for the customer to take advantage of tax credits and the site specific system costs. The level will achieve a $0.43/kWh savings for the program. It is the desire to adjust the incentive to a point where it will lower the payback for the system to 5 years.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.3 High Efficiency Water Heating** **5.3.3.1 Commercial Solar Water Heaters Electric Resistance** **5.3.3.2 Commercial Solar Water Heaters Heat Pump**
Description & Implementation Strategies (continued)	APPLICATION PROCESS 1. A prescriptive worksheet/saving calculator will be competed and submitted for review • Unit sizes, model, derating rating, operational hours • System diagram 2. A sample of sites will have pre/post inspections COMPLEMENTARY PROGRAMS • Water saving showerheads, spray-rinse valves, and fixtures.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.3 High Efficiency Water Heating** **5.3.3.3 Heat Pump – Conversion – Electric Resistance** **5.3.3.4 Heat Pump Upgrade** **5.3.3.5 Military Housing SWH Incentive**
Projected Impacts	Demand 307 kW Energy 1,388,311 kWh Incentive Budget $ 803,700 (4%) Cost per kWh $0.579 /kWh TRB $3,421,645
Incentives	<u>Incentive</u> <u>Units</u> Heat Pumps -Electric Resistance $120 20 Tons -Upgrade $65 20 Tons Military Housing SWH $1,000 800 units
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Heat pump water heaters can provide a highly efficient source of water heating. Water-Source Heat pumps are the most efficient when used to supplement the heat rejection from chilled water return loops and condenser water systems to heat a facilities' domestic water needs or swimming pools. Heat pumps can also be air-source and provide heat mitigation in areas such a commercial kitchen and serve pools as a stand-alone water heater. The systems can reduce electrical consumption for water heating by providing supplemental pre-heating all the way to 100% of the water heating needs limited by the hot water demand characteristic and the site's physical constraints on heat pump storage tanks. The Military Housing Solar Water Heating (SWH) Incentive is reserved for a Military existing home retrofit with BTU metering and maintenance program for 800 homes behind a commercial meter. The total project will cover three years and be up to 1,200 homes. TARGET AUDIENCE Who – AOAOs, Property Managers, Private and Public Facilities Directors. Mechanical Contractors, Mechanical Engineers. What – Commercial Pools, Hotel, Condominium and Apartments & Government housing. INCENTIVE & TARGETED ECONOMICS The offering of a $120 or 65 per ton prescriptive incentive based on the installed

	capacity of the heat pump. The base system must have been electric resistance, failing heat pump (10 year or older) or heat recovery off an electric chiller. Conversion/remaining on a gas backup system are permitted to eliminate any potential electrical demand from the system and allow quick peak recovery.
Program Category	**5.3 Business Energy Efficiency Measures** **5.3.4 High Efficiency Water Pumping - Summary of Programs**
Projected Impacts	Demand 42 kW Energy 467,277 kWh Incentive Budget $ 99,900 (1%) Cost per kWh $0.214 /kWh TRB $716,482
Incentives	<u>Incentive</u> <u>Units</u> VFD Dom. Water Booster Packages – VFD $600 75 hp VFD Dom. Water Booster Packages – added HP Reduction $80 30 hp reduced VFD Pool Pump Packages $350 150 hp

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.4 High Efficiency Water Pumping** **5.3.4.1 VFD Dom. Water Booster Packages – VFD** **5.3.4.2 VFD Dom. Water Booster Packages – added HP Reduction**
Projected Impacts	Demand 24 kW Energy 258,801 kWh Incentive Budget $ 47,400 (<1%) Cost per kWh $0.183 /kWh TRB $402,130
Incentives	<u>Incentive</u> <u>Units</u> VFD Dom. Water Booster Packages – VFD $600 75 hp VFD Dom. Water Booster Packages – Added HP Reduction $80 30 hp reduced
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY The replacement of single speed staged domestic water booster pumps can provide up to 70% energy savings by: • providing constant pressure regardless of flow • reducing pump speed during low use periods increases system efficiency TARGET AUDIENCE Who – Property Managers, Facilities Directors, Chief Engineers and Governmental Facilities Departments, Mechanical Contractors and VFD Pump Package suppliers. What – Apartments, Office Buildings, Hotels, Hospitals INCENTIVE & TARGETED ECONOMICS The offering of a prescribed $80 per HP reduction and for booster pump system with VFD, add $600 per HP. The incentive is targeted to achieve a 10 to 15% reduction in the system cost. All pump motors must meet CEE Premium Efficiency standards. CUSTOMER QUALIFICATIONS 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 Constructions.

Program Category	5.3 Business Energy Efficiency Measures 5.3.4 High Efficiency Water Pumping 5.3.4.1 VFD Dom. Water Booster Packages – VFD 5.3.4.2 VFD Dom. Water Booster Packages – added HP Reduction
Description & Implementation Strategies (continued)	APPLICATION PROCESS The following will be completed and submitted for review • Rebate Application • Booster Pump Rebate Worksheet • Manufacturer's specification sheets or Name Plate Information including: • Manufacturer • Model Number • Serial Number • Motor Size (nominal hp) – All pump motors must meet CEE Premium Efficiency standards • Pump Type • Identify Pump with VFD or without VFD • Existing System hp minus New System hp COMPLEMENTARY PROGRAMS • Customized Project Measures • Central Plant Optimization Competition • CEE Listed Premium Efficiency Motors

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.4 High Efficiency Water Pumping** **5.3.4.3 VFD Pool Pump Packages**
Projected Impacts	Demand 17 kW Energy 208,476 kWh Incentive Budget $ 52,500 (<1%) Cost per kWh $0.25 /kWh TRB $314,351
Incentives	**Incentive** **Units** VFD Pool Pump Packages $350 150 hp
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Pool pumps often run much longer than necessary. A variable speed commercial pool pump motor in place of a standard single speed motor can save energy and maintain a comfortable swimming pool temperature and chemical circulation by using a smaller, higher efficiency pump and by operating it less. TARGET AUDIENCE Who – Property Managers, Facilities Directors, Chief Engineers and Governmental Facilities Departments What – Commercial facilities with swimming pool. INCENTIVE & TARGETED ECONOMICS The offering of a prescribed $350 per HP installed. CUSTOMER QUALIFICATIONS Existing single speed pool pump APPLICATION PROCESS The following will be completed and submitted for review • Rebate Application • VFD Pool Pump Rebate Worksheet • Manufacturer's specification sheets • Name Plate - Manufacturer, Model Number, Serial Number • Motor Size–pump motors must meet NEMA Premium Efficiency • Pump Type • Proof of installation and purchase COMPLEMENTARY PROGRAMS • Customized Project Measures • Central Plant Optimization Competition

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.5 High Efficiency Motors** **5.3.5.1 CEE Premium Efficiency Motors** **5.3.5.2 ECM w/ Controller- Evaporator Fan Motors** **5.3.5.3 ECM- Fan Coil Fans**
Projected Impacts	Demand 288 kW Energy 2,551,209 kWh Incentive Budget $ 151,000 (1%) Cost per kWh $0.06 /kWh TRB $4,143,532
Incentives	**<u>Incentive</u>** / **<u>Unit</u>** CEE Tier 1+ Premium Efficiency Motors — $10/hp — 50 hp ECM w/ Controller- Evaporator Fan Motors — $85/motor — 800 Motor ECM- Fan Coil Fans — $55/motor — 1,500 Motor
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY CEE LISTED MOTORS There is an opportunity to save energy with motors designed to utilize less power for the same horsepower of work. Motors in many applications (Water pumping and air handing) have long operational hours and are often out of sight and mind until they fail. The CEE Premium Efficiency Specification will be the qualification level for motors. This is driven by the December 2010 implementation of the Energy Independence and Security Act of 2007 (EISA) requiring the vast majority of new electric motors to meet NEMA Premium Efficiency standards. ECM There is an opportunity to save energy with ECM motors that have higher electrical efficiency (Electronically Commutated Motor, 70 percent efficient) than PSC (Permanent split capacitor, 49 percent efficient) or shaded-pole (32 percent efficient). In addition, “cooler” motor operation creates less heat load on the conditioned space. When motors fail there is often an operational urgency to replace them at the lowest first-cost as the replacement was not budgeted. TARGET AUDIENCE Who – Property Managers, Mechanical & Electrical Contractors, Motor Repair/Rewind Shops, Motor Distributor and Supply houses What – All Refrigeration and PTAC units

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.5 High Efficiency Motors** **5.3.5.1 CEE Premium Efficiency Motors** **5.3.5.2 ECM w/ Controller- Evaporator Fan Motors** **5.3.5.3 ECM- Fan Coil Fans**
Description & Implementation Strategies (continued)	INCENTIVE & TARGETED ECONOMICS The current $6/hp incentive will be transformed with the intention to eliminate the cost premium for the listed CEE Premium efficiency motors up to 200 hp. The $85 and $55/motor incentives are aimed at 20% of installed cost. APPLICATION PROCESS 1. A contractor or customer submitted application and savings worksheet. • Unit size, model, • Unit location description • Operational hours 2. A sample of sites will have post inspections COMPLEMENTARY PROGRAMS • High Efficiency HVAC • Central Plant Optimization • Target Cost per kWh Request for Proposals

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.6 Commercial Industrial Processes – Summary of Programs**
Projected Impacts	Demand 89 kW Energy 474,031 kWh Incentive Budget $ 125,000 (2%) Cost per kWh $0.26 /kWh TRB $836,031
Incentives	

	Incentive	Unit
Kitchen Exhaust Hood Demand Ventilation	$700	150 hp
Refrigerated Case Night Cover	$10 Linear ft.	2,000 Linear ft.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.6 Commercial Industrial Processes** **5.3.6.1 – Kitchen Exhaust Hood Demand Ventilation**
Projected Impacts	Demand 56 kW Energy 327,907 kWh Incentive Budget $ 105,000 (1%) Cost per kWh $0.32 /kWh TRB $608,788
Incentives	<u>**Incentive**</u> <u>**Unit**</u> Kitchen Exhaust Hood Demand Ventilation $700/hp 150 hp
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Kitchen ventilation with demand control hood exhaust uses temperature and/or smoke sensors to adjust ventilation rates. This saves significant energy comparing with the traditional 100% on/off controls. Traditional ventilation systems operate at one speed regardless of how hard the appliances are working. Demand Control Kitchen Ventilation systems respond to variations in stove use, allowing the two-speed or variable speed fans to regulate exhaust and makeup airflow as necessary. Therefore, when stoves are off or only a few burners are in use, the exhaust fans work at lower speeds and use less energy. TARGET AUDIENCE Restaurants, hotels, universities and hospitals. INCENTIVE & TARGETED ECONOMICS Incentive amounts will differentiate based on existing or new construction applications.. APPLICATION PROCESS To qualify for a Hawaii Energy Commercial Kitchen Demand Ventilation Controls Rebate, the following conditions must be met: • The control system must be used in conjunction with variable speed fan motor controls. • All motors must meet NEMA Premium Efficiency standards and be UL® Approved • Temperature or optical fume sensors must have the ability to sense and ramp up or down the ventilation rate based on the presence of temperature, smoke or steam from cooking activity

- Temperature and Infrared cooking sensors must have the ability to measure temperature at the cooking surface to ramp ventilation up or down based on when cooking starts
- Hawaii Energy Incentive Worksheet must be submitted with incentive application

COMPLEMENTARY PROGRAMS

- ENERGY STAR Kitchen Equipment
- SBDI – Restaurant Lighting
- Low Flow Spray Rinse Nozzles

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.6 Commercial Industrial Processes** **5.3.6.2 – Refrigerated Case Night Covers**
Projected Impacts	Demand 33 kW Energy 146,124 kWh Incentive Budget $ 20,000 (<1%) Cost per kWh $0.14 /kWh TRB $227,242
Incentives	<u>Incentive</u> <u>Unit</u> Refrigerated Case Night Covers $10/Linear ft. 2,000 Linear ft.
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY The installation of retractable aluminum woven fabric covers for open-type refrigerated display cases, where the covers are deployed during the facility's unoccupied hours in order to reduce refrigeration energy consumption. TARGET AUDIENCE Supermarkets, grocery stores, convenience stores and big box stores. INCENTIVE & TARGETED ECONOMICS The incentive target is $10/linear feet. APPLICATION PROCESS Eligibility • Must install a cover on an existing open refrigerated display case to decrease its cooling load during off hours. • The equipment manufacturer must not object to the use of night covers for the existing display case model. • This incentive is based on linear footage of the installed night cover. • The cover must be applied for a period of at least six hours. COMPLEMENTARY PROGRAMS • EC Evaporator Fan Motors • Refrigerated case lighting

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.7 Building Envelope Improvements**		
Projected Impacts	Demand	90	kW
	Energy	331,685	kWh
	Incentive Budget	$ 73,000	(<1%)
	Cost per kWh	$0.22	/kWh
	TRB	$560,309	
Incentives		**Incentive**	**Unit**
	Window Tinting	$0.85/sq.ft.	80,000 sq.ft.
	Cool Roof Technologies	$0.20/sq.ft	25,000 sq.ft.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.7 Building Envelope Improvements** **5.3.7.1 Window Tinting**
Projected Impacts	Demand 86 kW Energy 325,458 kWh Incentive Budget $ 68,000 (<1%) Cost per kWh $0.21 /kWh TRB $543,079
Incentives	**Incentive** / **Unit** Window Tinting — $0.85/sq.ft. — 80,000 sq.ft.
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Window tinting can save energy by reducing the heat gain through windows as well as preventing lowering of temperature set points by occupants near the windows. Modern tints can provide the rejection of infrared energy while not blocking visible light. This expands the tinting opportunities in view sensitive locations such as hotel and office buildings. TARGET AUDIENCE Who – AOAOs, Property Managers, Private and Public Facilities Directors. Window Tinting Companies What – Hotel, Office, Condominium and Apartments & Government housing. INCENTIVE & TARGETED ECONOMICS The offering of a $0.85 / sq. ft. prescriptive incentive based on the film's Solar Heat Gain Coefficient (SHGC) < 0.435. • *Warranty* – Film must have a minimum five-year manufacturer's warranty and one-year installer's warranty • *Conditioned Space* – Incentives shall be paid on actual square footage of glass in a conditioned space on the east, west, and south facing windows. • *Eligible Types* – Windows may be clear or factory tinted, single or double pane, but must not have reflected glass. • *Unshaded* – Windows significantly shaded by buildings, trees or awnings are not eligible for rebates. • *Replacement Film* – Replacement of deteriorated window film is eligible for incentives if the customer did not receive an incentive for the existing film, depending on measure life. Must meet/exceed existing SHGC. This incentive is targeted to provide a 25% cost reduction for the installation.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.7 Building Envelope Improvements** **5.3.7.1 Window Tinting**
Description & Implementation Strategies (continued)	APPLICATION PROCESS 1. A prescriptive worksheet will be completed and submitted for review • Square footage of tinting • HVAC system Information • Site Layout • Exterior Photo of the south, east and west of the facility 2. Manufacturer specification sheets. 3. A request for a manufacturer's energy savings model run based on the location specific site conditions. 4. All sites will have pre/post inspections COMPLEMENTARY PROGRAMS • High Efficiency HVAC Measures • Central Plant Optimization

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.7 Building Envelope Improvements** **5.3.7.2 Cool Roof Technologies**
Projected Impacts	Demand 4 kW Energy 6,227 kWh Incentive Budget $ 5,000 (<1%) Cost per kWh $0.80 /kWh TRB $17,231
Incentives	**Incentive** / **Unit** Cool Roof Technologies $0.20/sq.ft 25,000 sq.ft.
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Cool Roofs increase the reflectivity of the roof and reduce cooling loads by either the reflective white or silver color and/or by "stealth" technologies such as ceramic and titanium oxide particles embedded in the material. The cool roof technologies allow a wide range of roof colors. TARGET AUDIENCE Who – AOAOs, Property Managers, Private and Public Facilities Directors. Roofing Companies, Architects What – All Commercial Facilities INCENTIVE & TARGETED ECONOMICS The offering of a $0.20 / sq. ft. prescriptive incentive based on Energy Star Qualified roofing products. • *Warranty* – Roof must have a minimum fifteen-year manufacturer's warranty and one-year installer's warranty • *Conditioned Space* – Incentives shall be paid on actual square footage of roof covering a conditioned space. • *Unshaded* – Roofs significantly shaded by buildings, trees or awnings are not eligible for rebates. This is targeted to incentive will provide a 25% of the incremental cost of moving from standard to Energy Star roofing materials.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.8 Energy Star Business Equipment** **5.3.8.1 Energy Star Refrigerators w/Recycling**
Projected Impacts	Demand 14 kW Energy 339,987 kWh Incentive Budget $ 25,000 (<1%) Cost per kWh $0.07 /kWh TRB $434,468
Incentives	**Incentive** **Unit** Energy Star Refrigerators w/Recycling $50/unit 500 units
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY There is a 32 to 62% energy reduction opportunity in the replacement of the "old" office refrigerator with a modern Energy Star model. TARGET AUDIENCE Who – Property Managers, Executive Level Company Officers What – All Commercial INCENTIVE & TARGETED ECONOMICS The offering of a $50 incentive for Energy Star units bought and delivered by participating retailers. This incentive is a 10 to 25% reduction in the cost of a new Energy Star model. APPLICATION PROCESS 3. A retailer submitted application and recycling verification worksheet. • Unit size, model, • Confirmation of Pickup and Recycling. • Unit location description 4. A sample of sites will have post inspections COMPLEMENTARY PROGRAMS • High Efficiency HVAC and Lighting Measures

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.9 Energy Awareness, Measurement and Control Systems**
Projected Impacts	Demand 33 kW Energy 458,746 kWh Incentive Budget $ 140,000 (1%) Cost per kWh $0.31 /kWh TRB $419,936
Incentives	see below

Incentives	Incentive	Unit	
Hotel Room Occupancy Controls	$100	500	units
Condominium Submetering	$150	500	units metered
Small Business Submetering	$150	100	units metered

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.9 Energy Awareness, Measurement and Control Systems** **5.3.9.1 Hotel Room Occupancy Controls**
Projected Impacts	Demand 0 kW Energy 311,344 kWh Incentive Budget $ 50,000 (1%) Cost per kWh $0.16 /kWh TRB $228,763
Incentives	<u>Incentive</u> <u>Unit</u> Hotel Room Occupancy Controls $100 500 units
Description & Implementation Strategies	PROGRAM OBJECTIVE • This offer is for the installation of energy management systems that gives thermostat control to existing guest room air conditioning systems using occupancy sensors. REQUIREMENTS • All entry and lanai doors must have door switches or other technologies that will de-energize the fan coil unit • (FCU) when the door remains open. • All main rooms must have occupancy sensors that will de-energize the FCU when no movement is detected for a given period of time (not to exceed 15 minutes) Thermostat controls must be preset • Applicant must be on a Commercial Rate Schedule (reference utility bill). APPLICATION • Completed Commercial and Industrial Prescriptive Incentive Application • W-9 Tax Form • Completed Hotel Guest Room EMS Worksheet • Hotel Guest Room List • Equipment Invoice: Must clearly show the manufacturer, model number and quantity. • Equipment Specification Sheets INCENTIVE • $100 per guest room controlled

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.9 Energy Awareness, Measurement and Control Systems** **5.3.9.2 Condominium Submetering**
Projected Impacts	Demand 24 kW Energy 113,329 kWh Incentive Budget $ 75,000 (1%) Cost per kWh $0.16 /kWh TRB $142,461
Incentives	**Incentive** **Unit** Condominium Submetering $150 500 units metered
Description & Implementation Strategies	PROGRAM OBJECTIVE • This program is designed to assist master-metered condominiums and their Association of Apartment Owners (AOAO) to install billing sub meters for their units and common areas to drive energy conservation and ensure equity and fairness in allocating energy costs to tenants and/or owners of their condominium units. The knowledge of personal energy usage and the responsibility to pay for it can result in energy usage behavior modification and reward those making investments in energy efficient equipment. • The combination of billing sub meters, along with education, peer group comparisons and special equipment offerings, will assist the owner or tenant to achieve significant energy conservation and efficiency. • Provides the AOAO an opportunity to receive an energy audit of the property and participate in other Hawaii Energy incentives for conservation in all common areas. Possible incentives could include A/C, lighting, pool pumps, domestic water pumps and parking garage exhaust fans. INCENTIVE • The payment of this $150 per unit metered incentive is payable to the AOAO towards the purchase and installation of a third party sub metering system. The metering system is to be used for billing purposes so that each owner or tenant of the unit metered will be responsible for the payment of their own electric consumption. • Incentive payment will be made upon completion of: installation of each meter and billing system, tenant education sub metering workshop, energy audit of the AOAO property and commencement of real time billing to individual tenants. • Incentive payment cannot exceed 50% of total project cost.

Program Category	5.3 Business Energy Efficiency Measures 5.3.9 Energy Awareness, Measurement and Control Systems 5.3.9.2 Condominium Submetering
Description & Implementation Strategies (continued)	ENERGY SAVINGS • It is expected there will be at least a 10% reduction in energy usage; however, there is no minimum reduction in electrical use required to retain the incentive. • Currently the M&V Review suggests 3.8% this will be reviewed as compared to actual project performance. 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. • Energy meter data (sub metered billing statements) must be provided to Hawaii Energy 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. Components of the Pilot Program: • Physical verification review of meters serving the building. Review monthly billing history • AOAO to provide monthly individual data collection for a two month period after meter installation to Hawaii Energy. This would be the mock billing information that is supplied to the tenant. • Sub Metering system installation inspection review • Identification of Top (T) and Bottom (B) 5 energy users for the purpose of peer comparison. All information will be anonymous. • AOAO to host sub metering and energy conservation and efficiency workshops presented by Hawaii Energy. A free energy efficient power strip will be given to encourage attendance. (If power strips are not available, Hawaii Energy reserves the right to offer a comparable promotional item.) • CFL's and LED's can be purchased utilizing the point of purchase rebates made available by Hawaii Energy in retail outlets throughout the state. • AOAO owners/tenants are eligible for Energy Star Appliance rebates and can purchase Energy Star appliances through major retailers throughout the state.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.9 Energy Awareness, Measurement and Control Systems** **5.3.9.2 Condominium Submetering**
Description & Implementation Strategies (continued)	• AOAO to perform energy audit/Vendor Project Proposals with Hawaii Energy assistance on the following: 1. Common Area Lighting 2. HVAC 3. Domestic Water Pumping 4. Domestic Water Heating

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.9 Energy Awareness, Measurement and Control Systems** **5.3.9.3 Small Business Submetering**
Projected Impacts	Demand 9 kW Energy 34,073 kWh Incentive Budget $ 15,000 (<1%) Cost per kWh $0.44 /kWh TRB $48,712
Incentives	<u>**Incentive**</u> <u>**Unit**</u> Small Business Submetering $150 100 units metered
Description & Implementation Strategies	• Small Businesses ongoing efforts to reduce energy consumption and support the current submetering proposal as one that will insure both fairness in allocating energy costs as well as encouraging energy conservation through direct feedback of business energy use to the tenants. • Combining the submetering program with education and audits as proposed will complete developing the tenant's newfound desire for energy conservation with the how to achieve it. • $150 per unit metered, payable to the owner or small business • The payment of the incentive will be based on owner installing and utilizing the submeters for billing purposes as well as participating in the actions proposed below. • It is expected there will be at least 10% reduction in energy use, however, there is no minimum reduction in electrical use to be required by owner to retain the incentive. • We do require that the system remain in place and billing to occur for a period of at least five years or a pro-rated portion of the incentive will be recovered by Hawaii Energy. • A joint educational and monitoring program will be undertaken with owner to assist in the verification of savings and development of an ongoing energy incentive offering for other condominiums in Hawaii. • This will be a pilot program subject to review and approval of how savings will be determined. Savings methodology to be included in the TRM for 2012 Programs.

Program Category	5.4 Custom Business Energy Efficiency Measures Customized Programs Overview
Projected Impacts	Demand 190 kW Energy 6,642,000 kWh Incentive Budget $ 1,060,000 (5%) Cost per kWh $0.16 /kWh TRB $6,383,768
Incentives	This program provides for incentives for all energy-savings actions that are not already covered by the prescribed incentives. Custom incentives will not be limited to a certain list of measures.

	Incentive	Units
Customized Project Measures <5 yrs.	$0.08	2,000,000 kWh
Customized Project Measures >5 yrs.	$0.12	4,000,000 kWh
Customized Project Measures – Carry Over	$0.16	2,000,000 kWh

Program Category	**5.4 Custom Business Energy Efficiency Measures** **5.4.1 Customized Project Measures** **5.4.1.1 Customized Project Measures <= 5 yrs.** **5.4.1.2 Customized Project Measures >5 yrs.**
Projected Impacts	Demand 190 kW Energy 6,642,000 kWh Incentive Budget $1,060,000 (4%) Cost per kWh $0.16 /kWh TRB $6,383,768
Incentives	<u>Incentive</u> / <u>Units</u> Customized Project Measures <=5 yrs. — $0.08 — 2,000,000 kWh Customized Project Measures >5 yrs. — $0.12 — 4,000,000 kWh Customized Project – Carry Over — $0.16 — 2,000,000 kWh
Market Barriers	• Risk Avoidance • Market acceptance of new technologies • Lack of familiarity with availability of energy efficient technology • High initial up-front cost • Life Cycle Cost vs. Simple Payback decision analysis • Need for a cash positive investment • Access to and/or understanding of financial options • Lack of knowledge of operation and maintenance of technologies
Description & Implementation Strategies	**Customized Application Process** This program will provide a custom application and granting process for participants to receive incentives for installing non-standard energy efficiency technologies. The intent of this structure is to enable customers to invest in energy efficiency processes and technology measures that may require calculations of energy savings for specific, unique applications. Incentive awards will be based on calculated savings that ensure program cost-effectiveness. The process includes: • Program performs outreach and promotions to inform customers of incentive opportunities • Customer learns about the program offerings through various channels • Customer may call the program to request assistance. Customer or his agent must submit a brief proposal that describes the project and includes estimates of energy savings and payback • Engineering calculations are required and may be reviewed either internally or with a third-party engineering firm • Program provide feedback on the project to clarify if needed

Program Category	5.4 Custom Business Energy Efficiency Measures 5.4.1 Customized Project Measures 5.4.1.1 Customized Project Measures < = 5 yrs. 5.4.1.2 Customized Project Measures >5 yrs.
Description & Implementation Strategies (continued)	• Program provides pre-inspection and/or arranges for pre-metering of existing equipment if required • Customers select and approve purchase and installation of energy efficiency measures **Customized Project Criteria** • Payback of greater than one year or 6 months for LED projects. • Pass the utility benefit-cost test, Total Resource Cost Ratio (TRC) based on the value of the Utility avoided demand (kW) and avoided energy (kWh) that the project produces • Incentive rate will not exceed the 50 percent of incremental cost of the energy efficiency improvement **Customized Worksheet of Decision Criteria** We listened to feedback that the prior customized application process was mysterious and subjective. A customized worksheet was developed and implemented in PY2009 that incorporates all the information required to screen the project: • Base case and enhanced case scenarios • Project savings • Project costs The worksheet calculates and we are able to screen based on the following: • Simple Payback (>1 year or 6 months or greater for LED projects) • Incentive Amount (<=50% of incremental cost) • Total Resource Cost Ratio(>=1) Encouraged technology categories • Fresh Water Pumping / Waste Water Pumping • Data Centers - Airflow Optimization • Data Centers - Server Virtualization and Related Technologies • Parking Garages - Perimeter Dimming • Parking Ventilation Control • Demand Control Ventilation (CO2 Sensors in return airstream) • LED Refrigeration Case Lighting • LED Interior Lights

Program Category

5.4 Custom Business Energy Efficiency Measures

5.4.2 Customized Project Measures

5.4.2.1 Customized Project Measures <5 yrs.

5.4.2.2 Customized Project Measures >5 yrs.

Description & Implementation Strategies (continued)

- LED Traffic Lights and Exterior Lighting
- Commercial Refrigeration Measures
- Advanced Energy Management Controls
- High Performance Commercial Lighting
- Bi-Level Parking Garage Lighting

Key Changes

Tiered Incentives by Payback

- Projects that have longer life measures often have longer paybacks that businesses have a harder time gaining approval for. These projects can be pushed into reality by offering increases in the incentive levels in order to enhance feasibility and get them to a point where the customers will implement them.

Measure Life	Reduction in Energy Use Incentive	Evening Peak Demand Reduction (5PM-9PM Weekdays)	Day Peak Demand Reduction (12PM-2PM Weekdays)
< = 5 years	$0.08 / kWh	$125 / kW	*$100 / kW
> 5 years	$0.12 / kWh	$125 / kW	*$100 / kW
* HVAC application only			

Marketing Strategies

- Offer program ally custom incentive training and workshops to ensure program allies are comfortable with utilizing all aspects of the custom incentive program to sell more energy-efficient options to their respective customers
- Maintain direct contact with key market players to understand the markets and decision points and to leverage their marketing resources to inform members
- Email informational campaigns
- Award and publish success of customer and ally partners to demonstrate highest level leadership in an effort to pull the market

Program Category	**5.4 Custom Business Energy Efficiency Measures** **5.4.1 Customized Project Measures** **5.4.1.3 Customized Project – Carry Over**
Projected Impacts	Demand 47 kW Energy 1,660,500 kWh Incentive Budget $320,000 (1%) Cost per kWh $0.19 /kWh TRB $1,829,224
Incentives	**Incentive** / **Units** Customized Project – Carry Over $0.16 2,000,000 kWh
Description & Implementation Strategies	The program will provide an open opportunity for achieving energy efficiency by developing cost-effective projects that focus on high energy consumption businesses. The program will be a formal offer of matching or leveraging funds for projects that have not moved forward even with other sources of funding. The example were the HTDC (High Technology Development Corporation) funds for energy studies that were not fully subscribed due to the customers not having the remainder of the funding to execute. This co-funded work resulted in 2010 in eight energy studies resulting in at least one immediately implemented project. The projects will use utility metered data and if needed, will be submetered to ensure savings performance.

Program Category	5.5 Business Energy Services & Maintenance BESM Program Overview		
Projected Impacts			
	Demand	2,273	kW
	Energy	21,085,583	kWh
	Incentive Budget	$4,645,069	(24%)
	Cost per kWh	$0.22	/kWh
	TRB	$32,840,076	
Incentives		**Incentive**	**Units**
	5.3.1 Business Direct Installation		
	Small Business Direct Lighting Retrofits	$0.60	1,250,000 kWh
	5.3.2 Business Design, Audits & Commissioning		
	Benchmark Metering	$80,000	4 groups
	Decision Maker – Real-Time Submeters	$50,000	2 groups
	Energy Audit	$5,000	12 Studies
	Energy Study Project implementation	$25,000	8 Studies
	Energy Study Assistance – 50%	$15,000	3 Studies
	Design Study Assistance – 50%	$15,000	1 Design
	Water/Wastewater Catalyst	$0.18 / kwh	18,000,000 kWh

<table>
<tr><td>Program Category</td><td>5.5 Business Energy Services & Maintenance
5.5.1 Business Direct Installation
5.5.1.1 Small Business Direct Lighting Retrofits</td></tr>
<tr><td>Target Market</td><td>Small Business Customers receiving electric power under a Schedule “G” rate are eligible under this program.

Small customers similar to Schedule “G” customers that are under master-metered accounts would also be eligible.

The program will target the 50,000 customers within the small business market that have 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.

<table>
<tr><th colspan="2">Schedule "G" Customers</th></tr>
<tr><td>Oahu</td><td>29,117</td></tr>
<tr><td>Big Island</td><td>12,614</td></tr>
<tr><td>Maui</td><td>8,503</td></tr>
<tr><td>Lanai</td><td>194</td></tr>
<tr><td>Molokai</td><td>498</td></tr>
<tr><td>Totals</td><td>50,926</td></tr>
</table></td></tr>
<tr><td>Projected Impacts</td><td>
<table>
<tr><td>Demand</td><td>113</td><td>kW</td></tr>
<tr><td>Energy</td><td>1,314,563</td><td>kWh</td></tr>
<tr><td>Incentive Budget</td><td>$ 750,000</td><td>(4%)</td></tr>
<tr><td>Cost per kWh</td><td>$0.57</td><td>/kWh</td></tr>
<tr><td>TRB</td><td>$1,900,860</td><td></td></tr>
</table></td></tr>
<tr><td>Incentives</td><td>
<table>
<tr><th></th><th><u>Incentive</u></th><th><u>Units</u></th></tr>
<tr><td>Small Business Direct Lighting Retrofits</td><td>$0.60</td><td>1,250,000 kWh</td></tr>
</table></td></tr>
<tr><td>Technologies</td><td>Small Business Lighting Retrofit providing a “Turnkey” program consisting of audits, 100% incentivized lighting measures, installation by participating Hawaii Energy Participating contractors and 6 month financing of lighting retrofit costs of custom measures beyond the cost per kWh incentive.</td></tr>
</table>

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.1 Business Direct Installation** **5.5.1.1 Small Business Direct Lighting Retrofits**
Technologies (continued)	The program will be modified to return T8 32W to Low-wattage T8s (25/28W) to the standard incentive levels. This action is taken to increase cost effectiveness of the program and utilize the SBDIL budget to target the more T12s that remain in service. This also addressed more directly the customers that have for whatever operational/financial reason been unable to upgrade their T12 lighting. The 100% incentive levels will be reviewed to insure that changes in equipment pricing (LEDs in particular) are taken into account. Changes to the Partcipating Contractor Memorandum of Understandings (MOUs) will be made to address lessons learned in the first full year of implementation and to closely resemble the Solar Water Heater Program MOUs.
Market Barriers	• Trust in equipment vendors/contractors • Lack of familiarity with energy efficient lighting technologies • Inability to obtain project financing • Lack of time and expertise to seek and select lighting contractors • Life Cycle Cost vs. Simple Payback decision analysis

Description & Implementation Strategies	• Provide complete process to provide direct installation of lighting retrofits for small business customers. • Participating Hawaii Energy Participating contractors will offer six month payment plans for the lighting retrofits • Use of workforce development groups and grass roots volunteer organizations to generate leads and perform initial audits to lower cost of sales for Lighting contractors • Quick Inventory worksheet to ID potential targeting for future mechanical measures (AC/Water heating/Appliances/Refrigeration)
Marketing Strategies	• Direct contact with participating lighting contractors • Direct contact with Small Business Administration • Direct contact and printed materials to Property Management groups • Door-to-Door contact through Grassroots Action Groups • Website listing of participating lighting contractors

Program Category	5.5 Business Energy Services & Maintenance 5.5.2 Business Design, Audits and Commissioning 5.5.2.1 Benchmark Metering
Projected Impacts	Demand 0 kW Energy 420,660 kWh Incentive Budget $ 320,000 (1%) Cost per kWh $0.76 /kWh TRB $43,617
Incentives	**Incentive** / **Unit** Benchmark Metering $80,000 4 Groups
Description & Implementation Strategies	The Benchmark Metering incentive is designed to encourage business customers to install a central chiller plant metering and data logging system that will provide real-time data and trend data. This data reflects actual tons of cooling and measured efficiency in KW per ton. The new equipment will make it possible for the customer to set meaningful energy efficiency goals and track progress towards those goals. With the Hawaii Energy incentive, there is no cost to the customer for the metering equipment or installation (up to $80,000). Procedure: Customer: 1. Have a central chiller plant (or a central chiller plant project in the planning phase) with a total building electrical energy consumption of at least 3 million kWh per year. 2. Complete and submit Central Chiller Plant Benchmarking Application 3. The Hawaii Energy monitoring and data acquisition server shall be located at the customer's site and connected to the internet via customer's connection. 4. Submit to Hawaii Energy all payee information and the IRS Form W-9 at the beginning of every calendar year for processing of the IRS Form 1099. It is understood that Hawaii Energy will forward a copy of the IRS Form 1099 to the payee at the end of the calendar year. 5. Agree to inspection of project for up to 5 years after completion Industry Partners: 1. Assist customer in submission of application, savings estimate worksheet, and project proposal.

Program Category	5.5 Business Energy Services & Maintenance 5.5.2 Business Design, Audits and Commissioning 5.5.2.1 Benchmark Metering
Description & Implementation Strategies (continued)	2. Provide quotations for metering installation at customer's location. Only firm/fixed cost quotes will be accepted by Hawaii Energy. 3. Provide supporting documentation to support information submitted on Worksheet. Information may include drawings, vendor cut sheets, energy savings estimates (methodology and calculations). 4. Install approved measures and required metering/monitoring equipment Hawaii Energy: 1. Review application, worksheet, and proposal to determine if proposed project meets the intent of the program. 2. Perform post installation inspection to ensure all measures/equipment are properly install and operational. 3. Process approved incentive payments (to customer or authorized third party) based on validated savings calculations 4. Prepare and file close out report documenting actual savings achieved and incentives paid.
Marketing Strategies	• Direct contact with Mechanical Services companies, chief engineers, property managers and manufacturers representatives,

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.2 Decision Maker – Real-Time Submeters**
Projected Impacts	Demand 0 kW Energy 420,660 kWh Incentive Budget $100,000 (1%) Cost per kWh $0.24 /kWh TRB $43,617
Incentives	**Incentive** / **Units** Decision Maker – Real-Time Submeters: $50,000/group, 2 Groups
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY There are individuals within business organization who have influence over large numbers of employees whose behavior within the work environment drive unnecessary energy consumption. Examples can be leaving on lights, additional electronic equipment, and items such as foot heaters and additional fans that mask larger energy efficiency issues etc. This will be a pilot program subject to review and approval of how savings will be determined. Savings methodology to be included in the TRM for 2012 Programs. TARGET AUDIENCE Who – Property Managers, Executive Level Company Officers What – All Commercial INCENTIVE & TARGETED ECONOMICS The offering of the direct installation or materials with in-house installation of web-based electrical metering. This metering will be monitored by decision makers within the organization to identify usage patterns and be the basis of peer group competitions within the organization. APPLICATION PROCESS An MOU will be developed with the customer that will outline the purpose and process of setting up education and peer group competitions within their businesses. COMPLEMENTARY PROGRAMS • High Efficiency HVAC • High Efficiency Lighting Measures

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.3 Energy Audit**
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 60,000 (<1%) Cost per kWh $0.00 /kWh TRB $0
Incentives	**Incentive** / **Unit** Energy Audit $60,000 12 Studies
Description & Implementation Strategies	This offer is designed to promote energy-saving evaluations of building equipment and operations that consume electricity. Hawaii Energy provides an incentive for a portion of the existing facility's energy consumption analysis through a two phase process: (1) the completion of a preliminary energy audit (see Energy Audit Worksheet from website) and (2) a detailed energy study upon approval of the audit. Pre-approval is required prior to the start of any audit in order to ensure budget availability, review any prior studies at the location, and have a discussion about the goals and context of the energy analysis.

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.4 Energy Study Project Implementation - 100%**
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 200,000 (1%) Cost per kWh n/a TRB n/a
Incentives	**Incentive** **Units** Energy Study Assistance $25,000/study 8 studies
Description & Implementation Strategies	• 100% Funded up to $25,000 • Customer agrees to implement reccomendations with less than 2 year paybacks within 1 year up to the value of the energy study or pays back 50% of the energy study cost. • Load / Existing Performance Measurements • Modeling new systems • Actionable recommendations

Program Category	5.5 Business Energy Services & Maintenance 5.5.2 Business Design, Audits and Commissioning 5.5.2.5 Energy Study Assistance
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 45,000 (<1%) Cost per kWh n/a TRB n/a
Incentives	**Incentive** / **Units** Energy Study Assistance — $15,000/study — 3 studies
Description & Implementation Strategies	• 50% matching up to $15,000 • Load / Existing Performance Measurements • Modeling new systems • Actionable recommendations

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.6 Design Assistance**
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 15,000 (1%) Cost per kWh n/a TRB n/a
Incentives	<u>**Incentive**</u> <u>**Units**</u> Energy Study Assistance $15,000/study 1 Design
Description & Implementation Strategies	• 50% matching up to $15,000 for projects exceeding code requirements • Meet targeted energy efficiency levels • Actionable recommendations
Marketing Strategies	• Direct interaction with potential customers and mechanical engineers • Promote measure information on the website • Promote successful projects in the media and events

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.7 Water & Wastewater Energy Project Catalyst**
Projected Impacts	Demand 2,161 kW Energy 18,929,700 kWh Incentive Budget $ 3,155,069 (16%) Cost per kWh $0.17 /kWh TRB $30,851,981
Incentives	**Incentive** / **Units** W/WW Energy Project Catalyst $0.18/kWh 18,000,000 kWh
Description & Implementation Strategies	The objective of the catalyst program is to accelerate stalled high impact UV disinfection project. • *5 year Cost Neutral Incentive* – This measure will provide the funding required to drive this project into a 5 year lease that is cash neutral for the customer.

Program Category	**5.6 Business Hard-to-Reach** **BHTR Program Overview**
Target Market	Offices Water coolers use a significant amount of energy. A standard hot and cold water cooler can use more energy than a large refrigerator – according to Energy Star. The solution is to install timers to shut down during non-usage hours. Restaurants This sector has a low participation rate, low saturation of high efficiency equipment and high potential for energy savings. The Small Business Direct Installation (SBDI) method has shown to be effective to get attention and participation with the ability to then gather information on the restaurant equipment and operations that can lead to greater energy savings through other programs such as the ENERGY STAR Kitchen equipment program. Landlords The landlord/tenant relationship provides challenges to making energy efficiency capital investments in properties and operations such as air conditioning and lighting upgrades. This funding is to create a program that works with landlords that are taking This program will be targeted to provide landlords of small business schedule "G" customers with comprehensive audit, RFP and other support for energy saving projects that will drive down the energy cost of their tenants.
Projected Impacts	Demand 775 kW Energy 7,299,438 kWh Incentive Budget $842,000 (5%) Cost per kWh $0.11 /kWh TRB $7,917,209
Incentives	(see below)

	Incentive	Units
5.6.1 Energy Efficiency Equipment Grants		
Water Cooler Timers	$15	10,000 units
5.6.2 Restaurant Targeted Participation Programs		
SBDI - Kitchen Exhaust Hood Demand Ventilation	$1,700	50 hp
Low Flow Spray Rinse Nozzles	$22	500 units
Energy Star Commercial Kitchen Equipment	$0.10/kWh	778,846 kWh
SBDI - Restaurant Lighting	$0.50	1,000,000 kWh
5.6.3 Landlord, Tenant, AOAO Measures		
Energy Hero Landlord	$0.30	50,000 kWh

Program Category	**5.6 Business Hard to Reach** **5.6.1 Energy Efficiency Equipment Grants** **5.6.1.1 – Water Cooler Timers**
Projected Impacts	Demand 548 kW Energy 2,465,843 kWh Incentive Budget $ 150,000 (1%) Cost per kWh $0.06 /kWh TRB $2,130,499
Incentives	**Incentive** **Unit** Water Cooler Timers $15 10,000 units
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Water coolers use a significant amount of energy. To address the vast energy waste, water cooler timers can save over 70% on water cooler electricity cost in a standard office work week. Water coolers programmed to shut down during non-usage hours will save significant amount of energy. TARGET AUDIENCE Offices INCENTIVE & TARGETED ECONOMICS $15 per water cooler timer APPLICATION PROCESS. This program will be implemented through home-office delivery (HOD) companies that provide water services. Water cooler timers will be programmed to shut down during non-usage office hours.

Program Category	**5.6 Business Hard–to-Reach** **5.6.2 Restaurant Targeted Participation Program** **5.6.2.1 Low Flow Spray Rinse Nozzles**
Target Market	• Restaurants
Projected Impacts	Demand 0 kW Energy 2,685,029 kWh Incentive Budget $11,000 (<1%) Cost per kWh $0.00 /kWh TRB $2,695,920
Incentives	<u>**Incentive**</u> <u>**Units**</u> Low Flow Spray Rinse Nozzles $22 500 unit
Description & Implementation Strategies	A low-flow pre-rinse spray valve is one of the easiest and most cost effective energy saving devices available to the foodservice operator. In addition to minimizing water consumption, water heating energy and sewer charges are also reduced.

Program Category	**5.6 Business Hard-to-Reach** **5.6.2 Restaurant Targeted Participation Programs** **5.6.2.2 SBDI - Kitchen Exhaust Hood Demand Ventilation**
Target Market	• Restaurants
Projected Impacts	Demand 25 kW Energy 144,279 kWh Incentive Budget $85,000 (<1%) Cost per kWh $0.59 /kWh TRB $267,867
Incentives	<u>**Incentive**</u> <u>**Unit**</u> SBDI - Kitchen Exhaust Hood Demand Ventilation $1,700 50 hp
Market Barriers	• Familiarity with technology • Vendor/Contractor sales and support in Hawaii for technology • Customer lack of access to capital for energy improvements • Renter and Lessee reluctance to invest in non-owned property
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY Kitchen Exhaust hoods run typically at full speed during the operating hours of the restaurant. These controller systems monitor the cooking surfaces for heat and/or particulates in the air to run the fans only when needed. Saving the energy that is wasted during idle periods. This will be a pilot program subject to review and approval of how savings will be determined. Savings methodology to be included in the TRM for 2012 Programs. The modest savings value is based on a single project monitored in PY2011. TARGET AUDIENCE Who – Restaurant Owners, Hawaii Restaurant Association What – Restaurants INCENTIVE & TARGETED ECONOMICS The offering of the direct installation 100% Cost Incentive. Work to be performed by participating contractors/manufacturers. APPLICATION PROCESS • Targeted Anticipation and Vendor Driven leads drive interest. • Application and site audit information • Agreement to allow marketing/promotions in Restaurant regarding work performed and savings achieved.

Program Category	**5.6 Business Hard-to-Reach** **5.6.2 Restaurant Targeted Participation Programs** **5.6.2.3 SBDI - Restaurant Lighting**
Target Market	• Restaurants
Projected Impacts	Demand 31 kW Energy 1,095,930 kWh Incentive Budget $500,000 (3%) Cost per kWh $0.46 /kWh TRB $1,346,278
Incentives	Small Business Direct Installation — <u>**Incentive**</u>: $0.50 — <u>**Units**</u>: 1,000,000 kWh
Market Barriers	• Customer lack of access to capital for energy improvements • Renter and Lessee reluctance to invest in non-owned property
Description & Implementation Strategies	• Provide complete process to provide direct installation of lighting retrofits for small business customers. • Participating Hawaii Energy Participating contractors will offer six month payment plans for the lighting retrofits • Use of workforce development groups and grass roots volunteer organizations to generate leads and perform initial audits to lower cost of sales for Lighting contractors • Quick Inventory worksheet to ID potential targeting for future mechanical measures (AC/Water heating/Appliances/Refrigeration)
Marketing	• Direct contact with participating lighting contractors • Direct contact with Small Business Administration • Direct contact and printed materials to Property Management groups • Door-to-Door contact through Grassroots Action Groups • Website listing of participating lighting contractors

Program Category	**5.6 Business Hard-to-Reach** **5.6.2 Restaurant Targeted Participation Program** **5.6.2.3 SBDI - Restaurant Lighting**
Technologies	A "Turnkey" program consisting of audits, 100% incentivized lighting measures, installation by participating Hawaii Energy Participating contractors and 6 month financing of lighting retrofit costs of custom measures beyond the cost per kWh incentive. Changes to the Partcipating Contractor Memorandum of Understandings (MOUs) will be made to address lessons learned in the first full year of implementation and to closely resemble the Solar Water Heater Program MOUs. The program will be modified to return T8 32W to Low-wattage T8s (25/28W) to the standard incentive levels. This action is taken to increase cost effectiveness of the program and utilize the SBDIL budget to target the more T12s that remain in service. This also addressed more directly the customers that have for whatever operational/financial reason been unable to upgrade their T12 lighting. The 100% incentive levels will be reviewed to insure that changes in equipment pricing (LEDs in particular) are taken into account.
Market Barriers	• Trust in equipment vendors/contractors • Lack of familiarity with energy efficient lighting technologies • Inability to obtain project financing • Lack of time and expertise to seek and select lighting contractors • Life Cycle Cost vs. Simple Payback decision analysis

Program Category	**5.6 Business Hard to Reach** **5.6.2 Restaurant Targeted Participation Programs** **5.6.2.4 - ENERGY STAR Commercial Kitchen Equipment**
Projected Impacts	Demand 171 kW Energy 853,561 kWh Incentive Budget $ 81,000 (<1%) Cost per kWh $0.09 /kWh TRB $1,440,565
Incentives	**<u>Incentive</u>** **<u>Unit</u>** Commercial Kitchen Equipment $0.10 /kWh 778,846 kWh
Description & Implementation Strategies	ENERGY REDUCTION OPPORTUNITY This program will start with direct installation of variable exhaust ventilation systems that adjust to the cooking exhaust loads. TARGET AUDIENCE Who – Restaurants and commercial kitchens What – Commercial Kitchen Equipment INCENTIVE & TARGETED ECONOMICS This program will have a variety of incentives for dozens of equipment types. It is expected that the average cost per kWh will be $0.30 /kWh. We will work with Fishnick and CEE to develop equipment types and incentive levels. APPLICATION PROCESS. This program will be implemented through specialty contractors on a dollar per kWh capture basis. The program will also develop vendor driven program that will provide them direct incentives and the support of Hawaii Energy technology papers and sales call assistance. COMPLEMENTARY PROGRAMS • Target Cost per kWh Request for Proposals

Program Category	**5.6 Business Hard–to-Reach** **5.6.3 Landlord, Tenant, AOAO Measures** **5.6.3.1 Energy Hero Landlord**
Target Market	• Property Managers, Landlords, BOMA
Projected Impacts	Demand 0 kW Energy 54,797 kWh Incentive Budget $15,000 (<1%) Cost per kWh $0.30 /kWh TRB $36,080
Incentives	**Incentive** **Units** Energy Hero Landlord $0.30 50,000 kWh
Market Barriers	The landlord/tenant relationship provides challenges to making energy efficiency capital investments in properties and operations such as air conditioning and lighting upgrades. The tenant energy usage can be accounted for by: 1. Paying a flat rate per square foot based on a lease agreement 2. Costs Incorporated in CAM 3. Third-Party submetered 4. Separate Utility submeter Energy savings project may: • not have a direct financial incentive for either party • have simple payback beyond lease term
Description & Implementation Strategies	**Energy Hero Landlord - Major Project Support** This program will be targeted to provide landlords of small business schedule "G" customers with comprehensive audit, RFP and other support for energy saving projects that will drive down the energy cost of their tenants. The program will work with local lenders to provide project financing support in conjunction with the program.

6.0 PROGRAM-LEVEL BUDGET

Below is the PY13 Program-Level Budget.*

Hawaii Energy Efficiency Program Annual Plan Budget
July 1, 2013 through June 30, 2014

Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	2,591,084	7,504,500	10,095,584
CESH	40,486	25,000	65,486
RESM	121,457	540,000	661,457
RHTR	121,457	801,939	923,396
Total Residential Programs	**2,874,484**	**8,871,439**	**11,745,923**
Residential Market Evaluation	**242,914**	**0**	**242,914**
Residential Outreach	**931,171**	**0**	**931,171**
Total Residential Services and Initiatives	**4,048,569**	**8,871,439**	**12,920,008**
Business Programs			
BEEM	1,286,545	4,295,800	5,582,345
CBEEM	989,650	1,060,000	2,049,650
BESM	692,755	4,645,069	5,337,824
BHTR	544,308	842,000	1,386,308
Total Business Programs	**3,513,258**	**10,842,869**	**14,356,127**
Business Market Evaluation	**296,895**	**0**	**296,895**
Business Outreach	**1,138,098**	**0**	**1,138,098**
Total Business Services and Initiatives	**4,948,251**	**10,842,869**	**15,791,120**
Total Residential and Business Services and Initiatives	**8,996,820**	**19,714,308**	**28,711,128**
Transformational Programs			
Residential Transformational Programs	0	985,715	985,715
Business Transformational Programs	0	1,204,763	1,204,763
Total Transformation Services and Initiatives	**0**	**2,190,478**	**2,190,478**
Total Supporting Services	**2,091,908**	**0**	**2,091,908**
Total Tax on Non-Incentive	**489,517**	**0**	**489,517**
Estimated Contractor Costs	**11,578,245**	**21,904,786**	**33,483,031**

* This table provides a program-level itemization of the overall contract budget. While the contractual budget categories and limitations are as set forth in the contract, the Hawaii Energy team will continue reporting status of budget and expenditures at the program-level, consistent with prior years. Formal changes to the contract budget will be in accordance with the contract.

7.0 PERFORMANCE INCENTIVE GOALS AND INCENTIVE WEIGHTING

7.1 Performance Incentive Goals

The following table shows the PY13 Program Performance Goals and Incentives as contained in the supplemental contract covering the PY13 budget. The transition between Minimum, Target and Maximum shall be calculated on a linear basis for both goals and awards where appropriate.

PY2013 Performance Goals								
	Performance Goals							
Performance Target Item		*Minimum*		*Target*		*Maximum*		
		75%		*100%*		110%		
First Year Energy Reduction		106,212,107		141,616,143		155,777,757	kWh	
Peak Demand Reduction		13,366		17,821		19,603	kW	
Total Resource Benefit	$	132,760,481	$	177,013,974	$	194,715,371	$	
Transformation Infrastructure Development		*Minimum Participation*		*Target Participation*				
Behavior Modification		13,500		18,000				
Professional Development		750		1,000				
Technical "Know How"		1,500		2,000				
Island Incentive Equity		*Minimum*		*Target*		*Maximum*		*Contribution*
		80%		100%				
County of Hawaii	$	1,987,202	$	2,484,003		n/a		12.6%
C&C Honolulu	$	11,733,956	$	14,667,445		n/a		74.4%
County of Maui	$	2,050,288	$	2,562,860		n/a		13.0%
Total			$	19,714,308				100.0%

PY2013 Performance Incentives								
		Program Incentive Award						
Performance Target Item	***% of Target***		***Minimum***		***Target***		***Maximum***	
			75%		*100%*		123.8%	
First Year Energy Reduction	35%	$	183,750	$	245,000	$	303,188	
Peak Demand Reduction	5%	$	26,250	$	35,000	$	43,313	
Total Resource Benefit	40%	$	210,000	$	280,000	$	346,500	
Infrastructure development	10%		n/a	$	70,000	$	70,000	
Island Incentive Equity	10%		n/a	$	70,000	$	70,000	
Total				$	700,000	$	833,000	
Potential Award for Performance in Excess of Targets						$	133,000	

7.2 Performance Incentive Fractions

The following table shows the PY13 Performance Incentive Fractions as contained in the supplemental contract covering the PY13 budget.

Performance Target Goal	Fraction of Incentive
First Year Energy Reduction	35%
Peak Demand Reduction	5%
Total Resource Benefit	40%
Infrastructure development	10%
Island Incentive Equity	10%

8.0 CONCLUSION

The Hawaii Energy Team is projecting strong energy savings results for PY12 (ending 30 Jun 2013).

Our ultimate energy efficiency and conservation success will require continuous innovation and improvement of our efficiency technologies, energy awareness education and program strategies to ensure that we stay ahead of our goals. The Hawaii Energy pledge is to engage these requirements with the best effort possible.

For PY13, the Hawaii Energy Team will continue the transparency, integrity, cost-effectiveness, innovation and singular focus on saving energy for Hawaii that have been the key hallmarks of our tenure as Hawaii's first independent Public Benefit Fee Administrator. Working under the PUC's leadership, together with our allies, government agencies, utilities and utility customers, we look forward to being a major catalyst and contributor to Hawaii's successful climb to a clean energy future.

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9.0 APPENDIX

Appendix A – Program Budget PY13 (Full Version)

Appendix B – Summary Presentation of Programs

Appendix C – TRB Utility Benefit Values

APPENDIX A – PROGRAM-LEVEL BUDGET PY2013 (Expanded Version)

As noted above, while the contract sets forth the overall budget categories and limitations, status of Hawaii Energy PY13 budget and expenditures will be reported at this itemized program-level.

Hawaii Energy Efficiency Program Annual Plan Budget - April 29, 2013	PY13 Budget
Residential Programs	
Residential Program Ops and Management	
REEM	2,591,084
CESM	40,486
RESM	121,457
RHTR	121,457
Subotal Residential Programs	2,874,484
Residential Market Evaluation	242,914
Residential Outreach	931,171
Total Residential Non-Incentive	*4,048,569*
Residential Incentives	
REEM	7,504,500
CESH	25,000
RESM	540,000
RHTR	801,939
Subtotal Residential Incentives	8,871,439
Residential Transformational	985,715
Total Residential Incentives	*9,857,154*
Total Residential Programs	**13,905,723**
Business (C&I) Programs	
Business Programs Ops and Management	
BEEM	1,286,545
CBEEM	989,650
BESM	692,755
BHTR	544,308
Subtotal Business Programs	3,513,258
Business Evaluation	296,895
Business Outreach	1,138,098
Total Business Non-Incentive	*4,948,251*
Business Incentives	
BEEM	4,295,800
CBEEM	1,060,000
BESM	4,645,069
BHTR	842,000
Subotal Business Incentive	10,842,869
Business Transformational	1,204,763
Total Business Incentives	*12,047,632*
Total Business Programs	**16,995,883**
Supporting Services	
Supporting Services	2,091,908
Total Supporting Services	**2,091,908**
Subtotal Non-Incentive (Prior to Tax)	11,088,728
Less Performance Incentives (Prior to Tax)	(700,000)
Subtotal Non-Incentive Less Performance Incentives (PI)	10,388,728
Total Tax on Non-Incentive Without PI	489,517
Performance Incentive Award (Inclusive of Tax)	700,000
Subtotal Non-Incentive Billed	*11,578,245*
Subtotal Residential and Business Customer Incentives	*19,714,308*
Subtotal Transformational Incentives	*2,190,478*
Subtotal Customer and Transformational Incentives	*21,904,786*
Sub-Total Estimated Contractor Costs	***33,483,031***
Performance Awards in Excess of Target Levels	133,000
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels	**33,616,031**

Hawaii Energy - PY2013 ANNUAL PLAN
SUMMARY PROPOSED PROGRAM BUDGETS

PROGRAM BUDGET GUIDELINES

PBFA Contract Renewal Guidelines for Year 5

Program Year	2013
Period of Performance	7/1/13 to 6/30/14
PBFA Budget Allocation	$ 33,616,031

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
General Adminstrative and IT Costs	$ 2,190,479	6.5%	94%
Performance Award in Excess of Target*	$ 133,000	0.4%	6%
Total PBFA Administrative Costs	$ 2,323,479	6.9%	100%

Budget Item / Category		Total	Allocation Targets: Direct Incentives	Allocation Targets: Direct Implementation
		100%	70.0%	30.0%
Residential Program Cost Split	45%	$ 14,081,648	$ 9,857,154	$ 4,224,494
Business Program Cost Split	55%	$ 17,210,904	$ 12,047,633	$ 5,163,271
Total Direct Program Costs	100%	$ 31,292,552	$ 21,904,787	$ 9,387,765

Budget Item / Category		Direct Incentives	Res + Bus Incentives
Residential Direct Incentives	40.5%	$ 8,871,439	90%
Business Direct Incentives	49.5%	$ 10,842,869	$ 19,714,308
Transformational Incentives	10.0%	$ 2,190,479	
Total Program Direct Incentives	100.0%	$ 21,904,787	

Proposed Incentives and Operations Breakouts

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
Residential Incentives	$ 8,871,439.00	26%	40.5%
Business Incentives	$ 10,842,869.00	32%	49.5%
Transformation Incentives	$ 2,190,479.00	7%	10.0%
Total Incentives	$ 21,904,787.00	65%	100.0%
Administration / IT	$ 2,190,479.00	7%	19%
Direct Program Implementation Costs	$ 9,387,765.00	28%	81%
Total Operations	$ 11,578,244.00	34%	100%
Total Incentives	$ 21,904,787.00	65%	65%
Total Operations	$ 11,578,244.00	34%	34%
Total Award in Excess of Target*	$ 133,000.00	0%	0%
Total Budget	$ 33,616,031.00	100%	100%

* = This Incentive Award budget amount is not earned until performance is achieved.

These highlighted figures are key program metric percentages

APPENDIX B -

Hawaii Energy - PY2013 ANNUAL PLAN - SUMMARY PRESENTATION OF PROGRAMS BY MEASURE

Combined Programs		Budget	Plan	Diff
Residential	45%	$ 8,871,439	$ 8,871,439	$ -
Business	55%	$ 10,842,869	$ 10,842,869	$ -
Bottom Up Program Impacts		$ 19,714,308	$ 19,714,308	$ -
Target Program Impacts		$ 19,714,308		

Energy	kW	kWh	$/kWh	TRB
Residential	9,616	69,544,319	$ 0.128	$ 71,459,715
Business	8,205	72,071,824	$ 0.150	$ 105,553,489
Plan Estimate	17,821	141,616,143	$ 0.139	$ 177,013,203
Target Impact Levels	17,821	141,616,143	$ 0.139	$ 177,013,974
% of Target	100%	100%	100%	100%

Residential Programs

Program	Category	Measures	Count	Units	Average Incentive per Unit	Estimated Budget	% Total Program	kW/Unit	kWh/Unit	$/Lifetime kWh	System Loss	Net-to-Gross	Effective kWh	Program Cost per kWh	kW	% Total Program	kWh	% Total Program	Life	TRB	% Total Program
		Residential Target				$ 8,871,439															
		Difference				$ -															
		Residential Plan				$ 8,871,439									9,616		69,544,319	$ 0.128		$ 71,459,715	
REEM	*Residential Energy Efficiency Measures*					$ 7,504,500	38%								9,056	51%	66,057,453	47%		$ 66,798,045	38%
	High Efficiency Water Heating					**$ 2,718,000**	**14%**								**1,124**	**6%**	**5,194,420**	**4%**		**$ 12,422,767**	**7%**
		Solar Water Heater (SWH) Incentive	2,400	systems	$ 1,000	$ 2,400,000	12%	0.460000	2,065.0	2.4%	10.7%	0.79	1,805.90	0.55	965	5%	4,334,171	3%	20.0	$ 10,756,287	6%
		Solar Water Heater Interest Buydown	258	systems	$ 1,000	$ 258,000	1%	0.460000	2,065.0	2.4%	10.7%	0.79	1,805.90	0.55	104	1%	465,923	0%	20.0	$ 1,156,301	1%
		Heat Pumps	300	units	$ 200	$ 60,000	0%	0.210000	1,503.0	1.3%	10.7%	0.79	1,314.42	0.15	55	0%	394,326	0%	10.0	$ 510,178	0%
	High Efficiency Lighting					$ 2,550,000	13%								6,953	39%	49,795,738	35%		$ 44,508,241	25%
		CFLs	1,500,000	lamps	$ 1.00	$ 1,500,000	8%	0.005000	36.3	0.5%	10.7%	0.79	31.75	0.03	6,559	37%	47,618,159	34%	6.0	$ 40,379,974	23%
		LED	150,000	lamps	$ 7	$ 1,050,000	5%	0.003000	16.6	2.8%	10.7%	0.79	14.52	0.48	394	2%	2,177,580	2%	15.0	$ 4,128,268	2%
	High Efficiency Air Conditioning					$ 207,500	1%								171	1%	916,140	1%		$ 1,470,281	1%
		VRF Split System AC	400	units	$ 200	$ 80,000	0%	0.095000	676.7	2.0%	10.7%	0.79	591.79	0.34	33	0%	236,718	0%	15.0	$ 410,619	0%
		Ceiling Fans	3,000	units	$ 35	$ 105,000	1%	0.019000	167.0	4.2%	10.7%	0.79	146.05	0.24	50	0%	438,140	0%	5.0	$ 298,982	0%
		Solar Attic Fans	150	units	$ 50	$ 7,500	0%	-	502.0	0.5%	10.7%	0.79	439.01	0.11	-	0%	65,852	0%	20.0	$ 92,974	0%
		Whole House Fans	200	units	$ 75	$ 15,000	0%	0.500000	1,003.0	0.4%	10.7%	0.79	877.15	0.09	87	0%	175,431	0%	20.0	$ 667,705	0%
	High Efficiency Appliances					$ 1,157,500	6%								349	2%	6,069,374	4%		$ 7,778,404	4%
		Refrigerator (<$600)	400	units	$ 50	$ 20,000	0%	0.017000	105.0	3.4%	10.7%	0.79	91.83	0.54	6	0%	36,730	0%	14.0	$ 63,793	0%
		Refrigerator with Recycling	5,500	units	$ 125	$ 687,500	3%	0.034000	819.0	1.1%	10.7%	0.79	716.24	0.17	164	1%	3,939,320	3%	14.0	$ 5,034,031	3%
		Garage Refrigerator / Freezer Bounty	1,000	units	$ 75	$ 75,000	0%	0.034000	859.0	0.6%	10.7%	0.79	751.22	0.10	30	0%	751,221	1%	14.0	$ 954,445	1%
		Clothes Washer (Tier II/III)	6,000	units	$ 50	$ 300,000	2%	0.028000	206.0	2.2%	10.7%	0.79	180.15	0.28	147	1%	1,080,919	1%	11.0	$ 1,489,311	1%
		Pool VFD Controller Pumps	500	units	$ 150	$ 75,000	0%	0.006000	597.3	2.5%	10.7%	0.79	522.37	0.29	3	0%	261,183	0%	10.0	$ 236,823	0%
	Energy Awareness, Measurement and Control Systems					$ 871,500	4%								460	3%	4,081,781	3%		$ 618,353	0%
		Room Occupancy Sensors & Timers	500	units	$ 5	$ 2,500	0%	0.004600	20.8	3.0%	10.7%	0.79	18.19	0.27	2	0%	9,095	0%	8.0	$ 11,714	0%
		Peer Group Comparison	75,000	homes	$ 11.32	$ 849,000	4%	0.006963	61.0	18.6%	10.7%	0.79	53.35	0.21	457	3%	4,000,975	3%	1.0	$ 576,162	0%
		Whole House Energy Metering	200	units	$ 100	$ 20,000	0%	0.007000	410.0	6.1%	10.7%	0.79	358.56	0.28	1	0%	71,711	0%	4.0	$ 30,477	0%
CESH	**Custom Energy Solutions for the Home**					$ 25,000	0%								72		71,955			$ 155,891	0%
	Target Cost Request for Proposals					$ 25,000	0%								72	0%	71,955	0%		$ 155,891	0%
		Custom Packaged Proposals (units in kWh)	100,000	kWh	$ 0.25	$ 25,000	0%	0.001000	1.0	5.0%	10.7%	0.65	0.72	0.35	72	0%	71,955	0%	5.0	$ 155,891	0%

Residential Programs Cont.

Program	Category	Measures	Count	Units	Average Incentive per Unit	Estimated Budget	% Total Program	kW/Unit	kWh/Unit		System Loss	Free Rider	Effective kWh	Program Cost per kWh	kW	% Total Program	kWh	% Total Program	Life	TRB	% Total Program
RESM	**Residential Energy Services & Maintenance**					$ 540,000	3%								268	2%	1,374,894	1%		$ 2,364,817	1%
	Residential Direct Installation					$ 10,000	0%								-		20,369			$ 13,412	
		TBD	20,000	kWh	$ 0.50	$ 10,000	0%	-	1.0	7.1%	10.7%	0.92	1.02	0.49	-	0%	20,369	0%	7.0	$ 13,412	0%
	Residential Design and Audits					$ 500,000	3%								204	1%	1,120,284	1%		$ 2,128,743	1%
		Efficiency Inside Home Design	500	Homes	$ 1,000	$ 500,000	3%	0.400000	2,200.0	3.0%	10.7%	0.92	2,240.57	0.45	204	1%	1,120,284	1%	15.0	$ 2,128,743	1%
	Residential System Tune-Ups					$ 30,000	0%								64	0%	234,241	0%		$ 222,662	0%
		Solar Water Heater Tune Up	200	Tune Ups	$ 150	$ 30,000	0%	0.315000	1,150.0	2.6%	10.7%	0.92	1,171.21	0.13	64	0%	234,241	0%	5.0	$ 222,662	0%
RHTR	***Residential Hard to Reach***					$ 801,939	4%								221	1%	2,040,017	1%		$ 2,296,853	1%
	Energy Efficiency Equipment Grants					$ 651,939									205		1,486,517			$ 1,439,520	
		Solar Inspections (WAP)	50	Inspections	$ 95	$ 4,750	0%	0.046000	206.5	9.2%	10.7%	1.00	228.60	0.42	3	0%	11,430	0%	5.0	$ 9,886	0%
		Solar Water Heater (SWH) Incentive	56	systems	$ 10,039	$ 562,189	3%	0.460000	3,097.5	16.2%	10.7%	0.79	2,708.86	3.71	23	0%	151,696	0%	20.0	$ 322,371	0%
		Energy Hero Gift Packs	250	Packs	$ 40	$ 10,000	0%	0.049100	245.9	3.3%	10.7%	1.00	272.21	0.15	14	0%	68,053	0%	5.0	$ 56,228	0%
		CFL Exchange	30,000	Lamps	$ 2.50	$ 75,000	0%	0.005000	37.8	1.1%	10.7%	1.00	41.84	0.06	166	1%	1,255,338	1%	6.0	$ 1,051,035	1%
	Landlord, Tenant, AOAO Measures					$ 150,000	1%								16		553,500			$ 857,332	0%
		Custom SWH Proposals (units in kWh)	500,000	kWh	$ 0.30	$ 150,000	1%	0.000029	1.0	1.5%	10.7%	1.00	1.11	0.27	16	0%	553,500	0%	20.0	$ 857,332	0%

Business Programs

			Business Target				$ 10,842,869															
			Difference				$ -															
			Business Plan				$ 10,842,869									8,205		72,071,824	$ 0.150		$ 105,553,489	
Program	Category	New/ Exist	Measures	Count	Units	Average Incentive per Unit	Estimated Budget	% Total Program	kW/Unit	kWh/Unit	$/Lifetime kWh	System Loss	Net-to-Gross	Effective kWh	Program Cost per kWh	kW	% Total Program	kWh	% Total Program	Life	TRB	% Total Program
BEEM	Business Energy Efficiency Measures						$ 4,295,800	22%							0.12	4,967	28%	37,044,804	26%		$ 58,412,435	33%
	High Efficiency Lighting						$ 1,885,700	10%							0.07	3,148	18%	26,952,779	19%		$ 39,278,297	22%
		E	CFL	16,100	lamps	$ 2.00	$ 32,200	0%	0.029000	246.5	0.3%	10.7%	0.75	204.66	0.01	388	2%	3,294,972	2%	3.0	$ 1,413,944	1%
		E	T12 to T8 Standard (2 / 3 / Straight 8 foot lamps)	5,000	lamps	$ 6.00	$ 30,000	0%	0.007000	56.4	0.8%	10.7%	0.75	46.83	0.13	29	0%	234,131	0%	14.0	$ 372,910	0%
		E	T12 to T8 Low Wattage	30,000	lamps	$ 10.00	$ 300,000	2%	0.010000	83.2	0.9%	10.7%	0.75	69.08	0.14	249	1%	2,072,304	1%	14.0	$ 3,269,678	2%
		E/N	T8 to T8 Low Wattage	100,000	lamps	$ 5.50	$ 550,000	3%	0.009000	78.1	0.5%	10.7%	0.75	64.84	0.08	747	4%	6,484,253	5%	14.0	$ 10,108,361	6%
		E	Delamp	5,000	lamps removed	$ 7.50	$ 37,500	0%	0.017000	149.2	0.4%	10.7%	0.75	123.87	0.06	71	0%	619,367	0%	14.0	$ 962,477	1%
		E	Delamp/Reflector	2,500	lamps removed	$ 15.00	$ 37,500	0%	0.017000	149.2	0.7%	10.7%	0.75	123.87	0.12	35	0%	309,683	0%	14.0	$ 481,238	0%
		E	LED Refrigerated Case Lighting	500	lamps	$ 75.00	$ 37,500	0%	0.023000	223.6	2.2%	10.7%	0.75	185.64	0.40	10	0%	92,822	0%	15.0	$ 147,094	0%
		E/N	ENERGY STAR LED Non-Dimmable	52,000	lamps	$ 7.00	$ 364,000	2%	0.017900	154.7	0.3%	10.7%	0.75	128.44	0.05	773	4%	6,678,863	5%	15.0	$ 10,926,770	6%
		E/N	ENERGY STAR LED Dimmable w/Controls	36,000	lamps	$ 10.00	$ 360,000	2%	0.023900	203.3	0.3%	10.7%	0.75	168.79	0.06	714	4%	6,076,434	4%	15.0	$ 9,986,159	6%
		E/N	ENERGY STAR LED Non-Dimmable A19	5,000	lamps	$ 7.00	$ 35,000	0%	0.006100	52.5	0.9%	10.7%	0.75	43.59	0.16	25	0%	217,941	0%	15.0	$ 356,976	0%
		E/N	ENERGY STAR LED Dimmable A19	3,000	lamps	$ 7.00	$ 21,000	0%	0.008100	70.1	0.7%	10.7%	0.75	58.20	0.12	20	0%	174,602	0%	15.0	$ 285,541	0%
		E	LED Exit Signs	1,000	signs	$ 20.00	$ 20,000	0%	0.035000	307.0	0.4%	10.7%	0.75	254.89	0.08	29	0%	254,887	0%	16.0	$ 433,626	0%
		E	HID Pulse Start	400	lamps	$ 40.00	$ 16,000	0%	0.035000	196.0	1.5%	10.7%	0.75	162.73	0.25	12	0%	65,092	0%	14.0	$ 117,186	0%
		E/N	Sensors	2,000	sensors	$ 20.00	$ 40,000	0%	0.025000	200.0	1.3%	10.7%	0.75	166.05	0.12	42	0%	332,100	0%	8.0	$ 347,858	0%
		E/N	Stairwell Bi-Level Dimming Fluorescent	100	Fixture	$ 50.00	$ 5,000	0%	0.056000	546.0	0.7%	10.7%	0.75	453.32	0.11	5	0%	45,332	0%	14.0	$ 68,478	0%
	High Efficiency HVAC						$ 970,000	5%							0.24	883	5%	4,028,680	3%		$ 8,248,653	5%
		E/N	Chillers - kW/Ton meter & Chiller Curve Optimization	1,500,000	kWh	$ 0.15	$ 225,000	1%	0.000200	1.0	0.8%	10.7%	0.75	0.83	0.18	249	1%	1,245,375	1%	20.0	$ 2,954,561	2%
		E	VFD - Chilled Water / Condenser Water	500	hp	$ 80	$ 40,000	0%	0.245000	902.7	0.6%	10.7%	0.75	749.47	0.11	102	1%	374,733	0%	15.0	$ 846,208	0%
		E	VFD - AHU	1,200	hp	$ 50	$ 60,000	0%	0.200000	471.6	0.7%	10.7%	0.75	391.55	0.13	199	1%	469,855	0%	15.0	$ 1,347,652	1%
		E/N	Garage Active Ventilation Control	1,000,000	kWh	$ 0.12	$ 120,000	1%	0.000114	1.0	1.5%	10.7%	0.75	0.83	0.14	95	1%	830,250	1%	8.0	$ 847,131	0%
		E	Package Units - 25% Better Than Code	500	tons	$ 200	$ 100,000	1%	0.093000	552.2	2.4%	10.7%	0.75	458.46	0.44	39	0%	229,232	0%	15.0	$ 423,308	0%
		E	VFR Split Systems - Existing	1,000	tons	$ 300	$ 300,000	2%	0.193000	782.0	2.6%	10.7%	0.75	649.26	0.46	160	1%	649,256	0%	15.0	$ 1,402,291	1%
		N	VFR Split Systems - New Construction	500	tons	$ 250	$ 125,000	1%	0.095000	554.0	3.0%	10.7%	0.75	459.96	0.54	39	0%	229,979	0%	15.0	$ 427,502	0%
	High Efficiency Water Heating						$ 826,200	4%							0.57	380	2%	1,440,409	1%		$ 3,774,728	2%
		E	Commercial Solar Water Heating - Electric Resistance	50	tons	$ 250	$ 12,500	0%	1.000000	927.0	1.8%	10.7%	0.75	769.64	0.32	42	0%	38,482	0%	15.0	$ 211,039	0%
		E/N	Commercial Solar Water Heating - Heat Pump	100	tons	$ 100	$ 10,000	0%	0.380000	164.0	4.1%	10.7%	0.75	136.16	0.73	32	0%	13,616	0%	15.0	$ 142,044	0%
		E	Single Family Solar Water Heater (SWH) Incentive	800	systems	$ 1,000	$ 800,000	4%	0.460000	2,066.0	2.4%	10.7%	0.75	1,715.30	0.58	306	2%	1,372,237	1%	20.0	$ 3,404,826	2%
		E	Heat Pump - Conversion - Electric Resistance	20	tons	$ 120	$ 2,400	0%	0.040000	668.0	1.8%	10.7%	0.75	554.61	0.22	1	0%	11,092	0%	10.0	$ 11,708	0%
		E	Heat Pump Upgrade	20	tons	$ 65	$ 1,300	0%	0.015000	300.0	2.2%	10.7%	0.75	249.08	0.26	0	0%	4,982	0%	10.0	$ 5,111	0%
	High Efficiency Water Pumping						$ 99,900	1%							0.21	42	0%	467,277	0%		$ 716,482	0%
		E	VFD Dom. Water Booster Packages - VFD ($3,000 per System)	75	hp	$ 600	$ 45,000	0%	0.373000	3,921.0	1.0%	10.7%	0.75	3,255.41	0.18	23	0%	244,156	0%	15.0	$ 379,368	0%
		E	VFD Dom. Water Booster Packages - added HP Reduction	30	hp reduced	$ 80	$ 2,400	0%	0.056000	588.0	0.9%	10.7%	0.75	488.19	0.16	1	0%	14,646	0%	15.0	$ 22,763	0%
		E/N	VFD Pool Pump Packages	150	hp	$ 350	$ 52,500	0%	0.140000	1,674.0	1.4%	10.7%	0.75	1,389.84	0.25	17	0%	208,476	0%	15.0	$ 314,351	0%
	High Efficiency Motors						$ 151,000	1%							0.06	288	2%	2,551,209	2%		$ 4,143,532	2%
		E/N	CEE Tier 1+ Premium Efficiency Motors	50	HP	$ 10	$ 500	0%	0.028300	46.4	1.4%	10.7%	0.75	38.52	0.26	1	0%	1,926	0%	15.0	$ 6,955	0%
		E/N	ECM w/Controller- Evaporator Fan Motors	800	motor	$ 85	$ 68,000	0%	0.150000	1,335.0	0.4%	10.7%	0.75	1,108.38	0.08	100	1%	886,707	1%	15.0	$ 1,438,809	1%
		E/N	ECM - Fan Coil Fans	1,500	motor	$ 55	$ 82,500	0%	0.150000	1,335.0	0.3%	10.7%	0.75	1,108.38	0.05	187	1%	1,662,576	1%	15.0	$ 2,697,768	2%
	Commercial Industrial Processes						$ 125,000	1%							0.26	89	1%	474,031	0%		$ 836,031	0%
		E/N	Kitchen Exhaust Hood Demand Ventilation	150	hp	$ 700	$ 105,000	1%	0.450000	2,633.0	1.8%	10.7%	0.75	2,186.05	0.32	56	0%	327,907	0%	15.0	$ 608,788	0%
		E/N	Refrigerated Case Night Covers	2,000	Linear Ft.	$ 10	$ 20,000	0%	0.020000	88.0	1.1%	10.7%	0.75	73.06	0.14	33	0%	146,124	0%	10.0	$ 227,242	0%
	Building Envelope Improvements						$ 73,000	0%								90	1%	331,685	0%		$ 560,309	0%
		E	Window Tinting	80,000	square feet	0.85	$ 68,000	0%	0.001300	4.9	1.7%	10.7%	0.75	4.07	0.21	86	0%	325,458	0%	10.0	$ 543,079	0%
		E	Cool Roof Technologies	25,000	square feet	0.20	$ 5,000	0%	0.000190	0.30	6.7%	10.7%	0.75	0.25	0.80	4	0%	6,227	0%	10.0	$ 17,231	0%
	Energy Star Business Equipment						$ 25,000	0%								14	0%	339,987	0%		$ 434,468	0%
		E	Refrigerators w/Recycling	500	units	$ 50	$ 25,000	0%	0.034000	819.0	0.4%	10.7%	0.75	679.97	0.07	14	0%	339,987	0%	14.0	$ 434,468	0%
	Energy Awareness, Measurement and Control Systems						$ 140,000	1%								33	0%	458,746	0%		$ 419,936	0%
		E/N	Hotel Room Occupancy Controls	500	units	$ 100	$ 50,000	0%	-	750.0	1.7%	10.7%	0.75	622.69	0.16	-	0%	311,344	0%	8.0	$ 228,763	0%
		E/N	Condominum Submetering Pilot	500	units metered	$ 150	$ 75,000	0%	0.057000	273.0	6.9%	10.7%	0.75	226.66	0.66	24	0%	113,329	0%	8.0	$ 142,461	0%
		E/N	Small Business Submetering Pilot	100	units metered	$ 150	$ 15,000	0%	0.114000	410.4	4.6%	10.7%	0.75	340.73	0.44	9	0%	34,073	0%	8.0	$ 48,712	0%

Business Programs Cont.

Program	Category		Measures	Count	Units	Average Incentive per Unit	Estimated Budget	% Total Program	kW/Unit	kWh/Unit		System Loss	Net-to-Gross	Effective kWh	Program Cost per kWh	kW	% Total Program	kWh	% Total Program	Life	TRB	% Total Program
CBEEM	**Custom Business Energy Efficiency Measures**						$ 1,060,000	5%							0.16	190	1%	6,642,000	5%		$ 6,383,768	4%
	Customized Project Measures						$ 1,060,000									190		6,642,000			$ 6,383,768	
		E/N	Customized Project Measures - Under 5 year Life	2,000,000	kWh	$ 0.11	$ 220,000	1%	0.000029	1.0	2.2%	10.7%	0.75	0.83	0.13	47	0%	1,660,500	1%	5.0	$ 896,097	1%
		E/N	Customized Project Measures - Over 5 year Life	4,000,000	kWh	$ 0.13	$ 520,000	3%	0.000029	1.0	1.1%	10.7%	0.75	0.83	0.16	95	1%	3,321,000	2%	12.0	$ 3,658,447	2%
		E/N	Customized Project Measures - Carry Over	2,000,000	kWh	$ 0.16	$ 320,000	2%	0.000029	1.0	1.3%	10.7%	0.75	0.83	0.19	47	0%	1,660,500	1%	12.0	$ 1,829,224	1%
BESM	**Business Service and Maintenance**						$ 4,645,069	24%								2,273	13%	21,085,583	15%		$ 32,840,076	19%
	Business Direct Installation						$ 750,000	4%								113	1%	1,314,563	1%		$ 1,900,860	1%
		E	SBDI - Lighting Retrofits	1,250,000	kWh	$ 0.60	$ 750,000	4%	0.000086	1.0	4.3%	10.7%	0.95	1.05	0.57	113	1%	1,314,563	1%	14.0	$ 1,900,860	1%
	Business Design, Audits and Commissioning						$ 3,895,069	20%								2,161	12%	19,771,020	14%		$ 30,939,216	17%
		E	Benchmark Metering	4	Groups	$ 80,000	$ 320,000	2%	0.000100	100,000	80.0%	10.7%	0.95	105,165	1	0	0%	420,660	0%	1.0	$ 43,617	0%
		E	Decision Maker - Real-Time Submeters	2	Groups	$ 50,000	$ 100,000	1%	0.000100	200,000	25.0%	10.7%	0.95	210,330	0	0	0%	420,660	0%	1.0	$ 43,617	0%
		E	Energy Audit	12	studies	$ 5,000	$ 60,000	0%				10.7%	0.95	-		-	0%	-	0%			0%
		E	Energy Study Project Implementation - 100%	8	studies	$ 25,000	$ 200,000	1%				10.7%	0.95	-		-	0%	-	0%			0%
		E	Energy Study Assistance - 50%	3	studies	$ 15,000	$ 45,000	0%				10.7%	0.95	-		-	0%	-	0%			0%
		E/N	Design Assistance - 50%	1	designs	$ 15,000	$ 15,000	0%				10.7%	0.95	-		-	0%	-	0%			0%
		E/N	Water & Waste Water Catalyst Projects	18,000,000	kWh	$ 0.18	$ 3,155,069	16%	0.000114	1.0	1.2%	10.7%	0.95	1.05	0.17	2,161	12%	18,929,700	13%	15.0	$ 30,851,981	17%
BHTR	**Business Hard to Reach**						$ 842,000	4%								775		7,299,438			$ 7,917,209	
	Energy Efficiency Equipment Grants						$ 150,000									548		2,465,843			$ 2,130,499	
		E	DI - Water Cooler Timers	10,000	units	$ 15.00	$ 150,000	1%	0.050000	225.0	1.3%	10.7%	0.99	246.58	0.06	548	3%	2,465,843	2%	5.0	$ 2,130,499	1%
	Restaurant Targeted Participation Programs						$ 677,000									227		4,778,799			$ 5,750,630	
		E	SBDI - Kitchen Exhaust Hood Demand Ventilation	50	hp	$ 1,700	$ 85,000	0%	0.450000	2,633.0	4.3%	10.7%	0.99	2,885.58	0.59	25	0%	144,279	0%	15.0	$ 267,867	0%
		E	Low Flow Spray Rinse Nozzles	500	each	$ 22.00	$ 11,000	0%	-	4,900.0	0.0%	10.7%	0.99	5,370.06	0.00	-	0%	2,685,029	2%	12.0	$ 2,695,920	2%
		E/N	ENERGY STAR Commercial Kitchen Equipment	778,846	kWh	$ 0.10	$ 81,000	0%	0.000200	1.0	0.9%	10.7%	0.99	1.10	0.09	171	1%	853,561	1%	12.0	$ 1,440,565	1%
		E	SBDI - Restaurant Lighting	1,000,000	kWh	$ 0.50	$ 500,000	3%	0.000029	1.0	3.6%	10.7%	0.99	1.10	0.46	31	0%	1,095,930	1%	14.0	$ 1,346,278	1%
	Landlord, Tenant, AOAO Measures						$ 15,000	0%								-		54,797			$ 36,080	0%
			Energy Hero Landlord	50,000	kWh	$ 0.30	$ 15,000	0%	-	1.0	4.3%	10.7%	0.99	1.10	0.27	-	0%	54,797	0%	7.0	$ 36,080	0%
Potential Business Project Pending Developer Progress on Planned Schedule (figures provided for demonstration of impact and not summarized in Business Program Totals above.																						
SWAC	**Sea Water Air Conditioning**						$ 7,500,000	38%								15,858	89%	85,239,000	60%		$ 196,507,820	111%
	Sea Water Air Conditioning						$ 7,500,000	38%								15,858	89%	85,239,000	60%		$ 196,507,820	111%
			SWAC Infrastructure Support Incentive	25,000	tons	$ 300	$ 7,500,000	38%	0.573000	3,080.0	0.5%	10.7%	1.00	3,409.56	0.09	15,858	89%	85,239,000	60%	20.0	$ 196,507,820	111%

Hawaii Energy - PY2013 ANNUAL PLAN
PROPOSED PROGRAM COST EFFECTIVENESS AND BENEFIT TARGETS

PROPOSED PROGRAM TARGETS

PBFA Contract Renewal Proposed Target Figures for Year 5

Total Program Direct Incentives	$	19,714,308	
First Year Energy Reduction		141,616,143	kWh - Program Level
Peak Demand Reduction		17,821	kW on Peak 5 to 9 p.m. Weekdays
Total Resource Benefit	$	177,013,974	NPV of Utility Cost Avoidance Attributed to the PBFA

Derived Top Down Cost Effectiveness Metrics

Total Program Direct Incentives	$	19,714,308	
First Year Energy Reduction	÷	141,616,143	
Measure Cost Effectiveness - First Year	$	0.139	per kWh - Program Level
First Year Energy Reduction		141,616,143	
Average Measure Life	x	7.7	years (Derived from TRB using Target Guideline Values)
Lifetime Energy Savings		1,086,195,817	kWh - Program Level
Total Program Direct Incentives	$	19,714,308	
Lifetime Energy Savings	÷	1,086,195,817	
Measure Cost - Lifetime	$	0.018	per kWh - Program Level
Total Program Direct Incentives	$	19,714,308	
Avg. Incentive % of Incremental Cost	÷	25%	
TRC - Total Resource Cost	$	78,857,232	
TRB - Total Resource Benefit	$	177,013,974	
TRC - Total Resource Cost	÷ $	78,857,232	
Cost Effectiveness - TRB/TRC		2.2	
First Year Energy Reduction		141,616,143	kWh - Program Level
Estimated Average Net-to-Gross	÷	0.78	
First Year Energy Reduction		181,559,158	kWh First Year - System Level
First Year Energy Reduction		181,559,158	kWh First Year - System Level
County Generation and T&D Losses	÷	110.7%	
First Year Energy Reduction		163,951,904	kWh First Year - Customer Level
HCEI 2030 Energy Reduction Goal	÷	4,300,000,000	kWh/year
% Achievement towards HCEI 2030 Goal		3.8%	
		163,951,904	
Average Energy Cost	x $	0.36	per kWh
Participant Customer Energy Cost Savings	$	59,022,685	per year
Average Measure Life	x	7.7	
Participant Customer Energy Cost Savings	$	452,703,996	over lifetime of Equipment Investment

County Distribution Targets

PBFA Contribution by County for PY2012

Hawaii	Maui	Honolulu	Total
12.6%	13.0%	74.4%	100%

Program Level Targets by County

Hawaii	Maui	Honolulu	Total	
$ 2,484,003	$ 2,562,860	$ 14,667,445	$ 19,714,308	Incentives
12,745,453	14,161,614	114,709,076	141,616,143	kWh First Year - PL
$ 0.195	$ 0.181	$ 0.128	$ 0.139	Cost per kWh

Target Savings Contribution by County

Hawaii	Maui	Honolulu	Total
9.0%	10.0%	81.0%	100%

County Generation and T&D Losses

Hawaii	Maui	Honolulu	Average
9.0%	10.0%	11.2%	10.7%

New Net-to-Gross Factors

Program		Net-to-Gross
BEEM	Business Energy Efficiency Measures	0.75
CBEEM	Custom Business Energy Efficiency Measures	0.75
BESM	Business Services and Maintenance	0.95
BHTR	Business Hard to Reach	0.99
REEM	Residential Energy Efficiency Measures	0.79
CESH	Custom Energy Solutions for the Home	0.65
RESM	Residential Services and Maintenance	0.92
RHTR	Residential Hard to Reach	1.00
Effective Program Total Based on PY11 Portfolio Performance		0.78

APPENDIX C –

Hawaii Energy - PY2013 ANNUAL PLAN
Proposed TRB Utility Benefit Values

Year	Period	Discount Rate 6% NPV Multiplier	HECO IRP4 Avoided Cost $/kW/yr.	HECO IRP4 Avoided Cost $/kWh/yr.	NPV for each Year $/kW/yr.	NPV for each Year $/kWh/yr.	NPV Cumulative from Final Year $/kW/yr.	NPV Cumulative from Final Year $/kWh/yr.
2013	1	1.00	$ 353.2	$ 0.104	$ 353	$ 0.1037	$ 353	$ 0.1037
2014	2	0.94	$ 370.6	$ 0.109	$ 350	$ 0.1027	$ 703	$ 0.2064
2015	3	0.89	$ 382.5	$ 0.112	$ 340	$ 0.1000	$ 1,043	$ 0.3064
2016	4	0.84	$ 386.2	$ 0.113	$ 324	$ 0.0953	$ 1,368	$ 0.4016
2017	5	0.79	$ 387.7	$ 0.114	$ 307	$ 0.0902	$ 1,675	$ 0.4919
2018	6	0.75	$ 389.1	$ 0.114	$ 291	$ 0.0854	$ 1,965	$ 0.5773
2019	7	0.70	$ 391.9	$ 0.115	$ 276	$ 0.0812	$ 2,242	$ 0.6584
2020	8	0.67	$ 390.7	$ 0.115	$ 260	$ 0.0763	$ 2,502	$ 0.7348
2021	9	0.63	$ 394.6	$ 0.116	$ 248	$ 0.0727	$ 2,749	$ 0.8075
2022	10	0.59	$ 398.3	$ 0.117	$ 236	$ 0.0693	$ 2,985	$ 0.8767
2023	11	0.56	$ 397.4	$ 0.117	$ 222	$ 0.0652	$ 3,207	$ 0.9419
2024	12	0.53	$ 401.4	$ 0.118	$ 211	$ 0.0621	$ 3,418	$ 1.0041
2025	13	0.50	$ 405.7	$ 0.119	$ 202	$ 0.0592	$ 3,620	$ 1.0633
2026	14	0.47	$ 409.3	$ 0.120	$ 192	$ 0.0564	$ 3,812	$ 1.1197
2027	15	0.44	$ 415.9	$ 0.122	$ 184	$ 0.0540	$ 3,996	$ 1.1737
2028	16	0.42	$ 423.3	$ 0.124	$ 177	$ 0.0519	$ 4,172	$ 1.2256
2029	17	0.39	$ 428.9	$ 0.126	$ 169	$ 0.0496	$ 4,341	$ 1.2752
2030	18	0.37	$ 433.9	$ 0.128	$ 161	$ 0.0475	$ 4,502	$ 1.3227
2031	19	0.35	$ 438.9	$ 0.130	$ 154	$ 0.0455	$ 4,656	$ 1.3682
2032	20	0.33	$ 443.9	$ 0.132	$ 147	$ 0.0436	$ 4,803	$ 1.4119

Hawaii Energy Efficiency Program

July 1, 2013 through June 30, 2014

Technical Reference Manual (TRM)

PY 2013

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 and engineering judgment
- 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 ΔkWh × (1 + SLF) x RR

Net Program kW = Gross Customer Level ΔkW × (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. ΔkWh = Gross customer level annual kWh savings for the measure
Gross Cust. ΔkW = Gross customer level connected load kW savings for the measure

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

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 2.1:

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 Evergreen (EM&V) report:

Table 2.2

New Net-to-Gross Factors		
Program		Net-to-Gross
BEEM	Business Energy Efficiency Measures	0.75
CBEEM	Custom Business Energy Efficiency Measures	0.75
BESM	Business Services and Maintenance	0.95
BHTR	Business Hard to Reach	0.99
REEM	Residential Energy Efficiency Measures	0.79
CESH	Custom Energy Solutions for the Home	0.65
RESM	Residential Services and Maintenance	0.92
RHTR	Residential Hard to Reach	1.00
Effective Program Total Based on PY11 Portfolio Performance		0.78

The total Net Energy Savings divided by the total Gross Energy Savings for PY13 is 78%.

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 claimed first year savings are reduced, and claimed for each year of the equipment's expected 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 (η_{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 (η_{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

Table 7.1

Hawaii Energy - PY2013 ANNUAL PLAN

Proposed TRB Utility Benefit Values

		Discount Rate						
		6%	HECO IRP4 Avoided Cost		NPV for each Year		NPV Cumulative from Final Year	
Year	Period	NPV Multiplier	$/kW/yr.	$/kWh/yr.	$/kW/yr.	$/kWh/yr.	$/kW/yr.	$/kWh/yr.
2013	1	1.00	$ 353.2	$ 0.104	$ 353	$ 0.1037	$ 353	$ 0.1037
2014	2	0.94	$ 370.6	$ 0.109	$ 350	$ 0.1027	$ 703	$ 0.2064
2015	3	0.89	$ 382.5	$ 0.112	$ 340	$ 0.1000	$ 1,043	$ 0.3064
2016	4	0.84	$ 386.2	$ 0.113	$ 324	$ 0.0953	$ 1,368	$ 0.4016
2017	5	0.79	$ 387.7	$ 0.114	$ 307	$ 0.0902	$ 1,675	$ 0.4919
2018	6	0.75	$ 389.1	$ 0.114	$ 291	$ 0.0854	$ 1,965	$ 0.5773
2019	7	0.70	$ 391.9	$ 0.115	$ 276	$ 0.0812	$ 2,242	$ 0.6584
2020	8	0.67	$ 390.7	$ 0.115	$ 260	$ 0.0763	$ 2,502	$ 0.7348
2021	9	0.63	$ 394.6	$ 0.116	$ 248	$ 0.0727	$ 2,749	$ 0.8075
2022	10	0.59	$ 398.3	$ 0.117	$ 236	$ 0.0693	$ 2,985	$ 0.8767
2023	11	0.56	$ 397.4	$ 0.117	$ 222	$ 0.0652	$ 3,207	$ 0.9419
2024	12	0.53	$ 401.4	$ 0.118	$ 211	$ 0.0621	$ 3,418	$ 1.0041
2025	13	0.50	$ 405.7	$ 0.119	$ 202	$ 0.0592	$ 3,620	$ 1.0633
2026	14	0.47	$ 409.3	$ 0.120	$ 192	$ 0.0564	$ 3,812	$ 1.1197
2027	15	0.44	$ 415.9	$ 0.122	$ 184	$ 0.0540	$ 3,996	$ 1.1737
2028	16	0.42	$ 423.3	$ 0.124	$ 177	$ 0.0519	$ 4,172	$ 1.2256
2029	17	0.39	$ 428.9	$ 0.126	$ 169	$ 0.0496	$ 4,341	$ 1.2752
2030	18	0.37	$ 433.9	$ 0.128	$ 161	$ 0.0475	$ 4,502	$ 1.3227
2031	19	0.35	$ 438.9	$ 0.130	$ 154	$ 0.0455	$ 4,656	$ 1.3682
2032	20	0.33	$ 443.9	$ 0.132	$ 147	$ 0.0436	$ 4,803	$ 1.4119

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 are used to calculate the Total Resource Benefits for PY13.

Effective Useful Life (EUL): Table 7.2

Version Date & Revision History
Draft date: July 1, 2013
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents: Econorthwest TRM Review – 6/23/10
DEER (The Database for Energy Efficient Resources) – 10/1/08

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 7.2

Residential (R) Business (B)	Measure Type	Description	DEER Effectve Useful Life (EUL)
R	Water Heating	Solar Water Heating	20
R		Heat Pumps	10
R	Lighting	CFL	6
R		LED	15
R	Air Conditioning	VRF Split	15
R		Ceiling Fans	5
R		Solar Attic Fans	20
R		Whole House Fans	20
R	Appliances	Refrigerator (<$600)	14
R		Refrigerator w/Recycling	14
R		Garage Refrigerator/Freezer Bounty	14
R		Clothes Washer (Tier II/III)	11
R		Pool VFD Controller Pumps	10
R	Control Systems	Room Occupancy Sensors & Timers	8
R		Peer Group Comparison	1
R		Whole House Energy Metering	4
R	Custom	Custom Packaged Proposals	5
R	Direct Install	TBD	7
R	Design and Audits	Efficiency Inside	15
R	Tune Ups	Solar Water Heater Tune Up	5
R	Hard to Reach Grants	Solar Inspections	5
R		Solar Water Heater	20
R		Energy Hero Gift Packs	5
R		CFL Exchange	6
R	Landlord Tennant	Custom SWH Proposals	20
B	Lighting	CFL	3
B		T12 to T8 Standard (2/3/8)	14
B		T12 to T8 Low Wattage	14
B		T8 to T8 Low Wattage	14
B		Delamp	14
B		Delamp w/Reflector	14
B		LED Refrigerator Case Lighting	8
B		ENERGY STAR LED Non-Dimmable	15
B		ENERGY STAR LED Dimmable w/Controls	15
B		ENERGY STAR LED Non-Dimmable A19	15
B		ENERGY STAR LED Dimmable A19	15
B		LED Exit Signs	16
B		HID Pulse Start	14
B		Sensors	8
B		Stairwell Bi-Level Dimming Fluorescent	14

Residential (R) Business (B)	Measure Type	Description	DEER Effectve Useful Life (EUL)
B	HVAC	Chillers	20
B		VFD - Chilled Water/Condenser Water	15
B		VFD - AHU	15
B		Garage Active Ventilation Control	8
B		Package Units	15
B		VFR Split System - Existing	15
B		VFR Split System - New Construction	15
B	Water Heating	Solar Water Heating - Electric Resistance	15
B		Solar Water Heating - Heat Pump	15
B		Military Solar Water Heating	20
B		Heat Pump - conversion - Electric Resistance	10
B		Heat Pump Upgrade	10
B	Water Pumping	VFD Dom Water Booster Packages	15
B		VFD Pool Pump	15
B	Motors	CEE Tier 1 + Premium Efficiency Motors	15
B		ECM w/Controller - evap fan motors	15
B		ECM - Fan Coil Fans	15
B	Industrial Process	Kitchen Exhaust Hood Demand Ventilation	15
B		Refrigerated Case Night Covers	10
B	Building Envelope	Window Tinting	10
B		Cool Roof	10
B	Business Equipment	ENERGY STAR Refrigerator	14
B	Control Systems	Hotel Room Occupancy Controls	8
B		Condominium submetering	8
B		Small Business submetering	8
B	Customized	Custom <= 5 years	5
B		Custom > 5 years	12
B		Custom Carryover	12
B	Direct Install	SBDIL - Lighting	14
B	Design and Audits	Benchmarking	1
B		Decision Maker - Real time submeters	1
B		Energy Audit	N/A
B		Energy Study Implementation - 100%	N/A
B		Energy Study Assistance - 50%	N/A
B		Design Assistance - 50%	N/A
B		Water/Wastewater Catalyst	15
B	Grants	Water cooler timer	5
B	Restaurant	SBDI - Kitchen Exhaust Hood Demand Ventilation	15
B		Low flow spray rinse nozzles	12
B		ENERGY STAR Kitchen Equipment	12
B		SBDI - Lighting	14
B	Landlord Tennant	Energy Hero Landlord	7

8 (REEM) Residential Energy Efficiency Measures

8.1 High Efficiency Water Heating

8.1.1 Solar Water Heater

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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.

Measure Life
20 years

Measure Costs and Incentive Levels

Table 1 – SWH Measure Costs and Incentive Levels

Description	Unit Incentive	Incremental Cost
Non-Military	$ 1000	$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 (Hot Water Cool Rates)

Version Date & Revision History
Draft date: May 22, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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
- 11/14/13 – Included peak demand savings calculations.

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**	
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
20 years

Measure Costs and Incentive Levels
Table 1 – SWH Measure Costs and Incentive Levels

Description	Unit Incentive	Incremental Cost
Non-Military	$ 1000	$6,600

8.1.3 Solar Water Heater Energy Hero Gift Packs

Version Date & Revision History
Draft date: October 4, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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)
- 11/14/13 – Included type and quantity of peripherals in the power strip calculation with Hawaii specific data. Adjusted demand savings for low fow showerhead.

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, 2013
End date: June 30, 2014

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.
- 11/14/13 – Adjusted savings to be consistent with the most recent product specifications.

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	1,088

Energy Savings:

	Demand Savings (kW)	Energy Savings (kWh/year)
Savings	0.21	1,644

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	÷	2.26	COP	
Heat Pump Water Heating Energy Usage		1,088	kWh / Year	
Base SERWH Energy Usage per Year at the Meter		2,732	kWh / Year	
Heat Pump Water Heating Energy Usage	-	1,088	kWh / Year	
Residential Heat Pump Water Heating Savings		1,644	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

Incentive = $100/ton

8.2 High Efficiency Lighting

8.2.1 Compact Fluorescent Lamp (CFL)

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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	0.056	50.4
Multi Family	0.056	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
6 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)

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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
15 years

Measure Costs and Incentive Levels

Table 1 – Residential LED Measure Costs and Incentive Levels

Description	Unit Incentive	Incremental Cost
LED - Res	$ 7.00	$ 15.00

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

Reference Tables
None

8.3 High Efficiency Air Conditioning

8.3.1 VRF Split System AC

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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**	

8.3.2 Ceiling Fans

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
- ENERGY STAR Ceiling Fan Savings Calculator

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

Major Changes:
- Reduced fan lighting hours of operation from 3.5 hours to 2.3 hours per day to be consistent with the other lighting measures – EM&V Review November 14, 2013

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	110	0.019
2014 on	65	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 (2.3/day, 365 days per year)	= 839.5 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) * 839.5 * 1.07)

= **110 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) * 839.5 * 1.07)

= **65 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 (110 kWh) should be claimed for the first four years, but the reduced annual savings (65 kWh) claimed for the remainder of the measure life. The savings adjustment is therefore equal to 65/110 = 59%.

<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

Incentive = $35/unit

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

8.3.3 Solar Attic Fans

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
- n/a

TRM Review Actions:
- November 14, 2013 – Conduct additional research to ensure the 10% air conditioning savings estimate is reasonable. This could include some metering or bill history analysis of customers who participated in this measure. This is a low priority research task as participation for this measure was small during the last program year.

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

Incentive = $50/unit

8.3.4 Whole House Fans

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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 Refrigerator and Clothes Washer

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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.
- 11/14/13 – Updated Energy Star clothes washer to be consistent with the most recent Energy Star standards and calculations.
- 11/14/13 – New standards will take effect beginning September 15, 2014.

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		966	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		609	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	0.042	328

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 Clothes Washer

Standard (kWh)	Energy Star (kWh)	Savings (kWh/yr)	SHW PF	Claimed Energy Savings (kWh)
966	609	357	92%	328

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. • 9.3 million units were sold in 2008. • 70 percent were not ENERGY STAR. • 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. • 8.7 million primary units were replaced in 2008. • 44 percent remained in use, whether they were converted to second units, sold, or given away. • 3.8 million units are candidates for retirement every year.	717	79.53	2,746,062	305
3. Decrease the number of second units. • 26 percent of households had a second refrigerator in 2008. • 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. • 19 percent of all units in use in 2008 were manufactured before 1993. • 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

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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.
- 11/14/13 – No changes are recommended.

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

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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.
- 11/14/13 – It is recommended that further research be conducted in order to determine if the savings assumptions used in this measure is appropriate.

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

Incentive = $5/unit

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

Reference Tables
None

8.5.2 Peer Group Comparison

Version Date & Revision History
Draft date: September 18, 2011
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

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.
- 11/14/13 – Change savings from 1.73% to 0.89%.

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 0.89% is based on EM&V recommendation.

Example Algorithm Calculating Customer Level Impact

ΔkWh = (Total Monthly Base Energy Usage)(# of Participating Months)(%Savings)

Demand Savings
ΔkW = Annual ΔkWh per Unit/ 3000 hours

(Note: 3000 hours was based on 8.22 hours per day of active behavioral usage)

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 test group receiving home energy reports.

Persistence
1 year

Measure Life
1 year

8.5.3 Whole House Energy Metering

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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	Efficient Case (kW)	Efficient Case (kWh/year)
Whole House Meter	1.47	11,544

Building Types	Gross Customer Savings (kW)	Gross Customer Savings (kWh/year)
Gross Customer Savings	0.026	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	0.007	410

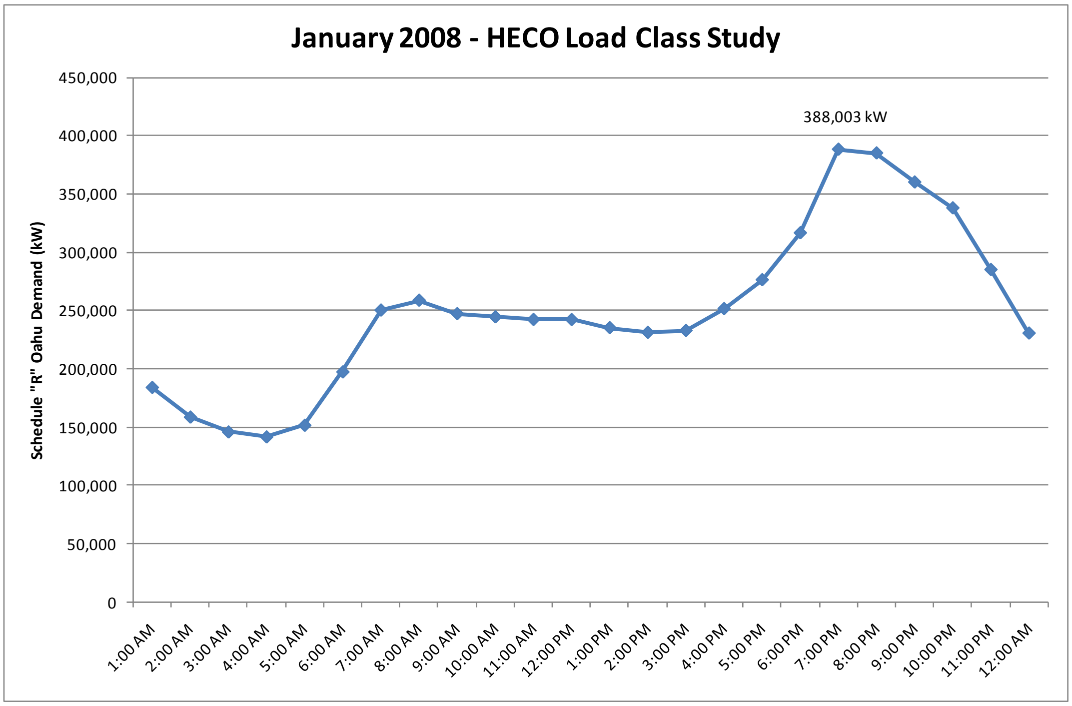
Savings Algorithms

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
4 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

Version Date & Revision History
Draft date: October 4, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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.

9.2 Residential Design

9.2.1 Efficiency Inside (New Home Construction Incentive)

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- n/a

TRM Review Actions:

- 10/5/11 – Currently Under Review.
- 11/14/13 – Since this is a customized process, there are no technical assumptions to 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**		

9.2.2 Solar Water Heating Tune-up

Version Date & Revision History
Draft date: February 21, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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:

-

Major Changes:

- New

Eligibility:

- Systems never received tune-up must be > 3 years old
- Systems that received a tune-up incentive cannot be eligible more than once every 5 years

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

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

Measure Life = 5 years

Operating Hours
10 hours

Loadshape
TBD

Freeridership/Spillover Factors
TBD

Demand Coincidence Factor

Persistence

Lifetime
1 years

Measure Costs and Incentive Levels
Incentive is available once per system per year.
Incentive = $150

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

Reference Tables
None

10 (RHTR) Residential Hard to Reach

10.1 Energy Efficiency Equipment Grants

10.1.1 Energy Hero Gift Packs

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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
- Low Flow Shower Head – Standard Electric Water Heater
- Faucet Aerator

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)
- Shower Head – Solar Water Heater
- Shower Head – Standard Electric Water Heater
- Faucet Aerator

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 Shower Head with Low Flow Shower (Solar) Head
- Replace Shower Head with Low Flow Shower (Electric) Head
- Replace with Low Flow Faucet Aerator

Energy Savings

Measure	Energy Savings (kWh/yr)	Demand Savings (kW)
15W CFL (3 Pack)	108.9	0.015
Akamai Power Strip	78.0	0.0089
7W LED	16.6	0.003

Note
No algorthims are shown for Low Flow Shower Heads or Faucet Aerators due to zero distribution of these measures for PY13.

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

10.1.2 CFL Exchange

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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.
- 11/14/13 – Changes will need to be made in PY14 to match the increases in federal minimum lighting standards over time.

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

10.1.3 Residential Water Cooler Timer

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- LBNL 2007 - http://enduse.lbl.gov/info/LBNL-56380%282007%29.pdf
- EPA2012 - http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=WA#specs

TRM Review Actions:

- Currently Under Review.

Major Changes:

- New measure

Measure Description:
Many homes have water coolers, often equipped with both cold and hot water spigots. Unbeknownst to many, however, is how much energy is used to continuously keep that water hot and cold.

Similar to the timers you might use to control lights in your home, water cooler timers are programmed to turn off during periods when family members are away or sleeping.

Baseline Efficiencies:
No timer

	Energy Usage	
Type of Water Cooler	Cold Only (kWh/day)	Hot/Cold (kWh/day)
ENERGY STAR	0.16	1.20
Conventional	0.29	2.19

Hours per Day	24
Days per year	365

Base Case Usage	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	58	438
Conventional (kWh/year)	106	799

High Efficiency:

Timer installed.

Enhanced Case Usage	Cold Only	Hot + Cold
ENERGY STAR (kWh/year)	41	311
Conventional (kWh/year)	75	567

Energy Savings:

Energy Savings	Cold Only	Hot + Cold
ENERGY STAR (kWh/year)	17	127
Conventional (kWh/year)	31	233
Average Savings (kWh/yr)	24	180
Ave Savings Combined (kWh/yr)	102	
Persistence Factor	75%	
Energy Savings (kWh/yr)	**76.4**	

Energy Savings Assumptions:

It is assumed that half of all water coolers are Energy Star and half are not:

- 50% Energy Star
- 50% Conventional

It is assumed that half of all water coolers are cold only and half are hot + cold dispenser:

- 50% Cold Only
- 50% Hot + Cold

The energy savings figure will be based on the average of the above-mentioned percentages.

Operating Hours: Timer Off from 10PM-5AM everyday.

Persistence Factor = 75% (half will not use for intended purpose)

Demand Savings:

No Demand savings since cooler is off from 10PM – 5AM.

Savings Algorithms

Type of Water Cooler	Cold Only (kWh/day)	Hot + Cold (kWh/day)
ENERGY STAR	0.16	1.2
Conventional	0.29	2.19

Hours per day	24
Days per year	365

Base Case Usage	Cold Only	Hot + Cold
ENERGY STAR (kWh/year)	58	438
Conventional (kWh/year)	106	799

Weekday OFF (hr/day)	7	(10PM-5AM)
Weekend OFF (hr/day)	7	(10PM-5AM)
Weekday (days/week)	5	
Weekend (days/week)	2	
Weekday (weeks/yr)	52	
Weekend (weeks/yr)	52	

Hours OFF	2548
Hours per year	8760
Hours Off (%)	29%
Hours On (%)	71%

Enhanced Case Usage	Cold Only	Hot + Cold
ENERGY STAR (kWh/year)	41	311
Conventional (kWh/year)	75	567

Energy Savings	Cold Only	Hot + Cold
ENERGY STAR (kWh/year)	17	127
Conventional (kWh/year)	31	233
Average Savings (kWh/yr)	24	180
Ave Savings Combined (kWh/yr)	102	
Persistence Factor	75%	
Energy Savings (kWh/yr)	**76.4**	

Lifetime
5 years

Measure Costs and Incentive Levels
Measure Cost = $15
Incentive = $15

11 (BEEM) Business Energy Efficiency Measures

11.1 High Efficiency Lighting

11.1.1 Compact Fluorescent Lighting (CFL)

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

	CFL Wattage Reduction		
	< 16W	16-26W	> 26W
Average Savings (W)	32	60	46

Energy Savings: (see Table 3 for Interactive Effect):

	CFL Energy Reduction		
Building Type	**< 16W**	**16-26W**	**> 26W**
All Commercial	131.5	246.5	189.0
Misc. Commercial	131.5	246.5	189.0
Cold Storage	126.5	237.1	181.8
Education	80.7	151.2	115.9
Grocery	177.0	332.0	254.5
Health	196.8	369.0	282.9
Hotel/Motel	150.2	281.6	215.9
Misc. Industrial	130.4	244.5	187.5
Office	85.4	160.1	122.7
Restaurant	160.5	300.8	230.6
Retail	128.0	240.0	184.0
Warehouse	126.5	237.1	181.8

Military Housing CFL energy savings: 46.2 kWh

Military Residential Values	kWh/year	kW
CFLs	46.2	0.004

Demand Savings: (see Table 3 for Interactive Effect):

	CFL Demand Reduction		
Building Type	**< 16W**	**16-26W**	**> 26W**
All Commercial	0.016	0.030	0.023
Misc. Commercial	0.010	0.018	0.014
Cold Storage	0.016	0.030	0.023
Education	0.006	0.012	0.009
Grocery	0.027	0.051	0.039
Health	0.021	0.039	0.030
Hotel/Motel	0.019	0.036	0.028
Misc. Industrial	0.016	0.030	0.023
Office	0.016	0.030	0.023
Restaurant	0.024	0.045	0.035
Retail	0.019	0.036	0.028
Warehouse	0.014	0.027	0.021

Military Housing CFL demand savings: 0.004 kW

Measure Life
3 years (DEER)

Unit Incentive/Incremental Cost

Incentive = $2/unit

11.1.2 T12 to T8 with Electronic Ballast

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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**	**8' Lamp**
All Commercial	0.0040	0.0070	0.0200
Misc. Commercial	0.0020	0.0040	0.0120
Cold Storage	0.0040	0.0070	0.0200
Education	0.0020	0.0030	0.0080
Grocery	0.0070	0.0110	0.0340
Health	0.0050	0.0080	0.0260
Hotel/Motel	0.0050	0.0080	0.0240
Misc. Industrial	0.0040	0.0070	0.0200
Office	0.0040	0.0070	0.0200
Restaurant	0.0060	0.0100	0.0300
Retail	0.0050	0.0080	0.0240
Warehouse	0.0040	0.0060	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**	**8' Lamp**
All Commercial	35.9	56.4	170.8
Misc. Commercial	35.9	56.4	170.8
Cold Storage	34.5	54.3	164.3
Education	22.0	34.6	104.8
Grocery	48.3	76.0	230
Health	53.7	84.5	255.7
Hotel/Motel	41.0	64.5	195.2
Misc. Industrial	35.6	56.0	169.5
Office	23.3	36.6	110.9
Restaurant	43.8	68.9	208.5
Retail	34.9	54.9	166.3
Warehouse	34.5	54.3	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

11.1.3 T8 to T8 Low Wattage

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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.
- 11/14/13 – Remove all forms of T12 lamps from the energy savings calculations in time for PY16.

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):

Commercial Lighting Factors

Building Type	Hours of Operation[1]	Peak Coincidence Factor[2]	Demand (kW) Savings	Energy (kWh) Savings
All Commercial	4,325	0.50	0.009	38.9
Misc. Commercial	4,325	0.30	0.005	21.6
Cold Storage	4,160	0.50	0.009	37.4
Education	2,653	0.20	0.004	10.6
Grocery	5,824	0.85	0.015	87.4
Health	6,474	0.65	0.012	77.7
Hotel/Motel	4,941	0.60	0.011	54.4
Misc. Industrial	4,290	0.50	0.009	38.6
Office	2,808	0.50	0.009	25.3
Restaurant	5,278	0.75	0.014	73.9
Retail	4,210	0.60	0.011	46.3
Warehouse	4,160	0.45	0.008	33.3

[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	$10.00	$0.13
4'T8 - LW 4'T8	0.006	78.1	$5.50	$0.07

11.1.4 Delamping

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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
$7.50 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

11.1.5 Delamping with Reflectors

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

11.1.6 LED Refrigerated Case Lighting

Version Date & Revision History
Draft date: October 3, 2011
Effective date: July 1,2013
End date: June 30, 2014

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.
- 11/14/13 – Correct the calculation of the refrigeration interactive effect to divide by the COP instead of multiply.

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:
199.7 kWh

Demand Savings:
0.032 kW

Savings Algorithms

LED Refrigerated Case Lighting Retrofit					
40W F40 T12 Linear Fluorescent Fixture Demand		40 W	40%		
Base Demand		0.040	kW		
		17	Hours per Day		
	x	365	Days	6,205	Hours per Year
4 foot Linear Fluorescent Lamp Blended Energy Usage		248.2	kWh per Year		
23 W LED Linear Fixture Demand		0.0230	kW		
		17	Hours per Day		
	x	365	Days	6,205	Hours per Year
Energy Usage		142.7	kWh per Year		
4 foot Linear Fluorescent Lamp Blended Energy Usage		248.2	kWh per Year		
Energy Usage	-	142.7	kWh per Year		
LED Savings Before Adjustments		105.5	kWh per Year		
Lighting Wattage Reduction		105.5	kWh per Year		
% of Lighting Savings reduced from Compressor Load	x	100%			
Cooling Energy Reduced from System		105	kWh per Year		
Lighting Contribution to Cooling Energy Reduced from System		105.5	kWh per Year		
Refrigerator Compressor Efficency	÷	1.12	COP		
Compressor Energy Reduced		94.2	kWh per Year		
LED Savings Before Adjustments		105.5	kWh per Year		
Compressor Energy Reduced	+	94.2	kWh per Year		
		199.7	kWh per Year		
		199.7	kWh per Year		
Persistance Factor	x	1.000	pf	0.0%	Lamps not installed or replaced back
Fixture Savings per Year		199.7	kWh per Year		
LED Case Lighting Energy Savings		**199.7**	**kWh / Year Savings**		
Annual Energy Savings		199.7			
Hours of Operation	÷	6205			
Total kW savings		**0.032**	**Demand Savings (kW)**		

11.1.7 LED

Version Date & Revision History
Draft date: November 30, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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 or Design Lights Consortium (DLC).

Incentives

11.1.8 LED Exit Signs

Version Date & Revision History
Draft date: January, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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
$20

11.1.10 HID Pulse Start Metal Halide

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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)

11.1.12 Sensors

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

11.1.13 Stairwell Bi-Level Dimming Lights

Version Date & Revision History
Draft date: March 30, 2014
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
Seattle City Light Energy Smart Services – ***"Funding Calculation Worksheets for Lighting"***

TRM Review Actions:

- 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:
Stairwell lighting typically operates continuously at full output despite very low, intermittent use. Bi-level stairwell dimming lights utilizes either an ultra-sonic or infrared motion sensor to detect motion in stairwells. Solid state controls are used to dim fixtures to lower light levels when a space is unoccupied. This technology is ideal for areas where codes user preferences, safety, or security requirements call for minimal light levels during unoccupied periods and full light output during occupied periods. Fixtures must be UL compliant. If the enhanced case is LED, it must meet program requirements which is 3 year warranty, one of the following: Energy Star/DLC/LED Lighting Facts, UL compliant.

Baseline Efficiencies:
The base case is no bi-level dimming lights with occupancy sensors.

High Efficiency:
The high efficiency case is bi-level dimming lights with occupancy sensors.

Energy Savings:
Energy savings is calculated based on the modified customized lighting worksheet which accounts for the following:

- Watts (Base)
- Watts (Enhanced)
- Hours of operation (including peak period of 5PM-9PM)
- % on High/Low Level (based on the following table from Seattle City Light Energy Smart Services):

Seattle City Light Energy Smart Services

Funding Calculation Worksheets for Lighting

- Occupancy Reference Table 1. Occupancy Type Codes -

Use this table to find the Occupancy Type Code inputs for the Bi-Level Stairway Lighting worksheet.

Occupancy Types		Occupancy Code	Occupied Fraction
High Rise >10 floors	Free Access	FH	10%
	Limited Access (Exit only)	LH	5%
Low Rise <10 floors	Free Access	FL	20%
	Limited Access (Exit only)	LL	10%

1) Occupancy Percentage. This column is included for information only. The Occupancy Percentage is automatically transferred to the Funding Calculation Worksheets when you

Sample Worksheet

CUSTOMIZED LIGHTING INCENTIVE WORKSHEET

Project:	
Application No.:	
Date:	
Done By:	

The yellow columns should correspond with the customized incentive worksheet.

Existing and Base Case

Location	Fixture Type	Fixture Qty	System Wattage	Total Wattage	M - F Hours of Operation	Sat Hours of Operation	Sun Hours of Operation	(E3) Annual Operating Hours	On-Peak Demand Hours (Weekday 5 to 9 pm.)	(E7) Off Peak Demand	(E8) On Peak Demand	(E9) Annual Energy Use (kWh / Yr.)
Stairwell	32WT-8's	205	34	6970	24	24	24	8760.00	4	6.97	6.97	61057.20
				0				0.00		0.00	0.00	0.00
				0				0.00		0.00	0.00	0.00
				0				0.00		0.00	0.00	0.00
				0				0.00		0.00	0.00	0.00
								8760.00	**4.00**	**6.97**	**6.97**	**61057.20**

Notes:

*Please delete all unused rows.

Operational Cost	
(E24) Annual Maintenance Cost	
Project Cost	
(F27) Equipment Cost	$ 1,000.00
(F26) Total Project Cost	$ 2,000.00
Installation Info	
(E30) Installation year	
(E31) Measure of Life	

Enhanced Case: Retrofit

Location	Fixture Type	Fixture Qty	System Wattage	Total Wattage	M - F Hours of Operation	Sat Hours of Operation	Sun Hours of Operation	(G3) Annual Operating Hours	On-Peak Demand Hours (Weekday 5 to 9 pm.)	(G7) Off Peak Demand	(G8) On Peak Demand	(G9) Annual Energy Use (kWh / Yr.)
Stairwell	Fluorescent Bi-level Lighting	205	6	1230	23	23	23	8395.00	4	1.23	1.23	10325.85
Stairwell	Fluorescent Bi-level Lighting	205	60	12300	1	1	1	365.00	1	12.30	3.08	4489.50
				0				0.00		0.00	0.00	0.00
				0				0.00		0.00	0.00	0.00
				0				0.00		0.00	0.00	0.00
								4380.00	**2.50**	**13.53**	**4.31**	**14815.35**

Notes:

*Please delete all unused rows.

Operational Cost	
(G24) Annual Maintenance Cost	
Project Cost	
(G27) Equipment Cost	$ 34,628.72
(G26) Total Project Cost	$ 49,330.13
Installation Info	
(G30) Installation year	2012
(G31) Measure of Life	13.00 years
(G32) New / Retrofit Project	Retrofit

Project Summary			Estimated Incentive Amount
Average Energy Savings Per Year	**46241.85 kWh/Year**	**$ 0.10 kWh/Year**	$ 4,624.19
On-Peak Demand Savings	**2.67 kW**	**$ 125 /kW**	$ 333.13
Total Demand Savings	**-6.56 kW**	**Total**	**$ 4,957.00**

Measure Life: 14 years (DEER)

11.2 High Efficiency HVAC

11.2.1 Chiller

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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	Reciprocating	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	Reciprocating	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
$0.15/kWh

11.2.2 VFD – Chilled Water/Condenser Water

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

11.2.3 VFD – AHU

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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		

11.2.4 Garage Demand Ventilation Control

Version Date & Revision History
Draft date: October 3, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

- $0.12/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
8 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			Incentive	$	0.18
	$ 16,496 /Year					

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**

11.2.5 Package Unit AC

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

Military Energy Savings = 559.5 kWh per ton (which is 1.5 times the residential AC values)

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

Military Demand Savings = 0.19 kW per ton

11.2.6 Inverter Variable Refrigerant Flow (VRF) Split Air Conditioning Systems

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

11.3 High Efficiency Water Heating

11.3.1 Commercial Solar Water Heating

Version Date & Revision History
Draft date: May 30, 2011
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- n/a

TRM Review Actions:

- 10/5/11 – Currently Under Review.
- 11/14/13 – more research should be done to determine typical baseline efficiencies for both standard electric resistance and heat pump water heaters.

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

11.3.2 Heat Pump

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

11.4 High Efficiency Water Pumping

11.4.1 Domestic Water Booster Packages

Version Date & Revision History
Draft date: May 23, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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:

- Effective 7/1/10 through 3/6/11
  VFD Installation: $1,600
  HP Reduction: $65 x Number of reduced HP
- Effective 3/7/11 through 6/30/14
  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

11.4.2 VFD Pool Pump Packages

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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
$225/HP

11.5 High Efficiency Motors

11.5.1 CEE Tier 1 Listed Premium Efficiency Motors

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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 200 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.

- Incentives apply to both ODP and TEFC enclosures with 1200 RPM, 1800 RPM or
- 3600 RPM motors.
- Motors must meet minimum efficiency requirements as shown in the Motor Incentive Reference Table on the CEE Premium Efficient Motors list available at www.cee1.org.
- Motors greater than 200 hp will be given consideration under the Hawaii Energy Customized Program
- If motors are not listed on the CEE website, submit manufacturer specifications, motor curve and performance data to Hawaii Energy for consideration

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

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.

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

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)

11.5.2 Refrigeration – ECM Evaporator Fan Motors for Walk-in Coolers and Freezers

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

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.

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 Condenser Fan – Freezer Compressor Fan – Freezer Evaporator Fan – Refrigerator Condenser Fan – Refrigerator Compressor Fan - Freezer	115 141 985 294 141 690	0.013 0.016 0.112 0.034 0.016 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

Table 1

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

Savings Algorithms

Deemed demand and energy savings should be calculated by the following formulas for Refrigeration applications:

kW savings = Rated Wattage x (kW/Wpre - kW/Wpost)

kWh savings = Rated Wattage x (kWh/Wpre – kWh/Wpost)

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

11.5.3 EC Motors – Fan Coil Units

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
- n/a

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

Major Changes:
- n/a

Measure Description:

Electronically commutated motors provide clear advantages over AC or conventional DC motors in terms of service life, controllability, flexibility, and cost-effectiveness.

For the past 30 years, forward-bladed centrifugal fans in fan coil-units have been driven by AC motors, which are typically around 45% efficient. However, the latest electronically commutated (EC) motors are 80% efficient, leading to significant operational benefits. The term EC is applied to a DC motor having electronic commutation achieved with a microprocessor.

Commutation means applying a current to the motor phases to produce the best torque at the motor's shaft. In brush-type motors, commutation is done electromechanically using graphite brushes and a commutator. In brushless motors, however, it is achieved by switching electronics using rotor-position information obtained by sensors. Thus, the EC motor is essentially a DC motor that can be connected direct to an AC mains supply.

Baseline Efficiencies:

BASE CASE		
Base demand 4 pole (1800 rpm)	107	watts

High Efficiency:

ENHANCED CASE		
High efficiency DC/EC demand	54	watts

The major advantage of EC motors over their AC counterparts is far higher efficiency, which enables a fan-coil unit to achieve a specific fan power (SFP) of 0.3 compared with 0.8 for an AC motor (the limit in the latest Building Regulations is 0.8 W/l/s).

This higher efficiency can be maintained at low speeds, so less motor heat is absorbed by the cold air discharged from the FCU, which in turn leads to more cooling applied in the space. Lower temperatures increase motor life, and in-built soft starting gives longer bearing life.

Speed control is simple, and results in impressive energy saving performance. The maximum cooling load on an FCU may only apply for 500 hour out of a total annual running time of 3,000 hour. With a typical fan coil unit, the fans deliver more air than necessary for 2500 hour/year — a shocking waste of energy.

By using the temperature controller on an FCU to reduce the speed of the EC motor during periods of reduced cooling demand, we can cut energy wastage dramatically. For example, an annual fan energy consumption of 620 kWh can be reduced to 140 kWh using speed control.

The reduction of air volume is, however, limited by considerations of the room air distribution. That is why we recommend that tests are undertaken in a suitable test facility to determine the optimum range of air volume.

Energy Savings:

ENERGY SAVINGS		
Energy savings 4 pole	232	kWh/year

PEAK DEMAND SAVINGS (5PM-9PM)		
Coincidence factor	0.5	
Peak demand savings (4 pole)	0.0265	kW

Electronically commutated motors offer six major benefits when used in fan-coil units.

- High efficiency of 85%, leading to lower input power.
- Lower rise in air temperature on the air stream.
- Efficient speed control.
- Longer motor life resulting from lower running temperatures.
- Longer bearing life because of the soft-start feature.
- Suitable for a 230 V supply.

By considering a typical 2 fan, fan coil unit providing 190l/s of air against an external resistance of 30Pa, from the testing undertaken by Caice the following figures were derived:

• 4 pole AC Motor Fan Unit powered by 2 off fans energy consumed = 107 watts, sfp 0.55 = w/l/s
• DC/EC Motor Fan Unit powered by 2 off fans energy consumed = 54 watts, sfp = 0.28 w/l/s.

Savings Algorithms

BASE CASE		
Base demand 4 pole (1800 rpm)	107	watts
ENHANCED CASE		
High efficiency DC/EC demand	54	watts
DEMAND SAVINGS		
Demand savings 4 pole	53	watts
hours of operation	12	hours/day
hours of operation	4380	hours/year
ENERGY SAVINGS		
Energy savings 4 pole	232	kWh/year
PEAK DEMAND SAVINGS (5PM-9PM)		
Coincidence factor	0.5	
Peak demand savings (4 pole)	0.0265	kW

Operating Hours
4,380 hours/year (12 hours/day)

Demand Coincidence Factor
0.5

Lifetime
15 years

Measure Costs and Incentive Levels
$55/unit

11.6 Commercial Industrial Processes

11.6.1 Demand Control Kitchen Ventilation (DCKV)

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

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: $700/installed HP (for both existing and new construction whether 1 sensor or 2). Sensors can be either temperature or smoke/fume.

11.6.2 Refrigeration – Cooler Night Covers

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- CL&P Program Savings Documentation for 2011 Program Year (2010). Factors based on Southern California Edison (1997). Effects of the Low Emissive Shields on Performance and Power Use of a Refrigerated Display Case.
- Energy & Resource Solutions (2005). Measure Life Study. Prepared for the Massachusetts Joint Utilities; Page 4-5 to 4-6.

Major Changes:

- New measure

Measure Description:
Installation of retractable aluminum woven fabric covers for open-type refrigerated display cases, where the covers are deployed during the facility unoccupied hours in order to reduce refrigeration energy consumption.

Baseline Efficiencies:
The baseline efficiency case is the annual operation of open-display cooler cases.

High Efficiency:
The high efficiency case is the use of night covers to protect the exposed area of display cooler cases during unoccupied hours.

Energy Savings:
ΔkWh = (Width)(Save)(Hours)
ΔkW = (Width)(Save)

Where:

Width = Width of the opening that the night covers protect (ft)
Save = Savings factor based on the temperature of the case (kW/ft) – see table below
Hours = Annual hours that the night covers are in use.

Cooler Case Temperature	Savings Factor
Low Temperature (-35 to -5 F)	0.03 kW/ft
Medium Temperature (0 F to 30 F)	0.02 kW/ft
High Temperature (35 F to 55 F)	0.01 kW/ft

Operating Hours
Hours represent the number of annual hours that the night covers are in use, and should be determined on a case-by-case basis.

Demand Coincidence Factor
Coincidence factors are set to zero since demand savings typically occur during off-peak hours

Lifetime
10 years

Eligibility

- Must install a cover on an existing open refrigerated display case to decrease its cooling load during off hours.
- The equipment manufacturer must not object to the use of night covers for the existing display case model.
- This incentive is based on linear footage of the installed night cover.
- The cover must be applied for a period of at least six hours.

Measure Costs and Incentive Levels
Incentive = $10/linear foot

*Cost	Linear feet	Material ($/linear feet)	Labor ($/linear feet)	Total ($/linear feet)
$ 235	4	$ 58.75	$ 15.00	$ 73.75
$ 315	6	$ 52.50	$ 15.00	$ 67.50
$ 395	8	$ 49.38	$ 15.00	$ 64.38
				$ 68.54

*Source: Econo Frost

Savings	0.02 kw/foot	Med Temp
Closed	12 hr/day	
Savings (kWh/day)	0.24 kWh/day/ft	
Days per year	365 days/year	
Savings (kWh/year)	87.6 kwh/year	
Incentive per linear feet	$ 10.00 per linear feet	
Program Cost ($/kWh)	$ 0.11	
Average Cost (linear feet)	$ 68.54	
% Incentive of Project Cost	15%	

Costco
Safeway
Foodland
Walmart
Sam's Club
Target
Times

11.7 Building Envelope Improvements

11.7.1 Window Tinting

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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
- Replacement of deteriorated window film is eligible for 50% of the incentive if the customer did not receive an incentive from the existing window film. The incentive will be rounded up.

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:

$0.85/square feet

Persistence Factor

1.0

Coincidence Factor

1.0

Lifetime

10 years (DEER)

11.7.2 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
- (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.

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).

Energy Savings
ΔkWh = SF / 1000 * ΔkWhkSF

ΔkWh = 0.25 kWh / square feet

Coincident Peak Demand Savings
ΔkW ΔkW x CF

Where:

CF = The coincident peak facto = 0.50

Demand Savings per square feet

ΔkW = 0.0001 * 0.50
ΔkW = 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
$0.20/Square Foot (Roof Surface Area w/conditioned space below).

11.8 Energy Star Business Equipment

11.8.1 Refrigerators w/Recycling

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2013
End date: June 30, 2014

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. • 9.3 million units were sold in 2008. • 70 percent were not ENERGY STAR. • 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. • 8.7 million primary units were replaced in 2008. • 44 percent remained in use, whether they were converted to second units, sold, or given away. • 3.8 million units are candidates for retirement every year.	717	79.53	2,746,062	305
3. Decrease the number of second units. • 26 percent of households had a second refrigerator in 2008. • 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. • 19 percent of all units in use in 2008 were manufactured before 1993. • 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**

11.9 Energy Awareness, Measurement and Control Systems

11.9.1 Condominium Submetering

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2012
End date: June 30, 2013

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. Baseline Annual Energy Usage is the actual average usage (kWh/year) based on historical usage for past 24 months (or as appropriate) for entire condominium (master metered) divided by the number of condominium units. Baseline demand (kW) is the Average Historical Demand divided by the number of condominium units.

Building Types	Demand Baseline (kW)	Energy Baseline (kWh/year)
Condominium	1.42	7,200

High Efficiency

The high efficiency case is with submetering. It is expected there will be a 10% reduction in energy usage and 8% reduction in peak demand during (5PM – 9PM).

Building Types	Efficient Case (kW)	Efficient Case (kWh/year)
Condominium	1.30	6,480

Energy and Demand Savings:

Building Types	Gross Customer Savings (kW)	Gross Customer Savings (kWh/year)
Condominium	0.113	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	0.113	720

Example Savings Algorithm:

Submetering (Condominium)				
Average Master Meter Energy Usage (kWh/month)		180,000	kWh per month	
Number of tenant Units	÷	300	Units	
Average Tenant Energy Usage (Example)		600	kWh per home per month	
	x	12	month per year	
Baseline Annual Household Energy Usage		7,200	kWh per Year	
Average Master Meter Demand (kW)		425		
Number of tenant Units	÷	300		
Baseline Demand (kW)		1.42	kW	
Energy Reduction		10.0%		
Actively Informed Household Energy Usage		6,480	kWh per Year	
Baseline Annual 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	
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		1.42	kW	HECO 2008 Load Study
Peak Demand Reduction		8.00%		
Actively Informed Household Demand		1.30	kW	
Baseline Household Demand		1.42	kW	
Actively Informed Household Demand	-	1.30	kW	
Gross Customer Demand Savings		0.113	kW	
Gross Customer Demand Savings		0.113	kW	
Persistance Factor	x	1.0		
Coincidence Factor	x	1.0		
		0.113	kW	
Condominium Sub-Metering Demand Savings		0.113	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.
- There is no minimum reduction in electrical use to be required by AOAO to retain the incentive.

Description	Incentive	Incremental Cost
Condominium Submeter	$150	$750

Measure Life: 8 years (based on DEER. Similar technology as time-clocks and occupancy sensors)

11.9.2 Small Business Submetering Pilot

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.

Example 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.

Incentive = $150 per tenant unit

12 (CBEEM) Custom Business Energy Efficiency Measures

12.1 Customized Project Measures

12.1.1 Customized Project Measures

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- n/a

TRM Review Actions:

- 10/5/11 – Currently Under Review.

Major Changes:

- Incentive values have decreased from PY12

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	$0.08 /kWh	$125 / kW	*$100 / kW		
> 5 years	$0.12 /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 (BESM) Business Energy Services and Maintenance

13.1 Business Direct Installation

13.1.1 Small Business Direct Lighting Retrofits

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

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	Step 2: Total Units (each) a	Step 3: M-F Hours per Day b1a	Sat. Hours per Day b1b	Sun. Hours per Day b2a	Annual Hours of Operation (hrs/year) b3 = b1*b2*(365/7)	Step 4: Wkdays Hours on between 5 and 9 p.m. (hrs) c	On-Peak Fraction (%) c2 =c / 4	Total Watts Saved (Watts) d = a x o	Energy Savings (kWh/Year) e = b x (d/1000)	Energy Cost Savings ($/year) f = e x f2	Hawaii Energy Participating Contractor NTE Pricing ($) g = a x p	Hawaii Energy Cash Incentive ($) h = a x q	Net Customer Cost ($) i = a x (p-q)	Simple Payback (Months) j = (i/f) x 12	6 Month Monthly Payment ($/month) k = i /6	Monthly Savings % of Payment (%) 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 (Watt/unit) m	Unit New Watts (Watt/unit) n	Unit Watts Saved (Watt/unit) o = m-n	Hawaii Energy Participating Contractor Pricing ($/unit) p	Hawaii Energy Cash Incentive ($) q	Public Benefit Fee Investment ($/kWh) 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

13.2 Business Design, Audits and Commissioning

13.2.1 Benchmark Metering

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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 • Metering Plan • Development of Sequence of Operations • Operational Improvements • System Upgrade Improvements • Maintenance and Operations Plan • Operational Training • 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. • 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 • 25% for performance at sixth month • 25% for performance at one year

*Total incentives not to exceed customer cost.

13.2.3 Decision Maker – Real Time Submetering - Advanced Pump Efficiency Program (APEP)

Version Date & Revision History
Draft date: April 8, 2013
Effective date: May 1, 2013
End date: June 30, 2014

Referenced Documents:

- n/a

TRM Review Actions:

- n/a

Major Changes:

- New measure/program offering

Measure Description:
This program is an educational and incentive program intended to encourage energy efficiency and conservation for water supply entities by providing metering (flow & power) devices to measure, test and improve pumping efficiency. The purpose is to determine if their pumps are performing at optimal capacity and to make cost-effective recommendations for needed repairs and/or adjustments.

Baseline Efficiencies:
The baseline case is the existing pump as found with no change in operation or retrofit.

High Efficiency:
The high efficiency case is making efficiency adjustments/improvements to the pump after conducting a pump test which measures the pump's operation including flow, pressure and power usage.

Energy Savings:
Savings will be determined on a case-by-case basis based on actual energy and demand savings through pre and post measurements.

Overall pump efficiency (OPE) can be generally characterized as follows:

Motor HP	Low%	Fair %	Good %	Excellent		
				Well Pump	Booster	Submersible
3 - 5	≤ 41.9	42.0 - 49.9	50.0 - 54.9	≥ 55.0	≥ 55.0	≥ 52.0
7.5 - 10	≤ 44.9	45.0 - 52.9	53.0 - 57.9	≥ 58.0	≥ 60.0	≥ 55.0
15 - 30	≤ 47.9	48.0 - 55.9	56.0 - 60.9	≥ 61.0	≥ 65.0	≥ 58.0
40 - 60	≤ 52.9	53.0 - 59.9	60.0 - 64.9	≥ 65.0	≥ 70.0	≥ 62.0
75 - up	≤ 55.9	56.0 - 62.9	63.0 - 68.9	≥ 69.0	≥ 72.0	≥ 66.0

Algorithm

Water Pumping			
Base Pump Motor Use:			
Base HP =	10	HP	Example
Motor Efficiency =	92%		Example
Average Load =	75%		Example
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%		
kWh savings = % savings * kWh annual use =	9,027	kWh	
kW average savings = kWh savings/Hours =	1.50	kW	
Coincidence Factor (CF)	0.5		
kW savings = average kW savings * CF =	0.75	kW	
Energy Savings (kWh/HP)	**903**	**kWh/HP**	
Peak Demand Savings (kW/HP)	**0.08**	**kW/HP**	

Operating Hours
TBD

Demand Coincidence Factor
TBD

Persistence
TBD

Lifetime
1 year – TBD

Measure Costs and Incentive Levels
The following incentive budget will be allocated to the following counties:

- $50,000 – Honolulu
- $50,000 – Maui
- $50,000 – Hawaii

13.2.4 Energy Study

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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

13.2.5 Design Assistance

Measure ID:

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2013
End date: June 30, 2014

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 50% limited to a maximum of $15,000

13.2.6 Technology & Project Demonstration Assistance

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.

14 (BHTR) Business Hard to Reach

14.1 Energy Efficiency Equipment Grants

14.1.1 Water Cooler Timer (H$_2$Off)

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- LBNL 2007
- http://enduse.lbl.gov/info/LBNL-56380%282007%29.pdf
- EPA2012
  http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=WA#s
  pecs

TRM Review Actions:

- Currently Under Review.

Major Changes:

- New measure

Measure Description:
Many businesses have water coolers, often equipped with both cold and hot water spigots. Unbeknownst to many, however, is how much energy is used to continuously keep that water hot and cold. Think about it: Water coolers are generally plugged in 24/7, so they're ready and waiting to make a nice cup of hot tea if someone happens to drop by the office at 3 a.m.

Similar to the timers you might use to control lights in your home, plug-in appliance timers allow you to pre-program the times that various appliances in your business are turned on and drawing electricity. So you could pre-program the water cooler so it turns on one hour before the office opens and turns off again after everyone leaves.

Baseline Efficiencies:
No timer

	Energy Usage	
Type of Water Cooler	Cold Only (kWh/day)	Hot/Cold (kWh/day)
ENERGY STAR	0.16	1.20
Conventional	0.29	2.19

Hours per Day	24
Days per year	365

Base Case Usage	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	58	438
Conventional (kWh/year)	106	799

High Efficiency:

Enhanced Case Usage	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	21	157
Conventional (kWh/year)	38	287

Energy Savings:

Energy Savings	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	37	281
Conventional (kWh/year)	68	512
Average Savings (kWh/year)	**53**	**397**

Energy Savings Assumptions:

It is assumed that half of all water coolers are Energy Star and half are not:

- 50% Energy Star
- 50% Conventional

It is assumed that half of all water coolers are cold only and half are hot + cold dispenser:

- 50% Cold Only
- 50% Hot + Cold

The energy savings figure will be based on the average of the above-mentioned percentages.

Persistence Factor = 90%

Energy Savings = 225 x 90% = 202.5 kWh/year

Demand Savings:

Taking a conservative approach, the demand savings will based on the following calculation and methodology:

Demand Savings = 225 kWh/year divided by 8760 hrs/year = 0.026 kW

Coincidence Factor = 75%

Note: Based on utilization of 3 of the 4 peak hours (6PM-9PM). 5PM-6PM is not counted since most offices close at 5PM and the timer should be set to turn off cooler 1 hour after office closes which is 6PM.

Coincidence Demand Savings = 0.026 kW x .75 = 0.020 kW

Persistence = 90% (10% of people will disconnect)

Peak Demand Savings = 0.020 kW x .90 = 0.018 kW

Savings Algorithms

Hours per Day	24
Days per year	365

Base Case Usage	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	58	438
Conventional (kWh/year)	106	799

Weekday OFF (Hour/Day)	12
Weekend OFF (Hour/Day)	24
Weekday (Day/week)	5
Weekend (Day/week)	2
Weekday (Week/year)	52
Weekend (Week/year)	52

Hours OFF	5616
Hours per Year	8760
Hours OFF (%)	64%
Hours ON (%)	36%

Enhanced Case Usage	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	21	157
Conventional (kWh/year)	38	287

Energy Savings	Cold Only	Hot/Cold
ENERGY STAR USAGE (kWh/year)	37	281
Conventional (kWh/year)	68	512
Average Savings (kWh/year)	**53**	**397**

Operating Hours

Weekday OFF (Hour/Day)	12
Weekend OFF (Hour/Day)	24
Weekday (Day/week)	5
Weekend (Day/week)	2
Weekday (Week/year)	52
Weekend (Week/year)	52

Hours OFF	5616
Hours per Year	8760
Hours OFF (%)	64%
Hours ON (%)	36%

Lifetime
5 years

Measure Costs and Incentive Levels

Measure Cost = $15
Incentive = $15

14.1.2 Small Business Direct Installation - Demand Control Kitchen Ventilation (DCKV)

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

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)

14.1.3 Low Flow Spray Nozzles for Food Service (Retrofit)

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- Evergreen TRM Review – 1/15/14

TRM Review Actions:

- 10/5/11 – Currently Under Review.

Major Changes:

- n/a

Measure Description:
All pre-rinse valves use a spray of water to remove food waste from dishes prior to cleaning in a dishwasher. They reduce water consumption, water heating cost, and waste water (sewer) charges. Pre-rinse spray valves include a nozzle, squeeze lever, and dish guard bumper. Energy savings depend on the facility's method of water heating (electric resistance or heat pump). If the facility does not have electric water heating (i.e. gas or propane), there are no electric savings for this measure. The spray valves usually have a clip to lock the handle in the "on" position. Pre-rinse valves are inexpensive and easily interchangeable with different manufacturers' assemblies.

Baseline Efficiencies:
The baseline equipment is assumed to be a spray valve with a flow rate of 2.25 gallons per minute.

High Efficiency:
The efficient equipment is assumed to be a pre-rinse spray valve with a flow rate of 1.28 gallons per minute.

Energy Savings:

$$\Delta kWh = \Delta Water \times HOT_{\%} \times 8.33 \times (\Delta T) \times (1/EFF^*) / 3413$$

ΔWater = Water savings (gallons)
$HOT_{\%}$ = The percentage of water used by the pre-rinse spray valve that is heated = 69%
8.33 = The energy content of heated water (Btu/gallon/°F)
ΔT = Temperature rise through water heater (°F) = 65°F
*EFF1 = Water heater thermal efficiency (electric resistance) = 0.98
*EFF2 = Water heater thermal efficiency (heat pump) = 3.0
3413 = Factor to convert Btu to kWh

Building Type	Operating Schedule (Day/year)	kW Savings	Electric Resistance (kWh/yr) Savings	Heat Pump (kWh/yr) Savings
Restaurants/Institutions	365	1.03	4,753	1,553
Dormitories	274	0.9	3,568	1,165
K-12 Schools	200	0.79	2,604	851

Demand Coincidence Factor
TBD

Persistence
TBD

Lifetime
5 years

Measure Costs and Incentive Levels
The actual measure installation cost should be used (including material and labor).

14.1.4 Commercial Ice Makers

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- PG&E Work Paper PGECOFST108 Commercial Ice Machines Revision 3 – May 30, 2012

TRM Review Actions:

- Currently Under Review.

Major Changes:

- New measure

Measure Description:
This measure applies to Energy Efficient air-cooled commercial ice makers in retrofit and new construction applications installed in conditioned spaces. Commercial ice makers are classified into three equipment types; ice-making heads (IMHs), remote condensing units (RCUs) and self-contained units (SCUs). The measure described here applies to ice makers that use a batch process to make cubed ice.

The industry standard for energy use and performance of commercial ice machines is AHRI Standard 810. Key parameters reported for ice makers include the Equipment Type, Harvest Rate (lbs of ice/24hrs) and Energy Consumption Rate. The AHRI Directory of Certified Equipment150 lists these values by equipment manufacturer and model number.

Baseline and Efficiency Standard:
The Energy Efficient criteria for ice makers define efficiency requirements for both energy and potable water use.

Market Applicability
Hospitals account for 39.4 percent of all commercial icemaker purchases, followed by hotels (22.3 percent), restaurants (13.8 percent), retail outlets (8.5 percent), schools (8.5 percent), offices (4.3 percent), and grocery stores (3.2 percent).

Measure Savings Calculations:
Annual electric savings can be calculated by determining the energy consumed for baseline ice makers compared against ENERGY STAR performance requirements using the harvest rate of the more efficient unit. Peak demand savings can then be derived from the electric savings.

$$\Delta kWh = (kWh_{\boldsymbol{base,per100lb}} - kWh_{\boldsymbol{ee,per100lb}})/100 \times DC \times H \times 365$$

$$\Delta kW = \Delta kWh / HRS$$

Where:

- 100 = conversion factor to convert kWh***base,per100lb*** and kWh***ee,per100lb*** into maximum kWh consumption per pound of ice.
- DC = Duty Cycle of the ice maker representing the percentage of time the ice machine is making ice
- H = Harvest Rate (lbs of ice made per day)
- 365 = days per year
- kWh = Annual energy savings
- HRS = Annual operating hours
- CF = 1.0

The baseline and energy efficient energy usage per 100lbs of ice produced is dependent on the category of ice maker, as well as the capacity of the energy efficient ice maker. The equations used to determine the energy per 100lbs of ice produced can be seen below.

This incentive applies towards the purchase of new or replacement energy efficient Air-cooled ice machines. Used or rebuilt equipment is not eligible. Customers must provide proof that the appliance meets the energy efficiency specifications listed in Table below.

This specification covers machines generating 60 grams (2 oz.) or lighter ice cubes, as well as flaked, crushed, or fragmented ice machines that meet the Energy Efficiency thresholds by Ice harvest (IHR) rate listed below. Only air cooled machines (icemaker heads, self-contained unites, and remote condensing units) are eligible for incentives. Performance data is based on ARI Standard 810.

Energy Efficiency Requirements

Equipment Type	Ice Harvest Rate Range (lbs of ice/24 hrs)	Energy Effficient Ice Makers		Federal Minimum Standard Energy Consumption Rate (kWh/100 lbs ice) (H = Harvest Rate)
		Energy Consumption Rate (kWh/100 lbs ice) (H = Harvest Rate)	Potable Water Use Limit (gal/100 lbs ice)	
Ice Making Heads	<450	≤ 8.72 - 0.0073H	≤ 20	10.26 - 0.0086H
	≥ 450	≤ 5.86 - 0.0009H	≤ 20	6.89 - 0.0011H
Remote Condensing Units	< 1,000	≤ 7.52 - 0.0032H	≤ 20	8.85 - 0.0038H
	≥ 1,000	≤ 4.34	≤ 20	5.10
Remote Condensing Units	< 934	≤ 7.52 - 0.0032H	≤ 20	8.85 - 0.0038H
	≥ 934	≤ 4.51	≤ 20	5.30
Self-Contained Units	< 175	≤ 15.3 - 0.0399H	≤ 30	18.0 - 0.069H
	≥ 175	≤ 8.33	≤ 30	9.80

Example Savings Calculations

Savings calculation for varying Harvest Rates (H) can be seen below:

Performance	IHR	IHR	IHR	IHR	IHR
Ice Harvest Rate (IHR) (lbs per 24 hrs.)	101-300	301-500	501-1,000	1,001-1,500	> 1,500
Average IHR Used in Energy Calculations (lbs/day)	200	400	750	1,250	1,750
Baseline Model Energy Usage (kWh/100 lbs)	9.8	6.82	6.07	5.1	5.1
Energy Efficient Model Energy Usage (kWh/100 lbs)	8.33	5.8	5.19	4.34	4.34
Baseline Model Daily Energy Consumption (kWh)	14.7	20.5	34.1	47.8	66.9
Energy Efficient Model Daily Energy Consumption (kWh)	12.5	17.4	29.2	40.7	57
Baseline Model Average Demand (kW)	0.613	0.853	1.421	1.992	2.789
Energy Efficient Model Average Demand (kW)	0.521	0.725	1.215	1.695	2.373
Estimated Demand Reduction (kW)	0.092	0.128	0.206	0.297	0.416
Baseline Model Annual Energy Consumption (kWh/yr)	5,366	7,468	12,452	17,452	24,432
Energy Efficient Model Annual Energy Consumption (kWh/yr)	4,561	6,351	10,645	14,851	20,791
Estimated Annual Energy Savings (kWh/yr)	805	1,117	1,807	2,601	3,641
Electric Cost ($/kWh)	$0.25	$0.25	$0.25	$0.25	$0.25
Baseline Model Annual Energy Cost ($/yr)	$1,342	$1,867	$3,113	$4,363	$6,108
Energy Efficient Model Annual Energy Cost ($/yr)	$1,140	$1,588	$2,661	$3,713	$5,198
Estimated Annual Energy Cost Savings ($/yr)	$201	$279	$452	$650	$910
Estimated Incremental Cost	$306	$266	$249	$589	$939
Estimated Useful Life (EUL)	12	12	12	12	12

Demand Coincidence Factor
CF = 1.0

Lifetime
12 years

Incentive Levels
TBD

14.1.5 Food Service – Commercial Electric Steam Cooker

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
- ENERGY STAR Commercial Kitchen Equipment Savings Calculator: Steam Cooker Calcs.
- PG&E Work Paper PGECOFST104 Commercial Steam Cooker Revision #4 (5/22/12)

TRM Review Actions:
- Currently Under Review.

Major Changes:
- New measure

Measure Description:
The installation of a qualified ENERGY STAR commercial steam cooker. ENERGY STAR steam cookers save energy during cooling and idle times due to improved cooking efficiency and idle energy rates.

Baseline Efficiencies:
The Baseline Efficiency case is a conventional electric steam cooker with a cooking energy efficiency of 30%, pan production of 23.3 pounds per hour, and an idle energy rate of 1.2 kW.

High Efficiency:
The High Efficiency case is an ENERGY STAR electric steam cooker with a cooking energy efficiency of 50%, pan production capacity of 16.7 pounds per hour, and an idle energy rate of 0.4 kW.

Energy Savings:
Unit savings are deemed based on study results:

ΔkWh/year = 3,258 kWh/pan
ΔkW = 2.23 kW

Savings Algorithms

Steam Cooker Calculations for the ENERGY STAR Commercial Kitchen Equipment Calculato

Inputs

	USER ENTRY	
	Electric	
Average daily operation	12	hours
Annual days of operation	365	days
Food cooked per day	100	pounds
Number of pans per unit	3	
Incremental cost	$2,000	

Assumptions

	Electric		
	Conventional	ENERGY STAR	
Type	steam generator	boilerless	
Water Use	40	3	gallons/hour
Time in constant steam mode	40%	40%	
Cooking energy efficiency	30%	50%	
Production capacity per pan	23.3	16.7	pounds/hour
Number of preheats per day	1	1	
Preheat length	15	15	minutes
Preheat energy rate	6,000	6,000	W
Idle energy rate	1,200	400	W
ASTM energy to food	30.8		Wh/pound
Equipment lifetime	12		years

Calculations

	Electric		
	Conventional	ENERGY STAR	
Annual operation	4,380		hours
Daily preheat energy	1,500	1,500	Wh
Daily cooking energy	10,267	6,160	Wh
Daily idle time	10.32	9.75	hour
Daily idle energy	37,052	14,382	Wh
Total daily energy	48,819	22,042	Wh

Annual energy consumption per steam cooker

	Conventional	ENERGY STAR	Savings (3 Pan)	Savings per Pan
Electric Usage (kWh/year)	17,819	8,045	9,774	3258

Operating Hours
The average steam cooker is assumed to operate 4,380 hours per year.

Demand Coincidence Factor
CF = 1.0

Persistence
100% persistence factor

Lifetime
12 years

Measure Costs and Incentive Levels
Incremental cost = $2,000
Incentive Level = $750/steamer

14.1.6 Food Service – Commercial Electric Griddle

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
- The industry standard for energy use and cooking performance of griddles are ASTM F1275-03: Standard Test
- Method for the Performance of Griddles and ASTM F1605-01: Standard Test Method for the Performance of Double-Sided Griddles
- ENERGY STAR Commercial Griddles Program Requirements Version 1.1, effective May 2009 for gas griddles and effective January 1, 2011 for electric.
- Database for Energy Efficient Resources, 2008, http://www.deeresources.com/deer0911planning/downloads/EUL_Summary_10-1-08.xls
- Assumptions based on PG&E Commercial Griddles Work Paper developed by FSTC, May 22, 2012.

TRM Review Actions:
- Currently Under Review.

Major Changes:
- New measure

Measure Description:
This measure applies to ENERGY STAR or equivalent electric commercial griddles in retrofit and new construction applications. This appliance is designed for cooking food in oil or its own juices by direct contact with either a flat, smooth, hot surface or a hot channeled cooking surface where plate temperature is thermostatically controlled.

Energy-efficient commercial electric griddles reduce energy consumption primarily through the application of advanced controls and improved temperature uniformity.

Baseline and Efficiency Standard
Key parameters for defining griddle efficiency are Heavy Load Cooking Energy Efficiency and Idle Energy Rate. There are currently no federal minimum standards for Commercial Griddles, however, the American Society of Testing and Materials (ASTM) publishes Test Methods155 that allow uniform procedures to be applied to each commercial cooking appliance for a fair comparison of performance results.

ENERGY STAR efficiency requirements apply to single and double sided griddles. The ENERGY STAR criteria should be reviewed on an annual basis to reflect the latest requirements.

ENERGY STAR Criteria for Electric Single and Double Sided Griddles

Performance Parameters	Electric Griddles
Heavy-Load Cooking Energy Efficiency	>= 70%
Idle Energy Rate	<= 320 watts per ft²

Energy Savings:
Annual savings can be calculated by determining the energy consumed by a standard efficiency griddle as compared with an ENERGY STAR rated griddle.

ΔkWh = kWh(base) – kWh(eff)

ΔkWh(base or eff) = kWh(cooking) + kWh(idle) + kWh(preheat)

kWh(cooking) = [LB(food) x E(food)/Cook(eff)] x Days

kWh(idle) = IdleEnergy x [DailyHrs – LB(food)/Capacity – PreheatTime/60] x Days

kWh(preheat) = PreheatEnergy x Days

Parameter	Description	Value	Source
Daily Hrs	Daily Operating Hours	12 hours	FSTC
Preheat Time	Time to Preheat (min)	15 min	FSTC
E(food)	ASTM defined Energy to Food	0.139 kWh/lb	FSTC
Days	Number of days of operation	365 days	FSTC
CookEff	Cooking energy efficiency (%)	See Table below	FSTC, ENERGY STAR
IdleEnergy	Idle energy rate (kW)		
Capacity	Production capacity (lbs/hr)		FSTC
Preheat Energy	kWh/day		FSTC
LB(food)	Food cooked per day (lb/day)		FSTC

General assumptions used for deriving deemed electric savings are values taken from the Food Service Technology Center (FSTC) work papers. These deemed values assume that the griddles are 3 x 2 feet in size. Parameters in the table are per linear foot, with an assumed depth of 2 feet.

Baseline and Efficient Assumptions for Electric Griddles

Parameter	Baseline Electric Griddles	Efficient Electric Griddles
Preheat Energy (kWh/ft)	1.33	0.67
Idle Energy Rate (kW/ft)	0.80	0.64
Cooking Energy Efficiency (%)	65%	70%
Production Capacity (lbs/h/ft)	11.7	16.33
Lbs of food cooked/day/ft	33.33	33.33

Base (kWh/year) per linear foot	
Cooking	2602
Idle	2599
Preheat	485
Total Base Energy Usage (kWh)	**5686**
Demand (kW)	**1.30**

Efficient (kWh/year) per linear foot	
Cooking	2416
Idle	2268
Preheat	245
Total Efficient Energy Usage (kWh)	**4928**
Demand (kW)	**1.13**

Energy Savings (kWh/year) per linear foot	**758**
Demand Savings (kW)	**0.17**

Operating Hours
The average steam cooker is assumed to operate 4,380 hours per year.

Demand Coincidence Factor
Coincidence factor is 1.0 because the cooking equipment is assumed to operate throughout the on-peak demand periods (5PM – 9PM).

Persistence
100% persistence factor

Lifetime
12 years – DEER (2008)

Measure Costs and Incentive Levels
Incremental cost = $774
(Assumptions based on PG&E Commercial Griddles Work Paper developed by FSTC, May 22, 2012).

Incentive = $

14.1.7 Food Service – Commercial Fryer

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- The industry standards for energy use and cooking performance of fryers are ASTM Standard Test Method for the Performance of Open Deep Fat Fryers (F1361) and ASTM Standard Test Method for the Performance of Large Vat Fryers (FF2144).
- ENERGY STAR Version 2.0, effective April 22, 2011
- Assumptions based on PG&E Commercial Fryers Work Paper developed by FSTC, June 13, 2012

TRM Review Actions:

- Currently Under Review.

Major Changes:

- New measure

Measure Description:
This measure applies to ENERGY STAR or its equivalent electric commercial open-deep fat fryers in retrofit and new construction applications. Commercial fryers consist of a reservoir of cooking oil that allows food to be fully submerged without touching the bottom of the vessel. Electric fryers use a heating element immersed in the cooking oil. High efficiency standard and large vat fryers offer shorter cook times and higher production rates through the use of heat exchanger design. Standby losses are reduced in more efficient models through the use of fry pot insulation.

Baseline and Efficiency Standard
Key parameters for defining fryer efficiency are Heavy Load Cooking Energy Efficiency and Idle Energy Rate. ENERGY STAR requirements apply to a standard fryer and a large vat fryer. A standard fryer measures 14 to 18 inches wide with a vat capacity from 25 to 60 pounds. A large vat fryer measures 18 inches to 24 inches wide with a vat capacity greater than 50 pounds. The ENERGY STAR criteria should be reviewed on an annual basis to reflect the latest requirements.

There are currently no federal minimum standards for Commercial Fryers, however, the American Society of Testing and Materials (ASTM) publishes Test Methods183 that allow uniform procedures to be applied to each commercial cooking appliance for a fair comparison of performance results.

ENERGY STAR Criteria and FSTC Baseline for Open Deep-Fat Electric Fryers

Performance Parameters	ENERGY STAR Electric Fryer Criteria	
	Standard Fryers	Large Vat Fryers
Heavy-Load Cooking Energy Efficiency	>= 80%	>= 80%
Idle Energy Rate	<+ 1.0 kW	<= 1.1 kW

Energy Savings:

Annual savings can be calculated by determining the energy consumed by a standard efficiency fryer as compared with an ENERGY STAR rated fryer.

ΔkWh = kWh(base) – kWh(eff)

ΔkWh(base or eff) = kWh(cooking) + kWh(idle) + kWh(preheat)

kWh(cooking) = [LB(food) x E(food)/Cook(eff)] x Days

kWh(idle) = IdleEnergy x [DailyHrs – LB(food)/Capacity – PreheatTime/60] x Days

kWh(preheat) = PreheatEnergy x Days

Parameter	Description	Value	Source
Daily Hrs	Daily Operating Hours	12 hours	FSTC
Preheat Time	Time to Preheat (min)	15 min	FSTC
E(food)	ASTM defined Energy to Food	0.167 kWh/lb	FSTC
Days	Number of days of operation	365 days	FSTC
CookEff	Cooking energy efficiency (%)	See Table below	FSTC, ENERGY STAR
IdleEnergy	Idle energy rate (kW)		
Capacity	Production capacity (lbs/hr)		FSTC
Preheat Energy	kWh/day		FSTC
LB(food)	Food cooked per day (lb/day)		FSTC

General assumptions used for deriving deemed electric savings are values taken from the Food Service Technology Center (FSTC) work papers.

Baseline and Efficient Assumptions for Electric Standard and Large Vat Fryers

Parameter	Baseline Electric Fryers		Efficient Electric Fryers	
	Standard	Large Vat	Standard	Large Vat
Preheat Energy (kWh/ft)	2.3	2.5	1.7	2.1
Idle Energy Rate (kW/ft)	1.05	1.35	1.00	1.1
Cooking Energy Efficiency (%)	75%	70%	80%	80%
Production Capacity (lbs/h/ft)	65	100	70	110
Lbs of food cooked/day/ft	150	150	150	150

Baseline Electric Fryers	Standard	Large Vat
Cooking	12191	13062
Idle	3619	5051
Preheat	840	913
Total Energy Usage (kWh/year) per Vat	16649	19025
Demand	3.80	4.34

Efficient Electric Fryers	Standard	Large Vat
Cooking	11429	11429
Idle	3507	4170
Preheat	621	767
Total Energy Usage (kWh/year) per Vat	15556	16366
Demand	3.55	3.74

Savings	Standard	Large Vat
Energy Savings (kWh/year) per Vat	1093	2659
Demand Savings (kW)	0.25	0.61

Operating Hours
The average steam cooker is assumed to operate 4,380 hours per year.

Demand Coincidence Factor
Coincidence factor is 1.0 because the cooking equipment is assumed to operate throughout the on-peak demand periods (5PM – 9PM).

Persistence
100% persistence factor

Lifetime
12 years – DEER (2008)

Measure Costs and Incentive Levels
Incremental cost = $769
(Assumptions based on PG&E Commercial Fryers Work Paper developed by FSTC, May 22, 2012).

Incentive = $

14.1.8 Hot Food Holding Cabinet

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:
- PG&E Work Paper PGEFST105 (Revision 3) – June 8, 2012

TRM Review Actions:
- Currently Under Review.

Major Changes:
- New measure

Measure Description:
Commercial insulated hot food holding cabinet models that meet program requirements incorporate better insulation, reducing heat loss, and may also offer additional energy saving devices such as magnetic door electric gaskets, auto-door closures, or dutch doors. The insulation of the cabinet also offers better temperature uniformity within the cabinet from top to bottom. This means that qualified hot food holding cabinets are more efficient at maintaining food temperature while using less energy.

- **Full-size holding cabinets** are defined as any holding cabinet with an internal measured volume of greater than or equal to 15 cubic feet (≥15 ft.3). This measure does not include cook-and-hold equipment. All measures must be electric hot food holding cabinets that are fully insulated and have doors. Qualifying cabinets must not exceed the maximum idle energy rate of 20 Watts per cubic foot in accordance with the ASTM Standard test method.

- **Half-size holding cabinets** are defined as any holding cabinet with an internal measured volume of less than 15 cubic feet (<15 ft.3). This measure does not include cook-and-hold or retherm equipment. All measures must be electric hot food holding cabinets that are fully insulated and have doors. Qualifying cabinets must not exceed the maximum idle energy rate of 20 Watts per cubic foot in accordance with the ASTM Standard test method.

Baseline Efficiency:
The baseline equipment is assumed to be a standard hot food holding cabinet with an idle energy rate of 40 watts per cubic foot.

High Efficiency:
The efficient equipment is assumed to be an ENERGY STAR qualified hot food holding cabinet with an idle energy rate of 20 watts per cubic foot.

Energy Savings:
Energy usage calculations are based on 15 hours a day, 365 days per year operation at a typical temperature setting of 150°F. The different sizes for the holding cabinets (half size and full size) have proportional operating energy rates. Operating energy rate for the full size holding cabinets was obtained in accordance with the ASTM Standard.

The energy savings calculations listed in the following tables use Title 20 (California) as the baseline for potential energy savings requiring all hot food holding cabinets sold in California to meet a normalized idle energy rate of 40 Watts/ft³.

Insulated Hot Food Holding Cabinet - Full Size

Performance	Baseline	High Efficiency Qualifying Model
Demand (kW)	1	0.28
Annual Energy Use (kWh/year)	5475	1533
Estimated Demand Reduction (kW)	-	0.72
Annual Energy Savings (kWh/year)	-	3942
Incremental Measure Cost ($)		2336
Estimated Useful Life (years)	12	12

Insulated Hot Food Holding Cabinet - Half Size

Performance	Baseline	High Efficiency Qualifying Model
Demand (kW)	0.38	0.05
Annual Energy Use (kWh/year)	2081	274
Estimated Demand Reduction (kW)	-	0.33
Annual Energy Savings (kWh/year)	-	1807
Incremental Measure Cost ($)		381
Estimated Useful Life (years)	12	12

The demand reduction estimation is based on measured data for standard efficiency insulated holding cabinets and for high-efficiency insulated holding cabinets. The measured data are derived from tests conducted under ASTM Standard Test Method for the Performance of Hot Food Holding Cabinets.

Measure ASTM test results for Hot Food Holding Cabinets

Cabinet Size	Cabinet Volume (ft³)	Normalized Idle Energy Rate (W/ft³)	Total Cabinet Idle Energy Rate (W)
Full-Size	25	11.3	0.28
Half-Size	10	5.7	0.05

Operating Hours
15 hr/day, 365 day/year = 5,475 hours/year

Demand Coincidence Factor
CF = 1.0

Lifetime
12 years

Measure Costs and Incentive Levels
The incremental cost for ENERGY STAR hot food holding cabinet is $2,336 (full size) & $381 (half size)

- Incentive (Full Size) = $250 ($0.063/kWh)
- Incentive (Half Size) = $150 ($0.083/kWh)

14.1.9 Commercial Kitchen Combination Ovens

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- U.S. Department of Energy, Energy Star website: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=COO
- Energy Star Commercial Kitchen Equipment Savings Calculator
- PG&E Work Paper PGEFST105 (Revision 3) – June 8, 2012
- Arkansas TRM Version 2.0 Volume 2
- KEMA report titled “Business Programs: Deemed Savings Parameter Development”, November 2009 - Coincidence factor for food service building type listed as 0.84

TRM Review Actions:

- Currently Under Review.

Major Changes:

- New measure

Measure Description:

Commercial combination ovens offer the ability to steam food in the oven cavity. These oven are capable of steaming, proofing and reheating various food products in addition to the normal functions of baking and roasting. Foods can be cooked in a variety of ways: in a convection oven dry heat only mode, a steam only mode, and a combination of dry heat and steam modes. Food to be cooked partially in one mode at a certain temperature and then finished in another mode and at a separate temperature by utilizing the programmability of combination ovens. Combination ovens range in size from 6 pan countertop models up to 40 pan stand-alone models.

Baseline Efficiency:

Parameter	< 15 Pans	15-28 Pans	> 28 Pans
Assumptions			
% Time in Steam Mode	50%	50%	50%
Preheat Energy (kWh/day)	3.0	3.75	5.63
Convection Idle Energy Rate (kW)	1.5	3.75	5.25
Steam Idle Energy Rate (kW)	10.0	12.5	18.0
Convection Cooking Energy Efficiency (%)	65%	65%	65%
Steam Cooking Energy Efficiency (%)	40%	40%	40%
Convection Production Capacity (lbs/hour)	80	100	275
Steam Production Capacity (lbs/hour)	100	150	350
Lbs of Food Cooked/day	200	250	400
Total Energy			
Annual Energy Consumption (kWh)	35,263	48,004	74,448
Demand (kW)	6.8	9.2	14.3

High Efficiency:

Parameter	< 15 Pans	15-28 Pans	> 28 Pans
Assumptions			
% Time in Steam Mode	50%	50%	50%
Preheat Energy (kWh/day)	1.5	2.0	3.0
Convection Idle Energy Rate (kW)	1.0	2.5	4.0
Steam Idle Energy Rate (kW)	5.0	6.0	9.0
Convection Cooking Energy Efficiency (%)	70%	70%	70%
Steam Cooking Energy Efficiency (%)	50%	50%	50%
Convection Production Capacity (lbs/hour)	100	152	325
Steam Production Capacity (lbs/hour)	120	200	400
Lbs of Food Cooked/day	200	250	400
Total Energy			
Annual Energy Consumption (kWh)	23,658	32,001	50,692
Demand (kW)	4.5	6.1	9.7

Energy Savings

Energy usage calculations are based on 12 hours a day, 365 days per year (4,380 hours/year). The different sizes for the combination ovens (< 15 pans, 15-28 pans, and > 28 pans) have proportional operating energy rates.

Performance	< 15 Pans	15-28 Pans	> 28 Pans
Annual Energy Savings (kWh)	11,604	16,003	23,756
Estimated Demand Reduction (kW)	2.6	3.7	5.4

Operating Hours
12 hr/day, 365 day/year = 4,380 hours/year

Demand Coincidence Factor
CF = 0.84

Lifetime
12 years

Measure Costs and Incentive Levels
The incremental cost for ENERGY STAR hot food holding cabinet is $xxx (< 15 pans), $xxx (15-28 pans), & $xxx (> 28 pans)

- Incentive (< 15 pans) = $xxx ($0.xx/kWh)
- Incentive (15-28 pans) = $xxx ($0.xx/kWh)
- Incentive (> 28 pans) = $xxx ($0.xx/kWh)

14.1.10 Commercial Kitchen Convection Ovens

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Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- U.S. Department of Energy, Energy Star website: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=COO
- Energy Star Commercial Kitchen Equipment Savings Calculator
- PG&E Work Paper PGEFST105 (Revision 3) – June 8, 2012
- Arkansas TRM Version 2.0 Volume 2
- KEMA report titled “Business Programs: Deemed Savings Parameter Development”, November 2009 - Coincidence factor for food service building type listed as 0.84

TRM Review Actions:

- Currently Under Review.

Major Changes:

- New measure

Measure Description:
Commercial convection ovens are widely used in the foodservice industry and have a wide variety of uses from baking and roasting to warming and reheating. Convection ovens are also used for nearly all types of food preparation, including foods typically prepared using other types of appliances (e.g., griddles, fryers, etc.). ENERGY STAR commercial ovens are about 20 percent more energy efficient than standard models.

- **Full-size electric convection ovens** are defined by the ability to accept a minimum of five (5) standard full-size sheet pans (18 in. x 26 in. x 1 in.). Qualifying ovens must meet Energy Star requirements by having a tested heavy-load (potato) cooking efficiency in accordance with ASTM F1496. Cooking energy efficiency must be greater than or equal to 70 percent (≥70%) and must not exceed the maximum idle energy rate of 1.6 kW (≤ 1.6kW).

- **Half-size electric convection ovens** are defined by the ability to accept a minimum of five (5) sheet pans measuring (18 in. x 13 in. x 1 in.). Qualifying ovens must meet Energy Star requirements by having a tested heavy-load (potato) cooking efficiency in accordance with ASTM F1496. Cooking energy efficiency must be greater than or equal to 70 percent (≥70%) and must not exceed the maximum idle energy rate of 1.0 kW (≤ 1.0kW).

Baseline Efficiency:

Parameter	Half Size	Full Size
Assumptions		
Preheat Energy (kWh/day)	1.0	1.5
Idle Energy Rate (kW)	1.5	2.0
Cooking Energy Efficiency (%)	65%	65%
Production Capacity (lbs/hour)	45	70
Lbs of food cooked/day	100	100
Energy per pound of food (kWh/lb)	0.0732	0.0732
Total Energy		
Annual Energy Consumption (kWh)	9,692	12,193
Demand (kW)	1.86	2.34

High Efficiency:

Parameter	Half Size	Full Size
Assumptions		
Preheat Energy (kWh/day)	0.9	1.0
Idle Energy Rate (kW)	1.0	1.6
Cooking Energy Efficiency (%)	70%	70%
Production Capacity (lbs/hour)	50	80
Lbs of food cooked/day	100	100
Energy per pound of food (kWh/lb)	0.0732	0.0732
Total Energy		
Annual Energy Consumption (kWh)	7,704	10,314
Demand (kW)	1.48	1.98

Energy Savings
Energy usage calculations are based on 12 hours a day, 365 days per year. The different sizes for the holding cabinets (half size and full size) have proportional operating energy rates.

Performance	Half Size	Full Size
Annual Energy Savings (kWh)	1,988	1,879
Estimated Demand Reduction (kW)	0.38	0.36

Operating Hours
12 hr/day, 365 day/year = 4,380 hours/year

Demand Coincidence Factor
CF = 0.84

Lifetime
12 years

Measure Costs and Incentive Levels
The incremental cost for ENERGY STAR hot food holding cabinet is $xxx (full size) & $xxx (half size)

- Incentive (Half Size) = $xxx ($0.xx/kWh)
- Incentive (Full Size) = $xxx ($0.xx/kWh)

14.1.11 Commercial Solid Door Refrigerators & Freezers

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

Referenced Documents:

- Southern California Edison Work Paper SCE13CC001 Commercial Reach-In Refrigerators and Freezers – April 6, 2012

TRM Review Actions:

- 10/5/11 – Currently Under Review.

Major Changes:

- New measure

Measure Description:
This measure relates to the installation of a new reach-in commercial refrigerator or freezer meeting ENERGY STAR efficiency standards. ENERGY STAR labeled commercial refrigerators and freezers are more energy efficient because they are designed with components such as ECM evaporator and condenser fan motors, hot gas anti-sweat heaters, or high-efficiency compressors, which will significantly reduce energy consumption. This measure could relate to the replacing of an existing unit at the end of its useful life, or the installation of a new system in a new or existing building.

Baseline Efficiencies:
In order for this characterization to apply, the baseline equipment is assumed to be a solid or glass door refrigerator or freezer meeting the minimum federal manufacturing standards.

High Efficiency:
In order for this characterization to apply, the efficient equipment is assumed to be a solid or glass door refrigerator or freezer meeting the minimum ENERGY STAR efficiency level standards.

Energy Savings:

Annual Energy Savings (kWh/year) = (kWhbase – kWhee) * 365

Demand Savings = Annual Energy Savings / HOURS * CF

Baseline Energy Usage

Type	kWhbase
Solid Door Refrigerator	0.10 * V + 2.04
Glass Door Refrigerator	0.12 * V + 3.34
Solid Door Freezer	0.40 * V + 1.38
Glass Door Freezer	0.75 * V + 4.10

Energy Efficient Usage

Equipment Description (cubic feet)	kWhee Daily Energy Usage (kWh/day)
Solid-Door Reach-In Refrigerator	
0 ≤ V < 15	≤ 0.089V + 1.411
15 ≤ V < 30	≤ 0.037V + 2.200
30 ≤ V < 50	≤ 0.056V + 1.635
50 ≤ V	≤ 0.060V + 1.416
Solid-Door Reach-In Freezer	
0 ≤ V < 15	≤ 0.250V + 1.250
15 ≤ V < 30	≤ 0.400V -1.000
30 ≤ V < 50	≤ 0.163V + 6.125
50 ≤ V	≤ 0.158V + 6.333
Glass-Door Reach-In Refrigerator	
0 ≤ V < 15	≤ 0.118V + 1.382
15 ≤ V < 30	≤ 0.140V + 1.050
30 ≤ V < 50	≤ 0.0888V + 2.625
50 ≤ V	≤ 0.110V + 1.500
Glass-Door Reach-In Freezer	
0 ≤ V < 15	≤ 0.607V + 0.893
15 ≤ V < 30	≤ 0.733V - 1.000
30 ≤ V < 50	≤ 0.250V + 13.500
50 ≤ V	≤ 0.450V + 3.500

Operating Hours
8760 hours/year

Demand Coincidence Factor
CF = 1.0

Lifetime
12 years

Measure Costs and Incentive Levels

Incremental Measure Refrigerator and Freezer Costs

Description	Under-Counter	Single-Door	Double-Door	Triple-Door
Nominal Size	1 door	1 door	2 doors	3 doors
Nominal Volume Range (cubic feet)	0 ≤ V < 15	15 ≤ V < 30	30 ≤ V 50	50 ≤ V
Solid-Door Reach-In Refrigerators Incremental Cost	$1,092.00	$ 1,410.73	$ 1,968.70	$2,723.28
Solid-Door Reach-In Freezers Incremental Cost	$ 257.60	$ 1,363.18	$15,556.71	$1,968.03
Glass-Door Reach-In Refrigerators Incremental Cost	$ 103.60	$ 863.80	$ 1,076.11	$1,548.96
Glass-Door Reach-In Freezers Incremental Cost	$ 25.48	$ 124.04	$ 214.20	$ 899.30

14.1.12 Small Business Direct Restaurant Lighting Retrofits

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

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 Restaurant Customers - TBD

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	Step 2 Total Units (each) a	Step 3 M-F Hours per Day b1a	Sat. Hours per Day b1b	Sun. Hours per Day b2a	Annual Hours of Operation (hrs/year) b3 = b1*b2*(365/7)	Step 4 Wkdays Hours on between 5 and 9 p.m. (hrs) c	On-Peak Fraction (%) c2 =c / 4	Total Watts Saved (Watts) d = a x o	Energy Savings (kWh/Year) e = b x (d/1000)	Energy Cost Savings ($/year) f = e x f2	Hawaii Energy Participating Contractor NTE Pricing ($) g = a x p	Hawaii Energy Cash Incentive ($) h = a x q	Net Customer Cost ($) i = a x (p-q)	Simple Payback (Months) j = (i/f) x 12	6 Month Monthly Payment ($/month) k = i /6	Monthly Savings % of Payment (%) 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 (Watt/unit) m	Unit New Watts (Watt/unit) n	Unit Watts Saved (Watt/unit) o = m-n	Hawaii Energy Participating Contractor Pricing ($/unit) p	Hawaii Energy Cash Incentive ($) q	Public Benefit Fee Investment ($/kWh) 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 Landlord, Tenant, AOAO Measures

14.2.1 Energy Hero Landlord

Version Date & Revision History
Draft date:
Effective date: July 1, 2013
End date: June 30, 2014

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

Incentive $0.30/kWh

PY2013 MEDIA COVERAGE REPORT

Please note that some stories, particularly television and radio, were unavailable therefore not included in this report.

Maui News
July 8, 2013

East Maui teens, residents benefit from solar training

July 8, 2013

By MELISSA TANJI - Staff Writer (mtanji@mauinews.com) , The Maui News

With a mere 30 solar water heating systems in Hana, a program teaching students how to install the systems and educate them about its benefits could prompt more East Maui residents to invest in alternative energy, with proponents saying that a household could save as much as 40 percent on its electric bill with the systems.

Pacific Business News
July 10, 2013

Ala Moana Hotel invests in energy management system

Jul 10, 2013, 12:33pm HST

Jenna Blakely

Reporter- *Pacific Business News*

The Ala Moana Hotel recently invested in an $800,000 energy management system that equips its rooms with sensors that automatically lower room temperature when guests leave, reducing energy consumption.

The system was funded by the Ala Moana Hotel's Association of Apartment Owners, which received a $125,800 rebate from Hawaii Energy to offset costs.

Called the Inncom system, the sensors were placed in all 1,176 guest rooms at the Ala Moana Hotel.

"With the new Inncom system in place, Ala Moana Hotel is making strides to complete its green energy master plan," General Manager Dave Lawrence said in a statement.

The hotel has also installed $500,000 worth of energy efficient lighting and has tinted some of its windows to conserve energy.

Honolulu Star-Advertiser
July 14, 2013

Hawaii Energy works to improve state's efficiency

POSTED: 01:30 a.m. HST, Jul 14, 2013

Question: What are the origins of Hawaii Energy, and what is its mission?

Answer: Hawaii Energy is the state's energy conservation and efficiency program, funded by electric utility ratepayers for the benefit of ratepayers. We serve the counties of Hawaii, Honolulu and Maui under the direction of the Hawaii Public Utilities Commission.

Our core mission is to educate, motivate and incentivize electric utility customers to adopt energy conservation and efficiency measures to save electricity and reduce Hawaii's dependence on imported fuels.

Q: Is Hawaii on track to meet the energy efficiency goals spelled out in the Hawaii Clean Energy Initiative?

A: 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 kilowatt-hours by 2030. To date, we are on track to reach and quite possibly exceed this goal. However, our work is far from over. Our efforts must continue to reduce the demand for Hawaii's limited resources.

Q: People may know Hawaii Energy for the rebates it provides for compact fluorescent lights and energy-efficient appliances, but it also conducts education and outreach programs. How is that effort going?

A: Hawaii Energy is making significant progress with our transformational program's wide range of educational and training opportunities, which are offered throughout the year for underserved population segments, teachers and energy professionals.

Q: Hawaii Energy works with both residential and commercial utility customers. Which area has greater potential to reduce Hawaii's overall energy consumption?

A: Commercial energy-efficiency efforts, with support from Hawaii Energy incentives, make a significant impact due to their size and volume. We work with businesses big and small — ranging from hotels to mom-and-pop stores — to see how we can reduce their electric bill and increase their bottom line with energy-efficient technology.

That said, without the participation and support of residential customers, we will not meet our energy efficiency goals.

Q: Is it true that installing a solar water heater is the largest single energy efficiency improvement homeowners can undertake to cut their electricity bill?

A: Yes. A typical home's largest energy consumer is the electric water heater — if the household doesn't have air conditioning or a swimming pool. When a household of four or more switches to a solar water heater, it can save up to 40 percent, at least $600 a year, on its electric bill. Hawaii Energy's limited-time $1,000 instant rebate, combined with applicable state and federal tax credits, reduces the cost of the average solar water heating system from approximately $6,600 to about $2,000.

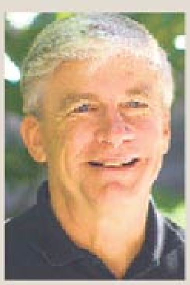
Q: What are some of the other, less obvious ways that homeowners can reduce their electricity usage?

A: There are several low-cost and no-cost things people can do today to save on their electric bill. People still waste a significant amount of electricity that they do not need to use. Here are some solutions:

>> Replace old-fashioned incandescent light bulbs with energy-saving compact fluorescent lights or light-emitting diodes. We provide instant rebates for both at various local retailers. No coupons or forms are needed since the prices factor in the rebate.

>> Turn off lights, computers, televisions and other electronics when you are not using them. Or, use a power strip so you can easily turn off multiple devices.

>> Instead of using the air conditioner, open your windows to capture our breezy tradewinds. If you need more cooling, try fans instead of the air conditioner.



PROFILE

RAY STARLING

>> **Position:** Program director
>> **Organization:** Hawaii Energy
>> **Website:** www.hawaiienergy.com
>> **Phone:** 537-5577 on Oahu, toll-free 877-231-8222 on the neighbor islands
>> **Other experience:** Retired major general in the Air National Guard JAG Corps after a 37-year career in active and reserve military service
>> **Education:** Bachelor of Science in mechanical engineering, North Carolina State University; Juris Doctor, Wake Forest University

KITV.com
July 23, 2013

Solar company incentives to lure customers not exactly free

HONOLULU —The warning about "free gifts" has been on the form for Hawaii's renewable energy income tax credit since 2009. However, incentives from solar energy contractors haven't been an issue until recently as competition in the booming industry heats up.

According to the Department of Business, Economic Development and Tourism, the total value of residential photovoltaic permits has reached $189.9 million so far this year, a 3.9 percent decrease from the same time period in 2012.

With the money pot shrinking, some solar companies have begun offering complimentary iPads or free trips to Las Vegas to entice new customers.

"We're seeing them because the market is really competitive right now," said Leslie Cole-Brooks, executive director of the Hawaii Solar Energy Association. "People really want to install solar, their electric rates are high (and) they want to protect the environment."

But taking that trip for two to Sin City or getting your hands on a new tablet will cost you in the end. The Tax Department says the cost of freebies must be deducted from the overall cost of a solar hot water heater or PV system.

"For taxpayers applying for the renewable energy technologies income tax credit, it is important for them to understand that the value of any free gifts or incentives provided to them by a solar company will be subtracted from the total cost of the qualified solar energy system," Hawaii Deputy Tax Director Joshua Wisch said in a statement to KITV4.

Wisch provided the following scenario as an example:

If a taxpayer installs a system that costs $20,000, but as an incentive for installation the taxpayer receives a trip to Las Vegas that is valued at $5,000, then the actual cost of the solar energy system, for purposes of the credit, will be $15,000.

Jeff Davis, known as The Solar Guy on his daily KGU radio show Hawaii's Tomorrow, is concerned some taxpayers may be caught off-guard when preparing their income tax forms at the end of the year.

"Free iPads, free trips to Vegas, free 15,000 miles, or perhaps even an air conditioner - all that must be removed from your invoice before determining your tax credits, and if you do not, your accountant should catch it," said Davis. "If your accountant doesn't catch it, both the client and the accountant are going to be involved in tax fraud with the IRS and the state of Hawaii tax office."

Currently, Hawaii offers a 35 percent tax credit on solar energy systems up to $5,000. The federal government provides a separate 30 percent credit for each qualifying system, with no maximum amount.

Cole-Brooks says homeowners who are contemplating a switch to solar energy should not shy away from contractors offering free trips or other special incentives. However, she stresses customers should be aware of the tax implications and do their homework.

For instance, Hawaii Energy's $1,000 rebate for the installation of a hot water will count against the overall price of the system when calculating the tax credit.

"Just think about it like anything," said Cole-Brooks. "Be a well-informed consumer with your feet on the ground."

Pacific Business News
Aug. 1, 2013

Hawaii Energy program promotes 'energy literacy' to teachers

Hawaii Energy, the state's conservation and energy efficiency program, recently sent three Hawaii teachers to a national conference in New Mexico for the National Energy Education Development project.

Kuulei Tengan from Kalihi-Waena Elementary School, Jeffrey Palmer of Kilohana Elementary School and Lisa Palmer of Kilohana Elementary School attended the national event, according to a statement.

The National Energy Education Development project, or NEED, is a program that promotes green energy education by rallying together students, educators, business, government and community leaders to come up with energy education programs. More than 65,000 classrooms across the nation use NEED's curriculum, and teachers who sign up as members for $35 receive curriculum updates each year.

Hawaii Energy, under contract with the Hawaii Public Utilities Commission, has been supporting participation in NEED on the local level. The organization has sponsored 14 NEED workshops in the Aloha State since 2011 and plans to do more workshops in the fall. Hawaii Energy funds teacher participation in these workshops, which have taught more than 520 teachers in Hawaii, to date. Hawaii Energy has also provided subsidies to send 11 teachers, including this year's three teachers, to NEED's national conference.

"As part of our mission to improve energy literacy in Hawaii, it is important that we support programs like this," said Chelsea Harder, transformational program management specialist at Hawaii Energy, in a statement. "This year's national conference provided Kuulei, Jeffrey and Lisa with the opportunity to explore many aspects of the NEED curriculum with guidance from veteran NEED teachers, collaboration with other teachers and networking with educators and energy professionals around the country."

Hawaii Energy recently launched a Teacher Advisory Board comprised of local teachers to discuss and give feedback about how to integrate and raise awareness to more local teachers about the NEED program. Teachers who participate in NEED are eligible for educational grants up to $2,500 to help teachers implement conservation projects and activities.

Pacific Business News
Aug. 8, 2013

Ilikai residents get rebate for installing energy-metering system

Hawaii Energy, the state's energy-conservation program, presented a $153,000 rebate check to the Owners of Ilikai Apartment Building Inc. on Thursday as part of the installation of a $430,000 system designed to more fairly allocate the cost of electricity and encourage occupants of each unit to conserve energy.

The new submetering system is expected to save the Ilikai property about $270,000 and 995,000 kilowatt hours per year.

"Electricity submeters allow apartment and condo residents to know exactly how much electricity they are utilizing, and help reward those who conserve with lower electric bills," Hawaii Energy Program Director Ray Starling said in a statement. "It's a simple way to raise awareness, reduce energy use and save money on monthly bills. I encourage businesses and residents to visit our website to learn more about submetering and the many other incentive opportunities we offer."

John Popovich, general manager for the Ilikai, said its owners and guests benefit directly from improvements that make it a more energy-efficient building.

"In addition to submetering, we are considering other measures, including split-system variable refrigerant flow air-conditioning systems and energy management guest room controls," he said in a statement.

Jeff Dickinson, vice president and senior property manager for Hawaii an Properties Ltd., worked with Lisa Harmon, business program specialist at Hawaii Energy, to procure the $153,000 rebate on behalf of the AOAO Ilikai.

Hawaii Energy said it offers an incentive of $150 per unit (up to 50 percent of the total project cost) for submeters used for billing. Depending on the property and the occupants' willingness to change their behavior, electricity reduction can range from 3 percent to 25 percent.

Associated Press
Aug. 14, 2013

Saving energy wins Waikiki hotel more than $119K

Posted: Aug 14, 2013 7:08 AM
Updated: Aug 14, 2013 7:08 AM

By Ian Scheuring - bio | email

HONOLULU (AP) - A Waikiki hotel is receiving more than $119,000 as a reward for installing energy efficient air conditioning systems and lights.

The conservation and energy efficiency program Hawaii Energy says the Courtyard Marriott Waikiki Beach retrofitted 400 guestrooms with air conditioning systems that turn off automatically when the rooms aren't occupied.

A switch also turns off the room's air conditioning when a lanai door is open. The hotel replaced less efficient halogen lamps in guestroom corridors with high performance and long-lasting light emitting diode lamps.

Hawaii Energy on Tuesday presented the hotel with a check for more than $119,000. It says the hotel will also likely save about $190,000 in electricity costs each year.

Hawaii's electric utility customers pay for the Hawaii Energy program.

Pacific Business News
Aug. 14, 2013

Courtyard by Marriott Waikiki Beach gets money back for saving energy

Aug 14, 2013, 2:33pm HST

Courtesy Hawaii Energy

Members of the Courtyard by Marriott Waikiki Beach pose with a check from Hawaii Energy that the hotel received for several energy-saving installations completed this spring. Top row, from left: Shannon Amaral, Jefferson Pascual, Juvanny Guittap, David Pangayan, Jody Munetake, and Lily Koo of Hawaii Energy. Kneeling, from left: Rostin Honda, Christopher Michaels.

Hawaii Energy, the state’s energy conservation program, presented a $119,836 incentive check to the Courtyard by Marriott Waikiki Beach for several energy-saving installations completed this spring.

The installations include split air-conditioning systems, a variable frequency drive for the pool pump, light-emitting diode lamps in guest corridors and guestroom air-conditioning energy management control systems.

In total, all four projects are estimated to save the hotel about $190,000 in electricity costs and 620,555 kilowatt hours per year, Hawaii Energy said.

“We applaud Marriott’s proactive approach to managing the hotel’s energy use,” Hawaii Energy Program Director Ray Starling said in a statement. “With the completion of several projects, the

Marriott has taken great strides toward energy efficiency [and] we encourage other hotels and businesses to consider participating in our incentive offerings."

All of the 400 guestrooms in both the Kuhio and Royal Hawaiian Towers have been retrofitted with integrated guestroom air-conditioning energy management systems, which sense the occupancy status of the room with a motion sensor.

These systems allow the air-conditioning to be automatically turned off when the room is not occupied. There's also a lanai door switch that turns off the unit when the door is open.

The estimated savings of this retrofit is 321,965 kilowatt hours per year, Hawaii Energy said.

The Courtyard by Marriott Waikiki Beach isn't the only property in Waikiki getting an efficiency makeover by Hawaii Energy.

Just last week, the Owners of Ilikai Apartment Building Inc. were presented with a $153,000 rebate check as part of the installation of a $430,000 system designed to more fairly allocated the cost of electricity and encourage residents to conserve energy.

West Hawaii Today
Aug. 14, 2013

In Brief | Big Island & State 08-15-13

Saving energy wins hotel more than $119K

HONOLULU — A Waikiki hotel is receiving more than $119,000 as a reward for installing energy efficient air conditioning systems and lights.

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Hawaii’s electric utility customers pay for the Hawaii Energy program. -

Pacific Business News
Aug. 16, 2013

JENNA BLAKELY
COVERING **NONPROFITS AND GENERAL BUSINESS NEWS** jbla

FOUR QUESTIONS FOR RAY STARLING

Hawaii Energy Program Director Ray Starling drives what he preaches. He's standing in front of his electric car.

COURTESY RAY STARLING

Ray Starling is program director for Hawaii Energy, the state's conservation and efficiency program. Its mission is to assist both residents and businesses in adopting renewable-energy practices, with help from rebates and other incentives. It serves the Honolulu, Hawaii and Maui counties and is administered by the Science Applications International Corp. under contract with the Hawaii Public Utilities Commission.

What is the hardest part of your job?

The toughest part of my job is trying to leverage a limited budget to make maximum impact on energy consumers, particularly those who have been historically underserved by the energy-efficiency program.

Where do Hawaii businesses stand in going green? Are we behind, okay, or ahead of the curve?

Some businesses are way ahead, mostly large, professionally managed facilities that understand the value of conservation and efficiency and want to make it a profit center. However, others are way behind. These are the hard-to-reach customers who struggle from month to month and do not generally have discretionary funds to invest in the future. But we have these businesses in our sights now with the Hawaii Public Utility Commission's on-bill financing program being developed for implementation early in 2014. Stay tuned!

With as many education efforts as there are about going green, how is general community awareness today?

We have made significant progress, but we still are not where we need to be with energy conservation and efficiency. That said, with outreach partners like Blue Planet Foundation, Hawaii Energy Policy Forum, Kanu Hawaii and KUPU, we are making great headway.

What's in your fridge?

An Energy Star label, and a cold Heineken or two.

West Hawaii Today

West Hawaii Today (Print & Online)
Aug. 22, 2013

Vendors of water cooler timers sought

Hawaii Energy, the energy efficiency and conservation program for Hawaii, Honolulu and Maui counties, is calling for vendors to participate in a new upstream water cooler timer business.

The offering, slated to launch this fall, will be available to businesses that are on commercial electricity rate schedules P, J or G.

“Our goal for this upcoming offering is two-fold,” said Ray Starling, the program’s director. “We want to promote simple, yet practical measures such as timer installations that can help businesses instantly achieve savings on their electric bills. Additionally, we hope that the adoption of energy saving behaviors will extend from the workplace to households across the state.”

Many businesses have water coolers plugged in 24 hours a day, seven days a week. A standard hot and cold water cooler can use more electricity than a large refrigerator. Installing a plug-in timer can reduce electricity use by up to 50 percent, or about 350 kilowatt hour, annually, which is more than $100 in electricity cost per year based on 30 cents per kilowatt hour).

Similar to timers used to control lights in a home, plug-in appliance timers allow for preprogramming of times when various appliances are turned on. For example, a water cooler timer can be pre-programmed to turn on one hour before the office opens and turn off when the office closes for the day.

For vendors to participate in this upcoming offering, the timers must be digital, as well as include an internal rechargeable battery and seven-day programmable on and off settings. Timer vendors will be responsible for identifying and contracting directly with water cooler companies to install timers on customer water coolers. Installation of the timers will be incentivized 100 percent by Hawaii Energy (up to $15 per timer).

For more information, call 839-8880 or (877) 231-8222.

Hawaii News Now & KFVE (Online)
Sept. 19, 2013

Hawaii Guard saves green by going green

Posted: Sep 19, 2013 5:53 PM
Updated: Sep 19, 2013 5:55 PM

By Lynn Kawano - email

A few simple changes have resulted in big savings for the Hawaii National Guard.

A pilot program to make the facilities more energy efficient has saved almost $80,000 in a year.

20 buildings were altered last summer. Fluorescent bulbs were removed from some of the light fixtures, high powered lights were made compatible with more efficient bulbs, and the air conditioners were turned down.

"We actually like it about 74-75 (degrees) and that's great... you get real dollar savings," says Derek Sonoda of Hawaii Energy, the company that worked with the Guard on the pilot program.

A joint press conference was held Thursday morning at the 22nd Avenue Armory to show off the ways they've brought energy usage down.

"Of course it's saving tax dollars, no question about that," says Governor Neil Abercrombie, "This is green government."

The Hawaii Guard is now expanding the program to other buildings.

The changes have brought down energy usage by 7%, they hope to eventually bring that down by 25%.

Honolulu Star-Advertiser

October 15, 2013

Refrigerator exchange expected to cut electric bills on Molokai

By Star-Advertiser Staff

A group of 60 Molokai households are expected to save nearly $400 a year on their electricity bills thanks to a program that allowed them to exchange their old refrigerators for a high-efficiency model at a discounted price.

Households were able to purchase Energy Star-approved refrigerators at a cost of $250 under the Hui Up! 2013 program run by Blue Planet Foundation, Hawaii Energy and Sustainable Molokai. The new refrigerators were delivered and the old ones hauled away at no charge to program participants.

The new refrigerators are expected to cut the electric bill of each participating household by an average of $374 a year, according to a news release from Blue Planet. The residential electric rate on Molokai is about 46 cents a kilowatt hour, roughly 40 percent higher than the residential rate on Oahu.

There are plans to extend the Hui Up! 2013 program to as many as 300 households on Molokai, according to the news release.

THE GREEN LEAF
October 21, 2013

http://thegreenleaf.staradvertiserblogs.com/2013/10/21/molokai-fridge-swap/

Molokai Fridge Swap

October 21st, 2013
By Nina Wu

Let's hear it for brand-new, energy-efficient fridges on the Friendly Isle!

A total of 60 EnergyStar refrigerators were delivered to Molokai residents earlier this week as part of Hui UP! 3.0, an appliance exchange program offered through a partnership between Blue Planet Foundation, Hawaii Energy and Sust'AINAble Moloka'i.

Molokai residents were able to swap in their old fridges for a high-efficiency model for just $250, considerably less than retail prices. Pick up of old fridges, recycling and home delivery was included.

Francois Rogers, Blue Planet's special projects director, says the foundation is hoping to reach as many as 300 households on Molokai.

Sust'AINAble Molokai helped with on-the-ground logistics, with help from Sears, Makoa Trucking, Island Movers and Refrigerant Recycling.

The Hui Up! program is a follow up to a CFL exchange program that replaced 36,000 incandescent bulbs on Molokai with Compact Fluorescent Lamps. As part of Hui Up! students from the Sust'AINAble Molokai Youth Energy Team will visit the households and using hand-held energy monitors, they will measure the differences in energy usage.

Participants are expected to save an average of $374 a year (based on Molokai's electricity rate of 46 cents per kilowatt hour) on their individual electric bills. Collectively, over the next 10 years, 300 households would save more than $1.1 million in energy costs.

If you live on Molokai and are interested in participating in Hui UP!, visit blueplanetfoundation.org/huiup or call 560-5410.

KITV News

October 17, 2013

Hui Up to green living!

UPDATED 9:30 AM HST Oct 17, 2013

Read more: http://www.kitv.com/news/thismorning/Hui-Up-to-green-living/22489524#ixzz3EGvXloW5

Maui News
Oct. 21, 2013

http://www.mauinews.com/page/content.detail/id/577921/Molokai-warms-up-to-program-offering-discounted-fridges.html?nav=10

Molokai warms up to program offering discounted fridges

October 21, 2013

By LEE IMADA - Managing Editor (leeimada@mauinews.com) , The Maui News

Sixty Molokai residents traded in their old refrigerators - some 20 years old - for new more energy-efficient ones Tuesday - for $250.

The cost included delivery and recycling of the refrigerators in the Hui Up! 3.0 appliance exchange program offered in a partnership among the nonprofit Blue Planet Foundation; Hawaii Energy, a ratepayer-funded conservation and efficiency program; and Sust'AINAble Moloka'i, a local, grass-roots sustainability group.

The Energy Star Kenmore 18.2-cubic-foot, top-freezer fridge, shipping, delivery and disposal likely would have cost more than $1,000, but program participants received a large discount, said Catherine Lo, communications director for the Blue Planet Foundation.

Article Photos

A shipment of Energy Star refrigerators is ready for delivery to Hui Up! participants on Molokai. Sixty refrigerators were delivered to Molokai residents at a cost of $250 apiece through the Hui Up! program.

"We're really happy the people on Molokai are so enthusiastic about the program," said Lo. "On Molokai, I guess they are a great example of how efficiency can help households lower their energy costs."

She said the 60 residents, the first of possibly 300 to receive new fridges through the program, could save as much as $90 a month in their power bills, especially because some of the refrigerators were rusted and more than 20 years old. The older models are not very energy efficient, said Lo, which compounds the fact that Molokai residents pay the second highest electricity rates in the state at 46 cents per kilowatt hour, about 7 cents a kilowatt hour more than Maui residential ratepayers.

"Basically, our electric rate is out of the roof, and this is one way we can bring our electric bill down," said Hui Up! 3.0 participant Desiree Puhi. "Here on Molokai, we don't have the Lowe's or the Costco. Getting appliances here is so difficult, so it's a great program."

There is no store that sells new large appliances like stoves and refrigerators on Molokai, said Lo. Most residents have to take a trip to Maui or Oahu, purchase the appliance and then arrange for shipping and delivery, she said.

In order to qualify for Hui Up! 3.0, applicants have to be Molokai residents and Maui Electric Co. ratepayers. Participants are asked to show proof of a residential MECO account and an old refrigerator in working order and put up the money upfront.

The volume purchase was negotiated by Blue Planet Foundation with funding from Hawaii Energy. The shipping, delivery and hauling away of the old fridges were worked out among Sust'AINAble Molokai, Sears, Makoa Trucking, Island Movers and Refrigerant Recycling.

"We're very proud to partner with Blue Planet Foundation and Sust'AINAble Molokai to help aid our mission to encourage more and more people to conserve and find ways to be more efficient with their energy usage," said Ray Starling, Hawaii Energy program director, in a news release.

Hui Up! 3.0 is a follow-up to an exchange program that replaced 36,000 incandescent bulbs on Molokai with energy-saving CFLs about two years ago. "We thought we don't want to just leave the community," said Lo, so the group did energy assessments and found that refrigerators were "really costing those households a lot of money."

Sust'AINAble Molokai Youth Energy Team members visited participating households to conduct an energy assessment prior to receiving the new fridges and will be revisiting families to measure their change in energy consumption, a news release about the program said.

Another shipment of about 40 refrigerators is set for delivery in early November, Lo said.

"We are hoping to do 300 before the end of the year," she said.

Molokai residents interested in Hui Up! 3.0 may find applications online at blueplanetfounda tion.org/huiup or by calling (808) 560-5410. Refrigerators are ordered on a first-come, first-served basis.

West Hawaii Today

West Hawaii Today
Oct. 31, 2013
http://westhawaiitoday.com/sections/news/local-features/about-town-10-31-13.html

About Town 10-31-13

Rid-A-Fridge and help the hungry

Hawaii Energy's Rid-A-Fridge to Fight Hunger promotion encourages residents to recycle old refrigerators or freezers and donate their rebates to their local food bank.

Hawaii Energy is offering this opportunity as part of its ongoing refrigerator bounty program that provides free curbside pickup, recycling and a $65 rebate.

While funds last, residential electric ratepayers can donate their rebate to The Food Basket. A $65 donation provides food for 250 meals on Hawaii Island.

All residential electric utility customers are eligible for the promotion. Full-size refrigerators and freezers of at least 14 cubic feet qualify for the promotion. Refrigerators and freezers must be in working condition.

Appointments to schedule a pick up can be made by calling (877) 231-8222. For more information, visit hawaiienergy.com/rid-a-fridge.

THE MAUI NEWS
MAUI'S NEWSPAPER SINCE 1900 Search:

Maui News
Nov. 3, 2013

Local Briefs - **Mauinews**.com | News, Sports, Jobs, Visitor's **...**
mauinews.com/page/content.detail/id/578447/Local-Briefs.html?nav...

Nov 3, 2013 - Hawaii Energy's **Rid**-A-**Fridge** to Fight Hunger program will offer a $65 donation, the value of the rebate on **Maui**, to the food bank. This offer is **...**

Lahaina News

Nov. 7, 2013

'Rid-a-Fridge' promotion supports Maui Food Bank

November 7, 2013
Lahaina News

- See more at: http://www.lahainanews.com/page/content.detail/id/509900/-Rid-a-Fridge--promotion-supports-Maui-Food-Bank.html?nav=19#sthash.VPZP5iku.dpuf

HONOLULU - Hawaii Energy's "Rid-A-Fridge to Fight Hunger" promotion encourages residents to recycle old refrigerators or freezers and donate their rebates to their local food bank.

Hawaii Energy is offering this new opportunity as part of its ongoing refrigerator bounty program that provides free curbside pickup, recycling and a $65 rebate for Maui residents.

While funds last, residential electric rate payers on Maui can choose to donate their rebate to Maui Food Bank. A $65 donation can provide food for 250 meals on Maui.

"Recycling an energy-wasting fridge or freezer is a very simple way to make an immediate impact on your monthly electric bill," explained Caroline Carl, Hawaii Energy's residential program manager.

"With 'Rid-A-Fridge to Fight Hunger,' customers can now enjoy the dual benefit of saving electricity while helping people that go hungry each day."

Refrigerators and freezers built prior to 1993 can be two to three times more expensive to operate than a new Energy-Star model.

Appointments to schedule pickup can be made by calling (877) 231-8222. For more information, visit www.hawaiienergy.com/rid-a-fridge.

Midweek
Nov. 27, 2013

http://www.midweek.com/photo-galleries/hot-shots-112713/

HOT SHOTS // HOT SHOTS- 11/27/13

Hawaii Energy Supports Pacific Allied Products

Hawaii Energy presented an incentive check for $91,484 to Pacific Allied Products in support of the company's commitment to become more energy-efficient. The Kapolei-based plastics manufacturing company recently installed a new high-speed bottle blower used to inflate plastic bottles. The machine captures and recycles excess air which in turn helps save electricity. Pictured are (from left) Kate Aurilio, energy program engineer at Hawaii Energy; Brian Donahue, vice president of finance at Pacific Allied Products; Bernie Coleman, president of Pacific Allied Products; Rob Deveraturda, public relations specialist at Hawaii Energy, and Lisa Harmon, program specialist at Hawaii Energy. Photo from Rob Deveraturda.

Hawaii News Now

Dec. 3, 2013

Rid-A-Fridge to Fight Hunger

(Hawaii News Now) - Do you have a working refrigerator you want to toss? Well, now's the time to recycle it - for free! It's a part of the Rid-A-Fridge to Fight Hunger program sponsored by The Hawaii Food Bank. It's a simple way to lower your electric bill while donating funds to the Hawaii Foodbank.

http://www.hawaiinewsnow.com/story/24136067/rid-a-fridge-to-fight-hunger

THE GREEN LEAF

Blog on Honolulu Star-Advertiser

Dec. 30, 2013

Holiday energy-saving tips

December 30th, 2013
By Nina Wu

http://thegreenleaf.staradvertiserblogs.com/2013/12/30/holiday-energy-saving-tips/

It's been a sunny holiday season in Honolulu, so rejoice if you have solar panels. If you don't, then put it on your New Year's resolution list because it's not too late — many solar contractors are offering informational sessions to help you navigate the new rules for solar PV installation.

Federal and state tax credits are still available, so there's no reason to delay.

Meanwhile, here are some holiday energy-saving tips from Hawaii Energy.

CHRISTMAS TREE LIGHTS

Use **ENERGY STAR LED** light strings, which use about 70 to 80 percent less energy than traditional incandescent strings. (I was surprised to see some ads for incandescent holiday lights out there). Even if they are on sale, consider the energy savings you will reap from LED lights — which can also be found at a good price. I bet they're on sale now that Christmas is over.

Limit the Time of Outdoor Lights

Use a timer to automatically turn off indoor or outdoor Christmas lighting displays.

COOKING IN THE OVEN

Keep Oven Doors Closed

Ovens lose about 25 degrees requiring additional energy to bring the temperature back up. Use the smallest pan and burner needed for the job. Cook with lids on your pans (cooking pasta without a lid can use three times as much energy).

FRIDGE & FREEZER

Keep the refrigerator door closed, too. Refrigerators get a real workout during the holidays and remains the second largest energy consumer in your home. Keep the doors closed as much as possible and try not to cram too much food at once (tough when you have a turkey in there).

WASHING CLOTHES

Only wash full loads, use cold water (which requires less energy) and air dry as much as possible.

PACIFIC BUSINESS NEWS

Pacific Business News
"Afternoon Edition"
Jan. 15, 2014

Hawaii Energy reports let residents compare electricity usage to neighbors

Duane Shimogawa

Hawaii Energy is sending some Oahu residents free reports in the mail that compare their electricity usage to their neighbors in an effort to encourage energy efficiency, the ratepayer-funded energy conservation and efficiency program said Wednesday.

The reports, which 57,500 residents will begin receiving this month, are designed to provide electricity usage information, offer customized energy-saving tips and track month-to-month progress.

Each household's energy usage is compared with 100 anonymous homes nearby that are similar in age, square footage and number of bedrooms.

"This is a very unique opportunity for people to see how their electricity habits stack up with their neighbors which can be a great motivator for positive change," Hawaii Energy Program Director Ray Starling said in a statement. "From years past, the reports proved to be very helpful to raise awareness about the importance of energy efficiency and how it can really save money."

The reports will be followed by three additional monthly reports to illustrate each household's progress towards saving electricity.

Originally launched in the Ewa Plain area on Oahu in 2011, followed by the other islands the next year, the Home Energy Report pilot program has saved an estimated 7.54 million kilowatt hours and $2.94 million toward electricity bills in some 75,000 households.

Pacific Business News
"Morning Edition"
Jan. 23, 2014
http://www.bizjournals.com/pacific/news/2014/01/22/hawaii-energy-doubles-rebate-for-old.html

Hawaii Energy doubles rebate for old refrigerators

Hawaii Energy, a ratepayer-funded energy conservation and efficiency program, said Wednesday that it is doubling its rebate to $50 for recycling extra working refrigerators or freezers on Oahu.

The higher rebate is designed to encourage residents to give up their energy-hogging, extra refrigerator or freezer, and in exchange, Hawaii Energy is providing free curb-side pick-up of the recycled appliances.

Refrigerators and freezers built before 1993 can be two to three times more expensive to operate than a new Energy Star model, so taking those old units off the electric grid could save Oahu residents as much as $275 on their electric bills each year, Hawaii Energy said.

Rather than accept the rebate, residents also have the option of donating their old refrigerators to the Hawaii Foodbank by filling out the application provided by the hauler at the time of the pick-up to donate it to the "Rid-A-Fridge to Fight Hunger" promotion.

A $50 donation could provide food for 125 meals on Oahu to those in need.

To date, about 1,792 refrigerators and freezers have been recycled, saving more than 1.5 million kilowatt hours of electricity and more than $550,000 in electricity costs.

For more information, go to www.hawaiienergy.com/bounty.

The Green Leaf
Honolulu Star-Advertiser's Blog
Jan. 24, 2014
http://thegreenleaf.staradvertiserblogs.com/2014/01/22/double-rates-for-rid-a-fridge/

RID-A-FRIDGE
to Fight Hunger

Double rates for rid-a-fridge

January 22nd, 2014
By Nina Wu

Still procrastinating on plans to get rid of your old fridge?

Hawaii Energy is giving you some motivation — it is now offering $50, double the $25 rebate originally offered for outdated, energy-hogging refrigerators and freezers.

Free curbside pick-up is available.

According to Hawaii Energy, **fridges and freezers built prior to 1993 are energy hogs that cost two to three times more to operate** than a new **EnergyStar** model. Taking those old units off the electric grid can save Oahu resident as much as $275 (based on current electricity rates) on the annual bill.

Residents can also donate the rebate to **Hawaii Foodbank** by simply checking a box on the application provided by the hauler at the time of refrigerator pick-up.

All Oahu residential electric utility customers are eligible. To qualify, fridges and freezers must be full-size and in working condition. Since Hawaii Energy launched its "Bounty Program" in August 2011, approximately 1,792 refrigerators and freezers have been recycled, keeping them out of landfills.

Hawaii Energy Savings Reports

A simple but effective strategy to motivate residents to keep electric bills low.
January 24, 2014

As South Maui real estate specialists, we like to keep an eye out for innovations that improve the lives of homeowners anywhere in Hawaii, and on that note, an interesting story came out recently about saving on electric bills. Hawaii Energy has begun sending Oahu residents free reports that compare their electricity usage to their neighbors in order to encourage energy efficiency, and it seems to be working. What a simple, smart idea.

This month, 57,500 residents will begin receiving the report, which will provide electricity usage information, offer customized energy-saving tips, and track the resident's month-to-month progress. There's nothing like a little competition to get people engaged in outperforming their neighbors, especially when it clarifies how much more money you are spending by using excess energy.

How the report works is that it provides information on 100 anonymous houses nearby, particularly the ones that are similar in age, square footage, and number of bedrooms. To make accurate comparisons, they need to look at Hawaii homes that are as similar as possible.

Ray Starling, the Hawaii Energy Program Director, said in a statement, "This is a very unique opportunity for people to see how their electricity habits stack up with their neighbors, which can be a great motivator for positive change."

After these homeowners get their initial report, they will get three follow-ups that will show them their progress, so they'll have some concrete evidence that their energy-saving efforts are adding up to real savings. So far, it's estimated that the Home Energy Report pilot program has saved about 7.54 million kilowatt hours and $2.94 million in electric bills throughout 75,000 households.

Let's hope that simple but effective strategies like these continue to make Hawaii an affordable, enjoyable and healthy place to live. Mahalo for reading this week!

RealEstateMauiHawaii.com - By Mark Harbison

PACIFIC BUSINESS NEWS

Pacific Business News
"Morning Edition"
Jan. 31, 2014

Pacific Beach Hotel gets largest energy incentive check of any Hawaii hotel

The Pacific Beach Hotel received an incentive check for $308,145 this week from Hawaii Energy for the energy upgrades made to the 839-room hotel in Waikiki.

The Pacific Beach Hotel in Waikiki has received the largest incentive check by a hotel as part of Hawaii Energy's initiative to make commercial properties more energy efficient, the ratepayer-funded conservation and efficiency program said Thursday.

The 839-room hotel, located at 2490 Kalakaua Avenue, which features the popular three-story indoor Oceanarium, received its $308,145 incentive check this week.

Recent upgrades to the hotel's air conditioning system, as well as the installation of a new energy management system, will save the hotel about $280,000 per year in electricity costs.

The Pacific Beach Hotel invested more than $2.1 million into the project, which included installing a new central air conditioning system, which was done by Honolulu-based Energy Management Consulting & Construction LLC over the period of a little more than a year.

The hotel also was the 2013 recipient of the Waikiki Improvement Association's Hoowehiwehi Award for its eco-friendly guest water bottle program, in which it provided each guest with a reusable water bottle upon check-in that can be refilled at various stations throughout the property.

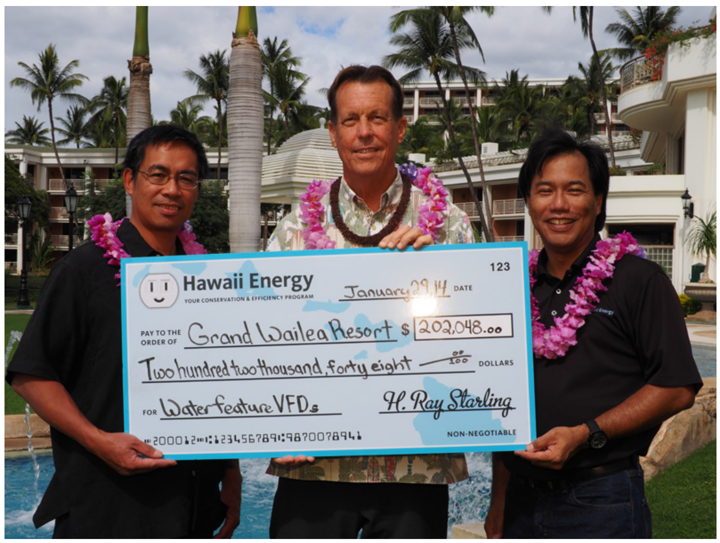
The program eliminates an estimated 350,000 bottles per year from ending up in a landfill.

MAUI TV NEWS

Maui TV News.com

Jan. 31, 2014

Resort Receives 'Grand' Energy Incentive



INCENTIVE IN PARADISE -From left, Bart Santiago, Director of Finance, Grand Wailea; Rob Hoonan, Director of Facility Management, Grand Wailea; Walter Enomoto, Program Specialist at Hawaii Energy. Click to enlarge. (Photo Courtesy Hawaii Energy)

Hawaii Energy, the energy conservation and efficiency program for Maui, Hawaii and Honolulu counties, presented an incentive check for $202,048 to the award-winning Grand Wailea, a Waldorf Astoria Resort, for its commitment to become even *more* energy-efficient.

Grand Wailea recently installed 37 new variable frequency drives and pump equipment designed to seamlessly adjust the water flow for its Wailea Canyon Activity Pool that includes nine separate pools and various waterslides, white water rapids, whirlpool and the world's first "water elevator."

The new equipment requires less electricity to operate and is estimated to save the hotel more than 1.2 million kilowatt hours and more than $380,028 in annual electricity costs based on $0.309/kWh.

To learn more about energy efficiency incentives available for your home or business, visit www.hawaiienergy.com.

Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by Leidos Engineering, LLC, 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.

Grand Wailea is nestled on 40 acres of lush tropical gardens fronting Wailea Beach, providing open spaces for the active vacationer, beauty for the romantic getaways and fun for the whole family. Built to portray the richness of Hawaii's culture, people, and nature, Grand Wailea is the ultimate Hawaiian resort providing an extensive selection of amenities and activities. Since opening in 1991, Grand Wailea consistently ranks among the world's best resorts by leading travel consumer reports and industry peers. For more information, call 800.232.4604 or visit www.grandwailea.com

Tags:
energy efficiency, energy incentive, Grand Wailea, grant, Hawaii, Hawaii Energy, Maui, pool heaters

BUILDING MANAGEMENT HAWAII

Building Management Hawaii
February – March 2014

Time To Stay Cool

Saving energy on your water cooler is all about timing.


A sample of an easy-to-use water cooler timer, which can save you more than $100 per year per water cooler. Courtesy of www.hookelenews.com.

By Keith Block

Water coolers are commonplace in homes and just about every office in America. Hawaii is no exception. In fact, there are more than 25,000 businesses in Hawaii that have water coolers.

Office workers commiserate around the water cooler on a Monday morning, warm their saimin for lunch and escape the summer heat with a refreshing glass of water. However, something we never give much thought to is how much electricity a water cooler uses, and how much it costs us?

For starters, water coolers in the U.S. consume about 7 billion kilowatt hours (kwh) annually—enough electricity to power a stadium's lighting for roughly 350,000 football games.

Most water coolers constantly draw electricity 24 hours a day, seven days a week, even if we only use them for a fraction of the day and rarely if ever on the weekends. Depending on the make, model and usage, a single water cooler with both cold and hot water spigots can draw up to 700 kWh annually—more than a full-size refrigerator (14 cubic feet). In terms of electricity costs, that equates to an estimated $217 on Oahu and slightly more on the Neighbor Islands.

However, the solution is very simple and not to mention free. Hawaii Energy, the ratepayer-funded energy conservation and efficiency program serving Hawaii, Honolulu and Maui counties, recently launched a new upstream water cooler timer program.

Now until June 30, 2014, or while supplies last, businesses in Hawaii will be able to obtain free plug-in water cooler timers with a retail value of about $30 each. In order to qualify, businesses must be located on either Hawaii Island, Lanai, Maui, Molokai or Oahu and be on one of the following electric rate schedules: P, J or G.

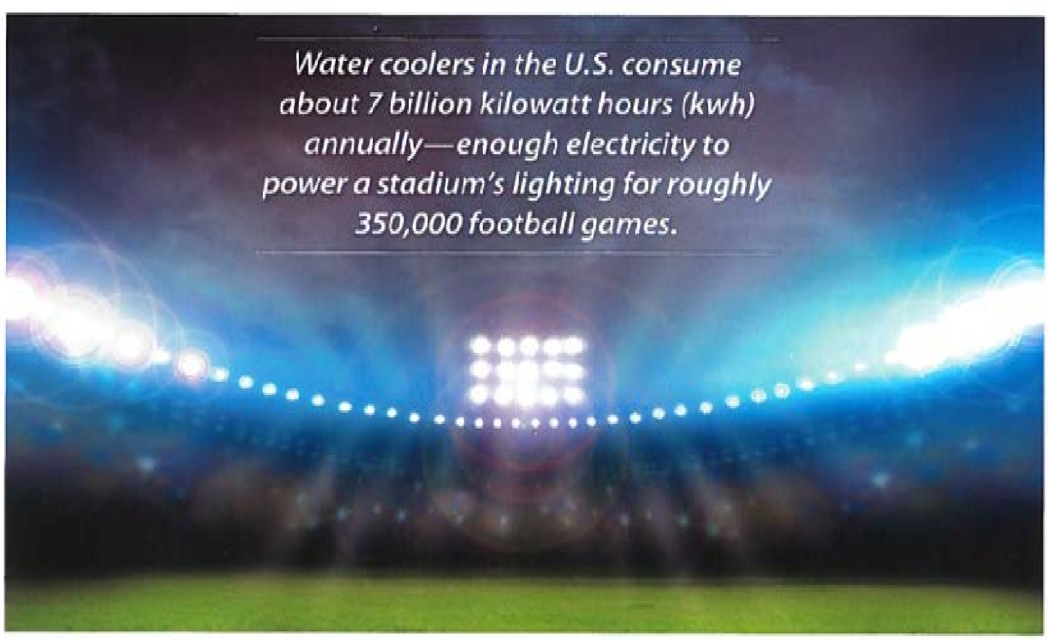
"Our goal is to encourage simple, yet practical measures such as installing a timer to help more businesses in Hawaii achieve instant savings on their electric bills," explains Keith Block, business program manager at Hawaii Energy. "This is just one of many simple energy-saving measures. We want to make more people aware that small, every day behavioral changes can mean big cost and energy savings in the future."

Water cooler timers operate the same way as home timers that are used to turn lights on and off at specified times. Customers simply plug the timer into the electrical wall outlet. The water cooler plug is then inserted directly into the timer.

Customers can pre-program the timer to turn the water cooler on an hour prior to the office opening and off in the late evening.

The water cooler timers provided by Hawaii Energy are distributed through participating vendors. The timers are all digital, include an internal rechargeable battery and 7-day programmable on/off settings.

On average, a water cooler timer can reduce electricity usage by an estimated 60 percent (about 397 kilowatt hour kWh) per year. That translates to a savings of $123 on electricity per water cooler annually, based on $0.31 /kWh (on Oahu).



BMH Resource

To obtain a free water cooler timer, visit **www.HawaiiEnergy.com/timer** or call toll-free at **1-877-231-8222.** Ask about other cash rebates and incentives for your business.

Keith Block is the business program manager at Hawaii Energy and has more than 20 years of experience working in energy conservation. His team implements energy conservation programs to help businesses reduce their electric bills. Hawaii Energy is the ratepayer-funded conservation and efficiency program administered by Leidos Engineering, LLC, under contract with the Hawaii Public Utilities Commission (PUC).

www.buildingmanagementhawaii.com

Star Advertiser

The Honolulu-Star Advertiser

February 11, 2014

$150 rebate offered toward cost of solar water heater tune-up

By Star-Advertiser Staff

Hawaii Energy is offering a $150 rebate for homeowners to help offset the cost of doing maintenance on their solar water heaters.

The rebate is available for maintenance done between Feb. 1 and May 31, or until funding runs out, according to a news release from Hawaii Energy, the ratepayer-funded energy efficiency program for Honolulu, Maui and Hawaii counties.

Solar water heaters require maintenance every three to five years to check for wear and tear that may include leaks, corrosion or pump failure, according to the news release. A properly maintained solar water heater should last 15 years or more.

In order to qualify for the rebate, systems must be at least three years old and the tune-up must be performed by a Hawaii Energy participating contractor. The cost of a tune-up typically ranges between $300 and $500, according to Hawaii Energy.

For more information, go to www.hawaiienergy.com/tune-up or call (808) 537-5577 or toll-free (877) 231-8222.

Hotel Business

Hotel Business
Feb. 18, 2014

Pacific Beach Hotel Earns $308K for Energy Program

Tuesday February 18th, 2014 - 10:13AM

HONOLULU, HI—Pacific Beach Hotel received a $308,145 incentive check from Hawaii Energy for the hotel's commitment to becoming more energy efficient.

The incentive is the largest amount presented to a hotel by Hawaii Energy—the ratepayer-funded conservation and efficiency program serving Hawaii Island, Lanai, Maui, Molokai and Oahu.

Recent upgrades to the hotel's air conditioning system, as well as the installation of a new energy management system, will save the Pacific Beach Hotel more than 1 million kilowatt hours (kWh) annually or $280,000 per year in electricity costs, acccording to the company. The Pacific Beach Hotel invested more than $2.1 million into the project.

The hotel's new central air conditioning system was installed for the hotel, which encompasses the Beach Tower and the Oceanarium Tower. The project involved replacing an older air conditioning system with newer energy-efficient equipment including chillers, chilled water pumps and water condenser pumps. The energy management system centralizes the operation. These projects were handled by Energy Management Consulting & Construction, LLC, and took place over the past 18 months.

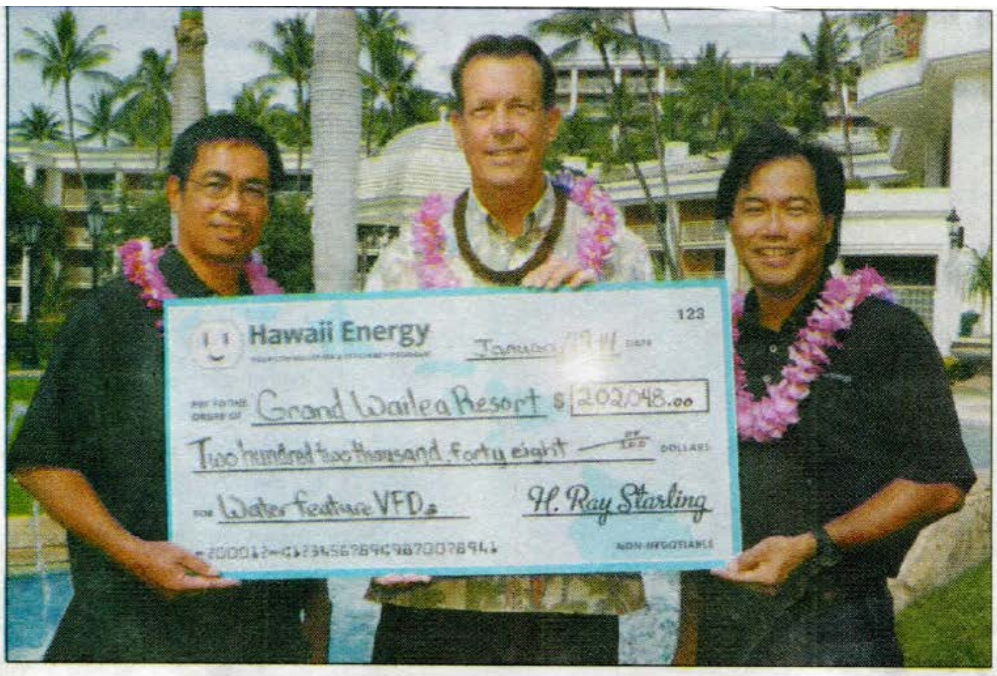
"We are delighted to have partnered with Hawaii Energy and look forward to celebrating this achievement with our valued Pacific Beach associates," stated Rob Robinson, general manager, Pacific Beach Hotel. "Our hotel is committed to energy conservation and will continue to research additional ways to become even more efficient."

Pacific Beach Hotel also was the 2013 recipient of the Waikiki Improvement Association's Hoowehiwehi Award for its eco-friendly guest water bottle program. The hotel provides each guest with a reusable water bottle upon check-in that can be refilled at various stations located throughout the hotel. The program eliminates an estimated 350,000 bottles per year from ending up in a landfill, according to the company.

"Pacific Beach Hotel is a terrific example of an organization recognizing the importance of investing in energy efficiency," stated Ray Starling, program director, Hawaii Energy. "We look forward to working with their team in the future to identify other projects to maximize their energy savings."

The Maui News
Winner of 13 Society of Professional Journalists' 2012 Excellence in Journalism Awards

Maui News
Feb. 19, 2014
Section A; Page 8



Bart Santiago, director of finance at the Grand Wailea (from left), and Rob Hoonan, the resort's director of facility management, accept a check from Walter Enomoto, program specialist at Hawaii Energy.

Grand Wailea rewarded for its energy efficiency efforts

Hawaii Energy, a ratepayer-funded conservation and efficiency program for Maui, Hawaii and Honolulu counties, presented an incentive check for $202,048 to the Grand Wailea to help offset the cost of becoming more energy-efficient.

Grand Wailea recently installed 37 new variable-frequency drives and pump equipment designed to seamlessly adjust the water flow for its Wailea Canyon Activity Pool that includes nine separate pools and various waterslides, white-water rapids, a whirlpool and a "water elevator."

The new equipment requires less electricity to operate and is estimated to save the hotel more than 1.2 million kilowatt hours each year and more than $380,028 in electricity costs.

To learn more about energy efficiency incentives available for a home or business, visit www.hawaiienergy.com.

Molokai Dispatch

Free Energy Education Workshops for Teachers

Wednesday, February 19th, 2014

By Molokai Dispatch Staff

Hawaii Energy News Release

This spring, Hawaii Energy is offering free, one-day workshops with tools and resources for Hawaii's teachers to learn about and teach energy efficiency in the classroom. The Molokai workshop will be held on March 1 at Molokai High School from 8:30 a.m. to 3:30 p.m.

Teachers of all subjects from Kindergarten –through 12th grade are welcome to attend. There are two types of workshops. One is Energy Education that teaches the concepts of force, motion, light, sound, heat, electricity, magnetism and energy transformations. The other is Building Science, aimed at helping students learn how buildings can become more energy-efficient through various measures such as lighting inspections, measuring electricity plug loads and taking temperature readings.

Each teacher will receive training, a choice of energy kits (valued between $300 and $400), breakfast, lunch, curriculum and access to online materials and resources. Reimbursement for substitute teachers will be provided. Participants are eligible to apply for Hawaii Energy Education Grants up to $2,500 and a scholarship to attend NEED's annual National Energy Conference for Educators.

The workshops are taught by The NEED (National Energy Education Development) Project in collaboration with Hawaii Energy – the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties.

Space is limited. Register online at least 7 days prior at HawaiiEnergy.com/teacher-workshops. Contact Wendi Moss with questions at wmoss@need.org or call 1-800-875-5029.

Molokai Dispatch
Feb. 19, 2014
(Page 1 of 3)

Energy Education with Big Goals

Friday, March 14th, 2014

By Catherine Cluett

Molokai High junior Sarah Jenkins hopes that her senior project will take an island-wide trend of energy awareness and conservation to the next level. She said she thinks teaching Molokai's youth about energy literacy is a good place to start, and on March 1, teachers from around the island participated in an energy education workshop with that very goal.

In a series of workshops offered statewide in collaboration between Hawaii Energy, a ratepayer-funded energy conservation and efficiency program, and National Energy Education Development (NEED), nearly 20 Molokai teachers from elementary through high school levels learned how to better educate their students on energy topics. In addition to performing a number of hands on activities for themselves, they each went home with a kit valued at $300 to $400 to use in their classrooms.

"This workshop sparks the interest of teachers to teach kids [about energy] at a young age — something I never had," Sarah said.

Kim Moats-Barnes, NEED program associate, led the workshop, offering an overview of energy facts, electricity consumption numbers and hands-on learning activities geared toward understanding the science of energy.

In Hawaii alone, for example, 33 barrels of oil are used for each man, woman and child living in the state. Seventy-four percent of energy generated comes from imported oil. Hawaii Energy claims to be helping to change those numbers and push the state toward its goal of 70 percent clean energy by 2030.

"If [students] can go home and show their parents how energy efficiency works, hopefully [we can reduce fossil fuel consumption]," said Moats-Barnes. "Because Molokai is so small, everybody's actions account for a larger percentage."

Teachers gathered around experiments from the kits using batteries, wires, thermometers, light bulbs and even apples to show the science of energy.

"It's going to give me different ways to demonstrate [energy]," said MHS teacher Weldon Wichman. He said he already teaches a unit on energy but said the kits will expand the opportunities to present the material.

Jonathan Smith, an MHS math teacher and one of Jenkins' senior project advisors, agreed.

"The earlier students are exposed to [energy education], they'll live the lifestyle [of energy conservation]," he said, supporting Jenkins' hope that one day, the entire island will be more conscious of their energy footprint.

For the high school's immediate future, Smith said energy conservation could have a tangible and much-needed effect.

"Spend less money on electricity, and that would secure more money for teachers," he said, adding that by reorganizing and prioritizing schools' limited funding could mean more resources could be directed where they're most needed — on teaching students.

When Sarah and her mother, Canoe Complex Area STEM Resource Teacher Heidi Jenkins, learned the workshop was coming to Molokai, they helped "spark the interest of teachers to come," said Sarah.

The workshop is part of the junior's senior project action plan. She's getting a head start on the project by launching a two-week energy challenge on campus next month, as well as conducting an energy audit on the school. In addition, Sarah plans to visit both elementary and high school classrooms to help teach energy literacy.

Next year, she'll be working with Hawaii Energy and NEED to make adjustments to how the school uses energy.

"Once I've identified the major users of electricity [where most of MHS's electric bill is spent], then we'll work to improve the school by implementing those changes," said

Sarah. She said she's also working on a green management plan for the proposed new science classroom building on campus.

That will be made possible in part by a $2,500 grant from Hawaii Energy and NEED that Sarah wrote with Smith.

Sarah's interest in energy was sparked by working with two energy-saving initiatives that took place across Molokai as a partnership between Blue Planet Foundation and Sust`ainable Molokai. Over the past few years, the CFL light bulb exchange and the Hui Up program that offered trades for old refrigerators with Energy Star models have already raised residents' awareness of electricity conservation, Sarah said.

The CFL and fridge exchanges already taught residents about energy efficiency, or using technology to eliminate waste and still get the desired services without using as much electricity. But Sarah's project hopes to take efficiency to the next level: conservation.

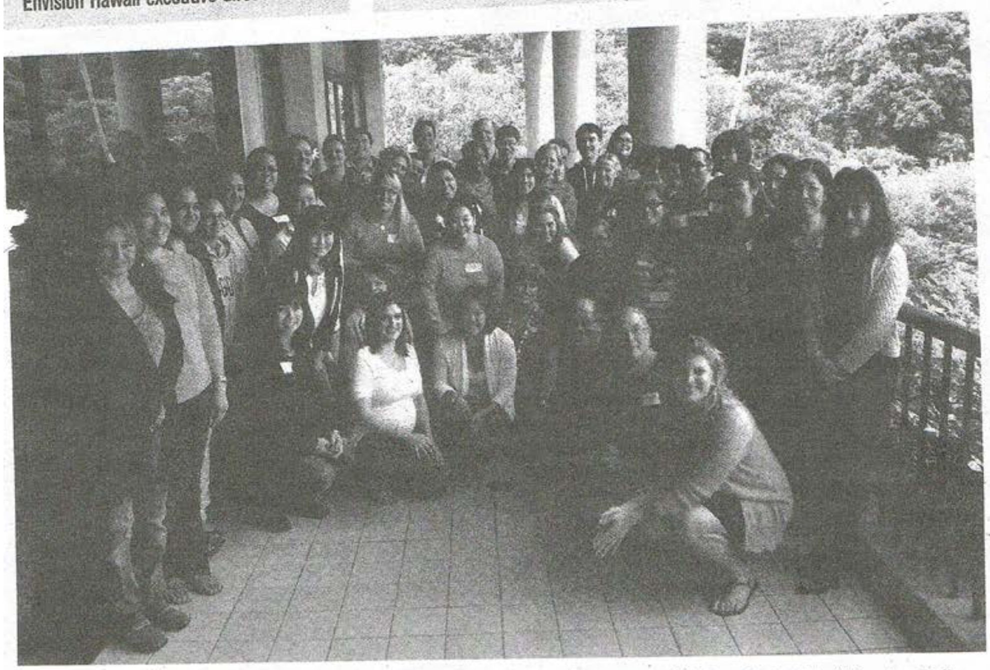
"Conservation is actually changing behaviors and habits to use less energy," she explained. For example, using an electric car would decrease the use of gas, but adjusting one's lifestyle and riding a bicycle instead of driving a car would conserve the most resources.

Saturday's event was one step in that process.

"After the teachers obtain this new knowledge, my goal is to utilize teachers and students to help improve energy conservation at Molokai High School and throughout the island," said Sarah.

Midweek Islander
Feb. 25, 2014

islander



The rate-payer funded Hawaii Energy program staged a free daylong workshop Feb. 25 at Koolau Ballrooms for teachers, to assist them in teaching energy conservation to students, as well as how to make buildings more efficient. Presented by the National Energy Education Development Project, the event included valuable energy kits for each participant, as well as breakfast and lunch at the Kaneohe conference center. Similar workshops were held in Waipahu and Honolulu. Photo from Rob Deveraturda.

Sustaina Summit

By

The University c Strategy" proves t university's colors front.

As part of the st second annual Su Summit Thursday Community Colle campuses will ex ecological balance

The summit is Chaminade and students, and oth the direction educ

Highlights incl night by Mitchell Nature President network of college and the author *Elements of a Sus* forums for studen

PACIFIC BUSINESS NEWS

Pacific Business News
"Morning Edition"
Feb. 27, 2014

Aloha Petroleum receives incentive check from Hawaii Energy

From left, Jimmy Pastor of Aloha Petroleum, Lily Koo of Hawaii Energy and Jeff Finch of Aloha Petroleum pose with the company's incentive check.

Aloha Petroleum Ltd., the largest independent gasoline marketer and one of the biggest convenience store operators in Hawaii, received a $41,352 incentive check from Hawaii Energy for installing energy-efficient lighting at 17 of its gas stations on Oahu.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program from all counties in the state except Kauai, said the check will help offset the cost of replacing old, inefficient lighting fixtures with 175 new, more efficient LED lighting fixtures. Aloha Petroleum said it will save an estimated $88,920 a year on its electricity bill.

The Honolulu-based company also is working with Hawaii Energy to retrofit its refrigerator and freezer case lighting with LEDs at various Aloha Island Marts across Oahu.

Just recently, Aloha Petroleum installed solar photovoltaic systems at five Aloha Island Marts on Oahu and one on the Big Island, which helped reduce its electric bill by up to 45 percent depending on the store's location with additional PV projects being considered.

green
HAWAI'I'S SUSTAINABLE LIVING MAGAZINE

***Green Magazine* (Website)**
Feb. 27, 2014
http://greenmagazinehawaii.com/hawaii-energy-presents-check-to-aloha-petroleum/

Hawaii Energy Presents Check to Aloha Petroleum

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawai‘i, Honolulu and Maui counties, presented a check to Aloha Petroleum for installing energy-efficient LED lighting at 17 gas stations on O‘ahu. The $41,352 incentive check will help offset the cost for replacing old, inefficient metal halide lighting fixtures with 175 new, more efficient LED canopy lighting fixtures. The new lights provide a warmer ambience and help increase visibility while customers pump their gas.

Aloha Petroleum will save an estimated 292,437 kilowatt hours (kWh) annually; equivalent to saving about $88,920 toward their electricity costs based on $0.28/kWh and $11.69 per kilowatt (kW) per month. The company is also working with Hawaii Energy to retrofit its refrigerator and freezer case lighting with LEDs at various Aloha Island Marts across O‘ahu.

Recently, the company installed photovoltaic solar panels at five Aloha Island Marts on O‘ahu and one on the Big Island that helped reduce its electric bill by 20 to 45 percent depending on the store’s location. Additional photovoltaic projects are also being considered. Aloha Petroleum was also the first petroleum company in Hawai‘i to install electric vehicle chargers at three of its retail fuel locations.

INFORMING AND SERVING THE PETROL RETAIL INDUSTRY GLOBALLY
PETROLWORLD.COM

PetrolWorld.com
March 6, 2014

USA: Aloha Petroleum Gets Incentives for Energy Efficiency

Thursday, 06 March 2014

Aloha Petroleum has announced receipt of $41,352 from Hawaii Energy, a local energy conservation and efficiency programme, for installing energy-efficient LED lighting at 17 fuel service stations.

The incentive helps meet the cost of replacing old, inefficient metal halide lighting fixtures with 175 new, more efficient LED canopy lighting fixtures. Aloha Petroleum will also save an estimated 292,437 kilowatt hours annually, equivalent to saving about $88,920 toward its electricity costs.

Aloha, which retails fuel at 100 Shell-, Aloha-, and Mahalo-branded fuel service stations throughout Hawaii, is also working with Hawaii Energy to replace its refrigerator and freezer case lighting with LEDs at various Aloha Island Marts across Oahu. Separately, the company recently installed photovoltaic (PV) solar panels at five Aloha Island Marts on Oahu and one on the Big Island, helping to reduce electricity bills by between 20% and 45%.

RAISING KEIKI MAUI STYLE // VOL 48// SPRING 2014 // FREE

Maui Family

MAUIFAMILYMAGAZINE.COM

Maui Family Magazine

Spring 2014

Teaching Keiki to Save Energy

Saving Energy is Easy, Inexpensive and Educational for the Entire Family

We've all reminded our kids to 'turn it off if you're not using it!" And for good reason, right? Nearly everything in our home requires electricity from lights, appliances, electronics to hot water and air conditioning.

Hawaii Energy, the energy efficiency and conservation program serving the islands of Maui, Hawaii, Lanai, Molokai and Oahu, offers some easy (and free) tips to follow.

Lights Out – As we touched upon earlier… if they're the last one to leave the room, make sure they turn the lights off either at home or school.

Turn Off & Unplug – Turn off and unplug stereos, TVs, DVD players, clocks and battery chargers. Any device with a light continuously draws power, called a "phantom load", even when turned off. Connect these devices to an advanced power strip to make turning it off all at once easier. You can save about $10 per year.

Shut It – Refrigerators are the second largest consumers of energy (after water heating) accounting for about 15 percent of your electricity usage. Keeping the door open too long can cost between $17 to $23 a year.

Game Over – Always have them check to see if their video game consoles and computers are off and not on sleep-mode. They are very easy to overlook and draw a lot of power.

Shorten That Shower – Shortening your shower by just two minutes every day could save about $56 per year. Not to mention you'll also save on your water bill!

Hang It Up – Let your children burn off extra calories and save electricity by hand-drying dishes rather than relying on the dishwasher's heated dryer. It can save about $23 per year.

Fan Favorite – Have them cool off with fans instead of running the air conditioner. If they do use the air conditioner, use fans to circulate the cold air.

The sooner children learn the importance of saving energy the better. Better for your pocketbook too.

Want to learn more? Hawaii Energy offers cash rebates and other incentives to residents and businesses to help offset the cost of installing energy-efficient equipment. Visit www.HawaiiEnergy.com or call toll-free at (877) 231-8222.

PACIFIC BUSINESS NEWS

Pacific Business News

March 14, 2014

PEOPLE ON THE MOVE

► ENERGY


Joe Simpkins


Caroline Carl


Rob Deveraturda

Hawaii Energy promoted Joe Simpkins to senior energy project manager from director of technical services and Caroline Carl to program specialist for the Big Island from residential program manager. It also hired Rob Deveraturda as a public relations specialist.

PACIFIC BUSINESS NEWS

March 21, 2014

Page 2

"People on the Move" Title Correction

[redacted]

PACIFIC BUSINESS NEWS

Pacific Business News

"Afternoon Edition"

March 19, 2014

Nationally recognized energy efficient expert to visit Honolulu

A nationally recognized energy efficiency expert is visiting Honolulu later this month to teach a series of workshops and conduct sales training sessions aimed at helping both vendors who want to increase their sales of energy efficiency solutions and building owners and managers that want to take control of their energy use.

Mark Jewell, co-founder of the Efficiency Sales Professional Institute in San Francisco, who has spent the past two decades working in the energy efficiency industry, is leading Hawaii Energy's "Creating Value with Energy Efficiency Spring Workshop Series," which includes a series of in-person and online workshops from March 31 to April 4 with separate sales training sessions from May 5-9.

For more information, go here.

PACIFIC BUSINESS NEWS

Pacific Business News
(Print & Online)
March 28, 2014

ENERGY

Businesses can get free upgrades to save energy

Small businesses and restaurants on Oahu, the Big Island, Maui, Molokai and Lanai are being encouraged to take advantage of an opportunity to replace for free their old lighting with newer energy-efficient fixtures and bulbs between now and June.

The program is being overseen by Hawaii Energy, a ratepayer-funded energy conservation and efficiency program for all the major islands except Kauai.

Since Hawaii Energy's Small Business Direct Install Lighting program launched in 2011, a total of 1,790 small businesses and restaurants have participated, receiving free consultation, lighting and installation. They range from hardware stores to surf shops to art galleries to bakeries.

Hawaii Energy estimates that the total amount of electricity saved on lighting at 9.4 million kilowatt hours or $310,200.

To qualify, businesses must have individual meters and be on an electric rate schedule "G," or occupy a work space of less than 5,000 square feet.

The Green Leaf
Honolulu Star-Advertiser's Blog
March 31, 2014

Hawaii businesses: Save energy plus LED exit signs

March 31st, 2014
By Nina Wu

Universal LED Exit sign from www.simplyexitsigns.com.

Swapping to an LED exit sign can save a business substantial electricity costs plus qualify for a $40 rebate from Hawaii Energy.

Attention, Hawaii businesses.

Did you know swapping out your older, incandescent exit sign for an LED one can save you $80 to $100 a year. **Hawaii Energy**'s offering up to $40 in additional incentive to businesses that do so from now until **May 31**.

An Energy Star LED exit sign uses only about 44 kilowatt hours annually compared to 350 kilowatt hours for an incandescent sign — about 87 percent in savings.

It's as simple as that.

The exit signs, a legally-required safety feature in case of an emergency, are on 24 hours a day throughout the year.

Businesses must complete an application and submit a paid invoice or show proof of purchase to qualify for the incentive.

Also, **Hawaii Energy** is offering small businesses and restaurants an opportunity to replace their old lighting with newer, energy-efficient ones for free from now until **June 9**. Incandescent bulbs and halogen lighting are swapped out for CFLs (compact fluorescent lamps) and LEDs (light-emitting diodes).

To qualify, businesses must have an individual meter and be on an electric rate schedule G, or occupy a workspace of less than 5,000 square feet. Restaurants on any electric rate schedule or of any size can qualify.

Pagoda took advantage of Hawaii Energy's lighting retrofit program to save costs. Courtesy photo.

Pagoda Floating Restaurant participated in the program, and expects to save about $14,400 a year.

Visit **www.hawaiienergy.com/retrofit** to apply.

Lighting can account for nearly half of a retail businesses' overall electricity costs at 48 percent. For offices, it's about 27 percent, and for restaurants, about 18 percent.

Hawaii Energy's Small Business Direct Install Lighting program, launched in July 2011, has helped 1,790 small businesses and restaurants throughout the state — from hardware stores to surf shops, art galleries and bakeries. The program provides free consultation, lighting and installation.

Hawaii Energy is a ratepayer-funded energy conservation and efficiency program serving the isles of Hawaii, Lanai, Maui, Molokai and Oahu.

Visit **www.hawaiienergy.com/lighting** or call 839-8800 to learn more. On neighbor isles, call 877-231-8222.

PACIFIC BUSINESS NEWS

Pacific Business News
"Morning Edition"
Mar. 31, 2014

Hawaii businesses can turn their old exit signs into cash

Pacific Business News

Mar 31, 2014, 12:33pm HST

Replacing an old exit sign with a more energy efficient model could save a business up to $100 a year in electricity costs.

Hawaii businesses can turn their old lighted exit signs into cash by replacing them with new, more efficient signs that could save up to $100 per year on electricity costs.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for the Big Island, Lanai, Maui, Molokai and Oahu, also is offering a $40 incentive with a new light-emitting diode, or LED, exit sign from now until May 31.

"We encourage all businesses to update their exit signs to ensure the safety of their tenants and to help lower overhead costs," Hawaii Energy Business Program Manager Keith Block said in a statement. "It's a simple energy-efficient measure that any business with an existing sign can take advantage of."

Exit signs are an important and legally-required safety feature in case of an emergency, and these signs consume large amounts of energy from operating 24 hours per day throughout the year, Hawaii Energy said.

To find out more about this program, go here: www.hawaiienergy.com/lighting.

Star Advertiser

The Honolulu-Star Advertiser

March 31, 2014

Business Briefs

For Tuesday, April 1, 2014

By Star-Advertiser staff

Rebates offered for switch to LED exit signs

Businesses in Oahu, Maui and Hawaii counties are eligible to receive a rebate of $40 for each incandescent "exit" sign they replace with one that is illuminated with a light-emitting diode, or LED.

The rebates are being offered by Hawaii Energy, the ratepayer-funded energy conservation and efficiency program that operates in the three counties. The offer is available through May 31.

LED exit signs certified by the Energy Star program use about 44 kilowatt-hours of electricity a year compared with 350 kilowatt-hours a year for an incandescent sign — a savings of 87 percent, according to a news release from Hawaii Energy. For each incandescent exit sign replaced, the savings is about $80 to $100 a year, according to Hawaii Energy.

For more information visit www.hawaiienergy.com/lighting or call 839-8800 on Oahu and 877-231-8222.

wiliki o hawaii ENGINEER OF HAWAII
VOL. 50 NO. 2 SERVING 2000 ENGINEERS & LAND SURVEYORS APRIL, 2014

Wiliki o Hawaii (The Engineer of Hawaii) Newsletter

April 2014

"Sub-stantial" Cost and Electricity Savings with Submetering

by Hawaii Energy

Everyone from residents to businesses consume electricity differently. Some of us have large families at home or operate machinery or equipment at work that simply requires more electricity. Others may use very little electricity because of frequent business trips and are away from home for weeks at a time. The reasons can be plentiful. So it only makes sense to pay for the electricity you use rather than everyone paying the exact amount.

Condominiums and their Association of Apartment Owners (AOAO) are often on a single electrical "master meter" that monitors electricity for the entire building. The building's management purchases the electricity at a bulk rate and bills each resident. Electricity payments are a fixed amount based on a percentage of ownership within the property or the number of total units. The downside as mentioned earlier is that you're not paying for actual usage.

Installing a submetering system can drastically minimize these scenarios. It encourages tenants to become financially-responsible for their consumption behavior and it allows for a fair distribution of electricity costs. The building's management can also continue to pay a lower bulk rate for electricity.

The cost to install an electrical submetering system may range from $350 - $550 per unit. Monthly service fees can add an additional $1.50 to $5.

Hawaii Energy – the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties – offers a means to offset these costs with a substantial incentive of $150 per unit (up to 50 percent of the total project cost) for submeters used for billing. The program also provides education and an energy audit for equipment such as common area lighting, HVAC and central air conditioning or domestic water heating to help submetering participants.

Hawaii Energy is administered by Leidos Engineering, LLC, and is under contract with the Hawaii Public Utilities Commission. The program was designed to help both residents and businesses save money on their electric bills and reduce our state's dependence on imported oil.

continued on page 7

Submetering, from page 1

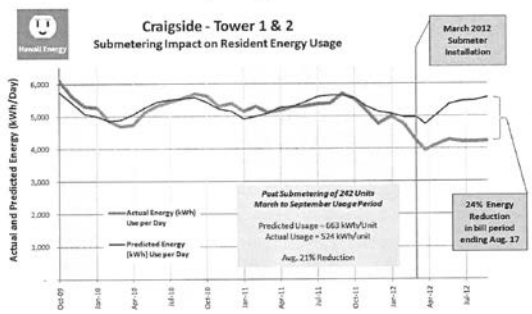
Submetering goes beyond allocating the cost of electricity. It's a motivator to conserve energy. Depending on the property and occupant's willingness to change their behavior, electricity reduction can range from 10 to 25 percent.

In turn, these energy-saving efforts help the state with the Hawaii Clean Energy Initiative to reach its 70% clean energy goal by 2030[1].

Condominiums, strip malls and office buildings with multiple tenants, that are electric utility customers on Hawaii Island, Lanai, Maui, Molokai or Oahu, are eligible for the submetering incentive. Applications can be submitted until June 30, 2014, or until funding lasts.

For additional information or to download a Submetering Incentive Application & Worksheet, please visit *www.hawaiienergy.com/submetering*. Or contact Lisa Harmon, Business Program Specialist at Hawaii Energy, at (808) 839-8865 or *lisa.m.harmon@leidos.com*.

Success Story: Craigside Condos, AOAO



Just months after installation, Craigside in Nuuanu achieved significant energy reduction. In March 2012, submetering was installed for 242 units. From March to September, actual usage was down from its predicted usage by about 20 percent. This is approximately 1,000 kWh reduction per day, which is equal to about $9,120 in electricity costs savings per month, based on 30 cents per kWh and adjusted for weather-related changes.

Hawaii Energy Offers $150 Incentives Per Unit for Submeters

[1]Hawaii Clean Energy Initiative
(*http://www.hawaiicleanenergyinitiative.org*)

Hawaii News Now

"Sunrise"

News Brief – Hawaii Energy's LED Exit Sign Rebate

Apr. 2, 2014

West Hawaii Today

West Hawaii Today

"In Brief | Island Inc." Section
April 7, 2014

Incentive offered for installing LED signs

Hawaii Energy, a ratepayer-funded energy conservation and efficiency program, is helping businesses show their old exit signs the door with a limited-time $40 incentive.

Until May 31, businesses can qualify for the incentive when replacing an older incandescent exit sign with a new, light-emitting diode, or LED, exit sign.

An Energy Star LED exit sign uses about 44 kilowatt hours of electricity annually compared to kilowatt hours for an incandescent sign, a savings of approximately $80 to $100 per year.

To qualify for the incentive, businesses are required to complete an application and submit a paid invoice to show proof of purchase. For more information, visit hawaiienergy.com/lighting or call 877-231-8222.

Program replaces inefficient lighting for small businesses

Hawaii Energy, a ratepayer-funded energy conservation and efficiency program, is offering small businesses and restaurants an opportunity to replace their old lighting with newer energy-efficient lighting for free now until June 9.

Hawaii is the most oil dependent state in America and has the highest energy prices. Lighting can account for nearly half of a retail business' overall electricity costs.

Since Hawaii Energy's Small Business Direct Install Lighting program launched in July 2011, 1,790 Hawaii small businesses and restaurants have participated in the program that provides free consultation, lighting and installation.

During an installation, old incandescent bulbs and halogen lighting are removed and replaced with new, lower wattage compact fluorescent lamps, or CFLs, and light-emitting diodes, or LEDs.

In order to qualify, businesses must have an individual meter and be on an electric rate schedule G, or occupy a work space of less than 5,000 square feet. Restaurants on any electric rate schedule or of any size can qualify.

For more information or to apply, visit hawaiienergy.com/retrofit or call 877-231-8222.

Star Advertiser

The Honolulu-Star Advertiser

April 8, 2014

Free water cooler timers offered for most Hawaii businesses

By Star-Advertiser Staff

POSTED: 10:18 a.m. HST, Apr 08, 2014

Businesses in Oahu, Maui and Hawaii counties are eligible to receive a free water cooler timers that can save more than $100 in electricity costs annually per unit based on today's rates.

The timers are being offered by Hawaii Energy, the ratepayer-funded energy conservation and efficiency program that operates in the three counties. The offer is available through June 30.

Hawaii Energy officials estimate a typical office cooler uses $217 worth of electricity annually on Oahu and slightly more on the neighbor islands. A water cooler timer can save about $123 in power costs annually based on a power rate of 31 cents a kilowatt hour, according to Hawaii Energy.

The timers are available from participating vendors while supplies last. For more information go to www.hawaiienergy.com/timer, or call 839-8800 and (877) 231-8222 on the neighbor islands.

PACIFIC BUSINESS NEWS

Pacific Business News
"Afternoon Edition"
April 9, 2014

Hawaii Energy offering free water cooler timers to businesses

Apr 9, 2014, 12:02pm HST

Courtesy Hawaii Energy

Hawaii Energy says a water cooler timer like the one pictured here can save a business up to 60 percent the electricity cost to operate a water cooler.

Hawaii Energy is giving businesses another way to save money on electricity by offering a free water cooler timer.

Water coolers require electricity around the clock, but are rarely used on weekends by most businesses, and a single water cooler with hot and cold spigots can draw up to 700 kilowatt hours per year, which is more than some full-size refrigerators, the company said.

That can cost about $217 a year on Oahu and even more on the Neighbor Islands, but a timer can cut the costs by about 60 percent, Hawaii Energy said.

Businesses on Oahu, the Big Island, Lanai, Maui or Molokai can qualify for the free timer, retail value $30, between now and June 30, if they are on rate schedules P, J or G.

Applications are available on the Hawaii Energy website.

Pacific Business News
Print Edition

April 25, 2014

ENERGY QUARTERLY

SOLAR HEATING

This industry's in hot water — that's a good thing

BY DUANE SHIMOGAWA
dshimogawa@bizjournals.com
808-955-8036, @PBNDuane

Rolf Christ, who has been in the solar hot water business in Hawaii for more than three decades, is noticing a resurgence in the industry as solar photovoltaic slows due to new rules instituted last year by Hawaiian Electric Co.

Sometimes called the stepsister to the solar photovoltaic industry, the solar hot water sector has been steady as ever, even picking up a bump in sales, said Christ, president of Honolulu-based R&R Solar Supply.

"One thing that has happened ever since HECO slowed down the PV market is that a lot of salespeople that used to sell PV systems are back to selling hot water systems," he said. "They can make a sale/commission quicker than selling PV systems. A lot of salespeople who sell both have gone back to selling hot water."

Last September, HECO changed its procedures related to interconnecting systems, which it said was necessary to ensure the safety and reliability of distributed solar, more commonly known as rooftop solar, as it entered the grid.

Christ said he has seen sales for hot water systems at his own business rise about 20 percent year over year.

Some PV firms have been either laying off workers or doing business differently since last September, when HECO changed the way it allows solar energy to connect to the electrical grid. But in March,

CONTINUED ON PAGE 23

TINA YUEN

R&R Solar Supply owner Rolf Christ looks on as James Kekoa welds the waterways for a solar collector. Christ says many salespersons have returned to selling solar hot water systems.

CONTINUED FROM PAGE 22

the Honolulu-based utility sent out new rules to PV contractors that increased circuit penetration levels, which has the potential to speed up the industry.

Christ, whose business also does PV work, did not lay off anyone and made up for the lost time by allowing employees to work overtime when handling solar hot water system sales.

"Hot water is long established and the penetration is very high," he said. "We have over 80,000 systems installed in Hawaii, and that's a fairly high penetration of owner-occupied houses."

Christ says the benefits of a solar hot water system compared to PV is that it's a much faster payback and it's also not as controversial as PV.

Ted Peck, former administrator of the state Energy Office and now an energy industry consultant, says that for solar hot water, there's no battle with the utility.

"To the consumer, it's a bigger payback and quicker," he told PBN. "It's a two- to three-year payback."

Peck, who has both a solar hot water and PV system on his rooftop, has saved roughly $80 a month on his utility bill from just the solar hot water system.

"It just makes good financial sense, and it takes no interconnection," he said.

Ted Peck

Hawaii Energy, the ratepayer-funded conservation and efficiency program for Oahu, the Big Island, Maui, Molokai and Lanai, has been noticing a steady interest in solar hot water heating, especially with strong incentives and mandates such as the requirement that new single-family homes have solar hot water heating systems.

In addition to offering a $1,000 rebate, Hawaii Energy has set up a tune-up and maintenance program.

"There seems to be a real strong focus on not just the installation but the maintenance is being recognized as an essential component," Hawaii Energy Residential Program Manager Caroline Carl told PBN.

On top of the strong interest in maintaining these systems, the number of participating contractors, which currently sits at about 80, is increasing every year.

"There is still a strong culture and interest in solar hot water heating," Carl said.

Star Advertiser

The Honolulu-Star Advertiser
"Kokua Line"
April 30, 2014
(Page 1 of 2)

Energy reports evaluate households' usage, savings

By June Watanabe

Question: I receive mail every month from Hawaii Energy telling me how much electricity I use compared with my neighbors. I'm bothered that they have access to my records. Is that information obtained legally? They must receive this data from Hawaiian Electric. Who is Hawaii Energy, and who are they to tell me how I rank? Are they aware of how many people live in my house? Are they aware that I have applied for solar installation but permission was held up by Hawaiian Electric?

Answer: Hawaii Energy obtains its information from Hawaiian Electric Co., Maui Electric and Hawaii Electric Light and says no personal information is disclosed to other customers.

It would help to know first what Hawaii Energy is.

In July 2009 the Hawaii Public Utilities Commission decided to have a third-party company run its energy efficiency/rebate program, which had been managed by HECO. The company selected was SAIC (Science Applications International Corp.), which later became Leidos Engineering LLC.

Hawaii Energy is "ratepayer-funded," which means a surcharge on your monthly HECO bill — the "public benefit fund" — pays for the cash rebates and other incentives offered residents and businesses for installing energy-efficient equipment.

Hawaii Energy also offers education and training for residents, businesses and trade allies to encourage energy conservation and efficiency measures, said Caroline Carl, residential program manager at Hawaii Energy.

Among its programs is home energy reports, designed to promote conservation and help customers manage their monthly electricity bills, she said.

The PUC has authorized Hawaiian Electric Companies (HECO, Maui Electric and Hawaii Electric Light) to provide customer electric usage information from the counties of Honolulu, Hawaii and Maui. Hawaii Energy is independent of the electric utilities, Carl said.

She said households are randomly selected and do not necessarily include homes on the same street. Homes that are chosen are nearby and have similar energy needs, comparable home size and age, etc.

The electricity usage information provided to Hawaii Energy does not include the number of people in a household nor whether the household is considering a solar system, she said.

However, participants can update their energy report profile online to reflect their household's characteristics at www.hawaiienergy.com/homeenergyreport.

Carl explained that the program does not evaluate energy savings by individual household, but rather calculates energy savings on an aggregate basis by county.

Savings calculations are provided in Hawaii Energy's Technical Resource Manual and are published yearly in Hawaii Energy's annual report.

The Technical Resource Manual Report for 2012 (Page 50) and the annual reports for 2012 (Page 104) and 2011 (Page 82) are online at www.hawaiienergy.com/information-reports.

The savings are consistent with similar peer group comparison programs nationwide, Carl said.

Participate or Not

Hawaii Energy selected 57,500 households to receive four reports for the year ending June 30: one report per month for the first three months and one report three months later.

The same households will continue receiving reports in the next program year, July 1 to June 30, 2015. Reports will be sent every other month for a total of six reports.

There are no plans to add more households at this time, but names can be placed on a wait list for consideration when the initiative is up for expansion or renewal, Carl said. While households cannot opt in to participate, they can choose to opt out any time, she said.

To opt out, go to the "My Account" section at www.hawaiienergy.com/homeenergyreport or call toll-free 877-231-8222. Anyone with questions about their reports can call Hawaii Energy at 537-5577.

The Green Leaf
Honolulu Star-Advertiser's Blog

The Green Leaf
Honolulu Star-Advertiser's Blog

WEfficiency: Crowdfunding to help non-profits

May 30th, 2014

By Nina Wu

Share 10

Crowdfunding is such the thing to do these days.

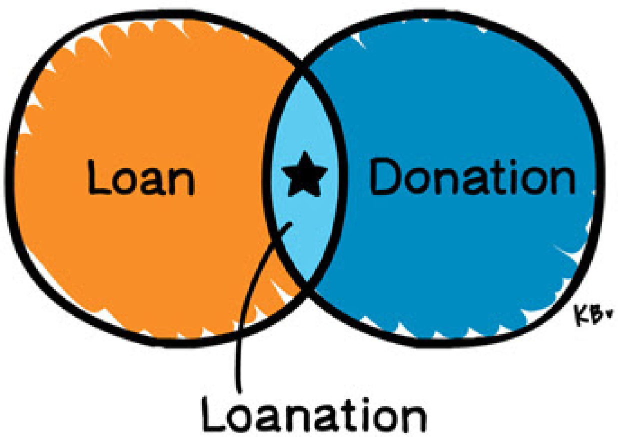
Now, with the **Blue Planet Foundation's launch of WEfficiency**, you can donate or loan money to a non-profit group, specifically with the intention of helping it become more energy-efficient.

It's a win-win because a $1 donation can turn into $4 in energy savings. A $10,000 lighting retrofit, for example, can save the non-profit up to $40,000 over its lifetime. The non-profit's investment in energy efficiency measures results in immediate energy savings.

You can opt to give the non-profit a loan (called a "loanation") and get your money back, or you can give an outright donation.

The Green Leaf
Honolulu Star-Advertiser's Blog

WEfficiency.org



The first three non-profits that are giving WEfficiency a shot are **YWCA Laniakea**, **Damien Memorial School** and **Hawaii Public Radio**.

To boost the kick-off of WEfficiency, **Hawaii Energy**, a ratepayer-funded energy conservation program , is offering matching "loanations."

Gov. Neil Abercrombie joined **Honolulu Mayor Kirk Caldwel**l and the Blue Planet foundation board of directors in presenting the first "loanations" to representatives from the three non-profit groups last Thursday (May 22) to kick off the program.

In 2013, WEfficiecy, which was developed by Honolulu-based solutions agency **Sudokrew**, was formally recognized as a **Clinton Global Initiative Commitment to Action**.

To make a "loanation," visit **www.wefficiency.org**.

Free pilot energy program

June 4th, 2014
By Nina Wu

Hawaii Energy and People Power are looking for 600 Oahu residents to test out its home energy management system for a year. For free. Courtesy image.

Ouch. The Hawaiian Electric Co. is **raising everyone's monthly bill by an average of $4.89** as part of a "decoupling" move. It won't matter whether you used more or less for the month — everyone is going to have to foot that extra fee. That's the bad news.

But there's some good news.

There's a cool technology being offered by **Hawaii Energy** (a ratepayer-funded conservation and efficiency program) in partnership with a Palo Alto, Calif.-based tech company called**People Power**. And they're offering it for up to 600 Oahu residents, for free.

That's right. Free.

There's not much you can get for free any more these days. **People Power** is looking for 600 Oahu residents to test out a home energy management system for a year, which can potentially save participants as much as 20 percent on their electric bill. The system comes with a mobile app — called **Presence** (which turns iOS devices into remotely monitored video cameras) — and **Monster Central** smart plugs. They're valued at about $300 or more.

By the end of the program, participants get to keep the **Presence Pro Energy kit**.

But there are only about half of the spaces left, and you do need to qualify.

To qualify, you need a smartphone or tablet, a home WiFi connection with an available port on your Wireless Internet router. You can still qualify even if you have solar water or solar PV.

Sign up at **www.Oahu.PresencePro.com**.

KITV News

June 26, 2014

Summer Energy Saving-Tips

Hawaii Energy Historical Summary

Program Year 2009 – *Smooth Transition*

On July 1, 2009, responsibility for the "demand-side management" programs was transferred from the electric utilities to a third-party Public Benefits Fee Administrator (PBFA) reporting directly to the Hawaii Public Utilities Commission (PUC). The scope and goals of the contract were developed to provide a focus to the energy efficiency and conservation efforts supporting the PUC's Legislative charge to meet the State of Hawaii's Energy Efficiency Portfolio Standard. The goal of the program in its first year was to provide a smooth and seamless transition of the programs to ensure that the obligations and commitments to customers and the efforts of trade ally businesses were supported during the transition.

In the first year, the Program accomplished much, while acknowledging areas to improve, specifically:

Achievements

- Provided a smooth transition of responsibilities from the utilities.
- Developed an identity with a new name, logo and program website.
- Enlisted trade allies and community-based organizations to support the Program's education, outreach and marketing efforts.
- Discontinued window air conditioner (A/C) program.
- Expanded ENERGY STAR® Appliance programs across all Islands.
- Standardized Commercial Program requirements and incentive levels across all Islands.
- Delivered $11,900,000 in incentives driving customer bill savings of over $29,200,000 annually and over $255,000,000 over the life of the measures installed.
- Verified first year Program Level savings of 153.7 GWhs.

Lessons Learned

- Need for increased efforts and methods to meet Island Equity goals.
- Need for program to enhance "Hard-to-Reach" participation.
- Provide for the ability to overcome economic impacts of the 2008 financial crisis.

Significant Event

- State mandate for Residential Solar Water Heating in new construction single-family homes.

Program Year 2010 – *Refinement and Additions*

In its second year, Hawaii Energy sought to refine programs to increase cost effectiveness and impacts. One method was to best leverage existing contractor relationships and refine processes to expand participating manufacturers, distributors and retailers to provide more efficient products to more locations at prices that could drive purchases.

The Program moved quickly to help the State secure and implement Federal Stimulus Funding in 2011 while addressing the needs identified to help hard-to-reach and commercial projects.

Implementation

- Initiated American Recovery and Reinvestment Act (ARRA) - funded projects.
    - Direct Implementation
        - Refrigerator Recycling Program to address "garage" or second refrigerator
        - Commercial Project Catalyst – 25% project cost

        - Residential Peer Group Comparisons
        - Solar Water Heating Loan Interest Buy-Down Program – Leveraging local financial institutions
        - Solar Water Heating Bonus –Increased to $1,000 per system
    - Supported Activity
        - State of Hawaii Office of Community Services (OCS) Weatherization Program – Hawaii Energy provided solar water heating system inspections for low-income homes.
- Central plant optimization commissioning program to pursue operational and low-cost savings in air conditioning systems.
- Developed prescriptive commercial measure for Variable Refrigerant Flow installations to promote adoption of this technology.

Achievements

- Supported the delivery of 1,798,633 CFLs into homes (66% increase over PY09).
- Successfully reached Island Equity Goals.
- Hired dedicated representatives for Maui and Hawaii counties.
- Delivered over $13,700,000 in incentives driving customer bill savings of over $48,100,000 annually and $473,200,000 over the life of the measures installed.
- Verified first year Program Level savings of 106.5 GWhs.

Lesson Learned

- The need to provide long-term support for projects in the initial phases to allow for customers' engineering, design, procurement and budgeting cycles.

Significant Event

- Federal ARRA grants

PY11 – Focus on Hard-to-Reach

In its third year, the Program addressed the need to provide outreach and energy education through portfolio offerings such as "Sharing the Aloha", which presented workshops in hard-to-reach communities, training for grade school educators, who in turn would convey the knowledge to their students and training for professional energy certification.

The Program also initiated 100% granted incentives for small businesses and restaurants. This program overcame technical, financial and trust barriers to implement lighting projects for these underserved electric customers.

Hawaii Energy reached out to non-profit organizations in Hawaii and Maui counties for grant-based incentive opportunities in solar water heating. This effort resulted in over 50 "in-need" homes receiving solar water heating systems that for various reasons did not qualify for other funding opportunities (e.g., ARRA, Weatherization Assistance Program (WAP), etc.).

Implementation

- Introduced "Transformational" energy education and awareness programs
- Developed residential Solar Water Heater grant program
- Grassroots organization-supported CFL exchanges
- Small Business Direct Install Program

Achievements

- Greater program recognition through media efforts.
- First-implemented AOAO submetering project after two years of customer and program efforts.

- Responded quickly to market opportunities to create and execute Garage Active Ventilation Controls within the program year.
- Conclusion of offerings created and/or enhanced through the additional funding from ARRA grants provided through the State Energy Office
- Delivered over $17,083,253 in incentives driving customer bill savings of over $51,671,208 annually and over $407,587,061 over the life of the measures installed.
- Verified first year Program Level savings of 130.1 GWhs.

Lessons Learned

- Developed experience leveraging the great work and expertise of third-party organizations within their specific communities or professions.

PY12 – Beyond Rebates: Expertise, Market Identification and Scale

In the fourth year, the Program issued a record $21,814,052 in direct incentives and services to customers. Accomplishing this milestone was the culmination of prior program year efforts and execution of targeted pilot measures.

The Solar Water Heating Grant (100% incentive) offering with Hawaii Community Economic Opportunity Council (HCEOC) was completed this year with 169 systems installed for "in-need" homes. This effort was the result of a year-long collaboration among HCEOC, the Program and its trade allies.

Another major collaboration of the Program and its trade allies was the Direct Install Lighting programs that reached 583 small businesses and restaurants providing a lifetime energy cost reduction of $26,738,793.

The Program extended its expertise gained over the past three years through market intelligence and data analysis of incented projects. By gaining a better understanding of the operational and physical conditions of energy-consuming systems, as well as revealing non-technical barriers, the Program was able to overcome various obstacles (e.g., funding gaps, job responsibilities, team capability or expertise in energy management) with offerings of training, equipment, targeted technical support and traditional financial incentives to help specialized sectors realize their opportunities for energy savings.

Implementation

- The Transformational program reached 600 government employees, 262 educators, 473 professionals and 2,733 residents.
- At the request of the PUC, Hawaii Energy began a program to support energy efficiency initiatives within the water and wastewater treatment and distribution sector. The Program visited over 38 facilities across all counties to identify opportunities for energy efficiency investments and to identify other needed technical support for management and operations personnel. One of the first areas of Program-funded support was the provision of metering equipment and training to assist in the counties' water and wastewater agencies' efforts to optimize pump efficiency.
- Hawaii Energy began supporting the design of the On-Bill Financing Program with an eye on leveraging synergies brought about by its expertise in energy efficiency measures and economics.

ATTACHMENT H

Comparison of Program's kWh Benefits and Cost Effectiveness at the Program, Customer and System Levels				
Level	Program Cost (Table 15)	Lifetime (kWh)	$/kWh	Table
System	$ 32,049,856	1,749,955,694	$ 0.018	18
Customer	$ 32,049,856	1,578,960,387	$ 0.020	19
Program	$ 32,049,856	1,367,592,053	$ 0.023	17