



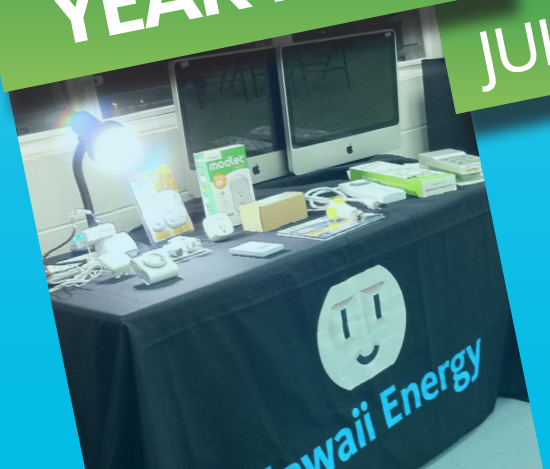
ANNUAL REPORT

PROGRAM YEAR 2014

JULY 1, 2014 - JUNE 30, 2015







Hawaii Energy

YOUR CONSERVATION & EFFICIENCY PROGRAM

leidos

Annual Report

Program Year 2014

July 1, 2014 – June 30, 2015

Submitted to the Hawaii Public Utilities Commission on
December 11, 2015 by:

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Public Benefits Fee Administrator
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Hawaii Energy is the ratepayer-funded energy 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 online at www.hawaiienergy.com/information-reports

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A majority of the tables in this report are sorted in descending order by Lifetime Energy Impact. This figure drives Program cost-effectiveness in terms of Total Resource Benefit (TRB) and Levelized Cost of Saved Energy (CSE).

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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 2014 (PY14) Annual Report, covering July 1, 2014 through June 30, 2015 and highlighting our sixth 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 PY14 will deliver 1.5 billion kWh in lifetime energy savings to the electric grid system at a total program cost of 2.4¢ per kWh (total program costs / total system kWh benefit). This, in turn, will save an estimated equivalent of 2.2 million barrels of oil and 1.3 million tons of greenhouse gas emissions. And, at an average electric utility price of 32¢ per kWh, customers will save approximately $443 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 *energy efficiency continues to be Hawaii's No. 1 electric grid resource*, over fossil and renewables.

In addition to meeting our PY14 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, Hawaiian Electric, 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 PY14, Hawaii Energy continued its aggressive engagement with hard-to-reach residential and business customers on the neighbor islands; helped more underserved small businesses and restaurants participate in our free lighting retrofit offer known as the *Small Business 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.

Most significantly this program year, Hawaii Energy (as the PBFA) was asked to expand the efficiency Program's scope to help facilitate acceleration of Hawaii's transformation to more efficient, clean-energy-tolerant and customer-accommodating electric grids. This included collaborative engagement with the utilities and others to identify and integrate energy efficiency and demand response capabilities through pilot projects focused on identifying controllable loads, energy storage, electric vehicle (EV) charging infrastructure and effective Time-of-Use (TOU) rates. This convergence of our team's continued service and proven capability as PBFA, along with the new initiatives that the PUC added to Hawaii Energy's portfolio of programs, 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 six years of progressive transition from the original legacy rebate program to an innovative, responsive and effective energy conservation and 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) [now Leidos Engineering, LLC (Leidos)] 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 - 2013) is provided in Attachment G.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Current Year Program Overview

PY14 – Expanding Collaboration Opportunities, Energy Efficiency Delivery Integration, and Data Analysis Use

Energy Efficiency Auction

- Implemented an open call for projects to provide energy savings to the Program. Received 73 project proposals; four turnkey projects were selected with a total award of $2,087,830.
    - Three projects involved turnkey direct installation provided at low or no-cost to customers. These services directly overcome the barriers to participation for a number of key sectors.
        - Technologies included: thermostats, LED and CFL bulbs, refrigerator and freezers improvements, high-efficiency showerheads, faucet aerators, and advanced power strips.
    - One project included networked smart outlets.
        - These devices provide a number of benefits including greater insight to the energy use of plug loads, the education of the occupants, optimized equipment scheduling and energy management diagnostics.

Integration of Energy Efficiency with Clean Energy initiatives

In PY14, we collaborated with a number of organizations to integrate our work and set the stage for the evolution to Hawaii Energy 2.0. The Program implemented five pilot projects:

- Smart meters – supported the Smart Grid (SG) initiative with Home Area Network (HAN) devices
- Codes and Standards – increased participation and research in support of higher code standards and adoption
- Electric Vehicles (EV) – tested the market for daytime charging incentives
- Demand Response (DR) – explored the potential to reduce and shift water heating loads to the solar day
- Benchmarking – expanded the catalog of local benchmarked sectors to target programs and motivate customer energy action

LEDs Are Ready for Prime Time

PY14 saw a significant increase in the penetration of LED products in the marketplace. We anticipate that falling prices coupled with improvements in quality and a significant growth in the diversity of product types available will continue to shift the market towards LEDs in coming years.

Long-Lead Time Projects Bearing Fruit

The Program recognizes that it often takes time and persistence to influence projects, particularly in large institutions. This year we saw further evidence that these efforts continue to pay off.

- Water/Wastewater Initiative – Continued engagement with industry through training programs and a successful water leak detection project.
- Benchmarking – Three years of instrumentation and data gathering has provided information used to assist customers in their energy decision making. This information is valuable on multiple levels, it informs internal program design and allows us to provide insight for customers and decision makers.

Business Programs

The Business portfolio spent $12,246,110 (91% of target), and achieved 54,611,354 kWh savings (85% of target), 8,414 kW peak demand savings (124% of target), and $81,807,345 in Total Resource Benefit (91% of target).

Implementation	Achievement
Hawaii Energy conducted its first-ever **Energy Efficiency Auction**	Hawaii Energy received proposals from 28 companies representing 68 different projects as a result of this Energy Efficiency Auction. From this pool and based on pre-specified criteria, Hawaii Energy selected three proposals for $1,476,830 to fund. However, as expected, the short project cycle proved to be a significant barrier for many proposed projects and impacted two of the three proposals selected.
Hawaii Energy launched a **Midstream Lighting Program** to offer instant rebates to commercial electric utility account holders at the point of purchase	A later than anticipated launch in the Program Year resulted in sign-up from one lighting distributor. As such, energy and demand savings were below expectations. However, a significant amount of excitement and interest was generated in the market sector and an additional six distributors have expressed interest in joining the program in PY15.
Continued success in LED Lighting projects	• LEDs in the BEEM Program generated energy (first year) and demand savings of 3,882,675 kWh and 543 kW, respectively. • LEDs in the CBEEM Program generated energy (first year) and demand savings of 14,676,354 kWh and 2,030 kW, respectively.
Launched a **15% Contractor Bonus in the Small Business Direct Install Program** to reinvigorate the market	Over the Program Year, 570 small businesses and restaurants were served, providing annual energy savings to these customers of over 5.5 million kWh.
Continued success in Commercial Water Pumping Improvements	Hawaii Energy provided a $135,000 incentive for the installation of a system-wide leak detection system on the water supply system on Hawaii Island that is expected to save 241,023 kWh per year.
Conducted a **Direct Install Refrigeration Measures Pilot Program**	Hawaii Energy worked with a contractor to develop a pilot program to offer commercial refrigeration energy efficiency measures, specifically new refrigeration gaskets, strip curtains and automatic door closers. The pilot program was successful with cumulative savings estimated at 265,796 kWh per year for nine grocery stores on Oahu at a cost of approximately $50,400 in incentive funds.

Residential Programs

The Residential portfolio spent $9,978,127 (90% of target), and achieved 61,971,862 kWh savings (88% of target), 10,083 kW peak demand savings (97% of target) and $63,733,260 in Total Resource Benefit (90% of target).

Implementation	Achievement
Introduced the **Home Energy-Saving Kits**, an online store pilot program.	Distributed a total of 4,953 energy saving kits over the six-week online store pilot. Utilized online marketing and social media campaign to drive participation.
Continued to **diversify measure portfolio away from CFLs**.	Rebated 527,905 LEDs in PY14, an increase of 183% from PY13. CFLs dropped to 1.3 million in PY14, down from 1.5 million in PY13.
Launched the ***Energy $mart for Homes*** **Multifamily Direct Install Program**.	Provided turnkey delivery and installation of in-unit energy-saving measures including high-efficiency lighting, high-efficiency showerheads, faucet aerators and advanced power strips to a total of 1,524 residential dwellings.
Continued the **Rid-A-Fridge program** in collaboration with the Hawaii Foodbank (Oahu), The Maui Food Bank and The Food Basket (Hawaii Island).	Participation more than doubled that of PY13, with a total of 864 units surrendered for recycling. A total of $7,035 in rebates was donated by customers to Hawaii's food banks.
Re-launched the **Solar Water Heating Tune-Up Program.**	The *Tune-Up* program far surpassed expectations with the rebating of 1,697 tune-ups within four months; more than doubling the number performed during the same timeframe in PY13.
Continued the **Solar Water Heating Grant program** with the Hawaii Community Economic Opportunity Council (HCEOC).	70 solar water heating systems were installed for "in-need" homes on Hawaii Island.
Launched the **Window Air Conditioner (AC) Trade-Up** program, which offers residents a $50 rebate for the purchase of a qualified window AC when surrendering an old working unit for pick-up and recycling.	282 rebates were issued for units purchased through 10 participating retailers in PY14, achieving savings of 92,284 kWh (first year) and 47 kW with $14,100 in incentives.
Continued **bi-monthly residential e-newsletter** highlighting the program, residential offers and rebates.	Grew subscriber list to roughly 10,800, up 16.7% since the end of PY13. Achieved open-rate average of 34.12%, which is above average rates by industry standards and indicate that the customers are engaged and interested in the content they receive.

Transformational Programs

Through the expertise and collaboration of Hawaii Energy and its subcontractors throughout PY14, the Transformational program met and exceeded its goals for behavior modification, professional development, and technical training for the Program Year.

Implementation	Achievements
"Sharing the Aloha" community workshops expanded to target housing communities where the tenants had to pay their own electricity bill for the first time.	• Achieved a 26% increase or 4,201 attendees • 900% increase in serving Public Housing Authority occupants
Social media and electronic communication – In previous years, Kanu Hawaii developed energy-saving "memes," (an image, video, phrase, etc.) that is spread via the Internet. This year focused on expanding delivery and reach of memes through social media.	• 34% increase social media activity or 936,846 views • 70% increase in engagement or 64,866 actions taken after viewing • The use of unique Hawaii words, terms and phrases is extremely effective in increasing views, likes, shares, and comments on Facebook
60 Day Energy Challenge - Piloted an offering with Kanu Hawaii to use energy-saving contests hosted by employers as a way to reduce household energy consumption.	• Five companies enrolled with a total of 365 participants • One company reported that the facility department gained internal support in implementing energy-saving projects due to the competition • Employers benefited in terms of morale and team-building
Professional Energy Efficiency Sales Trainings provided both in-person and online trainings to participants from all islands on how to more effectively get projects approved.	• 80 companies/organization viewed 500 online video trainings • 235 individuals participated in the trainings, representing 130 companies/organizations
The **Building Operator Certification (BOC) courses** had increasing success in improving the participation of the appropriate target audience from the non-degree holding workforce.	• 24% increase or 67 participants from the hospitality, entertainment industry, and hospital industries
Energy education in the schools built on previous years to include community Energy Expos in which parents, students, and the community were invited to learn about conservation and efficiency through student-led activities	• 332 teachers from all islands participated in educator workshops • Seven Energy Expos with an estimated 600 attendees including parents, teachers, students, and local community members organized by the schools staff and students
Provided non-monetary support and facilitation for the development of the **Facility Management Degree Program** at the University of Hawaii West Oahu (UHWO)	• Three years after the first planning meeting in PY12, the UHWO announced it will accept applications into the program in Fall 2015 • Co-sponsored two community outreach and fundraising events with the Hawaii Chapter of the International Facility Management Association (IFMA) to nearly 100 prominent Hawaii community and business leaders to gain their support for the program
The **Clean Energy Ally (CEA) program** was launched to support trade allies in the marketplace. All groups and individuals involved in the sale and installation of energy-related equipment are eligible. The CEA program trains allies in program offerings and processes, provides opportunities for professional energy efficiency sales training and offers events for cross-selling and networking.	• Certified 226 individual allies, representing 140 unique businesses • Created the online Clean Energy Ally vendor directory, which helps facilitate the customers' selection of energy efficiency solutions

Implementation	Achievement
Smart Grid Initiative – Enhanced implementation of the utility smart grid project with complementary tools through the Program. The first pilot project implemented an In-Home Display (IHD) and mobile app to allow customers to receive information available only from their smart meters.	• Launched the first collaborative Smart Grid Home Area Network (HAN) Pilot project with Hawaiian Electric Company (HECO) and Silver Spring Networks • Deployed 44 customer IHDs to monitor energy in near real-time with 25 of the users actively looking at the device on weekly basis • New features, more interaction and peer comparisons are needed to foster increased activity to reduce participant energy consumption • Analyzed the 15 min interval data from 4,000 residential customers and developed analytic algorithms to identify the customer load profile characteristics
Electric Vehicles – Piloted a daytime charging discount as a means to encourage the use of EV chargers at times when solar PV is at its mid-day peak. An additional offering for new EV owners included an EV energy-saving kit to offset a portion of their charging at home.	• 54 participants enrolled in EV Daytime Charging Pilot • 50 kits distributed to EV drivers with the assistance of local EV dealerships • Determined lower price was not as effective in changing behavior as anticipated • Identified need to offer method to transfer home PV credits to workplace charger
Demand Response (DR) – Piloted DR-enabled heat pumps in order to shift water heating loads to times when renewable energy is most plentiful.	• 10 households enrolled • Achieved an estimated 46% decrease in water heating energy usage • Conducted over 30 DR events per site • Able to shift an average of 19% load across 19 sites • Identified the need to improve setpoint control to maximize load shift
Benchmarking – Offered free benchmarking services to benefit building owners to help them understand their energy use intensity (EUI) as compared to others and discover opportunities to improve performance.	• Completed 428 benchmarks where 108 were analyzed in ENERGY STAR Portfolio Manager® and 320 were benchmarked using EUI • 9 buildings earned an ENERGY STAR® label • Specific segments targeted – AOAO, office, supermarket, banking • Used benchmarks to engage with customers
Water and Wastewater Initiative – Developed a Water/Wastewater Catalyst Fund to invigorate stalled energy projects that were stalled for lack of funding or other resources.	• Funding to County Water Agency for leak detection sensors. System discovered 235 gallon per minute leak that was repaired within a day of discovery. • Provided five sets of pump efficiency assessment kits to local water assistance groups and provided hands-on training sessions at pump stations

Bill $aver Program

Hawaii Energy provided the PUC with Bill $aver on-bill financing program development support focused on: Program Management, Contractor Management, IT Support, 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, and worked with the PUC and the potential investor on market analysis, estimated savings analyses, contracting terms, and supply chain and logistics issues.

Significant activities in PY14 included the following:

Program Management

- Provided market sizing by system size, island, and panel type based on Hawaii Energy's Solar Water Heater program data from the previous three program years in order to provide the PUC and the potential investor with realistic estimates for the deployment of the safe harbored 4x10 solar thermal panels. This data was critical for refining the underlying economics of the investment for the potential investor.
- Provided estimated savings analyses for potential customers in order to facilitate discussions and to drive recommendations for Bill $aver program refinement. This analysis resulted in in-depth discussions and weighing of the likely attractiveness of the program from a customer perspective, a key factor in driving overall program success, along with the ways to address the program's cost structure in order to better drive customer savings.
- Provided introductions of local distributors to the potential investor and assisted in their follow-on discussions on addressing logistics and supply chain issues, to include the challenges in deploying the potential investor's safe harbored solar thermal panels.

Contractor Management

- Gathered further industry feedback for the PUC through additional interactive sessions with solar water heater contractors and suppliers in order to indicate the levels of interest in the Bill $aver program offering based on program design and expected customer savings.
- Provided feedback on numerous revisions of the Master Services Agreement that would be required between the potential investor and the contractors, based on program experience.

IT Support

- Refined the Bill $aver informational website to provide customer-facing information on the program.
- Refined the Bill $aver contractor portal (both internal and with AFC First) through several rounds of testing, including online project submission, tracking and approval tools that allowed for efficient transfer of information between AFC First, Hawaii Energy and the participating contractor.

Marketing & Outreach

Refined the Bill $aver marketing brochure from the trifold design to a one-page flyer in order to provide a low cost printing option for marketing collateral to support customer education and engagement by both participating contractors and Hawaii Energy.

Achievements

- The Program invested a total of $36,029,967 (**Table 15**) to deliver 1,525,693,183 kWh (system-level, **Table 18**) over the measure lives resulting in a cost per kWh of $0.0236. The Program's CSE in PY14 was $0.0303/kWh, as calculated in **Table 1** below.
- Delivered $22,224,237 in incentives (**Table 17**) driving customer bill savings of $43,315,367 annually and over $435,893,642 over the life of the measures installed. See **Table 1a** for details of customer energy cost savings by island and rate tariff.
- A first year Program level savings of 116,583,217 kWh (**Table 17**).
- Diversified portfolio away from reliance on CFLs by 24%, while increasing LEDs by 71% (**Table 24**).

Table 1
Levelized Cost of Saved Energy

Lawrence Berkeley National Laboratory, March 2014 – CSE Report - http://emp.lbl.gov/sites/all/files/lbnl-6595e.pdf

$$Capital\ Recovery\ Factor = [A*(1+A)^{\wedge B}]/[(1+A)^{\wedge B}-1]$$

$$Levelized\ CSE = \frac{C\ x\ (Capital\ Recovery\ Factor)}{D}$$

			w/o Transformation	Total Program
Discount Rate	A		6%	6%
Estimated Program Savings Life	B		11.1	11.1
Total Program Budget Less Direct Install Programs	C*	$	32,354,987	$ 36,029,967
Annual kWh Saved at Customer Level	D		134,596,241	134,596,241
	A*(1+A)^B		0.114	0.114
	(1+A)^B-1	÷	0.907	0.907
	Capital Recovery Factor		0.126	0.126
	C	$	32,354,987	$ 36,029,967
	Capital Recovery Factor	x	0.126	0.126
	D	÷	134,596,241	134,596,241
	Levelized CSE	**$**	**0.0303 / kWh**	**$ 0.0338 / kWh**

Table 1a 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	$ 16,180,159	$ 1,421,905	$ 5,190,603	$ 5,936,264	$ 1,535,175	$ 56,532	$ 30,320,638	99,244,529	$ 0.30551
Hawaii Island	$ 4,634,051	$ 543,607	$ 764,194	$ 800,616	$ 0	$ 0	$ 6,742,467	17,501,912	$ 0.38524
Maui	$ 3,514,422	$ 220,733	$ 667,202	$ 1,795,440	$ 0	$ 0	$ 6,197,798	17,700,427	$ 0.35015
Molokai	$ 17,832	$ 13,885	$ 0	$ 0	$ 0	$ 0	$ 31,717	73,138	$ 0.43366
Lanai	$ 22,747	$ 0	$ 0	$ 0	$ 0	$ 0	$ 22,747	76,236	$ 0.29838
Total	$24,369,211	$2,200,130	$6,621,999	$8,532,320	$1,535,175	$56,532	$43,315,367	134,596,241	$0.32182
Customer Lifetime Energy Cost Savings									
Island	**R**	**G**	**J**	**P**	**DS**	**F**	**Total**	**kWh - Lifetime**	**Avg. Cost $/kWh***
Oahu	$ 129,891,400	$ 20,204,988	$ 56,836,486	$ 80,689,316	$ 22,066,079	$ 726,257	$ 310,414,526	1,034,555,912	$ 0.30005
Hawaii Island	$ 37,813,269	$ 7,692,286	$ 8,629,445	$ 10,295,512	$ 0	$ 0	$ 64,430,513	167,757,729	$ 0.38407
Maui	$ 28,101,027	$ 3,272,010	$ 8,502,113	$ 20,837,143	$ 0	$ 0	$ 60,712,293	174,146,566	$ 0.34863
Lanai	$ 56,235	$ 194,383	$ 0	$ 0	$ 0	$ 0	$ 250,618	694,161	$ 0.36104
Molokai	$ 85,692	$ 0	$ 0	$ 0	$ 0	$ 0	$ 85,692	428,407	$ 0.20002
Total	$195,947,623	$31,363,667	$73,968,044	$111,821,971	$22,066,079	$726,257	$435,893,642	1,377,582,777	$0.31642

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

Table 1b Program Year 2014 - Effective Average Utility Rate for Participants* ($/kWh)						
	R	**G**	**J**	**P**	**DS**	**F**
Oahu	$ 0.3300	$ 0.3400	$ 0.2800	$ 0.2800	$ 0.2600	$ 0.2900
Hawaii Island	$ 0.3900	$ 0.4800	$ 0.3800	$ 0.3300		
Maui	$ 0.3600	$ 0.4000	$ 0.3500	$ 0.3300		
Molokai	$ 0.4300					
Lanai	$ 0.4400	$ 0.5300				

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

Significant Event(s)

The Business program took a significant step to formalize its efforts in building a network of contractors, engineering firms, distributors and other market players that provide energy efficiency products and services to customers by creating the Clean Energy Ally program. By joining this program, these companies established a concrete relationship and affinity with the Hawaii Energy Program beginning with obligatory training about Hawaii Energy's mission, role and program. In addition to being listed on the Hawaii Energy website, these Clean Energy Allies will be offered "perks" beginning with training opportunities. Significant headway was made with the recruitment of 226 individuals representing 140 different companies. The program will continue to grow and nurture the CEA network as they are recognized as a force multiplier of the Hawaii Energy program itself.

In PY14, the Residential program hosted four 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 and gather feedback regarding current industry trends in solar water heating.

The Transformational program collaborated with the NEED Project to pilot seven Energy Expos. Energy Expos are student-led, teacher-hosted community events in which parents and community members learn about saving energy in the home. A total of seven Energy Expos with an estimated 600 attendees including parents, teachers, students and local community members were held in PY14.

Lessons Learned

The Business program piloted a contractor bonus opportunity within the Small Business Direct Install program. The bonus, specifically 15% of the contract value, grew project submissions and accelerated project completion rates. This was also effective in refocusing contractors had secured larger more profitable work in the marketplace. In Hawaii where labor constraints exist, this was an instrumental tool that benefitted the program.

The Business program also launched a midstream commercial lighting program. While it was a little slow to get started, as it is a relatively new concept for distributors and customers, it is now showing steady growth. The Program has also found that education of distributor sales staff is a key component to ensure quality participation through this channel.

The Residential program explored an online distribution channel for low-cost energy-saving kits. The program proved very effective at cost-effectively engaging over 3,400 customers in six weeks. The Program will continue to expand online programs and take advantage of social media advertising and web analytics to better target customers.

The Transformational program saw great promise in the smart meter pilot and its ability to provide valuable information to engage with customers. These efforts also demonstrated the Program's ability to integrate program design with load profile analysis and continue to assist the utility with furthering renewable integration.

Hawaii Energy places great value not only in our messaging on energy conservation and efficiency, but also in the way it is delivered. We have found that choosing the appropriate representative for each event, training or interaction helps utility customers better understand the message because they can relate to the person that is delivering it. Because of this, the Transformational program continues to collaborate with local and national non-profit organizations, recognized experts in the energy field, and leaders in the community to help deliver Program efficiency messages. We have also leveraged our work with students to make an impact on communities.

Program Objectives

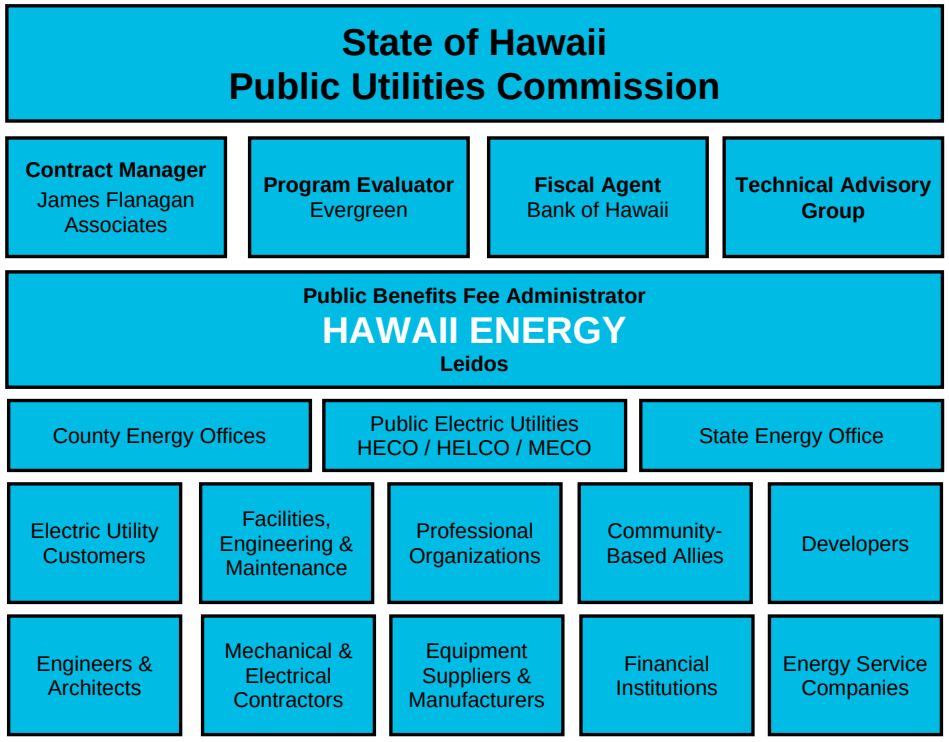
In addition to the PBFA Contract requirements and performance award goals, the Program's broader objectives for PY14 included:

- Reduce the State's demand for electricity, and by doing so, decrease the State's dependence on imported fuel.
- Explore new innovative strategies in energy conservation and efficiency.
- 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.
- 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 an on-going concern.

Oversight and Support

During PY14, Hawaii Energy collaborated with a wide range 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. The oversight and support organizations are shown in **Figure 1**.

Figure 1
Program Oversight and Support Organizations

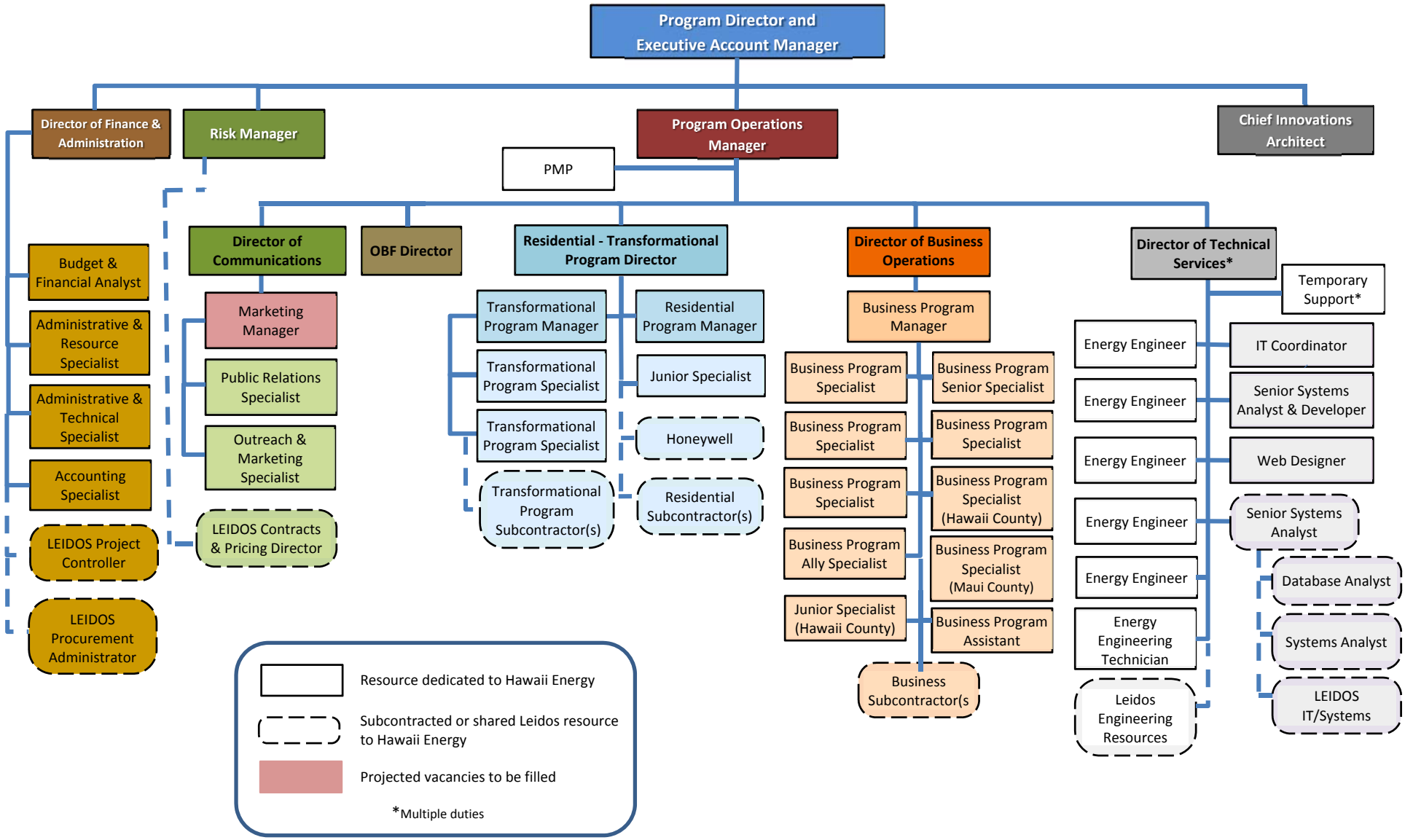


The foundation of the Program's organization is a core team of Leidos professionals in Honolulu, supported by off-site staff of uniquely skilled professionals throughout Leidos' organization nationwide. The Program also has a number of key subcontractors that together round out the Hawaii Energy team.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

- **Action Research** – Provided Community Based Social Marketing (CBSM) support to conduct effective campaigns encouraging energy-saving behavior changes.
- **Association of Energy Engineers (AEE)** – Provided technical training for Certified Energy Managers and Certified Energy Auditors.
- **Blue Planet Foundation** – Provided WEfficiency platform to support crowd-sourced energy efficiency projects.
- **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 "*Sharing the Aloha*" workshops 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, as well as 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 social media messaging, Pay-It-Forward advanced power strip distribution and 60-day Energy Challenge 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.

Program Organization

The Program's organization at the end of PY14 (including pending hires) is shown in the chart below:



PERFORMANCE INDICATORS AND 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 PY14 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)		101,112,173	134,816,230	148,297,852
Peak Demand Reduction (kW)		12,938	17,250	18,975
Utility Cost Avoidance (TRB)		$ 120,554,939	$ 160,739,919	$ 176,813,911
Market Transformation	Behavior Modification	12,600	18,000 Participants	
	Professional Development	750	1,000 Participants	
	Technical 'Know-How'	175	250 Participants	
	Hawaii Energy Ally Program	0 Allies	200 Allies	
	Benchmarking	200	500 Sites	
	Codes & Standards	2 items	3 Items	
	Demand Response	2 items	3 Items	
	Smart Grid	2 items	3 Items	
	Electric Vehicle	2 items	3 Items	
Indicator		**Minimum (80%)**	**Target ($)**	**PY14 % Contribution***
Island Equity	Honolulu County	$ 14,414,331	$ 18,017,914	73.3 %
	Hawaii County	$ 2,576,095	$ 3,220,118	13.1 %
	Maui County	$ 2,674,419	$ 3,343,024	13.6 %

*Based on Actual PY14 PBFA Contribution

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

Target: 134,816,230 kWh

Annual electric energy eavings 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 Annual Energy Savings Achievement of 116,583,217 kWh currently equates to 1,346,843 MMBTUs or avoided use of 220,140 BBLs of liquid fossil fuels in Hawaii; see **Table 3** and **Table 3a**.

Table 3
Estimation of Potential Fossil Fuel Avoidance

Potential Barrels (BBLs) of Fossil Fuels Avoided in PY14					
Annual Program Level Energy Savings Achievement			116,583,217	kWh/Yr.	
Average Program Attribution to System Level Impact	÷		78%		
System Level Gross Generation Energy Impact			149,034,270	kWh/Yr.	
Est. 2014 Electrical Generation Source Distribution					
Renewable Energy Generated (2014 RPS Report)			1,398,561,000	kWh/Yr.	
Less avg. 4.7% T&D Losses (HEI 10K 2014)	x		95.3%		
Est. of Renewable Energy Sold			1,332,828,633	kWh/Yr.	14.8%
Est. Fossil-Fueled Energy Sold	+		7,643,413,367	kWh/Yr.	85.2%
Total Energy Sold			8,976,242,000	kWh/Yr.	
Customer-Sited - Grid Connected Renewable DG			514,999,000	kWh/Yr.	5.7%
System Level Gross Generation Energy Impact			149,034,270	kWh/Yr.	
% System Average Fossil-Fuel Generation	x		85.2%		
Reduction Target Impact in Fossil Fuel-Generation			126,905,060	kWh	
Energy Avoided into Generators					
Fossil-Fuel Energy Generated			126,905,060		
Avg. System Generating Heat Rate	x		10,613	BTU/kWh	
Energy Required for Fossil-Fueled Electricity Production			1,346,843,403,996	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			1,346,843,403,996	BTU/Yr.	
Average System BTU/BBL	÷		6,118,110	BTU/BBL	
Number of Barrels of Fossil-Fuel Avoided			220,140	BBLs/Yr.	
Number of Barrels of Fossil-Fuel Avoided			220,140	BBLs/Yr.	
2014 Avg Cost per BBL for Fossil Fuels used for electricity	x	$	126	per BBL*	
Potential Fossil Fuel Cost Savings to State		$	27,779,522	per year	

*Price dropped to $65/BBL in March 2015. DBEDT Monthly Energy Trends:
http://files.hawaii.gov/dbedt/economic/data_reports/energy-trends/Monthly_Energy_Data.xlsx

Environmental Program Benefits

Reducing energy consumption has significant environmental benefits. In the past year, the energy saving efforts of all the participants have resulted in lowering Hawaii's environmental footprint as demonstrated in **Table 3a**.

The reduction of emissions was equivalent to removing over 21,000 passenger vehicles from the roads.

The fossil fuel reduction was the equivalent of the generating output of nearly 347,000 PV solar panels.

Table 3a
PY14 - Potential Green House Gas Equivalencies Avoided

System Level Gross Generation Energy Impact	149,034,270	kWh/Yr.
Green House Gas Reduction (www.epa.gov/egrid)**		
Energy in kWh	**149,034,270**	kWh/year
Energy in MWh	149,034	MWh/year
CO2 - Carbon Dioxide	129,773	Tons per Year
CH4 - Methane	8	Tons per Year
N2O - Nitrous Oxide	2	Tons per Year
Green House Gas Equivalencies* **		
Less Passenger Vehicles	21,635	
Less miles/year driven (avg. passenger vehicle)	244,682,690	
Wind turbines installed	28	
Acres of US forest sequestering carbon in one year	84,235	
Fossil Fuel Reduction Comparison to PV and Solar Water Heating		
Rooftop PV Panels (300W) to offset same energy usage	346,851	
Solar Water Heating Systems to offset same energy usage	72,172	

** 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 #2: Peak Demand Savings

Target: 17,250 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 2**. 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 17,250 kW is equivalent to the average peak power consumption of 17,250 homes at 1 kW each, shown in **Figure 3.**

Figure 2
Average Daily Seasonal Demand (Load) Profile + Rooftop PV Generation

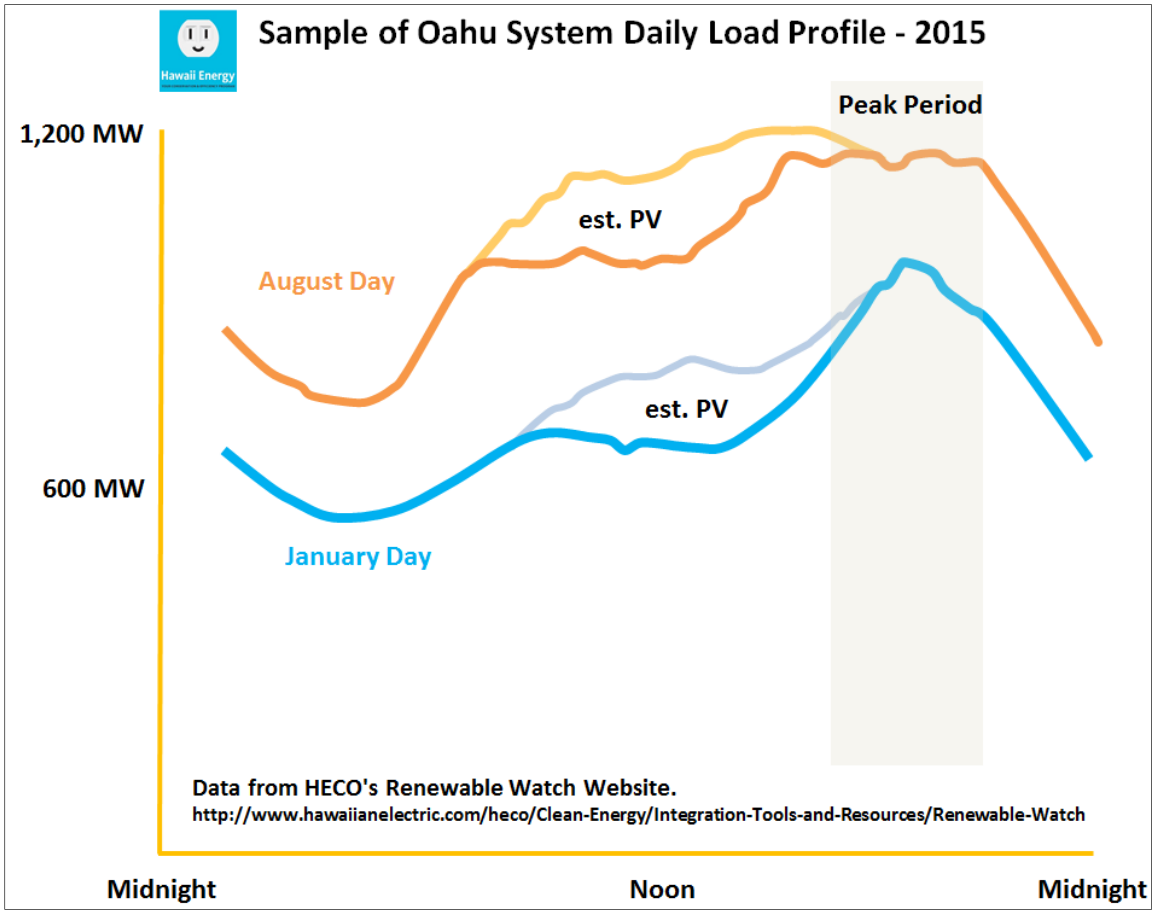
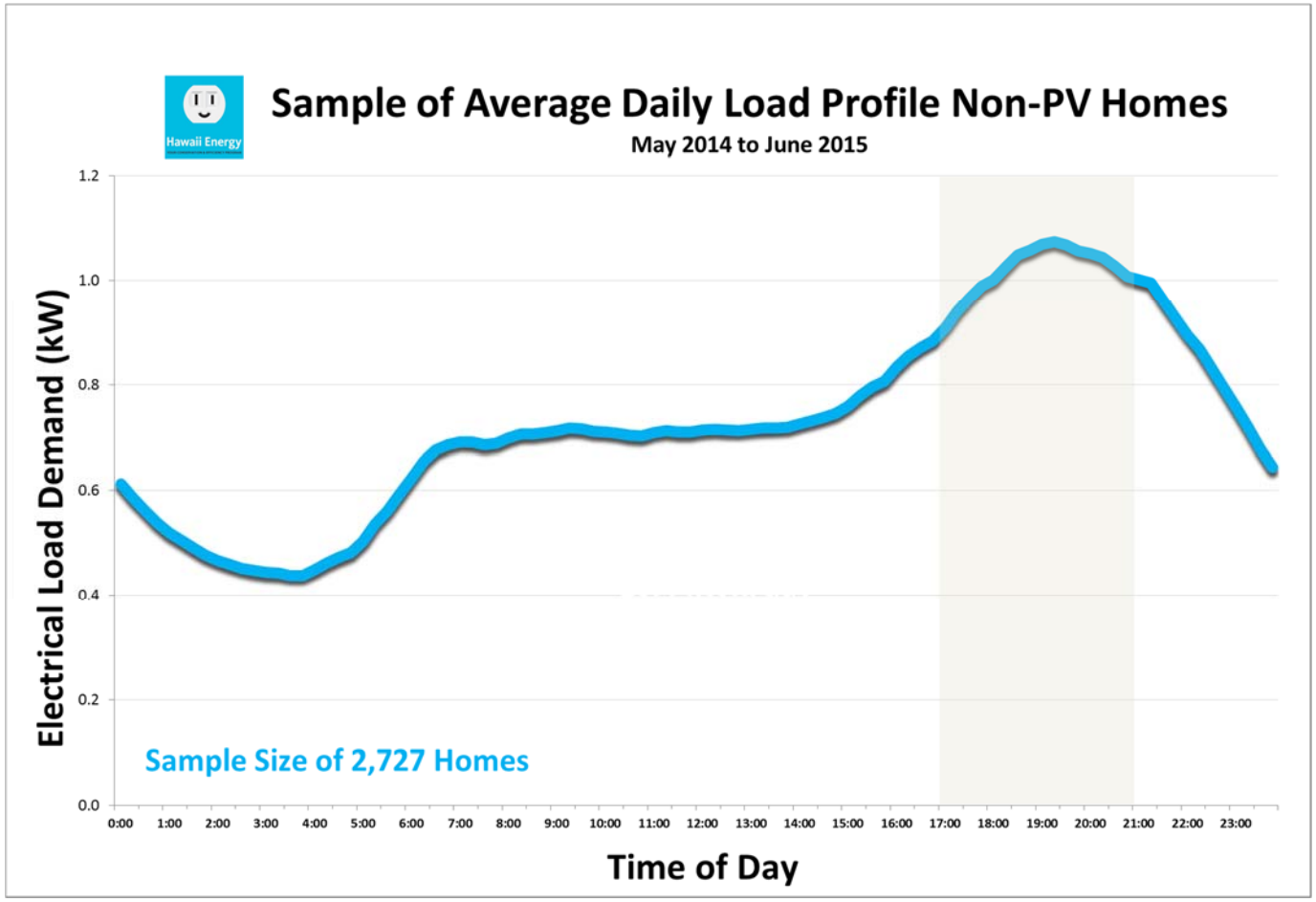


Figure 3
Average Home Daily Demand (Load) Profile



Performance Indicator #3: Total Resource Benefit (TRB)

Target: $160,739,919

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 2014 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 an eight-year life, achieving the program demand and energy 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								kW Target	kWh Target		Project Cost
	8	Discount Rate							25.0	25,000		$ 45,000
		6%	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
2014	1	1.00	$ 353	$ 0.104	$ 353	$ 0.1037	$ 353	$ 0.1037	$ 8,830	$ 2,592	$ 11,422	0.25
2015	2	0.94	$ 371	$ 0.109	$ 350	$ 0.1027	$ 703	$ 0.2064	$ 17,570	$ 5,160	$ 22,730	0.51
2016	3	0.89	$ 383	$ 0.112	$ 340	$ 0.1000	$ 1,043	$ 0.3064	$ 26,081	$ 7,660	$ 33,741	0.75
2017	4	0.84	$ 386	$ 0.113	$ 324	$ 0.0953	$ 1,368	$ 0.4016	$ 34,188	$ 10,041	$ 44,229	0.98
2018	5	0.79	$ 388	$ 0.114	$ 307	$ 0.0902	$ 1,675	$ 0.4919	$ 41,866	$ 12,297	$ 54,162	1.20
2019	6	0.75	$ 389	$ 0.114	$ 291	$ 0.0854	$ 1,965	$ 0.5773	$ 49,135	$ 14,432	$ 63,567	1.41
2020	7	0.70	$ 392	$ 0.115	$ 276	$ 0.0812	$ 2,242	$ 0.6584	$ 56,042	$ 16,461	$ 72,503	1.61
2021	8	0.67	$ 391	$ 0.115	$ 260	$ 0.0763	$ 2,502	$ 0.7348	$ 62,538	$ 18,369	$ 80,907	1.80
2022	9	0.63	$ 395	$ 0.116	$ 248	$ 0.0727	$ 2,749	$ 0.8075	$ 68,728	$ 20,187	$ 88,915	1.98

Performance #4: Market Transformation

Targets:

Transformational Programs

Behavior Modification	18,000 Participants
Professional Development	1,000 Participants
Technical Training	250 Participants
Hawaii Energy Ally Program	200 Allies

Pilot Projects

Benchmarking	500 Sites
Codes & Standards	3 Items
Demand Response	3 Items
Smart Grid	3 Items
Electric Vehicle	3 Items

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 PY14.

Figure 4
Summary of Transformational Programs

Behavior Modification	3rd Annual Hawaii Sustainability in Higher Education Summit
	Energy Efficiency Literacy at Scale – 60 Day Energy Challenge
	Energy Efficiency Literacy at Scale – Adoption of Energy-Saving Products
	Energy Efficiency Literacy at Scale – Social Media Messaging
	Green Office Program
	K-12 Community Energy Fairs
	Kapiolani Community College, Disruptive Sustainability Workshop
	Sharing the Aloha, Energy Literacy Community Workshops
Professional Development	Basic Energy Workshops for K-12 Educators
	Building Science Workshops for K-12 Educators
	Development of a Facility Management 4 year Degree Program
	Financial Analysis of Energy Efficiency Projects Workshops
	K-12 Teacher Advisory Board
	Learning to S.E.E. (Sell Efficiency Effectively) Workshops
	Making Efficiency Work in AOAO Settings Workshops
	Ninja (Energy Sales Professional) Networking Event
	Reframing Energy Efficiency as a High-Yield, Low-Risk Investment Workshops
	Saving Energy, Money & Maintenance Fees Workshop
	Selling Efficiency Effectively in the AOAO Market Workshops
	UC Site Visit and Training for UH Campuses
Technical Knowledge & Training	Air Handling Systems, Efficiency & Air Quality Workshop
	Beyond the Sticker Price: Life Cycle Costing Workshop for Restaurants
	Building Efficiency & Technology Update Workshop
	Building Operator Certification (BOC©) Workshops
	Certified Energy Manager (CEM), Energy Manager in Training (EMIT) Workshop
	Chillers and Cooling Towers Workshop
	Energy Efficiency Survey Workshop
	How to Manage your Business' Energy Costs Workshop
	Implementing Energy Efficiency Projects, Demand Response Workshop
	Motor Efficiency, VSD and Purchase Workshop
	Power Quality Workshop
	Surveying Your Kitchen: Boost Your Profits Through Energy Efficiency Workshops
	Unitary Air Conditioning & Efficiency Workshop
	Unitary Air Conditioning and Operations & Maintenance Workshop
	Water and Wastewater Training Workshop

Performance #5: Island Equity (Broad Participation)

Target: 80% of each County's contribution to the Public Benefits Fee

The Island Equity target is intended to promote the equitable participation in the Program among the counties. For PY14, "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, trainings and other Program initiatives.

Table 5 lists the results of the PY14 contributions to the PBF by island and county.

Table 5
Contributions to PBF by Island

Island	Residential Program Investment	Business Program Investment	PBFA Investment	Target %
Hawaii Island	$ 3,138,162	$ 2,115,594	$ 5,253,756	13.1 %
Lanai	$ 63,361	$ 59,850	$ 123,211	0.3 %
Maui	$ 2,949,817	$ 2,239,689	$ 5,189,506	12.9 %
Molokai	$ 80,071	$ 60,038	$ 140,109	0.3 %
Oahu	$ 13,209,812	$ 16,210,070	$ 29,419,882	73.3 %
Totals	**$19,441,223**	**$ 20,685,241**	**$ 40,126,464**	**100.0%**
County	**Residential Program Investment**	**Business Program Investment**	**PBFA Investment**	**Target %**
Hawaii	$ 3,138,162	$ 2,115,594	$ 5,253,756	13.1 %
Maui	$ 3,093,249	$ 2,359,577	$ 5,452,826	13.6 %
Honolulu	$ 13,209,812	$ 16,210,070	$ 29,419,882	73.3 %
Totals	**$ 19,441,223**	**$ 20,685,241**	**$ 40,126,464**	**100.0%**

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 PY14, 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 PY14 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	123.75% $303,188	35%	$245,000
Peak Demand Reduction	75% $26,250	100% $35,000	123.75% $43,313	5%	$35,000
TRB NPV of Utility Cost Avoidance	75% $210,000	100% $280,000	123.75% $346,500	40%	$280,000
Market Transformation	$48,750	100% $70,000	100% $70,000	10%	$70,000
Broad Participation "Island Equity"	-	100% $70,000	100% $70,000	10%	$70,000
If all indicator metrics meet this level:	**Minimum**	**Target**	**Maximum**		
Performance Award Potential is:	468,750	700,000	833,000		

Performance Award Claim Summary

The Program's Performance Award Claim for PY14, is $640,142.07 (including tax) or 91% 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)	134,816,230	116,583,217	86.48%	$211,865.35
Peak Demand Reduction (kW)	17,250	18,497	107.23%	$41,009.09
TRB NPV of Utility Cost Avoidance ($)	$ 160,739,919	$144,819,560	90.10%	$252,267.62
Market Transformation				
Behavior Modification	18,000 Participants	71,176	395.4%	$ 15,000.00
Professional Development	1,000 Participants	1,772	177.2%	$ 15,000.00
Technical 'Know-How'	250 Participants	584	233.6%	$ 15,000.00
Hawaii Energy Ally Program	200 Allies	226	113.0%	$ 5,000.00
Benchmarking	500 Sites	428	85.6%	$ 15,000.00
Codes & Standards	3 Items	2	Min	
Demand Response	3 Items	3	Min	
Smart Grid	3 Items	2	Min	
Electric Vehicle	3 Items	3	Min	
Island Equity			**Target Met?**	
Honolulu County	> 80%	92.9%	Yes	$ 70,000.00
Hawaii County	> 80%	133.7%	Yes	
Maui County	> 80%	106.1%	Yes	
Performance Award Claim				**$640,142.07**

Cumulative Annual Electric Energy Savings (Program-Level) Award Claim: $211,865.35

The Program Energy Reduction was 116,583,217 kWh, which was 86% of the target of 134,816,230 kWh in the award claim of $211,865.35. This award is calculated from $183,750 for meeting the minimum level and $28,115.35 for the remaining savings of 15,471,045 kWh awarded at a rate of $0.001817/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%	123.75%			
Energy Reduction Goals (kWh)	101,112,173		134,816,230	148,297,853			
	75%		100%	110%			
Incentive Calculation	**Meet Minimum**		**Target – Minimum**	**Maximum – Target**		**Total**	
Pool Award Potential	$183,750.00		$61,250.00	$58,188.00		$303,188.00	Max
Energy Goal Pools (kWh)	101,112,173	÷	33,704,058	13,481,623	/kWh	148,297,853	kWh
Award Amount / Rate ($/kWh)	$183,750.00		0.001817	0.004316			
Energy Achievement (kWh)	101,112,173		15,471,045	-		116,583,217	kWh
Award Amount / Rate ($/kWh)	$183,750.00	x	0.001817	0.004316	/MWh		
Energy Achievement Award Calculation	$183,750.00		$28,115.35	-		$211,865.35	Calculated
						$211,865.35	**Award Claim**

Peak Demand Savings Award Claim: $41,009.09

The Combined Peak Demand Reduction was 18,497 kW, which was 107% of the target savings level resulting in an award claim of $41,009.09. This award is calculated from $26,250 for meeting the minimum level, $8,750 for meeting the target, and $6,009.09 for the remaining savings of 1,247 kW. Levels are awarded at a rate of $2.03/kW achieved for the first two levels, and $4.82/kW for demand reduction beyond the target.

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

Table 9
Demand Reduction Award Claim Summary

Combined Annual Electric Demand Savings	**Minimum**	**Target**	**Maximum**
Demand Reduction Award Potential	$ 26,250.00	$ 35,000.00	$ 43,312.50
	75%	100%	123.75%
Demand Reduction Goals (kW)	12,938	17,250	18,975
	75%	100%	110%

Incentive Calculation	**Meet Minimum**		**Target – Minimum**	**Maximum – Target**		**Total**	
Pool Award Potential	$ 26,250.00		$ 8,750.00	$ 8,312.50		$ 43,312.50	Max
Demand Goal Pools (kW)	12,938	÷	4,313	1,725		18,975	kW
Award Amount / Rate ($/kW)	$2.029		$ 2.029	$ 4.819	/kW		
Demand Savings Achievement (kW)	12,938		4,313	1,247		18,497	kW
Award Amount / Rate ($/kW)	$2.029	x	$ 2.029	$ 4.819	/kW		
Demand Savings Achievement Award Calculation	$ 26,250.00		$ 8,750	$ 6,009.09		$ 41,009.09	Calculated
						$ 41,009.09	**Award Claim**

Total Resource Benefit (TRB) Award Claim: $252,267.62

The TRB achievement of $144,819,560 NPV is 90.1% of the target amount between the minimum and target level. This award claim of $252,267.62 is calculated from $210,000 for meeting the minimum level and $42,267.62 for the remaining 15.096% 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 Goal Pools in Metrics	75%	100%	123.75%			
TRB Goals	$ 120,554,939	$ 160,739,919	$ 176,813,911		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%	23.75%		123.75%	
Award Amount / Rate ($/%)	$ 2,800	$ 2,800	$ 2,800	/%		
TRB Achievement					$ 144,819,560.00	
TRB Goals					$ 160,739,919	
TRB Savings Achievement	75%	15.1%	-		90.10%	
Award Amount / Rate ($/%)	$ 2,800	$ 2,800	$ 2,800	/%		
TRB Energy Achievement Award Calculation	$ 210,000	$ 42,267.62	-		$ 252,267.62	Calculated
					$252,267.62	**Award Claim**

Market Transformation Award Claim: $65,000.00

The Market Transformation claim of $65,000.00 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	Achievement	Award Level	Award Claim
Behavior Modification	12,600 Participants	$ 11,250	18,000 Participants	$ 15,000	71,176 Participants	Target	$ 15,000
Professional Development	700 Participants	$ 11,250	1,000 Participants	$ 15,000	1,828 Participants	Target	$ 15,000
Technical 'Know-How'	175 Participants	$ 11,250	250 Participants	$ 15,000	584 Participants	Target	$ 15,000
Hawaii Energy Ally Program	-	-	200 Allies	$ 5,000	226 Allies	Target	$ 5,000
Benchmarking	200 Sites		500 Sites		428 Sites	Minimum	
Codes & Standards	2 Items		3 Items		2 Items	Minimum	
Demand Response	2 Items	$ 15,000	3 Items	$ 20,000	4 Items	Target	$ 15,000
Smart Grid	2 Items		3 Items		3 Items	Target	
Electric Vehicle	2 Items		3 Items		4 Items	Target	
Total							**$ 65,000**

Island Equity (Broad Participation) Award Claim: $70,000.00

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	PY14 PBF Contribution	PBF Contribution %	Target	PY14 Total Incentives	% Accomplished	% of Target	Met Minimum	Award Claim
Honolulu	$ 29,419,882	73.3%	>80%	$ 15,130,505	68.1%	93%	Yes	
Hawaii	$ 5,253,756	13.1%	>80%	$ 3,890,204	17.5%	134%	Yes	
Maui	$ 5,452,826	13.6%	>80%	$ 3,203,528	14.4%	106%	Yes	
Total	**$ 40,126,464**	**100.0%**		**$ 22,224,237**	**100.0%**		**Yes**	**$ 70,000**
								$ 70,000

Table 12a
Incentives and Transformational Spent vs. Budget $

County	Program Incentives	Transformational Incentives	Total Incentives Budgeted	Total Accomplished	% of Budget
Honolulu	$15,228,916	$2,036,942	$20,864,420	$ 17,265,858	82.8%
Hawaii	$3,832,366	$799,787	$3,728,839	$ 4,632,153	124.2%
Maui	$3,162,955	$838,251	$3,871,161	$ 4,001,207	103.4%
Total	**$22,224,237**	**$3,674,980**	**$28,464,420**	**$25,899,218**	**91.0%**

BUDGET PROGRESSION & EXPENDITURES

PY14 Annual Plan Budget

Pursuant to the Program's approved PY14 Annual Plan dated June 10, 2015, the Program's initial budget for the program year was $39.5M, comprised of $24.5M in Incentives, $11.1M in Non-Incentives, and $3.9M 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
PY14 Annual Plan Budget

Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	$2,225,000	$8,712,683	$10,937,683
CESH	$230,000	$977,542	$1,207,542
RESM	$100,000	$310,000	$410,000
RHTR	$300,000	$1,061,250	$1,361,250
Total Residential Programs	**$2,855,000**	**$11,061,475**	**$13,916,475**
Residential Market Evaluation	$219,561	0	$219,561
Residential Outreach	$600,000	0	$600,000
Total Residential Services and Initiatives	**$3,674,561**	**$11,061,475**	**$14,736,036**
Business Programs			
BEEM	$1,100,000	$4,809,550	$5,909,550
CBEEM	$1,100,000	$3,025,011	$4,125,011
BESM	$675,000	$2,437,500	$3,112,500
BHTR	$666,130	$3,247,520	$3,913,650
Total Business Programs	**$3,541,130**	**$13,519,581**	**$17,060,711**
Business Market Evaluation	$250,000	0	$250,000
Business Outreach	$700,000	0	$700,000
Total Business Services and Initiatives	**$4,491,130**	**$13,519,581**	**$18,010,711**
Total Residential and Business Services and Initiatives	**$8,165,691**	**$24,581,056**	**$32,746,747**
Transformational Programs			
Residential Transformational Programs	0	$1,747,514	$1,747,514
Business Transformational Programs	0	$2,135,850	$2,135,850
Total Transformation Services and Initiatives	**0**	**$3,883,364**	**$3,883,364**
Total Supporting Services	**$2,405,683**	**0**	**$2,405,683**
Total Tax on Non-Incentive	**$498,123**	**0**	**$498,123**
Estimated Contractor Costs	**$11,069,497**	**$28,464,420**	**$39,533,917**

Budget Transfers

In PY14 the program was given discretion to transfer funds within certain areas without a formal contractual request, consistent with guidance provided in PY13. Funds were allowed to be moved within each of the Operations and Management areas (Residential and Business) and within each of the Incentive areas (Residential and Business). During the course of PY14, there were four internal budget transfers to meet changing operational needs. Specifics of the internal transfers are detailed in **Table 14** and described below.

Internal Budget Transfers

The transfers were as follows:

- **March 2015** – Transferred Business Incentive funds as follows: FROM BEEM ($650,000), BESM ($1,330,000), and BHTR ($857,250); TO CBEEM ($2,837,250).
- **May 2015** - Transferred Residential Operations and Management funds as follows: FROM CESH ($175,000), RESM ($45,000), and Residential Evaluation ($40,000); TO REEM ($85,000), RHTR ($100,000), and Residential Outreach ($75,000). Transferred Business Operations and Management funds as follows: FROM - BESM ($150,000) and BHTR ($50,000); TO BEEM ($60,000), CBEEM ($120,000), and Business Outreach ($20,000).
- **May 2015** - Transferred Residential Incentive funds as follows: FROM CESH ($700,000); TO REEM ($600,000) and RESM ($100,000).
- **August 2015** – Transferred Residential Operations and Management funds as follows: FROM CESH ($2,000), RESM ($6,000), and Residential Evaluation ($16,000); TO REEM ($16,000) and RHTR ($8,000).

Table 14 Budget Progression 7/1/14-6/30/15								
	PY14 Annual Plan Budget	Bus Inc Transfer (3/2015)	PY14 Budget as of 3/2015	Incentive Transfers (5/2015)	O&M Transfers (5/2015)	PY14 Budget as of 5/2015	O&M Transfers (8/2015)	PY14 Budget as of 8/2015
Residential Programs								
Operations & Management								
REEM	2,225,000		2,225,000		85,000	2,310,000	16,000	2,326,000
CESH	230,000		230,000		(175,000)	55,000	(2,000)	53,000
RESM	100,000		100,000		(45,000)	55,000	(6,000)	49,000
RHTR	300,000		300,000		100,000	400,000	8,000	408,000
Total Residential Programs	2,855,000		2,855,000		(35,000)	2,820,000	16,000	(19,000)
Residential Market Evaluation	219,561		219,561		(40,000)	179,561	(16,000)	163,561
Residential Outreach	600,000		600,000		75,000	675,000	-	675,000
Total Residential Ops & Management	3,674,561		3,674,561		-	3,674,561	-	3,674,561
Residential Incentives								
REEM	8,712,683		8,712,683	600,000		9,312,683		9,312,683
CESH	977,542		977,542	(700,000)		277,542		277,542
RESM	310,000		310,000	100,000		410,000		410,000
RHTR	1,061,250		1,061,250			1,061,250		1,061,250
Subtotal Residential Incentives	11,061,475		11,061,475			11,061,475		11,061,475
Residential Transformational	1,747,514		1,747,514			1,747,514		1,747,514
Total Residential Incentives	12,808,989		12,808,989			12,808,989		12,808,989
Total Residential Programs	**16,483,550**		**16,483,550**			**16,483,550**		**16,483,550**
Business (C&I) Programs								
Operations & Management								
BEEM	1,100,000		1,100,000		60,000	1,160,000		1,160,000
CBEEM	1,100,000		1,100,000		120,000	1,220,000		1,220,000
BESM	675,000		675,000		(150,000)	525,000		525,000
BHTR	666,130		666,130		(50,000)	616,130		616,130
Total Business Programs	3,541,130		3,541,130		(20,000)	3,521,130		3,521,130
Business Market Evaluation	250,000		250,000			250,000		250,000
Business Outreach	700,000		700,000		20,000	720,000		720,000
Total Business Ops & Management	4,491,130		4,491,130		-	4,491,130		4,491,130
Business Incentives			-					-
BEEM	4,809,550	(650,000)	4,159,550			4,159,550		4,159,550
CBEEM	3,025,011	2,837,250	5,862,261			5,862,261		5,862,261
BESM	2,437,500	(1,330,000)	1,107,500			1,107,500		1,107,500
BHTR	3,247,520	(857,250)	2,390,270			2,390,270		2,390,270
Subtotal Business Incentives	13,519,581	-	13,519,581			13,519,581		13,519,581
Business Transformational	2,135,850		2,135,850			2,135,850		2,135,850
Total Business Incentives	15,655,431		15,655,431			15,655,431		15,655,431
Total Business Programs	**20,146,561**		**20,146,561**			**20,146,561**		**20,146,561**

Table 14 (con't) Budget Progression 7/1/14-6/30/15								
	PY14 Annual Plan Budget	Bus Inc Transfer (3/2015)	PY14 Budget as of 3/2015	Incentive Transfers (5/2015)	O&M Transfers (5/2015)	PY14 Budget as of 5/2015	O&M Transfers (8/2015)	PY14 Budget as of 8/2015
Supporting Services								
Supporting Services	2,405,683		2,405,683			2,405,683		2,405,683
Total Supporting Services	**2,405,683**		**2,405,683**			**2,405,683**		**2,405,683**
Subtotal Non-Incentive (Prior to Tax)	10,571,374		10,571,374			10,571,374		10,571,374
Less Performance Incentives (Prior to Tax)	(668,500)		(668,500)			(668,500)		(668,500)
Subtotal Non-Incentive Less Performance Incentives (PI)	9,902,874		9,902,874			9,902,874		9,902,874
Total Tax on Non-Incentive Without PI	466,623		466,623			466,623		466,623
Performance Incentive Award (Inclusive of Tax)	700,000		700,000			700,000		700,000
Subtotal Non-Incentives	***11,069,497***		***11,069,497***			***11,069,497***		***11,069,497***
Subtotal Residential and Business Customer Incentives	***24,581,056***		***24,581,056***			***24,581,056***		***24,581,056***
Subtotal Transformational Incentives	***3,883,364***		***3,883,364***			***3,883,364***		***3,883,364***
Sub-Total Estimated Contractor Costs	***39,533,917***		***39,533,917***			***39,533,917***		***39,533,917***
Performance Awards in Excess of Target Levels	133,000		133,000			133,000		133,000
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels	**39,666,917**		**-** **39,666,917**			**39,666,917**		**39,666,917**

Portfolio Expenditures

Throughout the year, the Program reviewed operational needs and leveraged funding to drive program value. At year-end, the Program had utilized 90% of budgeted Incentives, 98% of budgeted Non-Incentives (prior to holdback amounts), and 95% of budgeted Transformational Incentives. Details of final PY14 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	PY14 Budget	Percent Spent	Unspent	Percent Unspent
Residential Programs					
Operations and Management					
REEM	$ 2,325,000.47	$ 2,326,000.00	99.96%	$ 999.53	0.04%
CESH	$ 52,086.66	$ 53,000.00	98.28%	$ 913.34	1.72%
RESM	$ 48,953.55	$ 49,000.00	99.91%	$ 46.45	0.09%
RHTR	$ 407,446.45	$ 408,000.00	99.86%	$ 553.55	0.14%
Total Residential Programs	$ 2,833,487.13	$ 2,836,000.00	99.91%	$ 2,512.87	0.09%
Residential Evaluation	$ 160,747.08	$ 163,561.00	98.28%	$ 2,813.92	1.72%
Residential Outreach	$ 670,442.17	$ 675,000.00	99.32%	$ 4,557.83	0.68%
Total Residential Non-Incentives	$ 3,664,676.38	$ 3,674,561.00	99.73%	$ 9,884.62	0.27%
Residential Incentives					
REEM	$ 9,011,160.99	$ 9,312,683.00	96.76%	$ 301,522.01	3.24%
CESH	$ 1,319.08	$ 277,542.00	0.48%	$ 276,222.92	99.52%
RESM	$ 301,350.00	$ 410,000.00	73.50%	$ 108,650.00	26.50%
RHTR	$ 664,296.93	$ 1,061,250.00	62.60%	$ 396,953.07	37.40%
Subtotal Residential Incentives	$ 9,978,127.00	$ 11,061,475.00	90.21%	$ 1,083,348.00	9.79%
Residential Transformational	$ 1,684,719.01	$ 1,747,514.00	96.41%	$ 62,794.99	3.59%
Total Residential Incentives	$ 11,662,846.01	$ 12,808,989.00	91.05%	$ 1,146,142.99	8.95%
Total Residential Programs	**$ 15,327,522.39**	**$ 16,483,550.00**	**92.99%**	**$ 1,156,027.61**	**7.01%**
Business (C&I) Programs					
Operations and Management					
BEEM	$ 1,145,534.76	$ 1,160,000.00	98.75%	$ 14,465.24	1.25%
CBEEM	$ 1,183,445.15	$ 1,220,000.00	97.00%	$ 36,554.85	3.00%
BESM	$ 498,397.56	$ 525,000.00	94.93%	$ 26,602.44	5.07%
BHTR	$ 610,986.36	$ 616,130.00	99.17%	$ 5,143.64	0.83%
Total Business Programs	$ 3,438,363.83	$ 3,521,130.00	97.65%	$ 82,766.17	2.35%
Business Evaluation	$ 210,430.20	$ 250,000.00	84.17%	$ 39,569.80	15.83%
Business Outreach	$ 678,511.44	$ 720,000.00	94.24%	$ 41,488.56	5.76%
Total Business Non-Incentives	$ 4,327,305.47	$ 4,491,130.00	96.35%	$ 163,824.53	3.65%

Table 15 Program Expenditures and Unspent Funds (cont'd)					
	Total Expenditures	**PY14 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
Business Incentives					
BEEM	$ 3,586,527.04	$ 4,159,550.00	86.22%	$ 573,022.96	13.78%
CBEEM	$ 5,557,198.04	$ 5,862,261.00	94.80%	$ 305,062.96	5.20%
BESM	$ 886,665.49	$ 1,107,500.00	80.06%	$ 220,834.51	19.94%
BHTR	$ 2,215,719.66	$ 2,390,270.00	92.70%	$ 174,550.34	7.30%
Subtotal Business Incentives	$ 12,246,110.23	$ 13,519,581.00	90.58%	$ 1,273,470.77	9.42%
Business Transformational	$ 1,990,261.28	$ 2,135,850.00	93.18%	$ 145,588.72	6.82%
Total Business Incentives	$ 14,236,371.51	$ 15,655,431.00	90.94%	$ 1,419,059.49	9.06%
Total Business Programs	**$ 18,563,676.98**	**$ 20,146,561.00**	**92.14%**	**$ 1,582,884.02**	**7.86%**
Total Services and Initiatives	**$ 33,891,199.37**	**$ 36,630,111.00**	**92.52%**	**$ 2,738,911.63**	**7.48%**
Supporting Services					
Supporting Services	$ 2,351,388.19	$ 2,405,683.00	97.74%	$ 54,294.81	2.26%
Total Supporting Services	**$ 2,351,388.19**	**$ 2,405,683.00**	**97.74%**	**$ 54,294.81**	**2.26%**
Subtotal Non-Incentives (Prior to Tax)	$ 10,343,370.04	$ 10,571,374.00	97.84%	$ 228,003.96	2.16%
Less Performance Incentives (Prior to Tax)	$ (668,500.32)	$ (668,500.00)	100.00%	$ 0.32	0.00%
Subtotal Non-Incentive Less Performance Incentives (PI)	$ 9,674,869.72	$ 9,902,874.00	97.70%	$ 228,004.28	2.30%
Total Tax on Non-Incentive Without PI	$ 455,879.86	$ 466,623.00	97.70%	$ 10,743.14	2.30%
Performance Incentive Award (Inclusive of Tax)	$ -	$ 700,000.00	0.00%	$ 700,000.00	100.00%
Subtotal Non-Incentives Billed	*$ 10,130,749.58*	*$ 11,069,497.00*	91.52%	$ 938,747.42	8.48%
Subtotal Residential and Business Customer Incentives	*$ 22,224,237.23*	*$ 24,581,056.00*	90.41%	$ 2,356,818.77	9.59%
Subtotal Transformational Incentives	*$ 3,674,980.29*	*$ 3,883,364.00*	94.63%	$ 208,383.71	5.37%
Subtotal Customer and Transformational incentives	*$ 25,899,217.52*	*$ 28,464,420.00*	90.99%	$ 2,565,202.48	9.01%
Sub-Total Estimated Contractor Costs	***$ 36,029,967.10***	***$ 39,533,917.00***	**91.14%**	**$ 3,503,949.90**	**8.86%**
Performance Awards in Excess of Target Levels		$ 133,000.00			
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels		**$ 39,666,917.00**			

Bill $aver Program (On-Bill Financing and On-Bill Repayment Options)

In PY14, the Program contract included funding for the Bill $aver Program, comprised of the On-Bill Financing (OBF) and On-Bill Repayment (OBR) options. The budget and deliverables for these options were described in the Bill Saver Program proposal attached to Supplemental Contract No. 6. Bill $aver Program budgets and PY14 expenditures are detailed in **Table 16**. Although numerous Bill $aver deliverables were developed in PY14, delays outside of program control resulted in program launch being delayed (new launch date is currently pending). As a result, at year-end, the Bill $aver Program had utilized 18% of its allotted funds. A more detailed discussion on the Bill $aver Program can be found in the Program Overview.

Table 16
Program Expenditures and Unspent Funds

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
Block 1 - Ongoing OBF Program Administration					
Contractor Training, Management & Operations	$264,561.49	$308,794.00	85.68%	$44,232.51	14.32%
IT Tool Development	$76,952.49	$108,946.00	70.63%	$31,993.51	29.37%
Marketing & Outreach1	$3,660.00	$84,997.00	4.31%	$81,337.00	95.69%
Program Management / Admin	$6,130.00	$12,867.00	47.64%	$6,737.00	52.36%
Total Block 1 - Ongoing OBF Program Administration	**$351,303.98**	**$515,604.00**	**68.13%**	**$164,300.02**	**31.87%**
Block 2 - OBF Additional Program Development					
Program Development	$0.00	$116,966.00	0.00%	$116,966.00	100.00%
IT Tool Development	$0.00	$73,379.00	0.00%	$73,379.00	100.00%
Total Block 2 - OBF Additional Program Development	**$0.00**	**$190,345.00**	**0.00%**	**$190,345.00**	**100.00%**
Block 3 - GEMS/OBR Program Development & Administration					
Program Development	$30,162.50	$278,972.00	10.81%	$248,809.50	89.19%
Contractor Training, Management & Operations	$0.00	$464,255.00	0.00%	$464,255.00	100.00%
IT Tool Development	$13,440.00	$247,174.00	5.44%	$233,734.00	94.56%
Marketing & Outreach	$0.00	$167,516.00	0.00%	$167,516.00	100.00%
Program Management/Admin	$0.00	$151,828.00	0.00%	$151,828.00	100.00%
Total Block 3 -GEMS/OBR Program Development & Administration	**$43,602.50**	**$1,309,745.00**	**3.33%**	**$1,266,142.50**	**96.67%**
Block 4 - KIUC Program Development, Integration & Administration					
Program Development	$0.00	$70,329.00	0.00%	$70,329.00	100.00%
Contractor Training, Management & Operations	$0.00	$46,486.00	0.00%	$46,486.00	100.00%
IT Tool Development	$0.00	$28,597.00	0.00%	$28,597.00	100.00%
Marketing & Outreach	$0.00	$28,611.00	0.00%	$28,611.00	100.00%
Program Management/Admin	$0.00	$30,657.00	0.00%	$30,657.00	100.00%
Total Block 4 - KIUC Program Development, Integration & Administration	**$0.00**	**$204,680.00**	**0.00%**	**$204,680.00**	**100.00%**
Subtotal Block 1 - Ongoing OBF Program Administration	*$351,303.98*	*$515,604.00*	*68.13%*	*$164,300.02*	*31.87%*
Subtotal Block 2 - OBF Additional Program Development	*$0.00*	*$190,345.00*	*0.00%*	*$190,345.00*	*100.00%*
Subtotal Block 3 - GEMS/OBR Program Development & Administration	*$43,602.50*	*$1,309,745.00*	*3.33%*	*$1,266,142.50*	*96.67%*
Subtotal Block 4 - KIUC Program Development, Integration & Administration	*$0.00*	*$204,680.00*	*0.00%*	*$204,680.00*	*100.00%*
OBF Program Total (prior to tax)	***$394,906.48***	***$2,220,374.00***	***17.79%***	***$1,825,467.52***	***82.21%***
Total Tax on OBF program	$18,607.98	$104,624.00	*17.79%*	*$86,016.02*	*82.21%*
OBF Program Total (inclusive of tax)	**$413,514.46**	**$2,324,998.00**	***17.79%***	***$1,911,483.54***	***82.21%***

PORTFOLIO 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 Energy and Demand Savings

Program Energy Savings for PY14 were:

- **First Year** – 116,583,217 kWh
  (53.2% in Residential and 46.8% in Business programs)

- **Lifetime** – 1,191,771,572 kWh
  (41.9% in Residential and 58.1% 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 (six years and one 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 8.0 years in PY14 up from 7.8 years in PY13, while business measures have an average measure life of 12.6 years in PY14 down from 14.6 years in PY13.

Program Peak Demand reduction for PY14 was:

- **Peak Demand** – 18,497 kW (54.5% from Residential and 45.5% 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

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	1,752	88,071	$ 3,586,527	3,821	22,154,603	308,911,319	$ 0.162	$ 0.012
CBEEM	404	60,199	$ 5,557,198	3,481	25,366,309	293,171,679	$ 0.219	$ 0.019
BHTR	813	33,336	$ 2,208,570	1,112	6,849,420	89,446,256	$ 0.322	$ 0.025
BESM	22	68	$ 893,815	0	241,023	1,205,115	$ 3.708	$ 0.742
Business Totals	**2,991**	**181,674**	**$ 12,246,110**	**8,414**	**54,611,354**	**692,734,369**	**$ 0.224**	**$ 0.018**
REEM	15,093	3,358,298	$ 9,011,161	9,874	60,733,605	489,452,081	$ 0.148	$ 0.018
RESM	1,700	1,775	$ 301,350	50	631,896	5,169,866	$ 0.477	$ 0.058
RHTR	1,212	21,200	$ 664,297	159	606,361	4,415,256	$ 1.096	$ 0.150
CESH	1	1	$ 1,319	0	0	0	$ 0	$ 0
Residential Totals	**18,006**	**3,381,274**	**$ 9,978,127**	**10,083**	**61,971,862**	**499,037,203**	**$ 0.161**	**$ 0.020**
Total	**20,997**	**3,562,948**	**$ 22,224,237**	**18,497**	**116,583,217**	**1,191,771,572**	**$ 0.191**	**$ 0.019**

Program	**Total Resource Benefit (TRB)**	**Total Resource Cost (TRC)**	**Driven Benefit Ratio (TRB/Incentive $)**	**Driven Investment Ratio (TRC/Incentive $)**	**Benefit Test (TRB/TRC)**
BEEM	$ 36,751,925	$ 8,958,967	10.2	2.5	4.1
CBEEM	$ 33,797,316	$ 32,943,863	6.1	5.9	1.0
BHTR	$ 10,424,522	$ 2,143,255	4.7	1.0	4.9
BESM	$ 113,582	$ 1,043,250	0.1	1.2	0.1
Business Totals	**$ 81,087,345**	**$ 45,089,335**	**6.6**	**3.7**	**1.8**
REEM	$ 62,521,017	$ 23,034,782	6.9	2.6	2.7
RESM	$ 512,543	$ 555,900	1.7	1.8	0.9
RHTR	$ 699,700	$ 661,866	1.1	1.0	1.1
CESH	$ 0	$ 1,319	0.0	1.0	0.0
Residential Totals	**$ 63,733,260**	**$ 24,253,867**	**6.4**	**2.4**	**2.6**
Total	**$ 144,820,605**	**$ 69,343,202**	**6.5**	**3.1**	**2.1**

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	1,752	88,071	$ 3,586,527	5,080	29,424,752	410,964,014	$ 0.122	$ 0.009
CBEEM	404	60,199	$ 5,557,198	4,641	33,821,745	390,895,572	$ 0.164	$ 0.014
BHTR	813	33,336	$ 2,208,570	1,228	7,149,996	91,506,705	$ 0.309	$ 0.024
BESM	22	68	$ 893,815	0	253,708	1,268,542	$ 3.523	$ 0.705
Business Totals	**2,991**	**181,674**	**$ 12,246,110**	**10,950**	**70,650,202**	**894,634,833**	**$ 0.173**	**$ 0.014**
REEM	15,093	3,358,298	$ 9,011,161	12,498	76,878,053	619,560,787	$ 0.117	$ 0.015
RHTR	1,212	21,200	$ 664,297	215	819,171	5,878,144	$ 0.811	$ 0.113
RESM	1,700	1,775	$ 301,350	55	686,844	5,619,420	$ 0.439	$ 0.054
CESH	1	1	$ 1,319	0	0	0	$ 0	$ 0
Residential Totals	**18,006**	**3,381,274**	**$ 9,978,127**	**12,768**	**78,384,068**	**631,058,350**	**$ 0.127**	**$ 0.016**
Total	**20,997**	**3,562,948**	**$ 22,224,237**	**23,718**	**149,034,270**	**1,525,693,183**	**$ 0.149**	**$ 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	$ 48,886,487	$ 8,958,967	13.6	2.5	5.5
CBEEM	$ 45,063,003	$ 32,943,863	8.1	5.9	1.4
BHTR	$ 10,802,709	$ 2,143,255	4.9	1.0	5.0
BESM	$ 119,560	$ 1,043,250	0.1	1.2	0.1
Business Totals	**$ 104,871,759**	**$ 45,089,335**	**8.6**	**3.7**	**2.3**
REEM	$ 79,129,136	$ 23,034,782	8.8	2.6	3.4
RHTR	$ 935,493	$ 661,866	1.4	1.0	1.4
RESM	$ 556,484	$ 555,900	1.8	1.8	1.0
CESH	$ 0	$ 1,319	0.0	1.0	0.0
Residential Totals	**$ 80,621,113**	**$ 24,253,867**	**8.1**	**2.4**	**3.3**
Total	**$ 185,492,872**	**$ 69,343,202**	**8.3**	**3.1**	**2.7**

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	1,752	88,071	$ 3,586,527	4,584	26,567,178	370,995,257	$ 0.135	$ 0.010
CBEEM	404	60,199	$ 5,557,198	4,184	30,491,162	352,355,152	$ 0.182	$ 0.016
BHTR	813	33,336	$ 2,208,570	1,109	6,459,676	82,688,438	$ 0.342	$ 0.027
BESM	22	68	$ 893,815	0	232,760	1,163,800	$ 3.840	$ 0.768
Business Totals	**2,991**	**181,674**	**$ 12,246,110**	**9,877**	**63,750,776**	**807,202,647**	**$ 0.192**	**$ 0.015**
REEM	15,093	3,358,298	$ 9,011,161	11,297	69,486,595	559,990,086	$ 0.130	$ 0.016
RHTR	1,212	21,200	$ 664,297	194	739,754	5,328,818	$ 0.898	$ 0.125
RESM	1,700	1,775	$ 301,350	49	619,117	5,061,225	$ 0.487	$ 0.060
CESH	1	1	$ 1,319	0	0	0	$ 0	$ 0
Residential Totals	**18,006**	**3,381,274**	**$ 9,978,127**	**11,541**	**70,845,465**	**570,380,130**	**$ 0.141**	**$ 0.017**
Total	**20,997**	**3,562,948**	**$ 22,224,237**	**21,418**	**134,596,241**	**1,377,582,777**	**$ 0.165**	**$ 0.016**

Program	**Total Resource Benefit (TRB)**	**Total Resource Cost (TRC)**	**Driven Benefit Ratio (TRB/Incentive $)**	**Driven Investment Ratio (TRC/Incentive $)**	**Benefit Test (TRB/TRC)**
BEEM	$ 44,123,697	$ 8,958,967	12.3	2.5	4.9
CBEEM	$ 40,619,487	$ 32,943,863	7.3	5.9	1.2
BHTR	$ 9,759,765	$ 2,143,255	4.4	1.0	4.6
BESM	$ 109,687	$ 1,043,250	0.1	1.2	0.1
Business Totals	**$ 94,612,637**	**$ 45,089,335**	**7.7**	**3.7**	**2.1**
REEM	$ 71,494,332	$ 23,034,782	7.9	2.6	3.1
RHTR	$ 844,732	$ 661,866	1.3	1.0	1.3
RESM	$ 500,618	$ 555,900	1.7	1.8	0.9
CESH	$ 0	$ 1,319	0.0	1.0	0.0
Residential Totals	**$ 72,839,683**	**$ 24,253,867**	**7.3**	**2.4**	**3.0**
Total	**$ 167,452,320**	**$ 69,343,202**	**7.5**	**3.1**	**2.4**

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

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 134,596,241 kWh per year (1.5% of 2014 utility sale, **Table 33**), while Customer Peak Demand Savings was 21,418 kW (1.4% of 2014 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 1,553,900 kW. (See **Tables 33-34** for further breakdown.) 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

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	17,501,912	9.0%	19,077,084	79.5%	15,159,511
Lanai	73,138	9.6%	80,130	85.8%	68,776
Maui	17,700,427	10.0%	19,463,390	77.8%	15,144,594
Molokai	76,236	9.6%	83,524	78.4%	65,471
Oahu	99,244,529	11.2%	110,330,142	78.1%	86,144,864
Total	**134,596,241**	**10.7%**	**149,034,270**	**78.2%**	**116,583,217**
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	2,698	9.0%	2,940	79.2%	2,329
Lanai	14	9.6%	15	78.8%	12
Maui	2,771	10.0%	3,047	77.7%	2,368
Molokai	14	9.6%	15	78.5%	12
Oahu	15,922	11.2%	17,700	77.8%	13,776
Total	**21,418**	**10.7%**	**23,718**	**78.0%**	**18,497**
Percent of Customer Level Savings			111%		86%

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**
BEEM	26,567,178	10.8%	29,424,752	75.3%	22,154,603
CBEEM	30,491,162	10.9%	33,821,745	75.0%	25,366,309
BESM	232,760	9.0%	253,708	95.0%	241,023
BHTR	6,459,676	10.7%	7,149,996	95.8%	6,849,420
Business Programs	63,750,776	10.8%	70,650,202	77.3%	54,611,354
REEM	69,486,595	10.6%	76,878,053	79.0%	60,733,605
CESH	0	0%	0	0%	0
RESM	619,117	10.9%	686,844	92.0%	631,896
RHTR	739,754	10.7%	819,171	74.0%	606,361
Residential Programs	70,845,465	10.6%	78,384,068	79.1%	61,971,862
Total	**134,596,241**	**10.7%**	**149,034,270**	**78.2%**	**116,583,217**
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**
BEEM	4,584	10.8%	5,080	75.2%	3,821
CBEEM	4,184	10.9%	4,641	75.0%	3,481
BESM	0	0%	0	0%	0
BHTR	1,109	10.7%	1,228	90.5%	1,112
Business Programs	9,877	10.9%	10,950	76.8%	8,414
REEM	11,297	10.6%	12,498	79.0%	9,874
CESH	0	0%	0	0%	0
RESM	49	10.8%	55	92.0%	50
RHTR	194	10.8%	215	73.9%	159
Residential Programs	11,541	10.6%	12,768	79.0%	10,083
Total	**21,418**	**10.7%**	**23,718**	**78.0%**	**18,497**
Percent of Customer Level Savings			111%		86%

CFLs & LEDs – Market Shift Continues Toward LEDs

The Program reduced its dependency on CFLs in PY14. There were 1,347,684 Residential and Business CFLs incentivized, this is an 11.4% reduction from the 1,501,579 CFLs in PY13. CFL and LED savings remain a significant contributing measure to the Program as shown in **Table 24**.

Due to higher baseline lighting efficiencies, the combined Residential and Business CFL impact continued to decline to 31% of energy and 26% in demand reduction achieved, down from 38% of energy and 39% in demand reduction achieved in PY13. LED impact, however, was higher, driven by maturing LED technology in the business sector. Combined Residential and Business LED impact rose from 14% of energy and 16% of demand reduction achieved in PY13 to 26% of energy and 23% of demand reduction achieved in PY14. The Program continues to rapidly shift to incentivizing only LEDs.

The table below does not include the CFLs (3,394) and LEDs (4,953) provided in the Home Energy-Saving Kits.

Table 24
CFL & LED Statistics

CFL

County Comparison	Business	Residential	Total	%
Honolulu	1,513	967,158	968,671	71.9%
Hawaii	662	207,605	208,267	15.4%
Maui	177	170,921	171,098	12.7%
Total	**2,352**	**1,345,684**	**1,348,036**	**100.0%**

Cost-Effectiveness	Business	Residential	Total
CFL Incentives	11,059	$ 1,728,589	$ 1,739,647
CFL kWh 1st Year	271,577	36,067,136	36,338,713
1st Yr $/kWh	$ 0.041	$ 0.048	$ 0.048
CFL kWh Lifetime	1,774,643	216,251,690	218,026,333
Lifetime $/kWh	$ 0.006	$ 0.008	$ 0.008

Energy Comparison	Business	Residential	Total
CFL Program kWh	271,577	36,067,136	36,338,713
LED Program kWh	20,933,810	9,170,478	30,104,288
Portfolio kWh	54,611,354	61,971,862	116,583,217
CFL % of Energy	0%	58%	31%
LED % of Energy	38%	15%	26%

Incentive Comparison	Business	Residential	Total
CFL Incentives	11,059	1,728,589	1,739,647
LED Incentives	4,037,036	2,689,028	6,726,064
Portfolio Incentives	12,246,110	9,978,127	22,224,237
CFL % of Incentives	0%	17%	8%
LED % of Incentives	33%	27%	30%

LED

County Comparison	Business	Residential	Total	%
Honolulu	95,640	325,643	421,283	66.1%
Hawaii	8,510	114,375	122,885	19.3%
Maui	5,434	87,887	93,321	14.6%
Total	**109,584**	**527,905**	**637,489**	**100.0%**

Cost-Effectiveness	Business	Residential	Total
LED Incentives	$ 4,037,036	$ 2,689,028	$ 6,726,064
LED kWh First Year	20,933,810	9,170,478	30,104,288
First Yr $/kWh	$ 0.193	$ 0.293	$ 0.223
LED kWh Lifetime	233,662,606	137,557,166	371,219,772
Lifetime $/kWh	$ 0.017	$ 0.020	$ 0.018

Demand Comparison	Business	Residential	Total
CFL Program kW	40	4,687	4,727
LED Program kW	2,895	1,382	4,278
Portfolio kW	8,414	10,083	18,497
CFL % of Demand	0%	46%	26%
LED % of Demand	34%	14%	23%

*Includes 50 unit (lamps) over-count from single distributor across two counties

CFL counts dropped by 10.2% compared to PY13 participation numbers whereas LEDs have increased 78%. 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

CFL 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
PY2014	2,352	1,345,597	1,347,949
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
PY2014	271,577	36,067,136	36,338,713
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
PY2014	115	27	27

Measure Contribution toward Savings Impacts

In PY14, the Program incentivized over 68 measures in 19 different measure categories. High-Efficiency Lighting and Customized Project measures (most of which were also lighting related) accounted for the greatest savings impact and High-Efficiency HVAC was the third most impactful measure category. **Table 26** provides a summary of all measure categories and their respective energy impact for PY14.

- **#1 Contributor - High-Efficiency Lighting** – 46% of first year (down from 65% in PY13) and 39% lifetime energy savings (down from 56% in PY13). LEDs, T8LW and then CFL lighting contributed the most toward the Program.
- **#2 Contributor – Customized Project Measures** - 22% first year and 25% lifetime energy savings. Non-prescriptive (e.g. customized) lighting projects constituted the majority of projects in this category.
- **#3 Contributor – High-Efficiency HVAC** - 8% first year (down from 11% in PY13) and 13% lifetime energy savings (down from 16% in PY13). Chillers, VFDs and Variable Refrigerant Flow Air Conditioners were the most significant contributors to this category.

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	22,864	35.4%	1,983,051	7,360	39.8%	53,556,003	45.9%	469,335,392	39.4%	$ 5,232,297	23.5%	$ 0.011
2	Customized Project Measures	419	0.6%	3,243	3,332	18.0%	25,076,938	21.5%	293,068,464	24.6%	$ 5,409,772	24.3%	$ 0.018
3	High-Efficiency HVAC	2,569	4.0%	3,335	2,467	13.3%	9,765,446	8.4%	155,973,979	13.1%	$ 2,104,527	9.5%	$ 0.013
4	Business Direct Installation	2,678	4.1%	32,948	785	4.2%	6,132,133	5.3%	85,849,866	7.2%	$ 2,124,758	9.6%	$ 0.025
5	High-Efficiency Water Heating	1,983	3.1%	1,995	745	4.0%	3,954,025	3.4%	56,134,094	4.7%	$ 1,832,891	8.2%	$ 0.033
6	High-Efficiency Appliances	11,470	17.7%	11,346	249	1.3%	4,134,480	3.5%	55,670,215	4.7%	$ 712,315	3.2%	$ 0.013
7	Energy Awareness, Measurement and Control Systems	11,517	17.8%	1,493,620	2,210	11.9%	8,465,197	7.3%	21,371,551	1.8%	$ 1,908,578	8.6%	$ 0.089
8	High-Efficiency Air Conditioning	2,673	4.1%	3,509	227	1.2%	805,061	0.7%	9,321,159	0.8%	$ 138,855	0.6%	$ 0.015
9	Commercial Industrial Processes	41	0.1%	259	67	0.4%	457,664	0.4%	8,811,476	0.7%	$ 144,900	0.7%	$ 0.016
10	High-Efficiency Motors	38	0.1%	2,528	67	0.4%	583,608	0.5%	8,754,121	0.7%	$ 146,560	0.7%	$ 0.017
11	Building Envelope Improvements	33	0.1%	33	173	0.9%	639,250	0.5%	6,392,503	0.5%	$ 149,690	0.7%	$ 0.023
12	High-Efficiency Water Pumping	224	0.3%	231	29	0.2%	384,472	0.3%	5,213,820	0.4%	$ 70,653	0.3%	$ 0.014
13	Energy Efficiency Equipment Kits	13	0.0%	13	242	1.3%	574,934	0.5%	4,205,051	0.4%	$ 129,667	0.6%	$ 0.031
14	Restaurant Targeted Participation Programs	82	0.1%	381	326	1.8%	715,864	0.6%	3,579,318	0.3%	$ 10,530	0.0%	$ 0.003
15	Business Design, Audits and Commissioning	1,738	2.7%	1,736	50	0.3%	672,113	0.6%	3,360,567	0.3%	$ 910,388	4.1%	$ 0.271
16	Direct Installation - Residential Energy Kits	5,935	9.2%	10,485	119	0.6%	390,714	0.3%	1,953,569	0.2%	$ 88,782	0.4%	$ 0.045
17	Direct Installation - Solar Water Heating	70	0.1%	70	27	0.1%	123,387	0.1%	1,850,802	0.2%	$ 579,675	2.6%	$ 0.313
18	Energy Efficiency Equipment Grants	33	0.1%	12,584	21	0.1%	149,583	0.1%	897,500	0.1%	$ 12,975	0.1%	$ 0.014
19	Commercial Kitchen	4	0.0%	4	0	0.0%	2,344	0.0%	28,126	0.0%	$ 950	0.0%	$ 0.034
20	Accounting	250	0.4%	1,577	0	0.0%	0	0.0%	0	0.0%	$ 515,476	2.3%	$ 0
	Total	**64,634**	**100%**	**3,562,948**	**18,497**	**100%**	**116,583,217**	**100%**	**1,191,771,572**	**100%**	**$ 22,224,237**	**100%**	**$ 0.019**

Program Level impacts (first year) were greatest in the Residential Rate Schedule "R" with 61,847,201 kWh or 53% of savings, of which 70% was realized on Oahu. The Oahu Residential rate class provided the greatest savings of 43,151,371 kWh per year of all the rate schedules (37% of PY14 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 Island	10,132,805	1,150,164	1,765,134	2,019,990	0	91,418	15,159,511	13.0%
Lanai	35,233	28,441	5,102	0	0	0	68,776	0.1%
Maui	8,481,902	509,459	1,626,304	4,526,928	0	0	15,144,594	13.0%
Molokai	45,889	10,500	9,082	0	0	0	65,471	0.1%
Oahu	43,151,371	4,159,705	15,658,870	18,012,817	5,000,939	161,163	86,144,864	73.9%
Total	**61,847,201**	**5,858,269**	**19,064,492**	**24,559,735**	**5,000,939**	**252,581**	**116,583,217**	**100.0%**
Percent	53.0%	5.0%	16.4%	21.1%	4.3%	0.2%	100.0%	

Demand impact had similar results with the Residential Rate schedule customers providing 10,082 kW or 55% of the demand savings. Oahu Residential Rate Customers provided the greatest savings of 7,020 kW of all the rate schedules (38% of PY14 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 Island	1,648	149	224	294	0	14	2,329	12.6%
Lanai	11	0	1	0	0	0	12	0.1%
Maui	1,393	69	259	648	0	0	2,368	12.8%
Molokai	10	1	2	0	0	0	12	0.1%
Oahu	7,020	533	2,336	3,099	761	28	13,776	74.5%
Total	**10,082**	**751**	**2,821**	**4,040**	**761**	**42**	**18,497**	**100.0%**
Percent	54.5%	4.1%	15.3%	21.8%	4.1%	0.2%	100.0%	

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"**
  - 60,718,564 first year kWh (52% of total program)
  - The top three contributors toward this value were residential CFLs, LEDs and Peer Group Comparison. **See Table 57**.

- **# 2 Contributor – Customized Business Energy Efficiency Measures (CBEEM) within the Business Large Customer Rate Schedule "P"**
  - 12,295,622 kWh (11% of total program)
  - Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects. **See Table 47**.

Table 29
Program Energy Impact (first year kWh) by Rate Class

Program	R	G	J	P	DS	F	Total	%
BEEM	34,502	1,330,468	7,647,433	11,689,272	1,452,928	0	22,154,603	19.0%
CBEEM	0	588,966	8,681,129	12,295,622	3,548,011	252,581	25,366,309	21.8%
BESM	0	0	241,023	0	0	0	241,023	0.2%
BHTR	897	3,781,578	2,493,511	573,434	0	0	6,849,420	5.9%
Business Programs	**35,399**	**5,701,012**	**19,063,097**	**24,558,327**	**5,000,939**	**252,581**	**54,611,354**	**46.8%**
REEM	60,718,564	13,634	0	1,407	0	0	60,733,605	52.1%
CESH	0	0	0	0	0	0	0	0.0%
RESM	490,956	140,685	255	0	0	0	631,896	0.5%
RHTR	602,282	2,939	1,140	0	0	0	606,361	0.5%
Residential Programs	**61,811,803**	**157,258**	**1,395**	**1,407**	**0**	**0**	**61,971,862**	**53.2%**
Total	**34,502**	**1,330,468**	**19,064,492**	**24,559,735**	**5,000,939**	**252,581**	**116,583,217**	**100.0%**
Percent	**53.0%**	**5.0%**	**16.4%**	**21.1%**	**4.3%**	**0.2%**	**100.0%**	

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"**
  - 9,871 kW (53% 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"**
  - 2,397 kWh (13% of total program)
  - Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects.

Table 30
Program Demand Impact (kW) by Rate Class

Program	R	G	J	P	DS	F	Total	%
BEEM	4	195	985	2,397	240	0	3,821	20.7%
CBEEM	0	94	1,287	1,537	521	42	3,481	18.8%
BESM	0	0	0	0	0	0	0	0.0%
BHTR	0	458	548	106	0	0	1,112	6.0%
Business Programs	**4**	**747**	**2,821**	**4,040**	**761**	**42**	**8,414**	**45.5%**
REEM	9,871	3	0	0	0	0	9,874	53.4%
CESH	0	0	0	0	0	0	0	0.0%
RESM	50	0	0	0	0	0	50	0.3%
RHTR	157	2	0	0	0	0	159	0.9%
Residential Programs	**10,078**	**4**	**0**	**0**	**0**	**0**	**10,083**	**54.5%**
Total	**10,082**	**751**	**2,821**	**4,040**	**761**	**42**	**18,497**	**100.0%**
Percent	**54.5%**	**4.1%**	**15.3%**	**21.8%**	**4.1%**	**0.2%**	**100.0%**	

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"**
  - 69,469,208 kWh (52% of total program)
  - The top three contributors toward this value were Residential CFLs, LEDs, and Peer Group Comparison.

- **# 2 Contributor – Customized Business Energy Efficiency Measures (CBEEM) within the Business Large Customer Rate Schedule "P"**
  - 14,795,969 kWh (11% of total program)
  - Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects. High performance lighting driven by LED retrofits was the top contributor to this category.

Table 31
Customer Energy Impact (kWh) by Rate Class

Program	R	G	J	P	DS	F	Total	%
BEEM	41,545	1,603,346	9,103,106	14,076,592	1,742,589	0	26,567,178	19.7%
CBEEM	0	707,996	10,426,720	14,795,969	4,255,358	305,119	30,491,162	22.7%
BESM	0	0	232,760	0	0	0	232,760	0.2%
BHTR	815	3,455,249	2,481,038	522,574	0	0	6,459,676	4.8%
Business Programs	**42,359**	**5,766,590**	**22,243,624**	**29,395,136**	**5,997,947**	**305,119**	**63,750,776**	**47.4%**
REEM	69,469,208	15,743	0	1,644	0	0	69,486,595	51.6%
CESH	0	0	0	0	0	0	0	0.0%
RESM	481,309	137,559	249	0	0	0	619,117	0.5%
RHTR	734,728	3,621	1,405	0	0	0	739,754	0.5%
Residential Programs	**70,685,245**	**156,923**	**1,654**	**1,644**	**0**	**0**	**70,845,465**	**52.6%**
Total	**70,727,604**	**5,923,513**	**22,245,277**	**29,396,780**	**5,997,947**	**305,119**	**134,596,241**	**100.0%**
Percent	52.5%	4.4%	16.5%	21.8%	4.5%	0.2%	100.0%	

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"**
  - 11,294 kW (53% 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"**
  - 2,884 kWh (13% of total program)
  - Schedule "P" Customers are the biggest energy consumers and they undertake the largest energy-savings projects.

Table 32
Customer Demand Impact by Rate Class

Program	R	G	J	P	DS	F	Total	%
BEEM	4	235	1,172	2,884	288	0	4,584	21.4%
CBEEM	0	113	1,546	1,850	625	50	4,184	19.5%
BESM	0	0	0	0	0	0	0	0.0%
BHTR	0	418	595	96	0	0	1,109	5.2%
Business Programs	**4**	**766**	**3,313**	**4,830**	**913**	**50**	**9,877**	**46.1%**
REEM	11,294	3	0	0	0	0	11,297	52.7%
CESH	0	0	0	0	0	0	0	0.0%
RESM	49	0	0	0	0	0	49	0.2%
RHTR	192	2	0	0	0	0	194	0.9%
Residential Programs	**11,535**	**5**	**0**	**0**	**0**	**0**	**11,541**	**53.9%**
Total	**11,540**	**771**	**3,314**	**4,830**	**913**	**50**	**21,418**	**100.0%**
Percent	**53.9%**	**3.6%**	**15.5%**	**22.6%**	**4.3%**	**0.2%**	**100.0%**	

Energy Efficiency Portfolio Standard (EEPS) Impacts

2014 Energy Efficiency Potential Study

For continued reference, as noted in last year's report, a potential study was commissioned by the PUC and conducted by EnerNOC Utility Solutions Consulting. It is 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.

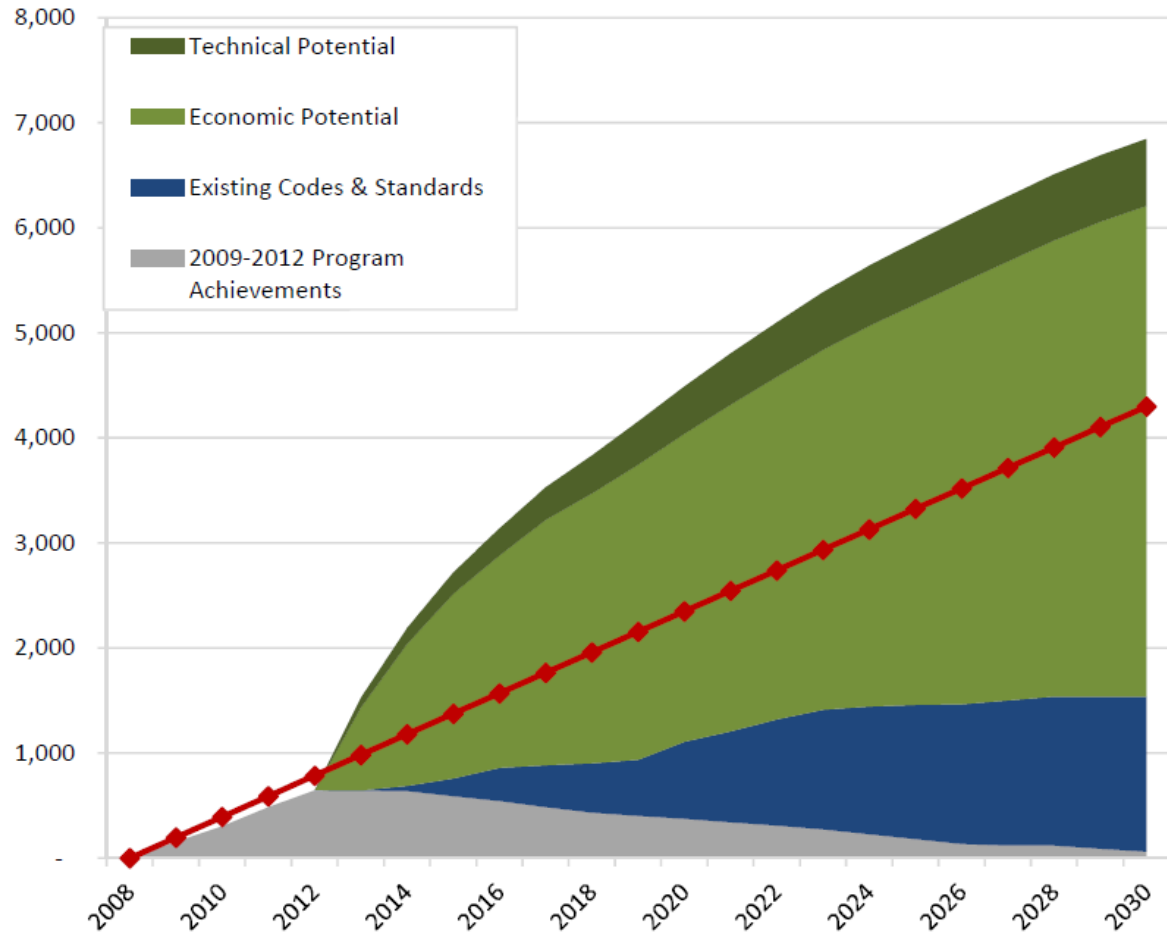
Key Findings

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.

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)



Application of Sixth Year Energy Savings towards EEPS Goal

The targeted EEPS goal is a 4,300 GWh reduction in 2030 (see Figure ES-1 from the study, on previous page). This goal will be achieved through 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 programs and services.

Cumulative Impacts of Energy Efficiency, Rooftop PV Installations and Unclaimed DSM/Market-Driven EE

Figure 5 provides a high-level view of the impacts and order of magnitudes that various activities have and may have on electrical consumption in Hawaii from 2000 to 2030. The items shown are:

Electrical Energy Usage Estimates

A. *EEPS / HCEI / IRP Electrical Usage Baseline Forecast* (orange dotted line) – This is the original electrical energy forecast for the HECO companies based on the Integrated Resource Plan 3.

B. *State of Hawaii GDP Prediction of Electricity Sales* (green line) – This line is based on a simple Hawaii State Gross Domestic Product (GDP) relation to energy consumption from 2000 to 2004. Energy sales matched the line closely during the period of tuning and show clearly the impact of the 2008 economic downturn where it sharply declined for one year and returned to a growth in expected sales.

C. *State of Hawaii GDP with Weather Adjustment Cooling Degree Day (CDD) Prediction of Electricity Sales* (green line with Circle Markers) – This line adjusts sales due to how much the high daily temperature was above 65°F.

Electrical Sales & Reduction Items

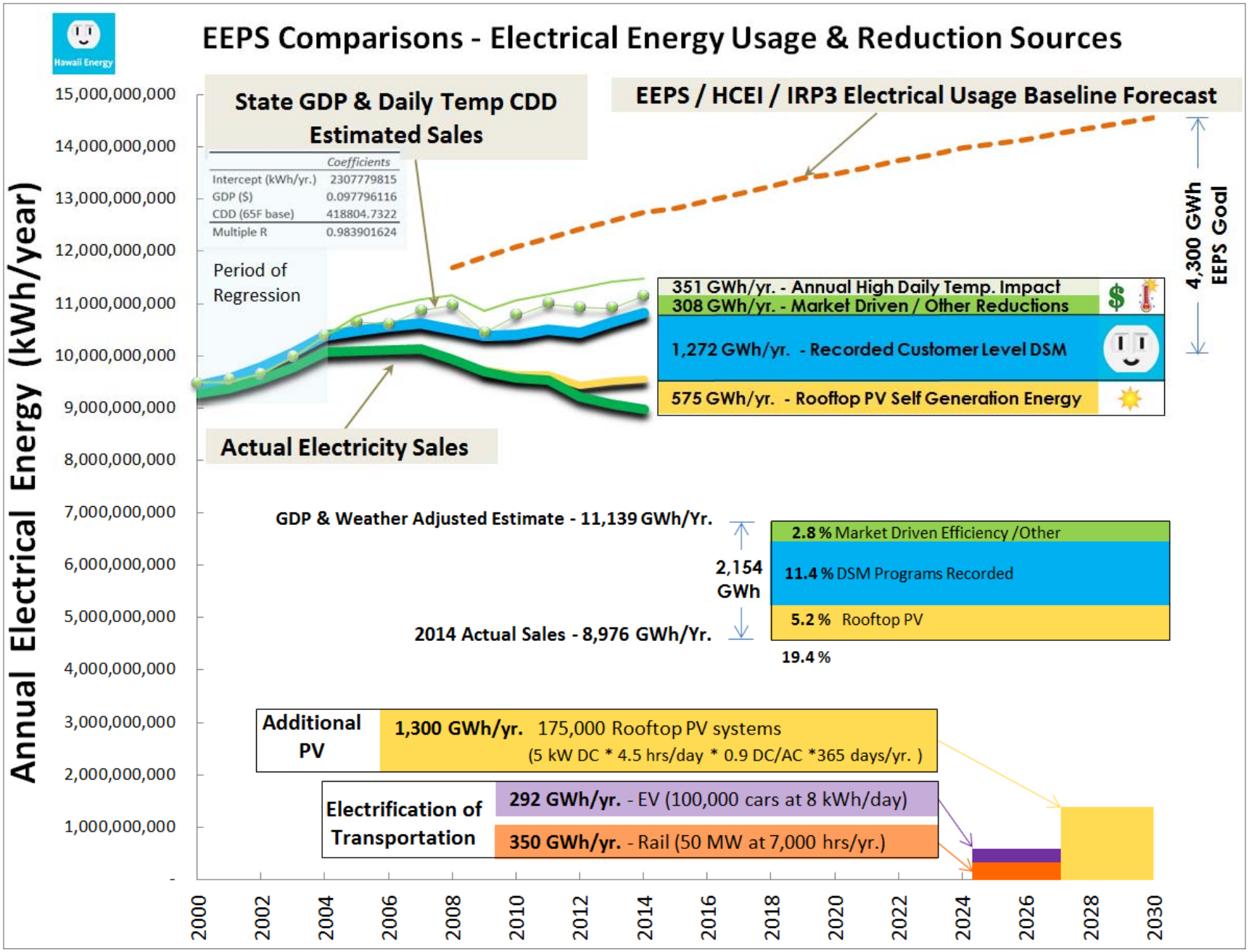
D. *Actual Electrical Sales* (dark green heavy solid line) – This is the actual annual sales for HECO, MECO and HELCO. There is a pronounced flattening of sales starting in 2004 until the 2007, when sales actually started to decline, a year prior to the 2008 economic downturn.

E. *Actual Sales + Estimated Roof Top PV Self-Generation* (yellow heavy line) – This line adds in the energy use that roof top PV systems are estimated to generate. In 2014, it is estimated that the PV systems generated 575 GWh.

F. *Actual Sales + Estimated Roof Top PV + Cumulative Impact of DSM Programs* (light blue heavy line) – This line adds in the customer level energy reductions recorded by the DSM programs since 1996. All measures savings have been allowed to remain without decay with the expectation that they will be replaced with as-good or better performing equipment or operations.

G. *Market Driven / Other Reductions* - The gap between “A” and “F” lines are remaining undefined impacts that include market-driven actions including naturally occurring energy efficiency outside of the DSM programs, savings not claimed by DSM above recorded, fuel conversions such as cogeneration, and other factors.

Figure 5


EEPS Comparisons - Electrical Energy Usage & Reduction Sources
Hawaii Energy
Annual Electrical Energy (kWh/year)
15,000,000,000
14,000,000,000
13,000,000,000
12,000,000,000
11,000,000,000
10,000,000,000
9,000,000,000
8,000,000,000
7,000,000,000
6,000,000,000
5,000,000,000
4,000,000,000
3,000,000,000
2,000,000,000
1,000,000,000
-
State GDP & Daily Temp CDD Estimated Sales
Coefficients
Intercept (kWh/yr.) 2307779815
GDP ($) 0.097796116
CDD (65F base) 418804.7322
Multiple R 0.983901624
Period of Regression
Actual Electricity Sales
EEPS / HCEI / IRP3 Electrical Usage Baseline Forecast
4,300 GWh EEPS Goal
351 GWh/yr. - Annual High Daily Temp. Impact
308 GWh/yr. - Market Driven / Other Reductions
1,272 GWh/yr. - Recorded Customer Level DSM
575 GWh/yr. - Rooftop PV Self Generation Energy
GDP & Weather Adjusted Estimate - 11,139 GWh/Yr.
2,154 GWh
2014 Actual Sales - 8,976 GWh/Yr.
2.8 % Market Driven Efficiency /Other
11.4 % DSM Programs Recorded
5.2 % Rooftop PV
19.4 %
Additional PV
1,300 GWh/yr. 175,000 Rooftop PV systems
(5 kW DC * 4.5 hrs/day * 0.9 DC/AC *365 days/yr.)
Electrification of Transportation
292 GWh/yr. - EV (100,000 cars at 8 kWh/day)
350 GWh/yr. - Rail (50 MW at 7,000 hrs/yr.)
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030

Hawaii Energy Program Attributed Savings vs. EEPS Goal

Figure 6 shows the relationship between the energy savings claimed by the Program in a single year and the true impact towards the EEPS goal.

The farthest right column shows the Program claimed an attributed 116,583,217 kWh/year. This is made up of both a discounted value of customer level savings "net" and credited utility system losses.

The customer level savings realized is discounted by two items:

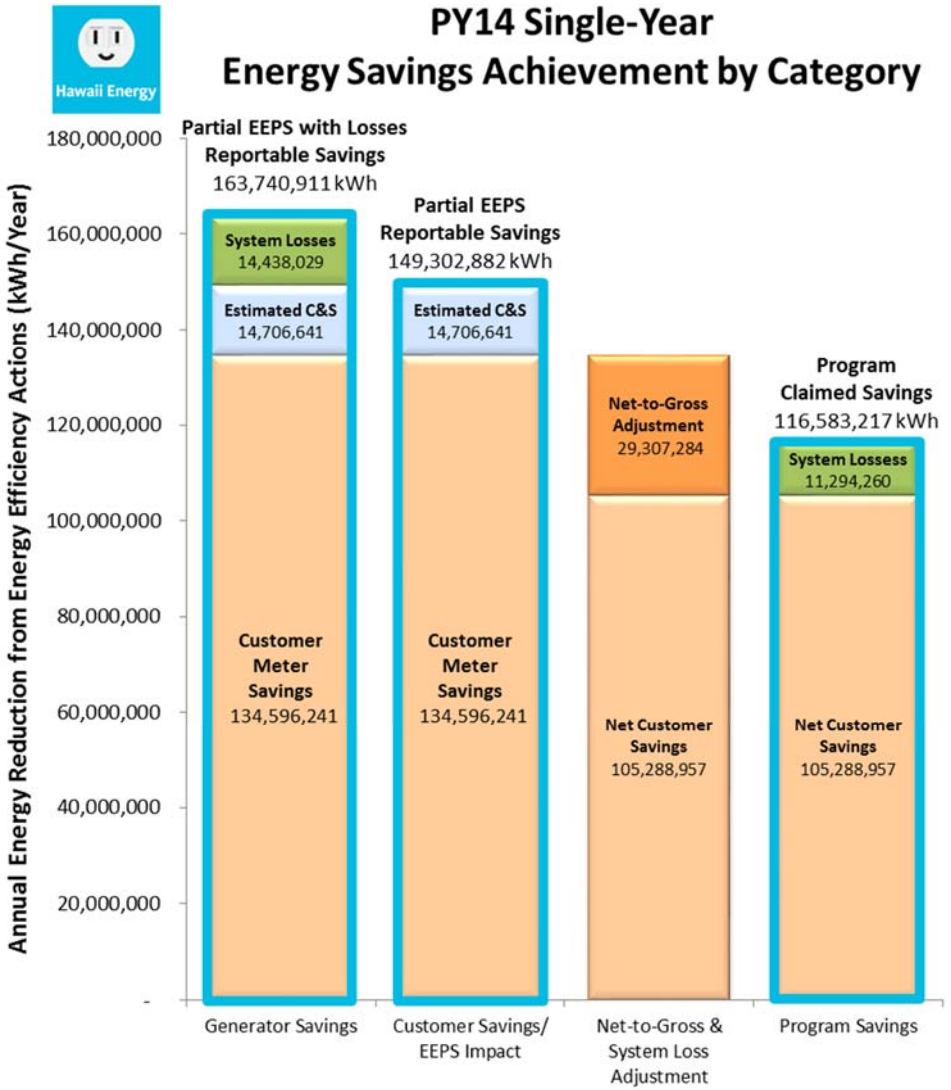
1. *Net-to-Gross* – The estimate of how many participants would have performed the energy reduction actions without program assistance.
2. *Codes & Standards* – This is the savings attributed to legal or industry driven efficiency of equipment and designs over the existing equipment that was replaced.

In PY14, the Partial EEPS Reportable Savings (a result of the actual savings from existing equipment to new equipment), which includes the impacts of improved codes and standards, would be 149,302,882 kWh/year. This 149 GWh/year is limited to the projects tracked and incentivized by Hawaii Energy. There are more energy-reducing projects that are implemented outside of Hawaii Energy involvement that could be incorporated into EEPS savings; Hawaii Energy intends to add tracking for these projects.

The PY14 Partial EEPS with losses Reportable Savings would be 163,740,911 kWh/year. This is generator-level savings that includes utility system losses of 14,438,029 kWh/year.

N-T-G Adjust	**100 Participants in a Program** **- 24 would have done anyway** **+ 5 took actions and not incentive** **81 Were influenced by Program**
Estimated C&S	**Existing Lamp is a 100 W Incan. Lamp** **C&S mandates a 72 W Incan. Lamp** **18 W LED Lamp Selected:** **100 W - 72 W = 28 W C&S Credit** **72 W - 18 W = 54 W Program Credit** **100 W - 18 W = 82 W Customer Savings**

Figure 6



Portfolio Impacts Relative to Load

Tables 33, 33a and 34 show the Program and Customer Level Impacts as compared to PY14 electricity sales.

Customer level savings were equivalent to 1.5% of the 2014 annual energy usage and 1.4% of the peak demand for the utility customers.

Hawaii and Maui counties had the greatest energy reduction as a percent of each island's usage at 1.6% each. Maui had the largest demand reduction as a percent of its island peak at 1.5%.

Table 33
Energy Impacts vs. Sales

Island	2014 kWh Sales*	Customer Level Savings	% of Island Sales	% of Total Sales	Program Level Savings	% of Island Sales	% of Total Sales
Hawaii	1,062,511,291	17,501,912	1.6%	0.2%	15,159,511	1.4%	0.2%
Lanai	26,528,809	73,138	0.3%	0.0%	68,776	0.3%	0.0%
Maui	1,076,319,631	17,700,427	1.6%	0.2%	15,144,594	1.4%	0.2%
Molokai	29,206,727	76,236	0.3%	0.0%	65,471	0.2%	0.0%
Oahu	6,781,664,556	99,244,529	1.5%	1.1%	86,144,864	1.3%	1.0%
Total	**8,976,231,014**	**134,596,241**		**1.5%**	**116,583,217**		**1.3%**

* DBEDT - Monthly Energy Trends - http://files.hawaii.gov/dbedt/economic/data_reports/energy-trends/Monthly_Energy_Data.xlsx

** HEI 2014 10K Report - http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9MjcwMzYyfENoaWxkSUQ9LTF8VHlwZT0z&t=1

Table 33a
HECO Sales vs. Generated & Purchased

HECO Consolidated Operating Statistics*	kWh/Yr	%
Net Generated and Purchased	9,438,000,000	100%
Sales	8,976,200,000	95%
System Losses and Use	**461,800,000**	**5%**

*HEI 2014 10K

Table 34
Demand Impacts vs. Sales

Island	2014 kW Peak*	Customer Level Reduction	% of Island Peak	% of Total Peak	Program Level Reduction	% of Island Peak	% of Total Peak
Hawaii	187,800	2,698	1.4%	0.2%	2,329	1.2%	0.1%
Lanai	5,000	14	0.3%	0.0%	12	0.2%	0.0%
Maui	190,700	2,771	1.5%	0.2%	2,368	1.2%	0.2%
Molokai	5,400	14	0.3%	0.0%	12	0.2%	0.0%
Oahu	1,165,000	15,922	1.4%	1.0%	13,776	1.2%	0.9%
Total	**1,553,900**	**21,418**		**1.4%**	**18,497**		**1.2%**

* Reported HEI 2014 10K Report (noncoincident and nonintegrated)

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 $144,820,605. **Table 35 & 36** shows the measures and their relative contributions.

The top three measure categories, shown in **Table 35**, provided 77% of the TRB value. They are: High-Efficiency Lighting, Customized Project Measures, and High-Efficiency HVAC.

- *High-Efficiency Lighting* – The largest contributor to the TRB at $57,823,193 (39.9%).
- *Customize Projects* – The second measure to offer significant contribution at $33,461,815 (23.1%) were customized projects.
- *High-Efficiency HVAC* – The third largest measure contributing to the TRB at $20,507,196 (14.2%) was High-Efficiency HVAC.

The top three measures (These can cross categories, for example High-Efficiency Lighting in Customized Projects), shown in **Table 36**, provided 56% of the TRB value. They are LED Lighting, CFL, and T12 to T8 Low Wattage retrofits.

- *LED Lighting* – The largest contributor to the TRB at $42,336,947 (29.2%).
- *CFL* – The second measure to offer significant contribution at $28,783,208 (19.9%) were customized projects.
- *T12 to T8 Low Wattage* - The third largest measure contributing to the TRB at $9,971,334 (6.9%).

The net TRB of $144,820,605 is based on the Program's standard calculation using the legacy utility avoided cost in **Example 1**. The Program is introducing a new TRB calculation in PY15, shown in **Example 2** below, based on guidelines to use an initial $0.161/kWh avoided cost figure and escalate it at 3% per year. This is further explained in the *Development of Avoided Costs* section at the end of this report.

Using the avoided costs in **Example 2**, and adopting the calculation of the TRB value at the end of the Program Year (i.e. PY14 = 2015 utility avoided cost), the PY14 TRB would increase by approximately $51,600,000 to $196,420,605.

Example 1: UPDATED UTILITY AVOIDED COST AND NON-UTILITY IMPACTS USING LEGACY METHOD

Hawaii Energy - PY14 - TRB Values Using Legacy Utility Avoided Cost								
		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.
2014	1	1.00	$ 370.6	$ 0.109	$ 371	$ 0.1089	$ 371	$ 0.1089
2015	2	0.94	$ 382.5	$ 0.112	$ 361	$ 0.1060	$ 731	$ 0.2149
2016	3	0.89	$ 386.2	$ 0.113	$ 344	$ 0.1010	$ 1,075	$ 0.3158
2017	4	0.84	$ 387.7	$ 0.114	$ 326	$ 0.0956	$ 1,401	$ 0.4115
2018	5	0.79	$ 389.1	$ 0.114	$ 308	$ 0.0905	$ 1,709	$ 0.5020
2019	6	0.75	$ 391.9	$ 0.115	$ 293	$ 0.0860	$ 2,002	$ 0.5880
2020	7	0.70	$ 390.7	$ 0.115	$ 275	$ 0.0809	$ 2,277	$ 0.6689
2021	8	0.67	$ 394.6	$ 0.116	$ 262	$ 0.0771	$ 2,540	$ 0.7460
2022	9	0.63	$ 398.3	$ 0.117	$ 250	$ 0.0734	$ 2,790	$ 0.8194
2023	10	0.59	$ 397.4	$ 0.117	$ 235	$ 0.0691	$ 3,025	$ 0.8885
2024	11	0.56	$ 401.4	$ 0.118	$ 224	$ 0.0658	$ 3,249	$ 0.9544
2025	12	0.53	$ 405.7	$ 0.119	$ 214	$ 0.0628	$ 3,463	$ 1.0172
2026	13	0.50	$ 409.3	$ 0.120	$ 203	$ 0.0597	$ 3,666	$ 1.0769
2027	14	0.47	$ 415.9	$ 0.122	$ 195	$ 0.0573	$ 3,861	$ 1.1342
2028	15	0.44	$ 423.3	$ 0.124	$ 187	$ 0.0550	$ 4,048	$ 1.1892
2029	16	0.42	$ 428.9	$ 0.126	$ 179	$ 0.0526	$ 4,227	$ 1.2418
2030	17	0.39	$ 433.9	$ 0.128	$ 171	$ 0.0504	$ 4,398	$ 1.2922
2031	18	0.37	$ 438.9	$ 0.130	$ 163	$ 0.0483	$ 4,561	$ 1.3404
2032	19	0.35	$ 443.9	$ 0.132	$ 156	$ 0.0462	$ 4,717	$ 1.3867
2033	20	0.33	$ 448.9	$ 0.134	$ 148	$ 0.0443	$ 4,865	$ 1.4310
2034	21	0.31	$ 453.9	$ 0.136	$ 142	$ 0.0424	$ 5,007	$ 1.4734
2035	22	0.29	$ 458.9	$ 0.138	$ 135	$ 0.0406	$ 5,141	$ 1.5139
2036	23	0.28	$ 463.9	$ 0.140	$ 129	$ 0.0388	$ 5,270	$ 1.5528
2037	24	0.26	$ 468.9	$ 0.142	$ 123	$ 0.0372	$ 5,393	$ 1.5900
2038	25	0.25	$ 473.9	$ 0.144	$ 117	$ 0.0356	$ 5,510	$ 1.6255

Example 2: NEW PROPOSED UTILITY AVOIDED COST AND NON-UTILITY IMPACTS

Hawaii Energy - PY14 - TRB Values Using Modified Current EEPS Utility Avoided Cost

			Discount Rate	Factored EEPS	Escalation Rate				
			6%	76%	3%				
				Utility Avoided Costs*		NPV for each Year		NPV Cumulative from Final Year	
Program Year	Year	Period	NPV Multiplier	$/kW/yr.	$/kWh/yr.	$/kW/yr.	$/kWh/yr.	$/kW/yr.	$/kWh/yr.
PY14	2015	1	1.00		$ 0.161	$ -	$ 0.1610	$ -	$ 0.1610
PY15	2016	2	0.94		$ 0.161	$ -	$ 0.1519	$ -	$ 0.3129
PY16	2017	3	0.89		$ 0.166	$ -	$ 0.1476	$ -	$ 0.4605
PY17	2018	4	0.84		$ 0.171	$ -	$ 0.1434	$ -	$ 0.6039
PY18	2019	5	0.79		$ 0.176	$ -	$ 0.1394	$ -	$ 0.7432
PY19	2020	6	0.75	$ 904	$ 0.181	$ 676	$ 0.1354	$ 676	$ 0.8786
PY20	2021	7	0.70	$ 986	$ 0.187	$ 695	$ 0.1316	$ 1,371	$ 1.0102
PY21	2022	8	0.67	$ 856	$ 0.192	$ 569	$ 0.1279	$ 1,940	$ 1.1381
PY22	2023	9	0.63	$ 750	$ 0.198	$ 471	$ 0.1242	$ 2,410	$ 1.2623
PY23	2024	10	0.59	$ 663	$ 0.204	$ 392	$ 0.1207	$ 2,803	$ 1.3830
PY24	2025	11	0.56	$ 590	$ 0.210	$ 329	$ 0.1173	$ 3,132	$ 1.5003
PY25	2026	12	0.53	$ 527	$ 0.216	$ 278	$ 0.1140	$ 3,410	$ 1.6143
PY26	2027	13	0.50	$ 474	$ 0.223	$ 236	$ 0.1108	$ 3,646	$ 1.7251
PY27	2028	14	0.47	$ 1,020	$ 0.230	$ 478	$ 0.1076	$ 4,124	$ 1.8327
PY28	2029	15	0.44	$ 1,066	$ 0.236	$ 471	$ 0.1046	$ 4,595	$ 1.9373
PY29	2030	16	0.42	$ 964	$ 0.244	$ 402	$ 0.1016	$ 4,997	$ 2.0389
PY30	2031	17	0.39	$ 875	$ 0.251	$ 344	$ 0.0987	$ 5,342	$ 2.1376
PY31	2032	18	0.37	$ 795	$ 0.258	$ 295	$ 0.0959	$ 5,637	$ 2.2336
PY32	2033	19	0.35	$ 724	$ 0.266	$ 254	$ 0.0932	$ 5,891	$ 2.3268
PY33	2034	20	0.33		$ 0.274	$ -	$ 0.0906	$ 5,891	$ 2.4174
PY34	2035	21	0.31		$ 0.282	$ -	$ 0.0880	$ 5,891	$ 2.5054
PY35	2036	22	0.29		$ 0.291	$ -	$ 0.0855	$ 5,891	$ 2.5909
PY36	2037	23	0.28		$ 0.300	$ -	$ 0.0831	$ 5,891	$ 2.6741
PY37	2038	24	0.26		$ 0.308	$ -	$ 0.0808	$ 5,891	$ 2.7548
PY38	2039	25	0.25		$ 0.318	$ -	$ 0.0785	$ 5,891	$ 2.8333

* EEPS (2013-0056) Avoided Capacity Cost factored by 76% to reflect contribution of kW reductions achieved on Oahu in PY13. $161/MWh Avoided Costs per Guidance Recommendations. This is a conservative estimate based on EEPS 2014 Projections of $192, $225 and $192/MWh for HECO, HELCO and MECO respectively.

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. PY14 Program Savings were achieved with an estimated TRC of $69,343,202. See **Table 37** for a comparison of incremental TRC to total project cost.

The largest customer investments were Customized Project Measures at $33,271,833 (48.0%), followed by High-Efficiency Water Heating at $12,693,400 (18.3%) and High-Efficiency Lighting at $8,967,181 (12.9%). See **Table 35** for details.

Table 35 Portfolio Total Resource Benefit and Costs (TRB & TRC) by Measure Category														
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	7,360	39.8%	53,556,003	45.9%	469,335,392	39.4%	8.8	6.4	$57,823,193	39.9%	$ 8,967,181	12.9%	$5,741,071	25.8%
Customized Project Measures	3,332	18.0%	25,076,938	21.5%	293,068,464	24.6%	11.7	1.0	$33,461,815	23.1%	$ 33,271,833	48.0%	$5,409,772	24.3%
High-Efficiency HVAC	2,467	13.3%	9,765,446	8.4%	155,973,979	13.1%	16.0	4.8	$20,507,196	14.2%	$ 4,259,823	6.1%	$2,104,527	9.5%
Business Direct Installation	785	4.2%	6,132,133	5.3%	85,849,866	7.2%	14.0	4.5	$9,578,240	6.6%	$ 2,124,513	3.1%	$2,124,758	9.6%
High-Efficiency Water Heating	745	4.0%	3,954,025	3.4%	56,134,094	4.7%	14.2	0.6	$7,159,989	4.9%	$ 12,693,400	18.3%	$1,832,891	8.2%
High-Efficiency Appliances	249	1.3%	4,134,480	3.5%	55,670,215	4.7%	13.5	2.7	$5,237,004	3.6%	$ 1,930,767	2.8%	$732,880	3.3%
Energy Awareness, Measurement And Control Systems	2,210	11.9%	8,465,197	7.3%	21,371,551	1.8%	2.5	1.5	$3,356,232	2.3%	$ 2,256,478	3.3%	$1,908,578	8.6%
High-Efficiency Air Conditioning	227	1.2%	805,061	0.7%	9,321,159	0.8%	11.6	21.0	$1,596,374	1.1%	$ 76,092	0.1%	$138,855	0.6%
Commercial Industrial Processes	67	0.4%	457,664	0.4%	8,811,476	0.7%	19.3	1.7	$845,900	0.6%	$ 503,511	0.7%	$144,900	0.7%
High-Efficiency Motors	67	0.4%	583,608	0.5%	8,754,121	0.7%	15.0	1.8	$927,748	0.6%	$ 529,035	0.8%	$146,560	0.7%
Building Envelope Improvements	173	0.9%	639,250	0.5%	6,392,503	0.5%	10.0	3.8	$1,038,072	0.7%	$ 269,763	0.4%	$149,690	0.7%
High-Efficiency Water Pumping	29	0.2%	384,472	0.3%	5,213,820	0.4%	13.6	1.6	$519,851	0.4%	$ 329,775	0.5%	$70,653	0.3%
Energy Efficiency Equipment Kits	242	1.3%	574,934	0.5%	4,205,051	0.4%	7.3	6.1	$785,128	0.5%	$ 129,667	0.2%	$129,667	0.6%
Restaurant Targeted Participation Programs	326	1.8%	715,864	0.6%	3,579,318	0.3%	5.0	88.6	$844,353	0.6%	$ 9,525	0.0%	$10,530	0.0%
Business Design, Audits And Commissioning	50	0.3%	672,113	0.6%	3,360,567	0.3%	5.0	0.3	$396,111	0.3%	$ 1,294,340	1.9%	$910,388	4.1%
Direct Installation - Residential Energy Kits	119	0.6%	390,714	0.3%	1,953,569	0.2%	5.0	4.2	$372,050	0.3%	$ 88,782	0.1%	$88,782	0.4%
Direct Installation - Solar Water Heating	27	0.1%	123,387	0.1%	1,850,802	0.2%	15.0	0.4	$247,031	0.2%	$ 579,675	0.8%	$579,675	2.6%
Energy Efficiency Equipment Grants	21	0.1%	149,583	0.1%	897,500	0.1%	6.0	8.3	$121,140	0.1%	$ 14,549	0.0%	$14,549	0.1%
Commercial Kitchen	0	0.0%	2,344	0.0%	28,126	0.0%	12.0	0.2	$3,178	0.0%	$ 14,494	0.0%	$950	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0	0.0	$0	0.0%	$ 0	0.0%	- $15,437	0.1%
Total	**18,497**	**100%**	**116,583,217**	**100%**	**1,191,771,572**	**100%**	**10.2**	**2.1**	**$144,820,605**	**100%**	**$ 69,343,202**	**100%**	**$22,224,237**	**100%**

**Accounting records for payments to specific programs including Advanced Power Strips, Multifamily Direct Install, and Power Down Timers, and for non-energy transactions including credit memos, and taxes.*

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 2.1 indicates that society is getting a 2.1 times return (or 210%) 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	%
ENERGY STAR LED Dimmable W/Controls	1	0.0%	7,396	0.0%	88,756	0.0%	12.0	194.8	$ 10,052	0.0%	$ 52	0.0%	$ 430	0.0%
T8 To T8 Low Wattage	7	0.0%	30,163	0.0%	452,452	0.0%	15.0	170.5	$ 61,380	0.0%	$ 360	0.0%	$ 5,115	0.0%
Low-Flow Spray Rinse Nozzles	326	1.8%	715,864	0.6%	3,579,318	0.3%	5.0	88.6	$ 844,353	0.6%	$ 9,525	0.0%	$ 10,530	0.0%
T12 To T8 Standard (3-ft. lamps)	0	0.0%	1,277	0.0%	17,878	0.0%	14.0	62.9	$ 2,076	0.0%	$ 33	0.0%	$ 186	0.0%
Whole House Fan	176	1.0%	353,057	0.3%	7,061,136	0.6%	20.0	27.0	$ 1,301,386	0.9%	$ 48,120	0.1%	$ 30,075	0.1%
VFD - AHU	732	4.0%	1,800,345	1.5%	27,005,169	2.3%	15.0	23.0	$ 4,877,760	3.4%	$ 211,934	0.3%	$ 133,713	0.6%
Delamping	13	0.1%	85,082	0.1%	1,191,149	0.1%	14.0	21.2	$ 138,100	0.1%	$ 6,504	0.0%	$ 4,065	0.0%
Freezer - Bounty	3	0.0%	83,817	0.1%	1,173,437	0.1%	14.0	16.6	$ 103,779	0.1%	$ 6,260	0.0%	$ 6,260	0.0%
Refrigerator - Bounty	23	0.1%	587,630	0.5%	8,226,816	0.7%	14.0	16.5	$ 727,577	0.5%	$ 44,205	0.1%	$ 44,205	0.2%
CEE Tier 1+ Motors	2	0.0%	3,482	0.0%	52,228	0.0%	15.0	14.8	$ 12,156	0.0%	$ 819	0.0%	$ 900	0.0%
VFD - Chilled Water / Condenser Water	498	2.7%	1,834,631	1.6%	24,248,138	2.0%	13.2	14.4	$ 2,983,869	2.1%	$ 207,825	0.3%	$ 195,600	0.9%
CFL	4,707	25.4%	36,189,129	31.0%	217,128,833	18.2%	6.0	14.1	$ 28,783,208	19.9%	$ 2,034,519	2.9%	$ 1,725,098	7.8%
LED Exit Signs	33	0.2%	289,859	0.2%	4,338,550	0.4%	15.0	13.5	$ 454,827	0.3%	$ 33,804	0.0%	$ 31,671	0.1%
Room Occupancy Sensors & Timers	36	0.2%	325,838	0.3%	1,821,022	0.2%	5.6	12.2	$ 318,079	0.2%	$ 26,100	0.0%	$ 26,100	0.1%
Delamping With Reflectors	73	0.4%	560,552	0.5%	7,847,726	0.7%	14.0	11.3	$ 881,249	0.6%	$ 78,220	0.1%	$ 38,705	0.2%
Ceiling Fans	51	0.3%	452,005	0.4%	2,260,023	0.2%	5.0	10.5	$ 294,988	0.2%	$ 27,972	0.0%	$ 108,780	0.5%
Window AC	49	0.3%	96,320	0.1%	1,155,843	0.1%	12.0	9.6	$ 255,501	0.2%	$ 26,550	0.0%	$ 14,750	0.1%
Metal Halide	11	0.1%	79,647	0.1%	1,115,063	0.1%	14.0	9.3	$ 127,826	0.1%	$ 13,753	0.0%	$ 11,945	0.1%

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	%
CFL Exchange	21	0.1%	149,583	0.1%	897,500	0.1%	6.0	8.3	$ 121,140	0.1%	$ 14,549	0.0%	$ 14,549	0.1%
Custom Lighting	53	0.3%	809,374	0.7%	11,244,268	0.9%	13.9	7.6	$ 1,070,216	0.7%	$ 140,757	0.2%	$ 178,144	0.8%
T12 To T8 Low Wattage	913	4.9%	6,193,365	5.3%	86,707,108	7.3%	14.0	7.3	$ 9,971,334	6.9%	$ 1,366,505	2.0%	$ 1,717,819	7.7%
Window Tinting	163	0.9%	614,714	0.5%	6,147,139	0.5%	10.0	6.5	$ 989,116	0.7%	$ 152,051	0.2%	$ 126,148	0.6%
Package Units – 15% Better Than Code	182	1.0%	986,351	0.8%	14,795,267	1.2%	15.0	6.4	$ 1,831,483	1.3%	$ 284,575	0.4%	$ 398,566	1.8%
Showerhead	62	0.3%	77,945	0.1%	389,723	0.0%	5.0	6.2	$ 134,139	0.1%	$ 21,672	0.0%	$ 21,672	0.1%
Home Energy Saving Kits-Online Fullfillment	242	1.3%	574,934	0.5%	4,205,051	0.4%	7.3	6.1	$ 785,128	0.5%	$ 128,348	0.2%	$ 128,348	0.6%
Efficiency Inside Home Design	0	0.0%	201,039	0.2%	3,015,579	0.3%	15.0	4.9	$ 230,167	0.2%	$ 46,800	0.1%	$ 46,800	0.2%
Water Cooler Timers	131	0.7%	1,756,497	1.5%	8,782,487	0.7%	5.0	4.6	$ 1,036,723	0.7%	$ 225,840	0.3%	$ 225,840	1.0%
Chillers	558	3.0%	3,460,429	3.0%	66,897,327	5.6%	19.3	3.4	$ 7,191,022	5.0%	$ 2,105,964	3.0%	$ 620,351	2.8%
T12 To T8 Standard (2 Ft. Lamps)	17	0.1%	178,655	0.2%	2,501,174	0.2%	14.0	3.4	$ 256,369	0.2%	$ 75,135	0.1%	$ 78,523	0.4%
Aerator	21	0.1%	38,675	0.0%	193,375	0.0%	5.0	3.2	$ 51,575	0.0%	$ 16,199	0.0%	$ 16,199	0.1%
Variable Refrigerant Flow Air Conditioners	560	3.0%	2,056,990	1.8%	30,854,854	2.6%	15.0	3.0	$ 4,509,707	3.1%	$ 1,526,775	2.2%	$ 876,218	3.9%
Building Envelope	40	0.2%	312,443	0.3%	9,373,290	0.8%	30.0	2.8	$ 705,510	0.5%	$ 255,362	0.4%	$ 80,962	0.4%
Refrigerator (with recycling of old)	108	0.6%	2,618,765	2.2%	36,662,713	3.1%	14.0	2.5	$ 3,258,201	2.2%	$ 1,314,360	1.9%	$ 405,925	1.8%
Advance Power Strips	21	0.1%	182,241	0.2%	911,203	0.1%	5.0	2.4	$ 119,068	0.1%	$ 48,838	0.1%	$ 48,901	0.2%
Clothes Washer	100	0.5%	736,402	0.6%	8,836,827	0.7%	12.0	2.3	$ 1,050,127	0.7%	$ 451,000	0.7%	$ 205,000	0.9%
Kitchen Ventilation	43	0.2%	254,466	0.2%	3,816,994	0.3%	15.0	2.2	$ 458,638	0.3%	$ 212,400	0.3%	$ 82,600	0.4%
Domestic Water Booster Packages	26	0.1%	247,424	0.2%	3,711,366	0.3%	15.0	2.0	$ 383,986	0.3%	$ 189,750	0.3%	$ 32,440	0.1%
LED Lighting	4,209	22.8%	29,592,627	25.4%	365,510,898	30.7%	12.4	1.9	$ 42,336,947	29.2%	$ 22,169,166	32.0%	$ 6,588,887	29.6%
VFD Pump (Non-HVAC)	21	0.1%	160,846	0.1%	1,608,464	0.1%	10.0	1.9	$ 197,524	0.1%	$ 105,729	0.2%	$ 42,292	0.2%
ECM	65	0.4%	580,126	0.5%	8,701,894	0.7%	15.0	1.7	$ 915,592	0.6%	$ 528,216	0.8%	$ 145,660	0.7%
Refrigeration	8	0.0%	582,355	0.5%	6,551,918	0.5%	11.3	1.7	$ 549,245	0.4%	$ 326,090	0.5%	$ 130,436	0.6%
Data Centers	42	0.2%	364,098	0.3%	4,369,174	0.4%	12.0	1.7	$ 495,988	0.3%	$ 290,589	0.4%	$ 80,954	0.4%
Solar Attic Fan	5	0.0%	126,763	0.1%	633,816	0.1%	5.0	1.7	$ 67,092	0.0%	$ 40,200	0.1%	$ 13,400	0.1%

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	%
Custom	56	0.3%	398,821	0.3%	5,444,917	0.5%	13.7	1.5	$ 623,326	0.4%	$ 416,460	0.6%	$ 110,206	0.5%
Submetering (Condo)	86	0.5%	626,454	0.5%	5,011,635	0.4%	8.0	1.3	$ 649,450	0.4%	$ 497,000	0.7%	$ 149,100	0.7%
Transformer	23	0.1%	203,198	0.2%	4,994,482	0.4%	24.6	1.3	$ 387,262	0.3%	$ 291,111	0.4%	$ 62,300	0.3%
Bi-Level Lighting	18	0.1%	181,198	0.2%	2,189,009	0.2%	12.1	1.3	$ 234,720	0.2%	$ 178,240	0.3%	$ 36,381	0.2%
EMS Controls	482	2.6%	3,883,525	3.3%	57,447,577	4.8%	14.8	1.1	$ 6,113,365	4.2%	$ 5,752,024	8.3%	$ 711,838	3.2%
Custom Controls	72	0.4%	742,826	0.6%	6,555,724	0.6%	8.8	1.1	$ 763,181	0.5%	$ 695,668	1.0%	$ 336,849	1.5%
VFD Pool Pumps	3	0.0%	137,048	0.1%	1,502,454	0.1%	11.0	1.0	$ 135,865	0.1%	$ 140,025	0.2%	$ 38,213	0.2%
Refrigerator (Purchase New Only)	4	0.0%	25,677	0.0%	359,477	0.0%	14.0	1.0	$ 43,428	0.0%	$ 44,800	0.1%	$ 14,000	0.1%
Peer Group Comparison - Phase 1/2/3	1,957	10.6%	5,756,406	4.9%	5,756,406	0.5%	1.0	0.9	$ 1,351,980	0.9%	$ 1,507,538	2.2%	$ 1,507,538	6.8%
Water Heating	18	0.1%	138,172	0.1%	764,630	0.1%	5.5	0.9	$ 102,987	0.1%	$ 114,064	0.2%	$ 93,209	0.4%
On Demand Ventilation Control - AC	1	0.0%	12,554	0.0%	188,312	0.0%	15.0	0.7	$ 18,543	0.0%	$ 25,000	0.0%	$ 1,972	0.0%
Solar Water Heating	726	3.9%	3,442,155	3.0%	51,632,322	4.3%	15.0	0.6	$ 6,732,901	4.6%	$ 11,760,075	17.0%	$ 2,332,892	10.5%
Custom HVAC	494	2.7%	2,140,960	1.8%	32,114,393	2.7%	15.0	0.6	$ 4,352,613	3.0%	$ 7,123,483	10.3%	$ 532,813	2.4%
Solar Water Heating Tune-Up	50	0.3%	431,090	0.4%	2,155,452	0.2%	5.0	0.6	$ 282,529	0.2%	$ 509,400	0.7%	$ 254,700	1.1%
LED Refrigerated Case Lighting	35	0.2%	214,405	0.2%	1,281,568	0.1%	6.0	0.6	$ 180,026	0.1%	$ 292,681	0.4%	$ 105,076	0.5%
Custom EMS Controls	35	0.2%	806,282	0.7%	7,996,146	0.7%	9.9	0.4	$ 820,992	0.6%	$ 1,960,281	2.8%	$ 318,463	1.4%
Heat Pump	46	0.3%	635,257	0.5%	6,352,574	0.5%	10.0	0.4	$ 674,119	0.5%	$ 1,513,000	2.2%	$ 79,674	0.4%
Custom VFD For Cooling Tower	27	0.1%	186,079	0.2%	2,462,942	0.2%	13.2	0.4	$ 293,399	0.2%	$ 726,265	1.0%	$ 48,737	0.2%
Cool Roof Technologies	10	0.1%	24,536	0.0%	245,364	0.0%	10.0	0.4	$ 48,956	0.0%	$ 117,712	0.2%	$ 23,542	0.1%
Water Pumping	0	0.0%	241,023	0.2%	1,205,115	0.1%	5.0	0.3	$ 113,582	0.1%	$ 334,741	0.5%	$ 135,000	0.6%
Reach-In Refrigerator Solid Door	0	0.0%	1,423	0.0%	17,072	0.0%	12.0	0.2	$ 1,929	0.0%	$ 9,217	0.0%	$ 850	0.0%
Ice Machine (Add Size Range)	0	0.0%	921	0.0%	11,054	0.0%	12.0	0.2	$ 1,249	0.0%	$ 5,277	0.0%	$ 100	0.0%
Contractor Reward (SBDIL)	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 0	0.0%	$ 77,727	0.3%
Recycler App - Freezer	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 16,320	0.0%	$ 3,605	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 0	0.0%	$ -15,191	0.1%

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**	**%**
Recycler App - Refrigerator	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 24,860	0.0%	$ 24,860	0.1%
Efficiency Project Auction	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 1,319	0.0%	$ 1,319	0.0%
Energy Study	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 165,000	0.2%	$ 235,489	1.1%
Installation Cost - Ladders	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 11,058	0.0%	$ 11,058	0.0%
Central Plant Benchmarking	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 285,199	0.4%	$ 285,199	1.3%
Custom Water Heater	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 3,500	0.0%	$ 3,500	0.0%
Recycler App - Accounting	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 0	0.0%	$ 0	0.0%
Recycler App - Window AC	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 8,460	0.0%	$ 8,460	0.0%
Total	18,497	100%	116,583,217	100%	1,191,771,572	100%	10.2	2.1	$ 144,820,605	100%	$ 69,343,202	100%	$ 22,224,237	100%
* Accounting records for payments to specific programs including Advanced Power Strips, Multifamily Direct Install, and Power Down Timers, and for non-energy transactions including credit memos, and taxes.														

Table 37 Total vs. Incremental Measure Cost			
Measure	**Measure Total Cost ($)**	**Measure Incremental ($)**	**Difference ($)**
LED Lighting	$25,253,808.33	$22,182,058.98	$3,071,749.35
Solar Water Heating	$11,796,075.00	$11,796,075.00	$ 0.00
Chillers	$10,529,820.00	$2,105,964.00	$8,423,856.00
Custom HVAC	$7,123,483.00	$7,123,483.00	$ 0.00
EMS Controls	$5,752,023.86	$5,752,023.86	$ 0.00
Refrigerator (with Recycling of Old)	$4,383,600.00	$1,315,080.00	$3,068,520.00
Variable Refrigerant Flow Air Conditioners	$3,053,549.00	$1,526,774.50	$1,526,774.50
T12 to T8 Low Wattage	$2,735,508.25	$1,371,453.45	$1,364,054.80
CFL	$2,708,869.14	$2,041,050.04	$ 667,819.10
Clothes Washer	$2,256,650.00	$ 451,330.00	$1,805,320.00
Custom EMS Controls	$1,960,281.00	$1,960,281.00	$ 0.00
Heat Pump	$1,513,000.00	$1,513,000.00	$ 0.00
Peer Group Comparison - Phase 1/2/3	$1,507,537.51	$1,507,537.51	$ 0.00
Package Units - 15% Better Than Code	$1,422,876.00	$ 284,575.20	$1,138,300.80
VFD - AHU	$ 852,175.25	$ 213,043.81	$ 639,131.44
VFD - Chilled Water / Condenser Water	$ 831,300.00	$ 207,825.00	$ 623,475.00
Custom VFD for Cooling Tower	$ 726,264.68	$ 726,264.68	$ 0.00
Custom Controls	$ 695,668.00	$ 695,668.00	$ 0.00
Window Tinting	$ 608,203.36	$ 152,050.84	$ 456,152.52
ECM	$ 528,216.00	$ 528,216.00	$ 0.00
Solar Water Heating Tune-up	$ 509,400.00	$ 509,400.00	$ 0.00
Submetering (Condo)	$ 497,000.00	$ 497,000.00	$ 0.00
Cool Roof Technologies	$ 470,848.60	$ 117,712.15	$ 353,136.45
Custom	$ 416,460.48	$ 416,460.48	$ 0.00
Water Pumping	$ 334,741.33	$ 334,741.33	$ 0.00
Energy Study	$ 330,000.00	$ 165,000.00	$ 165,000.00
Refrigeration	$ 326,090.25	$ 326,090.25	$ 0.00
LED Refrigerated Case Lighting	$ 292,681.00	$ 292,681.00	$ 0.00
Transformer	$ 291,111.00	$ 291,111.00	$ 0.00
Data Centers	$ 290,589.00	$ 290,589.00	$ 0.00
Central Plant Benchmarking	$ 285,199.14	$ 285,199.14	$ 0.00
Building Envelope	$ 255,362.00	$ 255,362.00	$ 0.00

Table 37 (cont'd) Total vs. Incremental Measure Cost			
Measure	**Measure Total Cost ($)**	**Measure Incremental ($)**	**Difference ($)**
Domestic Water Booster Packages	$ 253,000.00	$ 189,750.00	$ 63,250.00
Water Cooler Timers	$ 225,840.00	$ 225,840.00	$ 0.00
Refrigerator (Purchase New Only)	$ 224,800.00	$ 44,960.00	$ 179,840.00
Kitchen Ventilation	$ 212,400.00	$ 212,400.00	$ 0.00
Bi-Level Lighting	$ 178,239.56	$ 178,239.56	$ 0.00
VFD Pool Pumps	$ 171,825.00	$ 140,025.00	$ 31,800.00
Custom Lighting	$ 142,604.79	$ 142,604.79	$ 0.00
Ceiling Fans	$ 139,950.00	$ 27,990.00	$ 111,960.00
Metal Halide	$ 137,532.00	$ 13,753.20	$ 123,778.80
Window AC	$ 132,750.00	$ 26,550.00	$ 106,200.00
Home Energy Saving Kits- Online Fulfillment	$ 128,347.80	$ 128,347.80	$ 0.00
Water Heating	$ 114,064.46	$ 114,064.46	$ 0.00
VFD Pump (Non-HVAC)	$ 105,728.88	$ 105,728.88	$ 0.01
T12 to T8 Standard (2 foot lamps)	$ 84,682.50	$ 75,135.00	$ 9,547.50
Recycler App - Freezer	$ 81,600.00	$ 16,320.00	$ 65,280.00
Delamping with Reflectors	$ 78,220.00	$ 78,220.00	$ 0.00
Advance Power Strips	$ 48,837.93	$ 48,837.93	$ 0.00
Whole House Fan	$ 48,240.00	$ 48,240.00	$ 0.00
Efficiency Inside Home Design	$ 46,800.00	$ 46,800.00	$ 0.00
Refrigerator - Bounty	$ 44,270.00	$ 44,270.00	$ 0.00
Solar Attic Fan	$ 40,200.00	$ 40,200.00	$ 0.00
LED Exit Signs	$ 33,804.00	$ 33,804.00	$ 0.00
CFL Exchange	$ 28,266.17	$ 28,266.17	$ 0.00
Room Occupancy Sensors & Timers	$ 26,100.00	$ 26,100.00	$ 0.00
On Demand Ventilation Control - AC	$ 25,000.00	$ 25,000.00	$ 0.00
Recycler App - Refrigerator	$ 24,860.00	$ 24,860.00	$ 0.00
Custom Water Heater	$ 24,500.00	$ 24,500.00	$ 0.00
Showerhead	$ 21,672.30	$ 21,672.30	$ 0.00
T8 to T8 Low Wattage	$ 18,000.00	$ 360.00	$ 17,640.00
CEE Tier 1+ Motors	$ 16,380.00	$ 819.00	$ 15,561.00
Aerator	$ 16,198.58	$ 16,198.58	$ 0.00

Table 37 (cont'd) Total vs. Incremental Measure Cost			
Measure	**Measure Total Cost ($)**	**Measure Incremental ($)**	**Difference ($)**
Delamping	$ 12,424.00	$ 12,424.00	$ 0.00
Installation Cost - Ladders	$ 11,057.50	$ 11,057.50	$ 0.00
Low-Flow Spray Rinse Nozzles	$ 9,525.00	$ 9,525.00	$ 0.00
Reach-In Refrigerator Solid Door	$ 9,217.00	$ 9,217.00	$ 0.00
Recycler App - Window AC	$ 8,460.00	$ 8,460.00	$ 0.00
Freezer - Bounty	$ 6,260.00	$ 6,260.00	$ 0.00
Ice Machine (add size range)	$ 5,276.80	$ 5,276.80	$ 0.00
ENERGY STAR LED Dimmable w/Controls	$ 2,580.00	$ 51.60	$ 2,528.40
Efficiency Project Auction	$ 1,319.08	$ 1,319.08	$ 0.00
T12 to T8 Standard (3 foot lamps)	$ 660.00	$ 33.00	$ 627.00
Contractor Reward (SBDIL)	$ 0.00	$ 0.00	$ 0.00
Accounting	$ 0.00	$ 0.00	$ 0.00
Recycler App - Accounting	$ 0.00	$ 0.00	$ 0.00
Totals	**$ 93,479,885**	**$ 69,448,582**	**$ 24,031,303**

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 PY14, the Program's Island Equity targets were met due to:

- Increased activity in hotel renovations on the neighbor islands
- Airport performance contracts
- Direct install solar water heating on Hawaii island
- Island-wide fresh water leak detection sensor project

Table 38
Program and Customer Level Island Equity by Business and Residential

PY14 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
Hawaii	Hawaii Island	1,062,511,291	11.80%	5,022,834	9.2%	0.5%	10,136,676	16.4%	1.0%	15,159,511	13.0%	1.4%
Honolulu	Oahu	6,781,664,556	75.60%	42,867,892	78.5%	0.6%	43,276,972	69.8%	0.6%	86,144,864	73.9%	1.3%
Maui	Lanai, Maui, Molokai	1,132,055,167	12.60%	6,720,628	12.3%	0.6%	8,558,214	13.8%	0.8%	15,278,842	13.1%	1.3%
	Lanai	26,528,809	0.30%	33,543	0.1%	0.1%	35,233	0.1%	0.1%	68,776	0.1%	0.3%
	Maui	1,076,319,631	12.00%	6,667,503	12.2%	0.6%	8,477,092	13.7%	0.8%	15,144,594	13.0%	1.4%
	Molokai	29,206,727	0.30%	19,582	0.0%	0.1%	45,889	0.1%	0.2%	65,471	0.1%	0.2%
Total		**8,976,231,014**	**100.00%**	**54,611,354**	**100.00%**	**0.6%**	**61,971,862**	**100.00%**	**0.7%**	**116,583,217**	**100.00%**	**1.3%**

PY14 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
Hawaii	Hawaii Island	1,062,511,291	11.8%	5,737,020	9.0%	0.5%	11,764,892	16.6%	1.1%	17,501,912	13.0%	1.6%
Honolulu	Oahu	6,781,664,556	75.6%	50,012,354	78.4%	0.7%	49,232,175	69.5%	0.7%	99,244,529	73.7%	1.5%
Maui	Lanai, Maui, Molokai	1,132,055,167	12.6%	8,001,402	12.6%	0.7%	9,848,398	13.9%	0.9%	17,849,801	13.3%	1.6%
	Lanai	26,528,809	0.3%	32,430	0.1%	0.1%	40,707	0.1%	0.2%	73,138	0.1%	0.3%
	Maui	1,076,319,631	12.0%	7,945,141	12.5%	0.7%	9,755,286	13.8%	0.9%	17,700,427	13.2%	1.6%
	Molokai	29,206,727	0.3%	23,831	0.0%	0.1%	52,404	0.1%	0.2%	76,236	0.1%	0.3%
Total		**8,976,231,014**	**100.0%**	**63,750,776**	**100.0%**	**0.7%**	**70,845,465**	**100.0%**	**0.8%**	**134,596,241**	**100.0%**	**1.5%**

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

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 44.7%. The next highest incentive recipient rate schedule is "P" with 23.1%. Schedule "P" customers are Large Power Service users with demand greater than 200 kW per month.

The impact of the actual incentive distributed within each island is: 68.1% of incentive funds on Oahu, 17.5% on Hawaii, 13.2% on Maui, 0.7% on Lanai and 0.6% on Molokai as shown in **Table 39**.

Table 39
Island Incentive Spending by Rate Schedule

Island	R	G	J	P	DS	F	Total	%
Hawaii	$ 2,415,388	$ 342,075	$ 641,881	$ 471,974	$ 0	$ 18,886	$ 3,890,204	17.5%
Lanai	$ 118,556	$ 27,808	$ 1,555	$ 0	$ 0	$ 0	$ 147,919	0.7%
Maui	$ 1,562,999	$ 161,513	$ 311,286	$ 892,180	$ 0	$ 0	$ 2,927,978	13.2%
Molokai	$ 123,846	$ 1,605	$ 2,180	$ 0	$ 0	$ 0	$ 127,631	0.6%
Oahu	$ 5,705,424	$ 1,332,186	$ 3,016,899	$ 3,764,440	$ 1,283,201	$ 28,356	$ 15,130,505	68.1%
Total	**$9,926,211**	**$1,865,188**	**$3,973,801**	**$5,128,594**	**$1,283,201**	**$47,241**	**$22,224,237**	**100.0%**
Percent	44.7%	8.4%	17.9%	23.1%	5.8%	0.2%	100.0%	

Table 40 shows the island equity by program category. In total, energy savings was distributed as follows: 73.9% in Honolulu, 13.0% in Hawaii and 13.1% in Maui counties.

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

Program	Hawaii Island/ County	Lanai	Maui	Molokai	Maui County	Oahu C&C Honolulu	Total	%
BEEM	2,427,894	5,102	3,070,404	19,582	3,095,088	16,631,621	22,154,603	19.0%
CBEEM	1,174,953	0	3,005,111	0	3,005,111	21,186,245	25,366,309	21.8%
BESM	241,023	0	0	0	0	0	241,023	0.2%
BHTR	1,178,965	28,441	591,987	0	620,428	5,050,026	6,849,420	5.9%
Business Programs	**5,022,834**	**33,543**	**6,667,503**	**19,582**	**6,720,628**	**42,867,892**	**54,611,354**	**46.8%**
REEM	9,986,259	35,233	8,406,733	42,125	8,484,091	42,263,256	60,733,605	52.1%
CESH	0	0	0	0	0	0	0	0.0%
RESM	41,949	0	38,540	3,765	42,305	547,642	631,896	0.5%
RHTR	108,468	0	31,819	0	31,819	466,074	606,361	0.5%
Residential Programs	**10,136,676**	**35,233**	**8,477,092**	**45,889**	**8,558,214**	**43,276,972**	**61,971,862**	**53.2%**
Total	**15,159,511**	**68,776**	**15,144,594**	**65,471**	**15,278,842**	**86,144,864**	**116,583,217**	**100%**
Percent	13.0%	0.1%	13.0%	0.1%	13.1%	73.9%	100%	

Table 41 shows island equity by incentive dollars spent. The actual incentive spending received by each island is broken down as follows: 68.1% in Honolulu, 17.5% in Hawaii and 14.4% in Maui counties.

Table 41 Island Equity Incentives by Program Category								
Program	**Hawaii Island / County**	**Lanai**	**Maui**	**Molokai**	**Maui County**	**Oahu / City & County of Honolulu**	**Total**	**%**
BEEM	$ 429,145	$ 1,555	$ 509,124	$ 3,785	$ 514,464	$ 2,642,918	$ 3,586,527	16.1%
CBEEM	$ 277,050	$ 0	$ 573,696	$ 0	$ 573,696	$ 4,706,453	$ 5,557,198	25.0%
BESM	$ 431,968	$ 0	$ 126,104	$ 0	$ 126,104	$ 328,593	$ 886,665	4.0%
BHTR	$ 333,538	$ 27,808	$ 157,291	$ 0	$ 185,099	$ 1,697,082	$ 2,215,720	10.0%
Business Programs	**$ 1,471,702**	**$ 29,363**	**$ 1,366,215**	**$ 3,785**	**$ 1,399,363**	**$ 9,375,046**	**$ 12,246,110**	**55.1%**
REEM	$ 1,871,253	$ 118,556	$ 1,480,939	$ 121,596	$ 1,721,090	$ 5,418,818	$ 9,011,161	40.5%
CESH	$ 0	$ 0	$ 0	$ 0	$ 0	$ 1,319	$ 1,319	0.0%
RESM	$ 25,200	$ 0	$ 22,950	$ 2,250	$ 25,200	$ 250,950	$ 301,350	1.4%
RHTR	$ 522,050	$ 0	$ 57,875	$ 0	$ 57,875	$ 84,372	$ 664,297	3.0%
Residential Programs	**$ 2,418,503**	**$ 118,556**	**$ 1,561,764**	**$ 123,846**	**$ 1,804,165**	**$ 5,755,459**	**$ 9,978,127**	**44.9%**
Total	**$3,890,204**	**$147,919**	**$2,927,978**	**$127,631**	**$3,203,528**	**$15,130,505**	**$22,224,237**	**100%**
Percent	17.5%	0.7%	13.2%	0.6%	14.4%	68.1%	100%	

BUSINESS PROGRAM

Overall Impacts

For PY14, Hawaii Energy's Business program achieved savings of 54,611,354 kWh (first year), 692,734,369 lifetime kWh and 8,414 kW savings with $12,246,110 in incentives. In relative terms, 55.1% of Hawaii Energy's incentives ($12,246,110 out of $22,224,237 of direct incentives) captured 46.9% of kWh (first year), 58% of lifetime kWh and 45.5% of kW demand first year savings, respectively, with a Total Resource Benefit to Cost ratio of 1.8.

Table 42 provides a detailed breakdown by program with a closer look at each program to follow. For PY14, 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.

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.

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	88,071	3,821	45.4%	22,154,603	40.6%	308,911,319	44.6%	13.9	4.1	$ 36,751,925	45.3%	$ 8,958,967	19.9%	$ 3,586,527	29.3%
CBEEM	60,199	3,481	41.4%	25,366,309	46.4%	293,171,679	42.3%	11.6	1.0	$ 33,797,316	41.7%	$ 32,943,863	73.1%	$ 5,557,198	45.4%
BHTR	33,335	1,112	13.2%	6,849,420	12.5%	89,446,256	12.9%	13.1	4.9	$ 10,424,522	12.9%	$ 2,143,255	4.8%	$ 2,215,720	18.1%
BESM	69	0	0.0%	241,023	0.4%	1,205,115	0.2%	5.0	0.1	$ 113,582	0.1%	$ 1,043,250	2.3%	$ 886,665	7.2%
Total	**181,674**	**8,414**	**100%**	**54,611,354**	**100%**	**692,734,369**	**100%**	**12.7**	**1.8**	**$ 81,087,345**	**100%**	**$ 45,089,335**	**100%**	**$ 12,246,110**	**100%**

Midstream Program

To increase the effectiveness and efficiency of the commercial lighting program, in PY14 Hawaii Energy launched a midstream commercial lighting program to offer an instant rebate to commercial electric utility account holders at the point of purchase. Instant rebates on prescriptive lighting measures like reduced wattage T8's and LED lamps are offered at point of purchase through local and national lighting distributors. However, any new initiative as complex as this offering takes a significant amount of work on both the program and the participating distributors. Consequently, only one lighting distributor was signed up late in the program year, resulting in energy and demand savings below expectations. However, a significant amount of excitement was generated in the market sector and an additional six distributors have expressed interest in joining the program in PY15.

Energy Efficiency Auction

In PY14 Hawaii Energy conducted its first-ever Energy Efficiency Auction by inviting contractors, energy vendors, property managers and developers to compete for funding of their independent, cost-effective projects that focused on high energy consumption or hard-to-reach businesses. The purpose of the Energy Efficiency Auction was to allow the market to be creative in the actions and measures that achieve the turnkey savings and market penetration

goals. Eligible projects in the auction were any commercially available energy efficiency technology, mass installation opportunity, hard-to-reach market segment or offering either not currently served by existing Hawaii Energy programs or that the contractors were able to accomplish in a more cost-effective manner.

Hawaii Energy allocated up to $1,144,011 in incentives for commercial projects under this initiative. Each commercial project for consideration had to be for at least $50,000 in incentives. Applicants were allowed to request incentives up to, but not exceeding, the overall project cost. Selected projects had to be completed by May 30th, 2015. Hawaii Energy received proposals from 28 companies representing 68 different projects as a result of this Energy Efficiency Auction. From this pool, Hawaii Energy selected three proposals to fund. However, as expected, the short project cycle proved to be a significant barrier for many proposed projects and impacted two of the three proposals selected.

The following three projects were selected for funding:

Honeywell Smart Grid Solutions

This project initially targeted past SBDIL customers across Oahu and was subsequently broadened to any small business with central air conditioning. The project, budgeted for approximately $422,000 offered the installation of Honeywell WiFi 9000 smart thermostats with a software application to enable the small business owner to manage their energy use. When applicable, additional energy efficiency measures were included to increase the overall potential energy savings. With marketing commencing in April, the project's first customers were secured in May.

This project was selected, in part, as an opportunity to broaden Hawaii Energy's offerings to a traditionally underserved market by energy efficiency programs especially on air-conditioning related measures. With such a short period of time to stand up the program and generated demand, this offering will continue in PY15 and run its course as originally proposed.

Ibis Networks

Ibis Networks (Ibis) was selected for its "shovel-ready" project with the University of Hawaii as it fit well with Hawaii Energy's call for innovative solutions. This project, using Ibis' system of InteliSockets, InteliGateways and an InteliNetwork provided an opportunity to demonstrate a technology addressing what is considered to be one of the fastest-growing energy consumers in commercial buildings today; plug loads. This project, spanning three University of Hawaii campuses including Manoa, Windward and Hilo cost $168,140 of which $110,000 was offset by the Hawaii Energy auction.

Deployed and commissioned in May, a baseline was established for each campus with recommendations for policies and changes that would create savings for the school. This enabled discussions to begin with university personnel to consider scheduling and behavioral modifications to save significant amounts of energy during both core and non-core (nights, holidays, weekends) hours. Hawaii Energy, Ibis and the UH campuses will continue monitoring the progress of this project, which has a three year term.

Matrix Direct Install

The final commercial project selected in the Energy Efficiency Auction was a direct install project offered by Matrix Energy Services, Inc. using local electrical contractors. The project was targeted at market segments such as hotels, multi-family facilities, retail, restaurants, grocery and convenience stores, as well as hard-to-reach businesses. The project delivered the following technologies at little or no cost to the customer:

- Screw-in LED bulbs
- Linear LED bulbs
- LED exit signs
- Anti-Sweat Heater Controls
- Door closers for refrigerators and freezers
- Strip curtains for refrigerators and freezers

The project was awarded to Matrix in December 2014, which only left five months to market and deliver energy efficiency solutions to customers. Marketing was completed in April 2015 with proposals made to 163 businesses in the three counties served by the programs. However, as mentioned earlier, the short project cycle did not allow for all of the installations to be completed in PY14. Therefore, this offering will continue in PY15 and run its course as originally proposed.

Central Chiller Plant Benchmarking Program

The Central Plant Benchmarking Program was continued in PY14. 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 engineers at Hawaii Energy, having access to real-time and trend data for a variety of applications is an invaluable resource.

Direct Install Refrigeration Measures Pilot Program

In grocery stores, refrigeration electricity consumption can be as much as 60% of the customer's total energy consumption. Refrigeration systems are vital pieces of equipment for every foodservice operator, but since these systems operate 24 hours per day, 7 days a week, all year long, the smallest amounts of energy waste resulting from poor maintenance or negligence can add up to substantial costs over time. As part of the energy efficiency auction, a third party contractor submitted a direct install project to reduce the energy consumption of refrigeration units by significantly decreasing the cold air leakage from these systems. Although the original proposal was not sufficiently developed to be accepted as part of the energy auction, Hawaii Energy continued to work with the contractor after the auction was closed to develop a pilot program to offer these refrigeration energy efficiency measures, specifically new refrigeration gaskets, strip curtains and automatic door closers. The pilot program was successful in savings 265,796 kWh per year for nine grocery stores on Oahu at a cost of $50,406 in incentive funds.

Small Business Direct Install Lighting (SBDIL)

This offer provided full-cost lighting retrofits to 570 small businesses and restaurants to achieve 78,370,461 kWh - Life in customer level savings. The $2,124,758 of PBFA funds invested into these projects is now producing over $2,547,824 in annual savings for these businesses. This is a 120% annual Internal Rate of Return (IRR) and will achieve over $35.7 M in lifetime cost savings. The number of participating contractors also doubled.

Overall Expenditures

The Hawaii Energy commercial team continued its focus beyond the BEEM and CBEEM Program in PY14, 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

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
Business (C&I) Programs					
Operations and Management					
BEEM	$ 1,145,534.76	$ 1,160,000.00	98.75%	$ 14,465.24	1.25%
CBEEM	$ 1,183,445.15	$ 1,220,000.00	97.00%	$ 36,554.85	3.00%
BESM	$ 498,397.56	$ 525,000.00	94.93%	$ 26,602.44	5.07%
BHTR	$ 610,986.36	$ 616,130.00	99.17%	$ 5,143.64	0.83%
Total Business Programs	$ 3,438,363.83	$ 3,521,130.00	97.65%	$ 82,766.17	2.35%
Business Evaluation	$ 210,430.20	$ 250,000.00	84.17%	$ 39,569.80	15.83%
Business Outreach	$ 678,511.44	$ 720,000.00	94.24%	$ 41,488.56	5.76%
Total Business Non-Incentives	**$ 4,327,305.47**	**$ 4,491,130.00**	**96.35%**	**$ 163,824.53**	**3.65%**
Business Incentives					
BEEM	$ 3,586,527.04	$ 4,159,550.00	86.22%	$ 573,022.96	13.78%
CBEEM	$ 5,557,198.04	$ 5,862,261.00	95.00%	$ 305,062.96	5.20%
BESM	$ 886,665.49	$ 1,107,500.00	80.06%	$ 220,834.51	19.94%
BHTR	$ 2,215,719.66	$ 2,390,270.00	92.70%	$ 174,550.34	7.30%
Subtotal Business Incentives	$ 12,246,110.23	$ 13,519,581.00	90.58%	$ 1,273,470.77	9.42%
Business Transformational	$ 1,990,261.28	$ 2,135,850.00	93.18%	$ 145,588.72	6.82%
Total Business Incentives	**$ 14,236,371.51**	**$ 15,655,431.00**	**90.94%**	**$ 1,419,059.49**	**9.06%**
Total Business Programs	**$ 18,563,676.98**	**$ 20,146,561.00**	**92.14%**	**$ 1,582,884.02**	**7.86%**

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 to collaborate and support trade allies that leverage resources to promote energy conservation and efficiency.

Clean Energy Ally (CEA) Program

In PY14, Hawaii Energy launched its Clean Energy Ally Program as a means of formalizing its engagement with trade allies and providing additional value to these important individuals and companies responsible for making energy efficiency happen. For full details on the Clean Energy Ally Program, see *Clean Energy Ally (CEA) Program* in the Transformational Section.

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. Over the years, Hawaii Energy has developed a strong training program for lighting and HVAC contractors, mechanical contractors, architects and engineers participating in its business incentive program. During PY14, we augmented these efforts with a number of training sessions specifically for the Clean Energy Allies.

Continuous Feedback

The Clean Energy Ally program has helped Hawaii Energy gain additional intelligence surrounding trade ally perspectives and concerns. We have incorporated this feedback into the program planning process to establish well-supported, effective strategies. Industry groups are another way Hawaii Energy incorporates the views of representatives from key sectors. 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 performance by trade ally. Those trade allies that have signed on as Hawaii Energy's Clean Energy Allies are indicated with an *.

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**
Direct From Applicants	*1,155*	*5,713*	*34,006,469*	*404,209,621*	*50.1 %*	*$ 6,014,621*
Johnson Controls	72	868	4,439,376	72,343,735	9.0 %	$ 800,917
Energy Industries*	544	578	4,379,439	70,478,757	8.7 %	$ 758,491
EMCC*	588	168	1,547,792	22,418,038	2.8 %	$ 537,831
Lend Lease	3	61	500,575	13,095,456	1.6 %	$122,146
Paradise Lighting*	449	111	885,759	12,649,945	1.6 %	$ 279,100
AMM Electrical & AE Solutions, LLC*	459	158	897,805	12,569,277	1.6 %	$ 395,484
Correa Electric, LLC*	309	80	741,201	10,376,808	1.3 %	$ 224,819
Sylvania Lighting Services*	40	115	732,839	10,166,072	1.3 %	$ 85,385
W Services, LLC	5,104	158	1,772,888	8,864,438	1.1 %	$ 131,280
Trane*	3	24	701,231	8,099,375	1.0 %	$ 125,724
InSynergy Engineering*	5	75	406,267	7,136,595	0.9 %	$ 40,121
Pono Energy Solutions*	370	30	504,259	7,059,624	0.9 %	$ 254,842
Clear Blue Energy Corp*	1	55	381,958	5,729,370	0.7 %	$ 64,107
Hawaii Energy	10	93	590,939	5,696,401	0.7 %	$ 105,442
Dorvin D. Leis	4	85	364,096	5,626,355	0.7 %	$ 57,322
21st Century Lighting*	24	50	451,608	5,562,216	0.7 %	$ 65,872
InnCom	3	83	624,750	5,281,500	0.7 %	$ 83,300
Loeb Lighting Services, Inc.	1	57	498,986	4,989,860	0.6 %	$ 81,981
M. Watanabe Electrical Contractor, Inc.*	8	59	347,181	4,810,951	0.6 %	$ 50,737
Melink Corporation*	8	53	310,694	4,660,410	0.6 %	$ 82,600
Nordic PCL	5	42	256,200	4,520,690	0.6 %	$ 28,205
Photonworks Engineering, LLP*	3	74	648,213	4,015,282	0.5 %	$ 106,538
E Solutions	1	46	398,992	3,989,920	0.5 %	$ 53,579
Chelsea Group*	3	20	209,255	3,956,218	0.5 %	$ 114,606
Pacific Rim Connections	1	32	279,006	3,348,072	0.4 %	$ 59,782
BTS LED*	6	26	219,336	3,290,046	0.4 %	$ 33,269
American LED & Energy*	7	15	153,481	3,222,966	0.4 %	$ 23,744
Gexpro*	1	23	205,552	3,083,280	0.4 %	$ 48,730
WSP Group	24	39	248,742	3,067,998	0.4 %	$ 42,078
Island Energy Systems	4	30	209,245	2,900,890	0.4 %	$ 14,376
Remaining Allies	*2,802*	*857*	*5,836,642*	*69,982,484*	*8.7 %*	*$ 1,359,080*
Totals	**12,017**	**9,877**	**63,750,776**	**807,202,647**	**100.0 %**	**$ 12,246,110**

Business Energy Efficiency Measures (BEEM)

Objectives

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



Hyatt Residence Club
Kaanapali, Maui, Hawaii

The Hyatt Residence Club is a 132-room time share facility in the Kaanapali resort area of Lahaina, Maui, completed on November 14, 2014. Club management became aware of potential energy efficiency upgrades from the engineering team at its sister property, Hyatt Regency Maui. The upgrades included high-efficiency chillers and lighting, heat pumps and a solar water heating system, pump VFDs, guest room EMS systems and more, earning them a $85,276.92 incentive with expected savings of 713, 450 kWh ($192,631) annually.

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 the continued success of LED lamps installed in Program Year 2014. This LED offering achieved energy savings of 3,882,675 kWh this past year or 17.5% 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.

VFDs on Air Handlers and HVAC Pumps

As the energy efficiency market matures and energy savings get harder to find for a lot of customers, the obvious next path to energy savings is control systems. As such, Hawaii Energy saw an increase in the number VFDs installed and the energy savings they produced. In PY14 VFDs installed in HVAC systems produced energy savings of 3,634,976 kWh or 15.9% of the total BEEM program energy savings.

Impacts

For PY14, the BEEM Program achieved savings of 22,154,603 kWh (first year) and 3,821 kW savings with $3,586,527 in incentives.

In relative terms, the top three BEEM measures totaling 31.9 % of incentives captured a full 50.0% of the lifetime program energy, 43.1% first year kWh, and 37.4% kW of the demand savings.

Table 44a
BEEM Top Three Measures

	Program Demand (kW)	%	Program Energy (kWh First Year)	%	Program Energy (kWh - Life)	%	Incentive ($)	%
LED Lighting	543	14.21%	3,882,675	17.50%	57,891,722	18.74%	$ 291,263	8.10%
Chillers	441	11.54%	2,864,045	12.90%	57,280,892	18.54%	$ 472,280	13.20%
T12 To T8 Low Wattage	445	11.65%	2,808,289	12.70%	39,316,052	12.73%	$ 379,131	10.60%
Top Three Measures	1,429	37.40%	9,555,009	43.10%	154,488,666	50.01%	$ 1,142,674	31.90%
BEEM Total	3,821		22,154,603		308,911,319		$ 3,586,527	
% of Total	37.4%		43.1%		50.0%		31.9%	

Table 45 provides further details.

- **# 1 Contributor to BEEM – LED Lighting (20.4% Lifetime kWh)**
  LED lamps were the largest contributor to the BEEM Program savings with lifetime energy and demand savings of 57,891,722 kWh and 543 kW, respectively. (This includes LED Lighting, LED Exit Signs, LED Refrigerated Case Lighting and ENERGY STAR LED Dimmable with Controls)

- **# 2 Contributor to BEEM – Chillers (18.5% Lifetime kWh)**
  Chiller upgrades were the second largest contributor to the BEEM Program savings with lifetime energy and demand savings of 57,280,892 kWh and 441 kW, respectively.

- **# 3 Contributor to BEEM – T12 to T8 Low Wattage (12.7% Lifetime kWh)**
  There are still T12 upgrades available and they were the third largest contributor to the BEEM Program savings with lifetime energy and demand savings of 39,316,052 kWh and 445 kW.

Table 45 BEEM Program Impacts								
Category	Units	Program Demand (kW)	%	Program Energy (kWh First Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)
LED Lighting	38,778	543	14.2%	3,882,675	17.5%	57,891,722	18.7%	14.9
Chillers	38	441	11.5%	2,864,045	12.9%	57,280,892	18.5%	20.0
T12 To T8 Low Wattage	23,181	445	11.6%	2,808,289	12.7%	39,316,052	12.7%	14.0
VFD - AHU	182	732	19.2%	1,800,345	8.1%	27,005,169	8.7%	15.0
VFD - Chilled Water / Condenser Water	53	498	13.0%	1,834,631	8.3%	24,248,138	7.8%	13.2
Variable Refrigerant Flow Air Conditioners	585	138	3.6%	1,212,093	5.5%	18,181,399	5.9%	15.0
Package Units - 15% Better Than Code	278	182	4.8%	986,351	4.5%	14,795,267	4.8%	15.0
ECM	2,524	65	1.7%	580,126	2.6%	8,701,894	2.8%	15.0
Delamping With Reflectors	2,719	73	1.9%	560,552	2.5%	7,847,726	2.5%	14.0
Water Cooler Timers	8,760	131	3.4%	1,475,187	6.7%	7,375,935	2.4%	5.0
Window Tinting	28	163	4.3%	614,714	2.8%	6,147,139	2.0%	10.0
Submetering (Condo)	994	86	2.2%	626,454	2.8%	5,011,635	1.6%	8.0
Transformer	251	23	0.6%	203,198	0.9%	4,994,482	1.6%	24.6
LED Exit Signs	1,097	32	0.8%	280,519	1.3%	4,207,782	1.4%	15.0
Solar Water Heating	5	19	0.5%	269,965	1.2%	4,049,473	1.3%	15.0
Heat Pump	29	12	0.3%	392,149	1.8%	3,921,491	1.3%	10.0
Kitchen Ventilation	8	43	1.1%	254,466	1.1%	3,816,994	1.2%	15.0
Domestic Water Booster Packages	9	26	0.7%	247,424	1.1%	3,711,366	1.2%	15.0
Room Occupancy Sensors & Timers	1,305	36	0.9%	325,838	1.5%	1,821,022	0.6%	5.6
Refrigerator (With Recycling Of Old)	169	5	0.1%	115,420	0.5%	1,615,879	0.5%	14.0
Delamping	746	13	0.3%	85,082	0.4%	1,191,149	0.4%	14.0
Metal Halide	471	11	0.3%	79,647	0.4%	1,115,063	0.4%	14.0
LED Refrigerated Case Lighting	1,033	31	0.8%	191,122	0.9%	955,612	0.3%	5.0
CFL	1,928	28	0.7%	188,479	0.9%	611,275	0.2%	3.2
Clothes Washer	284	7	0.2%	48,682	0.2%	584,183	0.2%	12.0
T8 To T8 Low Wattage	300	7	0.2%	30,163	0.1%	452,452	0.1%	15.0
VFD Pool Pumps	13	2	0.1%	27,869	0.1%	410,670	0.1%	14.7
T12 To T8 Standard (2 Ft Lamps)	335	4	0.1%	28,990	0.1%	405,856	0.1%	14.0
Refrigerator - Bounty	31	1	0.0%	21,948	0.1%	307,268	0.1%	14.0
Cool Roof Technologies	5	10	0.3%	24,536	0.1%	245,364	0.1%	10.0
Advance Power Strips	364	3	0.1%	29,951	0.1%	149,756	0.0%	5.0
Ceiling Fans	207	3	0.1%	28,605	0.1%	143,023	0.0%	5.0

Table 45 BEEM Program Impacts								
Category	**Units**	**Program Demand (kW)**	**%**	**Program Energy (kWh First Year)**	**%**	**Program Energy (kWh - Life)**	**%**	**Average Measure Life (Years)**
Energy Star LED Dimmable w/Controls	43	1	0.0%	7,396	0.0%	88,756	0.0%	12.0
Bi-Level Lighting	1	1	0.0%	7,413	0.0%	74,131	0.0%	10.0
CEE Tier 1+ Motors	4	2	0.1%	3,482	0.0%	52,228	0.0%	15.0
Window AC	13	2	0.1%	4,036	0.0%	48,434	0.0%	12.0
Whole House Fan	2	1	0.0%	1,673	0.0%	33,451	0.0%	20.0
Freezer - Bounty	3	0	0.0%	2,135	0.0%	29,885	0.0%	14.0
Aerator	617	1	0.0%	3,709	0.0%	18,544	0.0%	5.0
T12 To T8 Standard (3 Foot Lamps)	22	0	0.0%	1,277	0.0%	17,878	0.0%	14.0
Refrigerator (Purchase New Only)	11	0	0.0%	957	0.0%	13,397	0.0%	14.0
Ice Machine (Add Size Range)	1	0	0.0%	921	0.0%	11,054	0.0%	12.0
Solar Attic Fan	3	0	0.0%	1,342	0.0%	6,710	0.0%	5.0
Showerhead	303	0	0.0%	744	0.0%	3,722	0.0%	5.0
Recycler App - Accounting	0	0	0.0%	0	0.0%	0	0.0%	0
Recycler App - Freezer	3	0	0.0%	0	0.0%	0	0.0%	0
Recycler App - Refrigerator	31	0	0.0%	0	0.0%	0	0.0%	0
Recycler App - Window AC	13	0	0.0%	0	0.0%	0	0.0%	0
Accounting	291	0	0.0%	0	0.0%	0	0.0%	0
Total	**88,071**	**3,821**	**100%**	**22,154,603**	**100%**	**308,911,319**	**100%**	**13.9**

Table 45 (cont'd) BEEM Program Impacts – *TRB, TRC & Incentives*							
Category	**TRB/TRC**	**Total Resource Benefit (TRB)**	**%**	**Total Resource Cost (TRC)**	**%**	**Incentives**	**%**
LED Lighting	4.6	$ 6,501,848	17.7%	$ 1,403,467	15.7%	$ 291,263	8.1%
Chillers	3.0	$ 5,981,784	16.3%	$ 1,961,964	21.9%	$ 472,280	13.2%
T12 To T8 Low Wattage	163.8	$ 4,557,122	12.4%	$ 27,817	0.3%	$ 379,131	10.6%
VFD - AHU	23.0	$ 4,877,760	13.3%	$ 211,934	2.4%	$ 133,713	3.7%
VFD - Chilled Water / Condenser Water	14.4	$ 2,983,869	8.1%	$ 207,825	2.3%	$ 195,600	5.5%
Variable Refrigerant Flow Air Conditioners	2.0	$ 1,917,482	5.2%	$ 943,782	10.5%	$ 585,318	16.3%
Package Units - 15% Better Than Code	6.4	$ 1,831,483	5.0%	$ 284,575	3.2%	$ 398,566	11.1%
ECM	1.7	$ 915,592	2.5%	$ 528,216	5.9%	$ 145,660	4.1%
Delamping With Reflectors	11.3	$ 881,249	2.4%	$ 78,220	0.9%	$ 38,705	1.1%
Water Cooler Timers	6.8	$ 899,424	2.4%	$ 131,400	1.5%	$ 131,400	3.7%
Window Tinting	6.5	$ 989,116	2.7%	$ 152,051	1.7%	$ 126,148	3.5%
Submetering (Condo)	1.3	$ 649,450	1.8%	$ 497,000	5.5%	$ 149,100	4.2%
Transformer	1.3	$ 387,262	1.1%	$ 291,111	3.2%	$ 62,300	1.7%
LED Exit Signs	13.4	$ 441,060	1.2%	$ 32,910	0.4%	$ 30,777	0.9%
Solar Water Heating	11.6	$ 381,955	1.0%	$ 33,000	0.4%	$ 73,017	2.0%
Heat Pump	0.3	$ 369,891	1.0%	$ 1,180,000	13.2%	$ 42,674	1.2%
Kitchen Ventilation	2.2	$ 458,638	1.2%	$ 212,400	2.4%	$ 82,600	2.3%
Domestic Water Booster Packages	2.0	$ 383,986	1.0%	$ 189,750	2.1%	$ 32,440	0.9%
Room Occupancy Sensors & Timers	12.2	$ 318,079	0.9%	$ 26,100	0.3%	$ 26,100	0.7%
Refrigerator (With Recycling Of Old)	2.4	$ 143,652	0.4%	$ 60,840	0.7%	$ 19,025	0.5%
Delamping	21.2	$ 138,100	0.4%	$ 6,504	0.1%	$ 4,065	0.1%
Metal Halide	9.3	$ 127,826	0.3%	$ 13,753	0.2%	$ 11,945	0.3%
LED Refrigerated Case Lighting	0.6	$ 137,951	0.4%	$ 250,140	2.8%	$ 62,535	1.7%
CFL	5.1	$ 87,079	0.2%	$ 17,015	0.2%	$ 5,456	0.2%
Clothes Washer	2.2	$ 69,442	0.2%	$ 31,240	0.3%	$ 14,200	0.4%
T8 To T8 Low Wattage	170.5	$ 61,380	0.2%	$ 360	0.0%	$ 5,115	0.1%
VFD Pool Pumps	2.7	$ 39,661	0.1%	$ 14,625	0.2%	$ 6,863	0.2%
T12 To T8 Standard (2 Ft Lamps)	89.2	$ 44,833	0.1%	$ 503	0.0%	$ 3,890	0.1%
Refrigerator - Bounty	14.7	$ 27,169	0.1%	$ 1,850	0.0%	$ 1,850	0.1%
Cool Roof Technologies	0.4	$ 48,956	0.1%	$ 117,712	1.3%	$ 23,542	0.7%
Advance Power Strips	2.4	$ 19,656	0.1%	$ 8,325	0.1%	$ 8,325	0.2%
Ceiling Fans	10.0	$ 18,633	0.1%	$ 1,863	0.0%	$ 7,245	0.2%

Table 45 (cont'd) **BEEM Program Impacts –** *TRB, TRC & Incentives*							
Category	**TRB/TRC**	**Total Resource Benefit (TRB)**	**%**	**Total Resource Cost (TRC)**	**%**	**Incentives**	**%**
ENERGY STAR LED Dimmable W/Controls	194.8	$ 10,052	0.0%	$ 52	0.0%	$ 430	0.0%
Bi-Level Lighting	0.4	$ 8,246	0.0%	$ 19,368	0.2%	$ 2,500	0.1%
CEE Tier 1+ Motors	14.8	$ 12,156	0.0%	$ 819	0.0%	$ 900	0.0%
Window AC	9.2	$ 10,707	0.0%	$ 1,170	0.0%	$ 650	0.0%
Whole House Fan	25.7	$ 6,166	0.0%	$ 240	0.0%	$ 150	0.0%
Freezer - Bounty	16.0	$ 2,643	0.0%	$ 165	0.0%	$ 165	0.0%
Aerator	0.9	$ 3,822	0.0%	$ 4,077	0.0%	$ 4,077	0.1%
T12 To T8 Standard (3 Foot Lamps)	62.9	$ 2,076	0.0%	$ 33	0.0%	$ 186	0.0%
Refrigerator (Purchase New Only)	0.9	$ 1,617	0.0%	$ 1,760	0.0%	$ 550	0.0%
Ice Machine (Add Size Range)	0.2	$ 1,249	0.0%	$ 5,277	0.1%	$ 100	0.0%
Solar Attic Fan	1.6	$ 711	0.0%	$ 450	0.0%	$ 150	0.0%
Showerhead	0.2	$ 1,092	0.0%	$ 5,846	0.1%	$ 5,846	0.2%
Recycler App - Accounting	0	$ 0	0.0%	$ 0	0.0%	$ 0	0.0%
Recycler App - Freezer	0	$ 0	0.0%	$ 0	0.0%	$ 90	0.0%
Recycler App - Refrigerator	0.0	$ 0	0.0%	$ 1,095	0.0%	$ 1,095	0.0%
Recycler App - Window AC	0.0	$ 0	0.0%	$ 365	0.0%	$ 365	0.0%
Accounting	0	$ 0	0.0%	$ 0	0.0%	$ -1,573	0.0%
Total	**4.1**	**$ 36,751,925**	**100%**	**$ 8,958,967**	**100%**	**$ 3,586,527**	**100%**

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

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
BEEM Operations	$ 1,145,534.76	$ 1,160,000.00	98.75%	$ 14,465.24	1.25%
BEEM Incentives	$ 3,586,527.04	$ 4,159,550.00	86.22%	$ 573,022.96	13.78%
Total BEEM	**$ 4,732,061.80**	**$ 5,319,550.00**	**88.96%**	**$ 587,488.20**	**11.04%**

Customized Business Energy Efficiency Measures (CBEEM)

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

Both the quality and availability of LED products continued to increase this program year. This lead to more products being listed by ENERGY STAR®, DesignLights Consortium® or Lighting Facts® and greatly increased the number and types of LED fixtures that could be installed through the CBEEM program. This contributed to the continued success of LED fixtures in the marketplace and resulted in customized LED lighting being the number one energy efficiency measure in the CBEEM program.

HVAC Equipment and Controls

In addition to LED lighting fixtures, the CBEEM program was also successful in promoting increased energy savings through advanced HVAC equipment and controls. As mentioned before, as the “low-hanging fruit” in energy efficiency is harvested it becomes increasingly difficult to produce additional savings for a facility. This is driving facility engineers to look beyond lighting to other measures that can continue improve the efficiency of their facilities. The next logical system to look at in most facilities is the mechanical HVAC system. This is leading to more advanced HVAC systems being installed when customers are looking to replace their mechanical systems. More sophisticated controls are being installed on these systems to further increase efficiency as well. The controls included Energy Management Systems that continuously monitor the performance of the system and dynamically adjust set points throughout the day to maintain optimum energy efficiency.

Impacts

For PY14, the CBEEM Program achieved savings of 25,366,309 kWh (first year) and 3,481 kW savings with $5,557,198 in incentives.

Table 47 provides a detailed breakout of the program.

- **#1 Contributor to CBEEM – LED Lighting (49.1% Lifetime kWh)**
  LED Commercial Lighting was the largest contributor to CBEEM Program savings with lifetime energy and demand savings of 143,978,318 kWh and 2,030 kW, respectively.

- **#2 Contributor to CBEEM – EMS Controls and Custom EMS Controls (22.3% Lifetime kWh)**
  Custom EMS controls were the second largest contributors to CBEEM Program savings with lifetime energy and demand savings of 65,473,723 kWh and 517 kW, respectively. (This includes EMS Controls and Custom EMS Controls.)

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	%
LED Lighting	57,416	2,030	58.3%	14,676,354	57.9%	143,978,318	49.1%	9.8	1.1	$ 17,050,006	50.4%	$ 15,108,286	45.9%	$ 3,098,256	55.8%
EMS Controls	1,390	482	13.8%	3,883,525	15.3%	57,447,577	19.6%	14.8	1.1	$ 6,113,365	18.1%	$ 5,752,024	17.5%	$ 711,838	12.8%
Custom HVAC	640	494	14.2%	2,140,960	8.4%	32,114,393	11.0%	15.0	0.6	$ 4,352,613	12.9%	$ 7,123,483	21.6%	$ 532,813	9.6%
Chillers	2	117	3.4%	596,385	2.4%	9,616,436	3.3%	16.1	8.4	$ 1,209,238	3.6%	$ 144,000	0.4%	$ 148,071	2.7%
Building Envelope	1	40	1.2%	312,443	1.2%	9,373,290	3.2%	30.0	2.8	$ 705,510	2.1%	$ 255,362	0.8%	$ 80,962	1.5%
Custom EMS Controls	11	35	1.0%	806,282	3.2%	7,996,146	2.7%	9.9	0.4	$ 820,992	2.4%	$ 1,960,281	6.0%	$ 318,463	5.7%
Custom Controls	66	72	2.1%	742,826	2.9%	6,555,724	2.2%	8.8	1.6	$ 763,181	2.3%	$ 467,358	1.4%	$ 117,721	2.1%
Refrigeration	13	8	0.2%	582,355	2.3%	6,551,918	2.2%	11.3	1.7	$ 549,245	1.6%	$ 326,090	1.0%	$ 130,436	2.3%
Custom	5	56	1.6%	398,821	1.6%	5,444,917	1.9%	13.7	1.6	$ 623,326	1.8%	$ 386,460	1.2%	$ 80,206	1.4%
Data Centers	2	42	1.2%	364,098	1.4%	4,369,174	1.5%	12.0	1.7	$ 495,988	1.5%	$ 290,589	0.9%	$ 80,954	1.5%
Custom Lighting	6	20	0.6%	190,823	0.8%	2,584,559	0.9%	13.5	0	$ 274,925	0.8%	$ 0	0.0%	$ 37,387	0.7%
Custom VFD For Cooling Tower	4	27	0.8%	186,079	0.7%	2,462,942	0.8%	13.2	0.4	$ 293,399	0.9%	$ 726,265	2.2%	$ 48,737	0.9%
Bi-Level Lighting	3	17	0.5%	173,785	0.7%	2,114,878	0.7%	12.2	1.4	$ 226,474	0.7%	$ 158,872	0.5%	$ 33,881	0.6%
VFD Pump (Non-HVAC)	5	21	0.6%	160,846	0.6%	1,608,464	0.5%	10.0	1.9	$ 197,524	0.6%	$ 105,729	0.3%	$ 42,292	0.8%
Water Heating	634	18	0.5%	138,172	0.5%	764,630	0.3%	5.5	0.9	$ 102,987	0.3%	$ 114,064	0.3%	$ 93,209	1.7%
On-Demand Ventilation Control - AC	1	1	0.0%	12,554	0.0%	188,312	0.1%	15.0	0.7	$ 18,543	0.1%	$ 25,000	0.1%	$ 1,972	0.0%
Total	**60,199**	**3,481**	**100%**	**25,366,309**	**100%**	**293,171,679**	**100%**	**11.6**	**1.0**	**$ 33,797,316**	**100%**	**$ 32,943,863**	**100%**	**$ 5,557,198**	**100%**

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

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
CBEEM Operations	$ 1,183,445.15	$ 1,220,000.00	97.00%	$ 36,554.85	3.00%
CBEEM Incentives	$ 5,557,198.04	$ 5,862,261.00	94.80%	$ 305,062.96	5.20%
Total CBEEM	**$ 6,740,643.19**	**$ 7,082,261.00**	**95.18%**	**$ 341,617.81**	**4.82%**



Honolulu International Airport
Honolulu, Hawaii

Working with energy performance contractor Johnson Controls, the State of Hawaii's Department of Transportation (DOT) has been making enormous upgrades to the Honolulu International Airport. For the project phases completed during PY14, DOT received $811,822 in incentives for several measures, including LED and lower-wattage lighting, chiller replacements, transformers and VFDs for pumps and air handling units.

Along with more than 5.4 million kWh in estimated annual savings, the new LEDs provide a fresh, updated look for airport parking and interior areas (pictured here) while enhancing the safety and security of the airport. The airport is also able to reinvest its incentives back to its maintenance projects for upcoming phases, like piping renewal.

Business Energy Services & Maintenance (BESM)

Objective

The objective of this program focuses on developing viable projects through collaboration, competition and direct support in the form of expertise and/or equipment (i.e. metering).

Accomplishments

Central Chiller Plant Benchmarking Program

The Central Chiller Plant Benchmarking Incentive continued in PY14. 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. Four projects were started and completed in PY14, with a total incentive expenditure of $285,199.

Water and Wastewater Facilities

Water and wastewater facilities are 24/7 facilities that have specific technical requirements, high capital costs and long procurement process. This targeted program continued practices started in PY13 to target water pumping systems in the plants for process improvements. The program was successful in installing comprehensive leak detection system throughout the entire water supply system on Hawaii Island that should substantially reduce the water lost through leaks, thereby reducing the combined pumping loads within the system. Lessons learned from PY13 and PY14, specifically the potentially long procurement cycle of these facilities, will be incorporated into the program in PY15 and Hawaii Energy will continue to pursue projects that we identified over the last two years.

Decision Maker: Real-Time Submeters

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, areas of unexpected high usage and can be the basis energy efficiency upgrades, increased maintenance, or peer group competitions within the organization.

Impacts

For PY14, the BESM Program achieved energy savings of 1,205,115 lifetime kWh, from the leak detection system deployed on the Island of Hawaii. There was no demand savings for the program in PY14. Hawaii Energy expended $886,665 in incentives in this program mostly driven at encouraging future energy efficiency projects.

By the very nature of the BESM programs they do not always provide direct savings. The studies and actions are designed to set the groundwork for saving in the future. This year the one project happened to immediately catch a problem and provided saving in the first year. In relative terms, 7.2% of Hawaii Energy's business incentives ($886,665 out of $12,246,110) 2captured only 0.2% lifetime kWh, 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 – Water and Wastewater Facilities (100.0% Lifetime kWh)**
  The system wide leak detection system installed on the water supply system on the Island of Hawaii was the largest contributor to the BESM Program with lifetime energy savings of 1,205,115 kWh.

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	%
Water Pumping	1	0	0%	241,023	100.0%	1,205,115	100.0%	5.0	0.3	$ 113,582	100.0%	$ 334,741	32.1%	$ 135,000	15.2%
Central Plant Benchmarking	4	0	0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 285,199	27.3%	$ 285,199	32.2%
Custom	3	0	0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 30,000	2.9%	$ 30,000	3.4%
Custom Controls	26	0	0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 228,310	21.9%	$ 219,127	24.7%
Energy Study	33	0	0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 165,000	15.8%	$ 235,489	26.6%
Accounting*	2	0	0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ -18,150	-2.0%
Total	**69**	**0**	**100%**	**241,023**	**100%**	**1,205,115**	**100%**	**5.0**	**0.1**	**$ 113,582**	**100%**	**$ 1,043,250**	**100%**	**$ 886,665**	**100%**
*Credit memos															

Expenditures

The Program had a slight surplus in the BESM incentive budget due to some BESM project completed later than expect and subsequently paid in PY15.

See **Table 50** for details.

Table 50
BESM Program Expenditures

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
BESM Operations	$ 498,397.56	$ 525,000.00	94.93%	$ 26,602.44	5.07%
BESM Incentives	$ 886,665.49	$ 1,107,500.00	80.06%	$ 220,834.51	19.94%
Total BESM	**$ 1,385,063.05**	**$ 1,632,500.00**	**84.84%**	**$ 247,436.95**	**15.16%**

Business Hard-To-Reach (BHTR)

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 and 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 restaurants and small businesses 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 customer level energy and demand savings of 78,370,461 lifetime energy and 717 kW, assisted by a 15% contractor bonus that Hawaii Energy instituted in the latter half of the program year to raise the importance of these projects in the Contractor's priority list. At $0.35 per kWh this is a $27,428,407 in lifetime energy cost reduction for the businesses!

Earlier in the program year it was determined that a substantial number of very large lighting projects, such as the Honolulu International Airport, had inundated local lighting contractors. Electrical contractors that traditionally focus on lighting projects were all busy with very large lighting projects, leaving only electrical contractors that use lighting projects as "fill" work when they are not working on other electrical jobs. This was causing a lag in the SBDIL program. To counteract this lag, Hawaii Energy introduced a 15% contractor bonus for any SBDIL project initiated and completed in the latter half of the year. This bonus was successful in getting the attention of some of the contractors that were less busy and allowed the program to reach its goal.



Eggs 'N Things
Honolulu, Hawaii

Popular Waikiki breakfast joint Eggs 'N Things was one of many businesses that received a free lighting retrofit through the Hawaii Energy Small Business Direct Install Lighting program this year. Eggs 'N Things upgraded to LEDs throughout their two-story dining and retail area as well as in their offices and restrooms. In addition to saving more than $3,400 in energy costs over the first year, the new lighting provides better visibility and a cooler ambiance for their customers and staff.

Impacts

For PY14, the BHTR Program achieved savings of 89,446,256 lifetime kWh and 1,112 kW savings with $2,215,720 in incentives. **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	%
T12 To T8 Low Wattage	15,832	468	42.1%	3,385,075	49.4%	47,391,056	53.0%	14.0	4.0	$ 5,414,212	51.9%	$ 1,338,688	62.5%	$ 1,338,688	60.4%
LED Lighting	11,034	253	22.8%	1,863,121	27.2%	26,083,692	29.2%	14.0	5.8	$ 2,964,686	28.4%	$ 510,340	23.8%	$ 510,340	23.0%
Custom Lighting	2,436	33	2.9%	618,551	9.0%	8,659,709	9.7%	14.0	5.7	$ 795,291	7.6%	$ 140,757	6.6%	$ 140,757	6.4%
Low-Flow Spray Rinse Nozzles	381	326	29.4%	715,864	10.5%	3,579,318	4.0%	5.0	88.6	$ 844,353	8.1%	$ 9,525	0.4%	$ 10,530	0.5%
T12 To T8 Standard (2 Ft Lamps)	829	13	1.2%	149,666	2.2%	2,095,319	2.3%	14.0	2.8	$ 211,536	2.0%	$ 74,633	3.5%	$ 74,633	3.4%
CFL	424	13	1.1%	83,098	1.2%	1,163,368	1.3%	14.0	24.4	$ 136,673	1.3%	$ 5,603	0.3%	$ 5,603	0.3%
LED Refrigerated Case Lighting	149	5	0.4%	23,283	0.3%	325,955	0.4%	14.0	1.0	$ 42,075	0.4%	$ 42,541	2.0%	$ 42,541	1.9%
LED Exit Signs	34	1	0.1%	9,341	0.1%	130,768	0.1%	14.0	15.4	$ 13,767	0.1%	$ 894	0.0%	$ 894	0.0%
Reach-In Refrigerator Solid Door	3	0	0.0%	1,423	0.0%	17,072	0.0%	12.0	0.2	$ 1,929	0.0%	$ 9,217	0.4%	$ 850	0.0%
Accounting	22	0	0.0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ 2,100	0.1%
Contractor Reward (SBDIL)	0	0	0.0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ 77,727	3.5%
Installation Cost - Ladders	2,191	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 11,058	0.5%	$ 11,058	0.5%
Total	**33,335**	**1,112**	**100%**	**6,849,420**	**100%**	**89,446,256**	**100%**	**13.1**	**4.9**	**$ 10,424,522**	**100%**	**$ 2,143,255**	**100%**	**$ 2,215,720**	**100%**

Small Business Direct Install Lighting Program – Customer-Level Impacts

Customers participating in the SBDIL program should save over $1,959,172 in operating expenses per year. Over the life of the lighting measures installed, the customers are expected to save $27,428,407. This is money that they can invest into their business, driving more job growth and profitability. See **Table 52** for further details.

Table 52
SBDIL Customer Level Impacts by Island

	Hawaii	Lanai	Maui	Molokai	Oahu	Total	Program Cost/ kWh
SBDIL – Lighting Retrofits							
Customers	55	2	51	0	350	458	
Measures	320	16	234	0	1,527	2,097	
kW Reduction	118	0	37	0	361	515	
kWh - First Year	890,006	26,221	346,745	0	2,886,775	4,149,748	**$ 0.408**
kWh - Life	12,460,087	367,100	4,854,435	0	40,414,852	58,096,474	**$ 0.029**
Incentives	$ 271,292	$ 27,808	$ 129,532	$ 0	$ 1,265,157	$ 1,693,789	
SBDIL – Restaurant Lighting							
Customers	13	0	4	0	95	112	
Measures	80	0	34	0	467	581	
kW Reduction	32	0	9	0	161	202	
kWh - First Year	188,278	0	89,569	0	1,170,295	1,448,142	**$ 0.298**
kWh - Life	2,635,890	0	1,253,962	0	16,384,135	20,273,986	**$ 0.021**
Incentives	$ 46,668	$ 0	$ 24,124	$ 0	$ 360,177	$ 430,969	
Total							
Customers	68	2	55	0	445	570	
Measures	400	16	268	0	1,994	2,678	
kW Reduction	150	0	46	0	522	717	
kWh - First Year	1,078,284	26,221	436,314	0	4,057,071	5,597,890	**$ 0.380**
kWh - Life	15,095,976	367,100	6,108,397	0	56,798,987	78,370,461	**$ 0.027**
Incentives	$ 317,960	$ 27,808	$ 153,656	$ 0	$ 1,625,334	$ 2,124,758	
Financial Benefits							
Average "G" Rate	$ 0.478	$ 0.530	$ 0.403	$ 0.000	$ 0.338	$ 0.350	
Annual Savings	$ 515,948	$ 13,885	$ 176,044	$ 0	$ 1,373,075	$ 1,959,172	
Lifetime Savings	$ 7,223,274	$ 194,383	$ 2,464,616	$ 0	$ 19,223,049	$ 27,428,407	
Simple Payback (years)	0.6	2.0	0.9	0	1.2	1.1	
IRR	162%	50%	115%	0%	84%	92%	

Expenditures

The Program distributed nearly all BHTR operation and incentive funds due to the popularity and demand for the Program offerings, in particular the limited time Contractor Bonus contributed significantly to the success of the program in PY14.

See **Table 53** for details.

Table 53
BHTR Program Expenditures

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
BHTR Operations	$ 610,986.36	$ 616,130.00	99.17%	$ 5,143.64	0.83%
BHTR Incentives	$ 2,215,719.66	$ 2,390,270.00	92.70%	$ 174,550.34	7.30%
Total BHTR	**$ 2,826,706.02**	**$ 3,006,400.00**	**94.02%**	**$ 179,693.98**	**5.98%**

RESIDENTIAL PROGRAM

Overall Impacts

Impacts

For PY14, Hawaii Energy's Residential program achieved savings of 61,971,862 kWh (first year), 499,037,203 lifetime kWh energy savings and 10,083 kW savings with $9,978,127 in incentives. In relative terms, 45% of Hawaii Energy's incentives ($9,978,127 out of $22,224,237 in direct incentives) captured 42% of lifetime kWh (499,037,203 out of 1,191,771,572) and 10,083 kW savings, respectively. See **Table 54**.

Table 54
Residential Program Impacts Summary

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	3,358,298	9,874	97.9%	60,733,605	98.0%	489,452,081	98.1%	8.1	2.7	$ 62,521,017	98.1%	$ 23,034,782	95.0%	$ 9,011,161	90.3%
RESM	1,775	50	0.5%	631,896	1.0%	5,169,866	1.0%	8.2	0.9	$ 512,543	0.8%	$ 555,900	2.3%	$ 301,350	3.0%
RHTR	21,200	159	1.6%	606,361	1.0%	4,415,256	0.9%	7.3	1.1	$ 699,700	1.1%	$ 661,866	2.7%	$ 664,297	6.7%
CESH	1	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 1,319	0.0%	$ 1,319	0.0%
Total	**3,381,274**	**10,083**	**100%**	**61,971,862**	**100%**	**499,037,203**	**100%**	**8.1**	**2.6**	**$ 63,733,260**	**100%**	**$ 24,253,867**	**100%**	**$ 9,978,127**	**100%**

Highlights

Hawaii Energy launched an online store and the Multifamily Direct Install Program as part of its continued efforts to make simple energy-efficient products more readily accessible to residential utility customers. Both these programs sought to overcome longstanding barriers to install by providing customers with new purchase and delivery mechanisms.

The EnerNOC Potential Study identified residential water heating as the highest potential area for future PBFA investment. This year, the Program implemented water measures like low-flow showerheads and faucet aerators as we sought to address additional energy saving opportunities. Through these initiatives, Hawaii Energy was also able to collect key occupancy and water heating data in order to better evaluate overall energy savings impact. Additional details are highlighted below.

Hawaii Energy Online Store: Energy-Saving Kits

In April 2015, Hawaii Energy launched its first-ever online store. Customers were able to order one basic energy-saving kit and one advanced energy saving kit, with direct delivery to their home. The basic kit was free to customers and included one CFL lamp, one LED lamp, one low-flow showerhead and one faucet aerator. The advanced kit had a $10 customer co-pay and included two LED lamps and one advanced power strip. The advanced kit was offered to provide interested customers with additional energy saving technologies. Through this effort, Hawaii Energy also collected specific water heating and occupancy data in order to more accurately calculate the energy savings potential.

The online sale lasted six weeks, during which time a total of 4,953 kits were ordered. The success of this pilot far surpassed initial expectations by almost doubling the original target of 2,500 kits. The program initiated some key online marketing initiatives that we believe helped drive customer traffic to the store. In particular, our social media campaign resulted in 339 conversions, approximately 10% of 3,394 unique orders.

Basic Kit Sales		
Island	**# of Kits**	**% of Total Basic**
Oahu	2,160	63.6%
Hawaii Island	935	27.5%
Maui	285	8.4%
Molokai	11	0.3%
Lanai	3	0.1%
Total Kits	**3,394**	**100%**

Advanced Kit Sales		
Island	**# of Kits**	**% of Total Advanced**
Oahu	949	60.9%
Hawaii Island	473	30.3%
Maui	131	8.4%
Molokai	5	0.3%
Lanai	1	0.1%
Total Kits	**1,559**	**100%**

Multifamily Direct Install Program

PY14 marked the expansion into another facet of direct install opportunities through the introduction of the Energy $mart 4 Homes (E$4H) program for multifamily residential properties. E$4H targeted an underserved portion of the multifamily market, including master-metered and rental units. E$4H provided turnkey delivery of in-unit energy-saving measures, including high-efficiency lighting, high-efficiency showerheads, faucet aerators and advanced power strips. Thirty-three multifamily properties participated during PY14 with a total of 1,524 tenant units serviced. This total was comprised of 1,150 tenant units that fell under residential rate codes and 374 units that were part of commercial master-metered buildings.





The Energy $mart 4 Homes program delivers energy-efficient equipment, free of charge, directly to customers' homes and eliminates the need for self-installation. Many of the homes serviced in in PY14 were rental units (pictured above), a type of home where energy-saving improvements can typically be limited.

Overall Expenditures

Expenditures

In PY14 the program successfully distributed 90.2% of residential incentive funds reaching 87.6% of the first year kWh target and savings target. The year ended with a total incentive spend of $9,978,127 leaving a surplus of $1,083,348. The surplus was due in part to unspent funds originally allocated for the PY14 Energy Efficiency Auction and the Residential Hard-to-Reach direct install efforts.

Residential Energy Efficiency Measures (REEM), which represents the backbone of the residential portfolio, utilized 96.8% of its budget.* Residential Energy Services & Maintenance (RESM) was also particularly successful this year as the Solar Water Heating Tune-Up program once again surpassed initial targets. This year the budget for Customized Energy Solutions for the Home (CESH) was reserved for the Energy Efficiency Auction project, which faced limitations in execution due to timing constraints. Thus, CESH played a minimal role in overall expenditures.

As previously mentioned, the Residential Hard-to-Reach program saw an exciting expansion with the implementation of the Multifamily Direct Install program. Additionally, Hawaii Energy funded the direct install of 70 solar water heating (SWH) systems on Hawaii Island. Despite a year of significant program activity, the Residential Hard-to-Reach budget closed PY14 with a $397k or 37% surplus. This was largely due to lower costs associated with the SWH direct install efforts. See **Table 55** for final budget allocations and spend details.

**Percent spent based on final budget allocations.*

Table 55 Residential Program Expenditures					
	Total Expenditures	**PY14 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
Residential Programs					
Operations and Management					
REEM	$ 2,325,000.47	$ 2,326,000.00	99.96%	$ 999.53	0.04%
CESH	$ 52,086.66	$ 53,000.00	98.28%	$ 913.34	1.72%
RESM	$ 48,953.55	$ 49,000.00	99.91%	$ 46.45	0.09%
RHTR	$ 407,446.45	$ 408,000.00	99.86%	$ 553.55	0.14%
Total Residential Programs	$ 2,833,487.13	$ 2,836,000.00	99.91%	$ 2,512.87	0.09%
Residential Evaluation	$ 160,747.08	$ 163,561.00	98.28%	$ 2,813.92	1.72%
Residential Outreach	$ 670,442.17	$ 675,000.00	99.32%	$ 4,557.83	0.68%
Total Residential Non-Incentives	**$ 3,664,676.38**	**$ 3,674,561.00**	**99.73%**	**$ 9,884.62**	**0.27%**
Residential Incentives					
REEM	$ 9,011,160.99	$ 9,312,683.00	96.76%	$ 301,522.01	3.24%
CESH	$ 1,319.08	$ 277,542.00	0.48%	$ 276,222.92	99.52%
RESM	$ 301,350.00	$ 410,000.00	73.50%	$ 108,650.00	26.50%
RHTR	$ 664,296.93	$ 1,061,250.00	62.60%	$ 396,953.07	37.40%
Subtotal Residential Incentives	$ 9,978,127.00	$ 11,061,475.00	90.21%	$ 1,083,348.00	9.79%
Residential Transformational	$ 1,684,719.01	$ 1,747,514.00	96.41%	$ 62,794.99	3.59%
Total Residential Incentives	**$ 11,662,846.01**	**$ 12,808,989.00**	**91.05%**	**$ 1,146,142.99**	**8.95%**
Total Residential Programs	**$ 15,327,522.39**	**$ 16,483,550.00**	**92.99%**	**$ 1,156,027.61**	**7.01%**

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 that play a role in driving energy efficiency in the residential market. Moreover, a number of these trade allies have furthered their participation with Hawaii Energy by signing on as Clean Energy Allies, a program initiated in PY14 (see Transformational section, pg. 146). 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. Program communications continue to expand through tailored delivery methods for participants, in order to reach the target recipient in the most effective manner. The launch of Hawaii Energy's Web 3.0 and the Clean Energy Ally program further encourages participant self-service and the use of web tools. In addition, the Program continues to send direct emails, utilize standard USPS letter mailings, and reach out to authorized principals/points of contact via phone. In PY14, Program representatives engaged in multiple retail and commercial events with our partners in order to spread the word about Hawaii Energy offerings. This multifaceted approach ensures we can modify programs proactively and respond to ally needs without delays.

Ongoing Quality Assistance

In PY14, the Residential program continued to enhance the quality of programs offered through trade allies. In particular, the Program presented performance summaries to managers of key retail stores participating in the ENERGY STAR® appliance programs. These presentations encouraged feedback and helped staff better understand their overall performance compared to previous years. Feedback collected during these sessions was utilized to implement updates to both the Refrigerator and Window AC trade-up programs in order to better serve customer needs.

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	666,629	2,372	17,322,289	156,778,053	27.5 %	$ 1,789,963
Home Depot	585,020	2,266	17,337,491	134,010,115	23.5 %	$ 1,441,658
Longs/Cvs	285,796	1,143	8,802,517	52,815,101	9.3 %	$ 493,890
City Mill	131,923	497	3,673,818	28,739,758	5.0 %	$ 334,136
Sears	2,649	107	1,376,971	18,386,754	3.2 %	$ 214,975
Lowes	27,549	166	1,440,605	16,118,500	2.8 %	$ 220,048
Other	18,812	115	1,443,694	14,082,603	2.5 %	$ 1,379,354
Walmart	55,642	223	1,713,774	10,282,642	1.8 %	$ 52,860
Island Cooling LLC	389	194	389,241	7,768,620	1.4 %	$ 29,125
Opower	1,476,250	2,242	6,595,222	6,595,222	1.2 %	$ 505,276
Alternate Energy - Oahu	212	96	431,585	6,473,775	1.1 %	$ 208,700
The Light Bulb Source	20,793	62	413,781	6,206,711	1.1 %	$ 126,358
Sams Club	29,947	117	888,872	5,883,606	1.0 %	$ 44,732
Alternate Energy	643	187	378,167	5,610,990	1.0 %	$ 108,700
Ponchos Solar Service - Oahu	163	75	336,595	5,048,925	0.9 %	$ 163,000
Techniart Inc	12	277	658,897	4,819,232	0.8 %	$ 128,348
Solar Help Hawaii	155	69	310,385	4,628,775	0.8 %	$ 149,150
Remaining Allies	78,690	1,334	7,331,561	86,130,749	15.1 %	$ 2,587,854
Residential Program Totals	**3,381,274**	**11,541**	**70,845,465**	**570,380,130**	**100.0 %**	**$ 9,978,127**

Residential Energy Efficiency Measures (REEM)

Objectives

This program consisted of five major initiatives including:

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

Rounding out the top three initiatives for first year kWh savings were CFLs, LEDs and Peer Group Comparisons. The largest offer, CFLs, was administered through indirect upstream incentives to customers via lighting distributors and manufacturers. Second to the CFL offering was LEDs, also administered through upstream incentives, which saw a unit increase of over 183% from PY13. The Peer Group Comparison program was the third largest offer in PY14, delivering Home Energy Reports to a total of 132,500 households on Oahu, Maui and Hawaii Island.

Although the top three initiatives for PY14 are similar to those in PY13, there was a noticeable increase in LED counts, moving up from #3 in PY13 to #2 this year. We expect this will continue to gain momentum in the following program years as well. LED technology has moved to the forefront of the Program with the number of LED product SKU's on the market more than tripling over the last program year. New products have reduced wattages with higher lumen output and we are continuing to see falling price points, allowing LEDs to be more cost competitive. Moreover, there have been product enhancements to the A-line omnidirectional bulbs which allow the full feature and benefit of a true 360-degree light output.

Impacts

For PY14, the REEM program achieved savings of 489,452,081 lifetime kWh and 9,874 kW savings with $9,011,161 in incentives.

As for many years the CFL and now LED programs dominate the program savings. In relative terms, three measures (CFLs, LEDs and Solar Water Heating) totaling 67% of REEM program incentives captured 79% first year kWh and 68% kW savings. See **Table 57** for details.

The three largest contributors to REEM program savings were:

- **#1 Contributor to REEM – CFLs (43.8% Lifetime kWh)**

  CFLs were the largest contributor to the REEM Program savings with lifetime energy and demand savings of 214,598,569 kWh and 4,645 kW, respectively. Much like PY13, reliance on CFLs continues to drop. CFLs accounted for 58.9% of REEM first year energy savings, down from 70.7% in PY13. The overall unit count of CFLs decreased by 170,000 from PY13 and was also coupled with a reduction in deemed savings per unit.

- **#2 Contributor to REEM – LEDs (28.1% Lifetime kWh)**

  LEDs were the second largest contributor to the REEM Program savings with lifetime energy and demand savings of 137,557,116 kWh and 1,382 kW, respectively. This performance was an increase in first year savings of over 220% from PY13. Moreover, with a measure life of 15 years, LEDs contribute over 28% of REEM lifetime energy savings.

- **#3 Contributor to REEM – Solar Water Heating (9.3% Lifetime kWh)**

  The Solar Water Heating program was the third largest contributor to the REEM Program savings with lifetime energy and demand savings of 45,732,046 kWh and 679 kW, respectively. In PY14, there were a total of 1,776 systems installed through the program.



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*	1,328,146	4,645	47.0%	35,766,428	58.9%	214,598,569	43.8%	6.0	14.3	$ 28,454,247	45.5%	$ 1,992,219	8.6%	$ 1,694,358	18.8%
LED Lighting	527,905	1,382	14.0%	9,170,478	15.1%	137,557,166	28.1%	15.0	3.1	$ 15,820,407	25.3%	$ 5,147,074	22.3%	$ 2,689,028	29.8%
Solar Water Heating	1,689	679	6.9%	3,048,803	5.0%	45,732,046	9.3%	15.0	0.5	$ 6,103,915	9.8%	$ 11,147,400	48.4%	$ 1,680,200	18.6%
Refrigerator (With Recycling Of Old)	3,482	104	1.0%	2,503,345	4.1%	35,046,834	7.2%	14.0	2.5	$ 3,114,549	5.0%	$ 1,253,520	5.4%	$ 386,900	4.3%
Variable Refrigerant Flow Air Conditioners	1,636	422	4.3%	844,897	1.4%	12,673,455	2.6%	15.0	4.4	$ 2,592,225	4.1%	$ 582,993	2.5%	$ 290,900	3.2%
Clothes Washer	3,816	93	0.9%	687,720	1.1%	8,252,645	1.7%	12.0	2.3	$ 980,685	1.6%	$ 419,760	1.8%	$ 190,800	2.1%
Refrigerator - Bounty	755	22	0.2%	565,682	0.9%	7,919,548	1.6%	14.0	16.5	$ 700,408	1.1%	$ 42,355	0.2%	$ 42,355	0.5%
Whole House Fan	399	175	1.8%	351,384	0.6%	7,027,685	1.4%	20.0	27.1	$ 1,295,220	2.1%	$ 47,880	0.2%	$ 29,925	0.3%
Peer Group Comparison - Phase 1/2/3	1,476,265	1,957	19.8%	5,756,406	9.5%	5,756,406	1.2%	1.0	0.9	$ 1,351,980	2.2%	$ 1,507,538	6.5%	$ 1,507,538	16.7%
Home Energy-Saving Kits-Online Fulfillment	12	242	2.4%	574,934	0.9%	4,205,051	0.9%	7.3	6.1	$ 785,128	1.3%	$ 128,348	0.6%	$ 128,348	1.4%
Heat Pump	185	34	0.3%	243,108	0.4%	2,431,083	0.5%	10.0	0.9	$ 304,228	0.5%	$ 333,000	1.4%	$ 37,000	0.4%
Ceiling Fans	2,901	48	0.5%	423,400	0.7%	2,117,000	0.4%	5.0	10.6	$ 276,355	0.4%	$ 26,109	0.1%	$ 101,535	1.1%
Water Cooler Timers	6,296	0	0.0%	281,310	0.5%	1,406,552	0.3%	5.0	1.5	$ 137,299	0.2%	$ 94,440	0.4%	$ 94,440	1.0%
Freezer - Bounty	109	3	0.0%	81,682	0.1%	1,143,551	0.2%	14.0	16.6	$ 101,136	0.2%	$ 6,095	0.0%	$ 6,095	0.1%
Window AC	282	47	0.5%	92,284	0.2%	1,107,409	0.2%	12.0	9.6	$ 244,794	0.4%	$ 25,380	0.1%	$ 14,100	0.2%
VFD Pool Pumps	209	1	0.0%	109,178	0.2%	1,091,783	0.2%	10.0	0.8	$ 96,204	0.2%	$ 125,400	0.5%	$ 31,350	0.3%
Solar Attic Fan	265	5	0.0%	125,421	0.2%	627,106	0.1%	5.0	1.7	$ 66,381	0.1%	$ 39,750	0.2%	$ 13,250	0.1%
Advance Power Strips	2,413	9	0.1%	82,189	0.1%	410,946	0.1%	5.0	2.6	$ 53,892	0.1%	$ 20,502	0.1%	$ 20,565	0.2%
Refrigerator (Purchase New Only)	269	4	0.0%	24,720	0.0%	346,080	0.1%	14.0	1.0	$ 41,811	0.1%	$ 43,040	0.2%	$ 13,450	0.1%
Solar Water Heating Tune-Up	1	0	0.0%	233	0.0%	1,165	0.0%	5.0	0.5	$ 153	0.0%	$ 300	0.0%	$ 150	0.0%
Recycler App - Freezer	111	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 16,320	0.1%	$ 3,515	0.0%
Recycler App - Refrigerator	750	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 23,765	0.1%	$ 23,765	0.3%
Recycler App - Window AC	303	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 8,095	0.0%	$ 8,095	0.1%
Custom Water Heater	7	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 3,500	0.0%	$ 3,500	0.0%
Recycler App - Accounting	0	0	0.0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ 0	0.0%
Accounting	5	0	0.0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ 0	0.0%
Total	**3,358,211**	**9,874**	**100%**	**60,733,605**	**100%**	**489,452,081**	**100%**	**8.1**	**2.7**	**$ 62,521,017**	**100%**	**$ 23,034,782**	**100%**	**$ 9,011,161**	**100%**

*Includes 50 unit (lamps) over-count from single distributor across two counties

Expenditures

In PY14, the Program utilized 96.8% of available incentive funds, realizing a small surplus of $301,522.* See **Table 58** for details.

*Percent spent based on final budget allocations.

Table 58
REEM Program Expenditures

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
REEM Operations	$ 2,325,000.47	$ 2,326,000.00	99.96%	$ 999.53	0.04%
REEM Incentives	$ 9,011,160.99	$ 9,312,683.00	96.76%	$ 301,522.01	3.24%
Total REEM	**$ 11,336,161.46**	**$ 11,638,683.00**	**97.40%**	**$ 302,521.54**	**2.60%**

Accomplishments

Popular Offerings

Figure 7 summarizes the participation of REEM incentives by measure.

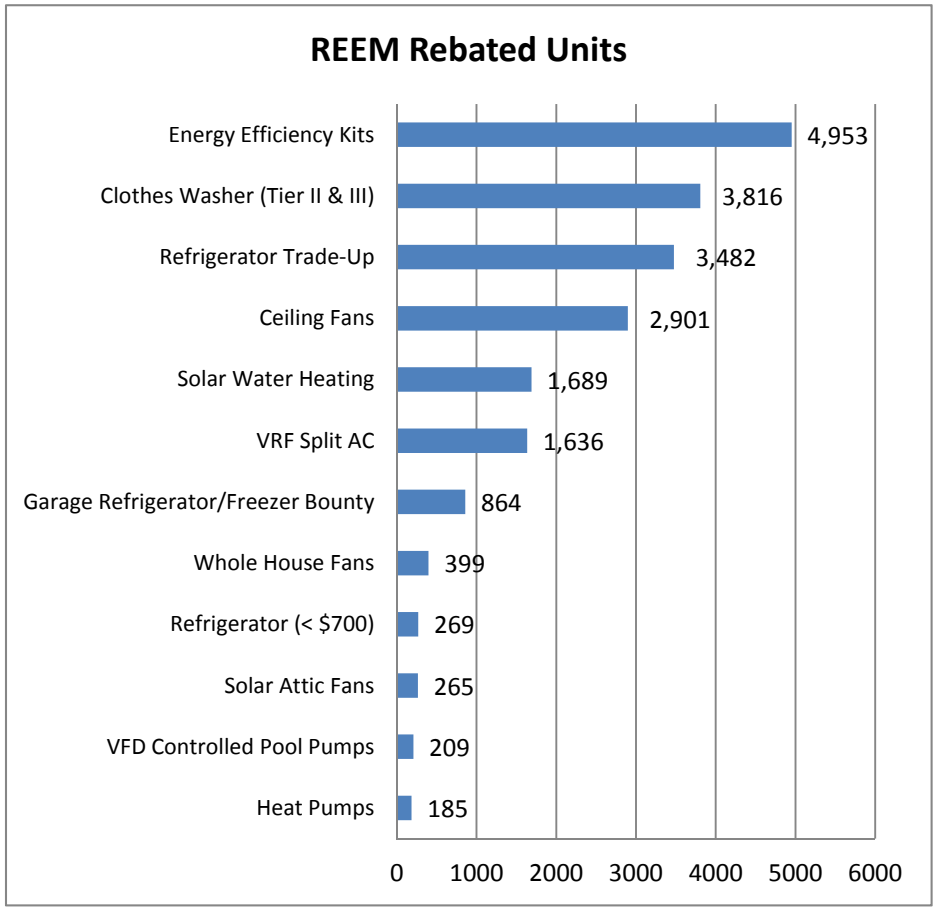
Quality Customer Support

During PY14, Hawaii Energy's residential call center handled over 14,649 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 670 of the customers who called were concerned about their energy usage related to the Peer Group Comparison Report. Less than 1% opted out of the report and most were pleased and 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-second average answer rate with less than a 1.1% abandonment rate for all customer calls.

Customer Experience Management

The Program continued to successfully utilize its Customer Experience Management tool, Medallia, for a fifth year. This software generates an automated customer email survey for the ENERGY STAR® rebate and Solar Water Heating program participants. In PY14, the Program sent out over 7,865 surveys to gauge customer experience with Hawaii Energy. With a response rate of over 33%, the overall satisfaction rating averaged 9.1 out of 10 in the areas of field service, rebate satisfaction and willingness to recommend Hawaii Energy offerings. In PY14, Hawaii Energy logged only nine complaints, which is up slightly from six complaints in PY13. 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.

Figure 7



Accomplishments by Measure Offering

High-Efficiency Water Heating (HEWH)

For PY14, the HEWH program achieved a savings of 48,163,130 lifetime kWh and 713 kW savings with $1,717,200 in incentives.

- Solar Water Heating (SWH) Instant Rebate and Interest Buy-Down Program – With 1,689 solar thermal systems installed and incentivized either directly or through participating lenders, the Program saw a steady performance in PY14. Solar water heating was the fourth largest contributor to the REEM Program savings with lifetime energy and demand savings of 45,732,046 kWh and 679 kW, respectively. At the close of the year, the Program had 71 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 PY14. The Program uses an algorithm to select systems to be inspected based on a number of factors including first-pass rates, although inspections were also conducted on an as-requested basis. This has helped to lower administration costs, while not sacrificing quality.

- Heat Pump Water Heaters reached 62% of target with 185 units rebated. Although this represents a slight decrease from PY13, this technology still represents as a viable option for smaller households. Hawaii Energy is working with retail locations to increase the availability of heat pumps and will also be piloting a new heat pump program specifically for multifamily properties during PY15. See **Table 59** for details of the High-Efficiency Water Heating offers.

- 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, review offerings 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 included all of the Program's residential offerings and the upcoming On-Bill Financing programs.

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 Heating	1,689	679	95.2%	3,048,803	92.6%	45,732,046	95.0%	15.0	0.5	$ 6,103,915	95.3%	$ 11,147,400	97.1%	$ 1,680,200	97.8%
Heat Pump	185	34	4.8%	243,108	7.4%	2,431,083	5.0%	10.0	0.9	$ 304,228	4.7%	$ 333,000	2.9%	$ 37,000	2.2%
Total	**1,874**	**713**	**100%**	**3,291,911**	**100%**	**48,163,130**	**100%**	**14.6**	**0.6**	**$ 6,408,143**	**100%**	**$ 11,480,400**	**100%**	**$ 1,717,200**	**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 County									
Category	**Units**	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st yr.)**	**%**	**Lifetime Energy (kWh)**	**%**	**Incentives $**	**%**
Hawaii	235	118	16%	535,451	16%	8,031,768	16%	759,324	32%
Lanai	3	1	0%	5,362	0%	80,429	0%	3,000	0%
Maui	300	133	18%	612,273	18%	9,184,102	18%	373,802	16%
Oahu	1,151	473	65%	2,288,706	66%	34,330,594	66%	1,205,566	51%
Total	**1,689**	**726**	**100%**	**3,441,793**	**100%**	**51,626,893**	**100%**	**2,341,692**	**100%**

Table 61 Solar Water Heating System Installations by Participating Contractor					
	Contractor	**% Total**		**Contractor**	**% Total**
1	Alternate Energy – Oahu	13.37%	26	Hawaiian Energy Systems, Inc.	0.60%
2	Poncho's Solar Service – Oahu	9.53%	27	Apollo Solar	0.54%
3	Solar Help Hawaii	8.87%	28	Hawaiian Island Solar, Inc.	0.54%
4	Haleakala Solar – Oahu	7.73%	29	Solar Aide Company	0.42%
5	Haleakala Solar, Inc. – Maui	6.18%	30	Commercial Plumbing, Inc.	0.36%
6	Hawaiian Solar & Plumbing	5.28%	31	Risource Energy Renewable Systems, LLC	0.36%
7	C&J Solar Solutions	4.50%	32	Perrin Plumbing, LLC	0.24%
8	Drainpipe Plumbing & Solar	4.26%	33	Poncho's Solar Service – Maui	0.24%
9	HI-Power Solar, LLC	4.26%	34	Built to Last Plumbing	0.18%
10	Sonshine Solar Corp.	3.78%	35	Giant Solar, LLC DBA Giant Energy	0.18%
11	Maui Pacific Solar, Inc.	3.54%	36	Knight's Plumbing, Inc.	0.18%
12	Keith Shigehara Plumbing, Inc.	3.42%	37	Sedna Aire Hawaii	0.18%
13	Energy Unlimited, Inc.	2.88%	38	21st Century Technologies HI – Oahu	0.12%
14	Affordable Solar Contracting	2.52%	39	Allen's Plumbing – Oahu	0.12%
15	True Green Solar, LLC	2.28%	40	Alternate Energy – Maui	0.12%
16	Grand Solar	2.22%	41	Calvin's Plumbing	0.12%
17	Island Solar Service, Inc. – Oahu	2.10%	42	Hawaiian Isle Electric, LLC	0.12%
18	Sun King – Maui	1.80%	43	HI-TECH Plumbing Corporation	0.12%
19	RT's Plumbing, Inc.	1.20%	44	M. Torigoe Plumbing, Inc.	0.12%
20	Solar Services Hawaii	1.08%	45	South Pacific Plumbing, LLC	0.12%
21	Kona Solar Service, LLC	1.02%	46	Best Plumbing & Electric, LLC	0.06%
22	Sun King – Oahu	0.84%	47	Faith Plumbing	0.06%
23	Qualified Plumbing	0.78%	48	Poncho's Solar Service – Big Island	0.06%
24	Royal Flush Plumbing	0.72%	49	Tamura Plumbing	0.06%
25	Allen's Plumbing – Maui	0.66%	**TOTAL**		**100.00%**

High-Efficiency Lighting

For PY14, the High-Efficiency Lighting Program achieved savings of 352,155,735 lifetime kWh energy, and 6,027 kW savings with $4,383,386 in incentives.

As mentioned previously, PY14 saw the LED market make even greater strides in qualifying products for the residential market. The 527,905 rebated units reflect an increase of 83% over PY13. Additionally, the Program moderated the volume of CFLs to a level of 1.3M (down from 1.5M) with an average incentive of $1.27 per unit.

Much effort was spent maintaining program participation with both manufacturers and retailers gained in PY13. The larger manufacturers included Cree, Westinghouse, Osram/Sylvania, GE, FEIT, Westinghouse, TCP and Phillips. The Program also recruited some smaller niche manufacturers such as Acuity, ETI, LSG, Green Light, and Batteries Plus, along with a few other distributors/retailers that work in the hardware, grocery and direct-to-consumer lighting markets. In PY14, the Program shifted focus away from big box stores, targeting CFL promotions with smaller retailer outlets in order to increase access to rebated products in more rural areas. Notably, we worked with Longs/CVS locally to distribute lighting in over 40 stores. This collaboration supported the local shopping model and provided high-efficiency lighting education. Feedback indicates that increased retailer education along with the proper selection of lighting products significantly drives customer adoption.

See **Table 62** for details.

*Includes 50 units (lamp) over-count from single distributor across two counties

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	1,328,146*	4,645	77.1%	35,766,428	79.6%	214,598,569	60.9%	6.0	14.3	$ 28,454,247	64.3%	$ 1,992,219	27.9%	$ 1,694,358	38.7%
LED Lighting	527,905	1,382	22.9%	9,170,478	20.4%	137,557,166	39.1%	15.0	3.1	$ 15,820,407	35.7%	$ 5,147,074	72.1%	$ 2,689,028	61.3%
Total	**1,856,051**	**6,027**	**100%**	**44,936,906**	**100%**	**352,155,735**	**100%**	**7.8**	**6.2**	**$ 44,274,654**	**100%**	**$ 7,139,293**	**100%**	**$ 4,383,386**	**100%**

High-Efficiency Air Conditioning

For PY14, the High-Efficiency Air Conditioning Program achieved savings of 23,552,656 lifetime kWh energy and 697 kW savings with $449,710 in incentives. This represents a 163% increase in lifetime kWh savings from PY13.

Notably, Hawaii Energy launched its Window Air Conditioner (AC) Trade-Up program which offers residents a $50 rebate for the purchase of a qualified window AC when surrendering an old working unit for pick-up and recycling. 282 rebates were issued for units purchased through 10 participating retailers in PY14, achieving savings of 92,284 kWh (first year) and 47 kW with $14,100 in incentives. Although this fell short of the 1,000 unit target, we anticipate the program will be fully subscribed in PY15, as we are now well-positioned to maximize participation during the hot summer months.



The Program promoted the Window AC Trade-Up offer in a residential utility customer bill insert, distributed by Hawaiian Electric to over 300,000 customers in all three counties.

In PY14, Hawaii Energy also updated its residential Variable Refrigerant Flow Air Conditioner program requirements to simplify the application process and better align with the commercial program design. These updates were based on feedback from manufacturers and distributors regarding their experience with current and historical Hawaii Energy rebate offerings. This information gathering provided an opportunity for dialogue regarding the deemed savings for applications in residential air conditioning, thus allowing better analysis of program cost effectiveness.

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	%
Variable Refrigerant Flow Air Conditioners	1,636	422	60.6%	844,897	46.0%	12,673,455	53.8%	15.0	4.4	$ 2,592,225	57.9%	$ 582,993	80.7%	$ 290,900	64.7%
Whole House Fan	399	175	25.1%	351,384	19.1%	7,027,685	29.8%	20.0	27.1	$ 1,295,220	28.9%	$ 47,880	6.6%	$ 29,925	6.7%
Ceiling Fans	2,901	48	6.9%	423,400	23.0%	2,117,000	9.0%	5.0	10.6	$ 276,355	6.2%	$ 26,109	3.6%	$ 101,535	22.6%
Window AC	282	47	6.7%	92,284	5.0%	1,107,409	4.7%	12.0	9.6	$ 244,794	5.5%	$ 25,380	3.5%	$ 14,100	3.1%
Solar Attic Fan	265	5	0.7%	125,421	6.8%	627,106	2.7%	5.0	1.7	$ 66,381	1.5%	$ 39,750	5.5%	$ 13,250	2.9%
Total	**5,483**	**697**	**100%**	**1,837,387**	**100%**	**23,552,656**	**100%**	**12.8**	**6.2**	**$ 4,474,975**	**100%**	**$ 722,112**	**100%**	**$ 449,710**	**100%**

High-Efficiency Appliances
For PY14, the High-Efficiency Appliances program achieved savings of 58,416,438 lifetime kWh energy and 479 kW savings with $855,238 in incentives.

Since PY09, Hawaii Energy has continued to expand its retail community to Hawaii and Maui counties, with a current total of over 200 retail participants. This includes many new independently owned retailers along with all of the "big box" retailers in the state. Hawaii Energy staff regularly visited all retailers throughout the program year to keep them updated on current 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.

- The ENERGY STAR® Clothes Washer and VFD Controlled Pool Pump offers held steady in PY14 with 3,816 and 209 units, respectively.

- Refrigerator Trade-Up – In order to moderate demand and manage the available PBF funds, the Program continued to offer the Refrigerator Trade-Up program in four batches throughout PY14, while reducing the rebate amount from $125 to $100. Overall, program performance was slower than previous years in both scale and contribution to the REEM portfolio. Participation fell this year by 35% to 3,482 units, achieving 2,503,345 kWh savings from this offer and, reflecting 60% of the cost of the lifetime energy savings for the High-Efficiency Appliance Program. Despite the slower performance, the Trade-Up program continues to be a big contributor in getting newer energy efficient refrigerators on the grid and, most importantly, it ensures the older refrigerators are recycled and off the grid or decommissioned. The average age of refrigerators pulled off of the grid in PY14 was 11.67 years old, with the oldest refrigerators being 50 years old.

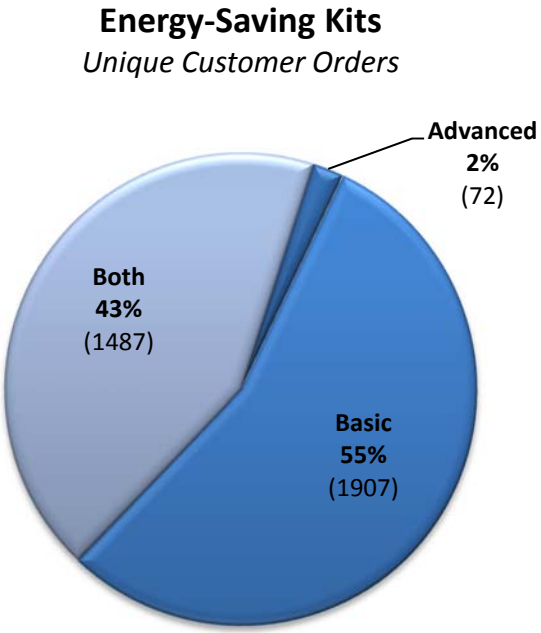
- Garage Refrigerator/Freezer Bounty Program – In PY14, the Refrigerator/Freezer Bounty Program continued as *Rid-A-Fridge to Fight Hunger*, a partnership between Hawaii Energy and local food banks. As an enhancement to the original Bounty program, which offers a rebate to customers who unplug and recycle 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. Participation in PY14 more than doubled that of PY13, with a total of 864 units surrendered for recycling. Additionally, at the conclusion of this year a total of $7,035 had been donated to Hawaii's food banks. This included $3,850 on Oahu, $1,170 on Maui and $2,015 on Hawaii Island.

- Energy Efficiency Equipment Kits – In PY14, Hawaii Energy introduced the Home Energy-Saving Kits – Online Fulfillment pilot program. As highlighted earlier, this pilot was Hawaii Energy's first-ever online store. Customers were able to order one basic energy saving kit and one advanced energy saving kit with direct delivery to their home, free of charge. The basic kit was free to customers and included one CFL lamp, one LED lamp, one low-flow showerhead and one faucet aerator. The advanced kit had a $10 customer co-pay and included two LED lamps and an advanced power strip.

  The success of this pilot far surpassed initial expectations by almost doubling the original target of 2,500 kits. The online store ran for six weeks, during which time a total of 4,953 kits were ordered. This included 3,394 basic kits and 1,559 advanced kits. It was particularly encouraging to see that of 3,466 unique customer orders approximately 43% (1,487 customers) ordered both kits. The program initiated some key online marketing initiatives that we believe helped drive customer traffic to the site. In particular, our online advertising campaign resulted in 339 conversions, approximately 10% of total unique orders.

Through this effort, Hawaii Energy also collected specific water heating and occupancy data in order to more accurately calculate energy savings potential. The program found that 48% of participant households indicated they had electric water heating and 37% indicated solar water heating. Participant households had an average of three occupants. Overall, the Home Energy-Saving Kits program achieved savings of 4,205,051 lifetime kWh energy and 242 kW savings with $128,348 in incentives. In PY15, Hawaii Energy will expand the provision of energy-saving devices in our online store. We also plan to incorporate additional web-based marketplace services for customers.

See **Table 64** for details.



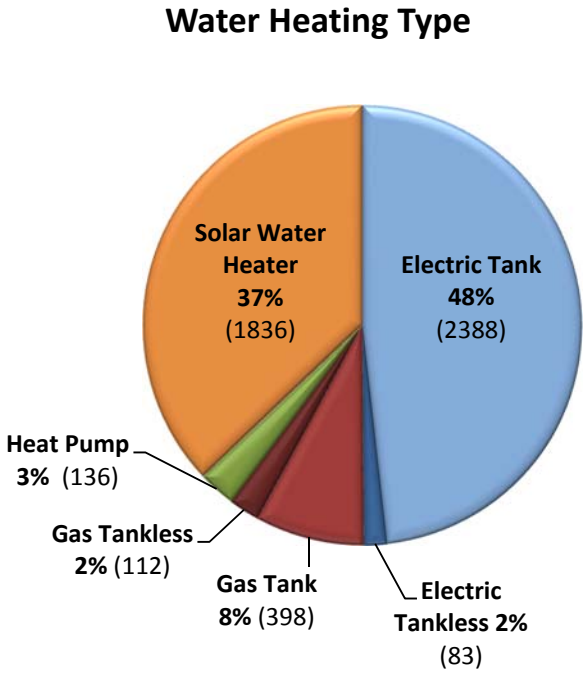


Table 64 REEM High-Efficiency Appliances Program Impacts															
Category	**Units**	**Program Demand (kW)**	**%**	**Program Energy (kWh 1st Yr.)**	**%**	**Program Energy (kWh - Life)**	**%**	**Average Measure Life (Years)**	**TRB/ TRC**	**Total Resource Benefit**	**%**	**Total Resource Cost**	**%**	**Incentives**	**%**
Refrigerator (With Recycling Of Old)	3,482	104	21.6%	2,503,345	54.1%	35,046,834	60.0%	14.0	0.7	$ 3,114,549	53.0%	$ 4,178,400	60.0%	$ 386,900	45.2%
Clothes Washer	3,816	93	19.5%	687,720	14.9%	8,252,645	14.1%	12.0	0.5	$ 980,685	16.7%	$ 2,098,800	30.2%	$ 190,800	22.3%
Refrigerator - Bounty	755	22	4.7%	565,682	12.2%	7,919,548	13.6%	14.0	16.5	$ 700,408	11.9%	$ 42,355	0.6%	$ 42,355	5.0%
Home Energy-Saving Kits-Online Fulfillment*	12	242	50.5%	574,934	12.4%	4,205,051	7.2%	7.3	6.1	$ 785,128	13.4%	$ 128,348	1.8%	$ 128,348	15.0%
Freezer - Bounty	109	3	0.7%	81,682	1.8%	1,143,551	2.0%	14.0	16.6	$ 101,136	1.7%	$ 6,095	0.1%	$ 6,095	0.7%
VFD Pool Pumps	209	1	0.2%	109,178	2.4%	1,091,783	1.9%	10.0	0.6	$ 96,204	1.6%	$ 156,750	2.3%	$ 31,350	3.7%
Advance Power Strips	2,413	9	2.0%	82,189	1.8%	410,946	0.7%	5.0	2.6	$ 53,892	0.9%	$ 20,502	0.3%	$ 20,565	2.4%
Refrigerator (Purchase New Only)	269	4	0.8%	24,720	0.5%	346,080	0.6%	14.0	0.2	$ 41,811	0.7%	$ 215,200	3.1%	$ 13,450	1.6%
Recycler App - Accounting	0	0	0.0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ 0	0.0%
Recycler App - Freezer	111	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 81,600	1.2%	$ 3,515	0.4%
Recycler App - Refrigerator	750	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 23,765	0.3%	$ 23,765	2.8%
Recycler App - Window AC	303	0	0.0%	0	0.0%	0	0.0%	0	0.0	$ 0	0.0%	$ 8,095	0.1%	$ 8,095	0.9%
Total	**12,229**	**479**	**100%**	**4,629,452**	**100%**	**58,416,438**	**100%**	**12.6**	**0.8**	**$ 5,873,813**	**100%**	**$ 6,959,910**	**100%**	**$ 855,238**	**100%**
*Unit number reflects the number of vendor transactions. The total number of kits ordered by customers was 4,953 as mentioned above.															



The Program used a mix of methods to promote the Home Energy-Saving Kits, including a postcard distributed at several outreach events (at right). The Program also leveraged the kit into an opportunity to 1) collect household water heating data and 2) promote additional rebates by including a copy of our Residential tri-fold brochure with every mailed kit.

Energy Awareness, Measurement and Control Systems

For PY14, the Energy Awareness, Measurement and Control Systems Program achieved savings of 7,162,958 lifetime kWh energy and 1,957 kW savings with $1,601,978 in incentives.

- Peer Group Comparison – In PY14, Hawaii Energy continued with the Peer Group Comparison Home Energy Report (HER) program. The Home Energy Report consists of an outbound mailer measuring a home's energy use against 100 homes in their peer group (i.e., similar sized home and demographics). Calls from customers responding to mailings range from general inquiries about the program to anger (e.g., save paper, privacy, low ranking). This is the expected outcome of the mailers, which are designed to elicit a strong response followed by behavioral changes. Customers are 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 decide to continue their participation in the program. Hawaii Energy continues to maintain one of the lowest attrition rates nationwide for the Peer Group Comparison report. In all, 5,756,406 kWh savings came from this offer, reflecting 80% of the lifetime energy for the Energy Awareness and Control System program.

  In PY14, HERs were enhanced to include customized marketing modules designed using market segmentation analysis. For example, during one promotion, customers were segmented based on their energy usage characteristics and previous participation in the Hawaii Energy Solar Water Heating program. Depending on a customer's market segment, different messages were utilized to promote either the standard program offer, the Solar Water Heating tune-up program or encourage sign-ups for Hawaii Energy's e-newsletter. These tailored messages are designed to create a more personalized experience for customers by identifying programs that are better suited to their needs. We will continue more detailed data analysis in PY15 in order to enhance the effectiveness of these market segmentation efforts.

- Water Cooler Timers – In PY14, Hawaii Energy expanded its water cooler timer offer to include residential customers (in PY13 the offer was only available for businesses). The Program worked with a vendor to engage water delivery companies in order to distribute timers to their residential customers. The vendor also distributed directly to customers at community events. A total of 6,296 timers were delivered to residents, achieving a lifetime kWh savings of 1,406,552.

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 - Phase 1/2/3	1,476,265	1,957	100.0%	5,756,406	95.3%	5,756,406	80.4%	1.0	0.9	$ 1,351,980	90.8%	$ 1,507,538	94.1%	$ 1,507,538	94.1%
Water Cooler Timers	6,296	0	0.0%	281,310	4.7%	1,406,552	19.6%	5.0	1.5	$ 137,299	9.2%	$ 94,440	5.9%	$ 94,440	5.9%
Total	**1,482,561**	**1,957**	**100%**	**6,037,717**	**100%**	**7,162,958**	**100%**	**1.2**	**0.9**	**$ 1,489,279**	**100%**	**$ 1,601,978**	**100%**	**$ 1,601,978**	**100%**

Custom Energy Solutions for the Home (CESH)

Objectives

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

Impacts

Energy Efficiency Auction

The majority of the CESH operations expenditures took place during the first half of the year in the design and implementation of Hawaii Energy's first-ever Energy Efficiency Auction. This initiative invited contractors, energy vendors, property managers and developers to compete for funding of their independent, cost effective projects that focus on high energy consumption or hard-to-reach residential sectors. Projects eligible for the auction were any commercially available energy efficiency technology, mass installation opportunity, hard-to-reach market segment or offering either not currently served by existing Hawaii Energy programs or that contractors were able to accomplish in a more cost effective manner. Selected projects had to be completed by May 30th, 2015.

The Residential program received proposals for five different projects as a result of this Energy Efficiency Auction. From this pool, Hawaii Energy selected one proposal to fund: *Honeywell Smart Grid Solutions – Green Neighborhood Program.* The Green Neighborhood Program proposed the direct install of energy efficient technologies for approximately 1,800 homes in the "Phase 0" neighborhoods of Moanalua and Pearl City. Plans included the installation of high-efficiency showerheads, faucet aerators, advanced power strips and CFLs, with an added effort to address water heating insulation, air conditioning filters and refrigerator coil cleaning. All measures were designed to be free to the customer. In order to generate maximum participation, these efforts also included a comprehensive marketing strategy to enroll residents during an outreach and education campaign in their neighborhood.

Because of the tight timeline for completion before program year end, the Green Neighborhood Program faced constraints in execution as originally proposed. Thus, the CESH program closed out the year with minimal incentive expenditures and no claimed savings. In PY15 the Program will revisit the project to determine whether feasible to implement.

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**	**%**
Efficiency Project Auction	1	0	0%	0	0%	0	0%	0	0.0	$ 0	0%	$ 1,319	100.0%	$ 1,319	100.0%
Total	**1**	**0**	**100%**	**0**	**100%**	**0**	**100%**	**0**	**0.0**	**$ 0**	**100%**	**$ 1,319**	**100%**	**$ 1,319**	**100%**

Expenditures

Table 67 CESH Program Expenditures					
	Total Expenditures	**PY14 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
CESH Operations	$ 52,086.66	$ 53,000.00	98.28%	$ 913.34	1.72%
CESH Incentives	$ 1,319.08	$ 277,542.00	0.48%	$ 276,222.92	99.52%
Total CESH	**$ 53,405.74**	**$ 330,542.00**	**16.16%**	**$ 277,136.26**	**83.84%**

Residential Energy Services & Maintenance (RESM)

Objectives

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 PY14, the RESM Program was comprised of the Solar Water Heating Tune-Up offering and Efficiency Inside Home Design Program. Overall the RESM Program achieved lifetime savings of 5,169,866 kWh and 50 kW with a total incentive of $301,350.

Accomplishments

Solar Water Heating Tune-Up Program

The Solar Water Heating Tune-Up program offered a $150 rebate to help offset the cost of maintenance for existing solar hot water systems. The Tune-Up program requires contractors to follow a key maintenance checklist to address system performance and longevity. The Program proved successful once again this year, exceeding the initial target of 1,000 tune-ups and finishing the year with a final count of 1,697 tune-ups performed. This work remains popular with contractors who see it as both an additional source of income and a means to build rapport with customers for future business.

In terms of system demographics, the program serviced a greater number of older systems during PY14. The average age of systems serviced in the Tune-Up program was 9.3 years old, which is 3.3 years older than the average system serviced in PY13. The oldest participant system was 38 years old. Additionally, there were 68 systems over 20 years old, and 20 systems over 30 years old. This represents a significant shift toward service of longer lifecycle systems as there were only six systems over 30 years old participating in PY13. We can interpret this data to mean that customers are eager to maintain systems beyond half-life and speaks to the longevity of all systems state-wide. We also saw a concentration of systems serviced in hotter sunshine zones during PY14 with 63% systems in the 400-450 zones and 24% in 500 zones.

Overall system condition once again ranked high, with approximately 70% of all systems rated as “Good” by the Contractors. However, several key performance indicators suggested that although the systems are visually sound, the effectiveness and necessity for the Tune-Up program is crucial to system longevity. For instance, 48% of system timers were not operational at the time of the Tune-Up. Since timer functionality is a key component for maximum system performance, we can infer that almost of half of the participant systems were not functioning at capacity before their tune-up. Furthermore, 38% of all anode rods replaced were in fair to poor condition. Again, we can infer that these systems were operating well below capacity as the deterioration of anode rods is the greatest threat to tank longevity and performance.

Overall, the PY14 Solar Tune-Up Program was highly successful for Hawaii Energy, Contractors, and Customers alike. We not only exceeded our original rebate targets, but also created an atmosphere for sustained business for Contractors and increased system longevity for Customers. We will continue to use data collected through the Tune-Up program to improve the SWH program design. In particular, in PY15 we will perform a more detailed analysis surrounding solar fraction and sizing requirements in the hotter sunshine zones. Hawaii Energy will also continue with the design and implementation of an educational campaign surrounding proper use of timers and promote the use of digital timers with contractors in order to increase program penetration.

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. PY14 served as the final year of our Efficiency Inside program, during which we incentivized 78 homes for energy modeling to close out the data collection.

In this final year, Hawaii Energy compared modeled energy consumption from past years with actual energy consumption data in a 400-home development, once the homes were occupied for 12 months. The analysis compared actual energy consumption to both the code-baseline and the as-designed Efficiency Inside models. On average, the homes as lived-in consumed 25% less energy than the code-baseline, and 15% less energy than the model predicted they would use as-designed. The Efficiency Inside incentives allowed the Program to identify the sources of these large savings over code. These include high Seasonal Energy Efficiency Ratio (SEER) air conditioning, improved roof insulation and attic cooling methods, tighter construction, an above-code window solar heat gain coefficient (SHGC), and a significantly decreased U-value of 0.31 due to the use of double-pane windows. The incremental improvements leading to decreased energy consumption are shown in **Figure 8** below.

The Program plans to use the data gathered over the last five years to work more closely with developers and residents, sharing data in a way that encourages behavioral changes in energy usage. In PY15, the Program will also work with the Hawaii State Energy Office by providing support for County building officials. As of this writing, the IECC 2015 energy code is being presented to the state and counties for adoption. Read more about Hawaii Energy's Codes Compliance study, creating energy code checklists, and the exploration of an incentive for early-implementation of energy codes in the Codes & Standards section (pg. 154).

Figure 8
Modeled vs. Actual Energy Consumption in Hawaii Residential New Construction

	IECC 2006	IECC 2006 - Hawaii	As-Constructed	Next Level of Performance	Actual home
kWh/Year	12,294	10,228 (2006-SWH)	8,968	8,675	7,656
Water Heating	Electric	Solar	Solar	Solar	Solar
A/C SEER	13	14	16	18	24.5
Ceiling Insulation	R-30	HI Amendment Options	(roof only)	(roof only)	(roof only)
Roof Insulation	HI Amendment Options	Attic R-19 / No Attic R-15 above roof or R-19 between frame	R-19.8	R-19.8	R-19.8
Construction Tightness SLA	0.00036	0.00036	0.00019	0.00019	0.00019
SHGC	0.4	0.3	0.22	0.22	0.22
Window U-value	1.2	1.2	0.31	0.31	0.31

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**	**%**
Efficiency Inside Home Design	78	0	0.0%	201,039	31.8%	3,015,579	58.3%	15.0	4.9	$ 230,167	44.9%	$ 46,800	8.4%	$ 46,800	15.5%
Solar Water Heating Tune-Up	1,697	50	100.0%	430,857	68.2%	2,154,287	41.7%	5.0	0.6	$ 282,376	55.1%	$ 509,100	91.6%	$ 254,550	84.5%
Total	**1,775**	**50**	**100%**	**631,896**	**100%**	**5,169,866**	**100%**	**8.2**	**0.9**	**$ 512,543**	**100%**	**$ 555,900**	**100%**	**$ 301,350**	**100%**

Expenditures

In PY14, the RESM program spent $301,350, or 73.5% of the incentive budget.*

See **Table 69** for details.

Table 69 RESM Program Expenditures					
	Total Expenditures	**PY14 Budget**	**Percent Spent**	**Unspent**	**Percent Unspent**
RESM	$ 48,953.55	$ 49,000.00	99.91%	$ 46.45	0.09%
RESM	$ 301,350.00	$ 410,000.00	73.50%	$ 108,650.00	26.50%
Total RESM	**$ 350,303.55**	**$ 459,000.00**	**76.32%**	**$ 108,696.45**	**23.68%**

**Percent spent based on final budget allocations.*

Residential Hard-To-Reach (RHTR)

Objectives

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

Multifamily Direct Installation – Energy $mart 4 Homes (E$4H)

PY14 marked the expansion into another facet of direct install opportunities through the introduction of the Energy $mart 4 Homes (E$4H) program for multifamily residential properties. E$4H targets an underserved portion of the multifamily market including master-metered and rental units, which account for approximately 20% of total residential energy use in Hawaii (Figure ES-3, *2014 Energy Efficiency Potential Study*). This scope of work includes marketing analysis and segmentation of multifamily properties with direct outreach of the program to property management companies, housing associations, housing communities, and building owners. The initial geographic focus is only on Oahu with the expansion to the neighbor islands as an option in a future phase.

Properties that sign on to E$4H receive replacement technologies for all units, which include the following four energy efficient measures:
1) Compact fluorescent lamps (CFLs), 2) high-efficiency showerheads, 3) high-efficiency faucet aerators and 4) advanced power strips. All measures are provided at no-cost to the property owner or residents. Installation technicians are assigned to remove and replace existing incandescent light bulbs, and higher-flow bath and kitchen fixture attachments for each residential unit as needed. Technicians also offer basic energy efficiency tips and information to tenants during the time of installation.

Since the launching of the program in Q3, 33 multifamily properties with a total of 1,524 residential units were retrofitted in four months. Of these, 1,150 units fell under a residential rate code and 374 units were part of commercial master-metered buildings. The E$4H program was particularly successful engaging senior living residential properties, subsidized housing and single-party owned properties.

E$4H has provided a valuable service to properties and individuals that otherwise might not have had the means, opportunity, or motivation to improve and upgrade those units to a greater level of overall energy efficiency. One of the greatest lessons learned during PY14 was the importance of proper market segmentation for this type of program as we streamlined the targeting and better aligned the program with the needs of key stakeholders. We have also gained a great deal of insight into consumer behavior and perception surrounding energy efficiency. From these experiences we have found that continued education and engagement with residents in the home is vital to gaining trust and support from both multifamily building owners and the individual occupants.

In PY15 we will expand the reach of the program with a target of 4,000 units and will also diversify measures to include decorative globe and small base LED lighting in order to address ceiling fan and sconce applications that we were not able to retrofit in the initial program stage.

Solar Water Heater – Direct Install

In PY14 the Program worked with Hawaii County Economic Opportunity Council (HCEOC) to install 70 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.

CFL Exchange

Carried over from PY13, Hawaii Energy finalized its CFL exchange in PY14. This final exchange effort targeted multifamily properties and community organizations serving a diverse population of residents. Groups were incentivized to exchange old incandescent bulbs for ENERGY STAR® CFLs provided by Hawaii Energy. For each bulb exchanged the participating organization received a $.50 bonus. Additionally, the Program offered free pick up and disposal of the incandescent bulbs collected. In all, 10 properties and 3 community organizations participated, exchanging over 5,000 bulbs.

Impacts

During PY14 Hawaii Energy built on PY13 successes and continued to provide Residential Hard-to-reach (RHTR) resources to traditionally underserved demographics. For PY14, the Residential Hard-To-Reach program achieved lifetime savings of 4,415,256 kWh (first year) and 159 kW savings with $664,297 in incentives.

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 Heating	70	27	17.3%	123,387	20.3%	1,850,802	41.9%	15.0	0.4	$ 247,031	35.3%	$ 579,675	87.6%	$ 579,675	87.3%
CFL Exchange	12,636	21	13.0%	149,583	24.7%	897,500	20.3%	6.0	8.3	$ 121,140	17.3%	$ 14,549	2.2%	$ 14,549	2.2%
CFL	4,902	22	13.6%	151,124	24.9%	755,622	17.1%	5.0	5.3	$ 105,209	15.0%	$ 19,682	3.0%	$ 19,682	3.0%
Showerhead	868	62	38.9%	77,200	12.7%	386,001	8.7%	5.0	8.4	$ 133,047	19.0%	$ 15,827	2.4%	$ 15,827	2.4%
Advance Power Strips	875	8	5.0%	70,100	11.6%	350,501	7.9%	5.0	2.3	$ 45,520	6.5%	$ 20,011	3.0%	$ 20,011	3.0%
Aerator	1,835	19	12.2%	34,966	5.8%	174,831	4.0%	5.0	3.9	$ 47,753	6.8%	$ 12,122	1.8%	$ 12,122	1.8%
Accounting	14	0	0.0%	0	0.0%	0	0.0%	0	0	$ 0	0.0%	$ 0	0.0%	$ 2,431	0.4%
Total	**21,200**	**159**	**100%**	**606,361**	**100%**	**4,415,256**	**100%**	**7.3**	**1.1**	**$ 699,700**	**100%**	**$ 661,866**	**100%**	**$ 664,297**	**100%**

Expenditures

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

Table 71
RHTR Program Expenditures

	Total Expenditures	PY14 Budget	Percent Spent	Unspent	Percent Unspent
RHTR Operations	$ 407,446.45	$ 408,000.00	99.86%	$ 553.55	0.14%
RHTR Incentives	$ 664,296.93	$ 1,061,250.00	62.60%	$ 396,953.07	37.40%
Total RHTR	**$ 1,071,743.38**	**$ 1,469,250.00**	**72.94%**	**$ 397,506.62**	**27.06%**

TRANSFORMATIONAL PROGRAM

Introduction

Market transformation seeks to identify, assess, and help overcome market barriers that inhibit residents and businesses from adopting energy efficient technologies and practices. Hawaii Energy facilitates:

- People being aware and informed about their energy use to allow them to consciously use energy at home and work,
- Professionals being effective at educating others and selling efficiency,
- Technical experts gaining the knowledge and skills required to buy and operate efficient equipment, and
- Decision makers incorporating comprehensive energy management strategies into their organizations.

This is accomplished through education, training, targeted behavior change campaigns, pilot projects, and research efforts to better understand the markets we serve. We foster relationships across the energy sector and engage multiple partners and stakeholders to build successful energy management systems. As it matures, the Market Transformation program is developing metrics and tracking systems to help link outcomes more directly to energy savings. Through the expertise and collaboration of Hawaii Energy staff and subcontractors throughout PY14, the Transformational program met and exceeded nearly all 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**	**Minimum**	**Target**
*Behavior Modification**	71,176*	12,600	18,000
Helen Wai – Sharing the Aloha	4,201		
BPF – WEfficiency	4		
Kanu Training Curriculum	905		
Kanu – Social Media & Devices	64,866		
Professional Development	1,828	700	1,000
The NEED Project	332		
Kupu Hawaii – RISE Program	6		
IFMA – Conference & Expo	1		
EEFG – Training	1,199		
University of Hawaii	268		
HPU – Green Office Program	22		
Technical Training	584	175	250
ASWB Workshop	384		
CEM - AEE	39		
BOC - UHMOC & SLIM	67		
W/WW Systems Trainings	49		
Fisher-Nickel	45		
Clean Energy Ally Program	226	n/a	200
Pilot Projects	**Actions**		
Benchmarking	428	200	500
Codes and Standards	Market Survey & 1 Action	Market Survey & 1 Action	Market Survey & 2 Actions
Demand Response	Market Survey & 3 Actions	Market Survey & 1 Action	Market Survey & 2 Actions
Smart Grid	Market Survey & 2 Actions	Market Survey & 1 Action	Market Survey & 2 Actions
Electric Vehicle	Market Survey & 3 Actions	Market Survey & 1 Action	Market Survey & 2 Actions

**Behavior modification participation numbers can be divided into two broad types of engagement: social/electronic media and education/training/other. 64,866 "participants" represent engagement through social media and email communication including "liking, sharing, or commenting" on social media posts, viewing energy efficiency education videos, and opening educational emails. The remaining 6,310 "participants" represent participation in trainings, events, projects, or energy saving competitions.*

Hawaii Energy's Market Transformational program seeks to ensure that activities will have a direct impact on energy savings within a five year time horizon and has a special focus on "hard-to-reach" ratepayers who are traditionally underserved by energy efficiency and conservation programs. In PY14 the Program continued to build on successful projects from previous years by deepening and broadening engagement and adapting programs based on lessons learned and recommendations from the PY12 EM&V report. For example, Hawaii Energy began developing logic models to articulate project outcomes, rationale, and support the development of metrics to track progress over time. Additionally, the Transformational program explored new pilot projects including community-based social marketing and technical training to support energy efficiency in the food service industry. We also began to explore how to provide Strategic Energy Management (SEM) services to large institutional energy users, primarily through work with the University of Hawaii.

New this year, Hawaii Energy launched five pilot projects related to various aspects of demand side management. The topics were: smart grid, codes and standards, benchmarking, electric vehicles, and demand response. The primary objectives were to demonstrate proof-of-concept on a small scale and to identify issues that must be resolved before expansion. Details and lessons learned are described in the "Energy Systems Integration Pilots" section below.

Behavior Modification

Behavior modification programs help people make daily decisions that reduce energy use. In PY14, we continued our focus on building energy literacy with "hard-to-reach" residential and business customers and those in underserved communities. We achieved noticeable increases in social media reach through an ongoing collaboration with Kanu Hawaii. We also expanded our program to include an energy-saving competition for residents and a community-based social marketing pilot focused on the AOAO market.

Energy Literacy in Hard-to-Reach Communities

For a fourth program year, Hawaii Energy offered free "Sharing the Aloha" energy efficiency workshops to residential ratepayers across Honolulu, Hawaii and Maui counties. These workshops target "hard-to-reach", who are typically residents with more than one job, extended families residing in geographically-isolated areas, or others who, for a variety of reasons, have been challenging for the Program to engage with and may have had little exposure to energy education. Workshops blend financial and energy literacy to connect energy-saving behaviors to reducing the cost of a household's electric bill. Attendees are also given a workbook and a simple energy-saving item to use in their home during the one-hour training. In PY14, 4,201 participants from all three counties attended a total of 164 workshops. Since beginning the workshops, the Program has seen a total of more than 12,000 participants in 438 workshops with wide island equity distribution (56% in the Honolulu County, 23% in Hawaii County and 21% in Maui County).



Community educator Helen Wai uses her "local-style" delivery and personal experiences to shed light on the often challenging concepts of energy efficiency and conservation. Helen has presented on behalf of the Program to all kinds of audiences, from corporate functions with 100+ attendees to small family groups in rural communities.

Trainings are led by longtime community educator Helen Wai and hosted by community organizations, housing and condo associations, government agencies, and local employers. Helen, who was born and raised in Nanakuli, has been training Hawaii residents in financial literacy, homebuyer education, foreclosure prevention, lease cancellation and energy efficiency in Hawaii for over 16 years.

Over the past four years, Hawaii Energy has received a number of positive testimonials about Helen's down-to-earth nature, engaging storytelling style and her ability to help people easily understand their energy use. This year at the 7th Annual Hawaii Clean Energy Day, Governor David Ige and the Hawaii Energy Policy Forum presented the "Transformational Achievements in Clean Energy" award to Helen and Hawaii Energy for the "Sharing the Aloha" workshops.

Each year, Helen expands the program's reach into new geographical areas and builds new connections with community partners. Notably, Helen was able to work with the Public Housing Authority to engage over 1,200 primarily low-income participants in the workshops this year. This represents a significant breakthrough with this target audience. Additionally, Helen continued to collaborate with non-profit service and employee union organizations bringing in over 2,600 participants in PY14, twice the number achieved with these groups last year.

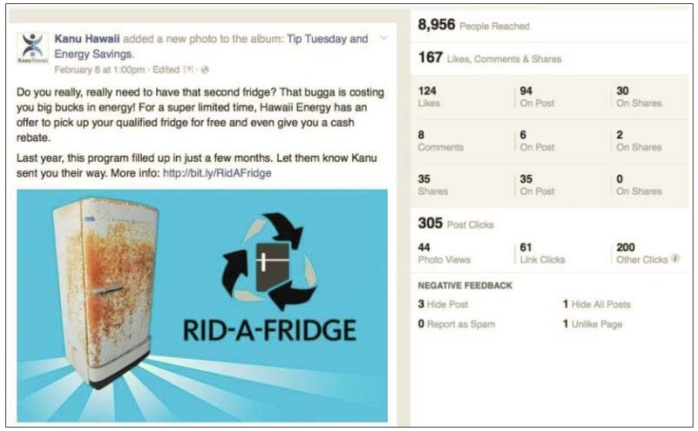
Hawaii Energy continues to work with Helen to refine the "Sharing the Aloha" curriculum based on participant feedback. A logic model was developed this year to better articulate the project's goals and move towards establishing measurable indicators of progress to help improve project design over time. The Program anticipates continued improvement to the content and an emphasis on reaching larger audiences in PY15.

Kanu Hawaii

Kanu Hawaii (Kanu) is a locally-based 501(c)(3) nonprofit that empowers people to build more environmentally-sustainable, compassionate, and self-reliant communities through demonstrations of *kuleana,* or responsibility. Members of Kanu commit to "being the change" they seek - taking specific actions that preserve and protect Hawaii's unique way of life. Over its five-year history, Kanu has attracted nearly 20,000 members spread across every zip code in the Hawaiian Islands, using grassroots community organizing, unique Kanu-developed online tools and bold social media outreach, reaching well over 100,000 people annually online. Kanu's communication style is different from other energy groups and organizations – they intentionally use a "local-style" of language and intersperse energy-focused messages with other creative and interesting messages to keep their community engaged. It has proven extremely effective in connecting with Hawaii's residents to build awareness about energy efficiency.

Catalyzing Energy Efficiency Dialogue through Social Media

Social media is a powerful, cost-effective tool for reaching the community with energy-saving information and offerings. Over the past three years, Hawaii Energy has collaborated with Kanu to raise energy efficiency awareness levels in the public arena via social media, using specialized content designed to engage customers, yet provide technically-accurate information. This year's work with Kanu focused on improving the design and distribution methods for their previously-developed energy tip memes (an image, video, phrase, etc. spread through the internet) and general energy-saving messages, as well as the promotion of specific Hawaii Energy residential rebate programs.



Kanu Hawaii used posts like the above on their Facebook page to encourage their followers to take advantage of Hawaii Energy rebates.

Kanu established four channels of content distribution this program year:

- *Energy Efficiency Icebreakers*: memes published through Facebook posts
- Targeted promotion of Hawaii Energy offerings published through Facebook posts
- "*Tip Tuesday*," a weekly opt-in email message service that people could choose to enroll in to receive energy saving tips.
- Promotion of the Advanced Power Strip (APS) Distribution Project via social media (see the "Pay-It-Forward" section below for more information on the deployment of APS devices).

Each of these channels offered a different level of commitment and action from participants, which included basic viewing and sharing of content, signing up for Hawaii Energy newsletters, subscribing to weekly "Tip-Tuesday" emails and taking advantage of Hawaii Energy rebates (i.e. Rid-A-Fridge or Solar Water Heating).

Reach to Hawaii's residents was expanded through social media "sharing, commenting and liking", and this year, the Hawaii Energy messages received a total of 64,866 engagements over a six-month time period as indicated below.

Key Findings
Kanu reported the following summarized results:

Social Media Strategy	Reach/ View*	Engagement**	Sticky %***
Energy Efficiency Icebreakers	661,557	46,045	6.96%
Promotion of Hawaii Energy Offerings	103,559	5,232	5.05%
Advanced Power Strip Promotion	168,058	12,371	7.36%
Tip Tuesdays	3,672	1,218	33.17%
Totals	936,846	64,866	6.92%

*Reach/View refers to the number of times a post is viewed
**Engagement refers to a verifiable interaction including viewing a video; signing up for a service; liking, sharing, or commenting on a post; or clicking through to another a website
***Sticky % refers to the percentage of people that convert from a viewer to someone who engages with the information presented as defined above

We have seen that Kanu Hawaii is particularly effective at reaching customers through social and electronic media, extending the reach of Hawaii Energy into households that might not otherwise engage with energy efficiency. Using local images and language continues to be an effective way to reach people across the state at scale. Kanu received multiple comments on how the content resonated with people. For instance, a woman commented and shared an energy post saying, "Any tip that includes the Hawaiian word "Pilau" is worth sharing!" Overall, there are many lessons learned that can be applied as we continue to refine this work. See below for a summary by initiative.

Energy Efficiency Icebreakers:

- The most viral (largest reach) post was a tip about cooking more efficiently in the rice cooker than in the oven and included advice to, "Make Ono Banana Bread in your Rice Cooker." One government staff commented in a meeting, "Oh! That was you guys… I ran off to Umeke Market to buy some bananas." These types of special interest pieces encourage action and sharing.
- Positive comments about "Will the Cat," the character used in the energy saving memes, came from people across the state. People may not know that the cat is connected to Kanu or Hawaii Energy, but they do know the cat is connected to saving energy. Characters like the cat can help people engage with energy efficiency; though, as in the anecdotal evidence, it may not be well suited for connecting to a brand name.

Targeted Promotion of Hawaii Energy Offerings:

- Some of the promotions such as Rid-A-Fridge and the Solar Water Heater Tune-Up had high engagement rates despite the fact that the specific offers did not apply to all viewers.
- Future projects would benefit from having systems in place to track actions taken by people who click through. The online advertising industry has been moving towards this type of "pay per action."

- The Dare to Compare post (see image at right) was our "stickiest" post meaning that 16% of people who saw it, engaged with it, compared with 7% average stickiness overall.



Tip Tuesday:

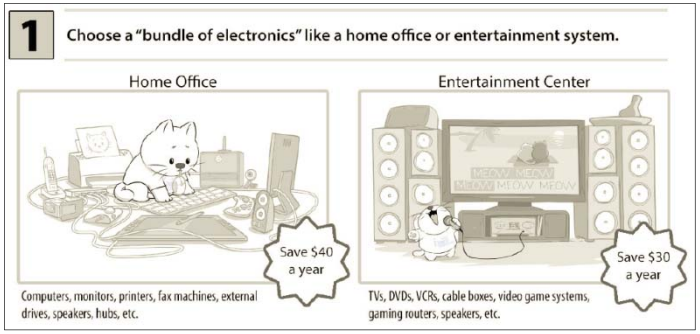
- 542 participants chose to enroll in the 26-week curriculum of emails to be received weekly on Tuesdays in their inbox (exceeding the goal of 500).
- 12% of enrollees chose to complete the pre-program "welcome" survey. Of those:
    - More than half of respondents knew 5 or fewer ways to reduce electricity use in the home.
    - Approximately 56% reported prior awareness of Hawaii Energy, which is consistent with market research completed this Program Year.
    - 46% of them were renters.
- Of the 46 people who took the follow-up survey more than 56% (22 respondents) scored it 1 or 2 (on a scale of 1 to 5, with 1 being best) in helpfulness for learning how to save energy.
- In future pilots it would be helpful to design the survey methodology to evaluate how effective the program is in raising awareness about Hawaii Energy and energy efficiency and conservation.



During the next Program Year, Hawaii Energy will work with Kanu to refine the messages and continue to engage ratepayers with energy efficiency through social media. We will look for new, creative ways to use the memes to reach our customers and develop survey methods to measure effectiveness and customer energy savings.

Pay-It-Forward – Creating Value for Simple Energy-Saving Devices

Many residential ratepayers lack the understanding of the value of such equipment and the standard instructions that accompany these devices are often difficult to understand, leading to incorrect or no use at all. Last year the Market Transformation program worked with Kanu Hawaii to pilot a distribution and education process for simple energy-saving devices. Their "pay-it-forward" model encourages participants to share a second device with families and friends, thus expanding the reach of the program. This year, Kanu Hawaii expanded efforts and distributed 1,200 advanced power strips through the pay-it-forward model. With the findings, Hawaii Energy plans to develop subsequent offers that would be well-designed to succeed, especially among hard-to-reach sectors.





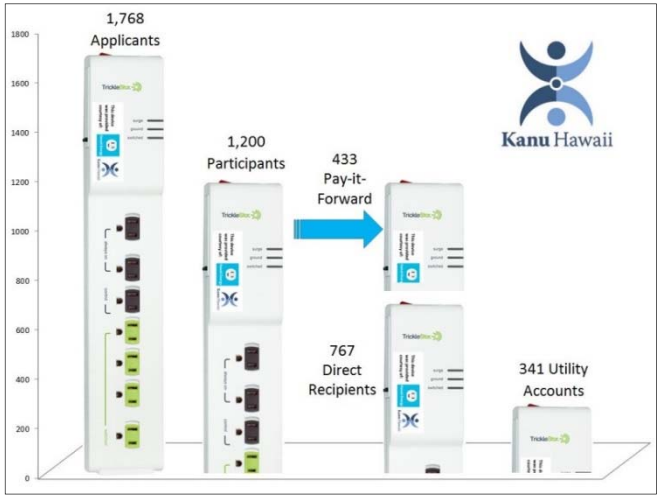
Kanu refined the "Pay-it-Forward" distribution method this program year and chose advanced power strips as the designated item.
Over 1,200 Kanu members utilized an online portal (left) as well as paper instructions included with the mailed power strips (right) to setup, use and share their devices.

Kanu developed an online portal for people to sign up in order to manage this multi-step project that required repeated participant engagement. Participants agreed to: fill out the application for themselves and a friend (they could also choose to send to multiple friends), set up the device for themselves and teach their friend(s) how to use it, upload pictures of the setup devices and fill out a survey at the end. The project involved both a social media outreach stage (results described above) and the device distribution phase to the 1,200 qualified, enrolled applicants.

Key Findings

The results of the distribution phase were reported by Kanu as follows:

- A total of 1,200 participants were recruited from 1,768 who signed up or were added as friends by others who had signed up.
- 767 received the APS directly from Kanu and 433 received through the pay-it-forward mechanism from a friend or family member.
- 70% of participants were home owners. 30% of participants were renters.
- 859 (71%) did not offer account information, 341 (29%) of the participants were able to verify their utility account number.
- 14% of participants completed a follow-up survey. Of those, over 87% felt that the power strip was easy or very easy to set up following Kanu's version of the setup instructions with only four people asking for additional help. 43 people said they made some other energy change along with setting up the power strip. The percentage of people who knew fewer than three ways to save energy decreased from approximately 28% to less than 16%.



A total of 1,200 residents received an advanced power strip through the Pay-It-Forward offer. 767 received their strip directly from Kanu and an additional 433 residents reported receiving their device through the Pay-It-Forward mechanism. Hawaii Energy was able to collect utility account information from 341 participants.

The distribution process has been refined through two years of piloting and has proven successful at delivering energy saving devices with instructions that make them easy to use but the customer intake process continues to present significant challenges. Specifically,

collection of utility account data is a barrier, particularly for renters. There is some indication that receiving the device may lead to reductions in energy use, but more analysis is needed to determine whether this is a cost-effective method for achieving the goals of raising awareness and lasting energy savings. Some participants reported implementing additional changes to save energy, along with installing the APS device, indicating there may be additional energy saving benefits to the program that could be further explored in future pilots.

60 Day Energy Challenge

Kanu Hawaii piloted the use of employer- and community-based energy contests as a way to reduce household energy consumption. The long-term goal is to develop a "turn-key" solution for self-managed energy-saving competitions. For this pilot, Kanu recruited five employers and community organizations to co-sponsor an "Energy Challenge" – a 60-day competition among employees of the company or members of community organizations (e.g., church, school, and neighborhood association). In addition to the group contest, a "Self-Service" energy course was also available for any individuals wishing to participate.

During the two month period, participants competed to see who could achieve the largest percent reduction in household electricity use, compared to the two months prior to the Challenge. All participants received weekly emailed tips and encouragement. Participants had access to an online course delivered through 19 entertaining, five-minute video clips of energy-saving tips. The program created an environment of friendly competition between colleagues, providing the incentive, inspiration and information needed to cut electric bills and help reduce Hawaii's dependence on imported oil. Participants' energy use was tracked and reported when utility bill information was available. Kanu worked with Hawaii Energy to recognize and award winners.

Key Findings

Overall, there were no significant savings by the participants generated by this initiative. There were dramatic results seen in the winners' energy reductions, though many took on short-term sacrifices in order to receive the prizes. One particular action, however, that provided good results for participants was turning off of the stand-by element in water heaters – a method that has the potential to provide persistent savings and is easily repeatable by others.

Specifically, Kanu reported that for the group contests:

- 5 companies enrolled with a total of 365 participants, exceeding the minimum target of 250 participants.
- 38% provided their electric account information.
- 59% of the participants were renters, a higher percentage than is found in the general population (44% in Honolulu County).
- Emails had a 36% open rate with 12% of them clicking-through to view the video course. (Note that there may have been additional views not captured by the system.)



Hawaii Prince Hotel was the largest employer group with 202 participants in the 60-Day Energy Challenge. Winners were surprised at work by Kanu and Hawaii Energy team members and presented with a prize bag for their efforts.

For the Self-Service course:

- 540 participants enrolled, exceeding the minimum target of 500 participants.
- 8% enrolled with their electric account information.
- 36% of participants were renters.
- Emails had a 40% open rate with 8% of them clicking-through to view the video course.

Kanu identified the following barriers to participation:

- Requiring and verifying electric utility account numbers.
- Company policy restricting the viewing of web content.
- Falling engagement rates throughout the course of the email drip message campaign.
- Limited ability to analyze behavior changes for homes with photovoltaic (PV) systems installed.
- Participants rating "prizes and recognition" as the most effective element in getting them to save energy.



Many lessons were also learned about how to implement an employer-based home energy saving competition. Based on PY14 findings, offering a turn-key group energy challenge that can be implemented without Hawaii Energy involvement may not be feasible. It will likely require a minimum "light touch" of support. If employers take on the task of internal promotion, recruitment, and registration and Hawaii Energy provides support for data management, analysis, and troubleshooting, this might be viable and cost-effective as an outreach and awareness building tool. Nearly all employers saw benefits in the areas of employee morale, team-building and potential PR/communications value, and there are anecdotal indications that there may be ripple effects of participants sharing information within the businesses in which they work and with their peers and neighbors. For example, one company launched a series of lighting retrofits during the contest and the engineering team that advocated for the changes reported it would have been difficult to get the projects funded without the enthusiasm generated by the contest. This model was also successful in reaching participants with limited prior knowledge of energy efficiency in the hard-to-reach sector.

Using lessons learned from this pilot, Hawaii Energy will work with Kanu to continue to refine the self-service energy video curriculum distributed through an email drip message system. Also, it is clear that developing a more user-friendly mechanism to verify utility account information would have great value as it would allow for a better evaluation of energy savings.

Community Based Social Marketing (CBSM) Campaign for Energy Efficiency in the Association of Apartment Owners (AOAO) Market

The Program launched a new community-based social marketing (CBSM) pilot project to conduct effective campaigns to encourage energy-saving behavior changes. CBSM is a best practice methodology to achieve lasting, quantifiable changes through targeting specific actions that have a meaningful impact on energy use. It offers a proven research and metrics-based alternative to traditional education campaigns by bringing together principles of psychology with applied research methods into a practical and implementable framework to promote energy efficient choices. The goal is to develop scalable marketing campaigns that can be implemented broadly across Hawaii in future years, as well as to develop the local capacity to implement CBSM to promote energy efficiency and conservation.

To launch this effort, Hawaii Energy engaged experts from Action Research, a mainland-based consultancy that specializes in CBSM and includes some of the nation's foremost CBSM experts. Action Research partnered with Susty Pacific, a Hawaii-based company, to build local capacity and expertise to support future CBSM energy efficiency projects. Hawaii Energy hosted a training session on the fundamentals of CBSM for Susty Pacific, Kanu Hawaii, the University of Hawaii, Hawaii Pacific University, Kupu Hawaii and Hawaii Energy staff.

Since CBSM is designed to be highly-customized to meet the needs of specific communities, Action Research worked with Hawaii Energy staff to select a target audience for the pilot. Hawaii Energy selected the Association of Apartment Owners (AOAO) market sector partly due to the significant challenges previously faced in implementing energy efficiency in this market segment, with the target outcome of instituting energy-saving behaviors in multifamily properties.

The next step in PY15 is to hone in on the most impactful behaviors. Technical experts were surveyed through an online research tool and 20 property managers from selected AOAO buildings and complexes were interviewed by phone. Based on findings from the online survey and phone interviews, a mail survey was prepared in PY14 to be distributed to 1,000 residents in 30 properties during the next program year. Hawaii Energy plans to continue this collaboration with Action Research and Susty Pacific to complete the implementation of these energy-changing behavior campaigns.

Collaborative Projects and Sponsorships

Blue Planet Foundation & WEfficiency

Hawaii Energy supported Blue Planet Foundation's new program, WEfficiency, which is an online lending platform where community members can make a loan to support a non-profit's energy efficiency project. Hawaii Energy's intent was to understand the efficacy of this strategy to fund projects in the hard-to-reach, nonprofit sector.



Through the WEfficiency platform, the nonprofit collects pledges to pay for the project. Once the target amount is met, the project is funded. Thereafter, a portion of the nonprofit's monthly energy savings (80-90%) will be used to repay the lenders. The lenders can opt to "recycle" the funds into further energy projects, donate the funds, or withdraw the funds. Once the lending crowd is repaid, the nonprofit may keep the money generated through future energy savings to further their mission and work.

The campaigns were successful in fully funding three pilot projects and the overall concept was well received. However, broadening the scale and capacity of the platform will most likely require additional investment for development.

"Building a Community of Change Agents: Learning About and Responding to Climate Change" at Kapiolani Community College

Kapiolani Community College (KCC) has a track record of training their students to be advocates for positive change. At their request, the Transformational team at Hawaii Energy collaborated with KCC's Service & Sustainability Learning Program to engage students in the leadership initiative, "Building a Community of Change Agents: Learning About and Responding to Climate Change." The Program's purpose was to ensure that as students learn about climate change, they understand the importance of energy efficiency and conservation and can become informed leaders in their community. Approximately 20 student leaders were trained to deliver messages about behavior change to mitigate the impact of climate change and sea level rise in Hawaii, emphasizing the importance of energy efficiency to reduce Hawaii's reliance on petroleum. Focusing on the strong influence of peer-to-peer teachings, students were encouraged to reach out to their peers and start the conversation on energy efficiency informing them about actionable measures their communities can take to improve Hawaii's dependence on fossil fuels. Student evaluations reported that they gained knowledge and awareness on energy efficiency and reported sharing that information with their friends and families.

Aloha+ Challenge and Energy Dashboard

Hawaii Energy was a sponsor of the Aloha+ Challenge and the Sustainability Measures Dashboard project. The Aloha+ Challenge is a statewide commitment to six sustainability targets for 2030 signed by the Governor, four Mayors and leadership from the Office of Hawaiian Affairs and unanimously endorsed by the State Legislature last year. The dashboard was designed to be an easy-to-understand, on-line resource that features indicators to track progress on clean energy and solid waste reduction at state and county levels. It also provides links to "Learn More and Make a Difference", where energy conservation and Hawaii Energy are featured. Prior to launching the energy dashboard, Hawaii Energy provided consultation on the development of the energy section of the dashboard and participated in briefings on each of the islands in our service territory over the course of the year. Hawaii Energy plans to continue to engage with Hawaii Green Growth and the dashboard in the future.

Professional Development

Professional development offerings target those who are in positions of influence to affect energy decisions at home and in businesses. These include teachers, energy sales professionals, and those entering or currently in the energy workforce. The Market Transformation Program continued several successful projects educating K-12 students and energy salespeople and expanded internship offerings to include a new collaboration with Hawaii Pacific University. Also this year, the University of Hawaii West Oahu Facilities Management decree program was further supported and is set to officially launch in PY15.



Energy Education in the Schools

For the 4th consecutive year, Hawaii Energy continued its efforts in bringing energy education into the classroom and reaching households through educating students.

The National Energy Education Development (NEED) Project brings over 30 years of experience in energy education and tailors their lessons and materials to Hawaii education standards and climactic and energy conditions. 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.

The NEED Project workshops focus on developing a clear understanding of the science of energy and energy efficiency and conservation lessons to affect energy savings in the home. Hawaii Energy offers two types of workshops, the Basic Energy Workshop and the Building Science Workshop, to teachers from K-12 grade levels from all subjects. Workshops include training, sample curriculums and energy learning kits for teachers to use in their classrooms, along with professional development credit hours and reimbursement for a substitute teacher (or a stipend if the workshop falls on a weekend). Throughout PY14, 332 teachers across Honolulu, Hawaii and Maui counties participated in workshops, development meetings and hosted community events.

Energy Expos

Over 800 unique teachers have participated in the Hawaii Energy NEED offerings over the last four years, building a large group of engaged and informed teachers. Hawaii Energy's 2012 Evaluation, Measurement and Verification (EM&V) report recommended that these energy education efforts have a more direct connection to local residents, so the Program's PY14 efforts with The NEED Project focused on leveraging past participants to affect energy savings in the home. Hawaii Energy, NEED and teachers from the Hawaii Teacher Advisory Board (TAB) collaborated to pilot Energy Expos to engage the community. Energy Expos are student-led, teacher-hosted community events in which parents and community members learn about saving energy in the home. A total of seven Energy Expos with an estimated 600 attendees including parents, teachers, students, and local community members were held in PY14. These events also serve as a platform for students to showcase their learning and/or projects in energy education and to promote other Hawaii Energy offerings to ratepayers. The Expos received positive feedback from community members and school administrators.



Students and staff at Kalihi Waena Elementary played Energy Trivia at their Energy Expo this past May.

Teacher Advisory Board (TAB)

Hawaii Energy and The NEED Project staff convened the 3rd Annual Hawaii Teacher Advisory Board (TAB) meeting with seven motivated and experienced teachers. The purpose of the meeting was to evaluate progress in the last program year and generate ideas for future implementation. Hawaii Energy aims to develop more robust metrics and tracking systems and to directly tie teacher education to affecting Hawaii residents' home energy use. Therefore, the PY14 TAB meeting focused on mechanisms to deliver energy savings into students' homes. In addition to continuing to build on the successful Energy Expo model, during PY15 TAB teachers will pilot a project to distribute home energy saving kits through the classroom with an associated curriculum.

The Program selected and funded a teacher from Molokai to attend The NEED Project's annual National Energy Conference for Educators in July 2014 located in Long Beach, California. This teacher was able to delve deeper into the NEED curriculum with peers from across the country and learn from well-seasoned NEED teachers as facilitators, giving her the opportunity to bring her experience and lessons learned back to her school.

Hawaii Energy/RISE (Rewarding Internships for Sustainable Employment) Internship Program

The Program recognizes the need to prepare the next generation for jobs in the energy sector by having them provide meaningful work to organizations and to inspire them to enter the energy workforce. Therefore, Hawaii Energy teamed with the RISE Program operated by Kupu Hawaii to recruit, train and mentor 6 interns for energy workforce development. Through the RISE program, these college students and young professionals had paid internships working in energy conservation and efficiency in the Business, Residential and Transformational programs within Hawaii Energy. Each intern had energy industry professionals guiding them in their process. Their experiences were educational, inspiring, and they were able to contribute meaningful work that helped advance Hawaii Energy's goals.

Interns worked on a variety of initiatives including:

- Hawaii Energy's Small Business Direct Install Lighting (SBDIL) program, performing a total of 142 SBDIL post-inspections within Hawaii, Honolulu and Maui counties;
- Market research for Hawaii Energy's Residential Program to inform further program development;
- Support for Hawaii Energy's K-12 educational program, creating home and school assessment workbooks; and
- University of Hawaii energy efficiency project review and Green Revolving Loan Fund (GRF) research assistance in collaboration with the Sustainability Coordinator of the University of Hawaii System.

To close out the year, the interns gave final presentations and submitted final reports to summarize their experience, work performed and recommendations for how to expand programs to benefit Hawaii ratepayers.



Kupu RISE interns were required to assist with at least two community outreach events in order to practice handling customer inquiries and build public speaking skills. Above, Intern Ben Lillebridge assists Hawaii Energy Hawaii Island specialists at the Kona-Kohala Chamber of Commerce's Business Expo in April.

Interns reported,

"It was an absolute pleasure and incredibly educational. I have found passion in the industry that I will take with me and apply for the rest of my life. I'm deeply grateful."

"This internship has solidified my interest in furthering my knowledge in the energy efficiency industry."

"It's been an invaluable learning experience for me. I learned so much about the energy efficiency industry, and thoroughly enjoyed working alongside the intelligent and driven team at Hawaii Energy."

In the future Hawaii Energy will look for ways to cost-effectively expand the number of students who can participate and the diversity of projects that they support.

Facility Management Degree Program at the University of Hawaii West Oahu (UHWO)

As experienced professionals age out of the workforce and the responsibilities of facility managers continue to expands, ensuring that the workforce is educated and knowledgeable about energy efficiency and conservation is increasingly important. As such, Hawaii Energy continued to support the University of Hawaii – West Oahu (UHWO) and the International Facility Management Association (IFMA) development efforts for a new four-year Bachelor of Applied Science degree program in Facilities Management. The degree has been designed to appeal to full-time and working students interested in a career in facility management, primarily in the hospitality, government, office space, commercial retail and health industries. The degree program will also have credit and non-credit certificate options for existing facilities management professionals, including Building Operator Certification (BOC), Facility Management Professional and Certified Facility Manager® courses.

In PY14, Hawaii Energy provided funding to send a key University of Hawaii administrative leader to attend IFMA's World Workplace Conference & Expo for facility management in New Orleans. The conference was attended by faculty members from prestigious universities from across the nation as well as institutions in the Netherlands and Czech Republic. The valuable interaction with these institutions and the top IFMA executives helped to refine, reshape and accelerate the pace of the UHWO degree program development. Impressively, only three years after the first planning meeting in PY12, UHWO announced it will accept applications into the Facility Management degree program beginning in Fall 2015.

Hawaii Energy also co-sponsored two community outreach and fundraising events that were hosted by the Hawaii chapter of IFMA. The two events had a combined total of nearly 100 prominent Hawaii community and business leaders present. Participants represented diverse energy-related Hawaii industries including, but not limited to, engineers, contractors and property and facility managers. In PY15, Hawaii Energy will continue to provide support for the degree, in particular the integration of energy efficiency and conservation education into the curriculum.



Energy Efficiency Sales Professional Training

Educating professionals in energy efficiency sales and advocacy leads to greater end-user demand for efficiency projects because it draws the connection between energy efficiency and business profitability. It also allows sales professionals to be more effective at getting projects approved. Energy Efficiency Funding Group (EEFG)® is a training and education services firm based in California. Its principal, Mark Jewell, is a nationally-recognized expert on selling energy efficiency. In our fourth year working with Mark Jewell, the Program expanded the efficiency sales training offerings beyond in-person workshops to include new online courses and Hawaii Energy-organized special events.



In addition to his popular sales training courses, the Program presented Mark Jewell at a number of new events this year, including a C-level professional breakfast with Chamber of Commerce members and a special presentation for AOAO board members and property managers.

In-person trainings took place over two separate weeks throughout the year and included a variety of courses covering efficiency sales and financial analysis metrics. Overall, the in-person training series closed the year with a total participant count of 354. This included 235 unique individuals representing a diverse audience of 130 companies/organizations.

We also increased the number of courses available in the online library, including titles such as: *Financial Analysis of Energy Efficiency Projects, Communicating the Value of What You Are Selling,* and *Dispelling Myths and Objections to Build Rapport,*. The year closed with over 500 online course views by 103 unique individuals collectively representing a diverse audience of 80 companies/organizations.

To leverage Mark Jewell's extensive knowledge and industry experience, Hawaii Energy organized a series of special events during his in-person visits. Several hundred utility customers participated in the following events:

- Breakfast for business leaders sponsored by the Hawaii Chamber of Commerce on *Reframing Energy Efficiency as a High-Yield, Low-Risk Investment*
- Member luncheon organized by the HCCA (Hawaii Council of Community Associations)
- Specialized training with a large Clean Energy Ally's sales staff and key customers
- After-hours presentation and networking event for AOAO board members and property managers
- Networking event for past participants in Mark Jewell's training courses, the "Ninja Network"
- Briefing for University of Hawaii Foundation executives on investing in energy efficiency

In PY15, Hawaii Energy will continue to develop and refine our offerings for energy sales professionals and Clean Energy Allies.

Third Annual Hawaii Sustainability in Higher Education Summit

Hawaii Energy has continued to develop strong relationships with the University of Hawaii (UH) system in PY14. One aspect of this was continuing the financial and technical support for the 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.

At this year's Summit, UH President David Lassner released the UH Executive Sustainability Policy that set specific targets for energy efficiency and launched the UH System Office of Sustainability. Over three days, approximately 200 faculty, students, staff and community members to collaborated in work sessions and shared best practices on sustainability and energy. Hawaii Energy participated in panel discussions, co-facilitated breakout groups for facilities staff and arranged for energy expert Mark Jewell to deliver one of the keynote addresses. Hawaii Energy intends to continue to support this event and explore how to deliver additional technical trainings at this venue.

Green Office Program Development for Universities using Community Based Social Marketing (CBSM) Methodology

Hawaii Energy collaborated with Hawaii Pacific University (HPU) to design a Green Office Program to achieve energy savings through behavior change in universities using the CBSM methodology. HPU hired two interns to serve as "Energy Ambassadors" to perform research and develop a template for other Hawaii colleges and universities to use to achieve energy savings.

The project held the kick-off for their Green Office Program project at HPU's Hawaii Loa campus for 20 faculty and staff and two Energy Ambassadors on March 23rd. The kickoff event included two presentations by Hawaii Energy staff and generated interest and awareness about the importance of energy savings. Attendees had the opportunity to volunteer to become "Energy Champions" to help lead efforts for this campaign.



Hawaii Energy worked with a team that included two interns from Hawaii Pacific University to design and pilot the Green Office Program at HPU's Hawaii Loa campus in Kaneohe, Oahu.

During PY14, HPU Energy Ambassadors recorded energy usage observations during daytime and nighttime walkthroughs of the campus. These baseline observations helped inform the behavior selection process to improve energy efficiency in offices. Four behaviors were selected with the help of Action Research, the Hawaii Energy subcontractor for CBSM work. From this process, the HPU Energy Ambassadors created an initial template detailing how to implement an energy efficiency behavior change program. This document will be made available to share with other universities. In PY15, work will continue to complete the CBSM methodology and to finalize the guide in collaboration with Hawaii Energy.

Technical Training

Technical Training offerings target people who buy or operate equipment such as engineers, facility managers, architects, building operators and energy managers. These professionals have typically had experience in infrastructure and energy for a substantial portion of their career, but continue to benefit from enhanced technical skills.

Technical Workshops

Building Operator Certification (BOC©) Workshops

Hawaii Energy collaborated with the University of Hawaii at Manoa Outreach College (UHMOC) and Sustainable Living Institute of Maui (SLIM) to once again bring Level 1 Building Operator Certification (BOC®), the nationally-recognized energy efficiency training and certification program, to those working in commercial building operations and maintenance on Maui and Oahu. The workshops target the facility maintenance workforce to provide skills and knowledge to implement energy efficiency practices at their workplaces. 67 participants from resorts, the entertainment industry, and the University of Hawaii received their Building Operator Certification this year and these workshops have been well-received by the employers of the participants and demand for future sessions has increased. As such, the Program plans to expand the BOC offering to Hawaii County in PY15.



Hawaii Energy co-hosted a five-day seminar to prepare candidates for the Certified Energy Manager (CEM) certification test in May. More than 30 participants took advantage of the course, which included a study guide and built-in homework review sessions.

ASWB Engineering and Hawaiian Electric Companies (HECO)

Hawaii Energy co-sponsored a weeklong series of 10 technical training workshops with HECO for business customers, facilitated by David Wylie of ASWB Engineering, a California-based firm specializing in energy management consulting. Workshops covered a variety of topics, including HVAC, motors, demand response, power quality and energy efficiency surveys. The workshops had a total enrollment count of 384 participants including 96 unique individuals, collectively representing a technical audience of 64 companies/organizations.

Certified Energy Manager (CEM) and Energy Manager-in-Training

Hawaii Energy has worked with the Association of Energy Engineers (AEE) to hold training seminars and certification programs in Hawaii over the last four years. These programs continue to strengthen the workforce in Hawaii by improving skill sets and offering attendees the opportunity to gain the Certified Energy Manager (CEM) certification designation, which fosters their professional development.

In PY14, the Program hosted a five-day CEM Preparatory Seminar, which was a great success with 39 unique registrants, ranging from utility employees to state employees to military personnel. 22 participants went on to receive CEM certification and three received the Energy Manager-in-Training 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. This year AEE added benefits to enhance the learning experience, including an additional hour each day to help participants with homework problems and questions, distributing study guides before the start of the training and a more interactive teaching style. The instructor was enthusiastic about the number of and caliber of questions the attendees asked and the course received positive evaluations from attendees.

Water and Wastewater Training

The Program continued its outreach and professional development efforts in support of the water and wastewater industry in PY14 by offering energy efficiency training to entry-level water and wastewater operators through the Sustainable Living Institute of Maui, as well as free training in Hilo for existing operators. Hawaii Energy organized the six-hour training in Hilo for 24 operators and engineers from both municipal and private water and wastewater systems. The training was presented by Rural Community Assistance Corporation's (RCAC) Kevin Baughman, a well-respected water circuit rider and former operator. The Department of Health approved valuable continuing education units for the full amount for the Hawaii Energy training material. In addition, peer group sessions were held in conjunction with RCAC on Molokai, Maui, and Kona for total participation of 48 individuals. These peer group sessions, while small in nature, gave private water operators an opportunity to "talk story" directly with Hawaii Energy and other state and federal entities that may be able to offer assistance. In addition, Hawaii Energy attended the Hawaii Water Works 53rd Annual Conference, the 2014 Water Reuse Conference, and presented at the American Water Works Association 2015 Pacific Water Conference. (For more information on other activities related to our water and wastewater initiative, see the "Energy Systems Integration Pilots" towards the end of the Transformational section.)

Food Service Trainings

Hawaii Energy brought in a team from Fisher-Nickel, Inc. ("Fisher-Nickel") to train professionals in Hawaii's foodservice industry on adopting energy efficient behaviors, techniques, and technology and to support the successful launch of our commercial ENERGY STAR® rebates for kitchen equipment. Fisher-Nickel, Inc. is a professional services firm with deep expertise in commercial kitchen energy efficiency and appliance performance testing. For nearly 30 years, they have provided the industry comprehensive and unbiased information about equipment energy use and performance through the development and execution of standardized test methods. Fisher-Nickel's team includes an experienced team of engineers, technicians, energy analysts and educators dedicated to helping the commercial food service industry better manage its utility costs through the utilization of energy and water efficient technologies.

Two of the four training sessions were co-hosted with the Chamber of Commerce of Hawaii, resulting in 45 participants. In addition, the Fisher-Nickel team conducted 10 commercial kitchen site visits (arranged by several training participants), which yielded additional inquiries about Hawaii Energy's business rebate offerings and the adoption of energy efficient behaviors.







Strategic Innovation for Energy Management

University of Hawaii

The University of Hawaii (UH) is one of the state's largest energy users. For the past three years, Hawaii Energy has strategically assisted in the design of a more comprehensive approach to energy management, which included support for planning, analysis, identification of priorities and helping overcome institutional barriers to getting projects implemented. The level of commitment from UH's senior administration and Board of Regents has increased with each year and more details in terms of design, funding, and staffing of such programs have been developed. Hawaii Energy support helps leverage the effort and enthusiasm of UH administrators, facilities staff, faculty, and students. With the passage of Act 99 this year, the University is now held accountable to the State Legislature for achieving net zero energy by 2035.

The Transformational program supported UH in the following ways:

- Sponsored a two-day energy efficiency training and site visit to the University of California San Diego, Irvine, and Los Angeles campuses for 24 University of Hawaii Facilities and Planning Department staff. Participants included mechanical and electrical engineers, project managers and architects. Training covered "right-sizing" projects, programmatic design for energy management, smart labs, submetering, monitoring-based commissioning, lighting and the Strategic Energy Partnership. Several attendees have since initiated projects based on what they learned.
- Provided technical support to review UH Manoa's campus energy use intensity (EUI) for buildings and to help identify next steps for energy efficiency planning.
- Hosted an executive breakfast in conjunction with the 3rd Annual Hawaii Sustainability in Higher Education for leaders from the UH System Office and the UH Foundation, community partners, and the Summit keynote speakers to explore energy efficiency as a low cost, high-yield investment and to determine next steps for establishing University-run green revolving loan funds. That breakfast resulted in unanimous agreement from participants to meet for a half-day work session to design the details of how such a fund would be launched and managed. The UH Office of Sustainability was charged with drafting a proposal and organizing the follow-up session.



The Energy Manager for the University of California Irvine discusses energy-saving strategies with facilities staff from the University of Hawaii on a site visit to their California campus.

- Supported the UH Manoa Office of Planning and Facilities and the Hawaii Natural Energy Institute in educating the university community about efficiency and developed recommended next steps toward achieving the University's energy reduction goals. This work included two educational workshops and a series of reports outlining the system's energy efficiency priorities, past actions, and milestones for energy initiatives. Additional reports provided summaries of the Hawaii Energy-sponsored site visit to the University of California and results of the 3rd Annual Sustainability in Higher Education Summit.

Out of this work a number of next steps have been identified for implementation in PY15, including the evaluation of pilot projects for the Green Revolving Fund, updates to the EUI technical review, and a community-based social marketing behavior change pilot.

Clean Energy Ally (CEA) Program

This year marked the introduction of the Clean Energy Ally (CEA) program, designed exclusively for industry professionals ("trade allies"). The CEA program was launched to identify and support those vendors, contractors, retailers, distributors, designers and installers who work closely with customers every day. The program objective is to recruit and motivate allies to become advocates of and active participants in Hawaii Energy programs, ultimately increasing the quantity of efficiency projects performed. PY14 successfully concluded with the recruiting, training and onboarding of 226 individual allies from 140 unique businesses.

In order to become a Clean Energy Ally, participants sign up through an online application process and attend Hawaii Energy Program training. Hawaii Energy offers specialized support to our Clean Energy Allies including professional development courses, technical assistance on complex and customized projects, training on Program practices and co-branded marketing opportunities. Professional development sales training courses led by Mark Jewell of EEFG, Inc. and technical trainings such as Building Operator Certification and Certified Energy Manager courses were a few of the opportunities that were offered to Clean Energy Allies in PY14.

This program year, Hawaii Energy hosted a number of networking events for our Clean Energy Allies. We designed these events so CEAs could mingle with utility customers and other vendors with whom they can partner to cross-sell and up-sell energy efficiency products and services. Highlights included a "Step into Spring" Chamber of Commerce business networking event and a specialized efficiency sales training for HVAC professionals.

As another benefit for the Clean Energy Allies, Hawaii Energy has designed an online vendor directory with their business information and links to their individual websites. This business directory makes it easy for utility customers to connect with Clean Energy Allies, as customers can filter their searches by technology, services, market sector or location to identify the right service provider to meet their needs.

As valued ambassadors in the field, we will continue to support CEA efforts. The program is expanding in PY15 with additional trainings, networking opportunities and ally assistance.

Energy System Integration Pilots

In Program Year 6, the Public Utilities Commission asked Hawaii Energy to expand the energy-efficiency box and tackle challenges of integrating demand side management with several complementary areas that are critical to achieving Hawaii's clean energy goals. This request spurred market research and five pilot projects that required the application of engineering and data analysis skill sets and break-through collaborations with Hawaiian Electric Company (HECO) and other groups. Pilot work focused on smart grid, codes and standards, electric vehicles (EV), demand response and benchmarking. Hawaii Energy is also investigating the intersections of these currently independent topics as we develop a more strategic approach to energy management in the Islands. More details about each of these pilots, as well as our continued efforts in the water/wastewater sector, follow in the section below.

Market Research

In PY14, Hawaii Energy conducted market research on a variety of topics in order to inform the design and development of our energy system integration pilots. The Program subcontracted with QMark, a local market research company, to perform both qualitative and quantitative market research through various methods, including surveys and focus groups, on Oahu, Maui, Kona, and Hilo (for additional information on the market research study, see the Marketing and Outreach section, pg. 163). Research topics included smart grid, demand response, Time-Of-Use (TOU), and electric vehicles. Hawaii Energy conducted its own market research surrounding codes and standards. A sampling of interesting findings is listed below:

QMark

- The awareness of smart grid technology is minimal and based on the term "smart grid" alone, participants could not guess what the idea entails. After the concept was explained, some participants understood how the technology could be beneficial in empowering people to manage their energy consumption.
- When the research study discussed the "Demand Response" concept, less than 12% of all respondents were familiar with the term. Across all counties that were polled, over half of the respondents expressed interest in the DR concept, citing their top reasoning due to openness to the concept, saving money on their electric bill, and their desire to lower their energy use. Many participants felt strongly that control over their appliances could eventually lead to further manipulation of their overall electrical usage.
- Nearly a third of respondents in the market study recognized the term, "Time-Of-Use rates" and over half expressed interest in the concept. Through the focus group, participants echoed the inconvenience of altering their lifestyle to avoid peak pricing. Some participants did note that they could see some changes to their daily habits in order to save money on their electrical rates.
- A vast majority of EV owners, primarily charge at home (72% overall) and interest in using public charging stations varied from county to county with the most positive feedback coming from Honolulu. Although the sample size was relatively small, EV owners noted that "helping the environment" and "overall cost savings" were perceived as positive characteristics of ownership. The expansion of charging stations was also noted by the group, but many still felt there were not enough to meet the current demand.

Codes and Standards Market Pulse

The Hawaii Energy market research for energy codes and standards was informed through meetings with diverse professionals at the State Building Codes Council (SBCC) and IECC 2015 Investigative Committee meetings. Attendees include county building officials, State Energy Office code officials, representatives from the American of Institute Architects, U.S. Green Building Council, Structural Engineers Association of Hawaii, home developers, building designers, and members of the public.

The Program presented findings that showed how new homes' energy consumption significantly exceeded the current energy code requirements. We learned from one home developer that energy efficient equipment was expected by buyers, though not favorable when it increased home cost. In the commercial sector, it seemed there was little conversation when it came to following energy code; yet standard practices often meet or exceed energy efficiency code by design.

The Program stayed abreast of the advancement of energy code and the industry's perspectives through the SBCC. The PY14 Codes Compliance Study has also identified challenges that designers face in knowing which performance information to include on plans, details of county amendments, specific sector concerns, and technical component intricacies.

Smart Grid Pilot

This year Hawaii Energy was tasked by the Public Utilities Commission to support the Smart Grid Initiative and collaborate with HECO on its initial smart meter project in Oahu. The goal was to provide demand side energy efficiency enhancements, utilize the smart meter data and accelerate the development of Home-Area-Networks (HAN) in smart grid homes so customers can benefit from smart meter technology. A Home-Area-Network is a network of energy management devices and applications within a home environment that enables two-way communication between residents and the electric utility. HAN not only plays a key role of customer engagement in implementing home energy management systems (HEMS) and DR, it can also provide more TOU and distributed generation (DG) capabilities.

The recent market survey conducted by QMark on behalf of Hawaii Energy has identified customer engagement as a significant challenge for smart grid in Hawaii's utility industry. The survey also noted that awareness of smart grid technology is almost non-existent among the general population in Hawaii. Therefore, the program decided to launch a small scale of HAN Pilot "Smart Home" to gain field experience of HAN applications with customers before HECO initiates the next phase of smart meter deployment.

Hawaii Energy subcontracted CEIVA Energy and selected its ZigBee-compliant In-Home Display (IHD) as the pilot device. CEIVA Energy has extensive experience in successfully deploying HAN devices such as IHDs, load controllers and smart thermostats in many projects across the country. CEIVA is also one of the few HEMS solution providers with the ISO 27001 Information Security certification, the highest form of security standards in the industry. CEIVA's IHD is a cloud-based smart picture frame that connects the smart meter to a Wi-Fi network and can provide energy information, energy conservation tips and utility messages all in near real-time (updated up to every six seconds). In addition, it supports over-the-air updates and can be deployed conveniently with no technical installation required from the customers. "Smart Home" was the first collaborative pilot project between HECO and Hawaii Energy. While Hawaii Energy was responsible for providing HAN devices, customer recruitment and engagement, HECO's DR team assisted in pre-testing and connecting HAN devices to the smart meter and coordinating its advanced metering infrastructure (AMI) vendor Silver Spring Networks to support the HAN communication.

Hawaii Energy mailed offers to participate in the pilot to 980 smart meter customers in the Kahala and Diamond Head areas – two neighborhoods chosen jointly by Hawaii Energy and HECO for recruitment. Of the 52 respondents, 44 qualified customers received a CEIVA IHD to monitor their energy usage so they could make informed decisions to lower their energy bill and experience HEMS during the pilot period. After two months, surveys were distributed to solicit feedback from participants.



Shown here is an example of CEIVA's Home-Area-Network capabilities. CEIVA's platform connects the smart meter information to the internet, providing near real-time energy information via in-home display, as well as a mobile app and web portal. It can also communicate with smart plugs, thermostats, load controllers, and even electric vehicles and PV systems, allowing customers to manage their energy consumption and generation conveniently. The Hawaii Energy pilot only deployed in-home displays due to time and budget limits.



Participants in Hawaii Energy's "Smart Home" Pilot received in-home displays, access to the CEIVA mobile app, HEMS service and energy saving tips from Hawaii Energy to manage their energy usage.

Some feedback from the Pilot participants:

"This is a great tool that has shown me a realistic breakdown of daily electricity usage."

"It's working great. Find myself moving the IHD from room to room, turning off and on stuff to determine the energy impact during my spare time."

"I can tell you that real-time energy information did change my thinking about energy."
– (Anonymous Hawaiian Electric employee)

"One night I had both split air units going, I was pedaling my bike and the IHD told me that my bill was projected to be $1,341. I almost fell off the bike. I thought I had an electrical leak somewhere...So I figured out the IHD was telling me if I used energy everyday like how I was using that night my monthly bill would end up to be that high!"

Key Findings

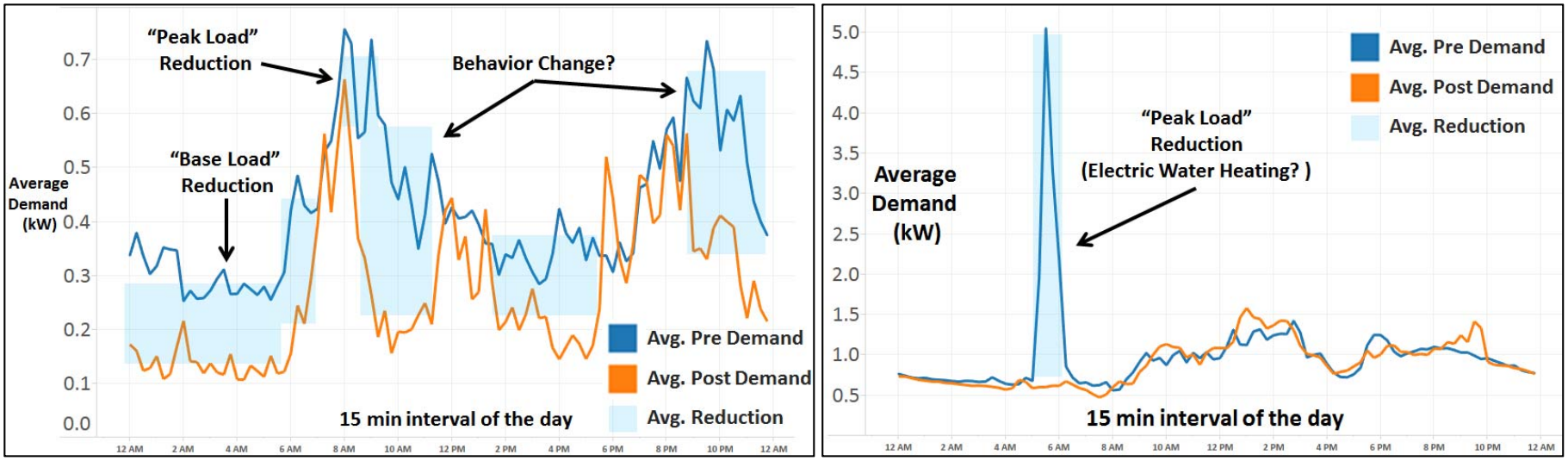
After two months with the IHDs in the home, the key findings of the initial EM&V analysis and survey are summarized here:

- As of PY14, 38 of the 44 participants have tried to connect their IHDs. For the 14 participants who never had any connection problems, the pre/post analysis showed an overall reduction of 4% relative to control neighbors.
- 86% of respondents prefer using IHDs over mobile apps to view their energy information and believe the real-time energy information is helping them to know their energy usage better. 14% of respondents prefer using mobile app and none prefer using web portal to view their energy information.
- The Program observed some significant changes among the participants by comparing the pre/post load profiles (see **Figure 9** for two examples). To evaluate the IHD impact and to gather more insights on user reactions to the real-time information, Hawaii Energy will engage with the participants and provide further long-term validation report in PY15.

In most cases from other utilities, Zigbee mesh network has shown to be a reliable technology for utility energy management solutions in the grid. However, after few weeks of IHDs deployment, Hawaii Energy began to see incidents where something was causing some of the IHDs to drop communication with the SSN meter. To investigate the problems, Hawaii Energy, CEIVA Energy, Silver Spring Networks and HECO formed a special task force to attempt to recreate the scenarios causing the incidents. After thirteen weeks of collaboration, the task force successfully solved the connection issues with CEIVA's dedicated support and continuous coordination from SSN. Lessons learned highlighted the importance of following proper HAN provision processes, understanding SSN's unique smart meter logic for HAN communication protocol, changing Zigbee channels to avoid the radio frequency interference in the home, having robust in-field testing and energy-service interface reboot impact.

In conclusion, although the pilot encountered several technical issues and it took some time for the Program to break through the barriers to conduct this first cross-party collaborative project, the field experience gained was invaluable and will be a stepping stone to help the Program, HECO and AMI/HAN vendor roll out smart grid and demand response programs smoothly in the future. The initial result was limited by the sample size but it demonstrated the benefits of in-home devices and mobile applications in getting customers involved in smart grid development. Building upon the lessons learned from PY14, Hawaii Energy will continue to collaborate with HECO Smart Grid/DR team to enhance HAN implementation of the smart grid benefits to customers.

Figure 9
Sample Pre/Post Customer Load Profiles During Smart Grid Pilot



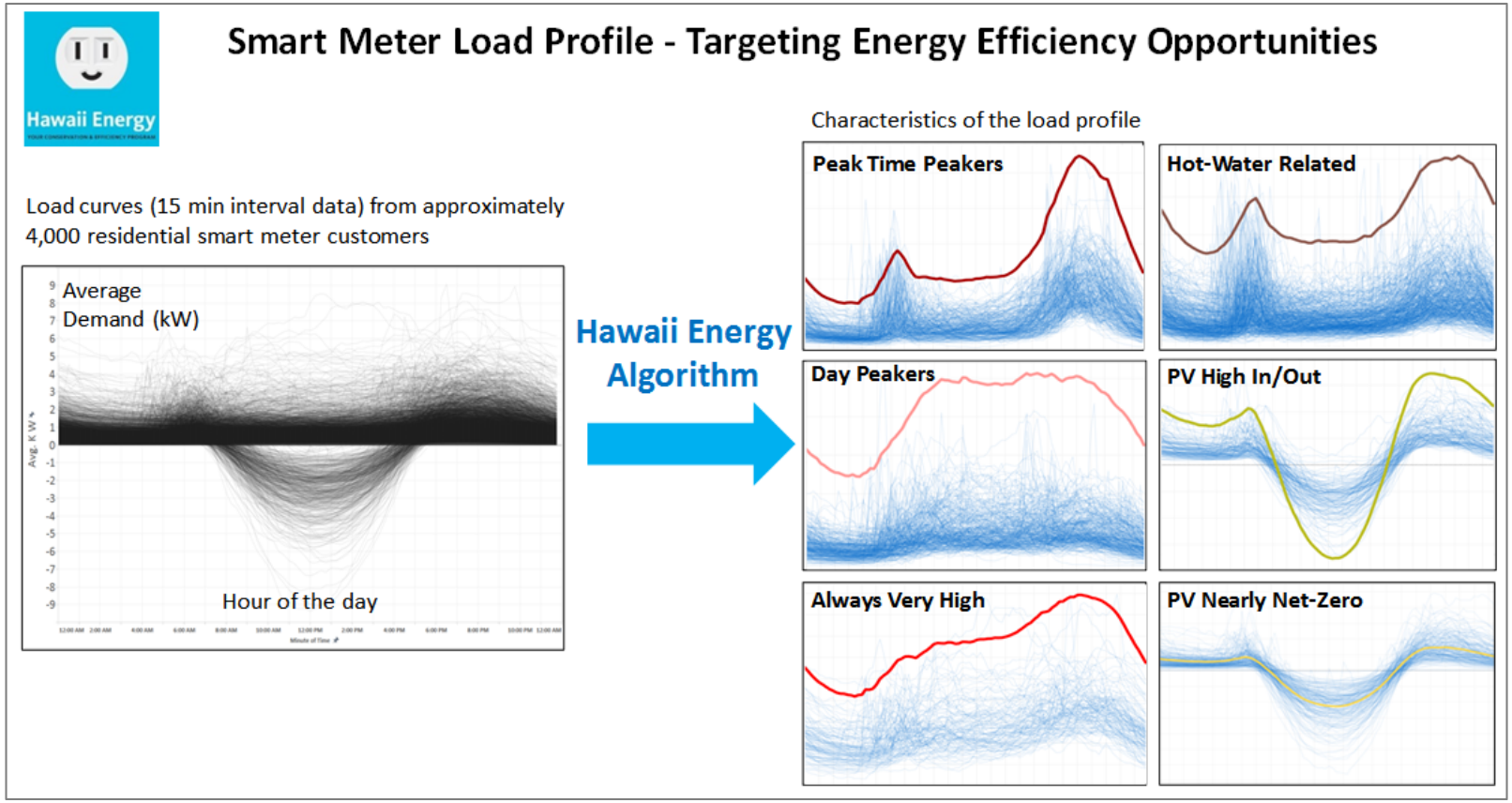
Above are two examples of average daily load profile change compared to the same period last year. Both customer profiles show reductions in energy usage; however, the profile on the right shows a drastic reduction during a short time frame, which could indicate a water heater replacement of some sort.

HECO Smart Grid Phase-0 Meter Data Review

In PY14, Hawaii Energy also developed the capacity to leverage the existing smart meter data and advanced analytics in a variety of ways. This included developing big data mining, cleansing, and interactive visualization techniques that allow Hawaii Energy to target customer segments, increase customer engagement, and dynamically measure savings to drive and evaluate energy efficiency actions. By utilizing 15-minute interval data in HECO's Smart Grid Phase 0 Pilot, the Hawaii Energy team has developed an analytic algorithm to identify the customer load profile characteristics in order to determine the potential for the Program to increase energy efficiency and renewable integration (see **Figure 10**). This load profile analysis can provide valuable insight for market segmentation and is essential when designing TOU rates.

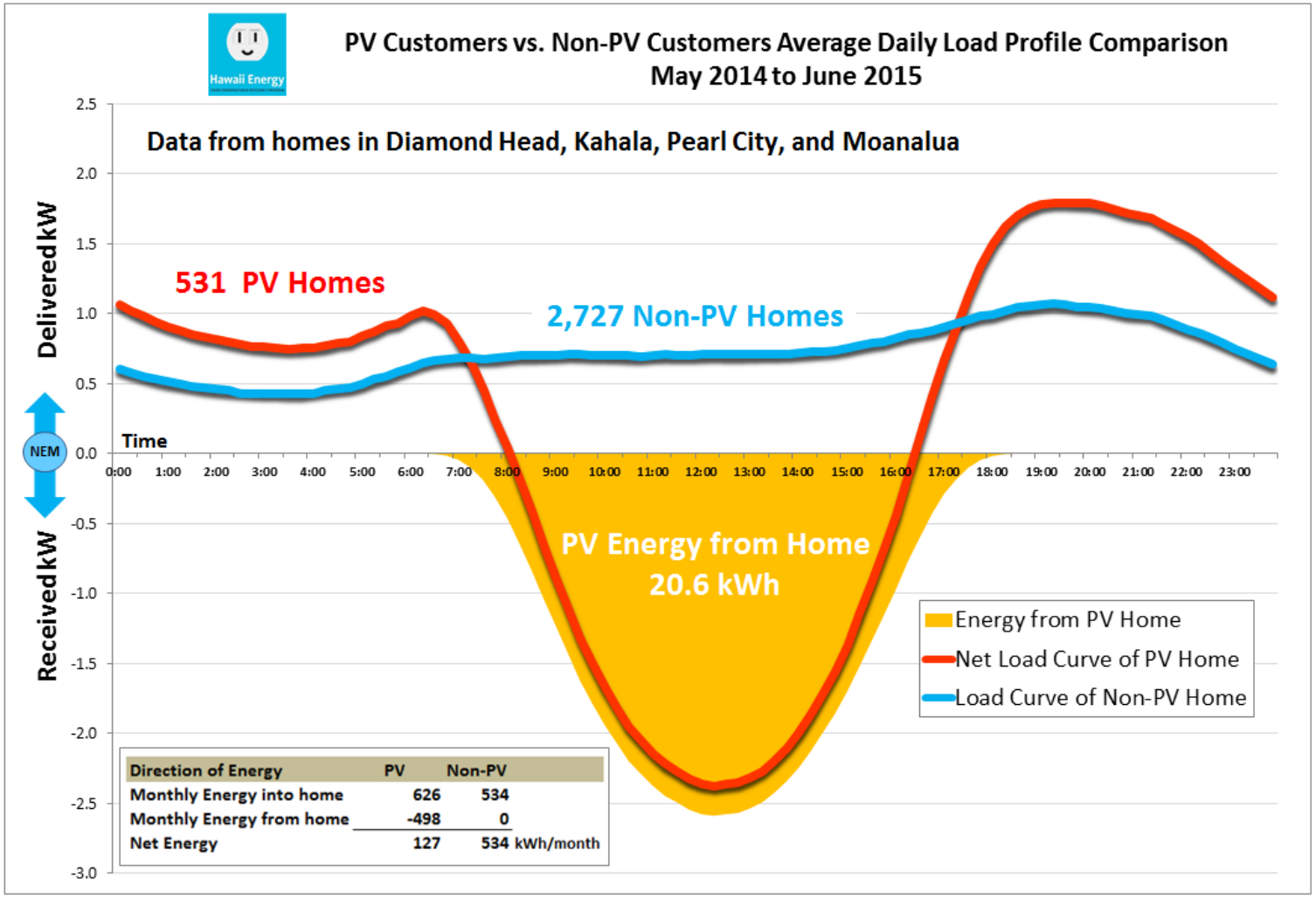
Capitalizing on these efforts, Hawaii Energy was able to assist the Division of Consumer Advocacy to better understand the consumption characteristics and behavior of PV customers. **Figure 11** shows the average daily load profile comparison for PV and Non-PV customers based on the available smart meter data in Diamond Head, Kahala, Pearl City and Moanalua. It appears PV customers are, on average, having higher demand in the evening and morning than non-PV customers.

Figure 10
Characteristic Identification of Smart Meter Customers Using Hawaii Energy Algorithm



Left: 4,000 average daily load curves from residential smart meters. Right: Characteristics identified by Hawaii Energy's algorithm.

Figure 11


PV Customers vs. Non-PV Customers Average Daily Load Profile Comparison
May 2014 to June 2015
Data from homes in Diamond Head, Kahala, Pearl City, and Moanalua
Delivered kW
Received kW
NEM
Time
531 PV Homes
2,727 Non-PV Homes
PV Energy from Home
20.6 kWh
Energy from PV Home
Net Load Curve of PV Home
Load Curve of Non-PV Home
Direction of Energy | PV | Non-PV
Monthly Energy into home | 626 | 534
Monthly Energy from home | -498 | 0
Net Energy | 127 | 534 kWh/month

Codes and Standards Pilot

The EnerNOC Potential Study identified energy codes and standards as a large factor in the future of energy efficiency in Hawaii. In addition, Hawaii Energy conducted a market review of current codes and standards conditions, which was informed through meetings with diverse professionals at the State Building Codes Council (SBCC) and IECC 2015 Investigative Committee meetings (refer to Market Research Section above for more information). In the PBFA territory of Hawaii, Honolulu, and Maui counties, all islands are currently bound by IECC 2006 standards, although many builders already build above minimum code requirements. In fact, each county in the state is currently exploring the possibility of adopting newer energy codes. In order to progress in terms of better buildings, Hawaii Energy believes that it is necessary to understand the current state of code compliance. The PY14 codes and standards pilot was created to accomplish these tasks. From this knowledge, the Program aims to create an incentive program for designers and builders to exceed minimum code requirements.

The PY14 codes compliance study was designed to build upon a 1999 DBEDT Codes Compliance study. Similar to the 32 plans reviewed at that time, 40 building plans across three counties were planned for the PY14 study. Kolderup Consulting was selected for the work, which consisted of three tasks:

1) Review commercial building plans from Honolulu, Maui and Hawaii counties for energy code compliance.
2) Conduct a field study comparing actual installed equipment with construction plans.
3) Create a form to assist designers and code examiners with codes compliance, and provide a method for Hawaii Energy to incentivize above-code achievement.

Key Findings

At the close of the year, we had successfully provided Hawaii and Maui counties with a report on the level of energy code compliance in planned commercial buildings. This report is the first step in assisting counties, and ultimately building designers, in meeting and exceeding Hawaii's building energy code. Designing the project, conducting the study, and finalizing the report within a single Program year was a challenge. Onboarding a new subcontractor, Kolderup Consulting, took more time than anticipated due to State documentation requirements. Once work was underway, the Program made key introductions to assist in gathering building plans from the three counties.

For Maui county, electronic copies were available and online access was provided to the consultant to review plans. For Hawaii County, hard-copy building plans were reviewed on-site at the county permitting office. The electronic approach was more effective, though both worked well and complete data was gathered from both counties. Honolulu County was unable to submit plans to the consultant for inclusion in the PY14 report and will be presented in a PY15 report. After multiple requests, the Honolulu Department of Planning and Permitting (DPP) did not provide a contact person to provide requested building plans. Several personnel were in communication with the consultant but ultimately no plans were delivered nor schedules coordinated for on-site review of plans. Tasks 2 and 3 will benefit from the information gleaned from Honolulu County and will also be included in the PY15 report.

Despite the challenges, several important lessons were learned through this pilot and key takeaways have been identified that lay the foundation for continued codes and standards work in PY15. The table below compares the 1999 and 2014 studies. Compliance has decreased in some areas primarily due to missing information on plans. Improvement in compliance can be attributed to industry practices leading code, for example in HVAC cooling efficiency where equipment that is currently available on the market will meet minimum 2006 IECC requirements.

Figure 12
Comparison of Energy Code Compliance Rates in 1999 vs. 2014

	1999 Study Compliance rates		Notes	2014 Study Compliance rates		Unknown	Notes
Lighting Power Compliance	87%	22/32		53%	10/19	5%	Track lighting & missing specifications
Lghting Controls	44%	14/32		-	-	-	
Exterior Lighting Power	-	-		75%	9/12	8%	
Roof Insulation Compliance	78%	14/18		33%	4/12	58%	Missing specifications
Wall Insulation Compliance	82%	14/17		83%	10/12	17%	
Fenestration	N/A	N/A		8%	1/13	85%	SHGC could not be verified: window specs not included on construction documents.
HVAC Cooling Efficiency	42%	11/26	Most non-compliance due to info missing from plans; excessive cooling capacity in restaurant & retail.	80%	12/15	20%	Currently available equipment will meet 2006 IECC.
Water Heating Compliance	39%	9/23	Specifics missing from plans (circulating systems, insulation, heat recovery, etc.)	53%	8/15	-	Specifics missing from plans (circulating systems, insulation, heat recovery, etc.)
Building Official Reports	Issue areas: Track Lighting and Cooling of unenclosed spaces			-	-	-	-
Design Professional Reports	Lighting power limits have greatest impact on design. HVAC design unaffected by IECC 2006 except for unenclosed spaces. Building officials provide few comments or feedback regarding energy code.			-	-	-	-
Areas of Concern	Small Retail Lighting			Small Retail Lighting			
	Lighting Controls			HVAC			
	HVAC			Insulation			
Recommendations	Training			Performance Information Guidelines for Plans			
	Staffing			Increase Awareness			
	Information Materials & Compliance Tools			Compliance Guidelines Incentives			
	Code Modifications			Guidance for window compliance			
	Plan Review Process Modifications						

The overall takeaway from this pilot is that current energy code compliance is mostly unknown due to a lack of information available on plans submitted. Key unknown areas include roof and wall insulation, window solar heat gain, HVAC cooling efficiency and duct insulation, and HVAC commissioning plan instructions. Interior lighting power has a high rate of non-compliance due to improper accounting for track lighting and missing specifications for lighting fixture input power. This was a previously unquantified issue that has been prioritized for action. Also, lack of awareness of county-specific energy code amendments was a recommended area to be addressed, including specific areas such as the commissioning-plan requirement.

As of this writing, the PY14 Codes Compliance study has been presented to the DBEDT energy codes team and to the SBCC. Copies of the report have been delivered to the county building officials and the Program will continue to work with codes officials and the industry to provide training and compliance forms.

The Program looks forward to completing the Honolulu study with the consultant in PY15, continuing with Honolulu building official contacts for the compliance and field studies, and utilizing Maui and Hawaii results for the compliance checklists. With the SBCC approved IECC 2015 for Hawaii, the Program could provide advice or an incentive for progressive buildings achieving IECC 2015 before the new code is adopted.

Electric Vehicle Pilot

Across the country and especially in Hawaii, electric vehicles (EVs) are growing in popularity. The addition of more and more EVs in the state will have a significant impact on the electric grid. Depending on financial incentives, consumer behavior and the development of infrastructure to provide charging capability outside of the home, EVs have the potential to become a valuable grid resource. Specifically, residential loads that correspond with peak demand could be decreased by shifting some EV charging loads to times of excessive PV and wind generation. Conversely, without deliberate planning and action, these vehicles could contribute to grid instability. For these reasons, Hawaii Energy created a pilot study to explore some of the issues related to EVs. The electric vehicle pilot had three main components: 1) a daytime charging study, 2) distribution of energy efficiency kits and 3) the development of an EV website to serve as a resource for potential purchasers.

Daytime Charging Study

The primary purpose of the study was to test technologies and rate tariffs that would encourage the use of EVs as a value proposition to potential vehicle owners and to support grid efficiency. Hawaii Energy collaborated with members of the EV Partnership group and Hydrogen Fuel Cell & Battery Electric Vehicle Stakeholder Charrette to determine the best course of action to improve integration of EVs as a grid resource. The working group represented EV dealerships, EVSE providers, EV owners, non-profit entities, the local utility, and government organizations. Ultimately, the Program developed and executed a daytime charging pilot that utilizes multiple charging stations throughout a network of locations to determine the feasibility and acceptance of day time charging as a load shifting mechanism. It was hypothesized that discounted charging rates could be used to encourage load shifting to times of high renewable energy penetration throughout the day. Hawaii Energy targeted EV owners that also had NEM accounts in order to promote daytime load-shifting awareness among PV system owners.

Key Findings

Findings from the study can be summarized with the following:

- Customer interest has been piqued, but was not reflective in discount charging sessions. Introducing the 40% discounted charging rate resulted in response rates that were slightly above the industry norm with 5.2% click-through rate for email marketing. Initially, 54 participants (from a pool of over 1400 members in the OpConnect charging station network) were eligible to receive the offered discount via an online registration form. Despite a quick uptake from OpConnect members for the introductory offer, the addition of the 60% discount resulted in no additional interest from members. Also, as the promotional discounts went live, a total of 38 discount sessions were logged during the three-month period, representing only 1% of all charging sessions that were eligible for discounts. Furthermore, the number of discounted sessions slightly decreased from March to May, depicting no significant increase in charging by participants receiving a higher discount rate.
- Customer feedback is essential. Feedback from participants cited the "inconvenience" of charging throughout the day as compared to at home. Additional confusion over the limited time period for charging left many potential and active participants perplexed by the discount promotion. Others lamented that the availability of charging locations was also prohibitive as well as the high cost (as compared to NEM credits and standard electricity rates). One OpConnect member contacted Hawaii Energy to clarify the discounted price, noting that with the cost still remaining slightly over the retail cost of electricity, the benefit to the consumer was unclear. A further discussion on the merit of grid efficiency and the role of EV charging result in the following response:

> *"I think getting folks to charge during PV peak times is an awesome idea! I wish there was a (utility) plan for that. Right now if I opt in to the (utility) EV plan, charging during peak would be way more expensive. This offer did make me think about my charging habits. Maybe I should charge our car at noon instead of 9pm."*

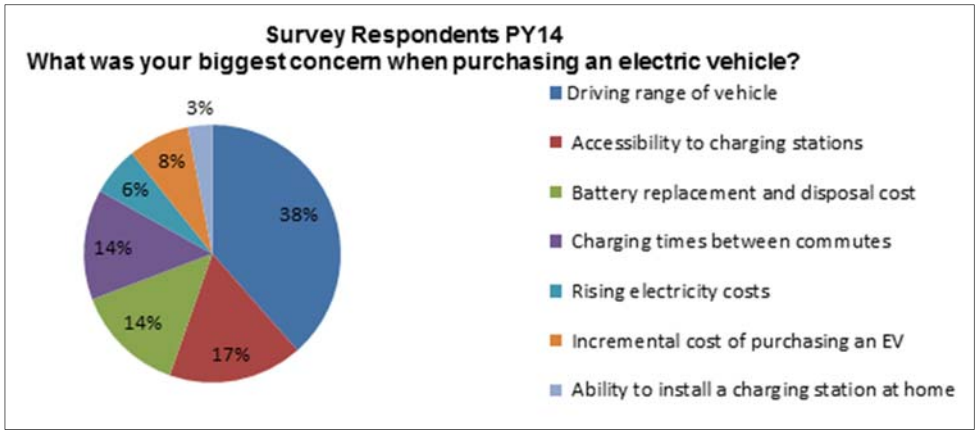
Many important lessons were learned as a result of this pilot project. Initially, Hawaii Energy planned infrastructure improvements such as installing charging stations or EVSE to encourage workplace charging in strategic locations. Upon further analysis it was determined that the inclusion of key stakeholders (building management, building owners, utility, contractor, and EVSE supplier) meant the time sensitive process of siting, designing, and constructing would be prohibitive for execution within the time allotted.[1] Moreover, national industry trends revealed that the effects on grid stability could become troublesome as EV adoption increased without considerations for optimal vehicle-grid integration (VGI).[2] Finally, revised rates for EV TOU rates are currently being proposed to incentivize daytime charging for EVs. Through efforts by the local utility, it is being developed in parallel with expanding the fast-charger network in the County of Honolulu.

Although response to the discounted EV charging pilot rates was not high, future pilot studies could explore the use of multichannel marketing to better reach EV owners. It was found that adjusting the pricing mechanisms to better reflect the market demand for daytime charging might be a challenge for customers who already see public charging as "inconvenient" and "costly." Augmenting off-peak charging will also require effective messaging and feedback, to express the value to targeted audiences and utilizing the communication forms they are most comfortable with. Lastly, advanced features such as throttling and vehicle-to-grid (V2G) services may be on the horizon, but incentivizing EV owners to participate will require careful consideration for the same barriers discussed above.

Energy-Saving Kits

An additional action that Hawaii Energy took as part of the EV pilot was to create home energy-saving kits for EV purchasers. From December 2014 to June 2015, Hawaii Energy offered free kits to help new EV owners offset the increase in energy consumption from charging their EVs by installing energy efficient devices in their homes. In order to receive their energy-saving kits, customers registered online or in person after purchasing or leasing a new plug-in EV from a participating dealership. It was requested that participants eligible for the EV kits complete a short survey in order to assist the program with providing useful information for potential EV owners. As a result, participants identified their top two biggest concerns with purchasing an EV as the "driving range of the vehicle" and "accessibility to charging stations" (See **Figure 13** for details). In a market study conducted in PY14 by Hawaii Energy, respondents who did not own a hybrid vehicle or EV perceived "initial vehicle cost", "cost to replace batteries", and "access to convenient charging stations" among the top three obstacles to ownership of an EV. Hawaii Energy plans to continue the success of the energy-saving kit offer for EV owners in PY15 with a new online storefront for fulfillment.

Figure 13
EV Participant Survey Sample Response



[1] *Plug-In Electric Vehicle Handbook for Workplace Charging Hosts.* NREL. U.S. Department of Energy, Clean Cities. August 2013. http://www.afdc.energy.gov/uploads/publication/pev_workplace_charging_hosts.pdf

[2] Martin, J. *Grid-Integrated Fleet & Workplace Charging for Plug-in Electric Vehicles.* SDG&E. Presented November 18, 2014. http://energy.gov/sites/prod/files/2014/12/f19/Session3B_Martin.pdf

Website

Finally, Hawaii Energy launched a new section within its website devoted to providing information about electric vehicles (https://hawaiienergy.com/for-homes/ev). The page includes a cost comparison of electric vehicles to conventional vehicles, descriptions of different types of electric vehicles, and factors to consider before purchasing an EV, as well as some frequently asked questions and additional resources. Hawaii Energy plans to continue its outreach efforts to raise awareness of energy efficiency as it pertains to electric vehicles in PY15.

Demand Response (DR) Pilot

In June of 2015 the landmark bill HB 623 set a path towards 100% renewable energy by 2045 for the State of Hawaii. With increasing levels of variable renewable energy integration on each island's grid, there is a greater need for coordinated efforts that provide load control to balance the grid. In PY14, Hawaii Energy studied the potential for integrated energy efficiency and DR solutions for the residential market. The purpose of the study was to assess the effectiveness of load control of a heat pump water heater (HPWH) as a means to support grid stability. Water heaters are the primary resource for residential demand response, since they are designed to heat water and then store it for later use.

Hawaii Energy reached out to Kanu Hawaii for collaboration. Kanu Hawaii is a local organization that boasts a large membership and a track record of collaborating with Hawaiian Electric Company as well as third-party research institutes. In fact, Kanu Hawaii already had experience in installing grid-interactive water heaters in residential settings. Their prior experience enabled them to offer field installation, providing seamless customer support when troubleshooting monitoring and communications equipment. Hawaii Energy staff acted as the project lead as well as afforded technical support and data analysis. Ten participating homes were chosen for the pilot. Each home had an existing standard electric resistance water heater (ERWH), which allowed Hawaii Energy to collect baseline data on water and energy consumption, as well as instantaneous power demand. A heat pump unit was added to the existing electric water heater, as well as low-flow faucet fixtures. Next, data was collected on the HPWH under normal operating conditions to demonstrate the relative efficiencies of the two technologies. The final phase of testing involved the addition of curtailment events, where the HPWH was disabled during peak demand periods, thereby shifting the load to non-peak periods. Curtailment events were initially scheduled for four hours (5-9 PM), and then extended to 13 hours (5 PM to 6 AM).

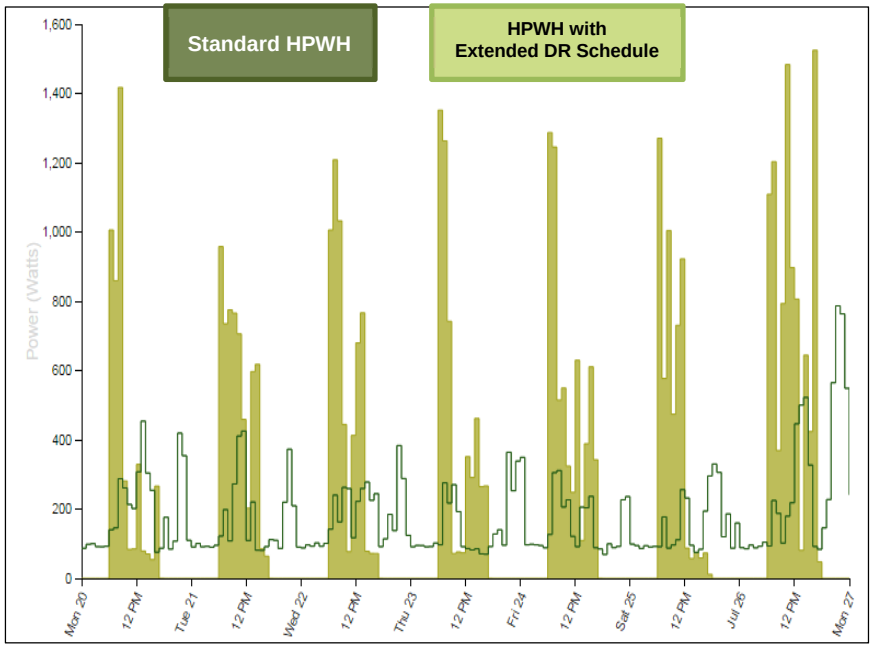
Key Findings

Evaluation of the pilot study resulted in energy and demand reductions for typical residential households when traditional ERWH was replaced with DR-enabled heat pump water heating. Installing the auxiliary HPWH and low-flow fixtures at four metered sites resulted in an estimated energy savings of around 2.7 kWh/day or 46% as compared to the 24-hour ERWH baseline. It was estimated that the electric demand changed from 4500W for the ERWH to an average of 844 W for HPWH across all sites. With the addition of the 5 P.M. to 6 A.M. curtailment schedule, HPWH DR load increased to average peak of 1166 W across four monitored locations. This recovery period was indicative of a snapback effect which should be considered if load control is implemented on a larger scale or on critical circuits. Also, due to the power reduction of the HPWH, longer runtimes were needed to meet the same hot water usage demand previously met by the ERWH. Standard ERWH high-demand heating elements would run for approximately 6% of the day, while the standard HPWH recovery rate would be active at least twice as long. Therefore a larger portion of the HPWH load coincided with the evening peak, but the addition of curtailment scheduling would shift this demand to the solar day, when renewable energy is plentiful.

This study concluded that load control was successfully demonstrated, but improving the energy efficiency by retrofitting the ERWH with HPWH reduced the magnitude of curtailable load. **Figure 14** demonstrates the extended curtailment schedule of shifting the water heating load for four participant households into the period of excess renewable energy.

There were many lessons learned from this pilot project and future areas of study. For example, additional energy savings from the cooling load (provided as a byproduct of the HPWH water heating process) was not determined, but should be investigated further for cases where existing or potential cooling is displaced. Interestingly, participants reported only two instances of water temperature fluctuations throughout a study period spanning 90 days of load shifting events with 4-hour and 13-hour durations. Thus, it was concluded the slower recovery rate of the HPWH is suitable for typical household water usage. It is advised that the long term effects be examined in order to determine if the HPWH units continue to achieve similar energy savings throughout all months of the year.

Figure 14
Ibis Networks' Online Dashboard Reporting Heat Pump Loads



Curtailment schedules through an IntelliSocket and gateway allowed load shifting away from peak demand periods of 5 P.M. to 9 P.M and an extended period of 5 P.M. to 6 A.M. The HPWH baseline indicated by lower demand profile outlined in dark green and the HPWH with the extended DR scheduling indicated in light green.

A customer education program was determined to be beneficial to programs considering DR-enabled HPWHs for the residential sector, as added maintenance requirements and slower recovery rates are inherent to most units. Participants in the pilot study were not notified of the precise timing of when units were scheduled to be "off", but feedback remained relatively positive throughout the duration of the pilot study. As with other existing residential direct load control programs, hot water service disruption has such a drastic impact on household activities. It should be carefully weighed what level of compensation is fair for the customer and the local utility. If considering long-term participation in a residential direct load control program, infrequent feedback following an event may potentially act as a deterrent for continued customer engagement.[3] Ultimately, participants were allowed to keep the HPWH, but no additional compensation was provided to the households for their demand reduction during peak periods. Therefore the impact of appropriate customer compensation was excluded from our study, but should be explored for DR participation in the future.

Moving forward in PY15, Hawaii Energy has committed to a demand response initiative for a new construction project in leeward Oahu consisting of 499 rental apartments, each with electric water heating. This is in support of efforts by Shifted Energy, HECO and the developer to coordinate the installation of grid-interactive water heaters.

[3] Faruqui, A. *The impact of informational feedback on energy consumption -- A survey of the experimental evidence.* http://www.uvm.edu/sustain/sites/default/files/faruqui2010_impactoffeedback.pdf

Benchmarking Pilot

The high cost of energy coupled with an increased awareness of energy efficiency and conservation often leads to building owners recognizing the need to reduce their energy costs. Benchmarking – measuring and analyzing a building's current energy consumption – helps building owners see where energy is being wasted, prioritize their future projects and make informed decisions about how to lower their costs.

The goal of the Hawaii Energy benchmarking pilot was to benchmark 500 commercial buildings during PY14 and the Program was able to complete benchmarking for 428 properties. 108 of these properties were analyzed using the ENERGY STAR® Portfolio Manager® and 320 properties were benchmarked using energy use intensity (EUI).

Key Findings

Initially, Hawaii Energy set out to benchmark 500 facilities via ENERGY STAR Portfolio Manager. Hawaii Energy hired a subcontractor to identify qualified candidates for free-of-charge benchmarking services, perform site visits, interview key facility personnel, and input data into the Portfolio Manager database. Despite marketing efforts by the subcontractor and Hawaii Energy, the subcontractor reported difficulty in generating participation and obtaining accurate and complete data required for benchmarking purposes. In response, Hawaii Energy conducted EUI comparisons by sector. This alternative method was used as a way to show various property types the value of benchmarking, prompt them to participate, and ask them to provide the necessary information for their property so that they could be benchmarked more thoroughly. Market sector comparisons included hotels, retail stores, supermarkets and restaurants statewide.

An example of this sector comparison is shown in **Figure 15.** Hawaii Energy has divided the population of office buildings into four groups: top 25%, low, average, and high EUI. Buildings in the top 25% group may be used as examples of how to operate a building efficiently, while buildings in the high group are the first place to look for potential energy-savings projects. Interestingly, it was observed that buildings with recent ENERGY STAR certification labels range from lowest to highest EUI. For this reason, Hawaii Energy has reached out to colleagues at the U.S. Environmental Protection Agency to determine how Hawaii-specific energy consumption data can be used to improve the Portfolio Manager® tool.

Figure 15

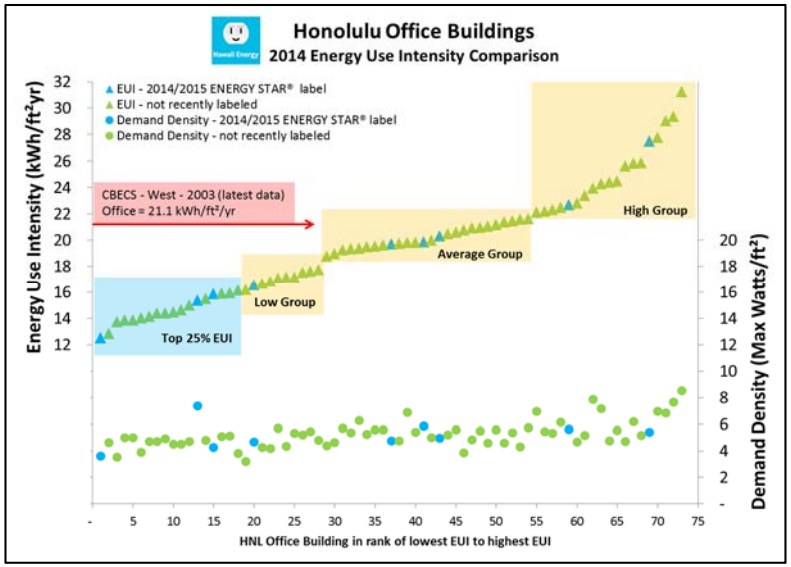
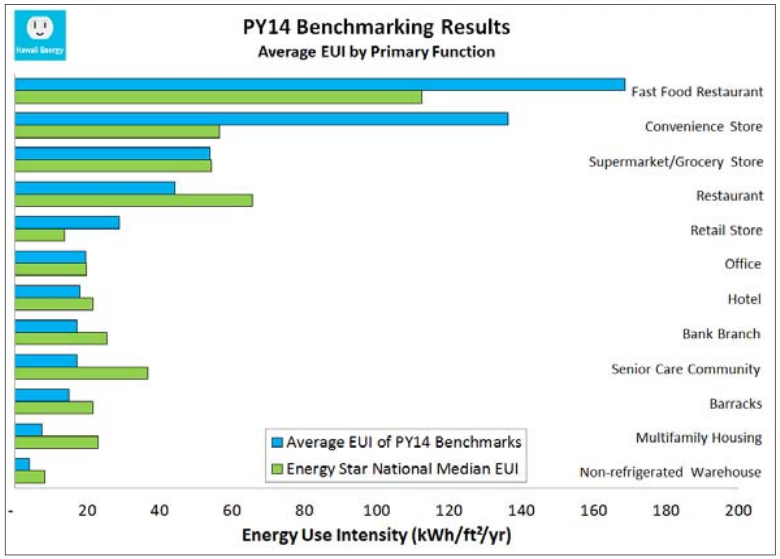


Figure 16



The average EUI results of the PY14 benchmarks can be found in **Figure 16** where they are compared to the ENERGY STAR national median values. Although these properties can be categorized together, it does not always serve as an apples-to-apples comparison. A successful benchmark is tailored to the structure and operational characteristics of each specific organization, not just a broad category, which could explain why there are differences between the Hawaii Energy and ENERGY STAR values.

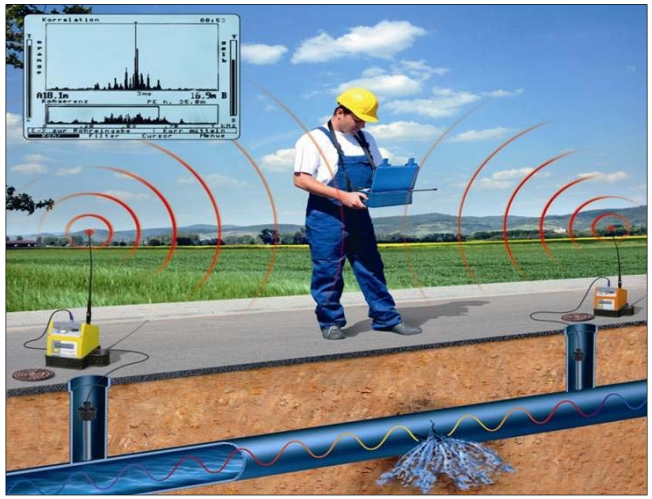
Benchmarking is not just an opportunity for buildings owners to seek out energy efficiency opportunities, but it also provides recognition for top energy efficiency performers. In PY14, nine buildings earned an ENERGY STAR label while participating in our benchmarking program for being identified as one of the top energy performers according to ENERGY STAR® PortfolioManager®. These buildings include offices, hotels, and multifamily housing.

In Program Year 2015, along with continuing to add more buildings to the Hawaii Energy portfolio, the next step for the benchmarking initiative is to target the properties with high EUIs. It is important for the Program to follow up with the benchmarked properties to help identify specific energy efficiency opportunities.

Water and Wastewater Initiative

Under the PUC's guidance, Hawaii Energy began a water and wastewater initiative in PY12 and remains committed to educating utility customers on the water-energy nexus. The primary goal of this initiative is to engage professionals in the sector and to inform them about the Program's financial offerings and other assistance. In this respect, great progress was made in Program Year 2014. In previous years, the Program searched out interested parties at both municipal and private water systems. In the most recent year, water and wastewater facility personnel began to seek out information directly from Hawaii Energy. This change can be attributed to the connections that have been made over the years with various people at local water conferences and through free trainings offered by Hawaii Energy. In particular, strong relationships have been forged with the County of Hawaii Department of Water Supply, Rural Community Assistance Corporation (RCAC), Hawaii Rural Water Association (HRWA), and the Department of Health Safe Drinking Water Branch. For more information on water and wastewater trainings and outreach, see *Technical Training* section.

In Program Year 2014, Hawaii Energy created the "Water/Wastewater Catalyst Fund". This fund was intended to invigorate stalled energy conservation/efficiency projects in the sector that had been shelved or stalled due to lack of funding or other resources. With this fund, we could incentivize a worthy project beyond our typical incentive levels, up to 100% funding. Two different projects were funded, coincidentally both at the County of Hawaii Department of Water Supply (DWS). This first project was 100% funding of a comprehensive energy study for the county water system. This study identified several energy conservation measures as well as other cost saving measures for the county. The second project was a cost-share project to accelerate the replacement of failed leak detectors and antennas that allow the county to remotely monitor the integrity of their distribution system. This monitoring system had proven itself successful in the past, but was failing due to mechanical issues and the manufacturer's warranty issues.



Through the Water/Wastewater Catalyst Fund, Hawaii Energy helped to provide new leak detectors with antennas (like the ones pictured above) to the Hawaii County Department of Water Supply, who used them to detect a 235 gallon/minute leak on the Kohala Coast. (Photo courtesy of Vivax-Metrotech.)

As water system operators are keenly aware, water loss equates to energy loss, which equates to revenue loss. Since the deployment of over 400 new devices, Hawaii DWS was almost immediately able to identify an actual water leak on the Kohala Coast, estimated at 235 gallons per minute. In this particular area on the Big Island, we calculate the water-energy relationship to be approximately 5 kWh per thousand gallons. Had this leak gone undetected for one month, for example, it would equate to over 50,000 kWh in wasted energy. Instead, the leak was repaired within one day of detection. This "equipment will amaze you as to its ability to locate and pinpoint a leak once the loggers have detected a problem within our distribution system" according to Earl Fukunaga, Supervising Water Service Investigator at the Hawaii DWS. Hawaii Energy looks forward to continuing its support of Hawaii DWS. Other projects were identified as potential

candidates for the Water/Wastewater Catalyst Fund, but were delayed for reasons beyond the control of Hawaii Energy. These projects are on the Program's radar for Program Year 2015.

As mentioned above, strong relationships have been formed with HRWA and RCAC. In PY 2014, Hawaii Energy gave away five sets of pump efficiency assessment kits (each valued at over $10,000) to the two groups and provided hands-on training sessions at pump stations in Holualoa on the Big Island and in Kawela on Molokai. The idea behind giving these kits away to these local groups was that the kits could then be loaned out to small water companies that may not have the resources to purchase their own testing equipment. Between HRWA and RCAC, test kits are available on Oahu, Maui, Molokai, Hilo, and Kona. According to our colleagues at HRWA, they currently have a waiting list of people that are interested in borrowing the kits.

MARKETING & OUTREACH

In PY14, the primary objective of the Program's Marketing & Communications (Marcom) efforts was to continue to increase awareness of and participation in Hawaii Energy offerings (i.e., residential rebates, business incentives and Transformational educational/training opportunities). The Program leveraged successes and lessons learned to enhance proven strategies and explored additional innovative and cost-effective opportunities to reach customers across the three counties with continuous refinement to maximize results. Below are highlights.

Market Research

In PY14 (October and December 2014), the Program subcontracted with QMark, a local market research company, to gauge awareness, obstacles and opportunities surrounding the Program's Demand Response, Smart Grid, Electric Vehicles and Time-of-Use (TOU) rate pilot projects. (See Transformational program section for details on the pilots). In addition to these topics, Hawaii Energy was able to include a number of program awareness and participation questions.

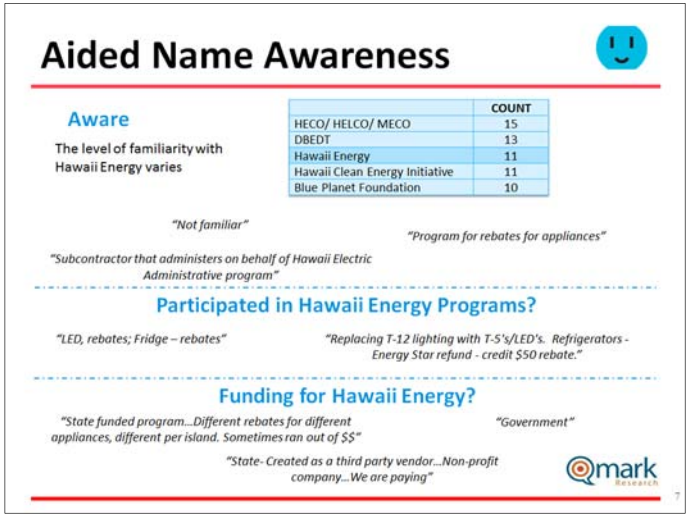
In summary, results indicated that although there is relatively low awareness of Hawaii Energy (56% on average across the three counties) as compared with the utilities notably 93% on average), of those who had heard of the Program, many had heard of specific program offerings (ranging from 78 to 35%) and some had participated (ranging from 34 to 15%). However, only 10% reported having had contact with the Program. As such, the research indicated a strong need to increase program branding/name awareness. Since the release of the findings, the Program continues to consider and propose strategies to address and incorporate the information and suggestions from the market research, and plans to do so throughout PY15.

The market research was comprised of two qualitative components and one quantitative component. Below are the key findings from each component as it pertained to program awareness and participation:

(1) Qualitative:

a. Focus groups (the results helped to shape the quantitative component): Five total groups with two on Oahu, one on Maui, one in Kona and one in Hilo

- Awareness was very low with one or two participants mentioning the "smiley face" logo. Once asked, a few participants were aware of a solar water heater rebate and ENERGY STAR appliance rebates but did not associate these with Hawaii Energy.
- Due to the low aided name awareness of Hawaii Energy, research participants agree that the organization needs to introduce itself to the public and explain its primary mission and goals. They feel the organization should stress that they are a local organization that understands the community they are tasked to serve. This is particularly important on the Neighbor Islands.



- Suggestions from participants to further promote Hawaii Energy included: advertising more, sharing the background of the program, clearly defining programs available, explaining how participants can save money, separating the program from the utilities and highlighting concepts of conservation or being "green".

b. One-on-one interviews: 15 interviews with respondents from property management, restaurant, service, retail and manufacturing sectors to focus on Business Program areas of improvement and opportunities.

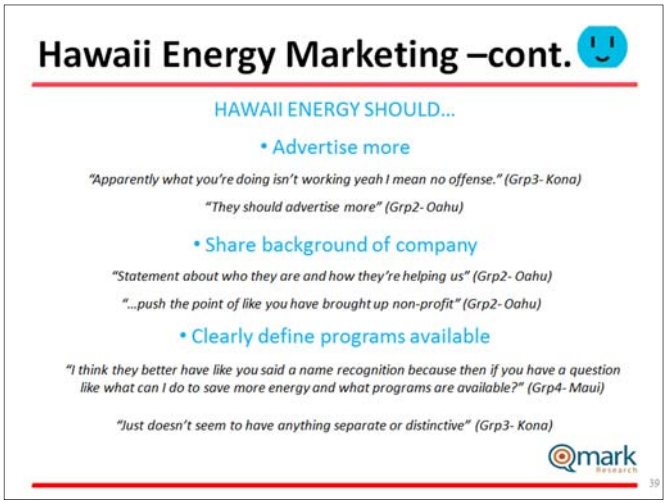
- Saving energy was considered important by 14 out of 15 participants and ranked at a mean of 8.0 on a scale from 1 to 10.
- 11 out of 15 were aware of incentive programs with nine reporting that they had participated in them. Two specifically named Hawaii Energy unaided.
- When Hawaii Energy was named by the interviewer, 11 out of 15 reported being familiar with the program.
- When asked what messaging points Hawaii Energy should focus on in its marketing and communications campaigns, suggestions included: being more aggressive (e.g., "more education", "make contact"), showing them the savings and emphasis on the environmental aspect (e.g., "saving our Hawaii", "right for the 'aina").

(2) Quantitative (a mix of telephone and online surveys): 632 residents were surveyed from late November through early December 2014. Of the respondents, 422 were from Oahu, 103 from Hawaii Island and 107 from Maui County.

- 56% said they had heard of Hawaii Energy. Notably, awareness of Hawaii Energy is higher among younger segments of the sample. For example, among adults under the age of 35, 67% had heard of Hawaii Energy. As a point of comparison, name awareness fell to 45% among residents over the age of 65.
- 10% reported having contact with Hawaii Energy at least once in the past.
- Of those who had heard of Hawaii Energy:
    - Approximately 87% felt very or somewhat favorable toward Hawaii Energy. Of the remainder, about 12% had an unfavorable view of the program. In contrast, 43% of the respondents reported an unfavorable opinion of the utilities.
    - Unaided Awareness:
        - 43% could describe – unaided – Hawaii Energy or a Hawaii Energy offering. The remaining 57% could not describe the program or an offering, or simply said they did not know. This infers that the respondents who reported having heard of Hawaii Energy is somewhat inflated based on the generic nature of the Program's name which many find familiar to varying degrees.
        - 9% said that Hawaii Energy is the organization behind the ENERGY STAR appliance rebates.
        - 8% claimed that Hawaii Energy's mission is to promote the conservation and reduction of energy use, while 5% felt Hawaii Energy is a champion of alternative energy resources.
    - Aided Awareness & Participation:
        - Of five specific offerings named (see below), respondents recognized them to varying degrees ranging from 78 to 35%, with participation ranging from 15 to 34%:

1. *Solar Water Heating*: 78% awareness, 23% participation
    - There was a higher awareness among homeowners in single family units (81%) as compared to renters and those living in multi-unit (70%) dwellings.
2. *ENERGY STAR appliances*: 71% awareness, 34% participation
    - Those who are currently paying the highest electric bills ($250+/month) are least likely to have heard of this rebate. For example, just 62% in this upper tier were aware of this offer compared to 75% among those whose bills average less than $250 per month.
    - Those with a college degree (77%) were more likely to have been aware of the Appliance rebate than are those without a degree (62%).
3. *Efficient light bulb low prices*: 50% awareness, 29% participation
4. *Old refrigerator rebates:* 42% awareness, 15% participation
    - Those with the lowest electric bills are more likely to have heard of the rebate to get rid of old refrigerators. For example, 52% of those whose monthly electric bills average less than $100 were aware of this program compared to 34% among those paying more than $250 each month.
5. *Home Energy Reports:* 35% awareness, 20% participation
    - Those on the Neighbor Islands (45%) were more likely to have prior awareness of the Home Energy Reports than are those on Oahu (31%).

- In addition, the 456 online survey respondents were presented with a list of different sources of information and asked to select the ones they would typically use to learn more about topics like those discussed (e.g., energy conservation and efficiency, as well as pilot topics). Top responses included the Honolulu Star-Advertiser, Hawaii News Now, KHON 2, word-of-mouth, KITV-4, websites/online, direct mail and radio (in that order, although respondents could check all that applied).



Marketing & Communications

The following highlights efforts and results from: (1) email marketing; (2) online engagement; (3) collateral development; (4) advertising; (5) direct mail; (6) outreach; and (7) sponsorships and collaborations.

Email Marketing

Email marketing has proven over the last year to be one of the most effective communication channels for the Program. PY14 efforts focused on growing and frequently engaging with our subscriber base, increasing promotion of Transformational and Clean Energy Ally program offerings and generating easy-to-digest, relatable content for all messaging.

The Program continues to provide three primary subscription options (Residential, Business and Energy Professionals) and is now also able to reach participating Clean Energy Allies through their own subscriber list. With the exception of the Clean Energy Allies, users may opt-in to as many of the subscription options as they choose; so many subscribers receive information for all three audience segments.

Some highlights of our email marketing efforts this year include:

- Growing the total subscriber list to over 12,560 subscribers, with more being added daily through our residential rebate applications, outreach event sign-ups and website opt-in portal. Residential is the largest list with more than 10,800 subscribers, followed by Business (830), Energy Professionals (780) and Clean Energy Allies (150).
- Continuing our monthly Residential and bi-monthly Business e-newsletter series, which achieved average open rates of 34.12% and 33.53%, respectively. Both are above average rates by industry standards and indicate that our audience is engaged and interested in the content they receive.
- Utilizing Hawaii Energy-generated emails as cross-promotion for Transformational offerings, including the EEFG Sales Training series and Certified Energy Manager and Building Operator Certification courses. These "reminder" messages sent to our Business and Energy Professionals lists not only helped to increase enrollment, but ensured that qualified potential participants were being reached.
- Building a robust launch and communication tool for the Clean Energy Ally program. Our specially-designed template allows the Program to easily send emails to all Allies at once and allows them to stay abreast of Program changes and the resources/benefits available to them.



Frequent e-newsletters like those pictured here help the Program keep in contact with customers and receive fast results on which content is of interest to subscribers.

Online Engagement

Social Media

Hawaii Energy continues to utilize social media (via Facebook, Twitter and on occasion, Instagram) as a communication channel and as a means of staying up-to-date with the energy industry, as well as local/national news and community events. Overall, the Program aims to produce a wide variety of content (text, photos, links, etc.), post at least 3-5 times a month on Facebook and Twitter and keep a constant pulse on user engagement. As of the end of PY14, the Program had over 3,500 Facebook "likes" and over 2,700 Twitter followers, counts that remained consistent over PY14. Additionally, the Instagram account, which was started in PY13, is up to approximately 136 followers.

Website

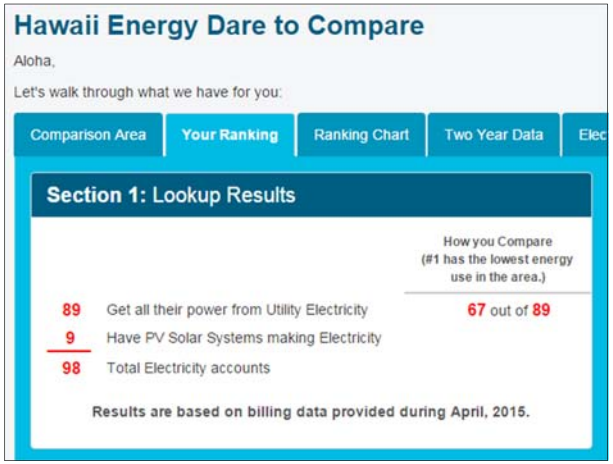
The Program's website continues to serve as a key resource to learn about how to save energy and money on electric bills. Website development and management was brought in-house in January 2015 with improvements to the homepage for easier navigation as well as plans to develop new customer engagement tools. This will ensure that our site is providing a relevant and positive user experience.

One example is the "Dare to Compare" tool, which is designed to engage residential and business customers with live, personalized information regarding their energy usage and monthly electricity bill as compared to their "neighbors" (i.e. within a 1/10 mile radius or a minimum of five properties in that area).

Prior to launching the redesigned website in January 2015, the website was receiving an average of 4,800+ unique visitors and 20,000 page views per month during PY14. Users spent between 2.5 - 3 minutes on the site and viewed an average of 2.77 pages each time. Since the redesign, the website receives approximately 5,200+ unique visitors and 23,451 page views per month, visits are now between 1 - 2 minutes and each user views an average of 1.34 pages. The reduction in visit time and page view counts may be due to improved navigational access to popular pages.

The Program will continue to refine the website and monitor and analyze the metrics to increase the website's value and usability to customers.





The new Hawaii Energy-developed "Dare to Compare" website tool provides a personalized energy usage comparison for all Hawaii residents

Collateral

Understanding the value of fresh, informative and engaging collateral pieces, the Program took the opportunity in PY14 to revitalize content and design for several existing brochures and handouts. Feedback from customers and team members helped fuel the update process as well as the creation of a number of new pieces that are now distributed during meetings, Hawaii Energy presentations and outreach events.

Updates to existing pieces included:

- *SBDIL brochure* – a complete redesign (added testimonials, a step-by-step walkthrough of the retrofit process and photo examples of qualifying lighting equipment)
- *Residential tri-fold* – updated rebate amounts and energy-saving tips; added a home energy usage graphic
- *Business summary sheets* – separated into Lighting & Non-Lighting sheets

New collateral pieces developed in PY14 include:

- A *Business Program overview brochure* listing the various incentives available (without technical specifications) for commercial customers and an introduction to the Clean Energy Ally program
- *Restaurant kitchen incentive-specific pieces*: overview brochure and restaurant-specific technical summary sheet
- A *postcard* promoting the launch of the free Residential energy-saving kit
- A *brochure* summarizing the Program's PY13 Annual Report



The Program also continued to build its case study library, which was developed to showcase some of our most successful projects in various market sectors and as a resource for Business program team members, contractors and customers. The following three case studies were developed in PY14:

- *Four Seasons Maui* – Large-scale project including lighting, HVAC, pool pumps, restaurant kitchen hood demand ventilation and a Building Automation System
- *Hawaii Prince Hotel Waikiki* – Water-Cooled Chillers
- *Honolulu Museum of Art* – LED Lighting (pictured at right)

Advertising

Seeking to maximize the available advertising budget, increase brand awareness and drive customers to participate in specific offers, the Program strategically planned and executed a number of advertising campaigns during the program year, ranging in duration from one month to multiple months. See below for highlights.

Co-op Advertising

To promote the Program's $1,000 residential solar water heating rebate, a co-op advertising program was once again offered to participating contractors as a means to help offset their advertising costs while increasing the Program's reach. To participate, contractors were required to include the Hawaii Energy logo and approved messaging. PY14 marks the first full year of offering this program, and after taking into consideration the feedback and lessons learned from our "pilot" program in PY13, the Program refined its requirements and increased the reimbursement cap to $3,000 per contractor. These changes, along with a longer window for participation, made it easier for contractors to take advantage of the offer. A total of nine companies representing all three

counties participated and the Program reimbursed over $18,000 in advertising costs. Many of the contractors expressed that they would not have been able to purchase ads had it not been for this offer.

Digital Advertising with Summit Media

In conjunction with the launch of the residential energy-saving kit online sale (see Residential section), Hawaii Energy purchased a digital advertising package with Summit Media that included a combination of web banner and Facebook ads for a 30-day period during the months of April and May.

The web banner ads were strategically distributed using several methods:

1) Outreach: Ads displayed on the first visit to several pre-determined collections of websites ("display networks") designed to reach particular demographics. We used three display networks, listed below with just some of the sites that fall under each:
    - *Women* – YouTube.com (Beauty & Fitness, Home & Garden, Cooking & Recipes); Zimbio.com; MyFitnessPal.com; Cosmopolitan.com
    - *Go Green* – Weather.com; Instructables.com; Edmunds.com; NationalGeographic.com
    - *Home Improvement* – bhg.com; Youtube.com (Home Improvement, Yard & Patio); GardeningKnowHow.com; DreamHomeSource.com
2) Keyword Targeting: Ads shown to users who type in specific search keywords
3) Retargeting: Ads shown to users after they visit and leave the Hawaii Energy website (i.e. energy-conscious customers). This method had a frequency cap of 24x per user.

Each method and its corresponding spend allocation was determined by Summit Media, within the constraints of our overall budget for this campaign. Summit Media tracked how many users clicked the ads and the number of "conversions" (completed sales transactions on the Hawaii Energy online kit order page).

The Facebook ads were run using the Facebook-provided Website Conversions format, in which the objective is to direct users to our website and take a specific action (e.g. sign up to receive a kit) using a conversion pixel to track actions (completed sales). This method of advertising proved to be an exceedingly cost-effective option for the Program – it was the smallest amount of money spent within the package (25% of the budget) but contributed to a majority (326 out of 339) of the sales conversions. In addition, the Facebook ads increased the daily reach of the Hawaii Energy page by as much as 900% compared to the average reach of the previous month.

A total of 3,466 unique kit orders were made during the sale period, with 9.8% coming from the digital ads.





Hawaii Energy ran three sizes of banner ads through its digital advertising buy with Summit Media, promoting the online redemption Home Energy Kits. Working with Summit Media allowed the Program to customize distribution methods and see real-time tracking on each method.

Radio Advertising Campaign with Summit Media

To increase reach and build on the momentum of the launch of a short radio advertising campaign in PY13 (April – June 2014), Hawaii Energy worked with Summit Media to develop and execute a strategic and cost-effective advertising campaign from October 2014 through June 2015.

For PY14, the campaign included the following:

1) KRTR 96.3 FM - "90's, 2K and Today"
    a. Traffic Billboards: Ten-second spots during the afternoon traffic report (3 – 7 p.m. weekdays) with a tagline mentioning that the report is brought to listeners by "Hawaii Energy – your energy conservation and efficiency program"
    b. Branding Spots: 15-second spots highlighting Hawaii Energy offers, including residential rebates such as Window AC, Rid-A-Fridge to Fight Hunger and Trade-Up, as well as spots to generally promote incentives for businesses.
    c. On-Air Energy Saving Tips: 15-second spots with energy-saving tips
    d. Endorsement Spots: 60-second spots "endorsed" by Shawnee Hammer, a key KRTR morning show deejay, with examples of energy-saving actions she's taken/considered with the help of the Program, encouraging listeners to check out Hawaii Energy's website to do the same at home.
    e. On-Air Interviews: 30-second monthly pre-recorded interviews with deejay Shawnee Hammer featuring Hawaii Energy Residential Program Director, Caroline Carl, promoting program offers/tips for the month.

2) Hawaiian 105 KINE FM - "The Hawaiian Music Station"
    a. Branding spots (same as above for KRTR)
    b. On-Air Energy Saving Tips (same as above for KRTR)
    c. On-Air Interviews (same as above for KRTR)

Both KRTR and KINE are ranked the most popular Oahu radio stations among adults 25 and over, and consistently in the top 3 in the Honolulu market. In general, KRTR reaches approximately 98,700 listeners each week, with KINE reaching about 94,000 listeners each week.

Hawaii Business Advertorial and Advertising Campaign

To build on the momentum started in PY13, the Program continued an advertorial and advertising campaign in PY14 with Hawaii Business magazine from October 2014 through May 2015. Hawaii Business reaches 81,000 business-minded readers and decision-makers each month. The campaign featured "Energy Tip of the Month" columns, a monthly advertisement designed to attract attention similar to an editorial in the front "Trending Now" section of the monthly publication. To increase readers' attention, the column was refreshed to feature Lisa Harmon, Clean Energy Ally Specialist, as the "author" and the Program refined the writing style and tone to be a fine balance between catchy and factual yet actionable for the business reader. In PY14, the column promoted a range of offerings including incentives for lighting retrofits and restaurant/kitchen equipment, as well as benefits for participants in the new Clean Energy Ally program.

In addition, the Program continued with a 1/3 page monthly ad placed in the "Small Business" section from October 2014 through April 2015 that highlighted a business customer that received an incentive. In PY14, featured businesses included Hilton Hawaiian Village Waikiki Beach Resort, Honolulu Museum of Art and Four Seasons Hualalai. Moreover, added value to the media buy included reduced cost for promotional benefits including Hawaii Energy-focused e-blasts reaching approximately 16,000 Hawaii Business online subscribers per blast (featuring topics such as a Small Business Direct Install Lighting program testimonial from Eggs 'N Things and new restaurant/kitchen equipment incentives); a full-page inside back cover ad in the September 2014 "Construction" issue; and Gold sponsorship benefits for Small Business Administration Hawaii District Office and Hawaii Business' Small Business Awards Luncheon in May 2015.

Additional Strategic Advertising Campaigns

To keep the Program top-of-mind with customers and increase reach across the three counties, Hawaii Energy focused on a number of additional strategic advertising buys to promote key messages outlined below. Overall, the advertising strategy used a mix of radio, print and online advertising. The portfolio of media purchased for this campaign yielded an estimated reach of 4.76 million.

"Meet the Team" ads promoting the Business program

- Objective: To increase awareness of incentives and technical resources for businesses.
- Creative: New creative was developed using in-house resources. The ads featured Hawaii Energy's team of business specialists available for a wide range of sectors and industries at the ready to help customers.

Media buy included:

- General business newspapers
  - Pacific Business News – Inserts in the Friday hard copy edition
- Trade publications with decision-maker/influencer audiences
  - Building Industry magazine
  - Hawaii Buildings, Facilities & Property Management Expo Guide
  - Building Management Hawaii magazine
- General population newspapers
  - West Hawaii Today - Hawaii Island newspaper
  - Hawaii Tribune Herald - Hawaii Island newspaper
  - Maui News - Maui newspaper
  - Honolulu Star-Advertiser
- Neighbor Island radio
  - NewWest Broadcast Corp. (KWXX Hilo, KAOY Kona, KNWB Hilo, KMWB Kona, KPUA Hilo) - Hawaii Island stations
  - Pacific Media Group (KJKS 99.9 FM, KPOA 93.5 FM, KMVI 900 AM, KNUI 550 AM) - Maui stations
- Online
  - MauiNow.com – Website banner ad (part of Pacific Media Group buy)

Residential Solar Water Heating & Participating Contractor "Mahalo" ads

- Objectives:
  - Solar Water Heating ads: Build on the brand equity and awareness from the PY12 and PY13 advertising campaigns, which ran the PY12 creative; increase awareness of the benefits of solar water heating; and drive customers to Hawaii Energy's website to learn how to get started.
  - "Mahalo" ads: Thank Solar Water Heating Participating Contractors listed in the ad and promote solar water heating.
- Creative: The Solar Water Heating advertising leveraged creative originally developed as part of a bigger ad campaign in PY12. The "Mahalo" ads were developed using in-house resources.

Media buy included:

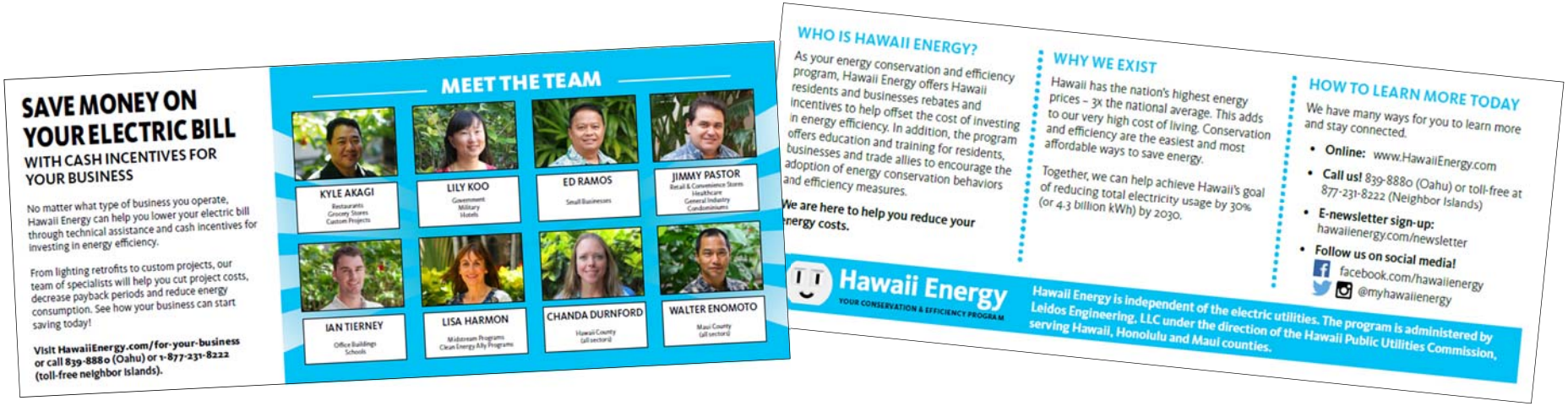
- Newspapers
  - West Hawaii Today - Hawaii Island newspaper
  - Hawaii Tribune Herald - Hawaii Island newspaper
  - Maui News - Maui newspaper
  - Midweek – Oahu weekly newspaper
- Neighbor Island radio
  - NewWest Broadcast Corp. (KWXX Hilo, KAOY Kona, KNWB Hilo, KMWB Kona, KPUA Hilo) - Hawaii Island stations
  - Pacific Media Group (KJKS 99.9 FM, KPOA 93.5 FM, KMVI 900 AM, KNUI 550 AM) - Maui stations
- Online:
  - StarAdvertiser.com – Homepage ad



Direct Mail

Electric Bill Inserts

The Hawaiian Electric family of companies once again offered the opportunity for the Program to produce inserts included with customer bills. The Program produced four Residential and three Business inserts that were included with the October, February, March and June electric bills in Hawaii, Honolulu and Maui counties, reaching approximately 360,000 residential and 60,000 commercial customers per month.



This electric bill insert (front and back, above) featuring Business Program specialists and their various service sectors was designed by Hawaii Energy and distributed to approximately 60,000 commercial account holders in PY14.

Solar Water Heating Direct Mail

In an effort to increase participation for the residential solar water heating rebate, we expanded upon last year's direct mail campaign. Design and data production were brought in-house, and the cost savings of developing the piece ourselves allowed us to distribute the mailer to more households.

The piece was mailed to approximately 50,000 customers across the counties who were identified as: (1) having a home size larger than 700 sq. ft., (2) having an average monthly energy use of greater than 700 kWh over the last year, (3) not having a photovoltaic system and (4) never having participated in the solar water heater rebate program before.

As a result, 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 used a direct mail strategy to reach a program data-driven target-segmented audience to promote an offer.

Outreach

The Program continues to participate in a variety of community events throughout the year as it generates brand awareness and allows for valuable face-to-face time with customers. Hawaii Energy participated in 45 events in PY14 – the most the Program has ever done in a single year. Our overall goals for community outreach have always been to: (1) collaborate with local businesses and nonprofit organizations to further our messaging efforts; (2) increase our participation in local events and expos to broaden our audience reach and (3) continue to present the Program to a variety of organizations and groups.

Event Participation and Presentations

Hawaii Energy built upon a strong foundation of successful outreach events and explored several opportunities to reach customers in specific market sectors and hard-to-reach areas. Community outreach participation is defined as the Program having a booth or table at an expo, conference, tradeshow, fair or festival and providing information and giveaways. Committing to events is done strategically, in alignment with the long-term goals of (1) reaching a wide array of electric ratepayers; (2) continuing to have a presence at past events that were deemed successful/valuable and (3) exploring new opportunities to reach targeted or historically underserved market segments. The 45 community outreach events we completed this year had an estimated total attendance of 106,875 people. Of these events, 73% of them were in the City & County of Honolulu, 11% in Hawaii County and 16% in Maui County.

Several new events were added in PY14, including: the Maui Food Technology Center Supply & Service Expo, a "Ride & Drive" event for National EV Week and a "Business After Hours" networking event hosted by the Chamber of Commerce of Hawaii (see next section).

Table 73
Number of Outreach Events and Presentations

Counties			Grand Total
Hawaii	Honolulu	Maui	
5	33	7	45

Table 74
Estimated Reach of Outreach Events & Presentations

Counties			Grand Total
Hawaii	Honolulu	Maui	
1,325	29,500	76,050	106,875

Sponsorships & Collaborations

Chamber of Commerce of Hawaii

The Chamber of Commerce of Hawaii ("the Chamber") serves as an advocacy and resource forum for 1,000+ member organizations representing more than 200,000 employees across the State. Hawaii Energy sponsored the Chamber, specifically for the resource objective of the organization[4], during the second half of the program year in alignment with our goal of increasing brand awareness and our reach to targeted market sectors. The sponsorship included advertisements on the Chamber website and in their weekly e-newsletters as well as title sponsorship of four events:

1. *"Reframing Energy Efficiency as a High-Yield, Low-Risk Investment"* – A 1.5 hour invitation-only breakfast event on February 25, 2015 targeting C-suite Chamber members and featuring Mark Jewell, founder of the Energy Efficiency Funding Group (EFFG). Approximately 58 individuals attended the event, which covered topics ranging from how to recognize and dispel myths that can delay or prevent investments in efficiency; demanding more from vendors and service providers, including pursuing all sources to fund efficiency initiatives; and taking a life-cycle cost approach to consider higher first-cost, premium-efficiency options. See the Transformational section for more information.

2. *"How to Get Your Chickens to Lay More Eggs: Hidden Energy Savings & Incentives for Manufacturers"* – A lunch-hour panel discussion on April 1, 2015 that targeted those in the manufacturing industry. The panel consisted of two manufacturing business executives who had received incentives from Hawaii Energy, Hawaii Energy's Director of Business Operations and Business Program Manager, and an executive from INNOVATE Hawaii, which provides resources for expanding and start-up businesses in Hawaii. Topics included how the two manufacturers grew their businesses and used energy-saving programs to improve their businesses and save money. Approximately 31 individuals attended the event.

3. *"Step Into Spring": Business After Hours networking event* – Hawaii Energy sponsored a quarterly Chamber networking event that was open to the public and Chamber members. This event on April 22, 2015 drew approximately 83 attendees. Hawaii Energy utilized this event to reach out to our growing base of Clean Energy Allies and provided complimentary admissions to the first 25 Allies to register. Hawaii Energy was also included in all event marketing and staffed an informational table at the event.

4. *Restaurant Industry Trainings* – Hawaii Energy hosted a two-day series with facilitators from Fisher-Nickel, Inc. on energy efficiency best practices for restaurant and foodservice facilities. The Chamber helped coordinate logistics and publicize the workshops to their foodservice industry members. Approximately 31 individuals attended the trainings. See the Transformational section for more information.





Top: Email announcement for the lunch-hour panel presentation tailored for manufacturing industry members. Bottom: Attendees at the "Step Into Spring" networking event.

[4] The Program did not participate in any advocacy objectives as it remains vigilant and cognizant that it is a ratepayer-funded program under the direction of the Public Utilities Commission.

Honolulu Board of Water Supply

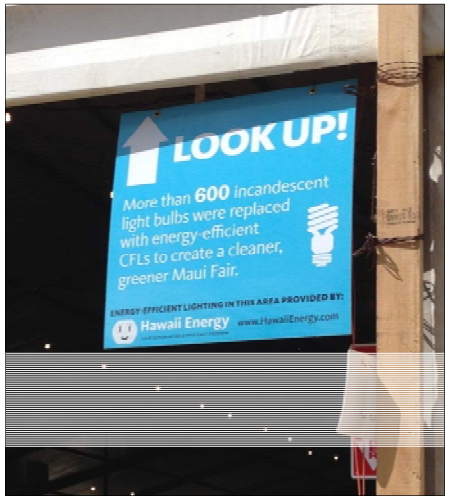
Hawaii Energy collaborated once again with the Honolulu Board of Water Supply to sponsor their 37th Annual Water Conservation Week Poster and Poetry Contests. This year's theme, "Water Matters – Conserve It," invited Oahu students to demonstrate their knowledge of the value of water conservation and how to preserve Oahu's precious drinking water supply for generations to come.

More than 1,400 posters and 275 poems were submitted to the annual contests and the winners were selected for each age group based on the accuracy of information, originality, creativity and artistic or poetic ability. 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 included in all marketing efforts, attended the Water Conservation Week mayoral proclamation and will be prominently featured on the end-of-year calendar highlighting all of the contest winners and submissions.

Maui Fair Lighting Retrofit

As a longtime participant in the Maui Fair, one of Maui's oldest and largest community events, Hawaii Energy was asked by Fair organizers for assistance in making the four-day annual event more energy-efficient. Maui County Business Program Specialist Walter Enomoto identified lighting as the quickest, most cost-effective way for the Fair to start seeing energy savings. Hawaii Energy provided more than 600 CFLs to replace old, incandescent bulbs in high-traffic areas of the fairgrounds, including the food court, Entertainment and Products & Services tents and entrance ticket booths. In exchange for providing the lamps, Hawaii Energy received the marketing value of an in-kind sponsor, which included three large vinyl banners placed around the fairgrounds, ad space and an editorial feature in the Maui News' annual Maui Fair tabloid piece and additional signage around the fairgrounds alerting attendees of the lighting retrofit.





The Products & Services tent was one of many areas at the 2014 Maui Fair retrofitted with new, energy-efficient CFLs. Signage was placed around the fairgrounds encouraging attendees to "Look Up!" and spot the new bulbs. The retrofit is estimated to save the Fair approximately 3,932 kWh and $1,475 annually.

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

This was the Program's second year running the "Rid-A-Fridge to Fight Hunger" campaign, where residents who participated in the refrigerator recycling rebate offer could choose to donate their rebate amount to a local food bank. After a successful collaboration with Hawaii Foodbank (Oahu), Maui Food Bank (Maui) and The Food Basket (Hawaii Island) in PY13, the Program re-launched the campaign at the start of PY14 with a news release promoting its continuation to eventually yield fruitful results. Across the three counties, more than $7,000 was donated and went toward providing meals for Hawaii's hungry. The Program will work on securing media coverage on the results and encourage more residents to participate in the rebate offer in PY15.

Public Relations

Public relations is the management of relationships between an organization and its various stakeholders through strategic communications. Hawaii Energy's public relations and outreach efforts have resulted in developing solid, working relationships with the local news media, which has allowed the Program to be featured in various newsworthy stories. Positive media coverage about Hawaii Energy was read, watched and listened to throughout PY14.

Hawaii Energy continued to strategically identify and leverage opportunities to amplify electric utility ratepayer's awareness of and participation in the program's offerings. Public relations continues to be a critical component to the Program's comprehensive marketing strategy to establish credibility and build awareness through earned media coverage.

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 total reach of all earned media coverage for PY14 was more than 10.4 million.

The Advertising Value Equivalency (AVE) is what the editorial coverage would cost if it were advertising space (print publications) or on-air time (television and radio). The Estimated Publicity Value is calculated by multiplying the AVE figures by three, since editorial coverage is a third-party opinion and therefore considered three times that of a paid advertisement. The Estimated Publicity Value totaled more than $197,000.

Media Coverage Highlights

Earned 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.



Left to Right: Matt Lynch (Sustainability Coordinator, University of Hawaii System), Larry Newman (Director of Business Operations, Hawaii Energy) and Michael Pfeffer (CEO, Ibis Networks).

Press Conference

On May 8, 2015, Hawaii Energy, the University of Hawaii (UH) and Ibis Networks (Ibis) hosted a joint press conference at the Windward Community College in Kaneohe. Hawaii Energy was one of the key presenters talking about a pilot project funded through the program's Energy Efficiency Auction. The auction funded 77% of the total $142,612 project costs.

The press conference was developed in collaboration with UH, Ibis and the Energy Excelerator to showcase the project that was designed to reduce plug-load energy consumption at three campuses: UH Manoa, Windward Community College and UH Hilo. Ibis installed 1,232 of its patented plug-load technologies (InteliSockets) into existing electrical outlets that collected energy usage data for more than 1,500 devices that included computers, monitors, printers, power strips, copiers, mini fridges and televisions.

Hawaii Energy's Larry Newman (Director of Business Operations) was one of the featured guest panelists at the conference alongside Michael Pfeffer (CEO, Ibis Networks) and Matt Lynch (Sustainability Coordinator, University of Hawaii System). Larry explained the goal of the Energy Efficiency Auction, why Ibis' project was selected and pointed out that the growth in plug-load energy consumption meant opportunities for energy efficiency.

The Energy Excelerator moderated the discussion and Representative Chris Lee, Chair of the Committee on Energy and Environmental Protection, provided the opening remarks and briefly discussed the State's clean energy goals. DBEDT's Director Luis Salaveria provided the closing remarks. A Windward Community College student presented her classwork that involved studying energy usage and management with the InteliSockets.

The press conference was covered by two television stations KHON (Hawaii's FOX affiliate) and KITV (ABC affiliate) on the 6 p.m. evening newscast and late night 10 p.m. newscast as well as the *Pacific Business News.*

Check Presentations

Hawaii Energy recognized and promoted several businesses' energy-saving projects and the financial incentives received from the Program. There were a total of seven check presentation events with companies in various industries, including hotels, federal government, non-profits and education. 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 photo placements and stories in several media outlets. Below is a sampling of the businesses that were featured and the resulting media coverage.

Hilton Hawaiian Village Waikiki Beach Resort

Hawaii Energy presented a $471,192 incentive check to the Hilton after the completion of phase I of a multi-phase, multi-million dollar energy efficiency upgrade project. Phase I included a major lighting retrofit in 1,839 guest rooms and the installation of energy-saving fan coil motors in all 2,860 guest rooms. The project costs were $1.91 million. Hawaii Energy's incentive covered 24% of these costs. The energy efficiency upgrades are estimated to save 2.8 million kWh annually – equivalent to $710,360 in energy costs based on $0.2837/kWh.

- *Green Lodging News* – "Hawaii Energy Awards Its Largest Hotel Incentive Ever"
- Hawaii News Now's "Sunrise" – Morning TV news show
- *Pacific Business News* – "Hawaii Energy Awards $471K to Hilton Hawaiian Village For Energy-Efficiency Programs"

Honolulu Museum of Art

The Honolulu Museum of Art on Beretania Street and the Honolulu Museum of Art Spalding House (formerly the Contemporary Museum) in Makiki replaced 1,236 linear fluorescent tube lights and 2,754 halogen, incandescent and compact fluorescent lamps with energy-efficient LEDs.

Hawaii Energy presented a $91,007 incentive check to the Honolulu Museum of Art for enhancing its lighting quality while saving substantial amounts of energy for both locations. The museum will save an estimated 468,599 kWh annually, which is the equivalent to $113,400 in energy cost based on $0.242/kWh.

- *Midweek* – "Donation Reduces Energy Costs"
- *Pacific Business News* – "Honolulu Museum of Art trades in fluorescent lighting for LEDs"

Kamehameha Schools

Hawaii Energy presented a $128,662 check to Kamehameha Schools (KS) for various energy efficiency renovations to its Oahu and Hawaii Island campuses as well as for a Kakaako commercial property. KS upgraded air conditioning systems and interior and exterior lights on its Kapalama campus on Oahu. The school replaced 106 fluorescent and incandescent lamps with dimmable LEDs in the Performing Arts Center. LEDs were also installed in 153 street lights that illuminate the 600-acre campus. Induction lights were installed in the school's new 500-stall parking garage.



Left to Right: Hawaii Energy Director of Business Operations Larry Newman; KS Sustainability Manager Amy Brinker; KS CFO/VP of Finance and Facilities Ben Salazar; KS Director of Facilities Development and Support Therese Rosier and Hawaii Energy Jr. Business Program Specialist Ian Tierney.

The newly-constructed KS Middle School, also on the Kapalama campus, installed an energy-efficient air conditioning system. On Hawaii Island, the 300-acre campus in Keaau significantly lowered its energy usage by tinting the south- and west-facing windows and adding 248 motion sensors to interior lights.

KS Kapalama is estimated to save 664,423 kWh annually, equivalent to $172,750 in energy costs based on $0.26/kWh. KS Hawaii is estimated to save 19,679 kWh annually, equivalent to $6,887 in energy costs based on $0.35/kWh (electric utility rates are slightly higher on Hawaii Island).

- *Honolulu Star-Advertiser* – "Kamehameha Schools Saves on Energy"
- *Green Hawaii Magazine* – "Kamehameha Schools Rewarded for Energy Efficiency"
- *Midweek* – "Kamehameha Schools Goes Green"

Hawaii Energy Offers

Throughout PY14, the Program parlayed each new or updated residential and business offer into a news opportunity. The process involved working closely with operational staff 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 documents addressing the frequently asked questions about these various offers.

The Program's 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.

Hawaii Energy Conservation Award

Hawaii Energy awarded Four Seasons Resort Maui at Wailea's 20-person engineering team with the "Hawaii Energy Conservation Award" for their impressive commitment to reducing energy costs at their facility. The award recognized the team's outstanding leadership, contribution and commitment toward energy conservation and sustainability for the State of Hawaii.

Four Seasons Resort Maui's team was led by its energy-saving visionary and Director of Engineering, Pat Ware. Pat was responsible for overseeing more than $8 million in energy-efficient renovation projects for the 635,976 square-foot property from 2010 through 2014. The resort is expected to save an estimated 3.8 million kWh per year. The electricity savings are estimated to total more than $1 million annually (based on $0.26/kWh) once the remaining projects are completed by 2016.

- MauiNow.com – "Four Seasons Resort Maui's Engineering Team Earns Energy Conservation Award"
- Maui TV News – "Saving Energy At Four Seasons Saves $1,000,000 A Year"
- *Pacific Business News* – "Four Seasons Resort Maui Receives Hawaii Energy Conservation Award"



Pat Ware, former Director of Engineering at the Four Seasons Resort Maui at Wailea, facilitated an extensive amount of energy-efficient upgrades at the resort during his tenure. He and his team were honored with the Hawaii Energy Conservation Award this program year a few weeks before his retirement.

Lighting Distributor Instant Rebates

Hawaii Energy launched a new Lighting Distributor Instant Rebate program to provide businesses, and the contractors who serve them, instant lighting rebates (as much as 75% of costs) at the time of purchase. The program was designed to help contractors and electric utility business customers reduce the working capital required to implement energy-efficient lighting projects. Lighting rebates are applied to the invoice at the time of purchase so customers do not need to complete any rebate forms.

- *Energy Manager Today* – "Businesses Offered 'Instant Rebates' from Utility"
- MauiNow.com – "Hawai'i Energy Offers Lighting Distributor Rebate Program"
- *Pacific Business News* – "Hawaii Energy Offers Instant Rebates for Energy-Efficient Lighting"

Energy Efficiency Auction

Hawaii Energy launched the "Hawaii Energy Efficiency Auction" to find out how innovative and cost-effective the market could be when it came to helping residents and businesses save energy. The Auction was an open call for contractors, developers, energy efficiency solution providers, energy service companies, energy vendors and property managers to submit qualified energy efficiency projects to compete for up to $2.1 million in incentive funds to offset project costs.

Hawaii Energy selected applicants for incentive funds of up to $1.96 million. The four applicants selected (one residential and three commercial) included Honeywell Smart Grid Solutions (Honeywell) (one residential and one commercial project), Matrix Energy Services (Matrix) and Ibis Networks, Inc.

Since the auction was open to companies both in Hawaii and the mainland, the Program distributed a press release through a national newswire service.

Local Coverage

- *Green Magazine* – "Hawaii Energy Selects Energy Auction Participants"
- Hawaii Public Radio's "The Conversation" – radio show
- *Hawaii Herald-Tribune* – "Energy Efficiency Auction Seeks Projects to Fund"
- *Honolulu Star-Advertiser*– "Hawaii Energy to Stage Energy Efficiency Auction"
- *Pacific Business News* – "$2M Energy Efficiency Program Selects Companies to Do The Work"
- *West Hawaii Today* – "Small Businesses, 3 Colleges to Benefit from Energy Efficiency Projects"

Sampling of National Coverage
(NOTE: Same headline as the press release, "Hawaii Energy Offers State's First-Ever Energy Efficiency Auction")

- Boston.com
- *Dallas Morning News*
- *Energy Manager Today*
- Reuters
- *The Sacramento Bee*
- *Sustainable Business News*
- Yahoo! Finance



Efficiency Auction Project Manager John Rei announces the auction on Hawaii Public Radio's "The Conversation" morning radio show.

Home Energy-Saving Kits

Hawaii Energy launched a new offer unlike any in the program's six-year history: free and low-cost home energy-saving kits that gave residential electric customers the opportunity to reduce their annual energy costs by up to $160.

The free kit (valued at $25) included the following: one ENERGY STAR® CFL, one ENERGY STAR LED, one high-efficiency showerhead and one faucet aerator. The advanced kit (valued at $39) was $10 to purchase and included two LEDs and one seven-plug advanced power strip.

- Hawaii News Now's "Sunrise" – Morning TV news show
- *Honolulu Star-Advertiser* – "Electrical Customers Eligible for Energy Kit"
- Maui Time – "How to Get Your Free Hawaii Home Energy Kit"
- MauiNow.com – "Hawai'i Energy Kits Can Save Up to $160 in Annual Energy Costs"
- *West Hawaii Today* – "Free Energy Saving Kits Offered to Big Island Residents"

Window AC Trade-Up

Hawaii Energy launched its "Window AC Trade-Up" offer to help residents purchase a qualified ENERGY STAR® window air conditioner. A $50 rebate was provided for those making the purchase when they surrender an old working unit. Residents could expect to save about 235 kWh or $80 annually based on an average of $0.34/kWh compared to a non-ENERGY STAR model. The Program also provided free pick-up and haul away to ensure the old working ACs were properly recycled. The press release issued secured the following key coverage:

- Green Leaf Blog (Hon. Star-Advertiser) – "Window A/C Rebates"
- *Honolulu Star-Advertiser* (Print & Online) – "Hawaii Energy Offering $50 Rebate"
- KHON's "Wake Up 2Day" (Hawaii Fox Affiliate) – Morning TV news show
- MauiNow.com – "Hawaii Energy Launches Window Air Conditioner $50 Rebate"



Residential and Transformational Program Director Caroline Carl demonstrates what to look for when purchasing a new window air conditioner on KHON2's "Wake Up 2Day" morning show.

Program Positioning

Hawaii Energy proactively pursued stories about the program as a whole to showcase its various offerings, upcoming plans for PY14 and offered practical energy-saving tips for residents. The team secured two stories in Hawaii's largest daily newspaper, the *Honolulu Star-Advertiser*, which included a half-page story in the Sunday edition that has the highest readership of any day in the week.

The half-page story appeared in a weekly column called "Akamai Money" that features Hawaii's business leaders addressing various topics in a question-and-answer format. Caroline Carl, Residential and Transformational program Director, answered various questions about how readers could practice energy conservation and efficiency.

Some of the no- to low-cost tips included replacing incandescent lights with CFLs or LEDs, reducing phantom loads and using an advanced power strip. To save more energy, Caroline talked about the benefits of using less hot water and installing a solar water heating system. She reinforced its annual energy

savings and Hawaii Energy's $1,000 instant rebate. Caroline also talked about refrigerators as the appliance that had the largest impact on a homeowner's electric bill and that a 20-year model may cost as much as $384 annually to operate. She discussed Hawaii Energy's "Refrigerator Trade-Up" program that provided a $100 rebate as well as the "Rid-A-Fridge" program to get rid of a second working refrigerator or freezer.

In November 2014, the Honolulu Star-Advertiser also ran a story previewing the Program's Transformational pilot projects. Joe Simpkins, Director of Technical Services, explained that the PUC asked the Program to expand its initiatives to develop and test different energy-efficiency strategies that would enhance the integration of renewable energy on the electric grid.

The story mentioned that Hawaii Energy planned to work with the electric utility to support energy storage and would provide technical support for the Hawaii Building Code Council's codes and standards as well as integrate demand response capabilities. Also discussed was that the program was working with the utilities on demand response devices to test smart thermostats to be used with air conditioner replacements, smart water heater controls and a demand response component to Hawaii Energy's existing solar water heating incentives. Joe pointed out that managed demand response, EVs, energy storage and other smart-grid capabilities were keys to accelerating the use of clean renewable energy to Hawaii's grid and reducing energy costs.

The *Honolulu Star-Advertiser* story was picked up nationally by *Bloomberg News* and featured on its website that receives an estimated 20.8 million unique visits per month.

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 modified the cadence of its "Negawatt Moment with Hawaii Energy" segments to a bi-weekly format (previously weekly). Each segment ran about 5 to 10 minutes. 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*.

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. It was also an opportunity to meet and stay connected with Hawaii's thought-leaders in the energy industry. The Program conducted media training and developed talking points to prepare staff members for each interview.



Residential Junior Program Specialist Rachel Fukumoto presents the "Negawatt Moment" for the "Hawaii: The State of Clean Energy" online talk show produced by ThinkTech Hawaii.

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.

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 PY14 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 PY14 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.
2014	1	1.00	353.2	0.104
2015	2	0.94	370.6	0.109
2016	3	0.89	382.5	0.112
2017	4	0.84	386.2	0.113
2018	5	0.79	387.7	0.114
2019	6	0.75	389.1	0.114
2020	7	0.70	391.9	0.115
2021	8	0.67	390.7	0.115
2022	9	0.63	394.6	0.116
2023	10	0.59	398.3	0.117
2024	11	0.56	397.4	0.117
2025	12	0.53	401.4	0.118
2026	13	0.50	405.7	0.119
2027	14	0.47	409.3	0.120
2028	15	0.44	415.9	0.122
2029	16	0.42	423.3	0.124
2030	17	0.39	428.9	0.126
2031	18	0.37	433.9	0.128
2032	19	0.35	438.9	0.130
2033	20	0.33	443.9	0.132

Second Avoided Cost Developed

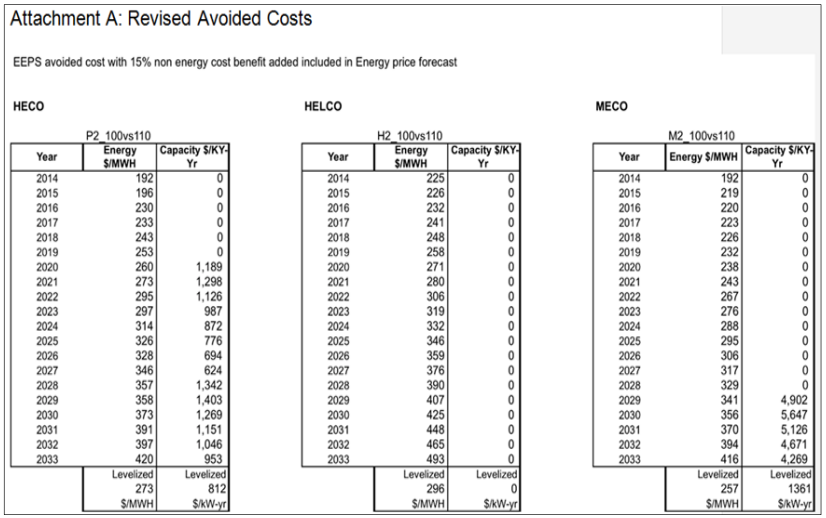
A second avoided cost was calculated based on guidelines to use an initial $0.161/kWh avoided cost figure, for 2015, and escalate it at 3% per year. **Table 77a** is an update to **Table 77**, where for PY14 we repeated the avoided cost predicted for 2015. This figure is a conservative value derived from EEPS filings in the Waiver Docket 2013-0056 shown in **Table 77b**. The capacity avoided cost for the Program takes into account a prorated demand value based on Oahu demand achievements of 76%. No capacity savings was used for Maui County as the out years do not materially impact the NPV TRB, as shown in **Table 77c**.

Table 77a
Utility Avoided Cost Using Modified Current EEPS Figures

			Discount Rate	Factored EEPS	Escalation Rate
			6%	76%	3%
				Utility Avoided Costs*	
Program Year	Year	Period	NPV Multiplier	$/kW/yr.	$/kWh/yr.
PY14	2015	1	1.00		$ 0.161
PY15	2016	2	0.94		$ 0.161
PY16	2017	3	0.89		$ 0.166
PY17	2018	4	0.84		$ 0.171
PY18	2019	5	0.79		$ 0.176
PY19	2020	6	0.75	$ 904	$ 0.181
PY20	2021	7	0.70	$ 986	$ 0.187
PY21	2022	8	0.67	$ 856	$ 0.192
PY22	2023	9	0.63	$ 750	$ 0.198
PY23	2024	10	0.59	$ 663	$ 0.204
PY24	2025	11	0.56	$ 590	$ 0.210
PY25	2026	12	0.53	$ 527	$ 0.216
PY26	2027	13	0.50	$ 474	$ 0.223
PY27	2028	14	0.47	$ 1,020	$ 0.230
PY28	2029	15	0.44	$ 1,066	$ 0.236
PY29	2030	16	0.42	$ 964	$ 0.244
PY30	2031	17	0.39	$ 875	$ 0.251
PY31	2032	18	0.37	$ 795	$ 0.258
PY32	2033	19	0.35	$ 724	$ 0.266
PY33	2034	20	0.33		$ 0.274
PY34	2035	21	0.31		$ 0.282
PY35	2036	22	0.29		$ 0.291
PY36	2037	23	0.28		$ 0.300
PY37	2038	24	0.26		$ 0.308
PY38	2039	25	0.25		$ 0.318

* EEPS (2013-0056) Avoided Capacity Cost factored by 76% to reflect contribution of kW reductions achieved on Oahu in PY13. $161/MWh Avoided Costs per Guidance Recommendations. This is a conservative estimate based on EEPS 2014 Projections of $192, $225 and $192/MWh for HECO, HELCO and MECO respectively.

Table 77b: AVOIDED COSTS ATTACHMENT A FROM WAIVER DOCKET – 2013-0056



Attachment A: Revised Avoided Costs

EEPS avoided cost with 15% non energy cost benefit added included in Energy price forecast

HECO

P2_100vs110

Year	Energy $/MWH	Capacity $/KY-Yr
2014	192	0
2015	196	0
2016	230	0
2017	233	0
2018	243	0
2019	253	0
2020	260	1,189
2021	273	1,298
2022	295	1,126
2023	297	987
2024	314	872
2025	326	776
2026	328	694
2027	346	624
2028	357	1,342
2029	358	1,403
2030	373	1,269
2031	391	1,151
2032	397	1,046
2033	420	953
	Levelized 273 $/MWH	Levelized 812 $/kW-yr

HELCO

H2_100vs110

Year	Energy $/MWH	Capacity $/KY-Yr
2014	225	0
2015	226	0
2016	232	0
2017	241	0
2018	248	0
2019	258	0
2020	271	0
2021	280	0
2022	306	0
2023	319	0
2024	332	0
2025	346	0
2026	359	0
2027	376	0
2028	390	0
2029	407	0
2030	425	0
2031	448	0
2032	465	0
2033	493	0
	Levelized 296 $/MWH	Levelized 0 $/kW-yr

MECO

M2_100vs110

Year	Energy $/MWH	Capacity $/KY-Yr
2014	192	0
2015	219	0
2016	220	0
2017	223	0
2018	226	0
2019	232	0
2020	238	0
2021	243	0
2022	267	0
2023	276	0
2024	288	0
2025	295	0
2026	306	0
2027	317	0
2028	329	0
2029	341	4,902
2030	356	5,647
2031	370	5,126
2032	394	4,671
2033	416	4,269
	Levelized 257 $/MWH	Levelized 1361 $/kW-yr

Table 77c: CALCULATION OF OAHU PRO-RATED CAPACITY AVOIDED COST

PY13 System Level Demand Impacts - kW		
Oahu	16,481	76.4%
Hawaii	2,469	11.5%
Maui	2,597	12.0%
Molokai	8	0.0%
Lanai	8	0.0%
Total	21,563	100.0%

CONCLUSION

As we conclude this PY14 Annual Report, the Hawaii Energy team would again 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 six years. We especially appreciate the confidence you have placed in us by extending our contract for a third additional year (through 2016). This will allow us to make an even stronger contribution to Hawaii's clean energy efforts during this time of unprecedented energy transformation.

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 energy efficiency as Hawaii's No. 1 most valuable grid resource. 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 final program year under the original PBFA contract, 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. And we will be passionately seeking to continue our service to Hawaii under the new PBFA contract solicitation expected later this year.



ATTACHMENTS

Attachment A: Acronym List

A list of the commonly used Hawaii Energy acronyms

Attachment B: PY14 Program Participation List

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

Attachment C: PY14 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: PY14 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: PY14 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: PY14 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 - 2013)

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 (PY2014)

Revised: September 16, 2015

ACRONYM	ACRONYM EXTENSION
AC	Air Conditioner
AEE	Association of Energy Engineers
AHU	Air Handler Unit
AOAO	Associations of Apartment Owners AOAO
APS	Advanced Power Strips
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
BBLS	Barrels
BEEM	Business Energy Efficiency Measures
BESM	Business Energy Services & Maintenance
BHTR	Business Hard to Reach
BOC	Building Operator Certification
C&I	Commercial and Industrial
CBEEM	Custom Business Energy Efficiency Measures
CBSM	Community-Based Social Marketing
CDD	Cooling Degree Day
CEA	Clean Energy Ally
CEE	Consortium for Energy Efficiency
CEM	Certified Energy Manager
CESH	Custom Energy Solutions for the Home
CEUS	Commercial End-Use Survey
CFL	Compact Fluorescent Lamps
CSE	Cost of Saved Energy
DEER	Database for Energy Efficient Resources
DOT	Department of Transportation
DR	Demand Response
DSM	Demand Side Management
DWS	Department of Water Supply
E$4H	Energy Smart 4 Homes
ECM	Electrically Commutated Motor
EE	Energy Efficiency
EEFG	Energy Efficiency Funding Group
EEPS	Energy Efficiency Portfolio Standard
EM&V	Evaluation Measurement & Verification

ACRONYM	ACRONYM EXTENSION
EMIT	Energy Manager in Training
EMS	Energy Management System
ERWH	Electric Resistance Water Heater
EUI	Energy Use Intensity
EV	Electric Vehicle
GDP	Gross Domestic Product
GWh	Gigawatt Hour
HAN	Home Area Network
HCCA	Hawaii Council of Community Associations
HCEI	Hawaii Clean Energy Initiative
HCEOC	Hawaii County Economic Opportunity Council
HECO	Hawaiian Electric Company
HEI	Hawaiian Electric Industries
HELCO	Hawaii Electric Light Company
HER	Home Energy Report
HEWH	High Efficiency Water Heating
HPU	Hawaii Pacific University
HPWH	Heat Pump Water Heater
HRWA	Hawaii Rural Water Association
HVAC	Heating Ventilation and Air Conditioning
IECC	International Energy Conservation Code
IFMA	International Facility Management Association
IHD	In-Home-Display
IRP	Integrated Research Plan
IRR	Individual Rate of Return
IT	Information Technology
KCC	Kapiolani Community College
KEMA	KEMA Laboratory
KIUC	Kauai Island Utilities Cooperative
kW	Kilowatt
kWh	Kilowatt Hour
LED	Light Emitting Diode
M	Million
MECO	Maui Electric Company
MMBTU	One Million British Thermal Unit
MWh	Megawatt Hour
NEED	National Energy Education Development Project
NPV	Net Present Value
NREL	National Renewable Energy Laboratory

ACRONYM	ACRONYM EXTENSION
NTG	Net-to-gross
OBF	On-Bill Financing
PBF	Public Benefits Fee
PBFA	Public Benefits Fee Administrator
PI	Performance Incentive
POP	Point of Purchase
PUC	Public Utilities Commission
PV	Photovoltaic (PV)
RCAC	Rural Community Assistance Corporation
REEM	Residential Energy Efficiency Measures
RESM	Residential Energy Services & Maintenance
RFP	Request For Proposal
RHTR	Residential Hard to Reach
RISE	Rewarding Internships for Sustainable Employment
SAIC	Science Applications International Corporation
SBCC	State Buildings Codes Council
SBDIL	Small Business Direct Install Lighting
SEER	Seasonal Energy Efficiency Ratio
SEM	Strategic Energy Management
SHGC	Solar Heat Gain Coefficient
SLIM	Sustainable Living Institute of Maui
SSC	Smart Sustainability Consulting
SWH	Solar Water Heating
TAB	Teacher Advisory Board
TAG	Technical Advisory Group
TOU	Time-of-Use
TRB	Total Resource Benefit
TRC	Total Resource Cost Ratio
TRM	Technical Reference Manual
UH	University of Hawaii at Manoa
UHMOC	University of Hawaii - Maui College
UHWO	University of Hawaii - West Oahu
VFD	Variable Frequency Drive
VRF	Variable Refrigerant Flow
VSD	Variable Speed Drive
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 ($/kWh-Life)**	**Program TRB**	**TRC**	**Average Customer Level kW/Unit**	**Average Customer Level kWh/Unit**
BEEM	**88,452**	**4,977**	**27,427,671**	**4,148**	**22,870,466**	**13.7**	**$ 0.011**	**$ 37,595,233**	**$ 20,464,580**	**0.056**	**310.1**
LED Lighting	38,778	654	4,679,304	543	3,882,675	14.9	$ 0.005	$ 6,501,848	$ 1,606,260	0.017	120.7
Chillers	38	529	3,441,014	441	2,864,045	20.0	$ 0.008	$ 5,981,784	$ 9,809,820	13.929	90,553.0
T12 to T8 Low Wattage	23,181	535	3,382,537	445	2,808,289	14.0	$ 0.010	$ 4,557,122	$ 1,390,860	0.023	145.9
VFD - AHU	182	878	2,159,955	732	1,800,345	15.0	$ 0.005	$ 4,877,760	$ 847,737	4.826	11,867.9
VFD - Chilled Water / Condenser Water	53	599	2,207,102	498	1,834,631	13.2	$ 0.008	$ 2,983,869	$ 831,300	11.302	41,643.4
Variable Refrigerant Flow Air Conditioners	585	166	1,459,825	138	1,212,093	15.0	$ 0.032	$ 1,917,482	$ 1,887,564	0.284	2,495.4
Package Units - 15% Better Than Code	278	220	1,191,880	182	986,351	15.0	$ 0.027	$ 1,831,483	$ 1,422,876	0.790	4,287.3
ECM	2,524	79	699,102	65	580,126	15.0	$ 0.017	$ 915,592	$ 528,216	0.031	277.0
Delamping with Reflectors	2,719	87	673,242	73	560,552	14.0	$ 0.005	$ 881,249	$ 78,220	0.032	247.6
Water Cooler Timers	8,760	158	1,773,900	131	1,475,187	5.0	$ 0.018	$ 899,424	$ 131,400	0.018	202.5
Window Tinting	28	197	741,737	163	614,714	10.0	$ 0.021	$ 989,116	$ 112	7.028	26,490.6
Submetering (Condo)	994	89	648,376	86	626,454	8.0	$ 0.030	$ 649,450	$ 497,000	0.090	652.3
Transformer	251	28	244,964	23	203,198	24.6	$ 0.012	$ 387,262	$ 0	0.112	976.0
LED Exit Signs	1,097	38	336,779	32	280,519	15.0	$ 0.007	$ 441,060	$ 32,910	0.035	307.0
Solar Water Heating	5	23	324,792	19	269,965	15.0	$ 0.018	$ 381,955	$ 33,000	4.575	64,958.3
Heat Pump	29	15	472,254	12	392,149	10.0	$ 0.011	$ 369,891	$ 0	0.518	16,284.6
Kitchen Ventilation	8	53	310,694	43	254,466	15.0	$ 0.022	$ 458,638	$ 212,400	6.638	38,836.8
Domestic Water Booster Packages	9	31	296,752	26	247,424	15.0	$ 0.009	$ 383,986	$ 253,000	3.489	32,972.4
Low Flow Spray Rinse Nozzles	381	392	860,493	326	715,864	5.0	$ 0.000	$ 844,353	$ 9,525	1.030	2,258.5
Room Occupancy Sensors & Timers	1,305	44	394,710	36	325,838	5.6	$ 0.014	$ 318,079	$ 26,100	0.034	302.5
Refrigerator (with Recycling of Old)	169	6	138,918	5	115,420	14.0	$ 0.012	$ 143,652	$ 202,800	0.034	822.0
Delamping	746	16	102,044	13	85,082	14.0	$ 0.003	$ 138,100	$ 6,504	0.021	136.8
Metal Halide	471	13	96,084	11	79,647	14.0	$ 0.011	$ 127,826	$ 137,532	0.028	204.0
LED Refrigerated Case Lighting	1,033	37	230,979	31	191,122	5.0	$ 0.065	$ 137,951	$ 250,140	0.036	223.6
CFL	1,928	33	228,152	28	188,479	3.2	$ 0.009	$ 87,079	$ 3,387	0.017	118.3
Clothes Washer	284	8	58,504	7	48,682	12.0	$ 0.024	$ 69,442	$ 156,200	0.028	206.0
T8 to T8 Low Wattage	300	8	36,177	7	30,163	15.0	$ 0.011	$ 61,380	$ 18,000	0.028	120.6
VFD Pool Pumps	13	3	33,797	2	27,869	14.7	$ 0.017	$ 38,616	$ 2,250	0.199	2,599.7

T12 to T8 Standard (2 foot lamps)	335	4	34,917	4	28,990	14.0	$ 0.010	$ 44,833	$ 10,050	0.013	104.2
Refrigerator - Bounty	31	1	26,629	1	21,948	14.0	$ 0.006	$ 27,169	$ 1,850	0.034	859.0
Cool Roof Technologies	5	12	29,428	10	24,536	10.0	$ 0.096	$ 48,956	$ 0	2.354	5,885.6
Smartstrip	364	4	35,922	3	29,951	5.0	$ 0.056	$ 19,656	$ 8,325	0.011	98.7
Ceiling Fans	207	4	34,569	3	28,605	5.0	$ 0.051	$ 18,633	$ 0	0.019	167.0
ENERGY STAR LED Dimmable w/Controls	43	1	8,871	1	7,396	12.0	$ 0.005	$ 10,052	$ 2,580	0.024	206.3
Bi-Level Lighting	1	1	8,891	1	7,413	10.0	$ 0.034	$ 8,246	$ 19,368	0.810	8,891.0
CEE Tier 1+ Motors	4	3	4,176	2	3,482	15.0	$ 0.017	$ 12,156	$ 16,380	0.637	1,044.0
Window AC	13	2	4,849	2	4,036	12.0	$ 0.013	$ 10,707	$ 5,850	0.190	373.0
Whole House Fan	2	1	2,006	1	1,673	20.0	$ 0.004	$ 6,166	$ 240	0.500	1,003.0
Freezer - Bounty	3	0	2,577	0	2,135	14.0	$ 0.006	$ 2,643	$ 165	0.034	859.0
Aerator	617	2	4,448	1	3,709	5.0	$ 0.220	$ 3,822	$ 4,077	0.003	7.2
T12 to T8 Standard (3 foot lamps)	22	0	1,536	0	1,277	14.0	$ 0.010	$ 2,076	$ 660	0.010	69.8
Refrigerator (Purchase New Only)	11	0	1,155	0	957	14.0	$ 0.041	$ 1,617	$ 8,800	0.017	105.0
Ice Machine (add size range)	1	0	1,117	0	921	12.0	$ 0.009	$ 1,249	$ 5,277	0.128	1,117.0
Solar Attic Fan	3	0	1,620	0	1,342	5.0	$ 0.022	$ 711	$ 0	0.020	540.0
Showerhead	303	1	893	0	744	5.0	$ 1.570	$ 1,092	$ 5,846	0.002	2.9
Recycler App - Freezer	3	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Recycler App - Accounting	0	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Accounting	291	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Recycler App - Refrigerator	31	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Recycler App - Window AC	13	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
CBEEM	**60,199**	**4,184**	**30,491,162**	**3,481**	**25,366,309**	**11.6**	**$ 0.019**	**$ 33,797,316**	**$ 32,253,971**	**0.069**	**506.5**
LED Lighting	345	2,261	17,042,049	1,880	14,178,531	9.9	$ 0.019	$ 16,476,092	$ 15,108,277	6.552	49,397.2
EMS Controls	1,390	580	4,672,129	482	3,883,525	14.8	$ 0.012	$ 6,113,365	$ 5,752,024	0.417	3,361.2
Custom HVAC	639	593	2,567,791	494	2,140,960	15.0	$ 0.017	$ 4,352,613	$ 7,123,483	0.928	4,018.5
Chillers	2	141	717,053	117	596,385	16.1	$ 0.015	$ 1,209,238	$ 0	70.650	358,526.5
Building Envelope	1	48	374,733	40	312,443	30.0	$ 0.009	$ 705,510	$ 255,362	48.100	374,733.0
Custom EMS Controls	11	42	974,170	35	806,282	9.9	$ 0.040	$ 820,992	$ 1,960,281	3.791	88,560.9
Custom Controls	66	86	892,229	72	742,826	8.8	$ 0.018	$ 763,181	$ 467,358	1.308	13,518.6
Refrigeration	13	10	699,545	8	582,355	11.3	$ 0.020	$ 549,245	$ 0	0.792	53,811.1
Custom	5	67	478,632	56	398,821	13.7	$ 0.015	$ 623,326	$ 386,460	13.450	95,726.4
Data Centers	2	50	436,686	42	364,098	12.0	$ 0.019	$ 495,988	$ 290,589	24.950	218,343.0
Commercial Lighting	57,068	180	599,248	150	497,822	6.4	$ 0.006	$ 573,914	$ 0	0.003	10.5

Custom Lighting	6	24	229,061	20	190,823	13.5	$ 0.014	$ 274,925	$ 0	4.042	38,176.8
Custom VFD for Cooling Tower	4	33	223,177	27	186,079	13.2	$ 0.020	$ 293,399	$ 726,265	8.213	55,794.3
Bi-Level Lighting	3	21	208,432	17	173,785	12.2	$ 0.016	$ 226,474	$ 158,872	6.990	69,477.3
VFD Pump (Non-HVAC)	5	26	195,453	21	160,846	10.0	$ 0.026	$ 197,524	$ 0	5.139	39,090.6
Water Heating	634	21	165,718	18	138,172	5.5	$ 0.122	$ 102,987	$ 0	0.033	261.4
On Demand Ventilation Control - AC	1	1	15,057	1	12,554	15.0	$ 0.010	$ 18,543	$ 25,000	1.300	15,057.0
Accounting	4	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
BESM	**69**	**0**	**232,760**	**0**	**241,023**	**5.0**	**$ 0.736**	**$ 113,582**	**$ 593,051**	**0.000**	**3,373.3**
Water Pumping	1	0	232,760	0	241,023	5.0	$ 0.112	$ 113,582	$ 334,741	0.000	232,760.0
Accounting	2	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Central Plant Benchmarking	4	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Custom Controls	26	0	0	0	0	0.0	$ 0.000	$ 0	$ 228,310	0.000	0.0
Energy Study	33	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Custom	3	0	0	0	0	0.0	$ 0.000	$ 0	$ 30,000	0.000	0.0
BHTR	**33,455**	**717**	**5,599,183**	**785**	**6,133,556**	**14.0**	**$ 0.026**	**$ 9,580,169**	**$ 2,063,528**	**0.021**	**167.4**
T12 to T8 Low Wattage	15,832	427	3,084,603	468	3,385,075	14.0	$ 0.028	$ 5,414,212	$ 1,338,688	0.027	194.8
LED Lighting	11,034	232	1,702,978	253	1,863,121	14.0	$ 0.020	$ 2,964,686	$ 510,340	0.021	154.3
Custom Lighting	2,436	30	568,318	33	618,551	14.0	$ 0.016	$ 795,291	$ 79,772	0.012	233.3
T12 to T8 Standard (2 foot lamps)	829	12	136,240	13	149,666	14.0	$ 0.036	$ 211,536	$ 74,633	0.014	164.3
CFL	424	11	76,052	13	83,098	14.0	$ 0.005	$ 136,673	$ 5,603	0.027	179.4
LED Refrigerated Case Lighting	149	4	21,155	5	23,283	14.0	$ 0.131	$ 42,075	$ 42,541	0.028	142.0
LED Exit Signs	34	1	8,544	1	9,341	14.0	$ 0.007	$ 13,767	$ 894	0.026	251.3
Reach-In Refrigerator Solid Door	3	0	1,293	0	1,423	12.0	$ 0.050	$ 1,929	$ 0	0.049	430.9
Accounting	523	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Installation Cost - Ladders	2,191	0	0	0	0	0.0	$ 0.000	$ 0	$ 11,058	0.000	0.0
REEM	**3,363,239**	**11,297**	**69,486,595**	**9,874**	**60,733,249**	**8.0**	**$ 0.019**	**$ 62,520,295**	**$ 20,488,909**	**0.003**	**20.7**
CFL	1,328,146	5,313	40,906,897	4,645	35,766,428	6.0	$ 0.008	$ 28,454,247	$ 2,656,292	0.004	30.8
LED Lighting	527,905	1,584	10,505,310	1,382	9,170,478	15.0	$ 0.020	$ 15,820,407	$ 7,918,575	0.003	19.9
Solar Water Heating	1,689	777	3,487,785	679	3,048,441	15.0	$ 0.037	$ 6,103,191	$ 0	0.460	2,065.0
Refrigerator (with Recycling of Old)	3,482	118	2,862,204	104	2,503,345	14.0	$ 0.011	$ 3,114,549	$ 4,178,400	0.034	822.0
Variable Refrigerant Flow Air Conditioners	1,636	481	962,572	422	844,897	15.0	$ 0.023	$ 2,592,225	$ 1,165,985	0.294	588.4
Clothes Washer	3,816	107	786,096	93	687,720	12.0	$ 0.023	$ 980,685	$ 2,098,800	0.028	206.0
Refrigerator - Bounty	755	26	648,545	22	565,682	14.0	$ 0.005	$ 700,408	$ 42,355	0.034	859.0

Whole House Fan	399	200	400,197	175	351,384	20.0	$ 0.004	$ 1,295,220	$ 47,880	0.500	1,003.0
Home Energy Saving Kits- Online Fullfillment	4,953	277	658,897	242	574,934	7.3	$ 0.031	$ 785,128	$ 128,348	0.056	133.0
Heat Pump	185	39	278,055	34	243,108	10.0	$ 0.015	$ 304,228	$ 0	0.210	1,503.0
Ceiling Fans	2,901	55	484,467	48	423,334	5.0	$ 0.048	$ 276,310	$ 0	0.019	167.0
Water Cooler Timers	6,296	0	321,096	0	281,310	5.0	$ 0.067	$ 137,299	$ 94,440	0.000	51.0
Freezer - Bounty	109	4	93,631	3	81,682	14.0	$ 0.005	$ 101,136	$ 6,095	0.034	859.0
Window AC	282	54	105,186	47	92,284	12.0	$ 0.013	$ 244,794	$ 126,900	0.190	373.0
VFD Pool Pumps	209	1	124,773	1	109,178	10.0	$ 0.029	$ 96,204	$ 156,750	0.006	597.0
Solar Attic Fan	265	5	143,100	5	125,421	5.0	$ 0.021	$ 66,381	$ 39,750	0.020	540.0
Advance Power Strips	1,206	11	94,068	9	82,189	5.0	$ 0.000	$ 53,892	$ 20,502	0.009	78.0
Refrigerator (Purchase New Only)	269	5	28,245	4	24,720	14.0	$ 0.039	$ 41,811	$ 215,200	0.017	105.0
Solar Water Heating Tune-up	1	0	249	0	304	5.0	$ 0.099	$ 200	$ 0	0.029	249.0
Custom Water Heater	7	0	0	0	0	0.0	$ 0.000	$ 0	$ 3,500	0.000	0.0
Recycler App - Accounting	0	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Accounting	1,299	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Peer Group Comparison - Phase 1/2/3	1,476,265	2,242	6,595,222	1,957	5,756,406	0.0	$ 0.000	$ 1,351,980	$ 1,507,538	0.002	4.5
Recycler App - Refrigerator	750	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
Recycler App - Window AC	303	0	0	0	0	0.0	$ 0.000	$ 0	$ 0	0.000	0.0
CESH	**1**	**0**	**0**	**0**	**0**	**0.0**	**$ 0.000**	**$ 0**	**$ 1,319**	**0.000**	**0.0**
Efficiency Project Auction	1	0	0	0	0	0.0	$ 0.000	$ 0	$ 1,319	0.000	0.0
RESM	**1,775**	**49**	**619,117**	**47**	**608,416**	**8.3**	**$ 0.060**	**$ 496,973**	**$ 46,800**	**0.028**	**348.8**
Efficiency Inside Home Design	78	0	196,564	0	201,039	15.0	$ 0.016	$ 230,167	$ 46,800	0.000	2,520.1
Solar Water Heating Tune-up	1,697	49	422,553	47	407,377	5.0	$ 0.125	$ 266,806	$ 0	0.029	249.0
RHTR	**21,200**	**194**	**739,754**	**159**	**606,361**	**7.3**	**$ 0.150**	**$ 699,700**	**$ 100,209**	**0.009**	**34.9**
Solar Water Heating	70	32	144,550	27	123,387	15.0	$ 0.313	$ 247,031	$ 0	0.460	2,065.0
CFL Exchange	5,084	25	184,549	21	149,583	6.0	$ 0.000	$ 121,140	$ 14,549	0.005	36.3
CFL	4,902	27	186,089	22	151,124	5.0	$ 0.026	$ 105,209	$ 19,682	0.005	38.0
Showerhead	868	76	95,128	62	77,200	5.0	$ 0.041	$ 133,047	$ 15,827	0.088	109.6
Smartstrip	875	10	86,352	8	70,100	5.0	$ 0.057	$ 45,520	$ 20,011	0.011	98.7
Aerator	1,835	24	43,086	19	34,966	5.0	$ 0.069	$ 47,753	$ 12,122	0.013	23.5
Accounting	7,566	0	0	0	0	0.0	$ 0.000	$ 0	$ 18,018	0.000	0.0
Program / Measure	**Units**	**Customer Level Demand (kW)**	**Customer Level Energy (kWh)**	**Program Level Demand**	**Program Level Energy (kWh)**	**Average Useful Life (Years)**	**Lifetime Resource Acquisition Cost ($/kWh-**	**Program TRB**	**TRC**	**Average Customer Level kW/Unit**	**Average Customer Level kWh/Uni**

				(kW)			Life)				t
BEEM	88,452	4,977	27,427,671	4,148	22,870,466	13.7	$ 0.011	$ 37,595,233	$ 20,464,580	0.056	310.1
CBEEM	60,199	4,184	30,491,162	3,481	25,366,309	11.6	$ 0.019	$ 33,797,316	$ 32,253,971	0.069	506.5
BESM	69	0	232,760	0	241,023	5.0	$ 0.736	$ 113,582	$ 593,051	0.000	3,373.3
BHTR	33,455	717	5,599,183	785	6,133,556	14.0	$ 0.026	$ 9,580,169	$ 2,063,528	0.021	167.4
REEM	3,363,239	11,297	69,486,595	9,874	60,733,249	8.0	$ 0.019	$ 62,520,295	$ 20,488,909	0.003	20.7
CESH	1	0	0	0	0	0.0	$ 0.000	$ 0	$ 1,319	0.000	0.0
RESM	1,775	49	619,117	47	608,416	8.3	$ 0.060	$ 496,973	$ 46,800	0.028	348.8
RHTR	21,200	194	739,754	159	606,361	7.3	$ 0.150	$ 699,700	$ 100,209	0.009	34.9
Grand Total	**3,568,390**	**21,418**	**134,596,241**	**18,494**	**116,559,380**	**10.2**	**$ 0.019**	**$ 144,803,268**	**$ 76,012,367**	**0.006**	**37.7**

June 30, 2014

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

HAWAII ENERGY EFFICIENCY PROGRAM

Renewal Proposal for Accelerating Hawaii's Clean Energy Transformation in PY2014

Leidos Engineering, LLC ("Leidos" or "Contractor") is pleased to present our Renewal Proposal for the period July 1, 2014 – June 30, 2015 ("Contract Renewal" or "Supplemental Contract"), reflecting requirements and direction received from the Public Utilities Commission:

1. PY2014 PROPOSAL HIGHLIGHTS: Key features of this Contract Renewal Proposal include:

a. Efficiency Program scope expansion to facilitate acceleration of Hawaii's transformation to more efficient, clean-energy-tolerant and customer-accommodating electric grids;

b. Aggressive energy savings goals of 134,816,230 kWh, exceeding the highest level of achieved annual savings to date and providing participants with $526M in savings over life of measures;

c. $0.03 per kWh average lifetime Program costs to achieve the above savings;

d. 72% of the total program budget devoted to direct customer incentives and offerings, above our contractual requirement of 70%;

e. $39.7M PY14 budget, representing an 18% increase from PY13 (including Transformational program targeted increases). This budget is below the PBF 1.5% collection value of $42.6M;

f. Increased support of codes and standards to help the State reach its EEPS goals faster;

g. Increased customer incentives averaging $0.294/kWh for first-year savings (up from $0.273/kWh in PY12 actual) to ensure energy efficiency is driven deeper into Hawaii's infrastructure;

h. Collaborative engagement with utilities and others to identify and integrate Energy Efficiency and more robust DR capabilities, including support for energy storage, Electric Vehicle (EV) charging infrastructure and effective TOU rates;

i. Progressive expansion of transformational offerings to lead markets and promote general awareness that will yield savings in future program years;

j. Increased use of customer-friendly web-based services and tools to improve customer experience and increase access to, as well as participation in the programs;

k. $2M in incentives for efficiency auctions aimed at both residential and business sectors to encourage innovative third-party offerings at or below the program average cost per kWh;

l. Geographically targeted offerings to respond to unique customer or locational needs, including: Central AC Retrofit program for Ewa Plain and Kihei-targeted initiatives to avoid new T-lines; and

m. Voluntary limit of Leidos employee bill rates to no more than $190/hour through Dec. 31, 2016 as an added value enhancement to the Contract.

2. CONTRACT HISTORY

Pursuant to a competitive bidding process, the original 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 (now Leidos) assumed the new statutory role of Public Benefits Fee Administrator ("PBFA") for the state under the direct supervision and control of the Hawaii Public Utilities Commission ("PUC" or "Commission") and the Contract Manager, James Flanagan Associates ("JFA"). The term of the Program Contract originally ran until December 31, 2013, but last year was extended until December 31, 2015 with the possibility of an additional no-bid extension until December 31, 2016 at the discretion of the Commission.

In its capacity as PBFA, Leidos (formerly SAIC) 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 Leidos as PBFA, the efficiency and DSM programs are now operated as *Hawaii Energy Conservation and Efficiency Program* ("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 PY2014. The detailed Annual Plan for PY2014, which is derived from parameters established in this Renewal Proposal, will be published no later than June 30, 2014 after approval by the PUC.

This Renewal Proposal does not include the budget or terms of an additional Scope of Work for the development and administration of the Bill $aver Program (On-Bill Financing or OBF) that is being negotiated separately from the Efficiency Program Contract.

3. SUMMARY BUDGET AND BUDGET BREAKOUT NUMBERS

Table 1 below shows a summary of the Program Budget and budget breakout numbers for PY2014 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 PY2014.

The PY14 program budget of $39.7M represents an 18% increase from PY13 (including increases targeted to the Transformational program). This budget is well below the 1.5% collection value of $42.6M estimated by HECO. The overall portfolio will provide energy savings at a lifetime cost of $0.03/kWh, including delivery.

Table 1: Summary Budget

PBFA Contract Renewal Guidelines for Year 6	
Program Year	2014
Period of Performance	7/1/14 to 6/30/15
PBFA Budget Allocation	$ 39,666,917

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
General Administrative and IT Costs	$ 2,405,683	6.1%	94.8%
Performance Award in Excess of Target*	$ 133,000	0.3%	5.2%
Total PBFA Administrative Costs	$ 2,538,683	6.4%	100.0%

Budget Item / Category		Total	Allocation Targets: Direct Incentives	Allocation Targets: Direct Implementation Cost
Residential Program Cost Split	45%	$ 16,707,705	$ 12,808,989	$ 3,898,716
Business Program Cost Split	55%	$ 20,420,529	$ 15,655,431	$ 4,765,098
Total Direct Program Costs		$ 37,128,234	$ 28,464,420	$ 8,663,814
Residential GA & IT Split	45%	$ 1,082,557		$ 1,082,557
Business GA & IT Split	55%	$ 1,323,126		$ 1,323,126
General Administrative and IT Costs		$ 2,405,683	$ -	$ 2,405,683
Total Direct Program Costs		$ 37,128,234	$ 28,464,420	$ 8,663,814
General Administrative and IT Costs		$ 2,405,683	$ -	$ 2,405,683
Total Incentives and Operations		$ 39,533,917	$ 28,464,420	$ 11,069,497
		100%	72.0%	28.0%

Budget Item / Category		Direct Incentives	Res + Bus EE Incentives
Residential Direct Incentives	38.86%	$ 11,061,475	86.4%
Business Direct Incentives	47.50%	$ 13,519,581	$ 24,581,056
			Res + Bus Trans Incentives
Residential Transformational Incentives	6.14%	$ 1,747,514	13.6%
Business Transformational Incentives	7.50%	$ 2,135,850	$ 3,883,364
Total Program Direct Incentives	100.00%	$ 28,464,420	

Proposed Incentives and Operations Breakouts

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
Residential Incentives	$ 11,061,475	27.9%	38.9%
Business Incentives	$ 13,519,581	34.1%	47.5%
Transformation Incentives	$ 3,883,364	9.8%	13.6%
Total Incentives	$ 28,464,420	71.8%	100.0%
Administration / IT	$ 2,405,683	6.1%	21.7%
Direct Program Implementation Costs	$ 8,663,814	21.8%	78.3%
Total Operations	$ 11,069,497	27.9%	100%
Total Incentives	$ 28,464,420	71.8%	72.0%
Total Operations	$ 11,069,497	27.9%	28.0%
Total Incentives and Operations	$ 39,533,917	99.7%	100%
Total Incentives and Operations	$ 39,533,917	99.7%	99.7%
Total Award in Excess of Target*	$ 133,000	0.3%	0.3%
Total Budget	$ 39,666,917	100.0%	100.0%

* = This Incentive Award budget amount is not earned until performance is achieved.
These highlighted figures are key program metric percentages

4. SUMMARY IMPACT RESULTS EXPECTED FROM THIS RENEWAL PROPOSAL

Table 2 below shows a summary of savings impacts for PY2014 based on the proposed budget presented in Table 1. The detailed Program Budget and Impacts for July 1, 2014 – June 30, 2015 will be included in the Annual Plan for PY2014 to be published by June 30, 2014.

Table 2: Cost Effectiveness and Benefit Targets

Hawaii Energy - PY2014 ANNUAL PLAN - PROGRAM COST EFFECTIVENESS TARGETS

PBFA Contract Renewal Guidelines			
Total Program Direct Incentives		$ 24,581,056	
First Year Energy Reduction		134,816,230	kWh - Program Level
Peak Demand Reduction		17,250	kW on Peak 5 to 9 p.m. Weekdays
Total Resource Benefit		$ 160,739,919	NPV of Utility Cost Avoidance

Derived Top Down Cost Effectiveness Metrics			
Total Program Direct Incentives		$ 24,581,056	
First Year Energy Reduction	÷	134,816,230	
Measure Cost Effectiveness - First Year		$ 0.182	per kWh - Program Level
First Year Energy Reduction		134,816,230	
Average Measure Life	x	9.9	years
Lifetime Energy Savings		1,334,111,790	kWh - Program Level
Total Program Direct Incentives		$ 24,581,056	
Lifetime Energy Savings	÷	1,334,111,790	
Measure Cost - Lifetime		$ 0.018	per kWh - Program Level
Total Program Direct Incentives		$ 24,581,056	
Avg. Incentive % of Incremental Cost	÷	33%	
TRC - Total Resource Cost		$ 74,488,048	
TRB - Total Resource Benefit		$ 160,739,919	
TRC - Total Resource Cost	÷	$ 74,488,048	
Cost Effectiveness - TRB/TRC		2.2	
First Year Energy Reduction		134,816,230	kWh - Program Level
Estimated Average Net-to-Gross	÷	0.81	
First Year Energy Reduction		167,107,353	kWh First Year - Customer Level
HCEI 2030 Energy Reduction Goal	÷	4,300,000,000	kWh/year
% Achievement towards HCEI 2030 Goal		3.9%	
First Year Energy Reduction		167,107,353	kWh First Year - Customer Level
Average Energy Cost	x	$ 0.32	per kWh
Participant Customer Energy Cost Savings		$ 53,474,353	per year
Average Measure Life	x	9.9	
Participant Customer Energy Cost Savings		$ 526,754,085	over lifetime of Equipment

County Distribution Targets

PBFA Contribution by County for PY2012

Hawaii	Maui	Honolulu	Total
13.0%	13.0%	74.0%	100.0%

Program Level Targets by County

Hawaii	Maui	Honolulu	Total	
$ 3,195,537	$ 3,195,537	$ 18,189,981	$ 24,581,056	Incentives
12,133,461	13,481,623	109,201,146	134,816,230	kWh First Year - PL
$ 0.263	$ 0.237	$ 0.167	$ 0.182	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%

Defining Levelized Cost of Saved Energy — PY14 Plan

$$Levelized\ CSE\left(in\ \frac{\$}{unit}\ energy, e.g., kWh, therm, Btu\right) = \frac{C\ x\ (Capital\ Recovery\ Factor)}{D}$$

$$Capital\ Recovery\ Factor = [A*(1+A)^{\wedge}B]/[(1+A)^{\wedge}B - 1]$$

Where:

A = Discount rate (LBNL uses 6% in this analysis)

B = Estimated program savings life in years

C = Total program cost in 2012$ dollars

D =Annual kWh saved that year by the energy efficiency program

A		6%
B		9.9
C		$ 39,666,917
D		134,816,230
		0.107
	÷	0.780
Capital Recovery Factor		0.137
C		$ 39,666,917
Capital Recovery Factor	x	0.137
D	÷	134,816,230
Utility Levelized Cost of Saved Energy (CSE)		$ 0.040

LBNL March 2014 – CSE Report - http://emp.lbl.gov/sites/all/files/lbnl-6595e.pdf

5. PROPOSED PY2014 PERFORMANCE GOALS AND INCENTIVES

The chart below shows Leidos' Proposed Performance Goals and Incentives for PY2014 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 and $133,000 award in excess of target as provided for in the original 2009 Program Contract.

Table 3: PY2014 PERFORMANCE GOALS AND INCENTIVES

PY2014 Hawaii Energy - Performance Goals and Performance Incentives

Performance Target Item	*Performance Goals*				*Award Fraction*		*Program Incentive Award*		
Resource Acquisition	***Minimum***	***Target***	***Maximum***				***Minimum***	***Target***	***Maximum***
	75%	*100%*	110%				75%	*100%*	123.8%
First Year Energy Reduction	101,112,172	134,816,230	148,297,852	kWh	35%		$ 183,750	$ 245,000	$ 303,188
Peak Demand Reduction	12,937	17,250	18,975	kW	5%		$ 26,250	$ 35,000	$ 43,313
Total Resource Benefit	$ 120,554,939	$ 160,739,919	$ 176,813,911	$	40%		$ 210,000	$ 280,000	$ 346,500

Island Incentive Equity	***Minimum***	***Target***	***Maximum***	***Contribution***			***Minimum***	***Target***	***Maximum***
	80%	100%							
County of Hawaii	$ 2,556,430	$ 3,195,537	n/a	13.0%					
C&C Honolulu	$ 14,551,985	$ 18,189,981	n/a	74.0%	10%	All Counties met	n/a	$ 70,000	$ 70,000
County of Maui	$ 2,556,430	$ 3,195,537	n/a	13.0%					
Total		$ 24,581,056		100.0%					

Market Transformation	***Minimum***	***Target***	***Potential Actions***			***Minimum***	***Target***	***Maximum***
	70%	100%				75%	*100%*	
Behavior Modification	12,600	18,000	Participants	2%		$ 11,250	$ 15,000	$ 15,000
Professional Development	700	1,000	Participants	2%		$ 11,250	$ 15,000	$ 15,000
Technical "Know How"	175	250	Participants	2%		$ 11,250	$ 15,000	$ 15,000
Hawaii Energy Ally Program	n/a	Trade Ally Meeting 200 participants	Roll Out Program by 8/1/14	1%		n/a	$ 5,000	$ 5,000
Benchmarking	200	500	Sites EUI/ENERGY STAR/Peer Group Evaluated					
Codes & Standards	Market Survey & 1 Actions	Market Survey & 2 Actions	1. Incentive Program for Early Code Adoption 2. 30 by 2030 - Above Code Program 3. Code Compliance Assistance 4. Project TBD by Mutual Agreement w/PUC					
Demand Response	Market Survey & 1 Action	Market Survey & 2 Actions	1. In-field live-test and evaluated Project 2. EE/DR Incentive for installation of standard Specification devices 3. Project TBD by Mutual Agreement w/PUC	3%	All Items in Category must be met for award	$ 15,000	$ 20,000	$ 20,000
Smart Grid	Market Survey & 1 Action	Market Survey & 2 Actions	1. Direct Installation of in-home smart devices compatible with HECO Smart Grid 2. Evaluation Report on TOU Energy Data 3. Project TBD by Mutual Agreement w/PUC					
Electric Vehicle	Market Survey & 1 Action	Market Survey & 2 Actions	1. Develop proposal of "motivational" TOU rate tariff and incentives mix to drive EV charging station installation and use. 2. Marketing Materials to raise EE/EV awareness 3. Project TBD by Mutual Agreement w/PUC					
Total				100%			$ 700,000	$ 833,000
Potential Award								$ 133,000

6. SIGNIFICANT INCREASE IN ENERGY SAVINGS AND INCENTIVE BUDGET

The table below provides summary information regarding the energy savings achieved in past program years relative to expenditures, including lifetime cost per kWh.

Table 4: Program Year Number Comparisons

Program Year	Claimed kWh	Verified kWh	Average Life	Estimate kWh-Life	Total Program Cost	1st year $/kWh	Life $/kWh
PY11 Actual	128,785,968	130,108,676	8.4	1,092,912,878	$ 25,741,826	$ 0.198	$ 0.024
PY12 Actual	113,198,801	115,779,968	9.4	1,088,331,699	$ 30,903,826	$ 0.267	$ 0.028
PY13 Estimate	126,241,422	126,241,422	9.6	1,211,917,651	$ 32,000,000	$ 0.253	$ 0.026
PY14 Plan	134,816,230	134,816,230	9.9	1,334,111,790	$ 39,666,917	$ 0.294	$ 0.030

As this table indicates, the proposed energy savings for PY2014 is higher than any year's savings to date. To achieve this increased goal, Leidos proposes a budget increase that will translate into greater incentives going to the participating customers than ever before – both in dollars and as a percentage of the overall budget. This is needed to produce increased savings from deeper (more expensive) reaches into Hawaii's energy infrastructure. The associated budget table is included as Table 1. The following describes the key features of the PY14 budget:

- Higher percentage of the total budget is devoted to direct customer incentives and offerings (72% of total)
    - Reduced program delivery budget as a percentage of the entire budget (28% of total rather than the allowed 30%).
    - Reduced G&A and Performance Award to 6.4% from 6.9% last year (rather than the allowed 10%).

- Direct Energy Efficiency Incentives-to-Transformational activities split of 86%/14%.
    - This split provides for a $3.8M Transformational Budget, increased from $2.1M in PY13. This increased budget will support the new initiatives for pilots and the integration of Dynamic Demand Management (formerly DR) and Electric Vehicles in the EE programs.

- The incentive budget has $2M assigned to "Energy Auctions" that invite contractors to compete for providing independent cost-effective projects or program delivery mechanisms for both the business and residential sectors.

The proposed budget for PY2014 provides savings at an average lifetime cost of $0.03/kWh, representing a fairly steady increase in total delivery cost since PY2011. Note that, over time, the decreased reliance on CFL incentives and increases in the incentive budget associated with the Transformational program (with no direct energy savings attributed) will drive up the overall cost per unit.

7. PROPOSAL TECHNICAL DETAILS

a. Continued Emphasis on Total Resource Benefit (TRB) Target

The trend of Hawaii Energy's plan is the continued emphasis on investments with longer term savings. The target goals provided reflect this emphasis by weighting and targeting an aggressive Total Resource Benefit (TRB) target.

The targeted average measure life of 9.9 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.

b. New Program Net-to-Gross Values

The Third-Party Evaluator recommendations for Net-to-Gross values were adopted in the development of the PY2013 Annual Plan. These values recognize the differences in program-driven savings between the various categories of measures. For PY2013 we used the straight average of 0.78. Based on PY2013 results to date, we have adjusted this value to the savings-weighted average of 0.81 as reflected in the table below.

Table 5: PY2014 Net-to-Gross Factors

PY2014 Net-to-Gross Factors		
Program		**Attribution Rate**
BEEM	Business Energy Efficiency Measures	75.0%
BESM	Business Services and Maintenance	95.0%
BHTR	Business Hard to Reach	99.0%
CBEEM	Custom Business Energy Efficiency Measures	75.0%
CESH	Custom Energy Solutions for the Home	65.0%
REEM	Residential Energy Efficiency Measures	79.0%
RESM	Residential Services and Maintenance	92.0%
RHTR	Residential Hard to Reach	100.0%
Weighted Average Net-to-Gross Attribution Rate		**81.0%**

8. PROGRAM AND MEASURE OVERVIEW

Leidos proposes to modify each program offering to address the needs of the markets served and to respond to the directives of the PUC. The following is a brief summary of the highlights of our proposed changes or addition to each program area. We look forward to working with the PUC and its staff to develop these and other potential new program offerings more fully. We will provide a full description of each program in the Annual Plan.

a. Residential Programs

i. Reduced dependence on CFLs (13% reduction in the number of units to be incentivized).
ii. Added an "Efficiency Auction" to the Customized Energy Solutions for the Home.
iii. Solar Water Heating – We have reduced the overall SWH count from 2,400 units estimated for PY14 plan to 2,200 units. The actual number of installations in PY13 is projected to be 2,250 units. This reduction is due to several reasons, including already achieved market share of over 40% of residences, increased sales from PV-only contractors. We are continuing to work with the community to increase participation in HTR direct install and in the OBF program to increase SWH installations.
iv. Water Cooler Timers will be offered to the Residential market through a web-based opt-in offering.
v. Central Air Conditioning Retrofit Pilot will be offered to look at the effectiveness of replacing mid-life, 7-10 year-old, central ACs in areas such as the Ewa Plain.
vi. Added Programs:
    - Window AC "Bounty" Program to collect old units and recycle them. This work is incremental to the refrigerator and freezer pick-up and recycling program that has proven successful.
    - Smart Strips.
    - DVR Replacement Pilot.
    - Home Energy Savings Kits – both Direct Install and through Online Fulfilment.

b. Business Programs

i. Chiller Incentive modification to include installation of metering.
ii. Prescriptive LED Street and Parking Lot Lighting.
iii. Customized Incentives have been adjusted upward to drive participation.
iv. Added an "Efficiency Auction" to the Customized Business Energy Efficiency Measures.

c. Transformational Efforts

The budget for the Transformational program include costs associated with activities that do not immediately produce energy savings, but have long-reaching impact on behaviors and future program design. Highlights of planned Transformational activities include the following:

i. **Support for Benchmarking/Codes and Standards**
Leidos proposes to assign a full-time engineer to these tasks and enlist the assistance of specialist subcontractors to support this initiative that will be required to drive deep savings in new and major renovation projects as follows:

- ENERGY STAR® / Hawaii Energy Benchmarking Program – This program would have a goal of benchmarking as many facilities as possible by raising awareness and removing barriers to using the ENERGY STAR Portfolio Manager program.

- Hawaii Energy 30 by 2030 – 30% Above Code Programs - Leidos proposes to use market knowledge of the current design practices and levels of code achievement in order to identify and develop concrete incentives or program support for barrier removal.

ii. **Demand Response (DR) Pilots**

Leidos proposes to incorporate a more robust, automated and continuous form of DR activities in the following manners:

- Direct Integration – DR can be integrated into the ongoing Energy Efficiency (EE) programs as follows:
  - Promote DR Capable EE Projects – The discussion and identification of DR opportunities occurs primarily within the CBEEM and BESM measures where Hawaii Energy takes a more involved and earlier role in the project development.
  - Education promoting Efficiency First, DR Controls Capability, and Renewable Integration – There is an opportunity to perform awareness and education campaigns to demonstrate the "loading" order as well as operational and cost benefits of coordinated project planning.
- DR Technology Screening – There is a market need to understand the types of technologies that are available and useful to control for DR, as well as a need to identify the types and characteristics of technologies that are compatible controls with HECO systems.
- Pilot Projects – Working with HECO, Silver Spring Networks and several others, projects will be pursued to determine the technical opportunities and project/program costs of integration of EE and DR acquisition.
  - Mandate and/or Incentivize DR Capability in SWH Installations
  - Limited Incentives to Add DR Capability in EE Projects
  - Water Heater or AC Integrated DR Control
  - EV as DR and energy storage source – Hawaii Energy would integrate any EV work with capability to utilize these "rolling batteries" to achieve DR goals work as well take advantage of more dynamic storage and load shifting opportunities that are provided by large scale EV penetration.
  - Kihei and Wailea Maui EE/DR (and potentially SG/RE/DG) Pilot – There is a planned Ma'alaea-Kamali'i Transmission line on Maui that is a perfect opportunity to demonstrate the combined strength of targeted Energy Efficiency (EE) and DR. There is also the potential to include Smart Grid (SG), Renewable Energy (RE) and Distributed Generation (DG).

iii. **Smart Grid Support**

Hawaii Energy EE Integration with Phase 0 Smart Grid Project – Leidos proposes to dedicate an engineer to the task and coordination of determining how the program can enhance implementation of the smart grid project to include EE enhancements and options. The actions will include:

- Work with Silver Spring Networks and HECO
  - Communication Protocols
  - Tool Evaluations
  - Marketing and Outreach
  - Targeted EE Opportunities
- Energy Usage and Program Participation Data Review – Evaluate energy use and Hawaii Energy program participation of the initial Smart Grid Phase 0 Participants.
  - Program Participation
  - Time-of-Use Data

iv. **Expanded Electric Vehicle Role**

The ability for EE work to integrate with DR, energy storage and EV can be used to identify opportunities for EV charging that minimize renewable curtailment and support grid reliability by integrating the three offerings.

Net Zero Electric Car Purchase Package - Work with Electric Car Dealers, Manufacturers, Auto Loan Financial institutions, HECO, DBEDT, HCEI and electric vehicle support groups to develop a program to package Energy Efficiency with Electric Vehicle purchases.

Raise Awareness – Hawaii Energy can incorporate the Electric Vehicle (EV) messaging into the EE program work and provide marketing and communications support.

Determine motivational and effective Time-of-Use Rates – TOU rates appear to not be driven by ground up customer investment required to provide the equipment and processes needed to support the effort. The work could include a Pilot rate/incentive to demonstrate action with costs supported by the integrated benefit of the EE, DR and SG/RE acceptance benefits.

Strategic EV Plan – Leidos has the ability and experience to assist the PUC/HECO/DBEDT to evaluate the issues and opportunities with expanding EV opportunities in Hawaii. Leidos can offer a technical and cost proposal to follow a three-pronged approach to develop best practices, models, and strategies; gather lessons-learned; and create a relevant set of installation guidelines and ordinances through our experience, research, and surveys.

v. **Transformational Program Expansion Opportunities**

In addition to the activities described above, Leidos plans to continue and refine past Transformational offerings. Examples include the following:

- Dedicated Trade Ally Program “Hawaii Energy Allies” – Leidos has developed trade allies through the course of developing and implementing Hawaii Energy’s EE

programs, however there has not been a dedicated effort to concentrate on the support of these critical relationships. We propose to expand the effort to a dedicated program.

- Ally Service Center - This program offering provides centralized service and support to Hawaii Energy's Trade Allies through a service center approach.
- Rebuild Hawaii – We propose that Hawaii Energy restart the coordination and funding of this once successful industry collaboration event or an equivalent.
- Behavior Modification through Energy Literacy
    - Sharing the Aloha – Financial literacy workshops, often targeting underserved communities
    - Increased access to information through social media channels – Current work with Kanu will continue to develop and distribute "messaging" campaigns, curriculum, competitions as well as "access to simple devices/pay-it-forward" options.
    - Continued sponsorship of the UH Sustainability Conference, which is viewed as a catalyst for improving energy efficiency education and awareness throughout the UH system
    - Higher Ed Energy Program Support - Develop a program targeting the large universities in the State, specifically UH, HPU and BYU.
    - Direct Install Support – This effort will complement the incentives offered by the Residential and Business Hard to Reach portfolios.
    - AOAO – Supporting submetering with education, promotion and potentially piloting intra-building peer-group comparison.
- Professional Development
    - NEED - Refine the existing program to reach more teachers with a stronger focus on outcomes. This will also entail a complementary approach with Chevron and the DOE.
    - EEFG/Mark Jewell - Hawaii Energy will consider reframing these courses in the context of our Hawaii Energy Allies (e.g. value to participants)
    - UH/IFMA - Hawaii Energy will continue to support the University of Hawaii's initiative to offer a degreed program for facility management.
    - Internships - With programs like Kupu RISE that have proven capabilities to mentor and manage interns, we look to sponsorship interns to support operations.
    - EnergyStar® Benchmarking - The proposed Benchmarking work will be framed primarily as a Transformational program.
- Technical Know-How –
    - Water/Wastewater Best Practices 2.0 – This effort is intended to continue the work in PY13.
    - BOC Certification
    - Building Code
    - Trade Ally Support – Hawaii Energy will look to develop training opportunities that mutually benefit the program, its allies and their customers.
- Effectiveness of Marketing Campaigns – Leidos plans to conduct pre- and post-evaluations of marketing campaigns for specific offers to determine the effectiveness and success of the campaign messaging and tactics in relation to

established success metrics. This could include, but are not limited to, focus groups, and phone and online surveys. The primary focus of the evaluations will be on the digital component of the campaigns.

- Public Awareness of Hawaii Energy – Leidos will determine the awareness of Hawaii's residential and commercial ratepayers of Hawaii Energy, as a program, and the services it offers to the community as well as their understanding and awareness of energy efficiency and its benefits. This effort will consist of the use of focus groups as well as telephone and online surveys.

9. ADDITIONAL CONTRACT RENEWAL TERMS

a. Revised KEY PERSON LIST with Capped Hourly Rates

The table below contains a proposed new updated **KEY PERSON LIST** showing 2-Year Capped Hourly Rates for all personnel listed through Dec 31, 2016. Key persons dropped from the previous KEY PERSON LIST are no longer providing substantial support to the Program.

Table 6: Revised KEY PERSON LIST

KEY PERSON LIST				
KEY PERSON	**POSITION**	**PBFA WORK**	**NORMAL HOURLY RATE**	**2-YR CAPPED HOURLY RATE**
Ray Starling	Program Director	90%	$ 230	$ 190*
Michael Chang	Technology Director	100%	$ 230	$ 190*
Joe Simpkins	Operations Director	100%	$ 190	$ 190
Larry Newman	Customer Operations Director	100%	$ 190	$ 190
John Rei	OBF Operations Director	100%	$ 190	$ 190

* Previously Capped in 2011

b. Additional PBFA Incentive Support for Bill $aver (OBF) Program

In the event the Bill $aver (OBF) Program starts trending to exceed the 350 OBF solar water heater (SWH) unit goal already accommodated in the PY2014 Annual Plan, Leidos will utilize the standard PBFA Contractor and Hot Water Cool Rates SWH incentives available at that time until they are exhausted. Leidos will then utilize the residential and business measures as appropriate to cover the additional OBF SWH units using allowed adjustments to the Annual Plan budget expenditures, if needed. In any event, Leidos will ensure that a minimum of 150 additional OBF SWH units (500 OBF units total) are accommodated without requesting modification of Program Performance Incentive goals. Finally, Leidos will work with the Contact Manager and PUC to revise the Performance Incentive goals to accommodate further desired increases in OBF participation, if needed.

c. Existing Contract Terms and Conditions not Modified Herein Remain In Place

Leidos proposes that all other Contract Terms and Conditions not specifically referenced in this Proposal be left as they currently are under the original 2009 Contract as subsequently amended, unless clearly inappropriate for the current circumstances.

10. CONTRACT VALUE ENHANCEMENT

Leidos is proud of the innovation, responsiveness and value that it has been able to deliver to Hawaii and the PBFA Program over the first 5 years of our contract. In addition to meeting the Program's critical performance goals, each year the Hawaii Energy Team has returned unspent annual budget to the Public Benefits Fund, while executing the PUC's very progressive transformation strategies. We continue our efforts to be good stewards of the public funds entrusted to us and we are constantly looking for more cost effective ways to administer the PBF.

This year, Leidos offers a significant added value enhancement for the people of Hawaii. Beyond the commitments already made for Key Persons in Section 9a above, Leidos will voluntarily limit all Leidos employee bill rates under this Contract to no more than $190/hour going forward for the duration of this Contract, including any additional extensions of the contract term through Dec. 31, 2016. This includes all Leidos reachback personnel. T&M savings to the PUC and Public Benefits Fund from these capped rates over two years is estimated to be in excess of $400,000.

The entire Leidos Team appreciates the extraordinary opportunity and responsibility we have been given to serve Hawaii in its unprecedented journey to transform from fossil fuel dependence to a sustainable, clean energy economy. We look forward to being a part of Hawaii's long term success in this effort.

Respectfully submitted,

Vice President
Leidos Engineering, LLC

Hawaii Energy

YOUR CONSERVATION & EFFICIENCY PROGRAM



ANNUAL PLAN • Program Year 2014

June 30, 2014

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1.0 INTRODUCTION

On behalf of Leidos Engineering, LLC ("Leidos") and the Hawaii Energy Efficiency Program, operating as the Hawaii Public Benefits Fee Administrator (PBFA) under contract with the Hawaii Public Utilities Commission (PUC), we are pleased to present the PBFA Annual Plan for Program Year 2014 [July 1, 2014 through June 30, 2015] (PY14).

1.1 Annual Plan

This PY14 Annual Plan provides strategies, budget, goals and a roadmap for administration and delivery of the Hawaii Energy Program based on enhanced PBFA statutory authority, our experience to date, PUC directives and the State's clean energy goals.

Key features of this PY14 Annual Plan include:

a. Efficiency Program scope expansion to facilitate acceleration of Hawaii's transformation to more efficient, clean-energy-tolerant and customer-accommodating electric grids;
b. Aggressive energy savings goal of 134,816,230 kilowatt hours (kWh), exceeding the highest level of achieved annual savings to date and providing customers with $526M in savings over life of measures;
c. $0.03 per kWh average lifetime Program costs to achieve the above savings;
d. 72% of the total Program budget devoted to direct customer incentives and offerings, above our contractual requirement of 70%;
e. $39.7M PY14 budget, representing an 18% increase from PY13 (including Transformational program targeted increases). This budget is below the estimated PBF 1.5% collection value of $42.6M;
f. Increased support of codes and standards to help the State reach its EEPS goals faster;
g. Increased customer incentives averaging $0.294 per kWh for first-year savings (up from $0.273 per kWh in PY12 actual) to ensure energy efficiency is driven deeper into Hawaii's infrastructure;
h. Collaborative engagement with utilities and others to identify and integrate Energy Efficiency and Demand Response (DR) capabilities, including identification of controllable loads, support for energy storage, Electric Vehicle (EV) charging infrastructure and effective Time-of-Use (TOU) rates;
i. Progressive expansion of Transformational offerings to lead markets and promote general awareness that will yield savings in future program years;
j. Increased use of customer-friendly web-based services and tools to improve customer experience and increase access to and participation in the programs;
k. $2M in incentives for efficiency auctions aimed at both residential and business sectors to encourage innovative third-party offerings at or below the program average cost per kWh; and
l. Geographically targeted offerings to respond to unique customer or locational needs, including: Central AC Retrofit program for Ewa Plain and Kihei-targeted initiatives to avoid new T-lines.

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 PY14.

1.2.1 *Increased Program Aggressiveness* – The PUC guidance has been to push the Program to achieve:

- expanded offerings and services for the Public,
- increased incentive rates on cost effective and longer life measures,
- provide the potential for most savings ever for the Hawaii Energy program,
- integration of Demand Response capability into energy efficiency projects,
- provide statewide energy benchmarking using Hawaii-specific data,
- expand transformational offerings to drive change and awareness,
- increase web services participant interaction

Table 1 PY14 Program Performance Targets and Impacts

Proposed PY14	First Year $/kWh	Lifetime $/kWh	Average Life yrs.	Incentives	Program Level First Year Energy kWh	Program Level Lifetime Energy kWh
Business	$ 0.211	$ 0.017	12.4	$ 13,519,581	64,137,168	797,418,359
Residential	$ 0.157	$ 0.021	7.6	$ 11,061,475	70,679,061	536,693,431
Direct Incentives Only	$ 0.182	$ 0.018	9.9	$ 24,581,056	134,816,230	1,334,111,790
Transformational Programs				$ 3,883,364		
Program Cost	**$ 0.294**	**$ 0.030**		**$ 39,666,917**	**134,816,230 kWh**	**1,334,111,790 kWh**

Economic Benefits		Annual	Lifetime
Program Level Savings		134,816,230 kWh	1,334,111,790 kWh
Average Program Attribution Factor	÷	80.7%	81.0%
Customer Level Savings		167,107,353 kWh	1,646,106,515 kWh
Average Cost per kWh	x	$ 0.32	$ 0.32
Potential Participant Cost Savings		**$ 53,474,353**	**$ 526,754,085**
Average Project Simple Payback		3.0 years	
Potential Participant Capital Investment		**$ 160,423,058**	
Direct Incentives		$ 24,581,056	
Average Project Incentive as a % of Project Cost		15%	

1.2.2 *Ensure Competitive Cost-Effectiveness* – The benchmark measurements of the Energy Efficiency programs is the "Program Cost Test" that takes into account all program related costs as compared to the energy reductions achieved. For PY14 the "All-In" cost per kWh is $0.03. Efficiency is truly the lowest cost source of energy.

The PY14 program energy figures are provided in the table below:

- First Year Energy Impact of 134M kWh
- 1,334,111,790 kWh savings over the life of the measures
- $39,666,917 Overall Program Budget "Program Cost"
- Lifetime cost per kWh of $0.030/kWh
- Annual Cost Savings to Participants of $43 Million

- Lifetime project cost savings of $410 Million
- Economic generation of $164 Million in facility improvements

1.2.3 *"How & What to Buy" Participant Advocacy* – Hawaii Energy has sustained a focused review of the inclusion of new measures and equipment into the program over the past five years and this has proven to have protected participants from "bleeding edge" and "here today, gone tomorrow" offerings. The program has always offered customized incentives that would encompass any energy savings action and perform reviews of post energy usage to confirm claimed energy savings. The Program has also stayed contractor/vendor neutral to the extent that no promotions of available companies were done in order to avoid the appearance of endorsement.

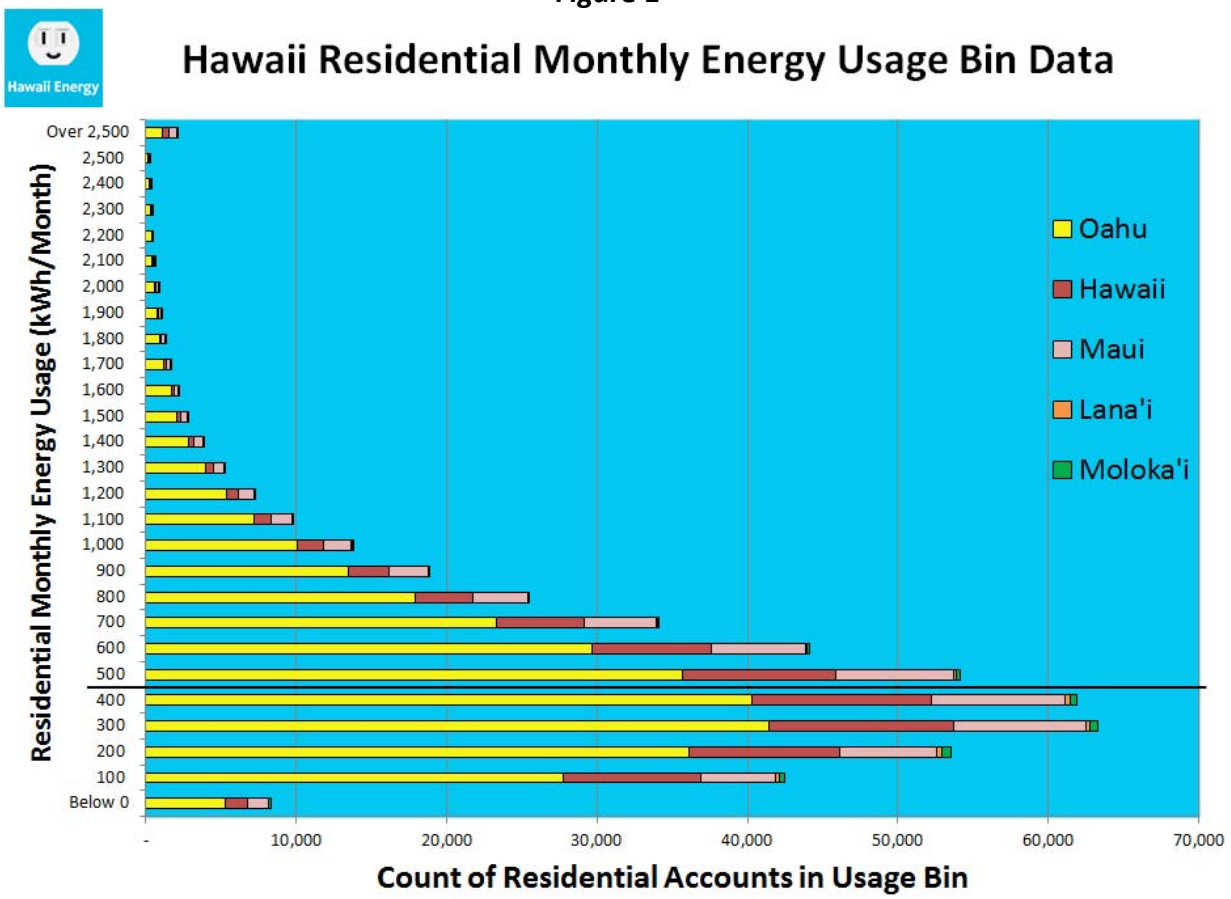
In PY14 Hawaii Energy will take a different tack with the roll out of a Clean Energy Ally program to create a program to identify and create awareness of all the companies that are providing energy efficiency goods and services. This along with "how-to-buy" discussions will address a common hurdle of indecision to starting energy projects.

1.2.4 *Creative and Innovative Programs by Inviting Others* – Hawaii Energy believes there are always more creative or innovative ways to apply the basic energy efficiency and conservation principles. In PY14, Hawaii energy will run an "Energy Efficiency Auction" to invite contractors and participants to compete for funding of their independent, cost-effective projects or program delivery mechanisms. These offerings will be compared against each other for cost-effectiveness. This first year pilot will be limited to awarding quick to implement measures and projects that fall within the program year, with the desire to evaluate and put into the planning cycle longer term projects that will be revealed by the process.

1.2.5 *Increased Benchmarking to Drive Awareness* – Hawaii Energy gained experience and saw the success of using peer group comparisons to drive behavior in both the business and residential sectors. Graphs such as the one on the next page, which show the energy use per month for residential customers, can show participants where their energy consumption compares with others in the community so they can make informed decisions where they want to be in the spectrum. There are also the demonstration of myths and trends in the data. As is shown in the graph below, there were over 7,000 homes with a less than zero energy consumption average over a year's time, this trend of over-production of PV leads to the identification of the need to determine and address causes.

In PY14, Hawaii Energy will run a benchmarking program to provide a common web-based benchmarking tool tied to ENERGY STAR® Portfolio Manager as well as direct assistance to get all the information needed to complete the benchmarking.

Figure 1



1.2.6 *Address Maturing Light Emitting Diode (LED) Lighting Market – We have been lowering the dependence on Compact Fluorescent Lamps (CFLs) for both the desire to drive longer lived savings as well as addressing the change in the marketplace to cost-competitive and maturing LED lighting offerings. To this end,*

- the CFL count in the residential programs has been lowered to 1.3M lamps from the 1.5M lamps in the PY13 plan (13% reduction)
- Prescriptive LED Street and Parking Lot Lighting offers will be implemented.

1.2.7 *On-Bill Financing (OBF) Program Support – Solar Water Heating* – Hawaii Energy has lowered the overall SWH count to 2,200 units and split the Solar Water Heating measures into the three categories of delivery.

- Direct Incentive to Contractor (1,800 units)
- Incentive to OBF Entity (350 units)
- Incentives provided to Financing Institutions (50 units)

Spreadsheet values for all technology-based incentives are estimates and subject to change based on market conditions and participant response. In the event the OBF program exceeds goals stated herein, Leidos (Hawaii Energy) can adjust budget to accommodate up to an additional 350 units without modifying program goals. If OBF solar water heater response exceeds this amount, Hawaii Energy will work with the Contract Manager to revise goals to accommodate revised portfolio efficacy.

1.2.8 *Constant Evolution to Meet Participant Feedback* – Hawaii Energy has demonstrated over the past five years to be able to identify and adjust focus on opportunities to drive participation such as AOAO Submetering and Garage CO Exhaust Controls.

The other method of evolution is to clarify and streamline programs. In PY14 the business chiller incentive will be again modified to drive more active management of these large energy consuming systems by separating the current offering into three fixed incentives. One for the chiller installation, another for installing permanent kW/ton metering for use in continuous commissioning, and a third for optimized selection of the chiller based on estimated or real building loads and chiller curve reviews. This offering provided additional incentives for these measures in the past, however they were offered in a combined $/ton manner that the market found confusing.

Customized Incentives have been adjusted upward to reflect the values needed to drive participation. The program last year reduced the incentive levels for over 5 year life projects to $0.12/kWh in order to reach the aggressive goals assigned. This level of incentive did not materially change project paybacks so, the values have been increased to $0.15 for Lighting Projects and $0.20/kWh for all other projects to get the incentive to levels that will drive projects.

These incentive levels can be adjusted higher on a case-by-case basis to get projects to move.

1.2.9 *Increased Transformational Program* – During PY11 and PY12, the Program demonstrated the value of Transformational Program activities. The Program will continue to expand on these efforts as proposed in this Plan. These activities include education, training and other similar transformational activities that may not result in immediate quantifiable energy savings, but are likely to contribute to energy savings over time.

1.2.10 *Equity Among Rate Classes and Among Islands* – In PY14, the Program will continue to expand its efforts to bring Program benefits to small businesses, landlord-tenant situations and other hard-to-reach (HTR) customers. Additionally, the Program will review available mechanisms that promote Island Equity and implement pilot programs where feasible to test for the best equity enhancers for each island's particular circumstances.

1.2.11 *Turn-Key and Direct Install Programs* – The Program demonstrated success in procuring turn-key programs and services from specialty vendors, including OPOWER peer comparison in PY10/11/12/13 and NEED.org teaching modules PY11/12/13. These turn-key programs have proven to be cost effective methods to secure highly skilled, top-notch services that the Program will continue into PY14. The following are examples of programs to be continued for PY14:

- *Educational and Training* – 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.

- *Small Business and Residential Direct Install Measures* – 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. In the residential sector, we will be targeting multi-family residents for turn-key installation of energy-saving kits, including energy efficient lighting, advanced power strips, low-flow showerheads and faucet aerators. The incentives will be split between commercial and residential budgets in order to accommodate for master-metered facilities.

1.2.12 *Constant Attention on Island Equity* – In PY14, Hawaii Energy will add two full-time Program Specialists to our existing team in Maui and Hawaii counties. Each island will now have two individuals that leverage other resources in the Counties such as the utilities, County Energy Offices, community organizations, vendors, contractors and educational facilities.

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.

2.0 OUTREACH & MARKETING COMMUNICATIONS

2.1 Overview

The primary objective of the Program's Outreach & Marketing Communications (Marcom) is to increase active customer participation in Hawaii Energy offerings (i.e., residential rebates, business incentives and transformational educational/training opportunities).

For PY14, Hawaii Energy has identified significant opportunities to leverage the successes and lessons learned to enhance strategies and tactics already proven effective, as well as explore additional innovative, cost-effective and wide-reaching opportunities. Comprised of a mix of traditional and non-traditional strategies and tactics, Hawaii Energy will reach customers across Hawaii, Honolulu and Maui counties and maximize reach and effectiveness with continuous analysis and refinement.

Key objectives, strategies and tactics are highlighted below.

2.2 Key Objectives

Key PY14 objectives for the Program's Marcom include:

- Increasing awareness of what Hawaii Energy is and our role as the "go-to" resource for energy conservation and efficiency for Hawaii, Honolulu and Maui county customers with emphasis on the fact that Hawaii Energy makes it easy and money-saving to adopt conservation behaviors and invest in energy-efficient equipment.
- Increasing participation in Hawaii Energy's growing family of residential, business and transformational offerings – simply put, Hawaii Energy offers something for everyone whether they're a homeowner, renter, teacher, engineer, energy professional, small business owner or corporate executive.
- Driving traffic to Hawaii Energy's website and call center for information on Hawaii Energy offerings so customers can participate today.

2.3 Outreach

The Program's community outreach efforts continues to play an important role in increasing and maintaining the awareness of Program rebates and offers to the general customer population and business communities. A few highlights of our outreach efforts include:

- *Traditional Outreach* – For PY14, the Program will continue to sponsor and/or participate in the community and trade expo events that proved to be successful. Participation in these events will be determined based on factors including post-event surveys, past history, audience, attendance and location. In addition, the Program will be increasing our presence and participation at 10% more outreach events by continuously working to keep a pulse on new opportunities and partnerships. As a part of our traditional outreach efforts, the Program will develop "brand ambassadors" to help supplement staffing at events.

- *Outreach Through Community Allies & Organizations* - The Program will continue to maintain and align itself with organizations that share a common or similar objective of helping the community through environmental and/or sustainable efforts. These strategic partnerships help us increase our ability to reach more electric customers, as well as "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 energy efficiency and conservation. 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.

2.4 Marketing Communications

Through integrated marketing efforts, Marcom will continue to provide essential and strategic support with a focus on increasing overall awareness of the Program and its mission. Marketing efforts will be implemented through industry-recognized channels including those highlighted below in: (1) website; (2) social media; (3) promotions; (4) videos; (5) email marketing; (6) marketing collateral; (7) direct mail; (8) co-op marketing with Clean Energy Allies;

A. Website

The Program's website serves as a resource for electric customers to learn about how homes and businesses can save energy and money on their electric bills. The redesigned website was launched in 4th quarter of PY13 and to ensure that our site is providing a relevant and positive user experience, Hawaii Energy will continue to review and refine the website. The Program will continue to humanize and keep the website fresh with frequent updates and features including but not limited to adding interactive elements to the site (e.g., savings calculators), residential and business-focused success stories, and a revamped "Tips to Save" Energy page. On average, in PY13 the website received approximately 6,000 unique visitors per month. In PY14, the Program's goal is to increase unique visitors by 10%.

Upon the launch of the Bill $aver program, anticipated this summer, the Program will be integrating the existing Hawaii Energy website with the newly-created Bill $aver program web pages in order to maximize customer awareness of and participation in energy efficiency programs.

B. Social Media

In PY13, the Program expanded its brand presence via active engagement and updates through the following social media channels: Facebook, Twitter, LinkedIn and Instagram. For PY14, the Program will continue to expand our reach and provide interesting and relevant content to keep our "followers" engaged and informed. The Program will work to increase its "followers" by 5% - 10% depending on the social media channel. Social media is a great way for the Program to stay at the forefront of customers minds on a daily basis.

C. *Promotions*

The Program will continue to develop promotions to bring excitement and increase word-of-mouth of Hawaii Energy. Promotions may include a Home Energy Makeover Contest, contests on social media highlighting specific energy efficiency measures and increase followers, and/or success stories/testimonials. The Program will establish and track participation metrics to determine the success of the promotion.

D. *Videos*

To continue to provide engaging content for the community, the Program will explore the strategy of conveying its messages through videos. Video content can range from featuring case studies/success stories, energy-saving tips and "how-to" videos. The videos will be featured on our website and YouTube pages as well as promoted through our e-newsletters and social media channels. The Program's goal is to build a library of resource videos for residential and commercial customers.

E. *Email Marketing*

In PY14, the Program will continue to develop and implement a robust email marketing system to support program communications. The Program will work to maintain and increase email addresses; better integrate/share email marketing communications via web and social media; and maintain high open rates of over 35%. In addition, the Program will work to increase its email subscribers by 10% for the "residential" and "business" e-newsletters.

In addition, the Program will increase the frequency of its email distribution. The "residential" e-newsletter will increase from a bi-monthly to a monthly distribution and the "business" e-newsletter will increase from a quarterly to a bi-monthly distribution.

F. *Marketing Collateral*

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

- Maintain and expand a collateral system to support the offering for the residential, business and transformational programs. This can include, but is not limited to, development of brochures, rack cards, flyers, one-sheets and posters.
- Ensure that important information and messaging is written and organized in an easy-to-understand manner for strategic partners, Clean Energy Allies and customers.
- Highlight the businesses and organizations that have participated and been helped by the Program via case study development.

G. *Direct Mail*

Direct mail to geographically-targeted areas is a new channel that the Program will explore in PY14. The Program will consider implementing targeted direct mail and other integrated marketing efforts to promote various rebates and energy efficiency measures to businesses and residential customers, when applicable. In addition, the Program will continue to work

with Hawaiian Electric to distribute its targeted messaging and inserts through the electric company's business and residential monthly bills across the counties. For any offering promoted via direct mail, the Program will track and analyze the uptake of offers by assigning it a specific website address.

H. Co-Op Advertising with Clean Energy Allies

The Program will continue offering co-op advertising to Clean Energy Allies including solar water heating residential participating contractors. In PY14, we anticipate expanding the offer to manufacturers and financial institutions as appropriate. We will continue to work to refine this offering to make it easy for Clean Energy Allies to participate. Co-op advertising is a cost-effective way for us to partner with our allies, increase our brand awareness and maximize our marketing budget. Co-op advertising launched in 2nd quarter of PY13 and had a slow start, but the Program's goal in PY14 is to further encourage participation by Clean Energy Allies and hopefully increase participation by 10% determined by the number of Clean Energy Allies who submit ads for reimbursement.

In the past program years, the Program's advertising efforts mainly consisted of the development and execution of a short-run integrated advertising campaign comprised of online, TV, radio and print ads to promote a specific residential offering. Pending budget, the Program can continue with that strategy if there is a residential, transformational or business offering that requires a big "push."

In addition to a single advertising campaign push one-time a year; the Program will expand its advertising efforts so that it has an overall presence in the market throughout the year. The Program will continue to review and explore other advertising opportunities that can provide unique, added-value to Hawaii Energy and its brand. For example, having an "Energy Tip of the Month" advertorial column in a print publication or an "Energy Saving Tip of the Day" promoted on a local radio station as cost-effectively done in PY13.

As with all prior advertising campaigns, metrics such as website traffic and online ads are tracked and analyzed to determine impressions and awareness.

2.5 Public Relations

Public relations ("PR") is the strategic communication process that fosters mutually beneficial relationships between organizations and the general public. The news media is the primary medium to shape, articulate and amplify a particular message. Unlike paid-for advertising, news coverage is "earned" (vs. purchased) and validated by a third-party (i.e., the media), which enhances its credibility.

A. Media Relations

The goal is to secure local news coverage throughout the State, as well as "third-party endorsements" (e.g., testimonials or positive, endorsing statements) from key community leaders and stakeholders. Hawaii Energy will target securing one to three media stories per month. Actual media coverage garnered may vary due to factors beyond Hawaii Energy and PR's innate nature.

Local media outreach will include:

- **Mass print media** (e.g., Honolulu Star-Advertiser, Pacific Business News, numerous neighbor island newspapers and magazines, Hawaii Business, Honolulu magazine, Hawaii Home & Remodeling magazine, Green Hawaii magazine)
- **Mass broadcast** (e.g., KHON, Hawaii News Now, Hawaii Public Radio, FM & AM radio talk shows across the State, ʻOlelo and public access TV)
- **Trade publications** (e.g., Building Industry Hawaii, Building Management Hawaii)
- **Community and professional organizations** (e.g., via newsletters, emails, presentations and/or collateral distribution)
- **Online media** (e.g., local blogs, local community-minded websites)

Media and presentation training will be conducted for staff and subcontractors as needed to ensure Hawaii Energy's messaging is consistent and understandable by the various audiences.

In PY14, the goal is to increase the total value of the media coverage by 10%. Publicity value is calculated by multiplying the advertising value by three, which is a factor generally accepted by the marketing industry. Advertising value is defined as the value of media coverage by comparing it to the cost of a similar placement as an advertisement.

B. Program Positioning

The Program will identify opportunities to offer and coordinate informational presentations to various groups to influence energy efficiency decision-makers and buyers; including those groups that serve the "hard-to-reach" This will include leverage existing relationships with state agencies and community service organizations, as well as identifying and making contacts with additional groups as needed. The presentations will be led and/or conducted by the Hawaii Energy staff and/or key subcontractors depending on the audience.

<u>Target groups for the presentations include, but are not limited to:</u>

- Key community stakeholders, including policymakers and geographic district advisory groups
- Property management/AOAOs
- Business professional groups
- Energy industry organizations:
- Large employee meetings

For PY14, the goal is to reach 25 key organizations.

3.0 TRANSFORMATIONAL ACTIONS

3.1 Overview

Market Transformation seeks to identify, assess and help overcome market barriers that inhibit 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 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 in underserved populations, workplace personnel and the technical workforce.

3.2 Key Objectives

The key objectives of the Transformational programs will be to:

- Leverage the effective work of others in the community to reach their niches and assist in implementation of Transformational efforts as part of their missions.
- Seek to ensure that actions are focused on having direct impact in the reduction of energy consumption in the State within a five year period.
- Achieve sustainable change and leverage resources appropriately such as educating teachers and incorporating actions to develop PBFA funded programs into self-sustaining efforts.

3.3 Behavior Modification

Behavior modification will continue to be built upon the foundation of energy literacy and strive to reach the mass market as well as "hard-to-reach" residents in underserved communities in Hawaii, Honolulu and Maui counties. Often English is not necessarily the primary language used in the household. The following outlines the PY14 portfolio of Transformational offerings planned:

- *"Sharing the Aloha" Community Workshops* – This workshop blends financial and energy literacy to connect energy-related behavior and choices to one's electric bill. Workshops will target community organizations, housing and condo associations and organizations that can provide access to a large number of residential customers (e.g. municipalities, hotels, etc.).
- *Creation and Distribution of Transformative Messaging*
    - Hawaii Energy will be executing a communications campaign to increase the availability of energy-saving information using culturally-relevant images, videos, phrases, etc., that is spread via the Internet and often in a creative or humorous way. This content will start discussions among and raising the understanding awareness of users often leading them to other Hawaii Energy offers.

- Hawaii Energy will be piloting energy-saving curriculum to businesses and community groups that feature competitions (e.g. gaming) to inspire groups to help teach and promote energy-saving behaviors, multiplying Hawaii Energy's reach and raising the understanding of the importance of energy efficiency.

- *Access and Use of Simple Energy-Saving Devices* – Hawaii Energy will be piloting a system to distribute simple energy-saving devices via a "pay-it-forward" model. By overcoming barriers to using the right device and correctly installing it, participants will be encouraged to help friends and families take those same steps on their own. This approach holds the promise to scale with limited Program resources and if successful, apply to other energy saving measures.
- *"Hard-to-Reach" Direct Install Support* – Hawaii Energy plans to support incentives offered by the Residential and Business hard-to-reach portfolios with educational workshops.
- *Higher Education Support*
  - Hawaii Energy will continue to sponsor the University of Hawaii's Sustainability Summit, which has been a catalyst for improving energy efficiency education and awareness throughout the UH System as well as other institutions of higher education.
  - Hawaii Energy plans to assist in the development of a long-term Strategic Energy Plan with the University of Hawaii to educate faculty, staff and students in energy efficiency and conservation practices. This effort will be focused on building consensus and momentum.
  - Integrated with the Business Incentive Portfolio, Hawaii Energy plans to support the installation of submetering within the University campuses to allow measurable energy-saving behavioral action to be recognized and provide feedback that supports future initiatives and education.
- *Energy Student Summit* – Hawaii Energy intends to pledge support to the creation of an Energy Student Summit that will provide a showcase event to acknowledge student interest and activities related to energy efficiency and Hawaii Energy's mission.

3.4 Professional Development

Professional development is aimed at professionals who are either new to the working world, new to energy efficiency or both.

3.4.1 *K-12 Educator Development*

- The NEED Project will be engaged to continue with energy efficiency education with multifaceted training and instructional programs on all aspects of energy, including production, consumption, and economic and environmental issues to give educators an understanding of the interrelationship between energy and the environment.
- Hawaii Energy's Teacher Advisory Board (TAB) will continue to provide feedback on the program (e.g. curriculum and materials) and pilot a new Hawaii Energy

offering (slated to be an "energy fair in a box") to connect schools, students, parents and the broader community with Hawaii Energy and its mission.

- Hawaii Energy plans to be a key collaborator with the State of Hawaii's Department of Education "Ka Hei" initiative and Maui Economic Development Board's Island Energy Inquiry that also offers professional development for educators.

3.4.2 *Creating a Career Path starting with Higher Education* – University of Hawaii's West Oahu College and the International Facility Management Association of Hawaii continues to develop a two and four year degree in Facility Management to meet the rising demand for skilled professionals in the field. Hawaii Energy plans to support this initiative with funding as well as technical and industry expertise.

3.4.3 *Professional Development for the Business Community*

- Offered primarily through Hawaii Energy's Clean Energy Ally Program and in support of the Higher Education initiatives, training will be offered to professionals in order to better frame energy efficiency opportunities in a compelling business case to secure project approval and compete more effectively for capital.
- Hawaii Energy plans to retain interns through Rewarding Internships for Sustainable Employment (RISE) and potentially by other means to support Hawaii Energy's operations to foster strong careers in the energy efficiency related field.

3.5 Technical Know How

Technical "know how" is focused on engineers, facility managers, architects, building operators, energy managers and the like who have experience in infrastructure and energy for a substantial portion of their career, but need to enhance their technical skills. This will be a key offering for Clean Energy Allies, but offered to all qualifying participants.

- Building Operator Certification Level I and Level II training sessions with University of Hawaii's Manoa Outreach College and Maui College's SLIM program will be supported.
- Technical training workshops on HVAC, pumps, motors, etc.
- Water/Wastewater Best Practices 2.0 – This focus will continue on in this program year. Hawaii Energy will deliver two, three-hour courses of instruction on energy efficiency in water and wastewater treatment to the Basic Water and Wastewater Operator Training Course sponsored the Sustainable Living institute of Maui (SLIM), UH Maui Campus.

  Hawaii Energy will provide eight hour trainings on energy efficiency in water and wastewater treatment facilities to employees of the Hawaii County Department of Water and Hawaii County Environmental Services, Wastewater Division.

  Hawaii Energy will participate with The Hawaii Rural Water Association in training small, private operators via their circuit rider training process. Details are pending on number of operators and plants serviced in PY14.

3.6 Energy Systems Integration Pilots

3.6.1 *Support for Benchmarking*

- *ENERGY STAR® / Hawaii Energy Benchmarking Program* – This program would have a goal of benchmarking as many as 500 facilities by raising awareness and removing barriers to using the ENERGY STAR® Portfolio Manager program. This would be achieved by automating the uploading of electrical energy data as well as prepopulating portfolio accounts to give participants a head start on completing their portfolio. Hawaii Energy would work closely with the State Department of Business, Economic Development & Tourism's Energy Office (DBEDT) to build on prior benchmarking experience and complement work already completed.

- *Green Button and ENERGY STAR® Partnering* – Direct feed using the Environmental Protection Agency (EPA)'s Portfolio Manager web services to get energy data into ENERGY STAR® Portfolio Manager

- *Hawaii Specific Tax-Map-Key (TMK) data integration* – Acquire and utilize square footage and other facility information for benchmarking and EUI.

- *Accessible by Registration Web Site to allow customers "Utility" Management tools* – This will build upon the OBF contractor site tools to provide a valuable service to track and monitor multiple site energy usage as energy projects are implemented and planned.

- *Provide full cost incentives to targeted Benchmarking Participants* - based on their initial ENERGY STAR® score to encourage participation in the ENERGY STAR® benchmarking. These can include Grants to perform Initial Energy Reviews, ENERGY STAR® Certifications and Decision Maker type metering.

3.6.2 *Codes and Standards*

3.6.2.1 Hawaii Energy 30 by 2030 – 30% Above Code Programs – Hawaii Energy proposes to use market knowledge of the current design practices and levels of code achievement in order to identify and develop concrete incentives or program support for barrier removal. From our work with the new home developers as well as review of new construction plans in the course of incentive reviews, Hawaii Energy believes that most new construction is being built above code already, due in great part to the high cost of energy in Hawaii. We propose to build upon DBEDT's work with the Hawaii Codes Council to move not only the adoption of IECC 2012 in all counties, but to determine realistic targets above the codes to support with PBFA incentives.

3.6.2.2 Assessment of Baseline Compliance – The first step in increasing compliance is to assess a baseline condition determine what the current levels of compliance are and to what extent the typical building meets the code requirements. From there we can design appropriate training and outreach and, more importantly, measure improvements over time to show success or

the need to adjust program offerings.

- Perform a Codes Compliance Survey. Any survey developed will be designed for use in measuring changes in compliance over 3 years.

- Work with the existing codes councils, county agencies, DBEDT and others to conduct a process evaluation to determine the existing level of code compliance and the need for additional support.

- Determine the extent to which the 2006 standard is achieved and what portion of the building industry is already moving towards, or in compliance with, the 2009 standard.

3.6.2.3 Code Compliance Assistance – Hawaii Energy can provide assistance to county codes officials in the review and approval of building plans. By providing expert technical assistance, Hawaii Energy can increase compliance on a local level by helping the reviewers with interpreting the technical requirements of the building code. In addition, we will help identify areas that will be impacted by adoption of the 2009 and 2012 standards. Specific areas of support may include:

- Support to Counties for Code Compliance Reviews such as Staffing Grants
- Identification and training of plan reviews to provide expert technical support
- Two-days per month of on-site assistance in each of the county codes official's offices.
- Telephone and email support to codes officials on an on-going basis.
- Review of up to 10 building plans per month to assist in the assessment of code compliance in each of county offices.

3.6.2.4 Compliance Enhancement – early adoption of IECC 2012 – There are opportunities to enhance the current building code by having more "Upstream" Engagement with the Developer/Design community to encourage builders and designers to exceed the existing code requirements. Activities may include:

- Training for builders, designers, and code officials. Series of one-day classroom sessions that may include:
  - Energy Codes Demystified – What IECC 2012 means in practical terms.
  - Sessions for code officials and builders on how to conduct a site review to determine code compliance. Sessions will use pictures and videos of construction sites.

- Sessions for architects and engineers demonstrating the use of parametrics in building energy simulations that will help to identify the most cost-effective upgrades to a variety of building types to increase building energy performance. Sessions may be broken out by building types (residential, school, retail, etc.) or other considerations.
- Incentivize early compliance

- Work with stakeholder groups to build consensus on techniques for integration of new code requirements.

3.6.3 *Demand Response Pilots*

Hawaii Energy proposes to incorporate Demand Response (DR) capacity acquisition activities to provide the Hawaiian Electric Companies (HECO) greater access to controllable loads in the following manners:

3.6.3.1 Direct Integration – The discussion of DR can be integrated into the ongoing Energy Efficiency (EE) programs as follows:

- Promote DR Capable EE Projects – The discussion and identification of DR opportunities occurs primarily within the CBEEM and BESM measures where Hawaii Energy takes a more involved and earlier role in the project development. The justification of both Building Management Control Systems is supported by both EE and DR benefits. Items such as increased submetering and control circuits can be more cost effectively implemented during major retrofits that may occur every 15 to 20 years, so catching the projects at the right time is critical to DR adoption. Details such as promotion and redirection to existing DR programs or general preparation for future capability will be coordinated with HECO.
- Education promoting Efficiency First, DR Controls Capability, and Renewable Integration – There is an opportunity to perform awareness and education campaigns to demonstrate the "loading" order as well as operational and cost benefits of coordinated project planning.

3.6.3.2 DR Technology Screening – There is a market need to understand the types of technologies that are available and useful to control for DR, as well as a need to identify the types and characteristics of technologies that are compatible controls with HECO systems. Hawaii Energy will work closely with HECO to define compatible DR implementation technologies and specifications. Further, we will survey manufacturer equipment offerings to define a series of available equipment. We will also identify DR loads that are potentially available to be controlled for the main building types in the residential and commercial sectors.

3.6.3.3 Pilot Projects – Several projects can be pursued to determine the technical opportunities and project/program costs of integration of EE and DR acquisition. Every instance would start with working with HECO and others to

determine interoperable DR devices to include in our program.

- Mandate and/or Incentivize DR Capability in SWH Installations – Hawaii Energy can implement integration of DR capable devices into the specifications for the SWH program Approved Products List. This change would impact both EE and OBF SWH installations.
  - The implementation of these devices would be an incremental cost to the overall SWH projects and should be more cost effective to acquire DR capacity.
  - Incorporation into the tune-up programs where 5 year old+ systems are being serviced and contractor is already on-site.
- Limited Incentives to Add DR Capability in EE Projects – Hawaii Energy will assign an incentive budget in the planning process and propose integration of DR capable devices into the standard Commercial Central Plant offerings.
  - Develop and test an Incentive Pilot to test viability of a financial or technical incentive motivation to drive DR acceptance and awareness
    - Budget $75,000 for direct incentives with a targeted $125/kW under DR control. This is the same as the EE customized demand value.
- Water Heater or AC Integrated DR Control Pilot – Develop a project to demonstrate Equipment integrated DR capability.
  - RFI to determine technologies available that are compatible with the planned Smart Grid network and/or identify manufacturers willing to incorporate DR capability built into their equipment.
  - Examples could be Residential Heat Pump Water Heaters and AC units and Commercial Package Rooftop AC seen in many applications.
- EV as DR Source – Hawaii Energy would integrate any EV work with capability to utilize these "rolling batteries" to achieve DR goals work as well take advantage of more static load shifting opportunities that are provided for by large scale EV penetration. Survey local business to determine EV penetration in large parking structures to evaluate the effectiveness of a daytime charging as a load shifting mechanism.
- Kihei and Wailea Maui EE/DR (and potentially other energy system integration) Pilot – There is a planned Ma'alaea-Kamali'i Transmission line on Maui that is a perfect opportunity to demonstrate the combined strength of targeted Energy Efficiency (EE) and Demand Response (DR). There is also the potential to include Smart Grid (SG), Renewable Energy (RE) and Distributed Generation (DG).

The plan would be to meet with the following agencies to determine the

scope of a potential pilot:

1. Maui County Energy Office – The County is involved in overall energy planning. In addition they control large loads in the area such as the new Kihei Police Station, Water and Wastewater facilities.
2. Maui Hotel Engineers Association – Hawaii Energy has been engaged with major hotels in Wailea for several years and there have been major reductions in energy consumption along with greater control capability designed into the projects.
3. MECO – The Utility performing the Transmission Infrastructure planning.
4. State Department of Education (DOE) / Chevron Energy Services – The State DOE has contracted with Chevron Energy Service to develop a Sustainability Master Plan and is looking for opportunities to make a showcase school. The Kamali'i Elementary School and the new Kihei High School (one of the identified drivers for the need for capacity) could be target showcase schools.
5. Wailea 670 – Developer of 1,400 unit Master Planned Community of Honua'ula.

Hawaii Energy can target the SBDIL program in the Kihei area where there is a large concentration of small businesses as well as develop targeted incentives to drive material reductions in energy usage and demand profiles.

3.6.4 *Smart Grid Support: Integration with HECO Smart Grid Project*

Hawaii Energy proposes to dedicate an engineer to the task and coordination of determining how the program can enhance implementation of smart grid project to include EE enhancements and options and coordinating these efforts with HECO. The actions will include:

- *Work with HECO* – There are several technical and coordination details that Hawaii Energy needs to understand and determine how to incorporate into EE enhancements to the initial Smart Grid roll out.
    - Communication Protocols – Understanding the communication protocols to be used is critical to the incorporation of making EE projects DR and Smart Grid ready. Hawaii Energy needs to identify manufacturers and off-the-shelf products to educate EE participants.
    - Tool Evaluations - The Silver Spring Networks customer engagement portal will be evaluated to see how it compares, complements or duplicates efforts such as OPOWER Peer Group Evaluation letters and on-line tools. Changes to the Hawaii Energy programs will be recommended as appropriate to avoid duplication and participant confusion.

- Marketing and Outreach – Hawaii Energy has already participated in HECO Smart Grid customer outreach events and it is expected that this support will continue and may be expanded in PY14.

- Targeted EE Opportunities – ID and take action with customers who are identified and desire to take action based on SG pilot.

- *Energy Usage and Program Participation Data Review* – Evaluate energy use and Hawaii Energy program participation of the initial Smart Grid Initial Phase Participants.

  - Program Participation - It is expected that there will be greater participation as there are higher levels of engagement with HECO, Blue Planet and Hawaii Energy outreach in selected communities. It is proposed that evaluation efforts be put towards the review and reporting of the results.

  - Time-of-Use Data – Hawaii Energy has direct access to the monthly energy consumption of HECO customers and time-of-use data indirectly through the PowerTracks Web Portal for selected customers. The new Smart Grid project will provide time-of-use data for 5,000 customers. Hawaii Energy will use both the coordinating engineer as well as Information Technology and Data Analysis resources to insure that this new information that will be hosted at Silver Spring Networks servers will be available and useful for the Energy Efficiency programs to make maximum use of the Smart Grid infrastructure investment.

3.6.5 *Expanded Electric Vehicle Role*

The ability for EE work to integrate with DR and EV can be used to identify opportunities for EV charging that minimize renewable curtailment and support grid reliability by integrating the three offerings.

3.6.5.1 Net Zero Electric Car Purchase Package – Work with Electric Car Dealers, Manufacturers, Auto Loan Financial institutions, HECO, DBEDT, HCEI and electric vehicle support groups to develop a program to package Energy Efficiency with Electric Vehicle purchases. Hawaii Energy has done some review for the Maui EV Association of what it would take to offset the energy that an Electric Car would consume. The result was that a Nissan Leaf will consume 8 kWh per Day for a 25 mile commute. This is less than a small window AC running for 7 hours a day. A Solar Water Heater could save a family of four around 5.7 kWh per day and with additional savings of LED lighting at almost 2 kWh per day the energy for an electric vehicle is in reach of being offset with efficiency improvements with a much smaller installation of PV required to offset the energy usage of an electric car.

- Tie Energy Efficiency and Electric Vehicles and hit the same demographic of caring and interested persons.
- Incorporate discussions on financing of EE offerings.

- Deliver the messages of the new HECO Load Curves and the ability to use the electric vehicles, water heaters and even AC loads to help shift loads to optimize the energy systems in Hawaii to be more efficient and incorporate more renewables.

3.6.5.2 Raise Awareness – Hawaii Energy can incorporate the Electric Vehicle (EV) messaging into the EE program work and provide marketing and communications support to include but not limited to:

- Outreach engagement at community events and trade shows
- Review and incorporation of Hawaii Energy branding on all public-facing documents
- Marketing promotions via print, broadcast, online, email and social media where needed and applicable
- Collateral and case study development
- Media and public relations support to highlight offer and successes.
- Participate in auto trade shows and work with local car dealerships.

3.6.5.3 Determine motivational and effective Time-of-Use Rates – Current TOU rates do not appear to drive customer investment required to provide the equipment and processes needed to support the effort. TOU rates have to drive project financials from the customer view first and foremost. Hawaii Energy has direct experience in providing technical and financial project review assistance that involved TOU rates to provide the driver. In the past five years, the current TOU rates have not demonstrated that they were factors in driving any projects forward.

Hawaii Energy could provide a review of projects found in the course of EE, EV and SG work proposed that could illuminate where TOU rates need to be to make real world decisions with real projects. This would provide a stake where the TOU rates need to be giving the Utility a target to shoot for.

The work could include a Pilot rate/incentive to demonstrate action with costs supported by the integrated benefit of the EE, DR and SG/RE acceptance benefits.

4.0 RESIDENTIAL PROGRAM STRATEGY & DETAILS

4.1 Overview

For PY14, Hawaii Energy will continue to maintain programmatic changes adopted in PY13, 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 PY14 will address the landlord/tenant barrier through direct installation of home energy saving kits. In PY14 geographic barriers will continue to be an opportunity for program targeting.

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 4.6. Appendix B contains a projection of potential energy savings for the planned programs.

Table 2
List of Residential Programs

Residential Programs
REEM - Residential Energy Efficiency Measures
High Efficiency Water Heating
High Efficiency Lighting
High Efficiency Air Conditioning
High Efficiency Appliances
Energy Efficiency Equipment Kits
Energy Awareness, Measurement and Control Systems
CESH - Custom Energy Solutions for the Home
Customized Project Measures
RESM - Residential Energy Services and Maintenance
Residential Design and Audits
Residential System Tune-Ups
RHTR - Residential Hard to Reach
Energy Efficiency Equipment Grants
Direct Installation - Residential Energy Kits

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

High Efficiency Water Heating

- *Solar Water Heater New Technology Pilots and Testing* – Hawaii Energy continually monitors the solar water heating market to track existing system performance and evaluate emerging technologies for inclusion into the Program. New technology pilots and testing efforts provide additional visibility into achieved energy savings and insight into ease of installation, perceived maintenance, and overall customer satisfaction. The ability to test and vet proposed new technologies prior to inclusion into the Program further strengthens the Hawaii Energy's industry knowledge and ability to better educate the end user.

High Efficiency Lighting

- *LED Lighting* – While not new to the residential portfolio, Hawaii Energy has witnessed a surge in the availability of ENERGY STAR® certified LED products while retail prices continue to fall. Thus, LEDS are becoming a more predominant energy saving lighting option for residential consumers. The Program closely follows availability (rising) and pricing (decreasing) in order to maintain adequate incentive levels. In response to current trends, the Program has increased the unit count to 300,000 for PY14 and decreased the average incentive level to $6.00.

High Efficiency Air Conditioning

- *Window Air Conditioning with Recycling* – This initiative targets a broader market than that reached in PY13 when incentives were issued only for inverter driven (VRF) technologies. Window units are generally recognized as more affordable and maintain a wider market penetration. The PY14 offer will extend beyond the Program's historical window air conditioner offering that was discontinued in PY11. In PY14 the Program will require the customer to surrender the old working window air conditioners in order to qualify for the rebate. Hawaii Energy will utilize existing industry partnerships to ensure proper recycling and disposal of old units.

High Efficiency Appliances

- *Set-Top Boxes Pilot* – This pilot will target 100 homes for the replacement of conventional set-top boxes with ENERGY STAR® qualified units. Using available case studies and industry working groups, Hawaii Energy will identify best practices for this type of initiative. The effort will require collaboration with service providers and manufacturers to determine the opportunities and barriers for program success.
- *Advanced Power Strips* – Hawaii Energy has previously distributed advanced power strips specifically as program giveaways. In PY14 the Program will offer

rebates for advanced power strips available at local retail locations. The initiative will be administered in a similar fashion to the upstream lighting program where the incentives will be used to buy down the cost at the point of purchase. The Program will leverage existing relationships with retailers to identify and target potential participating manufacturers.

Energy Efficiency Kits

- *Home Energy Saving Kits- Online Fulfillment* – Hawaii Energy will incentivize residential energy saving kits available for purchase online through a Program controlled web page. The kits will contain a variety of energy saving components including energy efficient light bulbs, advanced power strips, low flow showerheads and faucet aerators. Customers will be verified and kits will only be delivered to residents in the designated service area. Data gathered through the online fulfillment will allow greater insight into customer characteristics for future program targeting.

Energy Awareness, Measurement and Control Systems

- *Peer Comparison* – Hawaii Energy plans to continue the OPOWER Home Energy Report peer comparison program for 132,500 residential recipients. The program was first expanded to the neighbor islands in PY11 and then again to additional Oahu zipcodes during PY13. The market for peer comparison initiatives is evolving in PY14 to include additional analytical capabilities and geographic targeting. 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.
- *Whole House Energy Metering* – While not new to the residential portfolio, the market approach to promoting whole house offers will evolve. Specifically, Hawaii Energy will use data from industry working groups to qualify technologies and explore targeting specific high-use households to consider this measure.
- *Water Cooler Timers* – Originally introduced in PY13 as a business offering, Hawaii Energy will expand the water cooler timer incentive to residential customers as well. This program will utilize the home delivery water services providers to install digital timers on hot/cold water dispensers at no cost to customers, thus saving the stand-by losses in the cold and hot tanks during times that the systems are not being utilized. Self-service customers will also be able to request a timer for their personal water cooler through an online opt-in form linked to the Hawaii Energy website.

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

Customized Project Measures

- *Hawaii Energy Efficiency Project Auction* – Hawaii Energy will issue a call for projects in PY14 to encourage contractors and energy vendors to develop cost-effective projects that focus on high energy consumption and hard-to-reach 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 submetered if required to ensure savings performance.

4.1.3 *New Program Offerings of Residential Energy Services and Maintenance (RESM)*

Residential System Tune-Ups

- *SWH System Tune-Up* – Implemented in PY13, the Tune-Up achieved unprecedented success. As a result, Hawaii Energy will continue the Tune-Up offer on a seasonal basis. This will continue to complement the Solar Water heating marketing push and improve Program insight into system lifetime performance.
- *Central Air Conditioning Retrofit Pilot* – This initiative will look at the effectiveness of replacing mid-life central air conditioning systems. The pilot will target single-family homes (generally 15-20 years of age) with central air conditioners, that are ready to purchase a replacement system. The typical target home type will be equipped with central air conditioning units with EER of 10.0. The retrofit will consist of upgrading the primary unit to one with a higher EER of 13.0. These efforts may also require refrigerant upgrades and duct sealing which would result in higher costs for the customer.

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

Energy Efficiency Equipment Grants

- *CFL Exchange* – While not a new to the residential portfolio, the Program will expand on PY13 successes to offer CFL exchanges targeting large condo associations and community assistance programs. These groups have expressed continual interest in exchanges and have established central points of contact to facilitate the program administration. In the coming year, we will also explore the cost-effectiveness of shifting to LED exchanges.

Direct Installation

- *Multi-family Direct Install* – Multi-family property buildings will be targeted as recipients of turn-key installations of basic energy saving items for individual

units. Proposed installations include CFLs/LEDs, low-flow showerheads, faucet aerators, and advanced power strips. Program development will include market analysis and segmentation using input from state housing agencies, direct property manager outreach and tenant education efforts. All measures will be installed without customer co-pay.

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.

4.2 All Residential Programs Overview

4.3 Residential Energy Efficiency Measures (REEM)

- 4.3.1 High Efficiency Water Heating
- 4.3.2 High Efficiency Lighting
- 4.3.3 High Efficiency Air Conditioning
- 4.3.4 High Efficiency Appliances
- 4.3.5 Energy Efficiency Equipment Kits
- 4.3.6 Energy Awareness, Measurement and Control Systems

4.4 Custom Energy Solutions for the Home (CESH)

- 4.4.1 Customized Project Measures

4.5 Residential Energy Services & Maintenance (RESM)

- 4.5.1 Residential Design and Audits
- 4.5.2 Residential System Tune-Ups

4.6 Residential Hard-to-Reach (RHTR)

- 4.6.1 Energy Efficiency Equipment Grants
- 4.6.2 Direct Installation- Residential

4.2 Residential Programs Overview

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 10,439 kW Energy 70,679,061 kWh Incentive Budget $11,061,475 Cost per kWh $0.16 /kWh TRB $71,141,903
Technologies	**Incentivized Measures** — **Incentive Forecast** **Residential Energy Efficiency Measures** $8,712,683 **Custom Energy Solutions for the Home** $977,542 **Residential Energy Services & Maintenance** $310,000 **Residential Hard-to-Reach** $1,061,250 $11,061,475 • Solar Water Heating Systems $1,000 • Solar Water Heater Interest Buy Down $1,000 • Solar Water Heater- OBF contribution* $1,000 • Solar Water Heater- New Technology Pilots/Testing* $2,000 • Heat Pumps $200 • CFLs $ 1.10 • LED $6 • VRF Split System AC $200 • Window AC with Recycling* $80 • Ceiling Fans $35 • Solar Attic Fans $50 • Whole House Fans $75 • Refrigerator (Purchase only <$700) $50 • Refrigerator with Recycling $125 • Garage Refrigerator/Freezer Bounty $85 • Clothes Washers (Tier II / III) $50 • Set-Top Boxes – Pilot* $100 • Pool VFD Controller Pumps $150 • Advanced Power Strips* $15

Program Category	4.2 Residential Programs Overview Overview of All Categories	
	• Home Energy Saving Kits- Online Fulfillment*	$15
	• Room Occupancy Sensors & Timers	$5
	• Peer Group Comparison	$11.90/HH
	• Whole House Energy Metering	$100
	• Water Cooler Timers*	$15
	• Hawaii Energy Efficiency Project Auction*	$.18/kWh
	• Efficiency Inside Home Design	$600
	• Solar Water Heater Tune-Up	$150
	• Central Air Conditioning Retrofit Pilot*	$1,000
	• CFL Exchange(s)	$2.50/bulb
	• Refrigerator (with recycling) – Lanai and Molokai	$250
	• Refrigerator (with recycling) – Lanai and Molokai	$250
	• Solar Water Heater (SWH) Incentive	$11,000
	• Multi-Family Direct Install*	$129/unit
	*New or expanded measures	

4.3 Residential Energy Efficiency 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 934 kW Energy 4,376,259 kWh Incentive Budget $2,340,000 (9.5%) Cost per kWh $0.535 /kWh TRB $10,473,554
Technologies	**Incentivized** — **Incentive** — **Units** • Solar Water Heater (SWH) Incentive — $1000 — 1,800 • Solar Water Heater Interest Buydown — $1,000 — 50 • Solar Water Heater OBF Contribution — $1,000 — 350 • Solar Water New Technology Pilots/Testing — $2,000 — 40 • Heat Pumps — $200 — 300 (The following Solar Water Heater Systems budgets are included in the plan under the RHTR-Energy Efficiency Equipment Grants. See section 4.6.1) • Solar Water Heater (SWH) Incentive — $11,000 — 75 ***Total Solar Water Heating Systems*** ***$3,105,000***
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 • Operational knowledge and maintenances of technologies **Owner Occupant** • Access to and/or understanding of financial options • Time between purchase and tax refunds (carrying cost)

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.1 High Efficiency Water Heating**
Market Barriers (continued)	**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
Description & Implementation Strategies	**Solar Water Heating** *Solar Water Heater (SWH) Incentive* The program provides a $1,000 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 $1,000 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 (85%) to make sure the systems have been installed properly. • Upon successful inspection, Hawaii Energy will rebate the contractor $1,000. *Solar Water Heater Interest Buydown* The program works with participating lending institution to provide an incentive to buy down the interest charges for loans 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 works with a participating contractor to complete the standard installation process.

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.1 High Efficiency Water Heating**
Description & Implementation Strategies (continued)	*Solar Water Heater (SWH) Incentive – OBF Contribution* For PY14, Hawaii Energy has allocated funding specifically for solar hot water systems installed through the upcoming Bill $aver (On-Bill Financing) program. The customer will work the contractor to determine eligibility for the program. Once approved, these systems will be installed in accordance with the specifications for the standard incentives. *Solar Water Heater – New Technology Pilots and Testing* Hawaii Energy continually monitors the solar water heating market to track existing system performance and evaluate emerging technologies for inclusion into the Program. New technology pilots and testing efforts provide additional visibility into achieved energy savings and insight into ease of installation, perceived maintenance, and overall customer satisfaction. The ability to test and vet proposed new technologies prior to inclusion into the Program List further strengthens the Program's industry knowledge and ability to better educate the end user. **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. **Implementation With Clean Energy 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	• Continual solicitation of new participating lenders to offer loan interest buy down incentive • Cooperative Marketing funds for solar contractors and lenders • Additional metering and data collection efforts to evaluate energy savings and system performance
Marketing Strategies	• Comprehensive marketing initiative including online, print, TV and radio advertising • Direct contact with participating solar contractors • Community event promotion of High Efficiency Water Heating • Listing of participating contractors and solar water heating resources on our website

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 6,430 kW Energy 45,333,669 kWh Incentive Budget $3,230,000 (13%) Cost per kWh $0.071 /kWh TRB $43,732,048
Technologies	**Incentive** **Units** CFLs $1.10 1,300,000 LED $6.00 300,000
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 manufacturer direct incentives which are provided as point of sale cost reductions. The process includes: • Distributors, retailers and manufacturers complete a program application in which they commit to advertising and promotion for instant rebates for the CFL and LEDs sold to customers. • Participating retailers 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. • Manufacturers provide accurate, timely data on point of purchase information by store by SKU for rebate reimbursement. **Implementation with Clean Energy 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, Westinghouse, TCP and Philips. The participating LED manufacturers are: Cree, Feit, Philips, GE, and Lighting Science Group. Participating retailers include: City Mill, Costco, Don Quijote, Foodland, Home Depot, Longs Drugs/CVS, Safeway, Sam's Club, Times and Wal-Mart who have all utilized their buying power to offer a better blend of quality, affordable CFLs and LEDs across the State.
Key Changes	• Increased unit numbers and reduced incentive levels for LEDs to reflect market changes. • 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 • Educational information online and in the media to inform customers on best practices for purchasing CFLs and LEDs • Advertisements to explain how to select a CFL or LED • Leverage allies to share CFL information and increase participation • Encourage an increase in selection of CFLs available • Promotion via 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 370 kW Energy 954,553 kWh Incentive Budget $382,500 (1.6%) Cost per kWh $0.401 /kWh TRB $2,651,957
Technologies	**Incentive** / **Units** VRF Split System AC $200 700 Window AC with Recycling $80 1,000 Ceiling Fans $35 3,500 Solar Attic Fans $50 200 Whole House $75 400
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 • Homeowner 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 **Renters and Lessees** • Do not have the authority or responsibility for the HVAC system • May not pay for electricity

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. **Implementation with Clean Energy Allies** We will continue to build relationships with manufacturers, 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. We will also use industry working groups as a resource to identify appropriate efficiency standards when qualifying technologies to be incentivized.
Key Changes	• Addition of window air conditioning with recycling incentive. Rebate available for the purchase of an ENERGY STAR® qualified window AC provided an old working unit is surrendered. • The Program will continue to encourage variable refrigerant flow (VRF) inverter split system units with additional input from manufacturers and local distributors.
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 • Promotion via 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	256	kW
Energy	4,720,829	kWh
Incentive Budget	$825,000	(3.4%)
Cost per kWh	$0.175	/kWh
TRB	$6,086,287	

Technologies

	Incentive	Units
Refrigerator (Purchase only, <$700)	$50	500
Refrigerator with Recycling	$125	5,000
Garage Refrigerator/Freezer Bounty	$85	500
Clothes Washer (Tier II / III)	$50	2,000
Set Top Box Replacement- Pilot	$100	100
Pool VFD Controller Pumps	$150	100
Advanced Power Strips	$15	500

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
- Homeowner 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

Renters and Lessees

- Do not have the authority or responsibility for the appliances
- May not pay for electricity

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.4 High Efficiency Appliances**
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 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.
Key Changes	• Continue to improve quality control and reporting of recyclers • Increase price cap for ENERGY STAR® refrigerator (purchase new only) rebates to $750 to appropriately reflect market trends • Initiate set-top box replacement pilot • Develop new incentive for Advanced Power Strips
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 • Identify organizations to assist with appliance outreach • Advertise the Garage Refrigerator/Freezer Bounty offer as "Rid-A-Fridge"

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.5 Energy Efficiency Kits**
Target Market	**General** • Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers
Impacts	Demand 93 kW Energy 560,262 kWh Incentive Budget $37,500 (0.2%) Cost per kWh $.067/kWh TRB $439,669
Technologies	**Incentive** **Units** Energy Saving Kits- Online Fulfillment $15 2,500
Market Barriers	**General** • Lack of understanding of how energy is used in the home • Awareness of technologies • Understanding of best application • Installation
Description & Implementation Strategies	This program offers a basic introduction to energy saving opportunities in the home. Incentivized home energy saving kits will be made available for purchase online at a Program managed website. The kits will contain a variety of energy saving components including but not limited to: • Energy efficient light bulbs (LEDs or CFLs) • Advanced power strips • Low-flow showerheads • Faucet aerators **Implementation with Clean Energy Allies** Hawaii Energy will work with Clean Energy Allies and online retailers to establish a website where customers can purchase the incentivized home energy saving kit. The website will be customized to reflect Hawaii Energy educational messaging and customer location will be verified to ensure delivery only to residents in the designated service area. By providing an easy online form for residents to complete and shipping direct to the home, the Program hopes to overcome the barriers some residents face when evaluating multiple products available at retail locations. Data gathered through the online fullfillment will allow greater insight into customer characteristics and support future program targeting.

Program Category	**4.3 Residential Energy Efficiency Measures** **4.3.6 Energy Awareness, Measurement and Control Systems**
Target Market	**General** • Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers
Impacts	Demand 1,959 kW Energy 6,718,073 kWh Incentive Budget $1,897,683 (7.7%) Cost per kWh $0.282 /kWh TRB $2,049,044
Technologies	**Incentives** / **Units** Room Occupancy Sensor & Timers $5 200 Units Peer Group Comparison- Phase 1/2/3 $11.90 132,500 Homes Whole House Energy Metering $100 200 Units Water Cooler Timers $15 20,000 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 to 132,500 households. The program began in the Ewa region on Oahu (which was formerly funded with ARRA) and expanded across the neighbor islands (Hawaii, Maui, Lanai and Molokai) in PY11. It expanded again in PY13 to include multiple zip codes on leeward and windward Oahu. Our strategy will look for ways to affect measurable energy savings through behavior change. The market for peer comparison initiatives is evolving in PY14 to include additional analytical capabilities and geographic targeting. **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** **4.3.6 Energy Awareness, Measurement and Control Systems**
Description & Implementation Strategies (continued)	**Water Cooler Timers** Hawaii Energy will provide water cooler timers to residential customers through a web-based opt in offering. The Program will target 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. Educational videos and instructional guides to setting the timer will be made available at the time of request. **Implementation** The Program will continue to test distribution methods for room occupancy sensors and timers. We will reflect on lessons learned from the PY12 upstream implementation and incoming data from the online fulfillment initiative to inform targeting of the offer. 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. 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. The Water Cooler Timer program will utilize the home delivery water services providers to install digital timers at no cost to customers. Self-service customers will also be able to request delivery of a timer for their personal water cooler through an opt-in form linked to the Hawaii Energy website.
Key Changes	• Research and development of standards for Whole House Energy Metering incentive • Residential Water Cooler Timer initiative • Targeting for room occupancy sensor and timer distribution
Marketing Strategies	• Public relations and media opportunities stemming from Home Energy Reports • Three program specific marketing modules to be developed for printed Home Energy Reports • Integration of historical program participation data to Home Energy Report messaging • Collaboration with home delivery water service providers to deliver educational energy efficiency messages for water cooler timer recipients

4.4 Custom Energy Solutions for the Home

Program Category	**4.4 Custom Energy Solutions for the Home** **4.4.1 Custom Project Measures**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers • Mechanical and Solar Service Contractors
Impacts	Demand 0 kW Energy 5,973,595 kWh Incentive Budget $977,542 (4%) Cost per kWh $0.163 /kWh TRB $2,998,778
Technologies	**Incentive** **Units** Energy Efficiency- Project Auctions $0.18/kWh 5,430,788 kWh
Market Barriers	There were previously no mechanisms to accept "customized" residential energy efficiency proposals.
Description & Implementation Strategies	**Energy Efficiency- Project Auctions** Hawaii Energy will issue a call for projects in PY14 to solicit innovative, cost-effective projects that focus on energy efficiency in high-consumption and hard-to-reach homes. Projects must meet a total dollar per kWh savings target. **Implementation** Eligible projects in this auction will be any new technology, marketing approach or offering not currently served by existing Hawaii Energy programs. This initiative should increase customer satisfaction and participation in the energy efficiency program by allowing 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 submeters if required, to insure savings performance.
Key Changes	• New initiative
Marketing Strategies	• Direct contact with participating energy professionals • Direct contact with Property Managers and AOAOs

4.5 Residential Energy Services & Maintenance

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.1 Residential Design and Audits**
Target Market	• Residential Home Developers
Impacts	Demand 40 kW Energy 222,630 kWh Incentive Budget $60,000 (0.2%) Cost per kWh $0.27 /kWh TRB $428,620
Technologies	**Incentive** **Units** Efficiency Inside Home Design $600 100 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	The Efficiency Inside Home Design program uses 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. These efforts encourage interaction with the developer to maximize utilization of incentives through comparing model scenarios. It also demonstrates to the home building industry the value of building above code leading to a more energy efficient and cost-effective home. PY14 will be the final year of the Efficiency Inside program as Hawaii Energy will focus on designing programs for removing barriers to adoption of higher Codes and Standards moving forward. **Implementation** Hawaii Energy works with HERS raters and a number of developers to identify the pipeline of projects annually.
Key Changes	• Increased collaboration with developers to model and evaluate multi-family designs • Sunset of measure
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

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.2 Residential System Tune-Ups**
Target Market	• Homeowners, Landlords, Tenants and Property Managers • Manufacturers, Distributors, Dealers and Retailers • Mechanical and Solar Service Contractors
Impacts	Demand 105 kW Energy 499,581 kWh Incentive Budget $250,000 (1%) Cost per kWh $0.50 /kWh TRB $640,012
Technologies	**Incentive** / **Units** Solar Water Heater Tune-Up $150 1,000 Systems Central Air Conditioning Retrofit Pilot $1,000 100 Systems
Market Barriers	**General** • Lack of awareness of need for maintenance • Resistance to engage unknown contractors • High up front cost
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 and customer **Central Air Conditioning Retrofit- Pilot** • This pilot will explore the effectiveness of replacing central air conditioning units popularly installed in residential single family developments in the early 2000's. The retrofit will consist of upgrading the primary unit, typically with an EER of 10.0, to one with a higher EER of 13.0. • The higher incentive of $1,000 is designed to offset the cost of this work which is expected to require a significant investment from the customer. **Implementation** The program will conduct outreach sessions with existing contractors, both solar and HVAC, to promote the programs, solicit feedback for more efficient program operation, and identify opportunities for implementation and coordination of efforts.

Program Category	**4.5 Residential Energy Services & Maintenance** **4.5.2 Residential System Tune-Ups**
Key Changes	• Central Air Conditioning Retrofit Pilot
Marketing Strategies	• Direct contact with Solar and AC Contractors • Provide collateral to Clean Energy 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

4.6 Residential Hard-to-Reach (RHTR)

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 100 kW Energy 766,968 kWh Incentive Budget $900,000 (0.6%) Cost per kWh $1.17 /kWh TRB $1,016,954
Technologies	**Incentive** / **Units** CFL Exchange $2.50/Lamp 10,000 Lamps Refrigerator (w/recycling) Lanai and Molokai Equity $250 200 units Solar Water Heater (SWH Incentive) $11,000 75 Systems
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	**Implementation** **CFL Exchange** The Program encourages community organizations to participate in a CFL exchange as an energy saving and fundraising opportunity. Hawaii Energy provides CFL lamps free of charge to the groups so they can exchange with incandescent lamps. The group receives an incentive to the participating organization for each lamp exchange. **Refrigerator (with recycling) Lanai and Molokai equity** Building on existing relationships with local haulers/recyclers, the Program will expand its ENERGY STAR® refrigerator trade-up with recycling program to retail locations on Lanai and Molokai. **Solar Water Heater Incentive** The Program will continue to work with community assistance programs to identify hard-to-reach residential households to receive fully-funded solar water heating systems.
Key Changes	• Increased focus and penetration of direct install and educational outreach • CFL exchanges targeting large condo associations as a result of PY13 interest and feedback

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 Direct Installation**
Target Market	• Associations of Apartment Owners • Property Managers • Landlord/Tenants
Impacts	Demand 150 kW Energy 552,642 kWh Incentive Budget $161,250 (3%) Cost per kWh $0.292 /kWh TRB $624,982
Technologies	**Incentive** **Units** Multi-family Direct Install $129/unit 1,250
Market Barriers	• Lack of understanding of energy efficiency benefits • Renter and Lessee reluctance to invest in property
Description & Implementation Strategies	Multi-family property buildings will be targeted as recipients of turn-key installations of basic energy saving items for individual tenant units. Proposed installations include CFLs/LEDs, low-flow showerheads, faucet aerators, and advanced power strips. **Implementation** All measures will be direct install with no customer co-pay required. Hawaii Energy will manage customer education, scheduling and installation. Recipient recruiting will include market analysis and segmentation using input from State housing agencies, direct property manager outreach and tenant education. The multifamily direct install initiative could also take advantage of creative and cost effective proposals submitted under the Energy Efficiency Auction program.
Key Changes	• New initiative
Marketing Strategies	• Direct contact with State housing agencies, property managers, AOAOs, and landlords • Community event promotion • Print advertising and social media

5.0 BUSINESS PROGRAM STRATEGY & DETAILS

5.1 Overview

For PY14, Hawaii Energy will continue with its programmatic philosophies from PY13, 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 Business Program offerings can be found in the table below followed by a brief summary of any additions and changes. A detailed description of the Business Program follows in sections 5.2 through 5.5. Appendix B contains a projection of potential energy savings for the planned programs.

Table 3
List of Business Programs

Business Programs
BEEM - Business Energy Efficiency Measures
High Efficiency Water Heating
High Efficiency Lighting
High Efficiency HVAC
High Efficiency Water Pumping
High Efficiency Motors
Commercial Industrial Processes
Building Envelope Improvements
High Efficiency Appliances
Energy Star Business Equipment
Direct Install - Residential Energy Kits
Energy Awareness, Measurement and Control Systems
CBEEM - Customized Business Energy Efficiency Measures
Customized Project Measures
BESM - Business Energy Services and Maintenance
Benchmarking, Codes and Standards
Business Design, Audits and Commissioning
BHTR - Business Hard to Reach Programs
Business Direct Installation
Energy Efficiency Equipment Grants
Restaurant Targeted Participation Programs

5.1.1 *New Program Offerings of Business Energy Efficiency Measures (BEEM)*

High Efficiency Lighting

- For PY14 Hawaii Energy will add a prescriptive incentive for LED Street and Parking Lot Lighting. Participation for these measures significantly increased in PY13 and seems to be increasingly popular. Therefore, for ease of participation and for increase certainty in the incentive amount for the customer Hawaii Energy will create a prescriptive incentive for these measures. Incentive level would vary depending on the wattages of the existing fixture.

High Efficiency HVAC

- Central Chiller Plant >15% Better Than Code – Significant savings can be achieved with this measure particularly when you consider the life expectancy of a chiller is 20 years. However, due to budget constraints in PY13 the incentive for this measure was reduced. However after reviewing the performance of this incentive throughout the year, it's possible that the incentive was reduced to a level that may not have sufficiently influenced the market. Therefore for PY14 the incentive is being increased back up to the $50 per ton level it was at in PY13.
- 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 slightly from the PY13 program to continue to encourage a methodical selection 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

- Wastewater – Wastewater facilities are 24/7 facilities that have specific technical requirements, high capital costs and long procurement processes. This targeted program will continue practices started in PY13 to target the two highest energy consumers in the plants; aeration systems & UV lighting through process improvements. Lessons learned from PY13, specifically the potentially long procurement cycle of these facilities, will be incorporated into the program in PY14 and Hawaii Energy will continue to pursue projects that we identified in PY13.

Seawater Cooling

- Hawaii Energy will continue to support this evolving project in PY14 through metering and providing ad hoc resources as needed. The Program will pay incentives as directed in earlier proceedings upon installation and startup of the SWAC system.

5.1.2 *New Program Offerings of Customized Business Energy Efficiency Measures (CBEEM)*

Customized Project Measures

- Target Cost per KWh Call for Projects – There is a potential to utilize a program that will provide an open opportunity for achieving energy efficiency by developing cost-effective projects that focus on high energy consumption businesses. The program would be part of the customized measures and be a formal call for projects that meet a total dollar per kWh savings target and allow the market to be creative in how it is achieved. The projects will use utility metered data and if needed, will be submetered to ensure savings performance.

5.1.3 *New Program Offerings of Building Energy Services and Maintenance (BESM)*

Business Design, Audits and Commissioning

- Decision Maker: Real-Time Submeters – 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)*

Restaurant Targeted Participation Programs

- Low-Flow Spray Rinse Nozzles – 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

- ENERGY STAR® Kitchen Equipment – This program will focus on raising awareness of energy efficiency options when replacing equipment at end-of-life. In addition, Hawaii Energy will investigate a refrigeration door gasket replacement program. Bad gaskets overwork refrigeration and freezer compressors by simply allowing cold air to leak. Hawaii Energy conducted a pilot installation in PY13 of new door gaskets with very encouraging results. Hawaii Energy plans to continue this work in PY14.

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.

5.2 All Programs Overview

5.3 Business Energy Efficiency Measures (BEEM)

- 5.3.1 High Efficiency Lighting
- 5.3.2 High Efficiency HVAC
- 5.3.3 High Efficiency Water Heating
- 5.3.4 High Efficiency Water Pumping
- 5.3.5 High Efficiency Motors
- 5.3.6 Commercial Industrial Processes
- 5.3.7 Building Envelope Improvements
- 5.3.8 ENERGY STAR® Business Equipment
- 5.3.9 Energy Awareness, Measurement and Control Systems

5.4 Custom Business Energy Efficiency Measures (CBEEM)

- 5.4.1 Customized Project Measures

5.5 Business Energy Service & Maintenance (BESM)

- 5.5.1 Business Direct Installation
- 5.5.2 Business Design, Audits and Commissioning

5.6 Business Hard to Reach (BHTR)

- 5.6.1 Energy Efficiency Equipment Grants
- 5.6.2 Landlord, Tenant, AOAO Measures

5.2 Overview of All Business Programs

Program Category	5.2 All Business Programs Overview of All Business Programs
Target Markets	**Competitive Commercial** o Office Buildings o Retail **Governmental** o City o State o Federal **Industrial Sector** o Warehousing o Cold Storage o Water Pumping o Manufacturing **Multi-Site** o Convenience Stores o Restaurants **High Load Factor Customers** o Hospitals o Hotels o Super Markets o Data Centers **Multi-Family Commercial Rate** o AOAO o AOAO - Mixed Use
Projected Impacts	Demand 6,811 kW Energy 64,137,162 kWh Incentive Budget $13,519,581 Cost per kWh $0.2108 /kWh TRB $89,598,016
Incentives	**Measure Categories** — **Incentives** 5.3 Business Energy Efficiency Measures $ 4,809,550 5.4 Custom Business Energy Efficiency Measures $ 3,025,011 5.5 Business Service and Maintenance $ 2,437,500 5.6 Business Hard-to-Reach $ 3,247,520 $ 13,519,581

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. 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.

Program Category	**5.2 All Business Programs** **Overview of All Business Programs**
Description & Implementation Strategies (continued)	**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	• Expand prescriptive selections for LED lamps that achieve ENERGY STAR®, Design Lights Consortium or Lighting Facts status • Chiller incentives based on kWh savings, Chiller selection model and kW/ton BTU metering • ENERGY STAR® Commercial Kitchen Equipment
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.

5.3 Business Energy Efficiency Measures

Program Category	5.3 Business Energy Efficiency Measures BEEM Programs Overview

Projected Impacts

Demand	4,911	kW
Energy	31,989,281	kWh
Incentive Budget	$4,809,550	(20%)
Cost per kWh	$0.1503	/kWh
TRB	$ 53,089,674	

Incentives

	Incentives
High Efficiency Lighting	$2,014,500
High Efficiency HVAC	$1,190,000
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	$41,250
High Efficiency Appliances	$7,950
ENERGY STAR® Business Equipment	$2,500
Direct Install – Residential Energy Kits	$161,250
Energy Awareness, Measurement and Control Systems	$190,000

*These are residential end-use measures installed in multi-family dwellings billed by HECO as commercial accounts.

Program Category

5.3 Business Energy Efficiency Measures
5.3.1 High Efficiency Lighting

Projected Impacts

Demand	3,227	kW
Energy	23,000,274	kWh
Incentive Budget	$ 2,014,500	(8%)
Cost per kWh	$0.0876	/kWh
TRB	$ 35,779,064	

Incentives

	Incentive	Units	
CFL	$2.00	16,100	Lamps
T12 to T8 (2&3 foot lamps)	$6.00	100	Lamps
T12 to T8 Low Wattage	$10.00	32,500	Lamps
T8 to T8 Low Wattage	$5.50	110,000	Lamps
Delamp	$5.00	1,210	Lamps Removed
Delamp/Reflector	$7.50	2,600	Lamps Removed
LED Refrigerated Case Light	$75.00	500	Lamps
ENERGY STAR® LED			
-non-dimmable existing	$7.00	50,000	Lamps
-dimmable w/controls	$10.00	40,000	Lamps
-non-dimmable A19 existing	$7.00	5,000	Lamps
-dimmable A19 new	$7.00	3,250	Lamps
LED Exit Signs	$20.00	1,000	Signs
LED Fixtures	$30.00	200	Fixtures
LED Street and Parking Lot Fixtures	$35.00	1,000	Fixtures
Ceramic Metal Halide	$40.00	400	Lamps
Sensors	$20.00	2,250	Sensors
Stairwell bi-level dimming Fluorescent	$50.00	1000	Fixtures

Key Changes

For PY14 Hawaii Energy will add a prescriptive incentive for LED Street and Parking Lot Lighting. Participation for these measures significantly increased in PY13 and seems to be increasingly popular. Therefore, for ease of participation and for increase certainty in the incentive amount for the customer Hawaii Energy will create a prescriptive incentive for these measures. Incentive level would vary depending on the wattages of the existing fixture. Proposed incentives are detailed in the following table.

Existing Fixture Wattage	Incentive
Replace 311–400 watt lamp with LED	$115/fixture
Replace 251–310 watt lamp with LED	$90/fixture
Replace 201–250 watt lamp with LED	$70/fixture
Replace 151–200 watt lamp with LED	$60/fixture
Replace 101–150 watt lamp with LED	$50/fixture
Replace 71–100 watt lamp with LED	$40/fixture
Replace up to 70 watt lamp with LED	$30/fixture

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC**

Projected Impacts

Demand	755	kW
Energy	4,186,536	kWh
Incentive Budget	$ 1,190,000	(5%)
Cost per kWh	$0.2842	/kWh
TRB	$ 8,346,542	

Incentives

	Incentive	Units
Central Chiller Plant > 15% Better than Code	$50	6,400 Tons
Chillers – kW/ton meter and Chiller Curve Optimization	$5,000	25 Systems
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 Central Plant ->15% Better than Code Chillers**
Projected Impacts	Demand 206 kW Energy 1,457,214 kWh Incentive Budget $ 320,000 (1%) Cost per kWh $0.22 /kWh TRB $3,086,953
Incentives	**Incentive** **Units** Chillers $50 6,400 Tons
Description & Implementation Strategies	This incentive will be targeted at chillers, both air-cooled and water- cooled, that have efficiencies at least 15% better than code efficiency requirements in place at the time of permitting the project. This is a change from PY13 where only water-cooled chillers qualified for this incentive. Throughout PY13 a number of air-cooled chiller were processed as customized incentives. Applying this prescriptive incentive to air-cooled chiller that exceed code by more than 15%, greatly simplifies the process for customers and provides a greater assurance of the exact value of the incentive. Significant savings can be achieved with this measure particularly when you consider the life expectancy of a chiller is 20 years. However, due to measure cost-effectiveness constraints in PY13, the incentive for this measure was reduced. However after reviewing the performance of this incentive throughout the year, it's possible that the incentive was reduced to a level that may not have sufficiently influenced the market. Therefore for PY14 the incentive is being increased back up to the $50/ton level it was at in PY13.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.2 Chillers – kW/ton meter & Chiller Curve Optimization**
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 125,000 (1%) Cost per kWh 0 /kWh TRB 0
Incentives	**Incentive** **Units** Chillers $5,000 25 Systems
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 BTU metering will allow building operators to know exactly how efficient the chiller is running at all times including part load and full load conditions. This should allow the building operator to continuously optimize and maintain the chiller producing of energy savings over time. At this time it is not known what savings will be generated by this measure; consequently, this incentive will be run as a pilot program subject to review and approval of how savings will be determined. Once determined the savings methodology will be included in the TRM for 2014 Programs. **Target Audience** Who – Property Managers, Facilities Directors, Chief Engineers and Governmental Facilities Departments What – Large Commercial facilities **Incentive & Targeted Economics** After seeing lackluster participation in the chiller optimization program in PY13 that was based on the eventual installation of an optimized chiller, it was determined the ultimate goal of this incentive was to get vital information to the building operators once the chiller is installed. Therefore Hawaii Energy elected to modify this measure to a copayment for the installation of BTU metering when a new chiller is installed. Once this metering is installed it is believed that building operators will avail themselves of the increased information in order to run their chillers optimally. **Customer Qualifications** Customers with existing chillers include centrifugal, screw, scroll and reciprocating, approaching the end of their useful life. **Application Process** The following will be completed and submitted for review • Rebate Application , AC Chiller Rebate Worksheet

	• Chiller Equipment type (centrifugal, screw, reciprocating) • BTU metering configuration **Complementary Programs** • Customized Project Measures

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.3 Garage Active Ventilation Control**
Projected Impacts	Demand 94 kW Energy 824,963 kWh Incentive Budget $ 120,000 (1%) Cost per kWh $0.15 /kWh TRB $ 854,628
Incentives	**Incentive** **Units** 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, not to exceed 85% of the total project cost. **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 –T8 / T5 / Occupancy Sensors /Timers

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.2 High Efficiency HVAC** **5.3.2.4 Package Units – 15% Better Than Code**
Projected Impacts	Demand 38 kW Energy 227,772 kWh Incentive Budget $ 100,000 (1%) Cost per kWh $0.44 /kWh TRB $ 426,163
Incentives	**Incentive** **Units** 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 at or above 15% better than IECC 2006 energy codes. **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** **5.3.2.5 Variable Refrigerant Flow Air Conditioners – Existing Facility**
Projected Impacts	Demand 117 kW Energy 837,378 kWh Incentive Budget $ 425,000 (2%) Cost per kWh $0.51 /kWh TRB $ 1,770,160
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. **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** **5.3.2 High Efficiency HVAC** **5.3.2.7 VFD – AHU** **5.3.2.8 VFD – Chilled Water / Condenser Water**
Projected Impacts	Demand 299 kW Energy 839,210 kWh Incentive Budget $ 100,000 (<1%) Cost per kWh $0.12 /kWh TRB $ 2,208,638
Incentives	**Incentive** / **Units** VFD – AHU $50 1,200 hp VFD – Chilled Water / Condenser Water $80 500 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 (3-100 HP for existing facilities and 3-25 HP for new facilities) incentive. HVAC Pumps (VFD): The offering of a prescribed $80 per pump HP controlled (3-100 HP and 3-50 HP for new facilities) incentive for both existing and new construction 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** **5.3.2.7 VFD – AHU** **5.3.2.8 VFD – Chilled Water / Condenser Water**
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** **5.3.3 High Efficiency Water Heating**		
Projected Impacts	Demand	440	kW
	Energy	1,432,151	kWh
	Incentive Budget	$826,200	(3%)
	Cost per kWh	$0.58	/kWh
	TRB	$4,056,658	
Incentives		**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 136 kW Energy 48,805 kWh Incentive Budget $ 22,500 (<1%) Cost per kWh $0.431 /kWh TRB $ 609,093
Incentives	**Incentive** **Units** 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, the latter two receiving a smaller incentive commensurate with their lesser energy savings. 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.
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 Single Family SWH Incentive**
Projected Impacts	Demand 304 kW Energy 1,383,347 kWh Incentive Budget $ 803,700 (4%) Cost per kWh $0.58 /kWh TRB $3,447,565
Incentives	**Incentive** / **Units** Heat Pumps -Electric Resistance $120 / 20 Tons -Upgrade $65 / 20 Tons Single Family 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 Single Family 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. The construction of these homes was delayed in PY13, consequently Hawaii Energy committed to the Military to continue to honor the incentive in PY14. **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	36	kW	
	Energy	396,118	kWh	
	Incentive Budget	$ 99,900	(1%)	
	Cost per kWh	$0.25	/kWh	
	TRB	$616,691		
Incentives			**Incentive**	**Units**
	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 – added HP Reduction** **5.3.4.2 VFD Dom. Water Booster Packages – VFD ($3K per Sys.)**
Projected Impacts	Demand 24 kW Energy 257,153 kWh Incentive Budget $ 47,400 (<1%) Cost per kWh $0.183 /kWh TRB $ 404,845
Incentives	**Incentive** **Units** VFD Dom. Water Booster Packages – VFD $3,000 15 units 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 $3,000 for the VFD booster pump system plus another $80 per HP reduction 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 – added HP Reduction** **5.3.4.2 VFD Dom. Water Booster Packages – VFD ($3K per Sys.)**
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 12 kW Energy 138,965 kWh Incentive Budget $ 52,500 (<1%) Cost per kWh $0.38 /kWh TRB $211,846
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 $225 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 Tier 1+ Premium Efficiency Motors** **5.3.5.2 ECM- Fan Coil Fans** **5.3.5.3 ECM w/ Controller- Evaporator Fan Motors**
Projected Impacts	Demand 133 kW Energy 1,170,061 kWh Incentive Budget $ 151,000 (<1%) Cost per kWh $0.13 /kWh TRB $ 1,929,681
Incentives	**Incentive** / **Unit** 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 Tier 1+ Premium Efficiency Motors** **5.3.5.2 ECM- Fan Coil Fans** **5.3.5.3 ECM w/ Controller- Evaporator Fan Motors**
Description & Implementation Strategies (continued)	**Incentive & Targeted Economics** The current $10/hp incentive was designed 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	471,012	kWh	
	Incentive Budget	$ 125,000	(2%)	
	Cost per kWh	$0.27	/kWh	
	TRB	$ 841,722		
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 325,819 kWh Incentive Budget $ 105,000 (1%) Cost per kWh $0.32 /kWh TRB $ 612,895
Incentives	**Incentive** **Unit** 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 145,193 kWh Incentive Budget $ 20,000 (<1%) Cost per kWh $0.14 /kWh TRB $ 228,827
Incentives	**Incentive** / **Unit** 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	31	kW
	Energy	121,682	kWh
	Incentive Budget	$ 41,250	(<1%)
	Cost per kWh	$0.34	/kWh
	TRB	$ 201,697	
Incentives		**Incentive**	**Unit**
	Window Tinting	$0.85/sq.ft.	25,000 sq.ft.
	Cool Roof Technologies	$0.20/sq.ft	100,000 sq.ft.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.7 Building Envelope Improvements** **5.3.7.1 Cool Roof Technologies**
Projected Impacts	Demand 4 kW Energy 20,624 kWh Incentive Budget $ 20,000 (<1%) Cost per kWh $0.97 /kWh TRB $ 30,802
Incentives	**Incentive** **Unit** Cool Roof Technologies $0.20/sq.ft 100,000 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* – Rebates 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** **5.3.7 Building Envelope Improvements** **5.3.7.2 Window Tinting**

Projected Impacts

Demand	27	kW
Energy	101,058	kWh
Incentive Budget	$ 21,250	(<1%)
Cost per kWh	$0.21	/kWh
TRB	$ 170,895	

Incentives

	Incentive	Unit
Window Tinting	$0.85/sq.ft.	25,000 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* – Rebates 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. 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

This incentive is targeted to provide a 25% cost reduction for the installation.

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** **5.3.8 ENERGY STAR® Business Equipment** **5.3.8.1 ENERGY STAR® Office Refrigerators w/Recycling**
Projected Impacts	Demand 1 kW Energy 33,906 kWh Incentive Budget $ 2,500 (<1%) Cost per kWh $0.07 /kWh TRB $ 43,871
Incentives	**Incentive** **Unit** ENERGY STAR® Refrigerators w/Recycling $125/unit 20 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 $125 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 High Efficiency Appliances**		
Projected Impacts	Demand	2	kW
	Energy	41,226	kWh
	Incentive Budget	$ 7,950	(<1%)
	Cost per kWh	$0.19	/kWh
	TRB	$ 54,295	

	Incentive	Unit
AOAO Clothes Washer (Tier II/III)	$50	24
AOAO Refrigerator (Purchase New Only)	$50	10
AOAO Refrigerator (with recycling of old)	$125	50

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.10 Energy Awareness, Measurement and Control Systems**			
Projected Impacts	Demand	84	kW	
	Energy	721,793	kWh	
	Incentive Budget	$ 190,000	(1%)	
	Cost per kWh	$0.26	/kWh	
	TRB	$ 750,717		
Incentives		**Incentive**	**Unit**	
	Hotel Room Occupancy Controls	$100	500	
	Condominium Submetering	$200	500	units metered
	Small Business Submetering	$200	100	units metered
	Vending Machine Energy Control Systems	$200	100	

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.10 Energy Awareness, Measurement and Control Systems** **5.3.10.1 Condominium Submetering**
Projected Impacts	Demand 24 kW Energy 112,607 kWh Incentive Budget $ 100,000 (1%) Cost per kWh $0.89 /kWh TRB $ 143,720
Incentives	**Incentive** **Unit** Condominium Submetering $200 500 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 submeters 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 submeters, 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 $200 per unit metered incentive is payable to the AOAO towards the purchase and installation of a third party submetering 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 submetering 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** **5.3.10 Energy Awareness, Measurement and Control Systems** **5.3.10.1 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 found a 22.7% reduction on the projects they reviewed, but recommended no change to the 10% reduction assumption. **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 (submetered 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. • Submetering 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 submetering 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. • 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 • Domestic Water Heating

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.10 Energy Awareness, Measurement and Control Systems** **5.3.10.2 Hotel Room Occupancy Controls**
Projected Impacts	Demand 41 kW Energy 309,361 kWh Incentive Budget $ 50,000 (1%) Cost per kWh $0.17 /kWh TRB $ 335,550
Incentives	**Incentive** **Unit** Hotel Room Occupancy Controls $100 500
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** **5.3.10 Energy Awareness, Measurement and Control Systems** **5.3.10.3 Small Business Submetering**
Projected Impacts	Demand 9 kW Energy 33,856 kWh Incentive Budget $ 20,000 (<1%) Cost per kWh $0.59 /kWh TRB $ 49,143
Incentives	**Incentive** **Unit** Small Business Submetering $200 100 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. • $200 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 2014 Programs.

Program Category	**5.3 Business Energy Efficiency Measures** **5.3.11 Direct Install – Residential Energy Kits**
Projected Impacts	Demand 112 kW Energy 414,482 kWh Incentive Budget $ 161,250 (<1%) Cost per kWh $0.39 /kWh TRB $ 468,736
Incentives	**Incentive** **Unit** Multi-Family Direct Install Energy Savings Kits $129/unit 1,250 units
Description & Implementation Strategies	Multi-Family Direct Install – Multi-family property buildings will be targeted as recipients of turn-key installations of basic energy saving items for individual units. Proposed installations include CFLs/LEDs, low flow showerheads, faucet aerators, and advanced power strips. Program development will include market analysis and segmentation using input from State housing agencies, direct property manager outreach and tenant education. All measures will be installed without a customer co-pay.

5.4 Custom Business Efficiency Measures

Program Category	5.4 Custom Business Energy Efficiency Measures Customized Programs Overview

Projected Impacts

Demand	490	kW
Energy	17,155,773	kWh
Incentive Budget	$ 3,025,011	(12%)
Cost per kWh	$0.18	/kWh
TRB	$ 18,725,312	

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.	$0.10	1,500,000	kWh
Customized Project Measures >5 yrs.	$0.18	10,821,667	kWh
Efficiency Project Auction	$0.18	6,355,617	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	290	kW
Energy	10,164,913	kWh
Incentive Budget	$ 1,881,000	(8%)
Cost per kWh	$0.15	/kWh
TRB	$ 11,910,100	

Incentives

	Incentive	Units
Customized Project Measures <=5 yrs.	$0.10	1,500,000 kWh
Customized Project Measures >5 yrs.	$0.18	10,821,667 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 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
- LED Traffic Lights and Exterior Lighting
- Commercial Refrigeration Measures
- Advanced Energy Management Controls
- Variable Refrigerant Flow Air Conditioning
- High Performance Commercial Lighting
- Bi-Level Stairwell and 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. For PY14 Hawaii Energy has significantly increased the incentives for project with greater than a five year life expectancy, from $0.12/kWh in PY13 to $0.18/kWh for this program year. The incentive for measures with life expectancies of five year or less was also increased from $0.08 /kWh in PY13 to $0.10/kWh for this program year.

Measure Life	*Reduction in Energy use Incentive*
<= 5 years	$0.10 /kWh
> 5 years	$0.18 /kWh

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 Efficiency Project Auction**
Projected Impacts	Demand 200 kW Energy 6,990,861 kWh Incentive Budget $1,144,011 (5%) Cost per kWh $0.16 /kWh TRB $6,815,212
Incentives	**Incentive** **Units** Efficiency Project Auction $0.18 6,355,617 kWh
Description & Implementation Strategies	Hawaii Energy will issue a call for projects in PY14 for innovative energy efficiency programs from third parties. Eligible projects in this auction are any new technology, marketing approach or customer segment not already offered or served Hawaii Energy PY14 programs. Projects may include new technologies if it can be demonstrated that the technology is commercially available and any performance issues have been investigated and resolved. A ceiling price and evaluation methods will be defined in the call for projects.

5.5 Business Service and Maintenance

Program Category	**5.5 Business Energy Services & Maintenance** **BESM Program Overview**				
Projected Impacts	Demand	19	kW		
	Energy	1,455,967	kWh		
	Incentive Budget	$2,437,500	(10%)		
	Cost per kWh	$1.67	/kWh		
	TRB	$416,387			
Incentives		**Incentive**		**Units**	
	5.5.1 Benchmarking, Codes and Standards				
	ENERGY STAR® Portfolio Scoring Rewards	$11,333.33		32	Participants
	5.5.2 Business Design, Audits & Commissioning				
	Benchmark Metering	$100,000		4	Groups
	Decision Maker – Real-Time Submeters	$125,000		2	Projects
	Energy Audit	$15,000		25	Studies
	Energy Study Project Implementation-100%	$25,00		8	Studies
	Energy Study Assistance – 50%	$15,000		10	Studies
	Design Study Assistance – 50%	$15,000		15	Designs
	Education Facilities – Submetering for Energy Programs	$75,000		5	Participants
	Optimized Chiller Selection Engineering	$2,500		25	Participants
	Water/Wastewater Catalyst	$1.25	/kwh	160,000	kWh

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.1 Benchmarking, Codes and Standards** **5.5.1.1 ENERGY STAR® Portfolio Scoring Rewards**
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 200,000 (<1%) Cost per kWh $0.00 /kWh TRB $0
Incentives	**Incentive** **Unit** Benchmark Metering $11,333 32 Participants
Description & Implementation Strategies	This program would have a goal of benchmarking as many facilities as possible by raising awareness and removing barriers to using the ENERGY STAR® Portfolio Manager program. Facilities with scores <75 are considered a very low performing facility and in need of major facility improvements. For these facilities Hawaii Energy would offer participation in the Whole Building Assistance Program which includes Energy Audits, Energy Studies, and Design assistance. Facilities with scores between 75 - 90 are considered high performing buildings and Hawaii Energy would provide incentives for specific energy efficiency upgrades. For these facilities Hawaii Energy would offer ENERGY STAR® Certification assistance. Facilities with scores >90 are considered optimal performing buildings and need very specific projects in order to optimize existing systems. For these Facilities Hawaii Energy would offer Decision Maker Metering, a program that by installation of submetering allows decision makers to focus efforts on energy wasters that may not otherwise be obvious.

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 417,981 kWh Incentive Budget $ 400,000 (1%) Cost per kWh $0.96 /kWh TRB $45,502
Incentives	**Incentive** **Unit** Benchmark Metering $100,000 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 $100,000). 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. 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

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)	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 348,318 kWh Incentive Budget $250,000 (1%) Cost per kWh $0.72 /kWh TRB $37,918
Incentives	**Incentive** / **Units** Decision Maker – Real-Time Submeters $125,000/Project 2 Projects
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 2014 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 $ 375,000 (2%) Cost per kWh $0.00 /kWh TRB $0
Incentives	**Incentive** **Unit** Energy Audit $15,000 25 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 $0.00 /kWh TRB $0
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 $ 150,000 (<1%) Cost per kWh $0.00 /kWh TRB $0
Incentives	Energy Study Assistance — **Incentive**: $15,000/study — **Units**: 10 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 $ 225,000 (<1%) Cost per kWh $0.00 /kWh TRB $0
Incentives	**Incentive** **Units** Energy Study Assistance $15,000/Design 15 Designs
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 Education Facilities – Submetering for Energy Programs**
Projected Impacts	Demand 0 kW Energy 522,476 kWh Incentive Budget $ 375,000 (2%) Cost per kWh $0.72 /kWh TRB $56,877
Incentives	**Incentive** **Units** Submetering for Energy Programs $75,000 5 Participants
Description & Implementation Strategies	• Hawaii Energy plans to support the installation of submetering within the University campuses to allow measurable energy-saving behavioral action to be recognized and provide feedback that supports future initiatives and education.
Marketing Strategies	• Direct recruitment

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.8 Optimized Chiller Selection Engineering**
Projected Impacts	Demand 0 kW Energy 0 kWh Incentive Budget $ 62,500 (<1%) Cost per kWh $0 /kWh TRB $0
Incentives	**Incentive** **Units** Optimized Chiller Selection Engineering $2,500 25 Participants
Description & Implementation Strategies	**Energy Reduction Opportunity** The chiller selection process is an important element prior to chiller purchase that is often overlooked. In many applications, replacing chillers with the size chiller that currently exists misses an opportunity to downsize the chiller. Significant energy savings can occur if chillers are "right-sized" to the load. The PY13 chiller optimization program was based on the eventual installation of an optimized chiller. However, after participation was less than expected, it was determined that the ultimate goal of this incentive was to get vital information to the decision makers on the optimized size of the chiller before a buying decision is made. Hawaii Energy believes this can best be done by funding an energy optimization studies in the beginning of the selection process. **Target Audience** Who – Property Managers, Facilities Directors, Chief Engineers and Governmental Facilities Departments What – Large Commercial facilities **Incentive & Targeted Economics** Hawaii Energy would fund a study to determine the actual load that the existing chiller is serving. The result of the study can be used by the decision makers to right size the new chiller when it is purchased. **Customer Qualifications** Customers with existing chillers include centrifugal, screw, scroll and reciprocating, approaching the end of their useful life.

Program Category	**5.5 Business Energy Services & Maintenance** **5.5.2 Business Design, Audits and Commissioning** **5.5.2.9 Water & Wastewater Energy Project Catalyst**
Projected Impacts	Demand 19 kW Energy 167,192 kWh Incentive Budget $ 200,000 (<1%) Cost per kWh $1.20 /kWh TRB $276,091
Incentives	**Incentive** **Units** W/WW Energy Project Catalyst $1.25/kWh 160,000 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.

5.6 Business Hard-to-Reach

Program Category	**5.6 Business Hard-to-Reach** **BHTR Program Overview**
Target Market	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. **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 tax credits. 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 1,392 kW Energy 13,536,146 kWh Incentive Budget $3,247,520 (5%) Cost per kWh $0.24 /kWh TRB $17,366,643

Schedule "G" Customers	
Oahu	29,117
Big Island	12,614
Maui	8,503
Lanai	194
Molokai	498
Totals	50,926

Incentives		Incentive	Units	
	5.6.1 Small Business Direct Installation			
	Retrofitted Lamps	$143.67	21,082	Lamps
	Customized Retrofits	$0.25	80,000	kWh
	Ladder Charges	$10.00	500	Charges
	Refrigerated Cases	$1.10	90,909	kWh
	5.6.2 Energy Efficiency Equipment Grants			
	Water Cooler Timers	$15	15,000	units
	5.6.3 Restaurant Targeted Participation Programs			
	ENERGY STAR® Commercial Kitchen Equipment	$0.18/kWh	1,111,111	kWh
	Low Flow Spray Rinse Nozzles	$22	500	units
	SBDI - Kitchen Exhaust Hood Demand Ventilation	$1,700	50	hp
	SBDI - Restaurant Lighting			
	Retrofitted Lamps	$143.67	13,965	Lamps
	Customized Retrofits	$0.25	269,180	kWh
	Ladder Charges	$10.00	1,200	Charges

Program Category	**5.6 Business Hard to Reach** **5.6.1 Small Business Direct Installation** **5.6.1.1 – SBDI Lighting Retrofits** **5.6.1.2 – SBDI Refrigeration Retrofits**
Projected Impacts	Demand 341 kW Energy 3,988,110 kWh Incentive Budget $ 1,728,115 (4%) Cost per kWh $0.43 /kWh TRB $5,829,035
Incentives	**Incentive** **Units** Small Business Direct Lighting Retrofits Retrofitted Lamps $143.67 21,082 Lamps Customized Retrofits $0.25 80,000 kWh Ladder Charges $10.00 500 Charges Refrigerated Cases $1.10 90,909 kWh
Technologies	Small Business Lighting Retrofit providing a "Turn-key" 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. 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
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	**5.6 Business Hard to Reach** **5.6.2 Water Cooler Timers**
Projected Impacts	Demand 294 kW Energy 3,307,687 kWh Incentive Budget $ 225,000 (<1%) Cost per kWh $0.07 /kWh TRB $2,162,940
Incentives	**Incentive** **Unit** Water Cooler Timers $15 15,000 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** **5.6.3 Restaurant Targeted Participation Programs** **5.6.3.1 - ENERGY STAR® Commercial Kitchen Equipment**
Projected Impacts	Demand 242 kW Energy 1,209,945 kWh Incentive Budget $ 200,000 (<1%) Cost per kWh $0.17 /kWh TRB $2,068,662
Incentives	**Incentive** / **Unit** Commercial Kitchen Equipment: $0.18 /kWh / 1,111,111 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 Restaurant Targeted Participation Program** **5.6.3.2 Low Flow Spray Rinse Nozzles**
Target Market	• Restaurants
Projected Impacts	Demand 490 kW Energy 1,982,979 kWh Incentive Budget $11,000 (<1%) Cost per kWh $0.00 /kWh TRB $3,713,858
Incentives	**Incentive** **Units** Low Flow Spray Rinse Nozzles $22 500
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** **5.6.3 Restaurant Targeted Participation Programs** **5.6.3.3 SBDI - Kitchen Exhaust Hood Demand Ventilation**
Target Market	• Restaurants
Projected Impacts	Demand 25 kW Energy 143,360 kWh Incentive Budget $85,000 (<1%) Cost per kWh $0.59 /kWh TRB $269,674
Incentives	**Incentive** **Unit** 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 2014 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** **5.6.3 Restaurant Targeted Participation Programs** **5.6.3.4 SBDI - Restaurant Lighting**
Target Market	• Restaurants
Projected Impacts	Demand 0 kW Energy 2,904,065 kWh Incentive Budget $998,405 (4%) Cost per kWh $0.34 /kWh TRB $3,322,474
Incentives	**Incentive** / **Units** Retrofitted Lamps $143.67 13,965 Lamps Customized Retrofits $0.25 269,180 kWh Ladder Charges $10.00 1,200 Charges
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** **5.6.3 Restaurant Targeted Participation Program** **5.6.3.5 SBDI - Restaurant Lighting**
Technologies	A "Turn-key" 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. 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

6.0 PROGRAM BUDGET

Below is a summary of the PY14 Budget.

Table 4
Hawaii Energy Efficiency Program Annual Plan Budget
July 1, 2014 through June 30, 2015

Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	2,225,000	8,712,683	10,937,683
CESH	230,000	977,542	1,207,542
RESM	100,000	310,000	410,000
RHTR	300,000	1,061,250	1,361,250
Total Residential Programs	**2,855,000**	**11,061,475**	**13,916,475**
Residential Market Evaluation	**219,561**	**0**	**219,561**
Residential Outreach	**600,000**	**0**	**600,000**
Total Residential Services and Initiatives	**3,674,561**	**11,061,475**	**14,736,036**
Business Programs			
BEEM	1,100,000	4,809,550	5,909,550
CBEEM	1,100,000	3,025,011	4,125,011
BESM	675,000	2,437,500	3,112,500
BHTR	666,130	3,247,520	3,913,650
Total Business Programs	**3,541,130**	**13,519,581**	**17,060,711**
Business Market Evaluation	**250,000**	**0**	**250,000**
Business Outreach	**700,000**	**0**	**700,000**
Total Business Services and Initiatives	**4,491,130**	**13,519,581**	**18,010,711**
Total Residential and Business Services and Initiatives	**8,165,691**	**24,581,056**	**32,746,747**
Transformational Programs			
Residential Transformational Programs	0	1,747,514	1,747,514
Business Transformational Programs	0	2,135,850	2,135,850
Total Transformation Services and Initiatives	**0**	**3,883,364**	**3,883,364**
Total Supporting Services	**2,405,683**	**0**	**2,405,683**
Total Tax on Non-Incentive	**498,123**	**0**	**498,123**
Sub-Total Estimated Contractor Costs	**11,069,497**	**28,464,420**	**39,533,917**
Performance Awards in Excess of Target Levels			**133,000**
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels			**39,666,917**

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 PY14 Program Performance Goals and Incentives as contained in the supplemental contract covering the PY14 budget. The transition between Minimum, Target and Maximum shall be calculated on a linear basis for both goals and awards where appropriate.

Table 5 - Performance Goals and Performance Incentives

PY2014 Hawaii Energy - Performance Goals and Performance Incentives											
Performance Target Item	***Performance Goals***						***Award Fraction***		***Program Incentive Award***		
Resource Acquisition	***Minimum***		***Target***		***Maximum***				***Minimum***	***Target***	***Maximum***
	75%		*100%*		110%				75%	*100%*	123.8%
First Year Energy Reduction	101,112,172		134,816,230		148,297,852	kWh	35%		$ 183,750	$ 245,000	$ 303,188
Peak Demand Reduction	12,937		17,250		18,975	kW	5%		$ 26,250	$ 35,000	$ 43,313
Total Resource Benefit	$ 120,554,939		$ 160,739,919		$ 176,813,911	$	40%		$ 210,000	$ 280,000	$ 346,500
Island Incentive Equity	***Minimum***		***Target***		***Maximum***	***Contribution***			***Minimum***	***Target***	***Maximum***
	80%		100%								
County of Hawaii	$ 2,556,430		$ 3,195,537		n/a	13.0%	10%	All Counties met	n/a	$ 70,000	$ 70,000
C&C Honolulu	$ 14,551,985		$ 18,189,981		n/a	74.0%					
County of Maui	$ 2,556,430		$ 3,195,537		n/a	13.0%					
Total			$ 24,581,056			100.0%					
Market Transformation	***Minimum***		***Target***		***Potential Actions***				***Minimum***	***Target***	***Maximum***
	70%		100%						75%	*100%*	
Behavior Modification	12,600		18,000		Participants		2%		$ 11,250	$ 15,000	$ 15,000
Professional Development	700		1,000		Participants		2%		$ 11,250	$ 15,000	$ 15,000
Technical "Know How"	175		250		Participants		2%		$ 11,250	$ 15,000	$ 15,000
Hawaii Energy Ally Program	n/a		Trade Ally Meeting 200 participants		Roll Out Program by 8/1/14		1%		n/a	$ 5,000	$ 5,000
Benchmarking	200		500		Sites EUI/ENERGY STAR/Peer Group Evaluated		3%	All Items in Category must be met for award	$ 15,000	$ 20,000	$ 20,000
Codes & Standards	Market Survey & 1 Actions		Market Survey & 2 Actions		1. Incentive Program for Early Code Adoption 2. 30 by 2030 - Above Code Program 3. Code Compliance Assistance 4. Project TBD by Mutual Agreement w/PUC						
Demand Response	Market Survey & 1 Action		Market Survey & 2 Actions		1. In-field live-test and evaluated Project 2. EE/DR Incentive for installation of standard Specification devices 3. Project TBD by Mutual Agreement w/PUC						
Smart Grid	Market Survey & 1 Action		Market Survey & 2 Actions		1. Direct Installation of in-home smart devices compatible with HECO Smart Grid 2. Evaluation Report on TOU Energy Data 3. Project TBD by Mutual Agreement w/PUC						
Electric Vehicle	Market Survey & 1 Action		Market Survey & 2 Actions		1. Develop proposal of "motivational" TOU rate tariff and incentives mix to drive EV charging station installation and use. 2. Marketing Materials to raise EE/EV awareness 3. Project TBD by Mutual Agreement w/PUC						
Total							100%			$ 700,000	$ 833,000
Potential Award											$ 133,000

8.0 CONCLUSION

Hawaii Energy's PY14 will clearly be a challenging period of unprecedented change for the entire energy industry in Hawaii. As such, this Annual Plan must be a living document subject to strategic modification throughout the year as required to take advantage of unique opportunities, overcome unexpected barriers and integrate any changes in course directed by the PUC. Such modifications will be made with the concurrence of the PUC Contract Manager.

In particular, the expanded Transformational program initiatives directed by the PUC are designed to accelerate Hawaii's transition to a more efficient, clean-energy-tolerant and ratepayer-accommodating electric grid. This will be accomplished through collaboration with utilities and key stakeholders to facilitate the identification and development of opportunities to integrate energy efficiency, demand management, energy storage, EV and TOU rate capabilities into the grid.

For PY14, the Leidos team will continue the transparency, integrity, cost-effectiveness, innovation and singular focus on helping Hawaii achieve its clean energy goals that have been key hallmarks of our tenure as Hawaii's first PBFA. Working under the PUC's leadership, together with our allies, government agencies, utilities and utility customers, we look forward to being an even better catalyst and contributor to Hawaii's successful evolution to a clean energy future.

MAHALO,

The Leidos Hawaii Energy Team

9.0 APPENDICES

Appendix A Program-Level Budget PY2014 (Expanded Version)
Appendix B Summary Proposed Program Budgets
Appendix C Program Cost-Effectiveness Targets
Appendix D Summary Presentation of Programs By Measure
Appendix E TRB Utility Benefit Values

APPENDIX A - Program-Level Budget PY2014 (Expanded Version)

As noted above, while the contract sets forth the overall budget categories and limitations, status of Hawaii Energy PY14 budget and expenditures will be reported at this itemized program-level.

Table 6

Hawaii Energy Efficiency Program Annual Plan Budget - June 10, 2014	PY14 Budget
Residential Programs	
Residential Program Ops and Management	
REEM	2,225,000
CESH	230,000
RESM	100,000
RHTR	300,000
Subtotal Residential Programs	2,855,000
Residential Market Evaluation	219,561
Residential Outreach	600,000
Total Residential Non-Incentive	*3,674,561*
Residential Incentives	
REEM	8,712,683
CESH	977,542
RESM	310,000
RHTR	1,061,250
Subtotal Residential Incentives	11,061,475
Residential Transformational	1,747,514
Total Residential Incentives	*12,808,989*
Total Residential Programs	**16,483,550**
Business (C&I) Programs	
Business Programs Ops and Management	
BEEM	1,100,000
CBEEM	1,100,000
BESM	675,000
BHTR	666,130
Subtotal Business Programs	3,541,130
Business Evaluation --	250,000
Business Outreach	700,000
Total Business Non-Incentive	*4,491,130*
Business Incentives	
BEEM	4,809,550
CBEEM	3,025,011
BESM	2,437,500
BHTR	3,247,520
Subotal Business Incentive	13,519,581
Business Transformational	2,135,850
Total Business Incentives	*15,655,431*
Total Business Programs	**20,146,561**
Supporting Services	
Supporting Services	2,405,683
Total Supporting Services	**2,405,683**
Subtotal Non-Incentive (Prior to Tax)	10,571,374
Less Performance Incentives (Prior to Tax)	(668,500)
Subtotal Non-Incentive Less Performance Incentives (PI)	9,902,874
Total Tax on Non-Incentive Without PI	466,623
Performance Incentive Award (Inclusive of Tax)	700,000
Subtotal Non-Incentive Billed	*11,069,497*
Subtotal Residential and Business Customer Incentives	*24,581,056*
Subtotal Transformational Incentives	*3,883,364*
Subtotal Customer and Transformational Incentives	*28,464,420*
Sub-Total Estimated Contractor Costs	***39,533,917***
Performance Awards in Excess of Target Levels	133,000
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels	**39,666,917**

APPENDIX B – Summary Proposed Program Budgets

Table 7

Hawaii Energy - PY2014 ANNUAL PLAN

SUMMARY PROPOSED PROGRAM BUDGETS

PROGRAM BUDGET GUIDELINES

PBFA Contract Renewal Guidelines for Year 6

Program Year	2014
Period of Performance	7/1/14 to 6/30/15
PBFA Budget Allocation	$ 39,666,917

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
General Administrative and IT Costs	$ 2,405,683	6.1%	94.8%
Performance Award in Excess of Target*	$ 133,000	0.3%	5.2%
Total PBFA Administrative Costs	$ 2,538,683	6.4%	100.0%

Budget Item / Category		Direct Incentives	Res + Bus EE Incentives
Residential Direct Incentives	38.86%	$ 11,061,475	86.4%
Business Direct Incentives	47.50%	$ 13,519,581	$ 24,581,056
			Res + Bus Trans Incentives
Residential Transformational Incentives	6.14%	$ 1,747,514	13.6%
Business Transformational Incentives	7.50%	$ 2,135,850	$ 3,883,364
Total Program Direct Incentives	100.00%	$ 28,464,420	

Budget Item / Category		Total	Allocation Targets Direct Incentives	Direct Implementation Cost
Residential Program Cost Split	45%	$ 16,707,705	$ 12,808,989	$ 3,898,716
Business Program Cost Split	55%	$ 20,420,529	$ 15,655,431	$ 4,765,098
Total Direct Program Costs		$ 37,128,234	$ 28,464,420	$ 8,663,814
Residential GA & IT Split	45%	$ 1,082,557		$ 1,082,557
Business GA & IT Split	55%	$ 1,323,126		$ 1,323,126
General Administrative and IT Costs		$ 2,405,683	$ -	$ 2,405,683
Total Direct Program Costs		$ 37,128,234	$ 28,464,420	$ 8,663,814
General Administrative and IT Costs		$ 2,405,683	$ -	$ 2,405,683
Total Incentives and Operations		$ 39,533,917	$ 28,464,420	$ 11,069,497
		100%	72.0%	28.0%

Proposed Incentives and Operations Breakouts

Budget Item / Category	Amount	% of Total Budget	% of Subtotal
Residential Incentives	$ 11,061,475	27.9%	38.9%
Business Incentives	$ 13,519,581	34.1%	47.5%
Transformation Incentives	$ 3,883,364	9.8%	13.6%
Total Incentives	$ 28,464,420	71.8%	100.0%
Administration / IT	$ 2,405,683	6.1%	21.7%
Direct Program Implementation Costs	$ 8,663,814	21.8%	78.3%
Total Operations	$ 11,069,497	27.9%	100%
Total Incentives	$ 28,464,420	71.8%	72.0%
Total Operations	$ 11,069,497	27.9%	28.0%
Total Incentives and Operations	$ 39,533,917	99.7%	100%
Total Incentives and Operations	$ 39,533,917	99.7%	99.7%
Total Award in Excess of Target*	$ 133,000	0.3%	0.3%
Total Budget	$ 39,666,917	100.0%	100.0%

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

These highlighted figures are key program metric percentages

APPENDIX C - Program Cost-Effectiveness Targets

Table 8

Hawaii Energy - PY2014 ANNUAL PLAN - PROGRAM COST EFFECTIVENESS TARGETS

PBFA Contract Renewal Guidelines			
Total Program Direct Incentives		$ 24,581,056	
First Year Energy Reduction		134,816,230	kWh - Program Level
Peak Demand Reduction		17,250	kW on Peak 5 to 9 p.m. Weekdays
Total Resource Benefit		$ 160,739,919	NPV of Utility Cost Avoidance

Derived Top Down Cost Effectiveness Metrics			
Total Program Direct Incentives		$ 24,581,056	
First Year Energy Reduction	÷	134,816,230	
Measure Cost Effectiveness - First Year		$ 0.182	per kWh - Program Level
First Year Energy Reduction		134,816,230	
Average Measure Life	x	9.9	years
Lifetime Energy Savings		1,334,111,790	kWh - Program Level
Total Program Direct Incentives		$ 24,581,056	
Lifetime Energy Savings	÷	1,334,111,790	
Measure Cost - Lifetime		$ 0.018	per kWh - Program Level
Total Program Direct Incentives		$ 24,581,056	
Avg. Incentive % of Incremental Cost	÷	33%	
TRC - Total Resource Cost		$ 74,488,048	
TRB - Total Resource Benefit		$ 160,739,919	
TRC - Total Resource Cost	÷	$ 74,488,048	
Cost Effectiveness - TRB/TRC		2.2	
First Year Energy Reduction		134,816,230	kWh - Program Level
Estimated Average Net-to-Gross	÷	0.81	
First Year Energy Reduction		167,107,353	kWh First Year - Customer Level
HCEI 2030 Energy Reduction Goal	÷	4,300,000,000	kWh/year
% Achievement towards HCEI 2030 Goal		3.9%	
First Year Energy Reduction		167,107,353	kWh First Year - Customer Level
Average Energy Cost	x	$ 0.32	per kWh
Participant Customer Energy Cost Savings		$ 53,474,353	per year
Average Measure Life	x	9.9	
Participant Customer Energy Cost Savings		$ 526,754,085	over lifetime of Equipment

County Distribution Targets

PBFA Contribution by County for PY2012			
Hawaii	Maui	Honolulu	Total
13.0%	13.0%	74.0%	100.0%

Program Level Targets by County				
Hawaii	Maui	Honolulu	Total	
$ 3,195,537	$ 3,195,537	$ 18,189,981	$ 24,581,056	Incentives
12,133,461	13,481,623	109,201,146	134,816,230	kWh First Year - PL
$ 0.263	$ 0.237	$ 0.167	$ 0.182	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%

Defining Levelized Cost of Saved Energy

PY14 Plan

$$Levelized\ CSE\left(in\ \frac{\$}{unit}energy, e.g., kWh, therm, Btu\right) = \frac{C\ x\ (Capital\ Recovery\ Factor)}{D}$$

$$Capital\ Recovery\ Factor\ = [A*(1+A)^{\wedge B}]/[(1+A)^{\wedge B}-1]$$

Where:

A = Discount rate (LBNL uses 6% in this analysis)

B = Estimated program savings life in years

C = Total program cost in 2012$ dollars

D =Annual kWh saved that year by the energy efficiency program

A		6%
B		9.9
C		$ 39,666,917
D		134,816,230
		0.107
	÷	0.780
Capital Recovery Factor		0.137
C		$ 39,666,917
Capital Recovery Factor	x	0.137
D	÷	134,816,230
Utility Levelized Cost of Saved Energy (CSE)		$ 0.040

LBNL March 2014 – CSE Report - http://emp.lbl.gov/sites/all/files/lbnl-6595e.pdf

Table 9

Hawaii Energy - PY2014 ANNUAL PLAN - SUMMARY PRESENTATION OF PROGRAMS BY MEASURE

Item	Total	Incentives		Transformation		kW	kWh - 1st yr.		$/kWh 1st Yr.	kWh - Life	$/kWh Life	TRB $
Residential	$ 12,808,989	$ 11,061,475	45%	$ 1,747,514	45%	10,439	70,679,061	52%	$ 0.157	536,693,431	$ 0.021	$ 71,141,903
Business	$ 15,655,431	$ 13,519,581	55%	$ 2,135,850	55%	6,811	64,137,168	48%	$ 0.211	797,418,359	$ 0.017	$ 89,598,016
Direct Incentives Only		$ 24,581,056				17,250	134,816,230		$ 0.182	1,334,111,790	$ 0.018	$ 160,739,919
Direct and Transformational Incentives	$ 28,464,420	$ 24,581,056		$ 3,883,364			134,816,230		$ 0.211	1,334,111,790	$ 0.021	
Total Program Budget	$ 39,666,917						134,816,230		$ 0.294	1,334,111,790	$ 0.030	

Program, Category, Measure	Count	Unit	Average Participant Incentive per Unit	Estimated Incentive Budget ($)	% Total Program Budget (%)	Estimated Trans. Budget ($)	Peak Demand Reduction per Unit (kW/Unit)	Energy Reduction per Unit (kWh/Unit)	Program Demand (kW Peak)	Program Energy (kWh/Year)	% of Energy (%)	1st Year ($/kWh)	Life (yrs.)	Lifetime Energy (kWh/Life)	Lifetime Cost ($/kWh)	TRB ($)
Residential Programs				**$ 11,061,475**	**45.0%**	**$ 1,747,514**			**10,439**	**70,679,061**	**52.4%**	**$ 0.157**	**8**	**536,693,431**	**$ 0.021**	**$ 71,141,903**
REEM - Residential Energy Efficiency Measures				**$ 8,712,683**	**35.4%**				**10,043**	**62,663,645**	**46.5%**	**$ 0.139**	**12**	**487,770,678**	**$ 0.018**	**$ 65,432,557**
High Efficiency Water Heating			***$ 1,040.00***	***$ 2,340,000***	***9.5%***		***0.3180***	***1,568***	***934***	***4,376,259***	***3.2%***	***$ 0.535***	***18***	***83,239,464***	***$ 0.021***	***$ 10,473,554***
Solar Water Heater - Contractor Incentive	1,800	Systems	$ 1,000.00	$ 1,800,000	7.3%		0.4600	2,065	719	3,229,926	2.4%	$ 0.557	20	64,598,524	$ 0.024	$ 8,122,216
Solar Water Heater - Interest Buydown	50	Systems	$ 1,000.00	$ 50,000	0.2%		0.4600	2,065	20	89,720	0.1%	$ 0.557	20	1,794,403	$ 0.024	$ 225,617
Solar Water Heater - OBF Contribution	350	Systems	$ 1,000.00	$ 350,000	1.4%		0.4600	2,065	140	628,041	0.5%	$ 0.557	20	12,560,824	$ 0.024	$ 1,579,320
Solar Water Heater - New Technology Pilots and Testing	40	Systems	$ 2,000.00	$ 80,000	0.3%		-	-	-	-	0.0%		20			
Heat Pumps	300	Systems	$ 200.00	$ 60,000	0.2%		0.2100	1,644	55	428,571	0.3%	$ 0.140	10	4,285,713	$ 0.012	$ 546,401
High Efficiency Lighting			***$ 3.55***	***$ 3,230,000***	***13.1%***		***0.0040***	***26***	***6,430***	***45,333,669***	***33.6%***	***$ 0.071***	***11***	***310,948,825***	***$ 0.015***	***$ 43,732,048***
CFLs	1,300,000	Lamps	$ 1.10	$ 1,430,000	5.8%		0.0050	36	5,648	41,006,246	30.4%	$ 0.035	6	246,037,476	$ 0.005	$ 35,419,825
LED	300,000	Lamps	$ 6.00	$ 1,800,000	7.3%		0.0030	17	782	4,327,423	3.2%	$ 0.416	15	64,911,349	$ 0.024	$ 8,312,223
High Efficiency Air Conditioning			***$ 88.00***	***$ 382,500***	***1.6%***		***0.1548***	***418***	***370***	***954,553***	***0.7%***	***$ 0.401***	***14***	***14,423,267***	***$ 0.124***	***$ 2,651,957***
VRF Split System AC	700	Units	$ 200.00	$ 140,000	0.6%		0.2600	501	158	304,744	0.2%	$ 0.459	15	4,571,167	$ 0.027	$ 1,002,649
Window AC with Recycling	1,000	Units	$ 80.00	$ 80,000	0.3%		0.0021	19	2	16,250	0.0%	$ 4.923	9	146,246	$ 0.475	$ 18,491
Ceiling Fans	3,500	Units	$ 35.00	$ 122,500	0.5%		0.0120	65	36	197,689	0.1%	$ 0.620	5	988,443	$ 0.108	$ 161,611
Solar Attic Fans	200	Units	$ 50.00	$ 10,000	0.0%		-	502	-	87,244	0.1%	$ 0.115	20	1,744,873	$ 0.005	$ 124,841
Whole House Fans	400	Units	$ 75.00	$ 30,000	0.1%		0.5000	1,003	174	348,627	0.3%	$ 0.086	20	6,972,539	$ 0.004	$ 1,344,363
High Efficiency Appliances			***$ 82.14***	***$ 825,000***	***3.4%***		***0.0263***	***452***	***256***	***4,720,829***	***3.5%***	***$ 0.175***	***10***	***63,196,291***	***$ 0.027***	***$ 6,086,287***
Refrigerator (Purchase New Only)	500	Units	$ 50.00	$ 25,000	0.1%		0.0170	105	7	45,620	0.0%	$ 0.548	14	638,686	$ 0.034	$ 80,261
Refrigerator (with Recycling of Old)	5,000	Units	$ 125.00	$ 625,000	2.5%		0.0340	822	148	3,571,428	2.6%	$ 0.175	14	49,999,987	$ 0.011	$ 4,621,078
Garage Refrigerator / Freezer Bounty	500	Units	$ 85.00	$ 42,500	0.2%		0.0340	859	15	373,219	0.3%	$ 0.114	14	5,225,059	$ 0.007	$ 480,341
Clothes Washer (Tier II/III)	2,000	Units	$ 50.00	$ 100,000	0.4%		0.0420	328	73	570,038	0.4%	$ 0.175	11	6,270,419	$ 0.014	$ 781,192
Set-Top Box Replacements - Pilot	100	Units	$ 100.00	$ 10,000	0.0%		0.0285	250	2	21,724	0.0%	$ 0.460	5	108,620	$ 0.080	$ 15,144
Pool VFD Controller Pumps	100	Units	$ 150.00	$ 15,000	0.1%		0.0060	597	1	51,904	0.0%	$ 0.289	10	519,039	$ 0.025	$ 47,696
Advance Power Strips	500	Units	$ 15.00	$ 7,500	0.0%		0.0228	200	10	86,896	0.1%	$ 0.086	5	434,480	$ 0.015	$ 60,575
Energy Efficiency Equipment Kits			***$ 15.00***	***$ 37,500***	***0.2%***		***0.0427***	***258***	***93***	***560,262***	***0.4%***	***$ 0.067***	***5***	***2,801,311***	***$ 0.012***	***$ 439,669***
Home Energy Saving Kits- Online Fullfillment	2,500	Kits	$ 15.00	$ 37,500	0.2%		0.0427	258	93	560,262	0.4%	$ 0.067	5	2,801,311	$ 0.012	$ 439,669
Energy Awareness, Measurement and Control Systems			***$ 32.97***	***$ 1,897,683***	***7.7%***		***0.0072***	***133***	***1,959***	***6,718,073***	***5.0%***	***$ 0.282***	***5***	***13,161,519***	***$ 0.091***	***$ 2,049,044***
Room Occupancy Sensors & Timers	200	Units	$ 5.00	$ 1,000	0.0%		0.0046	21	1	3,615	0.0%	$ 0.277	8	28,919	$ 0.030	$ 4,727
Peer Group Comparison - Phase 1/2/3	132,500	Homes	$ 11.90	$ 1,576,683	6.4%		0.0170	50	1,957	5,756,863	4.3%	$ 0.274	1	5,756,863	$ 0.238	$ 1,352,057
Whole House Energy Metering	200	Units	$ 100.00	$ 20,000	0.1%		0.0070	410	1	71,255	0.1%	$ 0.281	4	285,019	$ 0.061	$ 31,023
Water Cooler Timers	20,000	Units	$ 15.00	$ 300,000	1.2%		-	51	-	886,340	0.7%	$ 0.338	8	7,090,718	$ 0.037	$ 661,236
CESH - Custom Energy Solutions for the Home				**$ 977,542**	**4.0%**				**-**	**5,973,595**	**4.4%**	**$ 0.164**	**5**	**29,867,974**	**$ 0.033**	**$ 2,998,778**
Customized Project Measures			***$ 0.18***	***$ 977,542***	***4.0%***		***-***	***1***	***-***	***5,973,595***	***4.4%***	***$ 0.164***	***5***	***29,867,974***	***$ 0.036***	***$ 2,998,778***
Hawaii Energy - Efficiency Project Auction	5,430,788	kWh	$ 0.18	$ 977,542	4.0%		-	1	-	5,973,595	4.4%	$ 0.164	5	29,867,974	$ 0.036	$ 2,998,778
RESM - Residential Energy Services and Maintenance				**$ 310,000**	**1.3%**				**146**	**722,211**	**0.5%**	**$ 0.429**	**10**	**7,305,498**	**$ 0.042**	**$ 1,068,632**
Residential Design and Audits			***$ 600.00***	***$ 60,000***	***0.2%***		***0.4000***	***2,200***	***40***	***222,630***	***0.2%***	***$ 0.270***	***15***	***3,339,448***	***$ 0.018***	***$ 428,620***
Efficiency Inside Home Design	100	Homes	$ 600.00	$ 60,000	0.2%		0.4000	2,200	40	222,630	0.2%	$ 0.270	15	3,339,448	$ 0.018	$ 428,620
Residential System Tune-Ups			***$ 575.00***	***$ 250,000***	***1.0%***		***0.3895***	***1,348***	***105***	***499,581***	***0.4%***	***$ 0.500***	***8***	***3,966,050***	***$ 0.315***	***$ 640,012***
Solar Water Heater Tune Up	1,000	Systems	$ 150.00	$ 150,000	0.6%		0.0290	249	29	251,977	0.2%	$ 0.595	1	251,977	$ 0.602	$ 38,306
Central Air Conditioning Retrofit Pilot	100	Systems	$ 1,000.00	$ 100,000	0.4%		0.7500	2,447	76	247,605	0.2%	$ 0.404	15	3,714,074	$ 0.027	$ 601,706

Hawaii Energy - PY2014 ANNUAL PLAN - SUMMARY PRESENTATION OF PROGRAMS BY MEASURE

Residential Programs Continued

Program, Category, Measure	Count	Unit	Average Participant Incentive per Unit	Estimated Incentive Budget ($)	% Total Program Budget (%)	Estimated Trans. Budget ($)	Peak Demand Reduction per Unit (kW/Unit)	Energy Reduction per Unit (kWh/Unit)	Program Demand (kW Peak)	Program Energy (kWh/Year)	% of Energy (%)	1st Year ($/kWh)	Life (yrs.)	Lifetime Energy (kWh/Life)	Lifetime Cost ($/kWh)	TRB ($)
RHTR - Residential Hard to Reach				$ 1,061,250	4.3%				250	1,319,610	1.0%	$ 0.804	12	11,749,281	$ 0.090	$ 1,641,936
Energy Efficiency Equipment Grants			***$ 3,750.83***	***$ 900,000***	***3.7%***		***0.1663***	***975***	***100***	***766,968***	***0.6%***	***$ 1.173***	***13***	***8,433,427***	***$ 0.100***	***$ 1,016,954***
CFL Exchange	10,000	Lamps	$ 2.50	$ 25,000	0.1%		0.0050	38	55	415,781	0.3%	$ 0.060	6	2,494,687	$ 0.011	$ 354,588
Refrigerator (with Recycling of Old) - Lanai & Molokai Equity	200	Units	$ 250.00	$ 50,000	0.2%		0.0340	822	7	180,832	0.1%	$ 0.277	14	2,531,645	$ 0.022	$ 233,979
Solar Water Heater (SWH) Incentive	75	Systems	$ 11,000.00	$ 825,000	3.4%		0.4600	2,065	38	170,355	0.1%	$ 4.843	20	3,407,095	$ 0.266	$ 428,387
Direct Installation - Residential Energy Kits			***$ 129.00***	***$ 161,250***	***0.7%***		***0.1090***	***402***	***150***	***552,642***	***0.4%***	***$ 0.292***	***6***	***3,315,854***	***$ 0.053***	***$ 624,982***
Multifamily Direct install - Energy Savings Kits	1,250	Kits	$ 129.00	$ 161,250	0.7%		0.1090	402	150	552,642	0.4%	$ 0.292	6	3,315,854	$ 0.053	$ 624,982
RTRAN - Residential Transformational Programs						$ 1,747,514										
Behavior Modification						***$ 367,950***										
Hawaii Energy / Kanu Hawaii Projects	14,000	Contacts				$ 178,750										
Hawaii Energy / Sharing the Aloha - Classes	2,500	Participants				$ 189,200										
Benchmarking, Codes and Standards						***$ 68,750***										
30% Above Code Design and Construction Program - Residential	1	Pilot				$ 68,750										
EE/DR/SG/EV Support						***$ 290,000***										
AC Integrated DR Control Pilot	1	Pilot				$ 55,000										
EV - EE, DR and Smart Grid Awareness	1	Pilot				$ 50,000										
Net Zero Electric Car Purchase Package	1	Pilot				$ 60,000										
Smart Grid EE Integration Support & Evaluation	1	Pilot				$ 60,000										
Transformational Time-of-Use Rates	1	Pilot				$ 10,000										
Water Heater Integrated DR Control Pilot	1	Pilot				$ 55,000										
Energy Trade Ally Support						***$ 35,000***										
Rebuild Hawaii	1	Program				$ 15,000										
Trade Ally Service Center	1	Pilot				$ 20,000										
Labor						***$ 486,605***										
Labor Transformational Labor						$ 486,605										
Professional Development						***$ 431,750***										
Hawaii Energy - Educator Training and Grants - NEED.org	270	Participants				$ 308,000										
Hawaii Energy/ Kupu RISE Intern Project Support	6	Interns				$ 123,750										
TBD						***$ 67,459***										
Transformation TBD						$ 67,459										

Hawaii Energy - PY2014 ANNUAL PLAN - SUMMARY PRESENTATION OF PROGRAMS BY MEASURE

Program, Category, Measure	Count	Unit	Average Participant Incentive per Unit	Estimated Incentive Budget ($)	% Total Program Budget (%)	Estimated Trans. Budget ($)	Peak Demand Reduction per Unit (kW/Unit)	Energy Reduction per Unit (kWh/Unit)	Program Demand (kW Peak)	Program Energy (kWh/Year)	% of Energy (%)	1st Year ($/kWh)	Life (yrs.)	Lifetime Energy (kWh/Life)	Lifetime Cost ($/kWh)	TRB ($)
Business Programs				$ 13,519,581	55.0%	$ 2,135,850			6,811	64,137,168	47.6%	$ 0.211	11	797,418,359	$ 0.017	$ 89,598,016
BEEM - Business Energy Efficiency Measures				$ 4,809,550	19.6%				4,911	31,989,281	23.7%	$ 0.150	14	436,398,357	$ 0.011	$ 53,089,674
High Efficiency Water Heating			***$ 307.00***	***$ 826,200***	***3.4%***		***0.5410***	***883***	***440***	***1,432,151***	***1.1%***	***$ 0.577***	***14***	***28,193,918***	***$ 0.032***	***$ 4,056,658***
Commercial Solar Water Heating - Elec. Res.	50	Tons	$ 250.00	$ 12,500	0.1%		1.1000	1,030	45	42,469	0.0%	$ 0.294	15	637,036	$ 0.016	$ 234,189
Commercial Solar Water Heating - Heat Pump	100	Tons	$ 100.00	$ 10,000	0.0%		1.1000	77	91	6,336	0.0%	$ 1.578	15	95,036	$ 0.087	$ 374,904
Heat Pump - Conversion - Electric Resistance	20	Tons	$ 120.00	$ 2,400	0.0%		0.0300	943	0	15,559	0.0%	$ 0.154	10	155,588	$ 0.013	$ 15,322
Heat Pump Upgrade	20	Tons	$ 65.00	$ 1,300	0.0%		0.0150	300	0	4,950	0.0%	$ 0.263	10	49,498	$ 0.022	$ 5,147
Single Family Solar Water Heater (SWH) Incentive	800	Systems	$ 1,000.00	$ 800,000	3.3%		0.4600	2,065	304	1,362,838	1.0%	$ 0.587	20	27,256,761	$ 0.024	$ 3,427,096
High Efficiency Lighting			***$ 18.67***	***$ 2,014,500***	***8.2%***		***0.0214***	***167***	***3,227***	***23,000,274***	***17.1%***	***$ 0.088***	***14***	***299,365,290***	***$ 0.009***	***$ 35,779,064***
Ceramic Metal Halide	400	Lamps	$ 40.00	$ 16,000	0.1%		0.0350	302	12	99,655	0.1%	$ 0.161	14	1,395,177	$ 0.009	$ 157,623
CFL	16,100	Lamps	$ 2.00	$ 32,200	0.1%		0.0300	247	398	3,273,987	2.4%	$ 0.010	3	9,821,962	$ 0.003	$ 1,462,456
Delamp with Reflector Kit (2 foot Lamp)	100	Lamps	$ 5.00	$ 500	0.0%		0.0170	149	1	12,308	0.0%	$ 0.041	14	172,318	$ 0.002	$ 19,375
Delamp with Reflector Kit (4 foot Lamp)	2,000	Lamps	$ 10.00	$ 20,000	0.1%		0.0170	149	28	246,169	0.2%	$ 0.081	14	3,446,363	$ 0.005	$ 387,503
Delamp with Reflector Kit (8 Foot Lamp)	500	Lamps	$ 15.00	$ 7,500	0.0%		0.0170	149	7	61,542	0.0%	$ 0.122	14	861,591	$ 0.007	$ 96,876
Delamp Only (2 foot Lamp)	10	Lamps	$ 2.50	$ 25	0.0%		0.0170	149	0	1,231	0.0%	$ 0.020	14	17,232	$ 0.001	$ 1,938
Delamp Only (4 foot Lamp)	1,000	Lamps	$ 5.00	$ 5,000	0.0%		0.0170	149	14	123,084	0.1%	$ 0.041	14	1,723,182	$ 0.002	$ 193,751
Delamp Only (8 Foot Lamp)	200	Lamps	$ 7.50	$ 1,500	0.0%		0.0170	149	3	24,617	0.0%	$ 0.061	14	344,636	$ 0.004	$ 38,750
ENERGY STAR LED Dimmable A19	3,250	Lamps	$ 7.00	$ 22,750	0.1%		0.0081	70	22	187,947	0.1%	$ 0.121	15	2,819,206	$ 0.007	$ 311,425
ENERGY STAR LED Dimmable w/Controls	40,000	Lamps	$ 10.00	$ 400,000	1.6%		0.0239	206	789	6,807,591	5.0%	$ 0.059	15	102,113,858	$ 0.003	$ 11,288,349
ENERGY STAR LED Non-Dimmable	50,000	Lamps	$ 7.00	$ 350,000	1.4%		0.0179	155	738	6,381,085	4.7%	$ 0.055	15	95,716,274	$ 0.003	$ 10,577,426
ENERGY STAR LED Non-Dimmable A19	5,000	Lamps	$ 7.00	$ 35,000	0.1%		0.0061	53	25	216,553	0.2%	$ 0.162	15	3,248,290	$ 0.009	$ 359,386
LED Exit Signs	500	Fixtures	$ 40.00	$ 20,000	0.1%		0.0350	307	14	126,632	0.1%	$ 0.158	16	2,026,108	$ 0.008	$ 218,276
LED Fixture	200	Fixtures	$ 30.00	$ 6,000	0.0%		-	181	-	29,798	0.0%	$ 0.201	15	446,965	$ 0.011	$ 35,435
LED Refrigerated Case Lighting	500	Kits	$ 75.00	$ 37,500	0.2%		0.0360	199	15	82,001	0.1%	$ 0.457	15	1,230,019	$ 0.025	$ 157,631
LED Street and Parking Lot Fixture	350	Fixtures	$ 100.00		35,000	0.1%	0.0500	492	18	172,170	0.1%	$ 0.203	15	1,230,019	$ 0.025	$ 378,410
Occupancy Light Sensors	2,250	Sensors	$ 20.00	$ 45,000	0.2%		0.0068	68	13	125,848	0.1%	$ 0.358	8	1,006,784	$ 0.037	$ 125,942
Stairwell Bi-Level Dimming Fluorescent	1,000	Systems	$ 50.00	$ 50,000	0.2%		0.0560	546	46	450,430	0.3%	$ 0.111	14	6,306,013	$ 0.007	$ 689,251
T12 to T8 Low Wattage	32,500	Lamps	$ 10.00	$ 325,000	1.3%		0.0090	39	241	1,042,959	0.8%	$ 0.312	14	14,601,424	$ 0.018	$ 2,114,611
T12 to T8 Standard (2 foot lamps)	75	Lamps	$ 5.00	$ 375	0.0%		0.0070	56	0	3,490	0.0%	$ 0.107	14	48,854	$ 0.006	$ 5,630
T12 to T8 Standard (3 foot lamps)	25	Lamps	$ 6.00	$ 150	0.0%		0.0070	56	0	1,163	0.0%	$ 0.129	14	16,285	$ 0.008	$ 1,877
T8 to T8 Low Wattage	110,000	Lamps	$ 5.50	$ 605,000	2.5%		0.0090	39	817	3,530,015	2.6%	$ 0.171	14	49,420,204	$ 0.010	$ 7,157,145
High Efficiency HVAC			***$ 741.27***	***$ 1,190,000***	***4.8%***		***0.0959***	***445***	***755***	***4,186,536***	***3.1%***	***$ 0.284***	***17***	***68,496,265***	***$ 0.015***	***$ 8,346,542***
Central Plant - >15% Better than Code Chillers	6,400	Tons	$ 50.00	$ 320,000	1.3%		0.0390	276	206	1,457,214	1.1%	$ 0.220	20	29,144,275	$ 0.009	$ 3,086,953
Chiller Plant Efficiency kW/Ton Meter	25	Systems	$ 5,000.00	$ 125,000	0.5%		-	-	-	-	0.0%		20			
Garage Active Ventilation Control	1,000,000	kWh	$ 0.12	$ 120,000	0.5%		0.0001	1	94	824,963	0.6%	$ 0.145	8	6,599,700	$ 0.015	$ 854,628
Package Units - 15% Better Than Code	500	Tons	$ 200.00	$ 100,000	0.4%		0.0930	552	38	227,772	0.2%	$ 0.439	15	3,416,582	$ 0.024	$ 426,163
Variable Refrigerant Flow Air Conditioners - New Construction	500	Tons	$ 250.00	$ 125,000	0.5%		0.0950	677	39	279,126	0.2%	$ 0.448	20	5,582,521	$ 0.018	$ 590,053
Variable Refrigerant Flow Air Conditioners - Existing Facility	1,000	Tons	$ 300.00	$ 300,000	1.2%		0.0950	677	78	558,252	0.4%	$ 0.537	20	11,165,042	$ 0.022	$ 1,180,107
VFD - AHU	1,200	hp	$ 50.00	$ 60,000	0.2%		0.2000	472	198	466,863	0.3%	$ 0.129	15	7,002,942	$ 0.007	$ 1,356,727
VFD - Chilled Water / Condenser Water	500	hp	$ 80.00	$ 40,000	0.2%		0.2450	903	101	372,347	0.3%	$ 0.107	15	5,585,202	$ 0.006	$ 851,911
High Efficiency Water Pumping			***$ 343.33***	***$ 99,900***	***0.4%***		***0.1740***	***1,877***	***36***	***396,118***	***0.3%***	***$ 0.252***	***15***	***5,941,772***	***$ 0.013***	***$ 616,691***
VFD Dom. Water Boosters - added HP Reduction	30	hp	$ 80.00	$ 2,400	0.0%		0.0560	588	1	14,552	0.0%	$ 0.165	15	218,285	$ 0.009	$ 22,916
VFD Dom. Water Boosters - VFD ($3K per Sys.)	75	hp	$ 600.00	$ 45,000	0.2%		0.3730	3,921	23	242,601	0.2%	$ 0.185	15	3,639,013	$ 0.010	$ 381,929
VFD Pool Pump Packages	150	hp	$ 350.00	$ 52,500	0.2%		0.0930	1,123	12	138,965	0.1%	$ 0.378	15	2,084,474	$ 0.021	$ 211,846

Hawaii Energy - PY2014 ANNUAL PLAN - SUMMARY PRESENTATION OF PROGRAMS BY MEASURE

Business Programs Continued

Program, Category, Measure	Count	Unit	Average Participant Incentive per Unit	Estimated Incentive Budget ($)	% Total Program Budget (%)	Estimated Trans. Budget ($)	Peak Demand Reduction per Unit (kW/Unit)	Energy Reduction per Unit (kWh/Unit)	Program Demand (kW Peak)	Program Energy (kWh/Year)	% of Energy (%)	1st Year ($/kWh)	Life (yrs.)	Lifetime Energy (kWh/Life)	Lifetime Cost ($/kWh)	TRB ($)
High Efficiency Motors			***$ 50.00***	***$ 151,000***	***0.6%***		***0.0683***	***538***	***133***	***1,170,061***	***0.9%***	***$ 0.129***	***15***	***17,550,912***	***$ 0.011***	***$ 1,929,681***
CEE Tier 1+ Premium Efficiency Motors	50	hp	$ 10.00	$ 500	0.0%		0.0283	46	1	1,914	0.0%	$ 0.261	15	28,709	$ 0.014	$ 7,002
ECM - Fan Coil Fans	1,500	motors	$ 55.00	$ 82,500	0.3%		0.0265	232	33	287,087	0.2%	$ 0.287	15	4,306,304	$ 0.016	$ 474,157
ECM w/Controller- Evaporator Fan Motors	800	motors	$ 85.00	$ 68,000	0.3%		0.1500	1,335	99	881,060	0.7%	$ 0.077	15	13,215,899	$ 0.004	$ 1,448,522
Commercial Industrial Processes			***$ 355.00***	***$ 125,000***	***0.5%***		***0.2350***	***1,361***	***89***	***471,012***	***0.3%***	***$ 0.265***	***13***	***6,339,218***	***$ 0.015***	***$ 841,722***
Kitchen Exhaust Hood Demand Ventilation	150	hp	$ 700.00	$ 105,000	0.4%		0.4500	2,633	56	325,819	0.2%	$ 0.322	15	4,887,284	$ 0.018	$ 612,895
Refrigerated Case Night Covers	2,000	Linear Ft.	$ 10.00	$ 20,000	0.1%		0.0200	88	33	145,193	0.1%	$ 0.138	10	1,451,934	$ 0.011	$ 228,827
Building Envelope Improvements			***$ 0.53***	***$ 41,250***	***0.2%***		***0.0007***	***3***	***31***	***121,682***	***0.1%***	***$ 0.339***	***10***	***1,216,820***	***$ 0.049***	***$ 201,697***
Cool Roof Technologies	100,000	sq. ft.	$ 0.20	$ 20,000	0.1%		0.0001	0	4	20,624	0.0%	$ 0.970	10	206,241	$ 0.080	$ 30,802
Window Tinting	25,000	sq. ft.	$ 0.85	$ 21,250	0.1%		0.0013	5	27	101,058	0.1%	$ 0.210	10	1,010,579	$ 0.017	$ 170,895
High Efficiency Appliances			***$ 75.00***	***$ 7,950***	***0.0%***		***0.0310***	***418***	***2***	***41,266***	***0.0%***	***$ 0.193***	***13***	***558,246***	***$ 0.020***	***$ 54,295***
AOAO Refrigerator (Purchase New Only)	10	Units	$ 50.00	$ 500	0.0%		0.0170	105	0	866	0.0%	$ 0.577	14	12,127	$ 0.034	$ 1,524
AOAO Refrigerator (with Recycling of Old)	50	Units	$ 125.00	$ 6,250	0.0%		0.0340	822	1	33,906	0.0%	$ 0.184	14	474,683	$ 0.011	$ 43,871
AOAO Clothes Washer (Tier II/III)	24	Units	$ 50.00	$ 1,200	0.0%		0.0420	328	1	6,494	0.0%	$ 0.185	11	71,435	$ 0.014	$ 8,900
Energy Star Business Equipment			***$ 125.00***	***$ 2,500***	***0.0%***		***0.0340***	***822***	***1***	***33,906***	***0.0%***	***$ 0.074***	***14***	***474,683***	***$ 0.004***	***$ 43,871***
Office Refrigerators w/Recycling	20	Units	$ 125.00	$ 2,500	0.0%		0.0340	822	1	33,906	0.0%	$ 0.074	14	474,683	$ 0.004	$ 43,871
Direct Install - Residential Energy Kits			***$ 129.00***	***$ 161,250***	***0.7%***		***0.1090***	***402***	***112***	***414,482***	***0.3%***	***$ 0.389***	***6***	***2,486,891***	***$ 0.053***	***$ 468,736***
Multifamily Direct install - Energy Savings Kits	1,250	Kits	$ 129.00	$ 161,250	0.7%		0.1090	402	112	414,482	0.3%	$ 0.389	6	2,486,891	$ 0.053	$ 468,736
Energy Awareness, Measurement and Control Systems			***$ 150.00***	***$ 190,000***	***0.8%***		***0.0820***	***761***	***84***	***721,793***	***0.5%***	***$ 0.263***	***8***	***5,774,342***	***$ 0.044***	***$ 750,717***
Condominum Submetering	500	Units Metere	$ 200.00	$ 100,000	0.4%		0.0570	273	24	112,607	0.1%	$ 0.888	8	900,859	$ 0.092	$ 143,720
Hotel Room Occupancy Controls	500	Units	$ 100.00	$ 50,000	0.2%		0.1000	750	41	309,361	0.2%	$ 0.162	8	2,474,888	$ 0.017	$ 335,550
Small Business Submetering Pilot	100	Units Metere	$ 200.00	$ 20,000	0.1%		0.1140	410	9	33,856	0.0%	$ 0.591	8	270,852	$ 0.061	$ 49,143
Vending Machine Energy Control Systems	200	Units	$ 100.00	$ 20,000	0.1%		0.0570	1,612	9	265,968	0.2%	$ 0.075	8	2,127,743	$ 0.008	$ 222,305
CBEEM - Customized Business Energy Efficiency Measures				**$ 3,025,011**	**12.3%**				**490**	**17,155,773**	**12.7%**	**$ 0.176**	**12**	**203,085,052**	**$ 0.015**	**$ 18,725,312**
Customized Project Measures			***$ 0.18***	***$ 3,025,011***	***12.3%***		***0.0000***	***1***	***490***	***17,155,773***	***12.7%***	***$ 0.176***	***12***	***203,085,052***	***$ 0.016***	***$ 18,725,312***
Customized Proj. Measures - Under 5 year Life	1,500,000	kWh	$ 0.10	$ 150,000	0.6%		0.0000	1	35	1,237,444	0.9%	$ 0.121	5	6,187,219	$ 0.020	$ 681,556
Customized Proj. Measures - Over 5 year Life	10,821,667	kWh	$ 0.19	$ 1,731,000	7.0%		0.0000	1	255	8,927,469	6.6%	$ 0.194	13	126,989,228	$ 0.015	$ 11,228,544
Hawaii Energy - Efficiency Project Auction	6,355,617	kWh	$ 0.18	$ 1,144,011	4.7%		0.0000	1	200	6,990,861	5.2%	$ 0.164	10	69,908,606	$ 0.018	$ 6,815,212
BESM - Business Energy Services and Maintenance				**$ 2,437,500**	**9.9%**				**19**	**1,455,967**	**1.1%**	**$ 1.674**	**3**	**3,796,661**	**$ 0.642**	**$ 416,387**
Benchmarking, Codes and Standards			***$ 11,333.33***	***$ 200,000***	***0.8%***		***-***	***-***			***0.0%***					
ENERGY STAR Portfolio Scoring Rewards	32	Participants	$ 11,333.33	$ 200,000	0.8%		-	-			0.0%					
Business Design, Audits and Commissioning			***$ 41,389.03***	***$ 2,237,500***	***9.1%***		***0.0001***	***73,334***	***19***	***1,455,967***	***1.1%***	***$ 1.537***	***4***	***3,796,661***	***$ 0.646***	***$ 416,387***
Benchmark Metering	4	Groups	$ 100,000.00	$ 400,000	1.6%		0.0001	100,000	0	417,981	0.3%	$ 0.957	1	417,981	$ 1.000	$ 45,502
Decision Maker - Real-Time Submeters	2	Projects	$ 125,000.00	$ 250,000	1.0%			166,667	-	348,318	0.3%	$ 0.718	1	348,318	$ 0.750	$ 37,918
Energy Audit	25	Studies	$ 15,000.00	$ 375,000	1.5%				-	-	0.0%					
Energy Study Project Implementation - 100%	8	Studies	$ 25,000.00	$ 200,000	0.8%				-	-	0.0%					
Energy Study Assistance - 50%	10	Studies	$ 15,000.00	$ 150,000	0.6%				-	-	0.0%					
Design Assistance - 50%	15	Designs	$ 15,000.00	$ 225,000	0.9%				-	-	0.0%					
Education Facilities - Submetering for Energy Programs	5	Participants	$ 75,000.00	$ 375,000	1.5%			100,000	-	522,476	0.4%	$ 0.718	1	522,476	$ 0.750	$ 56,877
Optimized Chiller Selection Engineering	25	Participants	$ 2,500.00	$ 62,500	0.3%		-	-	-	-	0.0%		20			
Water & Waste Water Catalyst - Rural Site Grants	160,000	kWh	$ 1.25	$ 200,000	0.8%		0.0001	1	19	167,192	0.1%	$ 1.196	15	2,507,886	$ 0.083	$ 276,091

Hawaii Energy - PY2014 ANNUAL PLAN - SUMMARY PRESENTATION OF PROGRAMS BY MEASURE

Business Programs Continued

Program, Category, Measure	Count	Unit	Average Participant Incentive per Unit	Estimated Incentive Budget ($)	% Total Program Budget (%)	Estimated Trans. Budget ($)	Peak Demand Reduction per Unit (kW/Unit)	Energy Reduction per Unit (kWh/Unit)	Program Demand (kW Peak)	Program Energy (kWh/Year)	% of Energy (%)	1st Year ($/kWh)	Life (yrs.)	Lifetime Energy (kWh/Life)	Lifetime Cost ($/kWh)	TRB ($)
BHTR - Business Hard to Reach Programs				$ 3,247,520	13.2%				1,392	13,536,146	10.0%	$ 0.240	14	154,138,290	$ 0.021	$ 17,366,643
Business Direct Installation			***$ 135.44***	***$ 1,728,115***	***7.0%***		***0.0115***	***134***	***341***	***3,988,110***	***3.0%***	***$ 0.433***	***14***	***55,846,531***	***$ 0.108***	***$ 5,829,035***
SBDI - Lighting Retrofits				*$ 1,628,115*	*6.6%*		*0.0117*	*137*	*333*	*3,889,114*	*2.9%*	*$ 0.419*	*14*	*54,460,594*	*$ 0.109*	*$ 5,684,030*
Retrofitted Lamps	21,082	Lamps	$ 143.67	$ 1,603,115	6.5%		0.0122	142	326	3,801,998	2.8%	$ 0.422	14	53,240,970	$ 0.111	$ 5,556,425
Customized Retrofits	80,000	kWh	$ 0.25	$ 20,000	0.1%		0.0001	1	7	87,116	0.1%	$ 0.230	14	1,219,625	$ 0.018	$ 127,605
Ladder Charges	500	Charges	$ 10.00	$ 5,000	0.0%						0.0%					
SBDI - Refrigeration Retrofits				*$ 100,000*	*0.4%*		*0.0001*	*1*	*8*	*98,996*	*0.1%*	*$ 1.010*	*14*	*1,385,937*	*$ 0.079*	*$ 145,006*
Refrigerated Cases	90,909	kWh	$ 1.10	$ 100,000	0.4%		0.0001	1	8	98,996	0.1%	$ 1.010	14	1,385,937	$ 0.079	$ 145,006
Energy Efficiency Equipment Grants			***$ 15.00***	***$ 225,000***	***0.9%***		***0.0180***	***203***	***294***	***3,307,687***	***2.5%***	***$ 0.068***	***5***	***16,538,436***	***$ 0.015***	***$ 2,162,940***
DI - Water Cooler Timers	15,000	Units	$ 15.00	$ 225,000	0.9%		0.0180	203	294	3,307,687	2.5%	$ 0.068	5	16,538,436	$ 0.015	$ 2,162,940
Restaurant Targeted Participation Programs			***$ 162.80***	***$ 1,294,405***	***5.3%***		***0.0385***	***271***	***757***	***6,240,350***	***4.6%***	***$ 0.207***	***14***	***81,753,323***	***$ 0.087***	***$ 9,374,668***
ENERGY STAR Com. Kitchen Equip.	1,111,111	kWh	$ 0.18	$ 200,000	0.8%		0.0002	1	242	1,209,945	0.9%	$ 0.165	12	14,519,340	$ 0.015	$ 2,068,662
Low Flow Spray Rinse Nozzles	500	Units	$ 22.00	$ 11,000	0.0%		0.9000	3,642	490	1,982,979	1.5%	$ 0.006	12	23,795,746	$ 0.001	$ 3,713,858
SBDI - Kitchen Exhaust Hoods	50	hp	$ 1,700.00	$ 85,000	0.3%		0.4500	2,633	25	143,360	0.1%	$ 0.593	15	2,150,405	$ 0.043	$ 269,674
SBDI - Restaurant Lighting				*$ 998,405*	*4.1%*		*0.0138*	*162*	-	*2,904,065*	*2.2%*	*$ 0.344*	*14*	*41,287,831*	*$ 0.091*	*$ 3,322,474*
Retrofitted Lamps	13,965	Lamps	$ 143.67	$ 919,110	3.7%		0.0144	168	-	2,610,942	1.9%	$ 0.352	14	37,184,100	$ 0.092	$ 2,990,014
Customized Retrofits	269,180	kWh	$ 0.25	$ 67,295	0.3%		0.0001	1	-	293,124	0.2%	$ 0.230	14	4,103,732	$ 0.018	$ 332,460
Ladder Charges	1,200	Charges	$ 10.00	$ 12,000	0.0%											
BTRAN - Business Transformational Programs						$ 2,135,850										
Behavior Modification						***$ 139,550***										
AOAO Submetering Awareness Peer Group Comparisons	200	Participants				$ 40,000										
Hawaii Energy / Kanu Hawaii Projects	1,000	Participants				$ 13,750										
Hawaii Energy / Sharing the Aloha - Classes	625	Participants				$ 47,300										
Hawaii Energy / UH - Sustainability Conference	200	Participants				$ 11,000										
UH / IFMA - Higher Education Energy Program Support	1	Pilot				$ 27,500										
Benchmarking, Codes and Standards						***$ 323,750***										
30% Above Code Design and Construction Program - Business	1	Pilot				$ 68,750										
Code Compliance Assistance	1	Pilot				$ 95,000										
Hawaii Energy Benchmarking Program	3	Pilots				$ 160,000										
EE/DR/SG/EV Support						***$ 191,489***										
Limited Incentivizes to Add DR Capability in EE Projects	1	Pilot				$ 76,489										
Smart Grid EE Integration Support & Evaluation	1	Pilot				$ 30,000										
Transformational Time-of-Use Rates	1	Pilot				$ 10,000										
Wailea-Kihei Maui EE/DR/SG Pilot	1	Pilot				$ 75,000										
Energy Trade Ally Support						***$ 105,000***										
Rebuild Hawaii	1	Program				$ 40,000										
Trade Ally Service Center	1	Pilot				$ 65,000										
Labor						***$ 733,072***										
Labor Transformational Labor						$ 733,072										
Professional Development						***$ 398,750***										
Hawaii Energy / EEFG - Energy Sales Professional Training	800	Participants				$ 275,000										
Hawaii Energy/ Kupu RISE Intern Project Support	6	Interns				$ 123,750										
TBD						***$ 4,239***										
Transformation TBD						$ 4,239										
Technical Development						***$ 240,000***										
Hawaii Energy - Water and Waste Water Industry Support	100	Participants				$ 75,000										
Hawaii Energy/ UH Continuing Education - BOC Certification	80	Participants				$ 165,000										

APPENDIX E – TRB Utility Benefit Values

Table 10

Hawaii Energy - PY2014 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.
2014	1	1.00	$ 370.6	$ 0.109	$ 371	$ 0.1089	$ 371	$ 0.1089
2015	2	0.94	$ 382.5	$ 0.112	$ 361	$ 0.1060	$ 731	$ 0.2149
2016	3	0.89	$ 386.2	$ 0.113	$ 344	$ 0.1010	$ 1,075	$ 0.3158
2017	4	0.84	$ 387.7	$ 0.114	$ 326	$ 0.0956	$ 1,401	$ 0.4115
2018	5	0.79	$ 389.1	$ 0.114	$ 308	$ 0.0905	$ 1,709	$ 0.5020
2019	6	0.75	$ 391.9	$ 0.115	$ 293	$ 0.0860	$ 2,002	$ 0.5880
2020	7	0.70	$ 390.7	$ 0.115	$ 275	$ 0.0809	$ 2,277	$ 0.6689
2021	8	0.67	$ 394.6	$ 0.116	$ 262	$ 0.0771	$ 2,540	$ 0.7460
2022	9	0.63	$ 398.3	$ 0.117	$ 250	$ 0.0734	$ 2,790	$ 0.8194
2023	10	0.59	$ 397.4	$ 0.117	$ 235	$ 0.0691	$ 3,025	$ 0.8885
2024	11	0.56	$ 401.4	$ 0.118	$ 224	$ 0.0658	$ 3,249	$ 0.9544
2025	12	0.53	$ 405.7	$ 0.119	$ 214	$ 0.0628	$ 3,463	$ 1.0172
2026	13	0.50	$ 409.3	$ 0.120	$ 203	$ 0.0597	$ 3,666	$ 1.0769
2027	14	0.47	$ 415.9	$ 0.122	$ 195	$ 0.0573	$ 3,861	$ 1.1342
2028	15	0.44	$ 423.3	$ 0.124	$ 187	$ 0.0550	$ 4,048	$ 1.1892
2029	16	0.42	$ 428.9	$ 0.126	$ 179	$ 0.0526	$ 4,227	$ 1.2418
2030	17	0.39	$ 433.9	$ 0.128	$ 171	$ 0.0504	$ 4,398	$ 1.2922
2031	18	0.37	$ 438.9	$ 0.130	$ 163	$ 0.0483	$ 4,561	$ 1.3404
2032	19	0.35	$ 443.9	$ 0.132	$ 156	$ 0.0462	$ 4,717	$ 1.3867
2033	20	0.33	$ 448.9	$ 0.134	$ 148	$ 0.0443	$ 4,865	$ 1.4310
2034	21	0.31	$ 453.9	$ 0.136	$ 142	$ 0.0424	$ 5,007	$ 1.4734
2035	22	0.29	$ 458.9	$ 0.138	$ 135	$ 0.0406	$ 5,141	$ 1.5139
2036	23	0.28	$ 463.9	$ 0.140	$ 129	$ 0.0388	$ 5,270	$ 1.5528
2037	24	0.26	$ 468.9	$ 0.142	$ 123	$ 0.0372	$ 5,393	$ 1.5900
2038	25	0.25	$ 473.9	$ 0.144	$ 117	$ 0.0356	$ 5,510	$ 1.6255

Hawaii Energy Efficiency Program

July 1, 2014 through June 30, 2015

Technical Reference Manual (TRM)

PY 2014

Measure Savings Calculations

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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
- Evergreen PY12 TRM Review – 1/15/14

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 PY14 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 - PY2014 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.
2014	1	1.00	$ 370.6	$ 0.109	$ 371	$ 0.1089	$ 371	$ 0.1089
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2018	5	0.79	$ 389.1	$ 0.114	$ 308	$ 0.0905	$ 1,709	$ 0.5020
2019	6	0.75	$ 391.9	$ 0.115	$ 293	$ 0.0860	$ 2,002	$ 0.5880
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2025	12	0.53	$ 405.7	$ 0.119	$ 214	$ 0.0628	$ 3,463	$ 1.0172
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2030	17	0.39	$ 433.9	$ 0.128	$ 171	$ 0.0504	$ 4,398	$ 1.2922
2031	18	0.37	$ 438.9	$ 0.130	$ 163	$ 0.0483	$ 4,561	$ 1.3404
2032	19	0.35	$ 443.9	$ 0.132	$ 156	$ 0.0462	$ 4,717	$ 1.3867
2033	20	0.33	$ 448.9	$ 0.134	$ 148	$ 0.0443	$ 4,865	$ 1.4310
2034	21	0.31	$ 453.9	$ 0.136	$ 142	$ 0.0424	$ 5,007	$ 1.4734
2035	22	0.29	$ 458.9	$ 0.138	$ 135	$ 0.0406	$ 5,141	$ 1.5139
2036	23	0.28	$ 463.9	$ 0.140	$ 129	$ 0.0388	$ 5,270	$ 1.5528
2037	24	0.26	$ 468.9	$ 0.142	$ 123	$ 0.0372	$ 5,393	$ 1.5900
2038	25	0.25	$ 473.9	$ 0.144	$ 117	$ 0.0356	$ 5,510	$ 1.6255

Effective Useful Life (EUL): Table 7.2

Version Date & Revision History
Draft date: July 1, 2013
Effective date: July 1, 2014
End date: June 30, 2015

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)
REEM	Water Heating	Solar Water Heating	20
R		Heat Pumps	10
R	Lighting	CFL	6
R		LED	15
R	Air Conditioning	VRF Split	15
R		Window AC w/recycling	9
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		Set top box	5
R		Pool VFD Controller Pumps	10
R		Advanced Power Strip	5
R	Control Systems	Room Occupancy Sensors & Timers	8
R		Peer Group Comparison	1
R		Whole House Energy Metering	4
R		Water cooler timer	8
CESH	Custom	Efficiency Project Auction	5
RESM	Design and Audits	Efficiency Inside	15
R	Tune Ups	Solar Water Heater Tune Up	5
R	Tune Ups	Central Air Conditional Retrofit	15
RHTR	Hard to Reach Grants	CFL Exchange	6
R		Refrigerator w/Recycling	14
R		Solar Water Heating	20
R	Direct Install	Energy Saving Kits	6

Residential (R) Business (B)	Measure Type	Description	DEER Effectve Useful Life (EUL)
BEEM	Water Heating	Solar Water Heating - Electric Resistance	15
B		Solar Water Heating - Heat Pump	15
B		Heat Pump - conversion - Electric Resistance	10
B		Heat Pump Upgrade	10
B		Single Family Solar Water Heating	20
B	Lighting	Ceramic Metal Halide	14
B		CFL	3
B		Delamp w/Reflector (2', 4', 8')	14
B		Delamp	14
B		ENERGY STAR LED Dimmable A19	15
B		ENERGY STAR LED Dimmable w/Controls	15
B		ENERGY STAR LED Non-Dimmable	15
B		ENERGY STAR LED Non-Dimmable A19	15
B		LED Exit Signs	16
B		LED FIXTURE	15
B		LED Refrigerator Case Lighting	15
B		LED STREET AND PARKING LOT FIXTURE	15
B		Sensors	8
B		Stairwell Bi-Level Dimming Fluorescent	14
B		T12 to T8 Low Wattage	14
B		T12 to T8 Standard (2/3)	14
B		T8 to T8 Low Wattage	14
B	HVAC	Chillers	20
B		Chiller Plant Efficiency kW/Ton Meter	20
B		Garage Active Ventilation Control	8
B		Package Units	15
B		VFR Split System - New Construction	15
B		VFR Split System - Existing	15
B		VFD - AHU	15
B		VFD - Chilled Water/Condenser Water	15

Residential (R) Business (B)	Measure Type	Description	DEER Effectve Useful Life (EUL)
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	Cool Roof	10
B		Window Tinting	10
B	Business Equipment	ENERGY STAR Refrigerator	14
B		Clothes Washer	11
B		Energy Savings Kit	6
B	Control Systems	Hotel Room Occupancy Controls	8
B		Condominium submetering	8
B		Small Business submetering	8
CBEEM	Customized	Custom <= 5 years	5
B		Custom > 5 years	13
B		Efficiency Project Auction	10
BESM	Design and Audits	Benchmarking Metering	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
BHTR	Direct Install	SBDI	14
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	Customized	Customized Retrofit	14

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, 2014
End date: June 30, 2015

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
- Evergreen TRM Review – 1/15/14

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:

- 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	12	Month/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, 2014
End date: June 30, 2015

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
- Evergreen TRM Review – 1/15/14

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	12	Month/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

8.1.3 Solar Water Heater Energy Hero Gift Packs

Version Date & Revision History
Draft date: October 4, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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
- Evergreen TRM Review – 1/15/14

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	92.4	0.012
Power Strip	78	0.009
LED	11.9	0.002
Low Flow Showerhead	42	0.022
TOTAL	**224.3**	**0.045**

Measure life

Measure	Measure Life (Years)
3 CFL	6
Power Strip	5
LED	5
Low Flow Showerhead	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, 2014
End date: June 30, 2015

Referenced Documents:

- From SalesForce Measures (Impact)
- October 2004 (KEMA Report)
- Evergreen TRM Review – 2/23/12
- Evergreen TRM Review – 1/15/14

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)

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, 2014
End date: June 30, 2015

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
- Evergreen TRM Review – 1/15/14

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.
- 11/14/13 – Adjust delta watts from 45W to 38.25W.

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	47.2
Multi Family	0.056	47.2

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	0.018	15.1
Multi Family	0.018	15.1

Energy Savings:

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	0.004	30.8
Multi Family	0.004	30.8

Savings Algorithms

CFL - Single and Multi Family Residential Home

60W Incandescent Lamp Demand		0.056	kW			72	
		2.30	Hours per Day			53	
	x	365	Days	839.5	Hours per Year	60	
60W Incandescent Lamp Energy Usage		47.2	kWh per Year			40	
						56.25	Base Watts
15W Compact Fluorescent Lamp Demand		0.018	kW				
		2.30	Hours per Day			25	
	x	365	Days	839.5	Hours per Year	21	
15W Compact Fluorescent Lamp Energy Usage		15.1	kWh per Year			15	
						11	
60W Incandescent Lamp Energy Usage		47.2	kWh per Year			18	CFL Watts
15W Compact Fluorescent Lamp Energy Usage	-	15.1	kWh per Year				
CFL Savings Before Adjustments		32.1	kWh per Year			38.25	Delta
		32.1	kWh per Year				
Persistance Factor	x	0.960	pf	4.0%	Lamps not installed or replaced back		
CFL Energy Savings		30.8	kWh per Year				

CFL Energy Savings	**30.8**	**kWh / Year Savings**	

60W Incandescent Lamp Demand		0.056	kW	
15W Compact Fluorescent Lamp Demand	-	0.018	kW	
CFL Demand Reduction Before Adjustments		0.038	kW	
CFL 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	0.960	pf	4.0% Lamps not installed or replaced back
CFL Demand Savings		0.004	kW	

CFL Demand Savings	**0.004**	**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

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, 2014
End date: June 30, 2015

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

Military savings
Based on EM&V review 1/15/14, military homes have 50 percent more operating hours than non-military homes, or 1,259.3 hours per year instead of 839.5 hours per year.

Type	Demand Savings (kW)	Energy Savings (kWh)
Non-Military	0.003	16.6
Military	0.003	24.9

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**

Military Savings Algorithm

LED - Military

Lamp Average Demand		0.035	kW		
		3.45	Hours per Day		
	x	365	Days	1,259.25	Hours per Year
Baseline Energy Usage		43.44	kWh per Year		
Enhanced LED Lamp Average Demand		0.010	kW		
		3.45	Hours per Day		
	x	365	Days	1,259.25	Hours per Year
Enhanced LED Lamp Energy Usage		12.28	kWh per Year		
Baseline Energy Usage		43.4	kWh per Year		
Enhanced LED Lamp Energy Usage	-	12.3	kWh per Year		
LED Savings Before Adjustments		31.17	kWh per Year		
		31.2	kWh per Year		
Persistance Factor	x	0.800	pf	20.0%	Lamps not installed or replaced back
		24.9	kWh per Year		

LED Energy Savings **24.9** **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. Military homes have 50 percent more operating hours than non-military homes, or 1,259.3 hours per year instead of 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

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, 2014
End date: June 30, 2015

Referenced Documents:
- Evergreen TRM Review – 2/23/12
- Evergreen TRM Review – 1/15/14

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.

Energy and Demand Savings: VRF systems have demonstrated a 20-30% reduction in energy consumption as compared to standard DX equipment.

Base Efficiency
Base case efficiency is 10.9 SEER.

High Efficiency
The high efficiency case is 16 SEER.

Energy Savings
Savings is based on per 1 ton (12,000 Btu/hr) cooling capacity.

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	÷	10.9	EER	Federal minimum standard (June 1, 2014)
Full Load Demand		1,100.9	Watts	
Conversion	÷	1,000.0	Watts / kW	
Full Load Demand		1.1	kW	
Conventional Room AC Full Load Demand		1.1	kW	
Honolulu Full Load Equivalent Cooling Hours	x	5,016.0	Hours per Year	EPA 2002
Conventional Room AC Annual Energy Consumption		5,522.2	kWh per Year	

VRF Split System AC

Average Unit Cooling Capacity		12,000	BTU / Hr	(Equals 1 Ton Cooling Capacity)
Energy Efficiency Ratio	÷	16.0	EER	HE minimum requirement for incentive
Full Load Demand		750.0	Watts	
Conversion	÷	1,000.0	Watts / kW	
Full Load Demand		0.8	kW	
VRFSplit AC Full Load Demand		0.750	kW	
Honolulu Full Load Equivalent Cooling Hours	x	5,016.0	Hours per Year	EPA 2002
VRF Split Annual Energy Consumption		3,762.0	kWh per Year	

Conventional Room AC Annual Energy Consumption		5,522.2	kWh per Year	
VRF Split Annual Energy Consumption	-	3,762.0	kWh per Year	
VRF Split Annual Energy Savings		1,760.2	kWh per Year	
VRF Split Annual Energy Savings		1,760	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		810	kWh per Year	
VRF Split Annual Energy Savings		1,760	kWh per Year	
Multi Family Use Factor	x	0.25		922 Multi Family Full Load Operating Hours (inferred)
Multi FamilyVRF Split AC Annual Energy Savings		431	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		810	kWh per Year	
Single Family Use Weighting	x	40%		
Single Family Savings Contribution to Measure		324	kWh per Year	
Multi FamilyVRF Split AC Annual Energy Savings		431.4370309	kWh per Year	
Multi Family Use Weighting	x	60%		
Multi Family Savings Contribution to Measure		259	kWh per Year	
Single Family Savings Contribution to Measure	-	324	kWh per Year	
Multi Family Savings Contribution to Measure	+	259	kWh per Year	
		583	kWh per Year	
		583		
Persistance Factor	x	1	pf	100.0%
		583	kWh per Year	

VRF Split AC Energy Savings **583 kWh / Year Savings**

Conventional Room AC Full Load Demand		1.101	kW	0.225
VRF Split AC Full Load Demand	-	0.750	kW	0.167
VRF AC Demand Reduction Before Adjustments		0.351	kW	
Single Family				
VRF Split AC Demand Reduction Before Adjustments		0.351	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		0.351	kW	
Single Family Use Weighting	x	40%		
Single Family Savings Contribution to Measure		0.140	kW	
Multi Family				
VRF Split AC Demand Reduction Before Adjustments		0.351	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		0.261	kW	
Multi Family Use Weighting	+	60%		
Multi Family Savings Contribution to Measure		0.157	kW	
Single Family Savings Contribution to Measure		0.14	kW	
Multi Family Savings Contribution to Measure	x	0.16	kW	
VRF Split AC Measure Demand Savings		0.30	kW	
VRF Split AC Measure Demand Savings	-	0.297	kW	
Persistance Factor	x	1.0	pf	100.0% ACs installed and operational at EER Efficiency
		0.30	kW	

Single & Multi Family VRF Split AC Demand Savings **0.30 kW Savings**

8.3.2 Window AC with Recycling

Version Date & Revision History
Draft date: December 23, 2014
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- Capacity = 8,500 Btuh (based on 6 months worth of actual AC purchases through Hawaii Energy's trade-up incentive (July-December 2014)
- Base-case efficiency = 9.8 EER (Energy conservation standard for 8500 Btuh capacity with louvered sides and without reverse cycle, per US DOE, until 5/31/2014. http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/41)
- Enhanced-case efficiency = 11.2 EER (Minimum Energy Star qualifying for < 19,999 Btuh capacity with louvered sides and without reverse cycle)
- Run time = 1824 (Hawaii Energy estimation based on Hawaii climate)
- Measure life = 9 years (DEER)
- Coincidence Factor = 0.50

Measure Description
This measure involves the early removal of an existing inefficient room window air conditioning unit from service and replacement with a new ENERGY STAR qualifying unit.

Baseline Condition
The baseline condition is the existing inefficient room air conditioning unit 8,500 Btuh at 9.8 EER.

Definition of Efficient Condition
The efficient condition is a new replacement room air conditioning unit 8,500 Btuh meeting the ENERGY STAR efficiency standard at 11.2 EER.

Annual Energy Savings Algorithm
Savings for remaining life of existing unit:

$$\Delta kWh = (Hours * BtuH * (1/EERexist - 1/EERee))/1,000$$

Where:

- Hours = Run hours of Window AC unit = 1,824 hr/yr
- Btuh = Capacity of replaced unit = Actual or 8,500 if unknown
- EERexist = Efficiency of existing unit in Btus per Watt-hour = 9.8
- EERee = Efficiency of ENERGY STAR unit in Btus per Watt-hour = 11.2

Annual Energy Savings = 197.8 kWh/year

Peak Demand Savings Algorithm

Peak Demand Savings = Annual Energy Savings divided by Hours of Operation multiplied by Coincidence Factor

Peak Demand Savings = 0.054 kW

Algorithm Savings

Window AC w/recycling				
Conventional Window AC		8500	BTU/Hr	based on 6 months worth of actual AC purchases through Hawaii Energy's trade-up incentive (July-December 2014)
Energy Efficiency Ratio	÷	9.8	EER	Energy conservation standard for 8500 Btuh capacity with louvered sides and without reverse cycle, per US DOE, until 5/31/2014
Full Load Demand		867.3	Watts	
Conversion	÷	1000	Watts/kW	
Full Load Demand		0.87	kW	
Conventional Full Load Demand		0.87	kW	
Honolulu Full Load Equivalent Cooling Hours	x	1824	Hours per Year	Hawaii Energy estimation based on Hawaii climate
Conventional AC Annual Energy Consumption		1582.0	kWh per Year	
Energy Star Window AC		8500	BTU/hr	Equals 1 Ton Cooling Capacity
Energy Efficiency Ratio	÷	11.2	EER	Minimum Energy Star Rated Window AC
Full Load Demand		758.9	Watts	
Conversion	÷	1000	Watts/kW	
Full Load Demand		0.76	kW	
ENERGY STAR Full Load Demand		0.76	kW	
Honolulu Full Load Equivalent Cooling Hours	x	1824	Hours per Year	Hawaii Energy estimation based on Hawaii climate
ENERGY STAR AC Annual Energy Consumption		1384.3	kWh per Year	
Annual Energy Savings		**197.8**	**kWh per Year**	
Demand Savings		0.108	kW	
Coicidence Factor		0.50		Window AC on 50% of peak period (5PM-9PM)
Peak Demand Savings		**0.054**	**kW**	

Incremental Cost

The incremental cost for this measure should be the actual implementation cost for recycling the existing units, plus $129.

Measure Life

The measure life is assumed to be **9 years**.

8.3.3 Ceiling Fans

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- ENERGY STAR Ceiling Fan Savings Calculator

TRM Review Actions:

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

Baseline Adjustment

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%.

Coincident Peak Demand Savings

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)

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

8.3.4 Solar Attic Fans

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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

8.3.5 Whole House Fans

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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

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, 2014
End date: June 30, 2015

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
- Evergreen TRM Review – 1/15/14

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 – 328 kWh, .042 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

8.4.2 Pool VFD Controller Pumps

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2014
End date: June 30, 2015

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.

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

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

8.4.3 Smart Strips

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- 11/22/11 – Akamai Power Strip kWh savings updated based on NYSERDA Measure Characterization for Advanced Power Strips.
- Evergreen TRM Review – 1/15/14

TRM Review Actions:

- n/a

Major Changes:

- n/a

Measure Description
Load sensing advanced power strips. This measure involves the purchase and installation of a new load sensing advanced power strips in place of a code-compliant or standard efficiency power strip.

Definition of Efficient Equipment
The high efficiency equipment is an advanced power strip.

Definition of Baseline Equipment
The baseline efficiency equipment is a code-compliant or standard efficiency power strip.

Measure Life
5 years

Savings Algorithm

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%	

8.4.4 Set-top-box (STB) Replacements - Pilot

Version Date & Revision History
Draft date: June 18, 2014
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- ENERGY STAR (2010). Set-top Boxes & Cable Boxes for Consumers.
- ACEEE Report (2004)
- NRDC from US EPA: http://www.nrdc.org/energy/files/settopboxes.pdf

TRM Review Actions:

- Need to send to EM&V for reasonableness review.

Major Changes:

- New measure

Measure Description:
A set top box, more commonly known as a Digital Video Recorder (DVR), is the box you rent or purchase and connect to your television in order to receive signals from your television service provider.

Most new set top boxes feature DVR capability and function as 24/7, always-on components designed to allow you to schedule the recording of TV programs hours, days and weeks in advance of the content airing on TV. And that always-on capability costs you in standby energy use.

Baseline Efficiencies:
The baseline efficiency case is a conventional set-top box that is not ENERGY STAR rated.

High Efficiencies:
The high efficiency case is an ENERGY STAR rated set-top box.

Hours:
The savings are based on 8,760 operational hours per year.

Measure Life:
4 years (Hawaii Energy estimate/assumption)

Energy Savings

Unit savings are deemed based on study results:

Where:

- Unit = Rebated set-top box
- ΔkWh = Average annual kWh savings per unit
- ΔkW = Average connected load reduction

Savings Algorithm

BASE CASE SET TOP BOX										
	On Mode			Light Sleep			Deep Sleep			Total Energy Consumption
	Watts	Hours	kWh/yr	Watts	Hours	kWh/yr	Watts	Hours	kWh/yr	kWh/yr
HD-DVR	32	9	105.1	31	15	169.7				274.8

ENERGY EFFICIENT SET TOP BOX										
	On Mode			Light Sleep			Deep Sleep			Total Energy Consumption
	Watts	Hours	kWh/yr	Watts	Hours	kWh/yr	Watts	Hours	kWh/yr	kWh/yr
HD-DVR	23	9	75.6	14	7	35.8	1	8	2.9	114.2

ENERGY SAVINGS (kWh/yr)	
Energy savings (kWh/yr)	160.6
Total Energy Savings (kWh/yr)	**160.6**

DEMAND SAVINGS (kW)	
Hours of operation per year	8760
Demand Savings (kW)	**0.0183**

- Recent estimates suggest an average of 1.5 digital cable boxes per subscriber household (U.S. Warburg LLC 2003) – taken from ACEEE Report A041 (page 4).

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, 2014
End date: June 30, 2015

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)

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, 2014
End date: June 30, 2015

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% per EM&V review.

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)
ΔkW = Annual ΔkWh per Unit/ 3000 hours

(Note: 3000 hours assumes 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

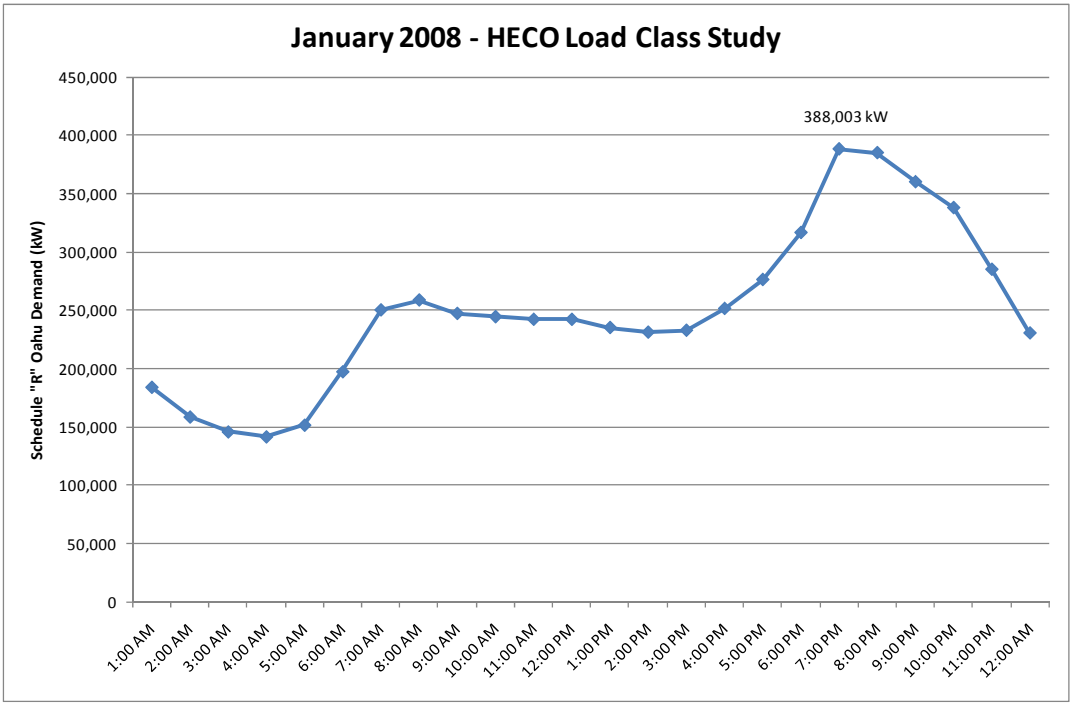
Savings Algorithms

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 Efficiency Project Auction

Version Date & Revision History
Draft date: October 4, 2011
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- n/a

TRM Review Actions:

- 10/5/11 – Currently Under Review.

Major Changes:

- n/a

Measure Description:
Hawaii Energy will issue a call for projects to solicit innovative, cost-effective projects that focus on energy efficiency in high-consumption and hard-to-reach homes. Projects must meet a total dollar per kWh savings target.

Implementation
Eligible projects in this auction will be any new technology, marketing approach or offering not currently served by existing Hawaii Energy programs. This initiative should increase customer satisfaction and participation in the energy efficiency program by allowing 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 submeters if required, to insure savings performance.

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, 2014
End date: June 30, 2015

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, 2014
End date: June 30, 2015

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.

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

Reference Tables
None

9.2.3 Central Air Conditioning Retrofit

Version Date & Revision History
Draft date: June 20, 2014
Effective date: July 1, 2014
End date: June 30, 2015

Measure Description
This measure involves the early removal of an existing inefficient central air conditioning unit from service, prior to its measure and natural end of life, and replacement with a higher efficient unit.

Baseline Condition
The baseline condition is the existing inefficient central air conditioning unit with an EER of 9.8.

Definition of Efficient Condition
The efficient condition is a new replacement central air conditioning with a higher EER of 13.0.

Annual Energy Savings Algorithm
Savings for remaining life of existing unit:

$$\Delta kWh = (Hours * BtuH * (1/EERexist - 1/EERee))/1,000$$

Where:

- Hours = Run hours of AC unit
- Btuh = Capacity of replaced unit
- EERexist = Efficiency of existing unit in Btus per Watt-hour = 9.8
- EERee = Efficiency of new higher efficient = 13.0

Savings Algorithm

Central AC Replacement				
Average Unit Cooling Capacity		12000	BTU/Hr	Equals 1 Ton Cooling Capacity
Energy Efficiency Ratio	÷	9.8	EER	DOE Federal Test Procedure 10CFR 430, Appendix F
Full Load Demand		1224.5	Watts	
Conversion	÷	1000	Watts/kW	
Full Load Demand		1.22	kW	
Conventional Full Load Demand		1.22	kW	
Honolulu Full Load Equivalent Cooling Hours	x	2920	Hours per Year	Based on 8 hr/day, 365 day/year
Conventional AC Annual Energy Consumption		3575.5	kWh per Year	
High Efficiency Central AC		12000	BTU/hr	Equals 1 Ton Cooling Capacity
Energy Efficiency Ratio	÷	13	EER	Minimum Energy Star Rated Window AC
Full Load Demand		923.1	Watts	
Conversion	÷	1000	Watts/kW	
Full Load Demand		0.92	kW	
High Efficiency Demand		0.92	kW	
Cooling Hours	x	2920	Hours per Year	
High Efficiency Energy Usage		2695.4	kWh per Year	
Annual Energy Savings		880.1	kWh per Year (PER TON)	
Coincidence Factor		0.75		
Demand Peak Savings		0.226	kW/TON	

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, 2014
End date: June 30, 2015

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.
- Evergreen TRM Review – 1/15/14

Major Changes:

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

Description:
Potential gift pack components:

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

Base Case

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

High Efficiency Case

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

Energy Savings

Measure	Energy Savings (kWh/yr)	Demand Savings (kW)
15 W CFL (3 pack)	114.8	0.012
Akamai Power Strip	78.0	0.0089
7 W LED	16.6	0.003
Low Flow Showerhead - Solar	42.0	0.022
Low Flow Showerhead - Electric	306.0	0.125
Faucet Aerator - Solar	6.5	0.004
Faucet Aerator - Electric	65.0	0.017
TOTAL	**628.9**	**0.1919**

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**	

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

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

Hot Water needed per Person		13.3	Gallons per Day per Person	HE
Average Occupants	x	3.77	Persons	KEMA 2008
Household Hot Water Usage		50.2	Gallons per Day	
Mass of Water Conversion		8.34	lbs/gal	
Finish Temperature of Water		130	deg. F Finish Temp	
Initial Temperature of Water	-	75	deg. F Initial Temp	
Temperature Rise		55	deg. F Temperature Rise	
Energy to Raise Water Temp		1.0	BTU / deg. F / lbs.	
Energy per Day (BTU) Needed in Tank		23,006	BTU/Day	
Energy per Day (BTU) Needed in Tank		23,006	BTU/Day	
BTU to kWh Energy Conversion	÷	3,412	kWh / BTU	
Energy per Day (kWh)		6.7	kWh / Day	
Days per Month	x	30.4	Days per Month	
Energy (kWh) per Month		205	kWh / Month	
Days per Year	x	365	Days per Year	
Energy (kWh) Needed in Tank to Heat Water per Year		2,460	kWh / Year	
Elec. Res. Water Heater Efficiency	÷	0.90	COP	
Base SERWH Energy Usage per Year at the Meter		2,733	kWh / Year	KEMA 2008 - HECO
Utilization Factor		28%		Percentage of water heating usage for showers
Base SERWH Energy Usage per Year at the Meter		765	kWh / Year	Energy Usage for showers
Base Case Showerhead		2.5	GPM	
High Efficiency Case Showerhead		1.5	GPM	
Savings = (1 - High Efficiency/Base)		40%		
Energy Savings		**306**	**kWh / Year**	
SERWH Element Power Consumption		4.0	kW	
Coincidence Factor	x	0.20	cf	12.0 Minutes per hour — Aquacraft Inc. Study
Water Heater Peak Usage	x	0.143	kW On Peak	
Residential Low Flow Shower Head Demand Savings		**0.114**	**kW Savings**	

Faucet Aerator w/Solar Water Heating				
Base Usage		10.9	gal/day/person	EPA Data
Base Flow Rate	÷	2.2	gpm	EPA Watersense Data
Faucet Run Time / day		4.95	min	
Proposed Flow Rate		1.5	gpm	
Faucet Run Time / day	x	4.95	min	
		7.43	gal/day	
Base Flow Rate		10.9	gal/day	
Proposed Usage	-	7.43	gal/day	
Water Savings		3.48	gal/day	
Faucet Temperature		80	F	Ohio and Connecticut Programs
Initial Temperature	-	75	F	Hawaii TRM
Temperature Rise		5	F	
Water Density		8.34	lbs/gal	
Energy Conversion		3412	kWh/Btu	
Energy to Raise Water Temp		1.0	BTU / deg. F / lbs.	
Water Heating Energy Saved		0.042469959	kWh	
People per Household		3.77	people	
Days per Year	x	365	days	
Annual Energy Needed		58.44	kWh	
Water Heater Efficiency		0.9		
		65	gross kWh saved by faucet aerator	
Design Annual Solar Fraction		90%	water heated by solar system	HE Program Design
		10%	water heated by backup element	
Annual Energy Savings w/ Solar		**6.5**	**kWh**	

	14.3%	faucet use during peak hours	
x	4.95	min / day	
	0.708	minutes	
÷	240	minutes during peak period	
	0.002949375	**coinsidence factor**	
	10.9	base gal / day / person	
x	3.77	person / household	
x	365	days / year	
÷	2.2	GPM	
÷	60	min / hour	
	114	**hours**	
	6.5	kWh savings	
÷	114	hours	
	0.06	average kW	
x	0.00295	coinsidence factor	
	0.00017	peak kW savings	

Peak kW Savings	**0.00017**	**kW**

Faucet Aerator w/Standard Electric Resistance Water Heater (SERWH)			
Base Usage	10.9	gal/day/person	EPA Data
Base Flow Rate	÷ 2.2	gpm	EPA Watersense Data
Faucet Run Time / day	4.95	min	
Proposed Flow Rate	1.5	gpm	
Faucet Run Time / day	x 4.95	min	
	7.43	gal/day	
Base Flow Rate	10.9	gal/day	
Proposed Usage	- 7.43	gal/day	
Water Savings	3.48	gal/day	
Faucet Temperature	80	F	Ohio and Connecticut Programs
Initial Temperature	- 75	F	Hawaii TRM
Temperature Rise	5	F	
Water Density	8.34	lbs/gal	
Energy Conversion	3412	kWh/Btu	
Energy to Raise Water Temp	1.0	BTU / deg. F / lbs.	
Water Heating Energy Saved	0.0425	kWh	
People per Household	3.77	people	
Days per Year	x 365	days	
Annual Energy Needed	58.44	kWh	
Water Heater Efficiency	0.9		
Annual Energy Savings	**65**	**kWh**	

	14.3%	faucet use during peak hours
x	4.95	min / day
	0.708	minutes
÷	240	minutes during peak period
	0.0029	**coinsidence factor**
	10.9	base gal / day / person
x	3.77	person / household
x	365	days / year
÷	2.2	GPM
÷	60	min / hour
	114	**hours**
	65	kWh savings
÷	114	hours
	0.57	average kW
x	0.0029	coinsidence factor
	0.0017	peak kW savings

Peak kW Savings	**0.0017**	**kW**

10.1.2 CFL Exchange

Version Date & Revision History
Draft date: February 24, 2010
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End date: June 30, 2015

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	0.056	47.2
Multi Family	0.056	47.2

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	0.018	15.1
Multi Family	0.018	15.1

Energy Savings:
CFL Gross Savings before operational adjustments:

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Single Family	0.038	32.1
Multi Family	0.038	32.1

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	32.1
Multi Family	0.005	32.1

Savings Algorithms

CFL Exchange - Single and Multi Family Residential Home

60W Incandescent Lamp Demand		0.056	kW			72	
		2.30	Hours per Day			53	
	x	365	Days	839.5	Hours per Year	60	
60W Incandescent Lamp Energy Usage		47.2	kWh per Year			40	
						56.25	Average base (W)
15W Compact Fluorescent Lamp Demand		0.018	kW				
		2.30	Hours per Day			25	
	x	365	Days	839.5	Hours per Year	21	
15W Compact Fluorescent Lamp Energy Usage		15.1	kWh per Year			15	
						11	
60W Incandescent Lamp Energy Usage		47.2	kWh per Year			18	Average post (W)
15W Compact Fluorescent Lamp Energy Usage	-	15.1	kWh per Year				
CFL Savings Before Adjustments		32.1	kWh per Year				
		32.1	kWh per Year				
Persistance Factor	x	1.000	pf	0.0%	Lamps not installed or replaced back		
CFL Energy Savings		32.1	kWh per Year				

CFL Energy Savings **32.1** **kWh / Year Savings**

60W Incandescent Lamp Demand		0.056	kW		
15W Compact Fluorescent Lamp Demand	-	0.018	kW		
CFL Demand Reduction Before Adjustments		0.038	kW		
CFL 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	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, 2014
End date: June 30, 2015

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	50%	
Energy Savings (kWh/yr)	**51.0**	

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 = 50% (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

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
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End date: June 30, 2015

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
- Evergreen TRM Review – 1/15/14

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	39.5	46

Energy Savings: (see Table 3 for Interactive Effect):

	CFL Energy Reduction		
Building Type	**< 16W**	**16-26W**	**> 26W**
All Commercial	131.5	162.3	189.0
Misc. Commercial	131.5	162.3	189.0
Cold Storage	126.5	156.1	181.8
Education	80.7	99.6	115.9
Grocery	177.0	218.5	254.5
Health	196.8	242.9	282.9
Hotel/Motel	150.2	185.4	215.9
Misc. Industrial	130.4	161.0	187.5
Office	85.4	105.4	122.7
Restaurant	160.5	198.1	230.6
Retail	128.0	158.0	184.0
Warehouse	126.5	156.1	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	0.020	0.023
Misc. Commercial	0.010	0.012	0.014
Cold Storage	0.016	0.020	0.023
Education	0.006	0.008	0.009
Grocery	0.027	0.034	0.039
Health	0.021	0.026	0.030
Hotel/Motel	0.019	0.024	0.028
Misc. Industrial	0.016	0.020	0.023
Office	0.016	0.020	0.023
Restaurant	0.024	0.030	0.035
Retail	0.019	0.024	0.028
Warehouse	0.014	0.018	0.021

Military Housing CFL demand savings: 0.004 kW

Measure Life
3 years (DEER)

11.1.2 T12 to T8 with Electronic Ballast

Version Date & Revision History
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End date: June 30, 2015

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 T12 to T8 Low Wattage

Version Date & Revision History
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End date: June 30, 2015

Referenced Documents:

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

TRM Review Actions:

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

Major Changes:

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

Description:
This measure involves the replacement of 4' standard T12 with low wattage T8 fixtures and electronic ballasts.

Base Efficiency
The baseline fixtures are assumed to be standard magnetic ballasts with T12 lamps.

High Efficiency
The high efficiency case is super T8 low wattage lamps with high performance electronic ballasts.

Energy and Demand Savings:
The savings for this measure were calculated assuming an even distribution of 1, 2, 3, and 4 lamp fixtures.

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):

T12 to low wattage T8 with HEEB		
Building Type	Demand (kW) Savings	Energy (kWh) Savings
All Commercial	0.009	78.1
Misc. Commercial	0.005	78.1
Cold Storage	0.009	75.1
Education	0.004	47.9
Grocery	0.015	105.1
Health	0.012	116.9
Hotel/Motel	0.011	89.2
Misc. Industrial	0.009	77.4
Office	0.009	50.7
Restaurant	0.014	95.3
Retail	0.011	76.0
Warehouse	0.008	75.1

Commercial Lighting Factors

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

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

[2] California Commercial End Use Summary (CEUS)

11.1.4 T8 to T8 Low Wattage

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End date: June 30, 2015

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)

11.1.5 Delamping

Version Date & Revision History
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End date: June 30, 2015

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)

11.1.6 Delamping with Reflectors

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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

11.1.7 LED Refrigerated Case Lighting

Version Date & Revision History
Draft date: October 3, 2011
Effective date: July 1,2014
End date: June 30, 2015

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)**		

11.1.8 LED Street and Exterior Lighting

Version Date & Revision History

- Draft date: July 1, 2014
- Effective date: July 1, 2014
- End date: June 30, 2015

Referenced Documents:

- PG&E Work Paper PGECOLTG151 (8/29/12)

TRM Review Actions:

- 8/1/14 – Currently Under Review.

Major Changes:

- New Measure

Measure Description:

Replacement of exterior HID fixtures with LED luminaires in outdoor street and exterior area applications.

Light emitting diode (LED) technology has proven to be an effective lighting source that can offer substantial savings over typical high intensity discharge (HID) lighting technologies.

The light is easily controllable and can be turned on and off instantly or dimmed for added energy savings at dawn and dusk.

LED streetlights are available from a variety of vendors and offer many advantages over traditional streetlight technologies.

- No mercury or other hazardous chemical and gasses in the LEDs
- Long lifetimes and highly reliable service, greatly reducing maintenance costs
- White light available in color temperatures from “warm” to “cool” with high CRI providing high-quality white light.

Baseline & High Efficiency:

Measure Name	Building Type	Base Case Wattage (W)	Measure Case Wattage (W)	Delta Watts (kW)	Annual Operating Hours	Energy Savings (kWh/yr)	Demand Reduction (kW)	Unit Definition	EUL	Base Case Cost ($/unit)	Measure Cost ($/unit)	Incremental Measure Cost (IMC)
LED Street/Exterior Lighting - Replace up to a 70 W Lamp with LED	ANY	85	50	0.035	4100	144	0.0350	Fixture	12	$217	$700	$483
LED Street/Exterior Lighting - Replace 71 to 100 W Lamp with LED	ANY	120	70	0.050	4100	205	0.0500	Fixture	12	$251	$800	$549
LED Street/Exterior Lighting - Replace 101 to 150 W Lamp with LED	ANY	176	110	0.066	4100	271	0.0660	Fixture	12	$296	$995	$699
LED Street/Exterior Lighting - Replace 151 to 200 W Lamp with LED	ANY	234	150	0.084	4100	344	0.0840	Fixture	12	$495	$1,200	$705
LED Street/Exterior Lighting - Replace 201 to 250 W Lamp with LED	ANY	293	192	0.101	4100	414	0.1010	Fixture	12	$535	$1,400	$865
LED Street/Exterior Lighting - Replace 251 to 310 W Lamp with LED	ANY	363	225	0.138	4100	566	0.1380	Fixture	12	$535	$1,600	$1,065
LED Street/Exterior Lighting - Replace 311 to 400 W Lamp with LED	ANY	468	265	0.203	4100	832	0.2030	Fixture	12	$555	$1,750	$1,195
Average Energy and Demand Savings						**397**	**0.097**					
Coincidence Factor (CF)	0.75											
Average Delta kW	0.097											
Peak Demand Savings	**0.073**											

Energy Savings:

Energy savings is based on the average kW reduction multiplied by hours of operation. Hours of operation is based on 4100 hours/year. **Average energy savings = 397 kWh/year**

Demand Savings:
Demand savings is based on the average kW reduction = 0.097 kW

- Coincidence Factor = 0.75
- Coincidence factor is based on lights being on during 6PM-9PM which is 3 out of the 4 peak demand hour period.

Peak Demand Savings = CF x 0.097 = 0.073 kW

Program Restrictions and Guidelines
To qualify for an incentive, the following requirements must be met:

- The LEDs must replace high intensity discharge, low pressure sodium, or incandescent lighting.
- Proposed fixture must be ENERGY STAR, Design Lights Consortium (DLC) listed or Lighting Facts.
- The pole/arm-mounted area and roadway luminaires must meet a minimum efficacy of 60 lumens per watt.
- Luminaire/enclosure type must be certified by NEMA/IEC as wet location for exterior parking, roadway, area, or wall-mounted luminaires and damp (or wet) location for parking garage luminaires.
- Not to exceed the power supply manufacturer's maximum recommended case temperature or TMP when measured during in-situ operation. Note: This performance characteristic is separate and distinct from thermal requirements established by UL, which governs safety rather than longevity of the power supply.
- Luminaires must possess a power factor greater than 0.9.
- The LEDs must possess less than 20% of total harmonic distortion.
- A written warranty must be issued to the customer guaranteeing repair or replacement of defective electrical parts (including light source and power supplies) for a minimum of three (3) years from the date of purchase.
- A product cut sheet and installation instructions must be provided.

Measure Life = 12 years (source: PG&E white paper).

Hours of Operation = 4100 hours/year (based on HECO Schedule F).

Incentives:

LED Street/Exterior Area Lighting

Existing Fixture Wattage	Incentive
Replace 311–400 watt lamp with LED	$115/fixture
Replace 251–310 watt lamp with LED	$90/fixture
Replace 201–250 watt lamp with LED	$70/fixture
Replace 151–200 watt lamp with LED	$60/fixture
Replace 101–150 watt lamp with LED	$50/fixture
Replace 71–100 watt lamp with LED	$40/fixture
Replace up to 70 watt lamp with LED	$30/fixture

11.1.9 **LED**

Version Date & Revision History
Draft date: November 30, 2011
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- The Database for Energy Efficient Resources (DEER)
- California Commercial End Use Summary (CEUS)
- Evergreen TRM Review – 2/23/12
- Evergreen TRM Review – 1/15/14

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).

11.1.10 LED Exit Signs

Version Date & Revision History
Draft date: January, 2010
Effective date: July 1, 2014
End date: June 30, 2015

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**	

11.1.12 HID Pulse Start Metal Halide

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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)

11.1.14 Sensors

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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)

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

11.1.15 Stairwell Bi-Level Dimming Lights

Version Date & Revision History
Draft date: March 30, 2014
Effective date: July 1, 2014
End date: June 30, 2015

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 9pm.)	(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 9pm.)	(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	46281.85 kWh/Year	$0.10 kWh/Year	$ 4,624.79
On-Peak Demand Savings	2.57 kW	$ 125 /kW	$ 333.33
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, 2014
End date: June 30, 2015

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.

Water Cooled Chiller Efficiency

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

Air Cooled Chiller Efficiency

2006 IECC

Equipment Type	Size	Min Eff	Type	kW/ton	15% Better kW/ton	Test Procedure
Air cooled, with condenser, electrically operated	< 150 tons	2.8	COP	1.256	1.068	ARI 550/590
		2.8	IPLV	1.256	1.068	
	> = 150 tons	2.5	COP	1.407	1.196	
		2.5	IPLV	1.407	1.196	

Water Cooled Energy Savings:

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

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

Air Cooled Energy Savings:

Air Cooled Chiller Energy Savings (kWh/ton)		
Building Type	Chiller <150 tons	Chiller >=150 tons
All Commercial	559.5	627.9
Misc. Commercial	559.5	627.9
Cold Storage	960.9	1,078.5
Education	551.2	618.7
Grocery	960.9	1,078.5
Health	780.1	875.6
Hotel/Motel	559.3	627.8
Misc. Industrial	780.1	875.6
Office	931.3	1,045.2
Restaurant	624.9	701.4
Retail	490.5	550.5
Warehouse	960.9	1,078.5

Water Cooled 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

Air Cooled Demand Savings:

Air Cooled Chiller Demand (kW) Savings per ton		
Building Type	Chiller <150 tons	Chiller >=150 tons
All Commercial	0.094	0.106
Misc. Commercial	0.094	0.106
Cold Storage	0.094	0.106
Education	0.038	0.042
Grocery	0.160	0.179
Health	0.122	0.137
Hotel/Motel	0.113	0.127
Misc. Industrial	0.094	0.106
Office	0.094	0.106
Restaurant	0.141	0.158
Retail	0.113	0.127
Warehouse	0.085	0.095

Measure Life
20 years (DEER)

11.2.2 VFD – Chilled Water/Condenser Water

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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		

11.2.3 VFD – AHU

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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, 2014
End date: June 30, 2015

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 85% of 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.

Notes
- Incentives is limited to 85% of incremental cost.
- 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				6/7 to 6/15	Notes			
							100%	1.0%					
							8,760 hr/yr.	88 hr/yr.					
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, 2014
End date: June 30, 2015

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, 2014
End date: June 30, 2015

Referenced Documents:

- Evergreen TRM Review – 2/23/12
- Evergreen TRM Review – 1/15/14

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

VRF Energy Savings per Ton

Energy Savings (kWh)					
	VRF Cooling Capacity (Btu/hr)				
Building Type	<65,000	65,000 - 135,000	135,000 - 240,000	240,000 - 760,000	>760,000
All Commercial	730.4	624.1	662.7	676.6	698.7
Misc. Commercial	730.4	624.1	662.7	676.6	698.7
Cold Storage	1,254.5	1,071.9	1,138.2	1,162.1	1,200.0
Education	719.6	614.9	652.9	666.6	688.4
Grocery	1,254.5	1,071.9	1,138.2	1,162.1	1,200.0
Health	1,018.5	870.2	924.0	943.5	974.3
Hotel/Motel	730.3	623.9	662.5	676.5	698.5
Misc. Industrial	1,018.5	870.2	924.0	943.5	974.3
Office	1,215.8	1,038.8	1,103.1	1,126.3	1,163.0
Restaurant	815.9	697.1	740.2	755.8	780.4
Retail	640.3	547.1	580.9	593.2	612.5
Warehouse	1,254.5	1,071.9	1,138.2	1,162.1	1,200.0

VRF Demand Savings

Demand Savings (kW)					
	VRF Cooling Capacity (Btu/hr)				
Building Type	<65,000	65,000 - 135,000	135,000 - 240,000	240,000 - 760,000	>760,000
All Commercial	0.123	0.105	0.111	0.114	0.117
Misc. Commercial	0.074	0.063	0.067	0.068	0.070
Cold Storage	0.123	0.105	0.111	0.114	0.117
Education	0.049	0.042	0.045	0.045	0.047
Grocery	0.209	0.178	0.189	0.193	0.200
Health	0.160	0.136	0.145	0.148	0.153
Hotel/Motel	0.147	0.126	0.134	0.136	0.141
Misc. Industrial	0.123	0.105	0.111	0.114	0.117
Office	0.123	0.105	0.111	0.114	0.117
Restaurant	0.184	0.157	0.167	0.171	0.176
Retail	0.147	0.126	0.134	0.136	0.141
Warehouse	0.110	0.094	0.100	0.102	0.106

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, 2014
End date: June 30, 2015

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.

Energy Savings
Energy savings is based on the following commercial solar water heating worksheet.

COMMERCIAL SOLAR HOT WATER INCENTIVE WORKSHEET

Hawaii Energy, Efficiency Program - Program Year 2014
(Effective July 1, 2014)

Hawaii Energy

CUSTOMER INFORMATION

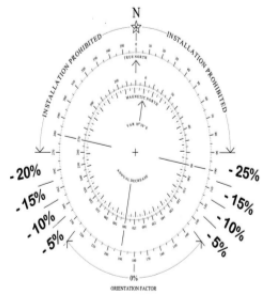
Customer Name:				Island:	Oahu	Application Number:	
Project Name:				T&D Loss Factor:	11.17%	Existing or New:	Existing
Storage Capacity:		# Tanks:		Design Finish Temp:		OG-100 Collector Rating (BTU):	
Panel Size (W x L):		# of Panels:		Total Cost of Project:		Existing System (electric / heat pump):	Electric
Building sq. ft.:		Year Built:		Installation Date:		Back-up Technology (gas / electric / heat pump):	Electric
Number of Units:		Num of Floors:		Building Type			

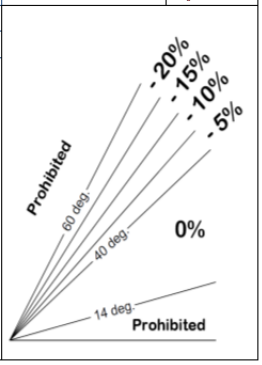
SOLAR INCENTIVE CALCULATION

	A	B	C	D		E	F	G		H	I		
Solar Panel Brand/Model	No. of Panels	Sun Zone	Panel rated Output BTU/Day	Total BTU D=A*C	N = New B=Burned out R=Retrofit	Orientation Factor	Tilt Factor	Total BTU Derating =(E*D+F*D)	Adjusted Solar Output =D-G BTU/Day	Adjusted Tons of Heating =H/K	Incentive factor		Incentive Amount =H*I
Example: SunEarth EC40	10	500	39,668	396,680	R	15%	5%	79,336	317,344	26.4	$250/ton	=	$6,611
		400		0	N - New	0%	0%	0	0	0.0	$250/ton	=	$ -
	0	300	0	0	N - New	0%	0%	0	0	0.0	$250/ton	=	$ -
								Total Adjusted Solar Output:	0			Total	$ -

SOLAR PANEL DERATING FACTORS

Collector Orientation	Derating	Collector Tilt	Derating
(Degrees True North)	(percent)	(degrees)	(percent)
0 - 89	prohibited	0 - 13	prohibited
90 - 115	25%	14 - 40	0%
105 - 115	10%	40 - 45	5%
115 - 125	5%	45 - 50	10%
125 - 225	0%	50 - 55	15%
225 - 235	5%	55 - 60	20%
235 - 245	10%	60	25%
245 - 255	15%	> 60	prohibited
255 - 270	20%		
271 - 360	prohibited		





Analysis

Impacts	kW	kWh/yr
Utility	0.67	#VALUE!
Customer	0.60	#VALUE!
Simple Payback (yrs)		#DIV/0!
TRB Ratio (TRB/Incremental Cost)		#VALUE!
* TRB Ratio must be ≥ 1		#VALUE!

Solar System Energy Production		
Installed Capacity	-	Btu/day
Realized Annual Output	90%	
Annual Output	-	Btu/year
Existing System Energy Displaced		
Energy Conversion	3,412	kWh/Btu
Electric Res. (COP 0.9)	-	kWh/Year
Heat Pump (COP 3.5)	-	kWh/Year
Additional Pump Energy		kWh/Year
Existing System On-Peak Demand Removed		
	-	kWh/day
Electric Resistance Power	4.0	kW
Heat Pump Average Power		kW
Run Time	-	Hours / Day
On-Peak Fraction	15%	
On-Peak Energy	0.60	kW On-Peak

TRB Calculation Table — 6% Discount Rate

System Life	Year	$/kW/yr.	$/kWh/yr.	Utility Benefits NPV
1	2012	$ 280	$ 0.099	#VALUE!
2	2013	$ 306	$ 0.100	#VALUE!
3	2014	$ 339	$ 0.104	#VALUE!
4	2015	$ 353	$ 0.104	#VALUE!
5	2016	$ 371	$ 0.109	#VALUE!
6	2017	$ 383	$ 0.112	#VALUE!
7	2018	$ 386	$ 0.113	#VALUE!
8	2019	$ 388	$ 0.114	#VALUE!
9	2020	$ 389	$ 0.114	#VALUE!
10	2021	$ 392	$ 0.115	#VALUE!
11	2022	$ 391	$ 0.115	#VALUE!
12	2023	$ 395	$ 0.116	#VALUE!
13	2024	$ 398	$ 0.117	#VALUE!
14	2025	$ 397	$ 0.117	#VALUE!
15	2026	$ 401	$ 0.118	#VALUE!
			Total Resource Benefit (TRB):	#VALUE!

Cost of Base Alternative:	$ 1,000
Cost of Solar System:	$ -
Incremental Cost:	$ (1,000)
Energy Savings:	-
Marginal Energy Cost:	$ 0.38 /kWh
First Year Project Savings:	$ -

Requirement: Must comply with Solar Rating and Certification Corporation (SRCC) Standards

Questions: Call the Business Program 839-8880 (Oahu) or toll free at 877-231-8222 • www.hawaiienergy.com

Measure Life
15 years

11.3.2 Heat Pump

Version Date & Revision History
Draft date: February 24, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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**	

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, 2014
End date: June 30, 2015

Referenced Documents:

- The increased incentive was based on previous paid booster pump installations and measured energy/demand savings.
- 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.
- Evergreen TRM Review – 1/15/14

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
		588.15	**kWh Reduction / HP / Year**

EM&V review comments recommend 500 - 700 kWh savings (Feb. 23, 2012)

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**

11.4.2 VFD Pool Pump Packages

Version Date & Revision History
Draft date: February 24, 2010
Effective date: July 1, 2014
End date: June 30, 2015

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.

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, 2014
End date: June 30, 2015

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, 2014
End date: June 30, 2015

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

11.5.3 EC Motors – Fan Coil Units

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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

11.6 Commercial Industrial Processes

11.6.1 Demand Control Kitchen Ventilation (DCKV)

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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
Measure Cost: $1,200 - $1,700 per HP based on business vertical and site complications (provided my Melink)

11.6.2 Refrigeration – Cooler Night Covers

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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:
$\Delta kWh = (Width)(Save)(Hours)$
$\Delta kW = (Width)(Save)$

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

*Cost	Linear feet	Material ($/linear feet)	Labor ($/linear feet)	Total ($/linear feet)
$ 285	4	$ 58.75	$ 15.00	$ 73.75
$ 315	6	$ 52.50	$ 15.00	$ 67.50
$ 395	8	$ 49.50	$ 15.00	$ 64.50
				$ 68.54

*Source: Ecuru Fresh

Savings	0.82	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, 2014
End date: June 30, 2015

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**

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, 2014
End date: June 30, 2015

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 0.50.

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.

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, 2014
End date: June 30, 2015

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, 2014
End date: June 30, 2015

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	

Notes

- 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.

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, 2014
End date: June 30, 2015

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.

11.9.3 Vending Misers

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

Version Date & Revision History
Draft date: March 2, 2011
Effective date: July 1, 2010
End date: TBD

Referenced Documents:

(1) USA Technologies Energy Management Product Sheets (2006). http://www.usatech.com/energy_management/energy_productsheets.php. Accessed 9/1/09.

TRM Review Actions:

- n/a

Measure Description

Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

ΔkWh = (kWrated)(Hours)(SAVE)
ΔkW = ΔkWh/ Hours

Where:

kWrated = Rated kW of connected equipment. See Table below for default rated kW by connected equipment type.
Hours = Operating hours of the connected equipment: default of 8,760 hours
SAVE = Percent savings factor for the connected equipment. See table below for values.

Vending Machine and Cooler Controls Savings Factors

Machine Type	kW Savings	kWh/year Savings
Refrigerated beverage vending maching (cans or bottles)	0.184	1612
Refrigerated	0.124	1086
Non-refrigerated snack vending machine	0.044	387
All (Average)	0.117	1028

Baseline Efficiency

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

High Efficiency
The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Hours
It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Life
5 Years

11.9.4 Water Cooler Timer (H_2Off)

Measure ID:

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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 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

11.10 High Efficiency Transformer

11.10.1 Transformer

Measure ID:

Version Date & Revision History
Draft date: *November 25, 2014*
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:

- CEE – Commercial and Industrial Distribution Transformer Initiative (November 9, 2011)
- Average Marginal Cost data from survey of manufacturers' current products; price to channel. Energy performance data prepared by members of the CEE Distribution Transformers Committee assuming a constant, linear load at 35% of unit capacity.
- CEE Tier 1 criteria are identical to NEMA Premium voluntary standard levels and the US DOE Energy Efficiency Level 2 (Distribution Transformers Technical Support Document, 2011)
- CEE Tier 2 criteria are identical to US DOE Energy Efficiency Level 5 (Distribution Transformers Technical Support Document, 2011)
- Barnes, P. R., J. W. Van Dyke, B. W. McConnell, and S. Das, Determination Analysis of Energy Conservation Standards for Distribution Transformers, 1996, Oak Ridge National Laboratory. Oak Ridge, TN. Report No. ORNL-6847.
  Distribution Transformer Standards Rulemaking. Dry-type Distribution Transformers, Life Cycle Cost Analysis on Design Line 9. Prepared for: Building Technology Program Office of Energy Efficiency and Renewable Energy (US Department of Energy), October 4, 2002. LBNL.

TRM Review Actions:

-

Major Changes:

- New Measure

Measure Description:
Distribution transformers are used in commercial and industrial applications to step down power from distribution voltage to be used in HVAC or process loads (220V or 480V) or to serve plug loads (120V). They are made up of one or more cores (typically carbon steel), two sets of metal windings (copper or aluminum), an insulating material (oil or air), and a container shell. Distribution transformers have no moving parts.

Baseline Efficiencies:

- NEMA TP-1 (current federal minimum standard level)

High Efficiency:

- CEE Tier I (single phase)
- CEE Tier II (single or three phase)

Energy and Peak Demand Savings:
Transformer energy efficiency is the ratio of output power to distribution voltage input power. Between input and output the transformer experiences losses, generally characterized as core losses (or no-load losses) and winding losses (or load losses). Core losses occur in the core materials of the transformer and are constant whenever the transformer is energized, regardless of load. Winding losses occur in the transformer windings, and increase exponentially with load.

Total losses, energy and demand savings associated with CEE Tier 1 level for **single-phase** transformers

KVA	Total Losses (kWh/yr)		Energy Savings vs. Baseline (kWh/yr)	Demand Savings vs. Baseline (kW)
	Baseline	Tier 1	Tier 1	Tier 1
15	1058	740	318	0.04
25	1533	1073	460	0.05
37.5	2070	1449	621	0.07
50	2606	1824	782	0.09
75	3449	2414	1035	0.12
100	4292	3005	1287	0.15
150	*6056*	*4239*	*1817*	*0.21*
167	6656	4659	1997	0.23
250	9198	6439	2759	0.31
333	11231	7862	3369	0.38

Total losses, energy and demand savings associated with CEE Tiers for **three-phase** equipment

KVA	Total Losses (kWh/yr)			Energy Savings vs. Baseline (kWh/yr)		Demand Savings vs. Baseline (kW)		Marginal Equipment Cost: Tier 1 vs. Baseline
	Baseline	Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2	
15	1380	966	736	414	644	0.05	0.07	$ 448
25	*1993*	*1395*	*1073*	*598*	*920*	*0.07*	*0.11*	*$ 687*
30	2300	1610	1242	690	1058	0.08	0.12	$ 807
45	3173	2221	1683	952	1490	0.11	0.17	$ 851
75	4599	3219	2460	1380	2139	0.16	0.24	$ 1,115
112.5	6209	4346	3346	1863	2863	0.21	0.33	$ 2,144
150	7818	5473	4139	2345	3679	0.27	0.42	$ 2,740
225	10348	7243	4139	3105	6209	0.35	0.71	$ 3,617
300	12877	9014	5151	3863	7726	0.44	0.88	$ 5,078
450	*18166*	*12716*	*6922*	*5450*	*11244*	*0.62*	*1.28*	*$ 4,881*
500	19929	13950	7512	5979	12417	0.68	1.42	$ 4,815

Operating Hours
24/7

Demand Coincidence Factor
TBD

Persistence
TBD

Lifetime
Measure life = **32 years** (Based on ORNL-6847, Determination Analysis of Energy Conservation Standards for Distribution Transformers)

Measure Costs and Incentive Levels

- Marginal (incremental) cost – see table above for 3-Phase.
- > 500 KVA (3-Phase) will be based on Custom Incentive Program
- > 333 KVA (Single Phase) will be based on Custom Incentive Program
- If a transformer size is not listed in table, we will apply the lower value
- Incentive level is based on the following table:

KVA	Energy Savings vs. Baseline (kWh/yr)		Inventives (total) $	
	Tier 1	Tier 2	Tier 1	Tier 2
Single-phase				
15	318		$ 80	
25	460		$ 115	
37.5	621		$ 155	
50	782		$ 195	
75	1035		$ 260	
100	1287		$ 320	
150	1817		$ 455	
167	1997		$ 500	
250	2759		$ 690	
333	3369		$ 840	
Three-phase				
15	414	644	$ 105	$160
25	598	920	$ 150	$230
30	690	1058	$ 175	$265
45	952	1490	$ 240	$375
75	1380	2139	$ 345	$535
112.5	1863	2863	$ 465	$715
150	2345	3679	$ 585	$920
225	3105	6209	$ 775	$1,550
300	3863	7726	$ 965	$1,930
450	5450	11244	$ 1,365	$2,810
500	5979	12417	$ 1,495	$3,100

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, 2014
End date: June 30, 2015

Referenced Documents:

- n/a

TRM Review Actions:

- 10/5/11 – Currently Under Review.

Major Changes:

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	$0.10 /kWh	$125 / kW	*$100 / kW		
> 5 years	$0.18 /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®, DLC or Lighting Facts LED Lamps	
• Five year manufacturer warranty or three year manufacturer warranty with LM79 and LM80 tests	• UL Listed

Category of Measure and Total Resource Cost

Custom Measures under 5 years

1. Lighting
    - TRC = $600,000

Custom Measure over 5 years

1. Lighting (LED & Non-LED)
    - TRC = $5,200,000

2. Mixed
    - TRC = $1,724,000

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.

12.1.2 Efficiency Project Auction

Version Date & Revision History
Draft date: June 20, 2014
Effective date: July 1, 2014
End date: June 30, 2015

Referenced Documents:
- n/a

TRM Review Actions:
- Currently under review

Major Changes:
- New measure

Description:
Hawaii Energy will issue a call for projects for innovative energy efficiency programs from third parties. Eligible projects in this auction are any new technology, marketing approach or customer segment not already offered or served Hawaii Energy PY14 programs. Projects may include new technologies if it can be demonstrated that the technology is commercially available and any performance issues have been investigated and resolved. A ceiling price and evaluation methods will be defined in the call for projects.

Energy Savings:
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.

Life:
DEER

Energy Savings:
Based on Pre/Post data logging

Demand Savings:
Based on Peak 5PM-9PM

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, 2014
End date: June 30, 2015

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) b1a*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, 2014
End date: June 30, 2015

Referenced Documents:

- n/a

TRM Review Actions:

- 10/5/11 – Currently Under Review.

Major Changes:

- n/a

Description:

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 $100,000).

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.
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.

13.2.2 Energy Study

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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

13.2.3 Design Assistance

Measure ID:

Version Date & Revision History
Draft date: September 20, 2011
Effective date: July 1, 2014
End date: June 30, 2015

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

14 (BHTR) Business Hard to Reach

14.1 Energy Efficiency Equipment Grants

14.1.1 Small Business Direct Installation - Demand Control Kitchen Ventilation (DCKV)

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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
Measure Cost: $1,200 - $1,700 per HP based on business vertical and site complications (provided my Melink)

14.1.2 Low Flow Spray Nozzles for Food Service (Retrofit)

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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).

14.1.3 Commercial Ice Makers

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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.

$$\Delta kWh = (kWh_{base,per100lb} - kWh_{ee,per100lb})/100 \times DC \times H \times 365$$

$$\Delta kW = \Delta kWh / HRS$$

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

14.1.4 Food Service – Commercial Electric Steam Cooker

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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
Incremental cost = $2,000

14.1.5 Food Service – Commercial Electric Griddle

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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).

14.1.6 Food Service – Commercial Fryer

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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).

14.1.7 Hot Food Holding Cabinet

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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
The incremental cost for ENERGY STAR hot food holding cabinet is $2,336 (full size) & $381 (half size)

14.1.8 Commercial Kitchen Combination Ovens

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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

14.1.9 Commercial Kitchen Convection Ovens

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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

14.1.10 Commercial Solid Door Refrigerators & Freezers

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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. It is assumed that the volume for baseline is the average of the range. For example if range is 0 to 15, the average volume is 7.5.

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 and Demand Savings:

Annual Energy Savings (kWh/year) = (kWhbase – kWhee) * 365

Demand Savings = Annual Energy Savings / HOURS * CF

Baseline Energy Usage

Equipment Description (cubic feet)	Baseline Daily Energy Usage (kWh/day)	Volume (cubic feet)	Baseline (kWh/day)
Solid-Door Reach-In Refrigerator			
0 ≤ V < 15	0.10 * V + 2.04	7.5	2.79
15 ≤ V < 30	0.10 * V + 2.04	22.5	4.29
30 ≤ V < 50	0.10 * V + 2.04	40	6.04
50 ≤ V 70	0.10 * V + 2.04	60	8.04
Solid-Door Reach-In Freezer			
0 ≤ V < 15	0.40 * V + 1.38	7.5	4.38
15 ≤ V < 30	0.40 * V + 1.38	22.5	10.38
30 ≤ V < 50	0.40 * V + 1.38	40	17.38
50 < V 70	0.40 * V + 1.38	60	25.38
Glass-Door Reach-In Refrigerator			
0 ≤ V < 15	0.12 * V + 3.34	7.5	4.24
15 ≤ V < 30	0.12 * V + 3.34	22.5	6.04
30 ≤ V < 50	0.12 * V + 3.34	40	8.14
50 < V 70	0.12 * V + 3.34	60	10.54
Glass-Door Reach-In Freezer			
0 ≤ V < 15	0.75 * V + 4.10	7.5	9.73
15 ≤ V < 30	0.75 * V + 4.10	22.5	20.98
30 ≤ V < 50	0.75 * V + 4.10	40	34.10
50 < V 70	0.75 * V + 4.10	60	49.10

Energy Efficient Usage

Equipment Description (cubic feet)	kWhee Daily Energy Usage (kWh/day)	Volume (cubic feet)	Enhanced Case (kWh/day)
Solid-Door Reach-In Refrigerator			
0 ≤ V < 15	≤ 0.089V + 1.411	7.5	2.08
15 ≤ V < 30	≤ 0.037V + 2.200	22.5	2.88
30 ≤ V < 50	≤ 0.056V + 1.635	40	3.88
50 ≤ V 70	≤ 0.060V + 1.416	60	5.02
Solid-Door Reach-In Freezer			
0 ≤ V < 15	≤ 0.250V + 1.250	7.5	3.13
15 ≤ V < 30	≤ 0.400V -1.000	22.5	8.00
30 ≤ V < 50	≤ 0.163V + 6.125	40	12.65
50 < V 70	≤ 0.158V + 6.333	60	15.81
Glass-Door Reach-In Refrigerator			
0 ≤ V < 15	≤ 0.118V + 1.382	7.5	2.27
15 ≤ V < 30	≤ 0.140V + 1.050	22.5	4.20
30 ≤ V < 50	≤ 0.0888V + 2.625	40	6.18
50 < V 70	≤ 0.110V + 1.500	60	8.10
Glass-Door Reach-In Freezer			
0 ≤ V < 15	≤ 0.607V + 0.893	7.5	5.39
15 ≤ V < 30	≤ 0.733V - 1.000	22.5	15.49
30 ≤ V < 50	≤ 0.250V + 13.500	40	23.50
50 < V 70	≤ 0.450V + 3.500	60	30.50

Energy and Demand Savings				365	8760
Equipment Description (cubic feet)	**Base Case (kWh/day)**	**Enhanced Case (kWh/day)**	**Energy Savings (kWh/day)**	**Energy Savings (kWh/year)**	**Demand Savings (kW)**
Solid-Door Reach-In Refrigerator					
0 ≤ V < 15	2.79	2.08	0.71	259.70	0.030
15 ≤ V < 30	4.29	2.88	1.42	516.48	0.059
30 ≤ V < 50	6.04	3.88	2.17	790.23	0.090
50 ≤ V	8.04	5.02	3.02	1103.76	0.126
Solid-Door Reach-In Freezer					
0 ≤ V < 15	4.38	3.13	1.26	458.08	0.052
15 ≤ V < 30	10.38	8.00	2.38	868.70	0.099
30 ≤ V < 50	17.38	12.65	4.74	1728.28	0.197
50 ≤ V	25.38	15.81	9.57	3491.96	0.399
Glass-Door Reach-In Refrigerator					
0 ≤ V < 15	4.24	2.27	1.97	720.15	0.082
15 ≤ V < 30	6.04	4.20	1.84	671.60	0.077
30 ≤ V < 50	8.14	6.18	1.96	716.50	0.082
50 ≤ V	10.54	8.10	2.44	890.60	0.102
Glass-Door Reach-In Freezer					
0 ≤ V < 15	9.73	5.39	4.33	1581.18	0.181
15 ≤ V < 30	20.98	15.49	5.48	2001.11	0.228
30 ≤ V < 50	34.10	23.50	10.60	3869.00	0.442
50 ≤ V	49.10	30.50	18.60	6789.00	0.775

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

14.1.11 Small Business Direct Restaurant Lighting Retrofits

Version Date & Revision History
Draft date:
Effective date: July 1, 2014
End date: June 30, 2015

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) b1a*(52*2*365/7)+b1b*52*365/7+b2a*52*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. 2 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



PY2014 MEDIA COVERAGE REPORT

Please note that some stories, particularly those by television and radio, were unavailable and therefore not included in this report.

Pacific Business News
"Afternoon Edition"
July 2, 2014

Hawaii Energy gives $150,000 to Hawaii Prince Hotel Waikiki for upgrading AC system

http://www.bizjournals.com/pacific/news/2014/07/02/hawaii-energy-gives-150-000-to-hawaii-prince-hotel.html



Hawaii Energy presented a $150,000 incentive check to the Hawaii Prince Hotel Waikiki and Golf Club for its energy-efficiency improvements. From left: John Gesser, district sales agency, York; Elaine Fong, branch manager, Johnson Controls; Wade Gesteuyala, hotel manager, Hawaii Prince; Lily Koo, business program specialist, Hawaii Energy; Kevin Inase, maintenance engineering 2nd, Hawaii Prince; Louis Vixaysakd, engineering 1st, Hawaii Prince; Mark Lee, engineering supervisor, Hawaii Prince; and Rod Suzumoto, director of engineering, Hawaii Prince.

Jason Ubay

Reporter- *Pacific Business News*

Hawaii Energy recently presented a $150,000 incentive check to the Hawaii Prince Hotel Waikiki and Golf Club for upgrading the hotel's air conditioning system. Three energy-efficient enhanced chillers were installed in March.

Compared to last year, the hotel will save an estimated 1.2 million kilowatt hours per year and save $288,000 on electricity costs based on a rate of 24 cents per kilowatt hour, Hawaii Energy said.

The air conditioning system covers the entire hotel, including its 541rooms, lobby, banquet facilities, gift shops, cafes and five restaurants.

Hawaii Energy has worked with the Hawaii Prince on an energy feasibility study since 2009. Other investments include new cooling towers, energy-efficient pumps and motors for the hotel waterfall, light reflectors, parking garage ventilation with carbon monoxide monitoring system, lobby window tinting and LED lamps and exit signs.

Hawaii Energy is the ratepayer-funded energy conservation and efficiency program for Oahu, the Big Island and Maui County.

***Green Magazine* (Website)**
July 2, 2015

Off-Peak EV Charging



OpConnect Hawaii and Hawaii Energy recently launched a pilot program to encourage residents with photovoltaic systems to charge their electric vehicles during off-peak demand hours from 9 a.m. to 2 p.m. in an effort to shift electricity loads. Hawaii Energy, the ratepayer-funded energy conservation and efficiency program serving Hawai'i, Lanai, Maui, Molokai and O'ahu, is aiming to find out at what price PV customers would be willing to charge their EVs during the day when renewable energy is most abundant. This would shift EV charging electric loads to off-peak demand hours rather than peak hours from 5 p.m. to 9 p.m. when the majority of residents return home and usually start charging.

In order to qualify for the pilot, participants need to be verified net energy metering customers, meaning they must have an approved photovoltaic system connected at the residence. To receive the 60 percent discount, participants are required to follow these steps: Sign up to become a free OpConnect member online (https://www.opconnect.com/Account/Register , obtain a membership number and add funds for future charges; Participants will receive an email to verify their electric utility account; Once verified, participants enter their member number when charging their EVs. The discount will be automatically applied at the end of the charging session. For questions, email HEpilot@opconnect.com.

The 60 percent discount is available until May 31 or while funding lasts.

"OpConnect members are early adopters of new technologies that will help them reduce their environmental footprint, while also saving them money, whether that is from driving electric vehicles or incorporating solar energy into their homes," says Dexter Turner, CEO of OpConnect Hawaii.

OpConnect is the largest provider of electric vehicle charging stations in Hawaii with more than 200 charging spots available at sites on O‘ahu, Maui, Kaua‘i and the Big Island. OpConnect’s electric vehicle charging stations have prevented more than 250 metric tons of greenhouse gases over the last year. With more than 2,600 registered EVs in Hawaii, OpConnect operates the state’s largest charging network. The EIA reports that Hawai‘i is only second to California in the number of EVs registered in the state. According to EIA, 4.2 out of every 1,000 registered light cars and trucks in Hawai‘i are electric vehicles.

Hawaii Energy also launched a pilot earlier this year to help EV drivers save energy. Energy-saving kits were distributed for free to new EV drivers at participating Oahu car dealerships. The program also developed an educational website (ev.hawaiienergy.com) with information about the benefits of EVs, different makes and models, fuel and cost savings and buying considerations.

Pacific Business News
"Afternoon Edition"
July 17, 2014

Honolulu Museum of Art trades in florescent lighting for LEDs

Pacific Business News

Jul 17, 2014, 11:31am HST

The Honolulu Museum of Art recently completed lighting renovations at its Beretania Street location and the Spalding House in Makiki for about $314,000.

The museum received a $91,007 incentive check from Hawaii Energy, a ratepayer-funded energy conservation program contracted by the Hawaii Public Utilities Commission, for making the renovations.

Energy Industries completed the project in about six months, replacing 1,236 of linear florescent tube lights and 2,754 halogen, incandescent and compact florescent lights with LEDs in both museums.

The renovations are estimated to save the art museum about $113,000 and the Spalding House about $9,600 annually on electric bills.

Energy Manager Today (Online Edition)
Sept. 8, 2014

Energy Efficiency Program Sponsors $2.1M Auction

September 8, 2014 by Linda Hardesty



Hawaii Energy is conducting a $2.1 million energy efficiency auction. Hawaii Energy is a ratepayer-funded conservation and efficiency program administered by Leidos Engineering under contract with the Hawaii Public Utilities Commission.

According to the firm's website, it's looking for contractors, energy vendors, ESCOs, property managers and developers to "bid" on incentive funding by submitting creative energy efficiency projects.

A spokesman for Leidos said the $2.1 million for the Hawaii Energy Efficiency Auction is separate from the funds set aside for prescriptive and custom rebates and incentives already offered through the Hawaii Energy Program. Vendors that are awarded funding through the auction are not eligible to request additional funds for the exact same project under other prescriptive or custom rebates.

"A key difference with the auction is that the vendor is providing us with the incentive amount needed to move their energy efficiency project forward, which can be up to the full cost of the project," said the spokesman. "On the other hand, our current prescriptive and custom incentives provide a set amount of funding based on the amount of energy saved. We will, however, be evaluating the auction proposals based on the level of incentive requested versus the 1st year and lifetime kWh of savings. So it is in the vendor's best interest to request only what is needed to move their project forward with their proposed customer(s)."

Eligible projects include:

- Projects addressing needs in specific markets and/or involving specific technologies selected by Hawaii Energy.
- Any project outside of the Targeted Projects list, including new technologies, new markets or mass installation opportunities.

Projects must reduce energy consumption with measured or verifiable savings and deliver one or more of the following results:

- Improved cost-effectiveness: Projects that are more cost-effective than existing Hawaii Energy program incentives (in both first year and lifetime energy savings).

- Increased penetration of market segments: Projects that demonstrate the ability to improve the uptake of energy efficiency initiatives in “hard-to-reach” market segments, which include rentals, small businesses, the healthcare sector and lower-income areas (as defined by geographic location).
- Mass installation: Projects that result in mass installation of energy-efficient technologies.
- New and Innovative: Innovative projects that are not currently incentivized by Hawaii Energy.

KHNR-AM (The Mike Buck Show)
Aug. 14, 2014
Topic: Water & Energy Conservation



MauiNow.com
Aug. 19, 2014

Rid-A-Fridge Program Offers Free Haul-Away and $65 Rebate

By Maui Now Staff

Hawaiʻi Energy, a ratepayer-funded energy conservation and efficiency program, has renamed its refrigerator recycling offer from "Bounty Program" to "Rid-A-Fridge" in an effort to get people to retire their old inefficient models and save energy.

The program provides residents on Maui with free curb-side pickup, a $65 rebate, and the option of donating rebates to the Maui Food Bank.

Program organizers say refrigerators and freezers built before 1993 can be two to three times more expensive to operate than a new Energy Star model–a factor that program representatives say could result in as much as $314 in savings for a Maui resident if they get rid of their second refrigerator or freezer.

"There are multiple benefits to recycling an energy-wasting refrigerator or freezer," said Hawaiʻi Energy Residential & Transformational Program Director Caroline Carl in a press release. "Participants don't need to worry about hauling away their refrigerator; they'll receive a financial incentive and begin saving money on their electric bill immediately."

Program representatives say that since the refrigerator recycling program began in August 2011, approximately 1,956 refrigerators and freezers have been recycled and kept out of landfills. Representatives estimate that more than 1.67 million kilowatt hours and $568,820 in electricity costs have been saved annually (based on an average $0.34 per kWh).

The promotion also raised more than $3,000 for three food banks across the state. Due to its success, residents can continue to donate their rebates throughout Hawaiʻi Energy's new program through June 30, 2015.

"We really appreciate the community's kindness and generosity for supporting the Maui Food Bank and for making a commitment to save energy," said Rich Yust, Maui Food Bank executive director. "Hawaiʻi Energy has been a terrific supporter and we look forward to another great year."

In order to qualify, refrigerators or freezers offered for recycling must be full-size (at least 14 cubic feet) and in working condition.

To schedule a pick-up, call (808) 537-5577 on Oʻahu, and toll-free on Hawaiʻi Island and Maui at (877) 231-8222. Further information is also available at the Hawaiʻi Energy[2] website.

Honolulu Star-Advertiser
August 21, 2014

Program pays cash for old refrigerators

By Kathryn Mykleseth / kmykleseth@staradvertiser.com

POSTED: 01:30 a.m. HST, Aug 21, 2014
LAST UPDATED: 11:22 a.m. HST, Aug 21, 2014

Hawaii Energy, a ratepayer-funded energy conservation and efficiency program, is giving residents the opportunity to cut down on energy costs as well as give back to the community with a refrigerator recycling program called "Rid-A-Fridge."

Formerly known as the "Bounty Program," this energy saving initiative focuses on collecting refrigerators and freezers to prevent the older units from being handed down or resold. The company is encouraging families to give up their second refrigerator or freezer to save energy and money. Hawaii Energy will pick up and recycle old refrigerators for free and pay a rebate to participants.

Oahu residents receive $50, while Maui and Hawaii island residents get $65 to recycle their inefficient units.

Hawaii Energy's partnership with local food banks gives participants the option to donate the rebates to Hawaii Foodbank in Oahu, Maui Food Bank, or The Food Basket on Hawaii island. Hawaii Energy does not serve Kauai. Hawaii Energy's promotion raised a combined $3,000 for all three major food banks since October.

"We'd like to give a big mahalo to the community for their kindness and generosity for supporting Hawaii's food banks," said Hawaii Foodbank Vice President and COO, Polly Kauahi. "Hawaii Energy has been tremendous to work with and we look forward to another great year."

Hawaii Energy changed the name of its bounty and freezer program on Monday to help the community to better understand the program's goal.

"Our program is devoted to promoting energy efficiency by removing the older refrigerators off of the grid. We make sure the residents receive energy savings but also make sure the refrigerators don't end up in a landfill," explained Caroline Carl, Hawaii Energy residential and transformational program director.

Refrigerators and freezers made prior to 1993 can be two to three times more expensive to operate than a new Energy Star model.

Residents who give up a second, older refrigerator on Oahu, Maui and the Big Island can save as much as $292, $314 and $336, respectively, on their annual electric bill.

Hawaii Energy reports it has saved residents over $560,000 in total electricity costs annually and has collected approximately 1,956 refrigerators and freezers since the program's launch.

"The refrigerators are taken to the local recycling yards and all of the refrigerators are drained, the oil is removed, and then they are stripped of all of the metals," said Carl. "The remaining material is then compressed and shipped off the island to companies that can use the material."

Honolulu Star-Advertiser
August 29, 2014

Hawaii Energy to stage energy efficiency auction

By Erika Engle

Hawaii Energy is offering up to $2.1 million in incentive funds for energy efficiency proposals on Oahu, Hawaii, and Maui.

Submissions will be welcomed from contractors, developers, energy efficiency solution providers, energy service companies, energy vendors and property managers by Monday, Sept. 29.

Proposed projects must reduce energy consumption and provide at least one of several benefits, including improved cost-effectiveness compared to existing Hawaii Energy offerings; increased energy efficiency in high energy consumption and/or hard-to-reach geographic areas; or mass installations of specific energy efficiency technologies or offerings.

If applicants' projects are selected, they will be notified by Oct. 17. Preference will be given to projects that can be completed by May 30.

The request for applications and application form can be found online.

http://auction.hawaiienergy.com

Sustainable Business News
(Online Edition)
Sept. 8, 2014

Hawaii's energy efficiency auction challenges innovators

By Sustainable Business News



To boost innovations in energy efficiency, Hawaii Energy is conducting what may be the first efficiency auction. Open to companies that offer efficiency services and property managers and developers, the program will compete for $2.1 million in funding that offsets project costs.
Proposed projects must reduce energy consumption and deliver one or more of the following:

- Improved cost-effectiveness compared to existing Hawaii Energy offerings
- Increased energy efficiency in high energy consumption and/or hard-to-reach geographic areas
- Mass installations of specific energy efficiency technologies or offerings.

Projects can either target specific target markets such as renters (residential or commercial) or offer new technologies not currently offered by Hawaii Energy.

"With our new efficiency auction, we're calling on industry professionals to demonstrate their ingenuity and market savvy to bring additional energy-saving solutions to electric customers," said Ray Starling, program director at Hawaii Energy.

Applications have to be in by Sept. 29 and winning projects will be announced on Oct. 17. Preference will be given to projects that can be completed by June 2015, but longer duration projects will be considered.

Hawaii Energy is the state's ratepayer-funded energy conservation and efficiency program which, like many U.S. programs, offers cash rebates and other incentives to residents and businesses to encourage switching to energy-efficient equipment and appliances.

This year Hawaii Energy began mailing reports to customers that compares their electricity consumption to those of their neighbors, based on research that shows the effectiveness of peer comparisons. The state has also signed energy savings performance contracts with the goal of doubling the efficiency of state and Honolulu County buildings by 2015 .

Hawaii's goal is to cut electricity demand 30 percent by 2030 while increasing the share of renewable energy to 40 percent.

Maui News
Sept. 10, 2014

Rid-A-Fridge: Dispose of second fridge or freezer for savings

The Maui News

Hawaii Energy, a refrigerator recycling program administered by Leidos Engineering, has been renamed to Rid-A-Fridge to encourage residents to dispose of their second fridge or freezer, the engineering company announced.

The ratepayer-funded energy conservation and efficiency program that is under contract with Hawaii Public Utilities Commission serves Maui County, the Big Island and Oahu. Since 2011, the program has recycled 1,956 refrigerators and freezers and has saved residents more than $560,000 in electricity costs annually, the company said.

Maui County residents can save as much as $314 on their electric bill annually by giving up their second fridge, especially those built before 1993. Older refrigerators can be two to three times more costly to operate than a new Energy Star model, the company said.

Hawaii Energy provides free curbside pickup, recycling and $65 rebates for refrigerators and freezers from Maui County residents. To qualify, the appliances must be full-sized, or at least 14 cubic feet, and in working condition.

Hawaii Energy offers cash rebates and other incentives to residents and businesses to help offset the cost of installing energy efficient equipment. The program contributes to the state's goal of reducing total electric energy usage by 30 percent, or 4.3 billion kilowatt hours, by 2030.

For more information on Hawaii Energy, visit www.hawaiienergy.com.

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Honolulu Star-Advertiser
September 19, 2014

Hawaii Energy offering $50 AC rebate

Hawaii Energy is offering a $50 rebate to residents on Oahu, Hawaii island and Maui under a new air-conditioning recycling program called "Window AC Trade-Up."

To qualify for the rebate, residents must purchase an Energy Star window air conditioner and recycle their older working model with the organization.

Hawaii Energy will pick up and haul away the old air conditioners for free.

Applications for the "Window AC Trade-Up" are provided by participating retailers when residents buy Energy Star window AC with a minimum energy efficiency ratio of 10.8.

The rebates are available only while funding lasts.

MauiNow.com
September 24, 2014

Hawai‘i Energy Launches Window Air Conditioner $50 Rebate

By Wendy Osher



A trade up promotion for energy efficient air conditioning comes as Maui faced three consecutive days of high temperatures [2] this week, including a record breaking 95 degree temperature on Saturday.

Hawai‘i Energy, a ratepayer-funded energy conservation and efficiency program for Hawai‘i, Lāna‘i, Maui, Moloka‘i and O‘ahu, launched the new rebate offer for Maui residents this week called the “Window AC Trade-Up.”

Under the offer, residents can receive a $50 rebate when they purchase a qualified ENERGY STAR window air conditioner and recycle their old working one. To qualify, the new model must have a minimum Energy Efficiency Ratio of 10.8.

Applications for the rebate are provided by participating retailers at the time of purchase, and can be found on Maui at Home Depot, Lowe’s, and Sears.

The program provides fee pick-up and recycling as part of the offer.

Program representatives say the rebates are available on a first-come, first-served basis and will be available while funding lasts.

According to Hawai‘i Energy’s Rob Deveraturda, residents can expect to save about 235 kilowatt hours or $80 annually based on an average of $0.34/kWh used, compared to a non-ENERGY STAR model. Factors that can impact savings include usage, model and electricity rates.

"The Window AC Trade-Up is a win-win for residents and the environment," said Caroline Carl, Hawaiʻi Energy Residential & Transformational Program Director in a press release. "Old air conditioners won't wind up in landfills and the rebate can help pay for a new one that can save more energy. The recycling process is really convenient, conducted responsibly and totally free for residents."

The offer is currently available on Maui Island, but not on the outer islands of Lānaʻi and Molokaʻi.

Similar rebate offers have been offered through the program in the past for other appliances such as refrigerators and solar water heaters.

KHON-TV (Hawaii FOX Affiliate)
Sept. 24, 2014





The Green Leaf
Honolulu Star-Advertiser's Blog
September 25, 2014

Window A/C rebates

September 25th, 2014
By Nina Wu



Summer's officially over, but if you're still trying to cool your heels in the isles, Hawaii Energy is offering $50 rebates for anyone who trades up to an EnergyStar-rated window air conditioner.

Hawaii Energy, a ratepayer-funded energy conservation and efficiency program, is offering a $50 rebate for individuals who swap out an old working unit for a more energy efficient one. They're available on a first-come, first-served basis, but the perk is free pick-up and haul-away of the old A/C unit.

The rebates are available on Oahu, Maui and the Big Island, but not Lanai or Molokai (sorry, folks).

To qualify, your unit must be **EnergyStar** rated and have an energy efficiency ratio of 10.8 or higher.

It's easy.

1. Pick up an application at the time of purchase of an **EnergyStar A/C unit** from participating retailers, including Lowe's, Sears, NEX, Home Depot and City Mill.

2. Schedule a pick-up of your old A/C unit for recycling by calling 537-5577 or (877) 231-8222.

3. Send your completed rebate application and original receipt via snail mail to **Hawaii Energy, P.O. Box 3920, Honolulu, HI 96812**. The rebate should arrive in the mail in eight to 10 weeks.

The switch could save you about $80 per year on your electric bill (though savings vary depending on the make, model and usage of your window A/C unit).

If you're getting a split-air A/C system, **there are $150 rebates available for variable refrigerant flow air conditioners up to 24,000 BTU, and $250 rebates for units from 24,001 to 36,000 BTU**. They must have a minimum SEER rating of 16.

Questions? See if the answer is in the **FAQ list**.

MauiNow.com
September 30, 2014

More Than 700 Energy-Saving Lights to Illuminate Maui Fair

By Maui Now Staff



The upcoming Maui Fair is bringing energy efficiency to the center stage by replacing old incandescent lighting with all-new compact fluorescent lights.

Hawai‘i Energy, the ratepayer-funded energy conservation and efficiency program for Maui, Hawai‘i and Honolulu counties, is supporting the fair this year by providing 702 CFL lights for high-traffic areas.

The energy efficient lights are installed throughout the fair grounds including the food and concessions area, entertainment tent and the “Maui Fair Products & Services” tent.

“We’re honored to support this timeless community tradition again and proud to help the fair reduce its energy consumption,” said Walter Enomoto, Hawai‘i Energy Program Specialist for Maui County.

“We look forward to working together in the future to find even more ways to conserve and maximize the fair’s efficient use of energy,” he said in a joint press release.

Organization representatives say ENERGY STAR certified CFLs use 75% less energy, produce the same amount of light as incandescent bulbs, and last nearly 10 times longer.

According to Hawai‘i Energy, switching to CFLs can save about $12 to $19 per lamp on an electric bill annually.

“We’d like to give a big mahalo to Hawai‘i Energy and all of our sponsors for donating their time, resources and expertise to make the Maui Fair a memorable event,” said Sherri

Grimes, Maui Fair Managing Director in the press release. “This year is truly special because we’re making strides to create a cleaner, greener fair than ever before.”

The 92nd Maui Fair will be held at the War Memorial complex in Wailuku from Thursday to Sunday, Oct. 2 to 5, 2014.

Maui TV News.com
Oct. 1, 2014

Bright Idea Will Save Energy at 92nd Maui Fair



FAIR-LY BRIGHT – The 92nd Maui Fair will be lit up with 702 compact fluorescent lights thanks to Hawai'i Energy.

(Photo Courtesy Hawai'i Energy)

HONOLULU – The Maui Fair, the largest and longest running annual fair for 92 years, is bringing energy efficiency to the center stage by replacing old incandescent lighting with all-new compact fluorescent lights (CFLs).

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Maui, Hawaii and Honolulu counties, has supported the Maui Fair and operated an educational booth the past three years in an effort to help fair goers save energy. This year, the program has taken a step forward by providing 702 energy-efficient CFLs installed at high-traffic areas throughout the fair grounds including the food and concessions area, entertainment tent and the "Maui Fair Products & Services" tent.

"We're honored to support this timeless community tradition again and proud to help the fair reduce its energy consumption," said Walter Enomoto, Hawaii Energy Program Specialist for Maui County. "We look forward to working together in the future to find even more ways to conserve and maximize the fair's efficient use of energy."

ENERGY STAR® certified CFLs use 75 percent less energy, produce the same amount of light as incandescent bulbs and last nearly 10 times longer. Switching to CFLs can save about $12 to $19 per lamp on your electric bill annually. To see how much

energy can be saved by switching from incandescent lamps to CFLs, visit www.hawaiienergy.com/savings-calculator.

Hawaii Energy offers instant rebates for CFLs at the following participating Maui retailers: Ace Hardware, Costco, Foodland, Home Depot, Longs Drugs/CVS, Safeway and Walmart.

"We'd like to give a big mahalo to Hawaii Energy and all of our sponsors for donating their time, resources and expertise to make the Maui Fair a memorable event," said Sherri Grimes, Maui Fair Managing Director. "This year is truly special because we're making strides to create a cleaner, greener fair than ever before."

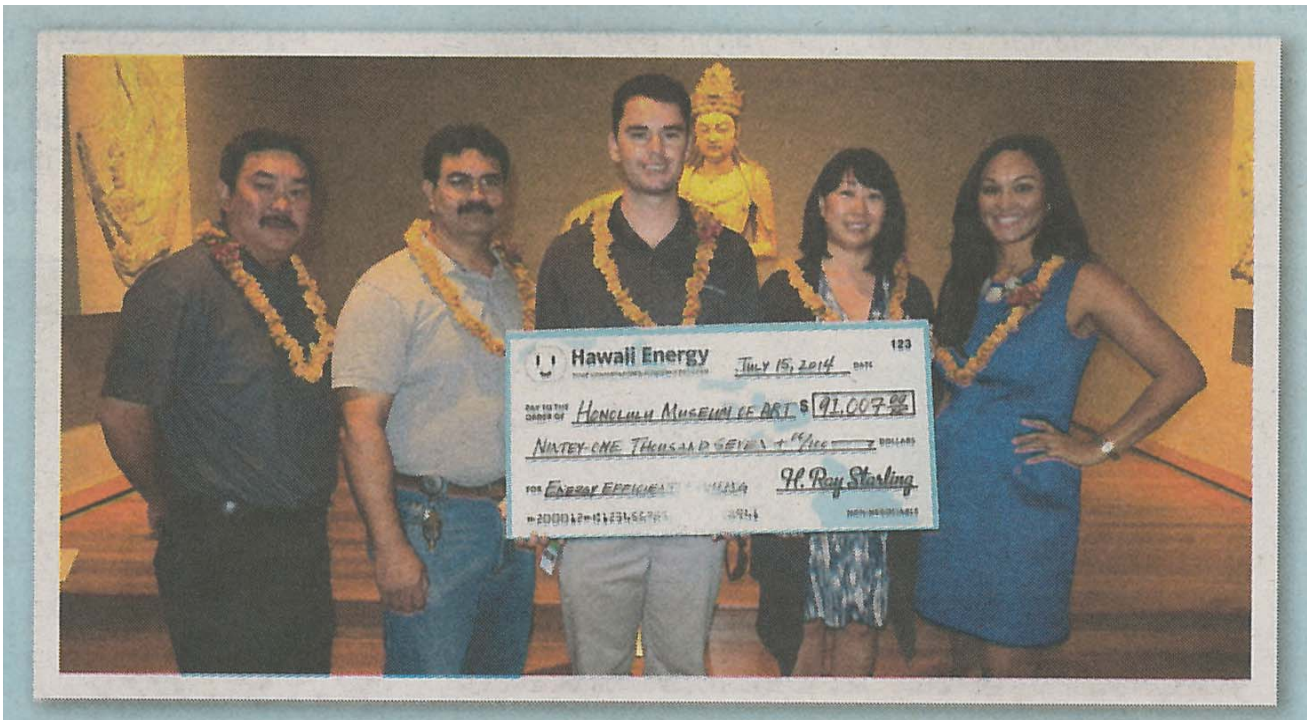
The 92nd Maui Fair will be held at the War Memorial Stadium in Wailuku from Thursday, October 2 to Sunday, October 5, 2014.

To learn more about Hawaii Energy and how to save energy and money on your electric bill, visit www.HawaiiEnergy.com or call toll-free at (877) 231-8222.

Tags:
CFL, entertainment, Hawaii, Hawaii Energy, Maui Fair

Midweek
Sept. 29 – Oct. 3, 2014

HOTSHOTS



▶ Donation Reduces Energy Costs

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, presented a $91,007 incentive check to Honolulu Museum of Art July 16 for enhancing its lighting and efficiency. Honolulu Museum of Art will save an estimated $113,400 in annual energy costs. Pictured are: Duane Ashimine, president & COO, Energy Industries; Richard Andrews Jr., director of operations, Honolulu Museum of Art; Ian Tierney, junior business program specialist, Hawaii Energy Center; Allison Wong, deputy director, Honolulu Museum of Art; and Arsena Kailihiwa, energy specialist, Energy Industries. Photo from Hawaii Energy.

Honolulu Star-Advertiser
Oct. 5, 2014

AKAMAI MONEY

Hawaii Energy offers tips to cut energy cost

By Kathryn Mykleseth

POSTED: 01:30 a.m. HST, Oct 05, 2014

Question: What are some everyday adjustments that homeowners, who cannot afford to install a rooftop PV solar system, could make to their daily lives to cut back on energy costs?

Answer: There are several low- and no-cost ways people can reduce their energy costs that do not require a photovoltaic system.

Replace old incandescent lights with energy-efficient lighting - Energy Star certified Compact Fluorescent Light Bulbs use about 75 percent less energy and produce the same amount of light as incandescent bulbs. They also last nearly 10 times longer.

Switching to CFLs can save about $12 to $19 per lamp on your electric bill annually. LED lamps save even more and can last up to 25 times longer than incandescent bulbs. Hawaii Energy offers instant rebates for CFLs and LEDs at participating retailers.

Reduce "phantom loads." Most electronic devices such as computers, DVD players and printers continue to use electricity even when they are not in use - called a "phantom" or "vampire" load. By connecting these devices to an advanced power strip, you can control the power to your electronics and save about $10 on your electric bill annually.

Take advantage of Hawaii's tradewinds to cool your home. This costs you nothing. When needed, use Energy Star ceiling fans. They are about 20 percent more efficient than typical ceiling fans. Plus, Hawaii Energy provides a $35 rebate.

PROFILE
Caroline Carl
>> Job: Residential and transformational program director, Hawaii Energy
>> Website: www.HawaiiEnergy.com
>> Contact: 537-5577 or hawaiienergy@leidos.com
>> Education: B.A. in environment and development from McGill University and an M.S. in geographic information science and technology from the University of Southern California

Q: Are there any daily habits that play a large part in energy use?

A: The amount of hot water you use can significantly impact your energy usage. For a typical four-person household on Oahu without a pool or air conditioning, heating water accounts for about 40 percent of electricity use. By shortening your showers by just 2 minutes, you can save up to 233 kilowatt hours (kWh) and an estimated $56 per person per year. You'll also save on your water bill.

Q: What about solar water heating? How much does that cost?

A: For families of four or more, installing a solar water heater can save you at least $600 on your electric bill per year. Hawaii Energy provides an instant rebate of $1,000 and when combined with state and federal tax credits, you can purchase a solar water heating system for about $2,000.

Q: What appliance has the largest impact on a homeowner's electric bill?

A: In most homes, the refrigerator is the appliance that uses the most electricity. Aside from appliances, water heating and air conditioning typically use the most energy in a home.

Q: What is the average cost to operate your refrigerator?

A: If you have a refrigerator that is 20 years or older, it could cost you up to $384 per year to operate. By upgrading to a more energy-efficient Energy Star model, Oahu residents can save as much as $225 on their electric bill annually.

Q: What can you do to reduce the energy cost of your refrigerator?

A: Purchase an Energy Star refrigerator.
Hawaii Energy's "Refrigerator Trade-Up" offer rewards you with a $100 rebate when you buy an Energy Star model from a participating retailer and surrender your old one.

Q: What are some programs Hawaii Energy offers that can help residents cut back on energy use and help them save on their energy bill?

A: Get rid of your extra working refrigerator or freezer. Hawaii Energy's "Rid-A-Fridge" offer provides free curb-side pickup and recycling to help you get rid of that second refrigerator or freezer. On top of that, Oahu residents will receive a $50 rebate. Neighbor islands receive $65.

West Hawaii Today
October 13, 2014

In brief | Island Inc. | 10-13-14

Resort gets check for energy-saving improvements

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, presented Four Seasons Resort Hualalai with a $70,655 incentive check for energy-efficient upgrades throughout the 243-room oceanfront resort on the Kona Coast.

Four Seasons Resort Hualalai installed 297 energy-saving motors in the air conditioning units in every guest room. Variable flow on-demand kitchen exhaust systems were installed in three kitchens, Beach Tree, ULU and the banquet kitchen, which vary fan speed and energy consumption based on the cooking demand that helps save on energy and air conditioning costs. Nearly 500 energy-efficient LED bulbs were also installed to replace halogen lights throughout the lobby and restaurant exteriors.

The resort's upgrades are projected to pay for themselves with the money saved on electricity in 14 months. The resort invested $196,287 toward the various energy-saving upgrades.

Midweek
Oct. 13 – 17, 2014

BUSINESS // MOVERS

Business Leaders on the Move in Hawaii – 10/15/14



Joe Simpkins has been promoted to program operations manager at Hawaii Energy. His responsibilities include detailed planning and execution of Hawaii Energy's annual plan. He works closely with various teams and clean energy allies to ensure all programs meet or exceed annual targets in energy savings and incentive dollars returned to utility ratepayers.

Pacific Business News
"Afternoon Edition"
October 15, 2014

Hawaii Energy gives $70k incentive check to Four Seasons Resort Hualalai for energy-efficiency projects



Hawaii Energy presented Four Seasons Resort Hualalai with a $70,655 incentive check for energy-efficient upgrades. From left: Florian Riedel, resort manager, Four Seasons Resort Hualalai; Chanda Durnford, business program specialist, Hawaii Energy; Kevin Toltzmann, director of engineering, and Chris White, director of marketing, Four Seasons Resort Hualalai.

Jason Ubay

Reporter- *Pacific Business News*

Email | Twitter

Hawaii Energy presented the Four Seasons Resort Hualalai with a $70,655 incentive check for energy-efficiency upgrades at the 243-room oceanfront resort on the Kona coast of the Big Island.

The resort installed 297 energy-saving motors in the air-conditioning units in every guest room and replaced nearly 500 halogen lights with energy-efficient LED bulbs throughout the lobby and restaurant exteriors. Variable flow on-demand kitchen exhaust systems also were installed in three kitchens – Beach Tree, Ulu and the banquet kitchen – varying fan speed and energy consumption based on cooking demand.

Four Reasons Hualalai invested a total of $196,287 in the energy-saving initiatives, and it expects to recoup that cost through energy savings in 14 months. The improvements are expected to save about 319,715 kilowatt hours annually, or $105,505 on electricity costs based on a rate of 33 cents per kilowatt hour.

Hawaii Energy will work with Four Seasons Hualalai to incentivize LED upgrades, optimize the property's central plant through an energy management system retrofit and install variable frequency drives on all swimming pool motors.

Hawaii Energy is the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties.

Krater 96 FM
Oct. 24, 2014



Honolulu Star-Advertiser
Nov. 12, 2014

Program spotlights smart grids, electric cars

By Kathryn Mykleseth

Smart-grid technologies and electric vehicles are among the areas being targeted in an informational outreach by Hawaii Energy, the energy conservation and efficiency program controlled by the state Public Utilities Commission.

The additional energy efficency efforts will be incorporated in Hawaii Energy's 2014 program year, which runs from July 1, 2014, to June 30, 2015.

"This year (the PUC has) asked us to do a few things we haven't done," said Joe Simpkins, director of technical services at Hawaii Energy. "Hawaii Energy's expanded program initiatives are representative of the PUC's commitment to the development and testing of energy-efficiency strategies that will enhance the integration of renewable energy on the electric grid."

The energy efficiency program, operated by Seattle-based Leidos Engineering LLC, will introduce a "charge-at-work" EV pilot program and smart technologies that will help residents efficiently manage electricity use.

In September, Hawaiian Electric Co. completed the initial installation of smart-grid technology by installing 5,200 smart meters for customers living in select neighborhoods on Oahu.

Smart meters give residents data broken down by day, time of day and even by 15-minute increments, to understand and manage electricity use.

The energy efficency program is also looking into smart power strips, which do not need a smart grid in order to work. These devices look similar to typical power strips but have the ability to automatically disconnect power to certain appliances that are not in use.

Hawaii Energy will work with HECO and other companies to support energy storage, provide technical support for the Hawaii Building Code Council's codes and standards as well as integrate demand response capabilities.

Demand response is a program in which customers grant the utility limited control to temporarily reduce electrical loads in their homes or businesses, such as air conditioners and water heaters, in exchange for lower-priced electricity or cash incentives.

HECO offers one demand response program for residents on Oahu called "Energy Scout," which provides 34,000 customers a credit on their electric bills to allow the utility to turn off their hot water heaters for brief periods when electric demand is high.

Hawaii Energy is working with the utility on demand response devices. Some of the considered devices the efficency program is looking to test are smart thermostats to be used with air conditioner replacements and smart water heater controls as well as a demand response component to Hawaii Energy's existing solar water heating incentives.

"Managed demand response, EVs, energy storage and other smart-grid capabilities are key to accelerating the use of clean renewable energy on our grid and reducing energy costs," Simpkins said.

Bloomberg "Businessweek"
Nov. 13, 2014

Program spotlights smart grids, electric cars [The Honolulu Star-Advertiser ::]

Nov. 12--Smart-grid technologies and electric vehicles are among the areas being targeted in an informational outreach by Hawaii Energy, the energy conservation and efficiency program controlled by the state Public Utilities Commission.

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"Managed demand response, EVs, energy storage and other smart-grid capabilities are key to accelerating the use of clean renewable energy on our grid and reducing energy costs," Simpkins said.

Pacific Business News
"Afternoon Edition"
Nov. 25, 2014

$2M energy efficiency program selects companies to do the work

Hawaii Energy has selected Honeywell Smart Grid Solutions, Matrix Energy Services and Ibis Networks Inc. to help small businesses, restaurants, residents in smart-metered neighborhoods and schools save energy as part of a nearly $2 million program.

Honeywell was selected for one residential and one commercial project through its "Green Neighborhood Program." It will initially engage Moanalua and Pearl City residents participating in Hawaiian Electric Co.'s smart meter pilot program by installing free energy efficiency measures, distributing educational materials about rebates and incentives and providing information about how to use their smart meter web portal to track energy usage.

Honeywell's commercial project is targeted towards customers who participated in Hawaii Energy's Small Business Direct Lighting program within the past three years.

Matrix Energy Services will offer turnkey energy efficiency technologies, including LED lamps and signs to commercial ratepayers such as hotels, retail stores, personal services locations, fitness centers, restaurants, grocery and convenience stores and the common areas of multi-family facilities.

Ibis Networks plans to reduce the energy consumption at three University of Hawaii campuses, including Manoa, Hilo and Windward Community College, in a project aimed reducing plug load energy consumption, increasing machine and electronic operational efficiency and finding innovative ways to reduce peak-hour demand.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, launched the "Hawaii Energy Efficiency Auction" in August, which was an open call for contractors, developers, energy efficiency solution providers, energy service companies, energy vendors and property managers to submit qualified energy efficiency applications to receive funding for residential and commercial projects.

A total of four applications were selected, one residential and three commercial, which are estimated to save more than $2 million on energy costs during the first year based on an average residential and commercial electric rate.

The selected projects will be completed by May 30, 2015.

Several of the applications not selected for auction funding are being evaluated for other potential financial incentives offered by Hawaii Energy.

Ray Starling, program director for Hawaii Energy, said it received more than 60 applications.

Hawaii Army Weekly
December 1, 2014

Tripler recognized for energy efficiency efforts

November 28, 2014



Col. David Dunning, TAMC commander, displays a ceremonial check presented by Hawaii Energy. (TAMC staff and others from left: Lt. Col. Hugh McLean, deputy for administration; Armand Carlos, Adam Duranceau and Joel Rittgarn, Johnson Control Inc.; Lt. Col. Gretta Bennett, chief of logistics; Dunning; Martin Lau, PRMC facilities director; Lily Koo, Hawaii Energy; Patrick Sharkey, mechanical engineer; Peter Kwong, program manager and deputy facility director; Troy Vigil, Johnson Control Inc.; and Walter Michel, chief of engineering.

Story and photos by Ana Allen

Pacific Regional Medical Command

HONOLULU — Tripler Army Medical Center received a $270,000 incentive from Hawaii Energy during a check presentation, recently, for the installation of energy-saving chillers at the TAMC commander's lanai.

The incentive helps offset the cost to upgrade the hospital's central plant with two chillers and a comprehensive new electronic control system.

The upgraded central plant, which provides chilled water to cool the hospital, is expected to reduce energy usage by an estimated 616,140 kilowatt hours per year — the equivalent to saving about $150,000 in energy costs based on $0.2434/kwh.

Col. David Dunning, commander, TAMC, accepted the recognition on behalf of the hospital.

“As the largest military medical facility in the Pacific, it is important that we are good stewards of the energy resources within our local community. This conservation effort lessens fossil fuels and correspondingly lowers greenhouse gas emissions, making TAMC a clean energy ally to the state of Hawaii,” said Dunning.

The new plant will also operate more reliably for the hospital.

TAMC’s facility management staff worked with technology experts at the U.S. Army Corps of Engineers-Huntsville Center, in Alabama, to identify project partners, including Johnson Controls, leading similar energy and technology updates for other federal agencies.

Prior to the upgrade, the central plant was running on two different systems with some of the functions controlled manually by TAMC plant operators. The updated chillers will be managed by a direct digital controls electronic control system, giving plant operators a real-time look at the plant’s performance to make operation easier and more effective.

“We proudly salute the U.S. Army for its commitment to a cleaner energy future by adopting energy conservation and efficiency measures at the hospital,” said Lily Koo, business program specialist, Hawaii Energy. “We look forward to collaborating with TAMC on future energy-saving projects.”

Tripler and Hawaii Energy

Tripler’s mission is to provide patient-centered, outcomes-based health care and to drive the transformation to a System for Health for beneficiaries in the Pacific Region.

In addition, TAMC educates, trains and provides a ready medical force to enhance health and save lives.

TAMC’s vision is to serve as the oasis of health and wellness for America’s heroes and families in the Pacific Region.

Visit www.tamc.amedd.army.mil/ or www.facebook.com/TriplerArmyMedicalCenter.

Hawaii Energy is the ratepayer-funded energy conservation and efficiency program administered by Leidos Engineering 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 kilowatt hours by 2030.

Visit www.HawaiiEnergy.com.

Maui Family Magazine
Winter 2014



Hawaii Energy's Energy Saving Tips All 12 Days of them!

Why not use this Christmas to celebrate conserving electricity rather than using it unscrupilously. Here are some tips to make less impact at Christmas.

Nothing gets us in the yuletide cheer like spending time with family, enjoying the neighborhood's twinkling Christmas lights or feasting on auntie's homemade gingerbread cookies. However, when we realize how much our electric bill is a month later things may not be so merry.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Maui, Hawaii and Honolulu counties, prepared "12 Days of Energy-Saving Tips" that can help you save energy and money on your electric bill this holiday season.

DAY 1: Buy ENERGY STAR® Electronics

Are electronics on your family's wish list? If so, consider purchasing ENERGY STAR® electronics. Products can range from televisions and DVD players to cordless phones. They use far less energy than non-certified products. To learn more, visit ENERGY STAR'S website: www.energystar.gov/products/certified-products and view the "electronics" section.

DAY 2: Keep Oven Doors Closed

You'll probably have family over during the holidays and some may want to peek in the oven to see what's cooking. However, tell them to keep the oven door closed. Ovens lose about 25 degrees each time they're opened and require additional energy to bring the temperature back up.

DAY 3: Turn Off the Air Conditioner

Leave the air conditioner off. Our Hawaii "winters" won't last long so bundle up and enjoy the chilly weather before summer rolls around. However, some days are just plain hot. If you've been relying on an old air conditioner, consider upgrading to a new ENERGY STAR® model. Hawaii Energy provides a $50 rebate and will recycle the old working one for free.

DAY 4: Try Alternative Cooking Methods

A 16-pound turkey can take up to four hours to cook in a conventional oven. Rather than using all that electricity, consider cooking it for less than two hours outdoors kiawe-style. That smoky, succulent turkey will take half the time to cook but still leave guests fully satisfied.

DAY 5: Install a Timer

Plug indoor and outdoor lighting displays into timers that can be programmed to run in the evening hours and turn off by the time you go to bed. Or simply unplug your lights when not in use.

DAY 6: Use Less Lighting Fixtures

If your Christmas tree lights are already decked out, extra lamps or permanent lighting fixtures may not be needed. The Christmas tree alone can be the showpiece and illuminate the room.

DAY 7: Save Energy When Doing Laundry

Spills and stains are inevitable during the holidays. Wash full loads in cold water rather than hot since it requires far more electricity to heat. Skip the dryer. Hang clothes outside and put the trade winds to good use.

DAY 8: Unplug Electronics Not in Use

Most electronic devices use electricity even when the power is turned off – called a "phantom" or "vampire" load. Be sure to unplug any laptops, video games, coffee pots and cell phone chargers not in use.

DAY 9: Switch to LED Christmas Lights

If you haven't already switched to LED Christmas lights, consider making the change. LEDs use about 70 – 80% less energy than typical incandescent Christmas lights. Plus, LEDs come in different shapes, colors and sizes so let your creativity run wild rather than the cost of your electric bill.

DAY 10: Consider Fiber Optic Decorations

Fiber optic trees and decorations are great for saving energy. They use a single light bulb located at the base of the unit to light up the entire decoration.

DAY 11: Limit Christmas Tree Lights

Rather than adding more lights to make your Christmas tree glow, consider enhancing its visual appeal with mirrored ornaments, tinsel or any other reflective items to make it sparkle.

DAY 12: Walk and Enjoy Christmas Lights

Walk. Burn a few calories with the family. What could be better? Well, maybe taking a walk around your neighborhood to check out everyone's Christmas lights on their houses (hopefully they've followed "Day 5" and installed a timer).

For more energy-saving tips this holiday season and beyond, visit HawaiiEnergy.com.

West Hawaii Today
Dec. 1, 2014

Small businesses, 3 colleges to benefit from energy efficiency projects



Students traverse the commons area at University of Hawaii at Hilo. This college will benefit from one of the upcoming Hawaii Energy Efficiency Auction projects. HOLLYN JOHNSON/Stephens Media Hawaii

Posted December 1, 2014 - 1:02am

Hawaii Energy has selected applicants for incentive funds of up to $1.96 million for the state's first energy efficiency auction. The applicants plan to help small businesses, restaurants, residents in smart-metered neighborhoods and educational institutions save energy.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, launched the "Hawaii Energy Efficiency Auction" in August.

The auction was an open call for contractors, developers, energy efficiency solution providers, energy service companies, energy vendors and property managers to submit qualified energy efficiency applications to receive funding for residential and commercial projects.

The auction was just one of many planned energy efficiency initiatives developed under the Hawaii Public Utilities Commission's guidance to help electric ratepayers maximize energy savings.

Hawaii Energy selected three applications: Honeywell Smart Grid Solutions, Matrix Energy Services and Ibis Networks Inc. Collectively, these projects are estimated to save more than 8.1 million kilowatt hours during the first year with an estimated energy savings of more than $2 million based on an average residential and commercial electric rate of 28 cents per kwh.

The projects will provide energy savings benefits to qualified electric ratepayers in Hawaii, Honolulu and Maui counties and will be complete by May 30. Additionally, several of the applications not selected for auction funding are being evaluated for other financial incentives offered by Hawaii Energy.

Ibis Networks plans to reduce the energy consumption at the University of Hawaii at Manoa, UH-Hilo and Windward Community College, which combined serve more than 30,000 students annually. The project is aimed at enabling the three campuses to reduce plug load energy consumption, increase machine and electronic operational efficiency and find innovative ways to reduce peak-hour demand.

Honeywell was selected for one residential and one commercial project. The residential project, the Green Neighborhood Program, will initially engage Moanalua and Pearl City residents participating in the electric utility's smart meter pilot program. Honeywell will install free energy efficiency measures, distribute educational materials about Hawaii Energy rebates and incentives and provide residents with information about how to use their smart meter Web portal to track energy usage.

The Hawaii Energy-funded energy efficiency measures that will be offered include LED and CFL lights, power strips, kitchen faucet aerators, low flow shower heads, refrigerator coil brushes and thermometers, room AC filters and water heater insulation, temperature check and adjustments. During on-site visits, Honeywell and Blue Planet Foundation representatives will also evaluate a home's potential to participate in future demand response programs.

Honeywell's commercial project is targeted at customers that participated in Hawaii Energy's Small Business Direct Install Lighting program within the past three years. Customers with air conditioning units will be offered free smart thermostats and a Web or smartphone/tablet application that provides information on thermostat settings and energy usage.

Customers not eligible for smart thermostats may still qualify for other energy efficiency measures. Both the Green Neighborhood Program and smart thermostat project are free for ratepayers to participate.

Matrix Energy Services will offer turnkey energy efficiency technologies to commercial ratepayers. Technologies offered include the following: screw-in LED lamps, linear LED lamps, LED exit signs, anti-sweat heater controls, evaporative controls, door closers and strip curtains for refrigerators and freezers.

Businesses that participate will also receive an energy audit of their facilities, education about the projects, installation, clean up and disposal and/or recycling of their old equipment and energy savings reports.

For more information about Hawaii Energy or these projects, call 839-8880 or visit hawaiienergy.com.

Honolulu Star-Advertiser
December 2, 2014



COURTESY HAWAII ENERGY

Joe Simpkins



COURTESY HAWAII ENERGY

Michael Chang

ON THE MOVE

Hawaii Energy has announced the following new promotions:

» **Joe Simpkins** to program operations manager. He previously retired from the Navy after a 33-year career that brought him to far-off places such as Moscow and Baghdad.

» **Michael Chang** to chief innovations architect and technology director. He previously served as an account executive and commercial energy efficiency program manager for Hawaiian Electric Co. as well as a performance contracting account executive, service manager and Honolulu branch manager for Johnson Controls.

Honolulu Star-Advertiser
December 3, 2014

ON THE MOVE



COURTESY
HAWAII ENERGY

Caroline Carl

Hawaii Energy has promoted:

» **Caroline Carl** to residential and transformational program director. Before joining Hawaii Energy, Carl worked at the Kohala Center to implement energy-saving programs on Hawaii island.



COURTESY
HAWAII ENERGY

Lisa Harmon

» **Lisa Harmon** to clean-energy ally specialist. She was previously working with AOAOs in health care and industrial companies across the islands in order to maximize their energy savings.

Hawaii News Now
"Sunrise"
December 11, 2014

Host Howard Dicus featured Hawaii Energy's check presentation to the Hilton Hawaiian Village during Sunrise.

(No Video Available)

Pacific Business News
"Morning Edition"
Dec. 12, 2014

Hawaii Energy awards $471K to Hilton Hawaiian Village for energy-efficiency programs



Courtesy Hawaii Energy

Hawaii Energy awarded an incentive check of $471,192 to the Hilton Hawaiian Village Resort & Spa. From left: Dante Aragon, president and owner, EMCC Hawaii; Calley Vankirk, energy solutions specialist, Gexpro; Tracy Walker, general manager, Hilton Hawaiian Village; Lily Koo, business program specialist, Hawaii Energy; John Clarke, director of property operations, Hilton Hawaiian Village; and Jason Hokom, field supervisor and Duane Ashimine, president and COO, Energy Industries.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, recently awarded the Hilton Hawaiian Village Waikiki Beach Resort for its energy-efficiency initiatives with a $471,192 incentive check, the largest it has given to a hotel.

Hilton Hawaiian Village recently completed phase one of a multi-phase, multi-million dollar energy efficiency upgrade project. The first phase, which cost more than $1.91 million, included a major lighting retrofit in 1,839 guest rooms and the installation of energy-saving fan coil motors in all 2,860 guest rooms.

The upgrades are estimated to save 2.8 million kilowatt hours annually, equivalent to $710,360 in energy costs based on $0.2837 per kWh.

The lighting retrofit replaced old lights with 14,843 light emitting diode, or LED, lamps, and retrofitting 3,088 lower wattage T8 fluorescent lights with high-performance ballasts. Energy Industries installed the lighting in Hilton's Alii, Diamond Head, Kalia and Rainbow towers, and its Coral Ballrooms.

The new fan coil motors, installed by EMCC Hawaii, use up to 50 percent less energy compared to older motors by reducing the speed during periods of reduced cooling demand.

In 2015, Hilton plans on completing its second phase of the project, which includes more light retrofits in its remaining towers and ballrooms. It also will install kitchen demand ventilation control systems in all its restaurants. The systems save as much as 50 percent on energy compared to traditional ventilation systems by sensing temperature, smoke, or both and adjusting as needed.

Honolulu Star-Advertiser
December 26, 2014

Business Briefs

For Friday, December 26, 2014

ON THE MOVE



Shan
Wirt

Hawaii Energy has announced the following promotion and hires:

» **Shan Wirt** to director of communications and program risk manager. Her experience includes serving as a litigation attorney and as a public relations professional.

» **Jimmy Pastor** has been hired as business program specialist. His 25 years of operational, technical and management experience includes facility services management at Aloha Petroleum, director of performance optimization for Aloha Airlines' flight operations division and six years in the U.S. Marine Corps.

» **Aurora Winslade** has been hired as transformational program manager. She will oversee educational programs designed for professional development, technical training and energy literacy. Her experience includes director of sustainability at University of Hawaii-West Oahu and system office and sustainability coordinator at UH-Manoa.

» **Alan Hong** has been hired as energy engineer. His experience in renewable energy includes projects in East Asia, Japan, Europe and California.

» **Jackie Lum** has been hired as energy engineer. Her experience includes assisting the Honolulu Board of Water Supply and the Hawaii Green Business Program in the areas of water and wastewater initiatives.

MauiNow.com
Dec. 29, 2014

Four Seasons Resort Maui's Engineering Team Earns Energy Conservation Award



Four Seasons Resort Maui at Wailea's engineering team. Courtesy photo.

By Maui Now Staff

Four Seasons Resort Maui at Wailea's 20-person engineering team was awarded the "Hawai'i Energy Conservation Award" for saving more than $1 million annually in energy costs.

Hawai'i Energy, the ratepayer-funded energy conservation and efficiency program for Maui, Moloka'i, Hawai'i, Lāna'i and O'ahu, presented the award for the team's outstanding leadership, contribution and commitment towards energy conservation and sustainability for the state.

Four Seasons Resort Maui's team was led by its energy-saving visionary, Pat Ware, the director of engineering, who was responsible for overseeing more than $8 million in energy-efficient renovation projects for the 635,976 square-foot property from 2010 through 2014.

Four Seasons Resort Maui will save an estimated 3.8 million kilowatt hours per year. The electricity savings will total more than $1 million annually (based on $0.26/kWh) once the remaining projects are completed by 2016. The projects include guest room energy management systems and electronically commutated fan coil motors.



Walter Enomoto (left) of Hawai‘i Energy and Pat Ware, formerly of Four Seasons Maui. Courtesy photo.

Ware recently retired after spending the past 30 years in various engineering positions at Four Seasons Hotels and Resorts for properties in Vancouver, Jakarta, Atlanta, San Francisco, Lāna‘i and Maui.

Hawai‘i Energy awarded Ware with a certificate of excellence for his dedication and efforts to save energy.

“It’s an honor to recognize Pat and his team for their unwavering commitment to helping the resort operate as energy-efficiently as possible,” said Joe Simpkins, program operations manager for Hawai‘i Energy. “Pat’s humility, character and legacy are a true inspiration for the next generation of engineers following in his footsteps.”

Four Seasons Resort Maui’s team replaced an old building automation system (centralized control system) with a state-of-the-art model that made it possible to monitor and manage more of the resort’s energy consuming equipment. The system helped identify an underground hot water leak when large energy spikes with the heat pumps were detected. By fixing the leak the resort saved more than $94,000.00/year (1,000 kWh/day) and prevented thousands of gallons of water from being lost.

Additionally, Ware taught the team how to install the building automation system themselves. The hands-on expertise increased the team's working knowledge of the system and ensured proper maintenance in the future.

Four Seasons Resorts Maui's engineering team was the first organization to win the Hawai'i Energy Conservation Award. The first individual to receive the award was Allen Evans in 2012. Allen is the owner and operator of Refrigerant Recycling Inc. on O'ahu, which developed the first refrigerant recycling service of its kind. The award will be presented annually to an individual or organization.

For more information, please call Hawai'i Energy at 839-8880 or toll-free on the Neighbor Islands at (877) 231-8222. Visit www.HawaiiEnergy.com.

Maui TV News.com
Dec. 29, 2014

Saving Energy At Four Seasons Saves $1,000,000 A Year



WINNERS – The Four Seasons Energy Engineering Team, led by Pat Ware, Bottom right. Click to enlarge. (Photo Courtesy Hawaii Energy)

WAILEA – Hawaii Energy has awarded Four Seasons Resort Maui at Wailea's 20-person engineering team with the "Hawaii Energy Conservation Award" for saving more than $1 million annually in energy costs.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Maui, Molokai, Hawaii, Lanai and Oahu, presented the award in recognition of the team's outstanding leadership, contribution and commitment towards energy conservation and sustainability for the State of Hawaii. Four Seasons Resort Maui's team was led by its energy-saving visionary, Pat Ware the Director of Engineering. He was responsible for overseeing more than $8 million in energy-efficient renovation projects for the 635,976 square-foot property from 2010 through 2014.

Four Seasons Resort Maui will save an estimated 3.8 million kilowatt hours (kWh) per year. The electricity savings will total more than $1 million annually (based on $0.26/kWh) once the remaining projects are completed by 2016 that include guest room energy management systems and electronically commutated fan coil motors.

These renovation and upgrade projects included lighting, air conditioning, water heating, ventilation systems for the parking garage, chilled water pumps, air handling units, guest room energy management systems and kitchen demand ventilation systems for four restaurants. Hawaii Energy helped offset some of these project costs by providing more than $500,000 in financial incentives from 2010 through 2014. Pat recently retired after spending the past 30 years in various engineering positions at Four Seasons Hotels and Resorts for properties in Vancouver, Jakarta, Atlanta, San Francisco, Lanai and Maui. For his dedication and efforts to save energy, Hawaii Energy awarded Pat with a Certificate of Excellence.

“It’s an honor to recognize Pat and his team for their unwavering commitment to helping the resort operate as energy-efficiently as possible,” said Joe Simpkins, Program Operations Manager, Hawaii Energy. “Pat’s humility, character and legacy are a true inspiration for the next generation of engineers following in his footsteps.”

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Four Seasons Resorts Maui’s engineering team was the first organization to win the Hawaii Energy Conservation Award. The first individual to receive the award was Allen Evans in 2012. Allen is the owner and operator of Refrigerant Recycling, Inc. on Oahu, which developed the first refrigerant recycling service of its kind. The award will be presented annually to an individual or organization.

For more information, please call Hawaii Energy at 839-8880 or toll-free on the Neighbor Islands.

Pacific Business News
"Afternoon Edition"
Dec. 29, 2014

Four Seasons Resort Maui receives Hawaii Energy Conservation Award

By Jason Ubay, Reporter



Courtesy Hawaii Energy

The engineering team at the Four Season Resort Maui at Wailea was recently recognized by Hawaii Energy for their energy-saving initiatives.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program, presented the Four Season Resort Maui at Wailea's engineering team with the Hawaii Energy Conservation Award for saving more than $1 million annually in energy costs.

The 20-person engineering team is the first organization to win the award. Allen Evans, owner and operator of Refrigerant Recycling, Inc., received the award in 2012.

Pat Ware, the Four Seasons Maui's director of engineering, was responsible for overseeing more than $8 million in energy-efficient renovation projects between 2010 and 2014.

Four Seasons Resort Maui will save an estimated 3.8 million kilowatt hours per year, saving more than $1 million annually based on $0.26 per kWh. Remaining projects to be completed by 2016 include guest room energy management systems and new fan coil motors.

Hawaii Energy provided more than $500,000 in financial incentives from 2010 to 2014 for projects including lighting, air conditioning, water heating, ventilation systems for the parking garage, chilled water pumps and more.

Another key improvement was replacing the building's centralized control system, making it possible to monitor and manage the resort's equipment. The system helped identify an underground hot water leak when large energy spikes with the head pumps were detected. By fixing the leak, the resort saved more than $94,000 a year, in addition to saving leaked water.

Pacific Business News
"Morning Edition"
Dec. 29, 2014

Hawaii Energy giving $150 rebates for solar water heating tune-ups

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for the all state's counties, except Kauai, is re-launching its solar water heating tune-up rebate of $150 due to high demand.

Last year, Hawaii Energy said it provided 826 tune-up rebates to residents totaling $123,900 during the four-month limited-time offer.

The tune-up rebate runs from Jan. 5 through May 31 or while funding lasts.

Residential electric ratepayers on the Big Island, Lanai, Maui, Molokai and Oahu are eligible to participate, although those who got a tune-up rebate last year won't be able to participate.

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 when not using a rebate.

Hawaii Energy said it also offers a $1,000 instant rebate when purchasing a solar water heating system.

Solar water heaters require maintenance every three to five years to check for and repair normal wear and tear, which may include leaks, corrosion or pump failure. A properly maintained solar water heater can last 15 years or more.

Households that replace their traditional electric water heater with a solar water heater typically save between 25 percent and 40 percent on their electric bill.

However, without regular maintenance these savings can gradually diminish.

Green Lodging News
Jan. 6, 2015

Hawaii Energy Awards Its Largest Hotel Incentive Ever

1/6/2015



HONOLULU—Hawaii Energy's largest incentive for a hotel to date was recently awarded to Hawaii's largest hotel—the Hilton Hawaiian Village Waikiki Beach Resort. Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, presented a $471,192 incentive check to the Hilton after the completion of phase I of a multi-phase, multi-million dollar energy efficiency upgrade project. Phase I included a major lighting retrofit in 1,839 guestrooms and the installation of energy-saving fan coil motors in all 2,860 guestrooms.

The incentive will help Hilton offset its phase I project costs of more than $1.91 million. Hawaii Energy's incentive covered 24 percent of these costs. These energy efficiency upgrades are estimated to save 2.8 million kilowatt hours (kWh) annually—equivalent to $710,360 in energy costs based on $0.2837/kWh. The simple payback period is just two years.

"We applaud the Hilton Hawaiian Village for embracing energy efficiency and leveraging the program's incentives to maximize their investment," said Ray Starling, Program Director, Hawaii Energy. "The visitor industry has been tremendous when it comes to saving energy and reducing its carbon footprint, which in the long run contributes to breaking Hawaii's dependence on imported oil."

Almost 15,000 LEDs Installed

The lighting retrofit involved replacing old lights such as halogens, incandescent bulbs and T12 fluorescent lights with 14,843 light emitting diode lamps (LEDs), as well as retrofitting 3,088 lower wattage T8 fluorescent lights with high performance ballasts. The new lights were installed by Energy Industries in the Hilton's Ali'i Tower, Diamond Head Tower, K'lia Tower and Rainbow Tower as well as the Coral Ballrooms.

"We're privileged to live, work and welcome visitors to our beautiful island home and with that privilege, we see a responsibility to do our part to help preserve Hawaii's beautiful environment through sustainable practices including the installation of energy-efficient equipment," said Tracy Walker, General Manager, Hilton Hawaiian Village.

In addition to lighting, the Hilton participated in Hawaii Energy's limited-time increased incentive for ECMs, which totaled $298,730—the largest amount the program has ever provided for this technology to a business ratepayer. The Hilton committed to the ECM project during Hawaii Energy's promotion (November 2013 to January 2014) of an increased incentive from $55 per motor to $100. ECMs use up to 50 percent less electricity compared to older inefficient motors by reducing the speed during periods of reduced cooling demand. The ECMs, installed by EMCC Hawaii, are fan motors that are used to circulate conditioned air throughout the guestrooms.

In phase II of this project, to be completed in 2015, the Hilton plans to install more LEDs and T8 fluorescent lights in its remaining towers and ballrooms. The hotel also plans to install kitchen demand ventilation control systems in all restaurants including its signature Bali Steak & Seafood and Tropics Bar & Grill. Similar to ECMs, these systems can also reduce energy usage by as much as 50 percent compared to traditional ventilation systems by utilizing temperature and/or smoke sensing to adjust ventilation rates as needed.

Green Magazine
Jan. 12, 2015

Hawaii Energy Selects Energy Auction Participants



Hawaii Energy has selected applicants for incentive funds of up to $1.96 million for the state's first energy efficiency auction. These applicants plan to help small businesses, restaurants, residents in smart metered neighborhoods and educational institutions save energy. Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawai'i, Honolulu and Maui counties, launched the "Hawaii Energy Efficiency Auction" in August. The auction was an open call for contractors, developers, energy efficiency solution providers, energy service companies, energy vendors and property managers to submit qualified energy efficiency applications to receive funding for residential and commercial projects.

The Hawaii Energy Efficiency Auction was just one of many planned energy efficiency initiatives developed under the Hawaii Public Utilities Commission's guidance and leadership to help electric ratepayers maximize their energy savings. Hawaii Energy selected four applications (one residential and three commercial): Honeywell Smart Grid Solutions, Matrix Energy Services and

Ibis Networks, Inc. Collectively, these projects are estimated to save more than 8.14 million kilowatt hours (kWh) during the first year with an estimated energy savings of more than $2.03 million based on an average residential and commercial electric rate of $0.28/kWh. The selected projects will provide energy savings benefits to qualified electric ratepayers in Hawai‘i, Honolulu and/or Maui counties and will be completed by May 30, 2015. Additionally, several of the applications not selected for auction funding are being evaluated for other potential financial incentives offered by Hawaii Energy.

“The response for this first-ever energy auction was tremendous. We received more than 60 applications that identified unique opportunities to install energy efficiency upgrades,” explains Ray Starling, Hawaii Energy program director. “It was incredibly difficult for the program to narrow down the selection. However, in the end the applications that were chosen addressed the greatest immediate needs and opportunities to save energy spanning various industries in Hawai‘i.”

Honeywell Smart Grid Solutions was selected for one residential and one commercial project. The residential project, the “Green Neighborhood Program,” will initially engage Moanalua and Pearl City residents participating in the electric utility’s smart meter pilot program. Honeywell will install free energy efficiency measures, distribute educational materials about Hawaii Energy rebates and incentives and provide residents with information about how to use their smart meter web portal to track energy usage.

The Hawaii Energy-funded energy efficiency measures that will be offered include LED and CFL lights, power strips, kitchen faucet aerators, low flow shower heads, refrigerator coil brushes and thermometers, room AC filters and water heater insulation, temperature check and adjustments. During on-site visits, representatives from Honeywell and Blue Planet Foundation will also evaluate a home’s potential to participate in future demand response programs that may be offered by the electric utility.

Honeywell’s commercial project is targeted towards customers that participated in Hawaii Energy’s Small Business Direct Install Lighting program within the past three years. Customers with air conditioning units will be offered free smart thermostats and a web or smartphone/tablet application that provides information on thermostat settings and energy usage. Customers not eligible for smart thermostats may still qualify for other energy efficiency measures including faucet aerators, low flow showerheads and pre-rinse spray valves. Both the

Green Neighborhood Program and smart thermostat project are free for ratepayers to participate.

Matrix Energy Services will offer turnkey energy efficiency technologies to commercial ratepayers like hotels/motels, retail stores, personal services locations, fitness centers, restaurants, grocery and convenience stores and the common areas of multi-family facilities. The technologies offered will include screw-in LED lamps, linear LED lamps, LED exit signs, anti-sweat heater controls, evaporative controls, door closers and strip curtains for refrigerators and freezers.

Businesses that participate will also receive an energy audit of their facilities, education about the projects, installation, clean up and disposal and/or recycling of their old equipment and energy savings reports.

The Ibis Networks, Inc. plans to reduce the energy consumption at three University of Hawai‘i System colleges including the University of Hawai‘i at Manoa, University of Hawai‘i at Hilo and Windward Community College, which together serve more than 30,000 students annually. The project is aimed at enabling the three campuses to reduce plug load energy consumption, increase machine and electronic operational efficiency and find innovative ways to reduce peak-hour demand. In addition to the energy savings, each college will seek ways to integrate the knowledge of plug load usage into college-credit course curriculum and/or research programs.

Pacific Business News
Jan. 23, 2015

Hawaii Energy has announced the promotion of **Shan Wirt** to director of communications and program risk manager and has hired four new members: **Jimmy Pastor**, **Aurora Winslade**, **Alan Hong** and **Jackie Lum**.


Shan Wirt

Wirt, a former attorney, oversees Energy's communications team and recently took on the role of program risk manager where she will work to identify and mitigate potential risks to maximize program efficiencies.


Jimmy Pastor

Pastor was hired as a business program specialist after nine years at Aloha Petroleum managing facility services, spearheading the implementation of both energy efficiency and solar power projects and vetting alternative fuels for retail operations. Prior to that he worked at Aloha Airlines.


Aurora Winslade

As transformational program manager Winslade oversees Hawaii Energy's programs that are designed to educate, provide system evaluation tools and develop behavioral changes that will lead to energy savings within five years of participation. She spent more than a decade at the University of Hawaii and the University of California, Santa Cruz.


Alan Hong

As an energy engineer, Hong assists with the development of the smart grid initiative as well as other emerging energy-efficient technologies. Previously he facilitated the deployment of solar projects, provided technical assessments, analyzed renewable energy production modeling and calculated the energy savings for various projects in East Asia, Japan, Europe and California.

Also an energy engineer, Lum is assisting with the development and launch of Hawaii Energy's demand response and electric vehicle offerings. She also supports various water/wastewater initiatives. She previously worked at the Honolulu Board of Water Supply.


Jackie Lum

Building Industry Hawaii
February 2015

NEWS MAKERS

Hawaii Energy Promotes Wirt, Hires 4



Shan Wirt

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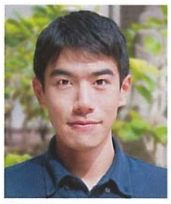

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Jackie Lum

Building Management Hawaii
February/March 2015

Industry News

Hawaii Energy Promotes Wirt, Hires 4 Others

Hawaii Energy has announced the promotion of **Shan Wirt** to director of communications and program risk manager and has hired four new members: **Jimmy Pastor**, **Aurora Winslade**, **Alan Hong** and **Jackie Lum**.


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Jackie Lum

KITV4 (Hawaii's ABC Affiliate)
February 15, 2015
7:20 a.m. (3 minute segment)

HAWAII ENERGY'S ELECTRIC VEHICLE PILOT FOR EV BUYERS





Honolulu Star-Advertiser
Feb. 21, 2014

Business Briefs

By Star-Advertiser staff

Kamehameha Schools saves on energy

Kamehameha Schools is expected to save more than $190,000 annually after completing energy-efficiency renovations at its Oahu and Hawaii island campuses as well as its Kakaako commercial property.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program, provided $128,662 in financial incentives for the upfront costs of the energy-efficient renovations.

Kapalama, the oldest and largest of Kamehameha Schools' three campuses, is estimated to save $172,750 annually on its electricity after the energy upgrades. The school upgraded its air-conditioning systems and lighting systems across the campus.

Kamehameha Schools Hawaii is estimated to save $6,887 annually on its electrical bill. The 300-acre campus in Keaau tinted windows and added motion sensors to interior lights.

The building at 660 Ala Moana Blvd. is estimated to save $13,567 in energy costs annually.

Pacific Business News
February 27, 2015

COVER STORY

SEAWATER AIR CONDITIONING

IS IT COMING TO A BUILDING NEAR YOU?

Honolulu Seawater Air Conditioning LLC got a major boost from investment firm Ulupono Initiative, and major customers are signing, putting it about halfway to its target

BY DUANE SHIMOGAWA · DSHIMOGAWA@BIZJOURNALS.COM · 808-955-8036 · @PBNDUANE

American City Business Journals - Not for commercial use

It's been a little more than a decade since seawater-cooled air conditioning of Downtown office buildings was proposed, billed then as one of the largest energy efficiency projects in Hawaii's history. Not much has happened–until now.

The Honolulu Seawater Air Conditioning LLC's $250 million project recently got a major boost with a new majority owner in eBay founder Pierre Omidyar's impact investment firm Ulupono Initiative. It has signed some major customers, too, including The Queen's Medical Center, the largest hospital in Hawaii, as well as an as-yet-to-be-named Downtown Honolulu office building the project says it will be able to identify "very soon." These customers, along with Hawaiian Electric Co., Finance Factors Ltd., First Hawaiian Center, Alakea Corporate Tower, One Waterfront Towers and the Prince Jonah Kuhio Kalanianaole Federal Building and Courthouse (its first federal government customer), brings HSWAC about halfway to its informal target for customers.

When completed, the system will pump cold seawater from more than four miles offshore into a cooling station behind the former Gold Bond Building on Ala Moana Boulevard. The seawater will pass through heat exchangers, cooling off freshwater circulating in a closed pipeline system that, in turn, will cool downtown buildings. Construction will include the installation of15,000 feet of pipeline from the cooling station to Downtown Honolulu, creating about 1,000 construction jobs and a dozen or so permanent positions.

The company estimates that, on average, customers could save anywhere from 5 percent to 15 percent on their annual cooling costs. It is in the process of finalizing its permits and hopes to start construction in March 2017 and be completed in about 18 to 20 months.

Slow start

Eric Masutomi, president and CEO of Honolulu Seawater A/C, who took over the company's top post in 2012, is quick to point out that the project has taken a lot longer than anyone envisioned.

"But that's the penalty of being first, not first in the technology, but first in Hawaii applying this technology," the former vice president of planning for Outrigger Enterprises Group told PBN in an exclusive interview at the firm's Downtown Honolulu office. "And frankly, we underestimated the difficulty we are encountering in standard permitting, sales and financing approaches."

The former director of planning for the Hawaii Community Development Authority noted that launching what is essentially a new utility turned out to be more complex and time consuming than originally thought.

"The reality is, we're talking about a privately installed utility to be put in place within the streets of Honolulu," Masutomi said. "We are dependent on the use of public right-of-ways for our system. If you recognize that, we need to secure necessary permits and easements to operate in those right-of-ways. So the city and state agencies are not very well-experienced in dealing with that on that scale, so the entire review process is turned on its head."

He estimates that the state and city permitting has taken up to three times longer than they expected.

"Would that have affected our decision to go or no go?" Masutomi asked. "I don't think so, but what we would've done is laid out a more pragmatic business plan. At the federal level, the [environmental impact statement] was effectively initiated back in 2009, but if you think about it, that's a long time."

The project, he said, was the first of its kind for federal regulators, too, so their review of it was also a struggle.

"They went through two reviews on it, so it hasn't been easy on regulators," Masutomi said. "I would like to say, it's been a learning experience for both of us. Our next project, damn, it's going to fly through, or somebody else's project."

> *"Even if it makes financial and environmental sense, until people see something up and working in Hawaii, they're a little reluctant to take a project seriously."*
>
> **MURRAY CLAY,** Managing Partner, Ulupono Initiative

Ulupono Initiative

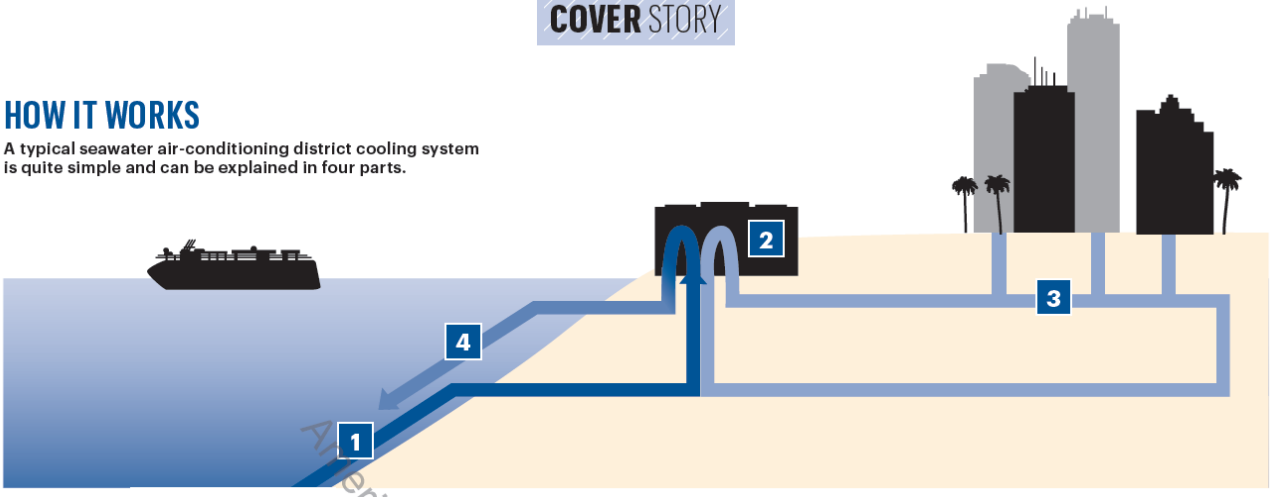
Ulupono Initiative began its due diligence on the Honolulu Seawater A/C project in 2011, shortly after Murray Clay, managing partner, joined the firm.

It actually was one of the first projects the investment firm looked



HOW IT WORKS

A typical seawater air-conditioning district cooling system is quite simple and can be explained in four parts.



1. Pumps bring up cold (44 - 45 degrees Fahrenheit) seawater from a depth of more than 1,700 feet — and a distance of four miles from the Kakaako shoreline — through an intake pipeline to a cooling station on shore.

2. The cold seawater passes through a heat exchanger at the cooling station, extracting heat from freshwater that circulates in its own closed-loop pipeline system. The heat exchangers ensure that seawater and the freshwater delivered to the buildings never mix. Chillers in the cooling station supplement the seawater's cooling effect to maintain a consistent 44 degrees Fahrenheit for the chilled fresh water distributed to the customers' buildings.

3. The chilled fresh water travels through underground pipes to each building's existing chilled-water air conditioning system.

4. The slightly warmed seawater is returned in an environmentally safe manner back to the ocean by releasing it through a diffuser located at a depth of 325 to 425 feet.

SOURCE: HONOLULU SEAWATER AIR CONDITIONING LLC

PBN

into funding.

"The team had previous contact with them before my arrival, so we have been aware of the project for some time," Clay told PBN. "We spent two years of due diligence on this project before investing. It probably aggravated Eric a little because we took that long."

But it needed to make sure the project made sense from an environmental and financial standpoint, able to stand on its own. Ulupono Initiative's investment started in 2013, followed by more funding in April 2014 and then putting in place more ongoing funding starting in the fall of 2014.

Today, Ulupono is the majority investor in the project at 62 percent. Masutomi declined to specify what that 62 percent amounts to.

For Clay, the next hurdle for the project is securing the customer contracts that will allow the project to move forward.

"Because even if it makes financial and environmental sense, until people see something up and working in Hawaii, they're a little reluctant to take a project seriously," he said. "After we got the basic financials and we were comfortable with the environmental side, we had to think about the contract side. If it can't get done, you generally shouldn't get involved in a project."

But Ulupono's involvement, Murray says, is not just a casual thing, especially when talking about the investments.

"We are really committed to this," he said. "We felt it's a very important infrastructure project for Hawaii. There will be jobs, construction spending. We are committed to get this thing done."

Other seawater projects

In the U.S., there are no commercial scale district cooling projects that utilize seawater, although there is a small project on the Big Island that has been running for decades.

"The technology works and it's proven," Clay said. "It's interesting that [Hawaii] pioneered it but has not profited from it [yet]."

When the project was first thought of, its developers thought it was going to be the first subtropical project of its kind, but since then, other areas have passed them by in building seawater projects, Masutomi said.

Such is the case in the Bahamas, which has already started construction on a system that will service a resort there. Tahiti also has a seawater project planned and a hotel in Bora Bora has a small system in the works, as does Aruba.

1,000

How many construction jobs would be created with the current project.

2017

When the construction could start and be completed in about 18 to 20 months.

▶ CLOSER LOOK

Other places seawater cooling systems would work in Hawaii:

- ▶ Downtown Honolulu
- ▶ Waikiki (project proposed)
- ▶ Kakaako (project talks have begun)
- ▶ Ko Olina
- ▶ Pearl Harbor
- ▶ Poipu on Kauai
- ▶ Kahului on Maui



Honolulu Seawater A/C's own personnel has direct experience in developing district cooling projects in the United States and Europe, including Europe's largest seawater air conditioning project in Stockholm, Sweden, which handles approximately 80,000 tons of air conditioning load and continues to expand, according to its website.

"No customer has said 'no,' based on their understanding of the system," Masutomi said. "Most are taking a wait-and-see approach."

California-based Douglas Emmett Inc., one of the largest office property owners in Downtown Honolulu, is one of these firms undertaking this approach. Signing up Douglas Emmett's buildings in Downtown Honolulu, including Bishop Square, would equate to about 4,000 tons of capacity.

Masutomi recently traveled to the Golden State to visit with executives of the Santa Monica-based real estate investment trust to make a pitch for the seawater project.

One of the challenges facing Honolulu Seawater A/C when it comes to Douglas Emmett is the fact that, about five years ago, the trust went through a bad experience with a district cooling system in Califor-

CONTINUED ON PAGE 12

American City Busin news journals Not for commercial use

CONTINUED FROM PAGE 11

nia, he said.

"First we had to overcome that, which I think we have," Masutomi said. "When I got actively involved with them, they just asked for our patience. We think with our recent flurry of sign-ups, it's a good time to bring them back into the fold."

Selling the utility

Greg Wong, director of customer service for Honolulu Seawater A/C, told PBN that it's a learning process for everyone, and thus takes a long time for people to understand what its delivering.

"It's just water, right?" he asked. "Part of the process is understanding how you get A/C into the building. It's the trailblazer phenomenon. If you're a building owner, A/C is not a subject you spend a lot of time thinking about."

However, he noted, cities that have district cooling systems, like Toronto, Minneapolis, Chicago or New York, are familiar with those types of systems.

"Here in Hawaii, being a new introduction, even for the most progressive businesses, like First Hawaiian Bank–frankly, they did it on the financials, but also because they believed in the product and spent a considerable [amount of time] on due diligence on it, and that takes time and money to investigate," Wong said.

Honolulu Seawater A/C itself spent a considerable amount of time doing due diligence for First Hawaiian Bank, but at the end of the day, the Honolulu-based bank had to make the final decision, he said.

"Most other building owners, frankly, are not interested in doing that," Wong said. "They don't have the time. It's a building block process. We have to go into the buildings, understand their systems and work with them."

Ray Starling, program director for Hawaii Energy, the state's conservation and efficiency program, thinks the project still has a shot at being developed, especially with Ulupono Initiatives' increased investment.

"There are a lot of us around who are hopeful they can get it over the hump," he told PBN. "It's a big project and it takes a lot of planning. It's a good thing and a good thing for Hawaii."

▸ PATH OF THE PIPES



The seawater air-conditioning project will require construction crews to tunnel under Downtown Honolulu streets to install almost three miles of pipeline that will carry the cool water to the buildings and return slightly heated water to the heat exchanger.

▸ SIGNED CUSTOMERS

1. Alakea Corporate Tower
2. Finance Factors Ltd.
3. First Hawaiian Center
4. Hawaiian Electric Co.
5. One Waterfront Towers
6. Prince Jonah Kuhio Kalanianaole Federal Building and Courthouse
7. The Queen's Medical Center

SOURCES: HONOLULU SEAWATER AIR CONDITIONING LLC, GOOGLE

PBN

CUSTOMERS CITE BOTH ENVIRONMENTAL, FINANCIAL BENEFITS FROM SEAWATER A/C

Customers who have signed up so far for the Honolulu Seawater Air Conditioning system realize that it's not only good for the environment, but their pocketbooks as well.

The Alakea Corporate Tower, a condominium office building located at 1100 Alakea St., is one of the newer customers of HSWAC.

Jim Cavanah, chairman of the board for the tower, previously told PBN that, in the end, it was a triple bottom line decision.

"The use of the HSWAC system not only makes sense from a financial and system reliability standpoint, but also allows our owners and tenants – most of whom are locally based businesses – to be part of an effort that, from an environmental standpoint, will also significantly contribute to the broader well-being of our island community," he said in an email to PBN.

The Queen's Medical Center, the state's largest private hospital, also recently signed up to use HSWAC, a big win for the project.

Cedric Yamanaka, spokesman for Queen's, one of the state's largest employers and the first nonprofit to sign up for the project, told PBN that it decided to go this route because of its potential benefits in energy reduction.

▸ CLOSER LOOK

5–15 %
Annual cost savings

15–25
Number of years of contract terms

5 K
Signed cooling capacity in tons

10 K
Tipping point (informal) cooling capacity in tons

25–28 K
Total project cooling capacity in tons

40 K
Total cooling capacity of Downtown Honolulu in tons

Hawaiian Electric Co., which signed a contract in 2011 to service its four-story Richards Street office building in Downtown Honolulu, expects to reduce the building's energy use by 20 percent, according to spokesman Peter Rosegg.

"We're still committed to supporting HSWAC as it completes its process," he said. "We're looking to get our building cooled by deep seawater. I think we will do whatever we can to support them whenever they come online."

In 2014, HSWAC signed up its first federal government customer with the Prince Jonah Kuhio Kalanianaole Federal Building and U.S. Courthouse agreeing to use its seawater cooling system.

The 930,000-square-foot federal government office building and courthouse in Downtown Honolulu will become the first federal government building in the nation to use seawater for cooling.

The incorporation of seawater air conditioning into the $121 million modernization and renovation already under way will help the GSA to meet its goal of reducing the building's energy consumption by 30 percent and attaining a silver designation under the U.S. Green Building Council's Leadership in Energy and Environmental Design, or LEED program, officials said.

American City Business Journals Not for commercial use

CONTRACTORS STAY ON BOARD DESPITE FACING LONG DELAYS

Despite the delay in construction, Honolulu Seawater Air Conditioning LLC said that all of the contractors chosen to help build the project are still on board.

Honolulu-based Makai Ocean Engineering noted that it is encouraged by the recent investment of Ulupono Initiative and the recent sign-up of several important customers, including The Queen's Medical Center.

"Makai is currently involved in half a dozen seawater A/C projects at various stages of development around the world and we understand well that these are large projects with a lot of moving parts," Duke Hartman, vice president of business development for Makai, told PBN in an email. "It is not unusual for a project of this magnitude and complexity to experience delays. We are optimistic that this recent momentum will propel HSWAC through this near-term hurdle to get the green light for construction financing."

▶ CONTRACTORS

- Frank Coluccio Construction Co.
- Hawaiian Dredging Construction Co. Inc.
- James W. Fowler Co.
- Healy Tibbits Builders Inc.
- dck pacific construction LLC

▶ DESIGN ENGINEERS / CONSULTANTS

- Makai Ocean Engineering
- R.M. Towill Corp.
- Yogi Kwong Engineers
- InSynergy Engineering



He also pointed out that the project represents a huge step forward in energy sustainability for Hawaii, in reducing its dependence on imported fossil fuel.

"We are eager to help HSWAC make it happen," Hartman said.

Bill Wilson, president of Honolulu-based Hawaiian Dredging Construction Co. Inc., told PBN that it also is still on board.

"HDCC is fortunate to have a number of projects underway so the delay has not been a concern," he told PBN in an email. "Hopefully for them and the community it does proceed [in a timely manner]."

Tim Pearia, an engineer with Seattle-based Frank Coluccio Construction Co., also said it is still ready to work on the project. Honolulu Seawater A/C officials said it selected Coluccio Construction because of the firm's extensive experience in Hawaii tunnel projects. Pearia said that the use of tunnels to and from the chiller plant can reduce the construction impact on the neighborhood and the traveling public.

"You can imagine the problems with digging a big trench for the pipes going across Ala Moana [Boulevard]," he told PBN.

Some of Coluccio Construction's work included the H-3 exploratory tunnel; Fort Kamehameha sewer extension tunnels at Pearl Harbor; Kalaheo, Hamakua and Wanaao sewer tunnels in Kailua; and the beachwalk wastewater pump station for Ala Moana Beach Park.

"Delays are not unusual and we are accustomed to work with owners and help them solve problems with delays," Pearia told PBN in an email.

Yogi Kwong Engineers, R.M. Towill Corp. and inSynergy Engineering, are working on engineering for the ground trenches and a cooling station.

Hawaiian Dredging Construction Co. and James W. Fowler Co. were chosen as the contractors for the project's underground pipe system, specifically for the downtown distribution portion.

American City Business Jo

MauiNow.com
March 18, 2015

Program Links Businesses and Residents with Energy Experts

Posted 07:28 AM HST, March 18, 2015

By Maui Now Staff

Hawai‘i Energy has initiated a Clean Energy Ally Program to connect Hawai‘i businesses and residents with local energy efficiency experts. The program aims to make it easier for participants to utilize cash rebates and incentives.

Hawai‘i Energy is a ratepayer-funded energy conservation program serving Maui County, as well as Hawai‘i and O‘ahu. The program has aligned with over 80 allies to provide utility customers with assistance in energy efficiency projects.

The allies include contractors, equipment vendors, architects, engineers, distributors, manufacturers and retailers who provide energy-efficient products and services, from air conditioning and lighting to restaurant wares and construction.

“The Clean Energy Ally program makes it incredibly easy for customers to go online and find qualified companies for their energy-saving project,” explained Lisa Harmon of Hawai‘i Energy. “Our allies are knowledgeable about our technical requirements, program offerings and the application process for cash incentives. These cash incentives can significantly reduce project costs and payback periods–two important factors in the decision-making process.”

To find an ally, visit Hawai‘i Energy’s online directory.

To become an ally, interested parties can call Hawai‘i Energy at (808) 839-8880, or toll-free at (877) 231-8222. Allied companies are eligible for training and development workshops at special rates and Hawai‘i Energy co-branding.

***Green Magazine* (Website)**
Mar. 20, 2015

Kamehameha Schools Rewarded For Energy Efficiency



Kamehameha Schools ramped up its sustainability efforts by making energy efficient improvements to two of its campuses as well as a commercial property in Kaka‘ako. Because of these improvements, Kamehameha Schools was rewarded with financial incentives to the tune of $128,662.

Kamehameha Schools made renovations on its Kapalama and Hawai‘i campuses as well as a property located at 660 Ala Moana Boulevard. The Kapalama campus upgraded air conditioning systems and indoor and outdoor lighting, while the Hawai‘i campus tinted south and west facing windows and added motion sensors for indoor lights.

The financial incentives were provided by Hawaii Energy, the state’s ratepayer-funded energy and efficiency program, to help offset the renovation costs. The infrastructure improvements will reduce Kamehameha Schools’ energy usage while growing its bank account. The improvements are expected to save Kamehameha Schools a total of 736,281 kilowatt hours and $193,204 annually. —*Ian Kai*

Midweek
Mar. 30 – Apr. 3, 2015

HOTSHOTS



▲ Kamehameha Schools Goes Green

Hawaii Energy (HE), the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, provided $128,662 in financial incentives to Kamehameha Schools (KS) Feb. 20 for various energy-efficiency renovations to its Oahu and Hawaii island campuses as well as its Kakaako commercial property. Pictured are (from left): HE director of business operations Larry Newman, KS sustainability manager Amy Brinker, KS CFO/VP of finance and facilities Ben Salazar, KS director of facilities development and support Therese Rosier, and HE junior business program specialist Ian Tierney. Photo from Hawaii Energy

MauiNow.com
April 3, 2015

Hawai'i Energy Offers Incentives for Restaurants, Commercial Kitchens

Posted 01:58 PM HST, April 3, 2015



Hawai'i Energy provides free, low-flow, pre-rinse spray nozzles (a $60 value) for businesses and organizations with commercial kitchens. Courtesy photo.

By Maui Now Staff

Hawai'i Energy has introduced new cash incentives for restaurants and organizations with commercial kitchens (schools, hospitals and hotels) in an effort to reduce high energy usage by offsetting the cost of installing energy-efficient equipment.

Hawai'i Energy is a ratepayer-funded energy conservation and efficiency program serving Hawai'i Island, Lāna'i, Maui, Moloka'i and O'ahu. It offers more than a dozen new incentives for ENERGY STAR ovens, refrigerators, freezers, steam cookers, fryers, hot food holding cabinets and electric griddles.

On average, 14 percent of the energy used by full-service restaurants comes from cooking and 23 percent comes from refrigeration.

Incentive range between $100 and $325 for commercial ice machines and between $500 and $2,400 for combination ovens. Amounts will vary based on the type, size and design specifications of each unit.

The program will continue to offer incentives for ENERGY STAR refrigerator trade-ins, kitchen exhaust hood demand ventilations and refrigerated night covers.

“There’s huge energy savings potential for restaurants considering most are open day and night–some 24/7,” said Larry Newman, director of business programs at Hawai‘i Energy. “We strongly encourage all electric ratepayers to take advantage of these new incentives and others that are completely free such as our spray nozzle and lighting offers for small businesses and restaurants.”

Hawai‘i Energy also provides free, low-flow, pre-rinse spray nozzles (a $60 value) for businesses and organizations with commercial kitchens. Using less water saves money, since energy is required to pump, transport and treat water.

Qualifying businesses must be electric utility ratepayers and heat water with heat pumps or electric water heaters.

The nozzles are designed to spray water to remove excess food on dishes prior to cleaning in a dishwasher. They are easily interchangeable and do not require professional installation (available while supplies last).

The nozzles have a flow rate of just 1.28 gallons per minute compared to 2.25 GPMs with traditional valves. Full-service restaurants typically use the nozzles four hours per day, which translates to saving 233 gallons of water daily–85,045 gallons annually. The energy savings translates to 1,553 kilowatt hours or $3941 annually for restaurants with heat pumps. Restaurants with electric water heaters can save approximately 4,753 kWh or $1,2071 annually.

Additionally, Hawai‘i Energy continues to offer its Small Business Direct Install Lighting program that provides free lighting, consultation and installation. About 18 percent of a restaurant’s overall energy usage comes from lighting.

In order to qualify, businesses must have an individual meter and be on an electric rate schedule G, or occupy a space of less than 5,000 square feet. Restaurants on any electric rate schedule and of any size can qualify since they are a historically underserved business segment.

Participants are required to work with a Hawai‘i Energy-approved lighting contractor for an assessment, approval and lighting installation.

For more information about Hawai‘i Energy’s kitchen equipment incentives, free low-flow pre-rinse spray nozzles or SBDIL program, call 839-8880 on O‘ahu or toll-free on the Neighbor Islands at (877) 231-8222.

For more information about the restaurant program, go online.

For more information about the Small Business Direct Install Lighting program, go online.

For more information about Hawaii Energy programs, go online.

Honolulu Star-Advertiser
April 11, 2015

Business Briefs

For Saturday, April 11, 2015

By Star-Advertiser staff

Electrical customers eligible for energy kit

Hawaii Energy is offering a free energy-savings kit to residential electrical customers. The ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties is offering a free kit that includes one Energy Star compact fluorescent light, one Energy Star light-emitting diode, a high-efficiency shower head and faucet aerator. The program is also offering a $10 kit that includes two LEDs and one seven-plug power strip.

To request or purchase a kit, visit hawaiienergy.com/kits.

The kits are available to residential electric utility customers in Hawaii, Honolulu and Maui counties only. Each household is limited to one free kit and one advanced kit. Kits will arrive via standard mail between four and six weeks.

MauiNow.com
April 11, 2015

Hawai‘i Energy Kits Can Save Up to $160 in Annual Energy Costs



Hawai‘i Energy launched a new program offering free and low-cost home energy-saving kits that give residential electric customers the opportunity to reduce their annual energy costs by up to $160.
The ratepayer-funded energy conservation and efficiency program for Hawai‘i, Honolulu and Maui counties is offering a free kit (valued at $25) that includes: one ENERGY STAR compact fluorescent light (CFL), one ENERGY STAR light-emitting diode (LED), one high-efficiency shower head and one faucet aerator.

The advanced kit (valued at $39) costs $10 and includes two LEDs and one seven-plug advanced power strip.

A four-person family with electric water heating can save an estimated 358 kilowatt hours (kWh) or $115 annually with the free kit and 143 kWh or $46 annually with the advanced kit based on $0.32/kWh.

To request or purchase a kit, go online.

Kits are available to residential electric utility customers in Hawai‘i, Honolulu and Maui counties only. Each household is limited to one free kit and one advanced kit. Kits are shipped via standard US mail and arrive within four to six weeks.

Each of the items in the kit are easy to install and do not require professional installation.

The kits and shipping are substantially subsidized by Hawai‘i Energy to encourage customers to take advantage of this offer, which is available on a first-come, first-served basis and while supplies last.

“After much planning and development, we are excited to offer two energy-saving kits– one free and one very affordable–so that energy-efficient items are accessible to more residents to help them save on their electric bills,” said Caroline Carl, residential and transformational program director for Hawai‘i Energy. “The kits provide great value and are easy to install, so you can begin saving immediately.”

In the free kit, the high-efficiency showerhead and faucet aerator are designed to save water and energy without reducing water pressure. The showerhead distributes approximately 1.5 gallons of water per minute–about 40 percent less than traditional showerheads.

The faucet aerator distributes approximately one gallon of water per minute–about 50 percent less than a faucet without an aerator.

The CFLs and/or LEDs use approximately 75 percent less energy to produce the same amount of light as an incandescent bulb and lasts about 10 times longer.

Advanced power strips prevent electronic devices from drawing power when they are turned off or not in use (phantom load) and can be programmed to shut down power at a designated time.

For more information, call (808) 537-5577 or toll-free on the Neighbor Islands at (877) 231-8222.

For more information about Hawai‘i Energy, go online.

West Hawaii Today
April 14, 2015

Free energy saving kits offered to Big Island residents

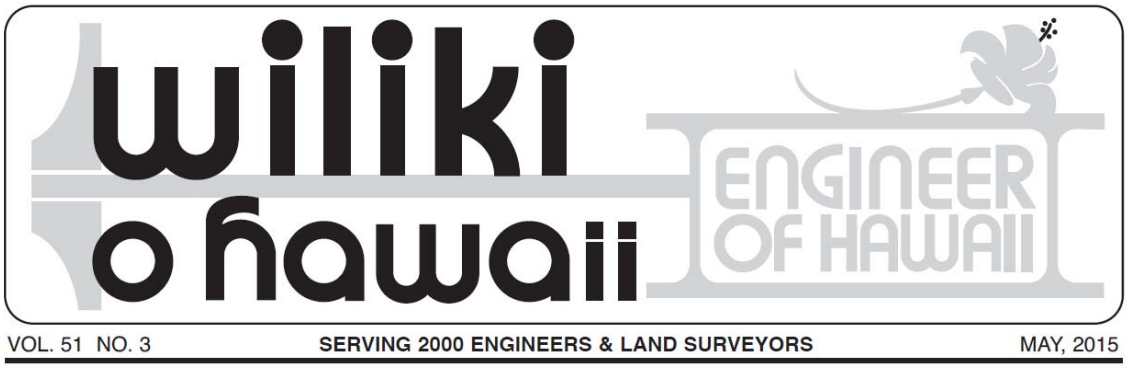
Hawaii Energy has launched a new offer unlike any in the program's six-year history: free and low-cost home energy-saving kits that give residential electric customers the opportunity to reduce their annual energy costs by up to $160.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, is offering a free kit (valued at $25) that includes the following: one Energy Star compact fluorescent light, one Energy Star light emitting diode, one high efficiency showerhead and one faucet aerator. The advanced kit (valued at $39) is $10 to purchase and includes two LEDs and one seven-plug advanced power strip.

A four-person family with electric water heating can save an estimated 358 kilowatt hours (kWh) or $115 annually with the free kit and 143 kWh or $46 annually with the advanced kit based on $0.32/kWh.

To request or purchase a kit, visit hawaiienergy.com/kits. The kits are available to residential electric utility customers in Hawaii, Honolulu and Maui counties only. Each household is limited to one free kit and one advanced kit. Kits will arrive via standard U.S. mail between four to six weeks.

Wiliki O Hawaii
May 1, 2015



VOL. 51 NO. 3 SERVING 2000 ENGINEERS & LAND SURVEYORS MAY, 2015

The Path Towards Energy Efficiency Begins with Benchmarking

If Your Building's Energy Performance Isn't Properly Measured, How Can You Expect to Improve?

Note: Full Copy Not Available

Pacific Business News
"Afternoon Edition"
May 5, 2015

Honolulu startup installs 1K sockets at University of Hawaii campuses

May 5, 2015, 1:07pm HST

Honolulu's Ibis Networks, a startup that sells plug-in products and services to help customers manage energy use, is installing about 1,000 sockets at three University of Hawaii campuses, PBN has learned.

An official announcement of the project is scheduled for Friday at Windward Community College in Kaneohe, with representatives from the state, Ibis Networks, UH, Hawaii Energy and the Energy Excelerator in attendance.

Ibis Networks, a Hawaii Energy Excelerator startup developed by the Honolulu engineering firm Oceanit, has installed the sockets in partnership with UH and Hawaii Energy to help the university decrease and manage its plug-load energy usage.

Just last month, Ibis Networks received $400,000 from eBay founder Pierre Omidyar's Honolulu impact investment firm Ulupono Initiative and Hawaii entrepreneur Henk Rogers.

The funding will be used to help Ibis Networks expand the commercial footprint of its flagship InteliNetwork platform, which was launched in October, the startup said.

"Plug loads" are one of the fastest-growing categories of energy consumption in commercial buildings.

Traditionally, energy service companies have focused on HVAC (heating, ventilating and air-conditioning), photovoltaic and lighting.

Plug load management solutions provide a high savings-to-investment ratio and a short payback relative to other energy efficiency measures.

Molokai Dispatch
May 6, 2015

Tips for Cutting Electric Costs

Wednesday, May 6th, 2015
By Colleen Uechi

For electric ratepayers looking to cut down on utility costs, options abound. Outdated air conditioning models can be upgraded for rebates. Extra refrigerators and old freezers can be sent in and recycled for cash. For Molokai residents, however, these and other options don't always apply, explained Hawaii Energy's Helen Wai at a workshop on Molokai last week.

"On Molokai you need two fridges and a freezer," said Wai, Community Outreach Specialist for Hawaii Energy. "You hunt, you fish, the barge comes once a week, you go to Costco once a month. … It can be an insult for someone to say, get rid of your freezer. It's not a luxury.

Wai invited the Molokai community to a workshop to show residents ways to save without getting rid of necessary appliances. Hawaii Energy is a program dedicated energy conservation and efficiency. It informs hard-to-reach communities and offers residential rebates, all focused on helping reach Hawaii's goal of decreasing total energy usage by 30 percent by 2030.

When it comes to fridges and freezers, said Wai, vacuum under and behind them regularly to clear dust and allow the motors to run more easily. It's also wise to think about what you plan to eat before you open the fridge, said Wai, as it can cost anywhere from $1 to $16 each time you take a peek inside.

"The longer you keep the door open, the more it has to work to set itself back to the right temperature," she explained.

She added that warm, humid air fills the fridge every time it's opened, and fridge owners can counter that by filling spaces inside with food containers, even if they're empty.

Appliances often take up electricity when homeowners least expect and overall contribute to 36 percent of the monthly bill, according to Hawaii Energy.

"I call them energy vampires, because what do vampires do? Suck your blood," said Wai. "But this one sucks your money from right underneath your nose."

Even when not heating food, a plugged-in microwave uses electricity to run its clock. A TV connected to the wall also sucks energy, as it sits on standby ready to turn on at a moment's notice. This type of power drain can take up 10 percent of the average household's energy bill, according to the website energy.gov. Wai suggested buying a power strip and shutting off items when not in use.

With summer approaching, conserving water, which takes up 19 percent of the bill, can prove vital. Wai said families looking to cool off on a hot day could opt for a quick hose down outside instead of jumping in the shower, and use a dishwasher instead of washing by hand.

Anything that requires heat takes up a lot of energy, so Wai recommended things like baking multiple dishes at once, pouring coffee into a thermos instead of leaving it on a hot plate, or storing cooked rice instead of leaving it in the pot to warm until breakfast the next morning.

While these may seem like common sense options, Wai believes it's often difficult for people to remember when they're not the ones paying the bill.

"Everyone else who lives in the house doesn't see it," she said. At the end of the workshop, attendees received free timers that owners can use to set automatic on and off schedules for devices.

With Hawaii averaging the highest cents per kilowatt-hour in the nation, according to the U.S. Energy Information Administration, and with Molokai paying the highest rates in the state per Hawaiian Electric statistics, every little bit counts.

"These are little things that I truly feel in my heart and mind Molokai can truly embrace," said workshop attendee Iruka Saitoh-Car`ee. "... It all begins with each individual, to show we're working for the same purpose. In my mind's eye that defines Molokai."

KITV4 (Hawaii's ABC Affiliate)
May 8, 2015
6 & 10 p.m. Newscast

New IntelliSocket device to save UH tens of thousands of dollars

UPDATED 7:10 PM HST May 08, 2015



HONOLULU — The University of Hawaii is making a big bet on a little high tech device. It's called an IntelliSocket and it monitors and regulates energy by installing on existing electrical outlets.

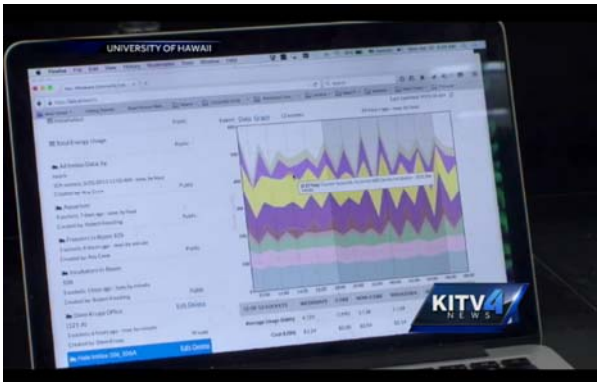
"What happens is you plug your device in and for the first time you can measure energy consumption for every device on your network, printers, copiers, coffee makers, water coolers, vending machines, air conditioners, whatever it is," said Michael Pfeffer CEO of Ibis Networks.

The devices can not only identify power hogs but also regulate when power is delivered to devices such as lights and vending machines.

"If we find we have an inefficient vending machine or refrigerator then we can actually run the numbers and see if financially we invest in purchasing a new more efficient device," said Matthew Kamakani Lynch, UH System Sustainability Coordinator.

The university says $40,402 a year can be saved with the new equipment. The cost of the IntelliSockets and monitoring equipment was $142,612. The bulk of the cost was funded by Hawaii Energy, $110,000, with the university providing the rest.

Officials in the energy industry believe investments like this one take Hawaii one step closer to becoming the premier green energy hotbed.



“We are in the middle of this revolution but we're not going to be able to get there with the technology that got us here today. It's going to take new solutions, new entrepreneurs, new technology to get us there,” said Dawn Lippert, director of Energy Excelerator.

Some 471 devices were installed at UH at Manoa, 461 at UH Hilo and 300 at Windward Community College.

KHON-TV (Hawaii FOX Affiliate)
May 8, 2015

New system helps UH campuses become more energy efficient

By Web Staff Published: May 8, 2015, 4:06 pm



InteliSockets in use at Windward Community College (Photo: University of Hawaii)

Three University of Hawaii campuses are taking steps toward becoming more energy efficient.

University of Hawaii at Manoa, Windward Community College and University of Hawaii at Hilo recently installed an innovative energy management system called "InteliNetwork."

The pilot project, executed in partnership with Ibis Networks, aims to save as much as $40,402 per year in energy costs over the three campuses.

Ibis Networks installed 1,232 "InteliSockets," which are devices plugged into existing electrical wall outlets and transmit energy usage data every 15 seconds for any electric device plugged into it.

Over periods of two to five weeks, the company then monitored the energy usage of more than 1,500 devices ranging from computers, monitors, printers, power strips, copiers, mini-fridges and televisions.

It established baseline energy profiles then made recommendations to maximize energy savings, including:

1. Scheduling periods with the InteliNetwork platform to turn devices off when not in use;
2. Replacing inefficient devices with modern energy-efficient devices (when the energy savings can pay for the device in less than 24 months) and
3. Modifying equipment and/or user behavior by better managing device usage during core business hours.

If the recommendations are followed, plug-load energy consumption across three campuses could be reduced by as much as 58 percent, Ibis says.

Here is the cost-savings breakdown:

- University of Hawaii at Manoa installed 471 InteliSockets for a potential plug-load energy savings of 65,628 kWh or $11,813 annually based on $0.18/kWh.
- University of Hawaii at Hilo installed 461 InteliSockets for a potential plug-load energy savings of 95,925 kWh or $23,022 annually based on $0.24/kWh.
- Windward Community College installed 300 InteliSockets for a potential plug-load energy savings of 30,930 kWh or $5,567 annually based on $0.18/kWh.

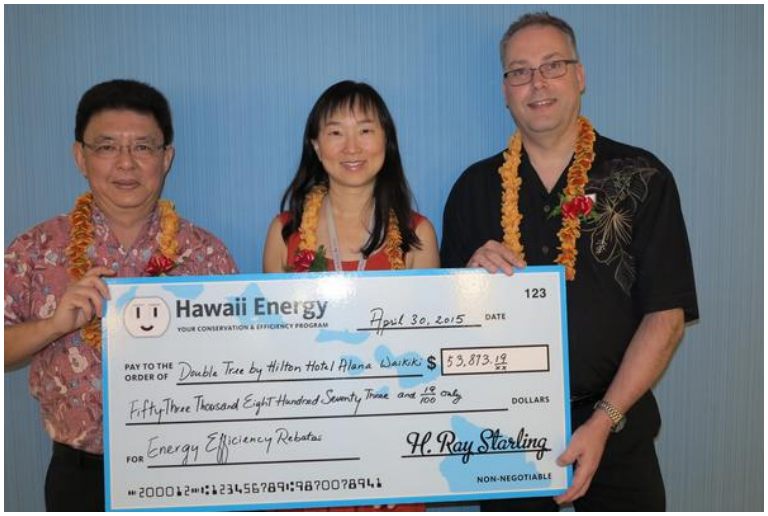
The overall project cost was $142,612 in which Hawaii Energy provided $110,000 (77 percent) through its Energy Efficiency Auction. The remaining costs were funded by UH. The energy savings is enough to pay for all three projects in an average of 3.52 years.

Students have played a significant role in the deployment of this new technology, using the campus as a living laboratory to create practical learning opportunities from real-life situations.

“It’s exciting that my research project, which started as an energy waste audit, may help UH and the state become more energy efficient,” said Windward CC pre-engineering student Madori Rumpungworn.

Pacific Business News
"Morning Edition"
May 8, 2015

DoubleTree Waikiki receives $54k incentive check for energy-saving lights



DoubleTree by Hilton Hotel Waikiki recently received a $53,873 incentive check from Hawaii Energy to offset the cost of its lighting innovation. From left to right: Gary Murashige, comptroller, DoubleTree; Lily Koo, energy efficiency advisor, Hawaii Energy; and Michael Wilding, general manager, DoubleTree.

DoubleTree by Hilton Hotel Waikiki recently received a $53,873 incentive check from Hawaii Energy to offset the cost of its lighting innovation.

The retrofit included all 317 guest rooms, corridors, office towers, lobby and parking garage.

The hotel worked with Energy Industries and replaced more than 3,000 light fixtures with LEDs and low wattage T8 fluorescent lights and high performance ballasts.

With Hawaii Energy's incentive payment, the project cost the DoubleTee $250,636 and will save the hotel $76,608 annually in energy costs, based on $0.179 kilowatt hours.

Hawaii Energy is the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties.

MauiNow.com
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Maui Energy Efficiency Programs & Tax Credits

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By Alexandra Mitchell

There seems to be a lot of buzz going around Maui pertaining to home energy efficiency, residential rebates for photovoltaic systems and new incentives through Hawai ʻi Electric Company.

Below is a short guide for navigating Maui County's energy programs and tax credits.

What is Hawai‘i Energy?

Hawai ʻi Energy is a series of conservation programs that have been created to assist Hawai‘i home and business owners in becoming more energy efficient, and at the same time, save some of their hard-earned cash.

Programs include rebates and incentives for residential homes and businesses. Residential home owners can apply for cash rebates that will help you invest in energy efficient equipment to power your home; solar power (water cooler timers, water heating, lighting, Energy Star appliances), HVAC systems and VFD swimming pool pumps.

In addition, Hawai‘i Energy offers business owner incentives for building envelope improvements, customized projects, Energy Star appliances, HVAC, lighting, pumps and motors, sub-metering, water cooler timers, water heating, additional renewable energy services and ongoing maintenance.

For more information, visit the Hawai ʻi Energy website.

After implementing Hawai ʻi Energy programs into your home or business, owners can check out two additional programs through Maui Electric Company: Net Energy Metering and Feed In Tariff.

Net Energy Metering

Available for both residential and commercial property types, Net Energy Metering is focused on distributing unused energy into the wholesale market. Basically, when your energy system generates more energy then you are using, the remainder flows to the grid available for others to use.

Those who join the Net Energy Program will be credited energy by MECO and be provided a "net energy" printout on their monthly statement.

For more information about NEM, visit MECO's website.

Feed In Tariff
Created in 2010 by the Hawai'i Public Utility Commission, the Feed In Tariff program allows MECO to purchase the renewable energy that your business generates. It allows larger sized systems than the Net Energy Metering Program does, but the payout rate that's received from MECO is lower than wholesale. The rate depends on the type of renewable energy technology that you are using–wind, solar, PV, etc.

Under this program, owners can, of course, use their own energy, but are not allowed to sell to a
third party.

For more information about FIT, visit MECO's website.

Tax Credits
If you have implemented a renewable energy system in your home or business, you are eligible for both State of Hawai'i and federal tax credits. These credits are available to you even if you are not a part of the NEM or FIT programs. For example, if you have a solar PV system, you are eligible for a 35% State of Hawai'i tax credit and a 30% federal tax credit.

For more information about the Maui County Energy Alliance and Hawai'i Renewable Energy Programs, visit the County of Maui website.

Pacific Business News
"Afternoon Edition"
June 30, 2015

Hawaii Energy offers instant rebates for energy-efficient lighting



Hawaii Energy has launched a new program to help businesses and contractors save money on energy-efficient lighting.

The lighting distributor instant rebate program can save businesses as much as 75 percent on lighting costs at the time of the purchase, Hawaii Energy said in a statement. In order to get the instant rebate, contractors and businesses must buy certified lighting from distributors that are enrolled with Hawaii Energy.

"The lighting distributor instant rebate program is truly a win-win for everyone," Larry Newman, director of business operations for Hawaii Energy, said in a statement. "Contractors and businesses have lower carrying costs and no applications to fill out, while we believe distributors can grow their business as a result."

According to Hawaii Energy, lighting can account for between 20 and 50 percent of a business' overall energy costs and an easy way to reduce energy consumption and cost is install energy efficient lighting.

Hawaii Energy is an energy conservation and efficiency program for Hawaii, Maui and Honolulu counties, administered by Leidos Engineering LLC, under contract with the Hawaii Public Utilities Commission.

Energy Manager Today
June 30, 2015

Businesses Offered 'Instant Rebates' from Utility

By Linda Hardesty

Hawaii Energy launched a Lighting Distributor Instant Rebate program to provide businesses, and the contractors who serve them, instant lighting rebates (as much as 75 percent of costs) at the time of purchase.

Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties, developed the program to help contractors and electric utility business customers reduce the working capital required to implement energy-efficient lighting projects. Lighting rebates are applied to the invoice at the time of purchase so customers do not need to complete any rebate forms.

To receive these instant rebates, contractors and business customers must purchase qualified lighting from participating distributors that have enrolled with Hawaii Energy.

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.

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.

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.

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

Program Year 2011 – 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.).

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.

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

Lessons Learned

- Developed experience leveraging the great work and expertise of third-party organizations within their specific communities or professions.

Program Year 2012 – 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.

Achievements

- The Program invested a total of $30,903,826 to deliver 1,458,535,502 kWh (system-level) over the measure lives resulting in a cost per kWh of $0.021.
- Delivered $21,814,052 in incentives driving customer bill savings of $45,054,796 annually and over $404,952,708 over the life of the measures installed.
- A first year Program Level savings of 140.1 GWhs.
- Diversified portfolio away from reliance on CFLs by 7%, while increasing LEDs by 124%.

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.

Lessons Learned

- Focus on industry segments is effective and should be continued.
- Better ways to gain valuable benchmarking and baseline energy consumption data and with this knowledge, transitioned from a more expensive and complex measure (Central Plant Optimization) to much more economical measure that will ultimately produce similar results.

Program Year 2013 – Advancing Energy Efficiency as Hawaii's Most Cost-Effective Grid Resource & Additional Innovative Measures

In the fifth year, Hawaii Energy's efficiency programs delivered 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.

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.

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.
- 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%.

Implementation

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 public relations efforts.

Implementation, continued

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 resource 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. 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*. 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.

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.

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.

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	$ 36,029,967	**1,525,693,183**	$0.0236	18
Customer	$ 36,029,967	**1,377,582,777**	$0.0262	19
Program	$ 36,029,967	**1,191,771,572**	$0.0302	17