

ANNUAL REPORT

Program Year 2015



Hawai'i Energy

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Program Year 2015

July 1, 2015 – June 30, 2016

Submitted to the Hawai'i Public Utilities Commission by:

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Hawai'i Energy is the ratepayer-funded energy conservation and efficiency program administered by Leidos Engineering, LLC under contract with the Hawai'i Public Utilities Commission serving the islands of Hawai'i, Lāna'i, Maui, Moloka'i and O'ahu.

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 EXECUTIVE DIRECTOR



On behalf of the entire Hawai'i Energy team, we are proud to submit our Program Year 2015 (PY15) Annual Report, covering July 1, 2015 through June 30, 2016 and highlighting our seventh year as Hawai'i's Public Benefits Fee Administrator (PBFA).

In the midst of a re-compete for the PBFA contract, the Hawai'i Energy team kept its focus and delivered another successful year in implementing energy efficiency in Hawai'i. As detailed in this Report, Hawai'i Energy's efficiency programs for PY15 will deliver 1.68 billion kWh in lifetime energy savings to the electric grid system at a total program cost of 2.2¢ per kWh (total program costs / total lifetime kWh benefit). This, in turn, will save an estimated equivalent of 2.5 million barrels of oil and 1.3 million tons of greenhouse gas emissions. And, at an average electric utility price of 22¢ per kWh, customers will save approximately \$338 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 Hawai'i's lowest cost electric grid resource, over fossil and renewables.

Operationally in PY15, Hawai'i 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 Hawai'i's large buildings; and continued development of multi-island opportunities to assist water and wastewater operations with energy efficiency upgrades and practices.

Hawai'i Energy continued to expand the efficiency Program's scope to help facilitate acceleration of Hawai'i's transformation to more efficient, clean-energy-tolerant and customer-accommodating electric grids. Our ongoing work 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, and EV charging infrastructure. As the State continues its progress towards 100% clean energy, the need to coordinate the programs to integrate with needs of the electrical grid is of utmost importance.

Finally, this Report caps seven years of cost-effective energy efficiency programs that has continued to evolve over the years. As we transition to Hawai'i Energy 2.0, we anticipate further success through continued collaboration with our Clean Energy Allies, key energy stakeholders, and customers.

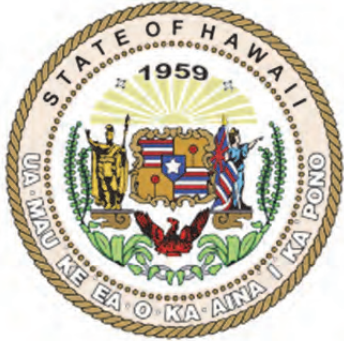
Respectfully submitted,

A handwritten signature in black ink that reads "Brian Kealoha". The signature is fluid and cursive, with a long, sweeping underline.

Brian Kealoha, Executive Director

BACKGROUND

Program Origins



In 2006, the Hawai'i Legislature (see Hawai'i Revised Statutes §269-121 through 269-124) authorized the PUC to transfer the existing demand-side management (DSM) surcharge collected by Hawai'i'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 Hawai'i'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 Hawai'i 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 Hawai'i's first PBFA and would operate the Hawai'i 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.

A complete Program Historical Summary is provided in Attachment G.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

Current Year Summary

Hard-to-Reach Efforts

In PY15, we grew residential and commercial hard-to-reach programs to unprecedented levels.

- The Multifamily Direct Install (MFDI) 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 4,225 residential dwellings, an increase of 2,701 units over PY14.
- The Small Business Direct Install Lighting (SBDIL) program saw its most successful year since inception. This offering provides full energy-efficient lighting retrofits to restaurants and small businesses in Hawai'i, Honolulu and Maui counties at no cost to the customer. Customers participating in the SBDIL program in PY15 are projected to save a combined \$2,960,998 in operating expenses per year and \$42,613,306 over the life of the lighting measures installed.

Clean Energy Ally Program

PY15 marked the second full year of the Clean Energy Ally program, a network of individuals and companies on the front lines of selling, designing, financing, installing and maintaining energy efficiency measures.

- The Program registered and trained 272 new Allies in PY15, a 57% increase over last year.
- Through their direct contact with utility customers, Allies help Hawai'i Energy meet performance goals and implement energy efficiency projects in both residential and commercial markets.
- Allies include product manufacturers, wholesale and retail suppliers, equipment contractors, architects, engineers and electricians who receive training on Program incentives and application processes.

Maturity of LEDs in the Marketplace

There was a significant increase in both the quality and availability of LED products PY16, which lead to more products being listed by ENERGY STAR®, DesignLights Consortium® or Lighting Facts® and a large increase in the number and types of LED fixtures that were incentivized through the residential and commercial programs.

Growing Midstream Distribution Channel

Hawai'i Energy continued its midstream lighting offer to incentivize lighting distributors to carry and sell energy-efficient lighting products and offer instant discounts to customers.

- The Program enrolled 16 distributors by year end and sales of energy-efficient lighting products also grew at an exponential rate.
- The midstream approach eliminates a number of barriers to participation. Hawai'i Energy is optimistic that this could be one of its most successful and cost-effective programs in the coming years.

Business Programs

The Business portfolio spent \$14,754,368 (99.98% of budget¹), and achieved 64,652,923 kWh savings (105% of target), 9,721 kW peak demand savings (158% of target), and \$149,932,561 in Total Resource Benefit (115% of target).

Implementation	Achievement
Grew the Midstream Lighting Program to include more distributors and significantly increase commercial sales of energy-efficient lighting products	<ul style="list-style-type: none"> Enrolled new 16 distributors Provided \$555,523 in incentives toward energy-efficient lighting products
Completed execution of several Energy Efficiency Auction projects	<ul style="list-style-type: none"> Generated 4,311,076 kWh in energy savings and 362 kW in demand savings
Saw continued success with LED lighting projects across the portfolio	<ul style="list-style-type: none"> LEDs in the BEEM Program generated energy (first year) and demand savings of 128,434,371 kWh and 1,097 kW, respectively. LEDs in the CBEEM Program generated energy (first year) and demand savings of 22,343,642 kWh and 2,959 kW, respectively.
Strengthened support for the water-energy nexus initiative via direct incentives for water loss reduction and energy savings.	<ul style="list-style-type: none"> Provided a \$130,000 incentive for a system-wide leak detection system on Hawai'i island that is expected to save 214,038 kWh per year Provided a \$20,000 incentive to a small, private water company on Hawai'i island for a pressure-reducing valve that will decrease losses from existing leaks and reduce the probability of future leaks. Capital project had been stalled for many years.

¹ Business portfolio spend of \$14,754,368 was 114% of the PY15 plan budget initially approved by the PUC. Transfers were made from Residential incentive portfolio, T&M and Transformational portfolio. (See Table 14 for details.)

Residential Programs

The Residential portfolio spent \$9,364,982 (99.99% of budget²), and achieved 53,514,217 kWh savings (88.5% of target), 10,532 kW peak demand savings (95.6% of target) and \$97,079,387 in Total Resource Benefit (101% of target).

Implementation	Achievement
Completed two Home Energy-Saving Kit online giveaway promotions that included devices such as light bulbs, showerheads, aerators, and power strips.	<ul style="list-style-type: none"> Distributed 5,584 energy-saving kits containing over 18,000 individual measures Kits accounted for 725,392 kWh of customer-level first-year energy savings, and 62 kW of customer-level demand savings.
Continued to transition the lighting measure portfolio away from CFLs and toward LEDs	<p>LEDs surpassed CFLs in their contribution to the portfolio's savings impact:</p> <ul style="list-style-type: none"> Rebated 874,680 LED bulbs, a 66% increase from PY14 and 203% increase from PY13 Rebated 932,203 CFL bulbs, a decrease from 1,328,146 in PY14
Expanded the "Energy Smart 4 Homes" Multifamily Direct Install offer to include more properties	<ul style="list-style-type: none"> Provided turnkey delivery and installation of in-unit energy-saving measures to 4,225 residential dwellings, an increase of 2,701 units over PY14
Continued the Refrigerator/Freezer "Rid-A-Fridge" program in collaboration with the Hawai'i Foodbank (O'ahu) and The Maui Foodbank	<ul style="list-style-type: none"> Influenced the recycling of over 500 refrigerators and freezers, resulting in lifetime energy savings of 5,551,953 kWh 57 participants donated their rebates to the Hawai'i Foodbank and Maui Foodbank, for a total of \$3,015 in donations
Offered Solar Water Heating Tune-Up rebates for a third year and collected data on system ages and conditions.	<ul style="list-style-type: none"> Conducted 1,150 tune-ups, accounting for 1,459,867 kWh in lifetime energy savings Found that average age of systems receiving tune-ups is 9.2 years old, and a majority of the units were found to be operating at suboptimal efficiency levels.
Expanded the Peer Group Comparison program, offering Home Energy Reports to additional residential customers	<ul style="list-style-type: none"> Distributed Home Energy Reports to an additional 110,000 households, bringing the tool to over 85% of homes in Hawai'i Energy's service areas Offered two new online services: the <i>Dare to Compare</i> tool and an online version of the Home Energy Report All told, the program accounted for 11,067,212 kWh in lifetime energy savings.
Provided quality customer support and continued to enhance the customer experience throughout the rebate redemption process.	<ul style="list-style-type: none"> Handled over 12,000 calls on residential rebate programs, solar offerings, home energy reports, and more. Earned an average customer satisfaction rating of 9.1/10 in field service, the rebate process and willingness to recommend the program to others.

² Residential portfolio spend of \$9,364,982 was 88.7% of the PY15 plan budget initially approved by the PUC. Transfers were made from Residential incentive portfolio, T&M and Transformational portfolio to cover Business program overdrive. (See Table 14 for details.)

Transformational Programs

Through the expertise and collaboration of Hawai'i Energy and its subcontractors throughout PY15, the Transformational program met and exceeded its goals for behavior modification, professional development, and technical training for the Program Year.

Implementation	Achievements
Expanded the "Sharing the Aloha" community workshops to target housing communities, low-income assistance programs and children's hospital workers	<ul style="list-style-type: none"> Reached 3,695 participants with a total of 117 workshops Worked with employers to offer energy literacy workshops to staff during lunch hour to increase reach.
Explored the power of "localizing" behavior change messaging through social media (enhancing existing memes with more place-specific language) and a mass-delivery project with a local restaurant chain	<ul style="list-style-type: none"> Made 110 enhancements to existing memes (updated copy and technical data) Achieved 23,945 actions or engagements on social media Distributed 29,000 keiki menus and 100,000 tray liners customized with energy-savings tips to all 24 Zippy's restaurant locations on O'ahu. Received over 1,000 new sign-ups for Hawai'i Energy's e-newsletter
Piloted a Community-Based Social Marketing campaign in the condominium and apartment market sector	<ul style="list-style-type: none"> Developed strategies for affecting behavior change focusing on water use in showers, fans vs. AC use and building manager-level behaviors Surveyed 431 households to gain insights into target audience behaviors Developed relationships with building managers and a process by which to engage them in future projects
Held both in-person and online energy efficiency sales trainings to participants from all islands	<ul style="list-style-type: none"> 362 energy professionals participated in the trainings, representing 109 companies/organizations 36 companies/organizations viewed 205 online video trainings Presented at targeted events tailored to engage key stakeholders and decision-makers in energy efficiency
Continued to support energy education in the schools through collaboration with the Hawai'i Department of Education and other organizations	<ul style="list-style-type: none"> Held five workshops training 173 teachers from all islands, reaching over 16,000 students Facilitated eight Energy Expos for an estimated 750 attendees Piloted a distribution channel for home energy efficiency kits coupled with educational component via teachers and students
Enhanced technical training offerings for professionals to address key energy efficiency issues in the market	<ul style="list-style-type: none"> 35 participants in BOC Level I and 23 participants in BOC Level II courses Sponsored AEE Certified Energy Manager and Certified Energy Auditor courses with a combined total of 33 participants from target audience 227 participants in Program-supported trainings for HVAC, lighting and water & wastewater
Grew the Clean Energy Ally (CEA) program with enhanced recruitment efforts and continued process improvements	<ul style="list-style-type: none"> Recruited an additional 272 trade allies, representing 165 unique businesses.

Transformational Pilot Projects

Implementation	Achievement
Smart Grid Initiative – Expanded In-Home Display (IHD) installations to include smart plug devices for customers to receive whole-home and appliance-specific energy use information.	<ul style="list-style-type: none"> Continued the collaborative Smart Grid Home Area Network (HAN) Pilot project with Hawaiian Electric Company (HECO) Enhanced IHD installations to include Zigbee-compatible smart plugs devices Analyzed 15 min interval data from 426 commercial customers and developed a dynamic load profile dashboard to identify the commercial load profile characteristics
Electric Vehicles – Offered free energy-saving kits for electric vehicle owners and worked with Kanu to create new marketing materials to raise awareness of energy efficiency and electric vehicles.	<ul style="list-style-type: none"> Successfully launched web store using online storefront vendor Gave away 554 EV Kits (approximately 16% EV population penetrated) Created an online video detailing the benefits of EV ownership and energy efficiency for promotion and educational purposes with Kanu Hawai'i
Demand Response/Load Shifting – Piloted heat pump water heater (HPWH) scheduling software that shifts water heating loads to provide the most value to the grid.	<ul style="list-style-type: none"> Installed load-shifting and data logging heat pump water heaters in four residences 30%-63% load shifted from utility on-peak time (4pm-12am) in two residences Demonstrated shifted load via data visualization for three of the four sites Overall home energy use reduction in all four homes ranged from 392 – 1,022 kWh/year
Benchmarking – Added to the Hawai'i Energy portfolio of local building benchmarks and peer group comparisons.	<ul style="list-style-type: none"> Completed 264 benchmarks (goal of 150) Specific segments targeted – Department of Education (kWh/student/yr) Benchmarked 85% of the Public DOE schools in the state

On-Bill Financing Winds Down

For PY15, Hawai'i Energy was in “standby mode” as the PUC sought out capital sources and then a financial administrator after the then current firm chose not to renew its contract. As the program year approached its final months, the PUC issued Order No. 33715: *Suspending the Establishment and Implementation of an On-Bill Financing Program* on May 20th. The order goes on to read: “The HECO Companies shall work directly with the HGIA to design and implement an on-bill repayment mechanism for the exclusive use of the HGIA.” Current work by Hawai'i Energy was therefore suspended; however, existing deliverables remain available to leverage and/or salvage by either party should the PUC desire.

Achievements

- The Program invested a total of \$36,894,871 (**Table 15**) to deliver 1,679,458,177 kWh (system-level, **Table 18**) over the measure lives resulting in a cost per kWh of \$0.0220. The Program's Levelized Cost of Saved Energy (CSE) in PY15 was \$0.0314/kWh, as calculated in **Table 1** below.
- Delivered \$24,119,351 in incentives (**Table 17**) driving customer bill savings of \$30,051,305 annually and over \$331,743,175 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 118,167,139 kWh (**Table 17**).

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				
		w/o Transformation	Total Program	
Discount Rate	A	6%		6%
Estimated Program Savings Life	B	11.2		11.2
Total Program Budget Less Direct Install Programs	C*	\$ 33,829,982	\$	36,894,871
Annual kWh Saved at Customer Level	D	134,953,508		134,953,508
$\text{Capital Recovery Factor} = \frac{A * (1 + A)^B}{(1 + A)^B - 1}$		$A * (1 + A)^B$		0.115
		$(1 + A)^B - 1$	÷	0.921
Capital Recovery Factor				0.125
$\text{Levelized CSE} = \frac{C * (\text{Capital Recovery Factor})}{D}$		C	\$ 33,829,982	\$ 36,894,871
		Capital Recovery Factor x		0.125
		D ÷	134,953,508	134,953,508
Levelized CSE		\$	0.0314 / kWh	\$ 0.0342 / kWh

Transformational Costs		Cost*
Total Program PY15 Expenditures	\$	36,894,871
RTRAN incentives	\$	1,472,014
BTRAN incentives	\$	1,592,875
	\$	33,829,982

* Does not remove T&M related to these HTR Programs

Table 1a Customer Energy Cost Savings by Island									
First-Year Energy Cost Savings									
Island	R	G	J	P	DS	F	Other*	Total	kWh - 1st yr
O'ahu	\$ 10,227,560	\$ 1,145,405	\$ 4,686,181	\$ 3,892,318	\$ 563,960	\$ 21,696	\$ 12,089	\$ 20,549,210	99,942,633
Hawai'i Island	\$ 3,095,200	\$ 494,064	\$ 790,880	\$ 599,454	\$ 0	\$ 368,921	\$ 7,479	\$ 5,355,997	18,816,675
Maui	\$ 2,462,157	\$ 168,876	\$ 482,678	\$ 979,248	\$ 0	\$ 0	\$ 1,786	\$ 4,094,744	16,031,019
Lāna'i	\$ 12,147	\$ 0	\$ 19,362	\$ 0	\$ 0	\$ 0	\$ 0	\$ 31,508	97,623
Moloka'i	\$ 8,532	\$ 3,422	\$ 5,527	\$ 1,056	\$ 0	\$ 0	\$ 1,309	\$ 19,846	65,559
Total	\$15,805,597	\$1,811,766	\$5,984,627	\$5,472,075	\$563,960	\$390,617	\$22,662	\$30,051,305	134,953,508
Customer Lifetime Energy Cost Savings									
Island	R	G	J	P	DS	F	Other*	Total	kWh - 1st yr
O'ahu	\$ 96,258,329	\$ 15,598,531	\$ 57,449,696	\$ 45,935,592	\$ 8,876,403	\$ 274,320	\$ 161,850	\$ 224,554,720	1,116,102,615
Hawai'i Island	\$ 29,795,301	\$ 7,117,169	\$ 10,287,585	\$ 6,513,610	\$ 0	\$ 3,689,210	\$ 112,179	\$ 57,515,054	202,965,348
Maui	\$ 24,729,231	\$ 2,602,566	\$ 7,032,623	\$ 14,822,301	\$ 0	\$ 0	\$ 26,785	\$ 49,213,506	196,287,029
Lāna'i	\$ 48,267	\$ 0	\$ 239,808	\$ 0	\$ 0	\$ 0	\$ 0	\$ 288,075	894,426
Moloka'i	\$ 24,951	\$ 43,605	\$ 77,523	\$ 14,784	\$ 0	\$ 0	\$ 10,958	\$ 171,820	577,168
Total	\$150,856,078	\$25,361,871	\$75,087,235	\$67,286,287	\$8,876,403	\$3,963,530	\$311,771	\$331,743,175	1,516,826,586

*Other combines the less frequently assigned rate codes for PY15

Table 1b Program Year 2015 - Effective Average Utility Rate for Participants* (\$/kWh)							
	R	G	J	P	DS	F	Other
O'ahu	\$ 0.24681	\$ 0.23071	\$ 0.18540	\$ 0.15999	\$ 0.14912	\$ 0.23493	\$ 0.20116
Hawai'i Island	\$ 0.30283	\$ 0.32361	\$ 0.25296	\$ 0.22033		\$ 0.30865	\$ 0.28168
Maui	\$ 0.27618	\$ 0.28468	\$ 0.24288	\$ 0.21624		\$ 0.26835	\$ 0.25767
Lāna'i	\$ 0.32468	\$ 0.34443	\$ 0.32156	\$ 0.29784		\$ 0.33592	\$ 0.32489
Moloka'i	\$ 0.31021	\$ 0.36498	\$ 0.28634	\$ 0.21202		\$ 0.31525	\$ 0.29776

*Average per kWh customer electric cost based on actual participants' total bill energy costs for calendar year 2015.

Program Objectives

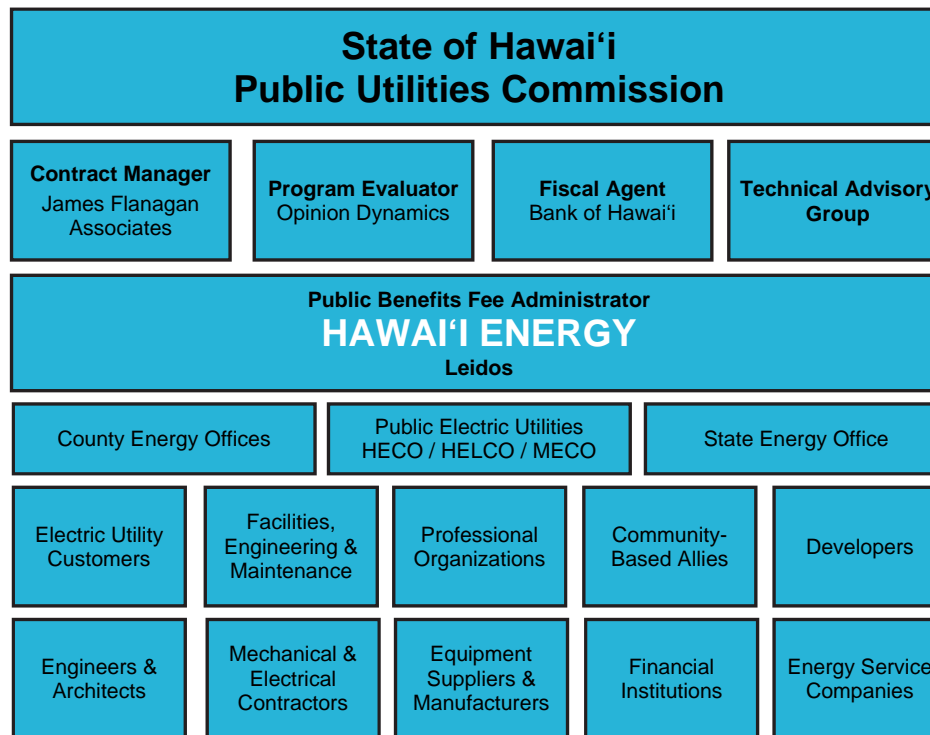
In addition to the PBFA Contract requirements and performance award goals, the Program's broader objectives for PY15 included:

- 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 Hawai'i Clean Energy Initiative and related efforts aimed at improving Hawai'i'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 address their on-going concerns around managing energy use.

Oversight and Support

During PY15, Hawai'i 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 (Opinion Dynamics), Fiscal Agent (Bank of Hawai'i) 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, Hawai'i 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

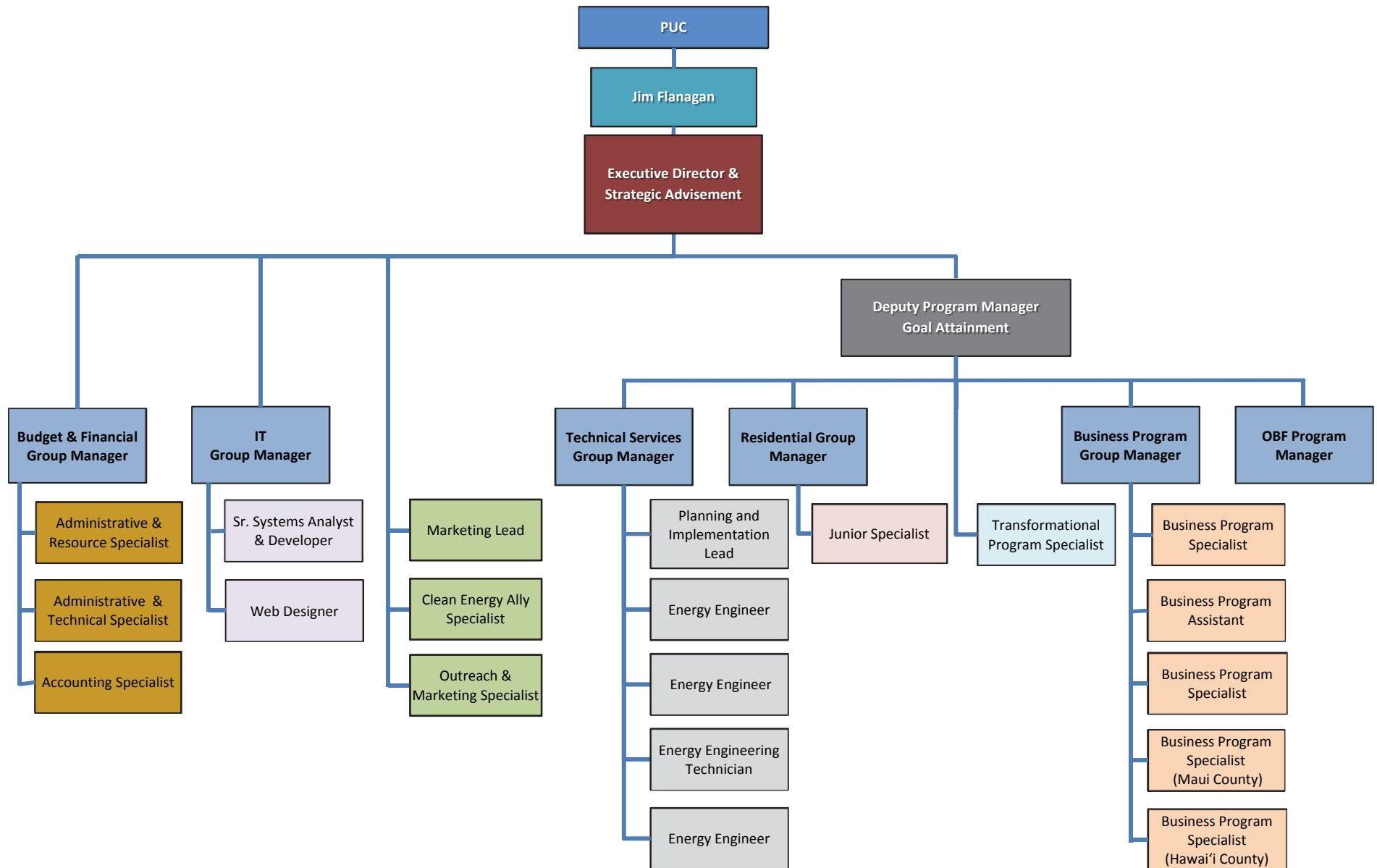


The foundation of the Program’s organization is a core team of Leidos professionals in Honolulu, supported by an off-site staff of uniquely skilled professionals throughout Leidos’ organization nationwide. The Program also has a number of key subcontractors that together round out the Hawai’i Energy 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, Energy Managers in Training (EMIT) and Certified Energy Auditors.
- **Selling Energy** – 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 Hawai’i 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.
- **Kanu Hawai’i** – Provided transformational social media messaging, development and distribution of keiki menus and tray-liners containing energy-efficiency content at Zippy’s restaurants, 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 and deployed a home energy kit pilot for student households
- **Opower** – Provided peer group comparison Home Energy Reports to residences in Maui County, Hawai’i County and select parts of Honolulu County
- **University of Hawai’i Outreach College** – Provided technical training for building operators through their existing Continuing Education programs.
- **University of Hawai’i Maui College/Sustainable Living Institute of Maui** – Provided technical training for building operators through their existing Continuing Education programs.

Program Organization

The Program's organization at the end of PY15 (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 PY15 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.

The Hawai'i Energy PY2015 Annual Plan utilized a Total Resource Benefit (TRB) Utility Benefit Values table as documented in Appendix C. Using this table of avoided costs to calculate the total program TRB, the PY2015 Annual Plan produced a value of \$159,372,834. This figure is included as a determinant of one of the performance incentives. In order to accurately determine the value for TRB that reflects more current avoided costs, a new TRB lookup table was developed during PY2015 based on renewable energy costs provided in the PUC Waiver Docket (2013-0156). The revised value for PY2015 TRB using the new table is \$226,178,274. Year-end reporting and goals were scaled to this revised number. As these goals and incentives were revised in a linear fashion, this change had no effect on the amount of performance incentives awarded.

Table 2 Performance Indicators				
Indicator		Minimum	Target	Maximum
First Year Energy Reduction (kWh)		91,682,791	122,243,721	134,468,093
Peak Demand Reduction (kW)		12,863	17,150	18,865
Utility Cost Avoidance (TRB)		\$ 169,633,706	\$ 226,178,274	\$ 248,796,101
Market Transformation	Behavior Modification	12,600 Participants	18,000 Participants	
	Professional Development	560 Participants	800 Participants	
	Technical Training	140 Participants	200 Participants	
	Hawai'i Energy Ally Program	175 Allies	250 Allies	
	Benchmarking	105 Sites	150 Sites	
	Codes & Standards	1 items	2 Items	
	Demand Response	1 items	1 Items	
	Smart Grid	1 items	2 Items	
	Electric Vehicle	1 items	2 Items	
Indicator		Minimum (80%)	Target (\$)	PY15 % Contribution*
Island Equity	Honolulu County	\$ 15,821,421	\$ 19,776,777	74.0 %
	Hawai'i County	\$ 2,779,439	\$ 3,474,299	13.0 %
	Maui County	\$ 2,779,439	\$ 3,474,299	13.0 %

*Based on Actual PY15 PBFA Contribution

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

Target: 122,243,721 kWh

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

The Program Level Annual Energy Savings Achievement of 118,167,139 kWh currently equates to 1,345,893 MMBTUs or avoided use of 220,486 BBLs of liquid fossil fuels in Hawai'i; see **Table 3** and **Table 3a**.

Table 3 Estimation of Potential Fossil Fuel Avoidance				
Potential Barrels (BBLs) of Fossil Fuels Avoided in PY15				
Annual Program Level Energy Savings Achievement		118,167,139	kWh/Yr.	
Average Program Attribution to System Level Impact	÷	79%		
System Level Gross Generation Energy Impact		149,423,313	kWh/Yr.	
Est. 2015 Electrical Generation Source Distribution				
Renewable Energy Generated (2015 RPS Report)		1,437,715,000	kWh/Yr.	
Less avg. 4.8% T&D Losses (HEI 10K 2015)	x	95.2%		
Est. of Renewable Energy Sold		1,368,704,680	kWh/Yr.	15.3%
Est. Fossil-Fueled Energy Sold	+	7,587,793,320	kWh/Yr.	84.7%
Total Energy Sold		8,956,498,000	kWh/Yr.	
Customer-Sited, Grid Connected Renewable DG (2015 RPS)		643,060,000	kWh/Yr.	7.2%
System Level Gross Generation Energy Impact		149,423,313	kWh/Yr.	
% System Average Fossil-Fuel Generation	x	84.7%		
Reduction Target Impact in Fossil Fuel-Generation		126,588,898	kWh/Yr.	
Energy Avoided into Generators				
Fossil-Fuel Energy Generated		126,588,898	kWh/Yr.	
Avg. System Generating Heat Rate (HEI 10K 2015)	x	10,632	BTU/kWh	
Energy Required for Fossil-Fueled Electricity Production		1,345,893,163,536	BTU/Yr.	
Generation Liquid Fossil Fuel Mix (HEI 10K 2015)				
Energy in BBL of Low Sulfur Fuel Oil		6,200,000	BTU/BBL	78.0%
Energy in BBL of #2 Fuel Oil (Diesel)		5,860,000	BTU/BBL	18.0%
Energy in BBL of Naphtha		5,335,500	BTU/BBL	4.0%
Average System BTU/BBL		6,104,220	BTU/BBL	100.0%
Energy Required for Fossil-Fueled Electricity Production		1,345,893,163,536	BTU/Yr.	
Average System BTU/BBL	÷	6,104,220	BTU/BBL	
Number of Barrels of Fossil-Fuel Avoided		220,486	BBLs/Yr.	
Number of Barrels of Fossil-Fuel Avoided		220,486	BBLs/Yr.	
2015 Avg. Cost per BBL for Fossil Fuels used for electricity	x	\$ 69	per BBL*	
Potential Fossil Fuel Cost Savings to State		\$ 15,213,513	per year	
*Compared to \$126/BBL in calendar year 2014. From 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 Hawai'i's environmental footprint as demonstrated in **Table 3a**.

The reduction of emissions was equivalent to removing over 22,000 passenger vehicles from the roads.

The fossil fuel reduction was the equivalent of the generating output of over 347,750 PV solar panels.

Table 3a PY15 - Potential Green House Gas Equivalencies Avoided		
System Level Gross Generation Energy Impact	149,423,313	kWh/Yr.
Green House Gas Reduction** (www.epa.gov/egrid)		
Energy in kWh	149,423,313	kWh/year
Energy in MWh	149,423	MWh/year
CO2 - Carbon Dioxide	117,774	Tons per Year
CH4 - Methane	7	Tons per Year
N2O - Nitrous Oxide	2	Tons per Year
Green House Gas Equivalencies***		
Less Passenger Vehicles	22,182	
Less miles/year driven (avg. passenger vehicle)	251,675,486	
Wind turbines installed	27	
Acres of US forest sequestering carbon in one year	99,404	
Fossil Fuel Reduction Comparison to PV and Solar Water Heating		
Rooftop PV Panels (300W) to offset same energy usage	347,756	
Solar Water Heating Systems to offset same energy usage	65,366	
** Power Profiler - HICC - O'ahu - 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: 17,150 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 17,150 kW is equivalent to the average peak power consumption of 17,150 homes at 1 kW each. An example load profile from 2,727 homes in 2015 showing the 5-9pm peak average of 1kW is pictured in **Figure 3**.

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

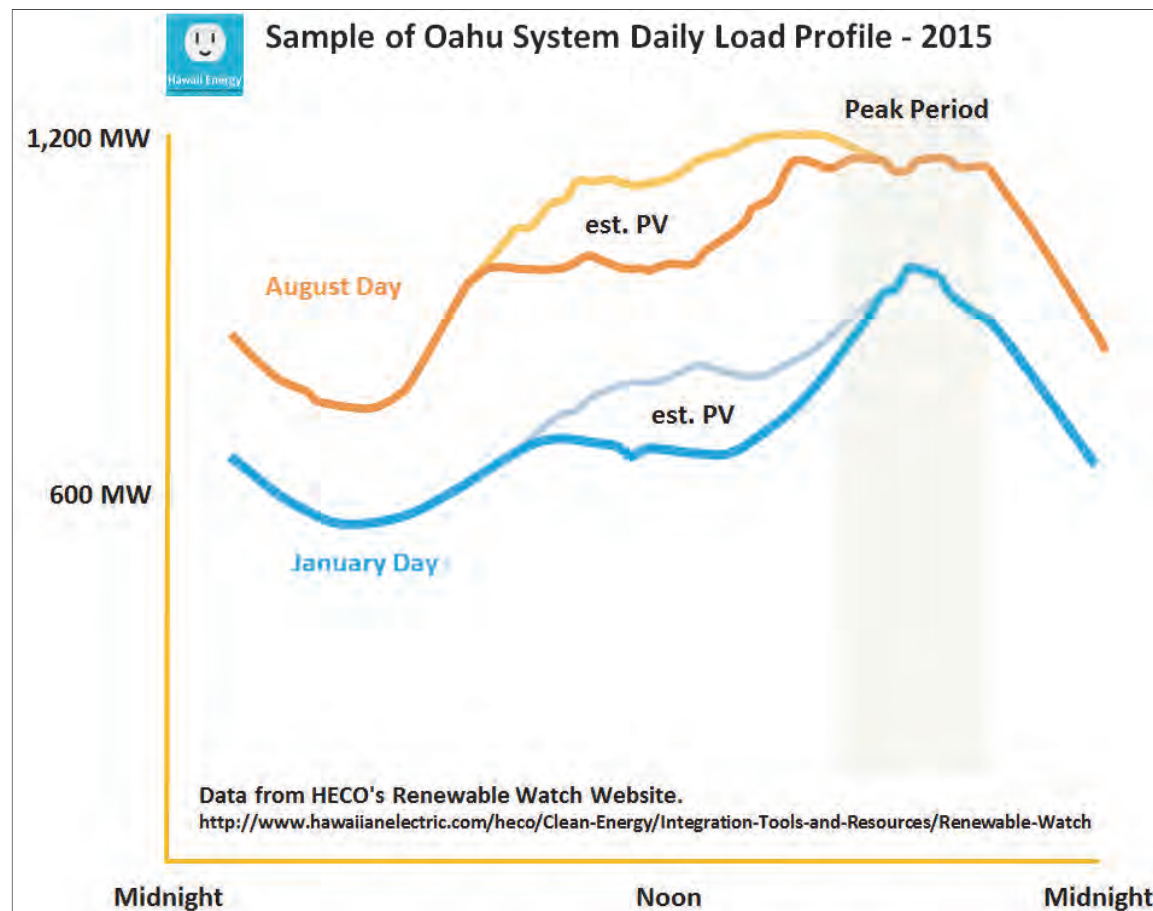
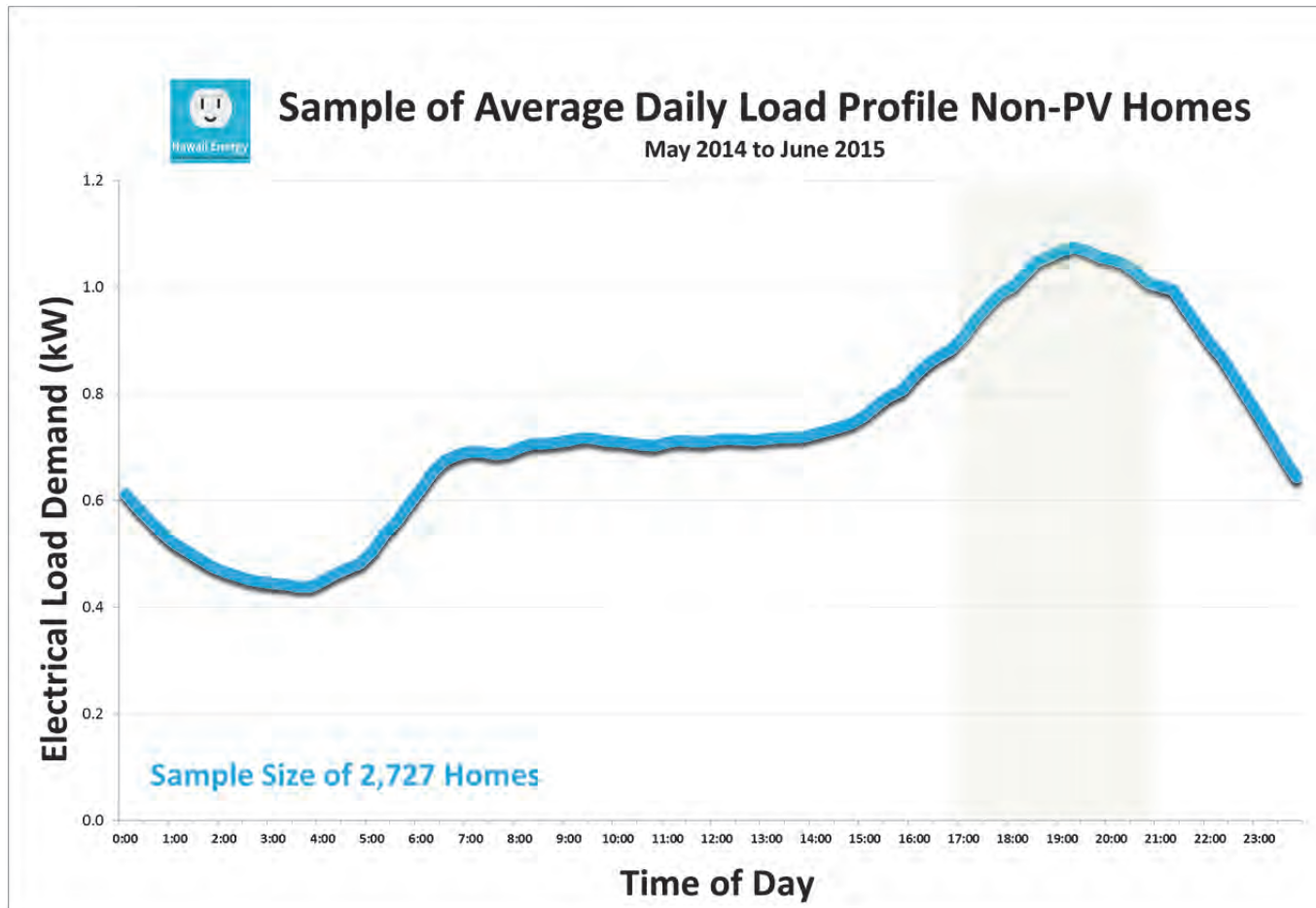


Figure 3
Average Home Daily Demand (Load) Profile



Performance Indicator #3: Total Resource Benefit (TRB)

Target: \$ 226,178,274

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 based on PY15 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. Average annual avoided cost for capacity and energy for calendar year 2015 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 years’ 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													
									kW Target	kWh Target		Project Cost	
									25	25,000		\$45,000	
			Life		Discount Rate								
			8		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	
2015	1	1		\$0.16	\$0	\$0.1610	\$0	\$0.1610	\$0	\$4,025	\$4,025	0.09	
2016	2	0.94		\$0.17	\$0	\$0.1564	\$0	\$0.3174	\$0	\$7,936	\$7,936	0.18	
2017	3	0.89		\$0.17	\$0	\$0.1520	\$0	\$0.4695	\$0	\$11,736	\$11,736	0.26	
2018	4	0.84		\$0.18	\$0	\$0.1477	\$0	\$0.6172	\$0	\$15,429	\$15,429	0.34	
2019	5	0.79		\$0.18	\$0	\$0.1435	\$0	\$0.7607	\$0	\$19,018	\$19,018	0.42	
2020	6	0.75	\$904	\$0.19	\$676	\$0.1395	\$676	\$0.9002	\$16,888	\$22,504	\$39,392	0.88	
2021	7	0.70	\$986	\$0.19	\$695	\$0.1355	\$1,371	\$1.0357	\$34,265	\$25,892	\$60,158	1.34	
2022	8	0.67	\$856	\$0.20	\$569	\$0.1317	\$1,940	\$1.1674	\$48,498	\$29,185	\$77,682	1.73	
2023	9	0.63	\$750	\$0.20	\$471	\$0.1280	\$2,410	\$1.2953	\$60,262	\$32,384	\$92,645	2.06	

Performance #4: Market Transformation

Targets:

Transformational Programs

Behavior Modification	18,000 Participants
Professional Development	800 Participants
Technical Training	200 Participants
Clean Energy Ally Program	250 Allies

Pilot Projects

Benchmarking	150 Sites
Codes & Standards	2 Items
Demand Response	2 Items
Smart Grid	1 Items
Electric Vehicle	2 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 list of the Market Transformation programs for PY15.

Figure 4
Summary of Transformational Programs

Behavior Modification	Community Based Social Marketing (CBSM) pilots
	"Sharing the Aloha" Workshops
	Energy Literacy – Social Media/Transformative Messaging
	Energy Literacy – Large-Scale Public Collaboration
	Aloha+ Challenge/Student Energy Summit & Design Challenge
	Hawai'i Sustainability in Higher Education Summit
	Maui Economic Development Board STEM Conference
Professional Development	K-12 Educator Training and Development
	Classroom Home Energy Kit Pilot
	Hawai'i Energy Fellowship Program
	Energy Efficiency Sales Trainings
	Educational Collaboration Initiatives
Technical Training	Certified Energy Manager®, Energy Manager in Training® and Certified Energy Auditor® Courses
	Building Operator Certification® (Levels I & II) Courses
	Facility Operations and Maintenance Series
	Lighting Fundamentals and Hi-End Residential Lighting Workshops
	Water and Wastewater Training
Pilot & Trade Ally Programs	Clean Energy Ally
	Benchmarking
	Codes & Standards
	Demand Response/Load Shifting
	Smart Grid
	Electric Vehicle

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 PY15, "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 PY15 contributions to the PBF by island and county.

Table 5 Contributions to PBF by Island				
Island	Residential Program Investment	Business Program Investment	PBF Investment*	Target %
Hawai'i Island	\$ 1,796,454	\$ 1,313,969	\$ 3,110,423	13.0 %
Lāna'i	\$ 34,327	\$ 37,736	\$ 72,064	0.3 %
Maui	\$ 1,676,689	\$ 1,400,403	\$ 3,077,092	12.9 %
Moloka'i	\$ 46,417	\$ 35,657	\$ 82,074	0.3 %
O'ahu	\$ 7,574,449	\$ 9,938,376	\$ 17,512,825	73.4 %
Totals	\$ 11,128,337	\$ 12,726,140	\$ 23,854,478	100.0%
County	Residential Program Investment	Business Program Investment	PBFA Investment	Target %
Hawai'i	\$ 1,796,454	\$ 1,313,969	\$ 3,110,423	13.0 %
Maui	\$ 1,757,434	\$ 1,473,796	\$ 3,231,230	13.5 %
Honolulu	\$ 7,574,449	\$ 9,938,376	\$ 17,512,825	73.4 %
Totals	\$ 11,128,337	\$ 12,726,140	\$ 23,854,478	100.0%

**The PY15 PBF contribution is based on 1.5% of total utility forecasted revenues and reduced for the application of the Green Infrastructure Fee.*

Performance Award for Achieving Targets

Under the PBFA Contract, Program Performance Amount 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 PY15, 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. **In PY15, Leidos waived the opportunity to claim an additional amount when exceeding target performance goals, setting the maximum achievable amount to 100% of the performance target.**

The maximum performance award potential for PY15 is \$700,000 as shown in **Table 6**.

Table 6 Potential Performance Awards					
Indicator	Minimum	Target	Maximum	Weight	Target
First Year Energy Reduction (kWh)	75 % \$ 183,750	100 % \$ 245,000	100.0% \$ 245,000	35 %	\$ 245,000
Peak Demand Reduction (kW)	75 % \$ 26,250	100 % \$ 35,000	100.0% \$ 35,000	5 %	\$ 35,000
TRB NPV of Utility Cost Avoidance (\$)	75 % \$ 210,000	100 % \$ 280,000	100.0% \$ 280,000	40 %	\$ 280,000
Market Transformation	70 %	100 %	100 %		
Behavior Modification	\$ 11,250	\$ 15,000	\$ 15,000	2.0 %	\$ 15,000
Professional Development	\$ 11,250	\$ 15,000	\$ 15,000	2.0 %	\$ 15,000
Technical Training	\$ 11,250	\$ 15,000	\$ 15,000	2.0 %	\$ 15,000
Hawai'i Energy Ally Program	\$ 0	\$ 5,000	\$ 5,000	1.0 %	\$ 5,000
Benchmarking	\$ 0	\$ 20,000	\$ 20,000	3.0 %	\$ 20,000
Codes & Standards					
Smart Grid					
Demand Response					
Electric Vehicle					
Broad Participation "Island Equity"	0 %	100 %	100 %		
	\$ 0	\$ 70,000	\$ 70,000	10 %	\$ 70,000
If all indicator metrics meet this level:	Minimum	Target	Maximum		
Performance Award Potential is:	\$ 453,750	\$ 700,000	\$ 700,000		

Performance Amount Claim Summary

The Program's Performance Amount Claim for PY15, is \$691,829.74 (including tax) or 99% of the Program's potential target performance awards.

The Program's Performance Amount 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)	122,243,721	118,167,139	96.7%	\$236,829.74
Peak Demand Reduction (kW)	17,150	20,253	118.1%	\$35,000.00
TRB NPV of Utility Cost Avoidance (\$)	\$226,178,274	\$247,011,948	109.2%	\$280,000.00
Market Transformation				
Behavior Modification	18,000 Participants	28,104 Participants	156.2%	\$15,000.00
Professional Development	800 Participants	831 Participants	103.8%	\$15,000.00
Technical Training	200 Participants	326 Participants	163.0%	\$15,000.00
Hawai'i Energy Ally Program	250 Allies	272 Allies	115.2%	\$5,000.00
Benchmarking	150 Sites	264 Sites	176.0%	\$20,000.00
Codes & Standards	2 Items	2 Items	100.0%	
Smart Grid	1 Items	1 Items	100.0%	
Demand Response	2 Items	2 Items	100.0%	
Electric Vehicle	2 Items	2 Items	100.0%	
Island Equity				
Honolulu County	\$19,776,777	\$16,983,680	85.9%	\$ 70,000.00
Hawai'i County	\$3,474,299	\$4,008,078	115.4%	
Maui County	\$3,474,299	\$3,127,593	90.0%	
Performance Award Claim				\$691,829.74

Cumulative Annual Electric Energy Savings (Program-Level) Amount Claim: \$236,829.74

The Program Energy Reduction was 118,167,139 kWh, which was 97% of the target of 122,243,721 kWh in the award claim of \$236,829.74. This amount is calculated from \$183,750 for meeting the minimum level and \$53,079.74 for the remaining savings of 26,484,349 kWh awarded at a rate of \$0.002004/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 Amount Potential	\$ 183,750	\$ 245,000	\$ 245,000		
	75 %	100 %	110 %		
Energy Reduction Goals (kWh)	91,682,791	122,243,721	134,468,093		
Incentive Calculation	Meet Minimum	Target – Minimum	Maximum – Target	Total	
Pool Award Potential	\$ 183,750	\$ 61,250	\$ 0	\$ 245,000	Max
Energy Goal Pools (kWh)	÷ 91,682,791	30,560,930	12,224,372 /kWh	134,468,093	kWh
Award Amount / Rate (\$/kWh)	\$ 0.002004	\$ 0.002004	\$ 0		
Energy Achievement (kWh)	91,682,791	26,484,349	-	118,167,139	kWh
Award Amount / Rate (\$/kWh)	x \$ 0.002004	\$ 0.002004	\$ 0.000000 /MWh		
Energy Achievement Award Calculation	\$ 183,750	\$ 53,079.74	\$ -	\$ 236,829.74	Calculated
				\$236,829.74	Award Claim

Peak Demand Savings Award Claim: \$35,000.00

The Combined Peak Demand Reduction was 20,253 kW, which was 118% of the target savings level resulting in an award claim of \$35,000.00. This award is calculated from \$26,250 for meeting the minimum level and \$8,750 for meeting the target. Levels are awarded at a rate of \$2.040816/kW achieved.

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	\$ 35,000	\$ 35,000	
		75 %	100 %	110 %	
Demand Reduction Goals (kW)		12,863	17,150	18,865	
Incentive Calculation		Meet Minimum	Target – Minimum	Maximum – Target	Total
Pool Award Potential		\$ 26,250	\$ 8,750	\$ 0	\$ 35,000 Max
Demand Goal Pools (kW)		÷ 12,863	4,288	1,715	18,865 kW
Award Amount / Rate (\$/kW)		\$ 2.040816	\$ 2.040816	\$ 0.000000 /kW	
Demand Savings Achievement (kW)		12,863	4,288	3,103	20,253 kW
Award Amount / Rate (\$/kW)		x \$ 2.040816	\$ 2.040816	\$ 0.000000 /kW	
Demand Savings Achievement Award Calculation		\$ 26,250	\$ 8,750.00	\$ -	\$ 35,000.00 Calculated
					\$ 35,000.00 Award Claim

Total Resource Benefit (TRB) Award Claim: \$280,000.00

The TRB achievement of \$247,011,948 NPV is 109% of the target amount. This award claim of \$280,000.00 is calculated from \$210,000 for meeting the minimum level and \$70,000.00 for the remaining 34% awarded at a rate of \$2,800/percent achieved beyond the minimum level up to \$70,000.

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	\$ 280,000	
TRB Goal Pools in Metrics	75 %	100 %	110 %	
TRB Goals	169,633,706	226,178,274	248,796,101	
Incentive Calculation	Meet Minimum	Target – Minimum	Maximum – Target	Total
Pool Award Potential	\$ 210,000	\$ 70,000	\$ 0	\$ 280,000 Max
TRB Goal Pools in Metrics	75 %	25 %	10 %	110 %
Award Amount / Rate (\$/%)	\$ 2,800	\$ 2,800	\$ 0 /%	
TRB Achievement				\$ 247,011,948
TRB Goals				\$ 226,178,274
TRB Savings Achievement	75 %	34 %	- %	109 %
Award Amount / Rate (\$/%)	\$ 210,000	\$ 2,800	\$ 0 /%	
TRB Energy Achievement Award Calculation	\$ 210,000	\$ 95,791.29	\$ -	\$ 280,000.00 Calculated
				\$ 280,000.00 Award Claim

Market Transformation Award Claim: \$70,000.00

The Market Transformation claim of \$70,000.00 is based on meeting or exceeding the target of every Annual Plan Transformational Task. 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	28,104 Participants	Target	\$ 15,000.00
Professional Development	560 Participants	\$ 11,250	800 Participants	\$ 15,000	831 Participants	Target	\$ 15,000.00
Technical Training	140 Participants	\$ 11,250	200 Participants	\$ 15,000	326 Participants	Target	\$ 15,000.00
Hawai'i Energy Ally Program	175 Allies	\$ 3,750	250 Allies	\$ 5,000	272 Allies	Target	\$ 5,000.00
Benchmarking	105 Sites	\$ 0	150 Sites	\$ 20,000	264 Sites	Minimum	\$ 20,000.00
Codes & Standards	1 Items		2 Items		2 Items	Minimum	
Smart Grid	1 Items		1 Items		1 Items	Target	
Demand Response	1 Items		2 Items		2 Items	Target	
Electric Vehicle	1 Items		2 Items		2 Items	Target	
Total							\$ 70,000

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

The Program achieved the targeted percentages of Island Equity this performance period. Because it is impossible for targets to be met precisely, successfully meeting the target for each county is established with the following ratio, specifically $\frac{\% \text{ Incentive Distribution}}{\% \text{ PBF Contribution}}$, is equal to or greater than 80%. For example, shown in **Table 12**, Honolulu contributed 73.4% of total PBF and the Program distributed 68.7% of incentives to Honolulu, therefore achieving a 95.2% ratio thus meeting the greater than 80% target.

See **Table 12** for details.

Table 12 Island Equity Award Claim Calculation											
County	PBF Contribution*	Contribution % of Total PBF	Target (\$)	Program Incentives (\$)	Transformational Incentives (\$)	Achievement (\$)	% Incentive Distribution	% of Target	Target Range	Met Minimum	Award Potential
Honolulu	\$ 17,512,825	73.4 %	\$ 19,620,501	\$16,983,680	\$1,689,371	\$ 18,673,051	68.7 %	95.2 %	> 80%	Yes	
Hawai'i	\$ 3,110,423	13.0 %	\$ 3,484,764	\$4,008,078	\$646,492	\$ 4,654,570	17.1 %	133.6 %	> 80%	Yes	
Maui	\$ 3,231,230	13.5 %	\$ 3,620,110	\$3,127,593	\$729,026	\$ 3,856,619	14.2 %	106.5 %	> 80%	Yes	
Total	\$23,854,478		\$26,725,374	\$24,119,351	\$3,064,889	\$27,184,240				Yes	\$70,000
Island Equity Performance Award Claim											\$ 70,000

*The PY15 PBF contribution is based on 1.5% of total utility forecasted revenues and reduced for the application of the Green Infrastructure Fee.

BUDGET PROGRESSION & EXPENDITURES

PY15 Annual Plan Budget

Pursuant to the Program's approved PY15 Annual Plan, the Program's initial budget for the program year was \$38M, comprised of \$23.5M in Incentives, \$11.3M in Non-Incentives, and \$3.2M in Transformational Incentives. As detailed in **Table 13** approximately 45% of the budget was allocated to Residential Programs and 55% to Business Programs, consistent with the prior program year.

Table 13			
PY15 Annual Plan Budget (in \$)			
Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	2,220,000	8,614,690	10,834,690
CESH	135,000	1,011,000	1,146,000
RESM	100,000	250,000	350,000
RHTR	620,000	682,250	1,302,250
Total Residential Programs	3,075,000	10,557,940	13,632,940
Residential Market Evaluation	200,212	0	200,212
Residential Outreach	564,281	0	564,281
Total Residential Services and Initiatives	3,839,493	10,557,940	14,397,433
Business Programs			
BEEM	1,150,000	3,561,800	4,711,800
CBEEM	1,170,000	6,131,459	7,301,459
BESM	620,000	780,000	1,400,000
BHTR	620,000	2,442,215	3,062,215
Total Business Programs	3,560,000	12,915,474	16,475,474
Business Market Evaluation	234,551	0	234,551
Business Outreach	643,234	0	643,234
Total Business Services and Initiatives	4,437,785	12,915,474	17,353,259
Total Residential and Business Services and Initiatives	8,277,278	23,473,414	31,750,692
Transformational Programs			
Residential Transformational Programs	0	1,595,166	1,595,166
Business Transformational Programs	0	1,656,794	1,656,794
Total Transformation Services and Initiatives	0	3,251,960	3,251,960
Total Supporting Services	2,522,354	0	2,522,354
Total Tax on Non-Incentive	508,879	0	508,879
Sub-Total Estimated Contractor Costs	11,308,511	26,725,374	38,033,885
Performance Awards in Excess of Target Levels			0
Total Estimated Contractor Costs			38,033,885

Budget Transfers and Reallocations

In PY15 the Program was given discretion to transfer funds within certain areas without a formal contractual request, consistent with guidance provided in PY14. 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). In addition, in PY15, the Program was also given discretion to reallocate funds across Residential and Business areas (within Incentives and from Operations and Management to Incentives), up to 10% of each area's respective budget. During the course of PY15, there were five internal budget moves to meet changing operational needs. Specifics of the budget changes are detailed in **Table 14** and described below.

Internal Budget Transfers

- **March 2016** – Reallocated Residential Incentive funds to Business Incentives as follows: FROM CESH (\$650,000); TO BHTR (\$650,000). The increase to BHTR Incentives was needed to maintain robust activity in the Small Business Direct Install Lighting (SBDIL) program. An underspend in CESH primarily due to the Honeywell Green Neighborhood program falling out, as well as low participation in the custom home lighting program, allowed for the reallocation of funds to BHTR.
- **April 2016** - Reallocated Residential Incentive funds to Business Incentives as follows: FROM CESH (\$350,000), RHTR (55,794); TO BHTR (\$405,794). The increase to BHTR Incentives was needed to maintain robust activity in the SBDIL program. An underspend in CESH primarily due to the Honeywell Green Neighborhood program falling out, as well as low participation in the custom home lighting program, allowed for the reallocation of funds to BHTR. In addition, limited opportunities in the Solar Water Heating Direct Install program under RHTR, enabled a funds transfer to BHTR.
- **May 2016** - Transferred Residential Operations and Management funds as follows: FROM CESH (\$100,000); TO REEM (\$100,000). REEM funds were modified to reflect higher spend in this area as a result of growing lighting, solar water heater and behavioral change programs. The transfer of funds from CESH correlated to the reduction in incentives that resulted from the Honeywell Green Neighborhood program falling out as well as low participation in the custom home lighting program.
 - Transferred Business Operations and Management funds as follows: FROM BESM (\$200,000); TO BEEM (\$200,000). The BEEM increase related to labor efforts to grow the midstream lighting program in its early stages, resulting in a higher T&M spend, but lower incentive spend. The reduction in BESM T&M funds correlated with the changes on the incentive side, relating to Water/Waste Water, system recommissioning, and benchmarking project efforts being less than planned.
 - Transferred Business Incentive funds as follows: FROM BEEM (\$234,000) and BESM (\$430,000); TO CBEEM (\$454,000) and BHTR (210,000). The increase in incentive funds in BHTR and CBEEM was a result of robust activity in the SBDIL program and large custom projects completed in the last quarter of the program year. Incentive funds transferred from BEEM where a result of spend on the midstream lighting program being slightly less than planned, as the program is in its early stages.
- **June 2016** - Completed several reallocations from Residential and Business Operations and Management funds and Transformational Incentives to Business Incentives. Overall, Operations and Management funds and Transformational Incentives were reduced by \$481,349 and \$167,539, respectively, while Business Incentives were increased by \$648,888. All fund transfers to Business incentives were completed to better align funding to final year spend. This alignment resulted in the reallocation of funds mostly to BHTR and CBEEM, to help fund robust activity in the SBDIL program and large custom projects completed in the last quarter of the program year.
- **August 2016** – Completed several small transfers within Residential and Business Operations and Transformational Incentives to align funding to final year operations spend.

Table 14 Budget Progression 7/1/15-6/30/16														
PY15 Annual Plan Budget		Incentive Transfers (3/2016)	PY15 Budget as of 3/2016 (R1)	Incentive Transfers (4/2016)	PY15 Budget as of 4/2016 (R2)	T&M Transfers (5/2016)	Incentive Transfers (5/2016)	PY15 Budget as of 5/2016 (R2)	T&M Transfers (6/2016)	Incentive Transfers (6/2016)	PY15 Budget as of 6/2016 (R3)	T&M Transfers (8/2016)	Incentive Transfers (8/2016)	PY15 Budget as of 8/2016 (R4)
<u>Residential Programs</u>														
Operations & Management														
REEM	2,220,000		2,220,000		2,220,000	100,000		2,320,000			2,320,000	93,000		2,413,000
CESH	135,000		135,000		135,000	(100,000)		35,000			35,000	(13,000)		22,000
RESM	100,000		100,000		100,000			100,000			100,000			100,000
RHTR	620,000		620,000		620,000			620,000	(182,406)		437,594	(80,000)		357,594
Total Residential Programs	3,075,000		3,075,000		3,075,000	-		3,075,000	(182,406)		2,892,594	-		2,892,594
Residential Market Evaluation	200,212		200,212		200,212			200,212			200,212			200,212
Residential Outreach	564,281		564,281		564,281			564,281			564,281			564,281
Total Residential Ops & Management			3,839,493		3,839,493			3,839,493	(182,406)		3,657,087	-		3,657,087
Residential Incentives														
REEM	8,614,690		8,614,690		8,614,690			8,614,690		125,102	8,739,792			8,739,792
CESH	1,011,000	(650,000)	361,000	(350,000)	11,000			11,000		(9,611)	1,389			1,389
RESM	250,000		250,000		250,000			250,000		(77,500)	172,500			172,500
RHTR	682,250		682,250	(55,794)	626,456			626,456		(174,496)	451,960			451,960
Subtotal Residential Incentives		(650,000)	9,907,940	(405,794)	9,502,146			9,502,146		(136,505)	9,365,641	-	-	9,365,641
Residential Transformational			1,595,166		1,595,166			1,595,166		(78,534)	1,516,632		(26,000)	1,490,632
Total Residential Incentives		(650,000)	11,503,106	(405,794)	11,097,312			11,097,312		(215,039)	10,882,273		(26,000)	10,856,273
Total Residential Programs	15,992,599	(650,000)	15,342,599	(405,794)	14,936,805	-	-	14,936,805	(182,406)	(215,039)	14,539,360	-	(26,000)	14,513,360
<u>Business (C&I) Programs</u>														
Operations & Management														
BEEM	1,150,000		1,150,000		1,150,000	200,000		1,350,000			1,350,000	45,000		1,395,000
CBEEM	1,170,000		1,170,000		1,170,000			1,170,000			1,170,000			1,170,000
BESM	620,000		620,000		620,000	(200,000)		420,000	(168,725)		251,275	(45,000)		206,275
BHTR	620,000		620,000		620,000			620,000	(53,835)		566,165			566,165
Total Business Programs	3,560,000		3,560,000		3,560,000	-		3,560,000	(222,560)		3,337,440	-		3,337,440
Business Market Evaluation	234,551		234,551		234,551			234,551	(54,722)		179,829	(4,000)		175,829
Business Outreach	643,234		643,234		643,234			643,234			643,234	4,000		647,234
Total Business Ops & Management			4,437,785		4,437,785			4,437,785	(277,282)		4,160,503	-		4,160,503
Business Incentives														
BEEM	3,561,800		3,561,800		3,561,800		(234,000)	3,327,800		117,108	3,444,908			3,444,908
CBEEM	6,131,459		6,131,459		6,131,459		454,000	6,585,459		444,870	7,030,329			7,030,329
BESM	780,000		780,000		780,000		(430,000)	350,000		36,716	386,716			386,716
BHTR	2,442,215	650,000	3,092,215	405,794	3,498,009		210,000	3,708,009		186,699	3,894,708			3,894,708
Subtotal Business Incentives		650,000	13,565,474	405,794	13,971,268		-	13,971,268		785,393	14,756,661	-	-	14,756,661
Business Transformational			1,656,794		1,656,794			1,656,794		(89,005)	1,567,789		26,000	1,593,789
Total Business Incentives		650,000	15,222,268	405,794	15,628,062			15,628,062		696,388	16,324,450		26,000	16,350,450
Total Business Programs		650,000	19,660,053	405,794	20,065,847	-	-	20,065,847	(277,282)	696,388	20,484,953	-	26,000	20,510,953

Table 14 (cont'd) Budget Progression 7/1/15-6/30/16														
	PY15 Annual Plan Budget	Incentive Transfers (3/2016)	PY15 Budget as of 3/2016 (R1)	Incentive Transfers (4/2016)	PY15 Budget as of 4/2016 (R2)	T&M Transfers (5/2016)	Incentive Transfers (5/2016)	PY15 Budget as of 5/2016 (R2)	T&M Transfers (6/2016)	Incentive Transfers (6/2016)	PY15 Budget as of 6/2016 (R3)	T&M Transfers (8/2016)	Incentive Transfers (8/2016)	PY15 Budget as of 8/2016 (R4)
<u>Supporting Services</u>														
Supporting Services	2,522,354		2,522,354		2,522,354			2,522,354			2,522,354			2,522,354
Total Supporting Services	2,522,354		2,522,354		2,522,354			2,522,354			2,522,354	-		2,522,354
Subtotal Non-Incentive (Prior to Tax)	10,799,632		10,799,632		10,799,632			10,799,632	(459,688)		10,339,944	-		10,339,944
Less Performance Incentives (Prior to Tax)	(668,500)		(668,500)		(668,500)			(668,500)	-		(668,500)	-		(668,500)
Subtotal Non-Incentive Less Performance Incentives (PI)	10,131,132		10,131,132		10,131,132			10,131,132	(459,688)		9,671,444	-		9,671,444
Total Tax on Non-Incentive Without PI	477,379		477,379		477,379			477,379	(21,661)		455,718	-		455,718
Performance Incentive Award (Inclusive of Tax)	700,000		700,000		700,000			700,000	-		700,000	-		700,000
Subtotal Non-Incentives	11,308,511		11,308,511		11,308,511			11,308,511	(481,349)		10,827,162	-		10,827,162
Subtotal Residential & Business Customer Incentives	23,473,414		23,473,414		23,473,414			23,473,414		648,888	24,122,302		-	24,122,302
Subtotal Transformational Incentives	3,251,960		3,251,960		3,251,960			3,251,960		(167,539)	3,084,421		-	3,084,421
Sub-Total Estimated Contractor Costs	38,033,885		38,033,885		38,033,885			38,033,885	(481,349)	481,349	38,033,885	-	-	38,033,885
Performance Awards in Excess of Target Levels	-		-		-			-			-			-
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels	38,033,885		38,033,885		38,033,885			38,033,885			38,033,885			38,033,885

Portfolio Expenditures

Throughout the year, the Program reviewed operational needs and leveraged funding to drive program value, including reallocating funds from Non-Incentives to Incentives, an unprecedented move in the history of the program. At year-end, the Program had utilized almost 100% of budgeted Incentives (includes reallocated funds), 96% of budgeted Non-Incentives (prior to holdback amounts), and almost 100% of budgeted Transformational Incentives. Details of final PY15 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	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
<u>Residential Programs</u>					
Residential Programs Ops and Management					
REEM	2,411,366.09	2,413,000.00	99.93%	1,633.91	0.07%
CESH	21,515.00	22,000.00	97.80%	485.00	2.20%
RESM	33,945.11	100,000.00	33.95%	66,054.89	66.05%
RHTR	353,294.59	357,594.00	98.80%	4,299.41	1.20%
Total Residential Programs	2,820,120.79	2,892,594.00	97.49%	72,473.21	2.51%
Residential Evaluation	171,886.20	200,212.00	85.85%	28,325.80	14.15%
Residential Outreach	532,226.60	564,281.00	94.32%	32,054.40	5.68%
Total Residential Non-Incentives	3,524,233.59	3,657,087.00	96.37%	132,853.41	3.63%
Residential Incentives					
REEM	8,739,791.56	8,739,792.00	100.00%	0.44	0.00%
CESH	1,388.03	1,389.00	99.93%	0.97	0.07%
RESM	172,500.00	172,500.00	100.00%	0.00	0.00%
RHTR	451,302.80	451,960.00	99.85%	657.20	0.15%
Subtotal Residential Incentives	9,364,982.39	9,365,641.00	99.99%	658.61	0.01%
Residential Transformational	1,472,014.11	1,490,632.00	98.75%	18,617.89	1.25%
Total Residential Incentives	10,836,996.50	10,856,273.00	99.82%	19,276.50	0.18%
Total Residential Programs	14,361,230.09	14,513,360.00	98.95%	152,129.91	1.05%

Table 15 (cont'd)					
Program Expenditures and Unspent Funds					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
Business (C&I) Programs					
Business Programs Ops and Management					
BEEM	1,393,523.65	1,395,000.00	99.89%	1,476.35	0.11%
CBEEM	1,136,884.61	1,170,000.00	97.17%	33,115.39	2.83%
BESM	201,037.48	206,275.00	97.46%	5,237.52	2.54%
BHTR	536,761.78	566,164.71	94.81%	29,402.93	5.19%
Total Business Programs	3,268,207.52	3,337,439.71	97.93%	69,232.19	2.07%
Business Evaluation	142,280.77	175,829.00	80.92%	33,548.23	19.08%
Business Outreach	646,761.87	647,234.00	99.93%	472.13	0.07%
Total Business Non-Incentives	4,057,250.16	4,160,502.71	97.52%	103,252.55	2.48%
Business Incentives					
BEEM	3,444,903.51	3,444,908.00	100.00%	4.49	0.00%
CBEEM	7,030,329.00	7,030,329.00	100.00%	0.00	0.00%
BESM	386,715.40	386,716.00	100.00%	0.60	0.00%
BHTR	3,892,420.37	3,894,708.00	99.94%	2,287.63	0.06%
Subtotal Business Incentives	14,754,368.28	14,756,661.00	99.98%	2,292.72	0.02%
Business Transformational	1,592,874.55	1,593,788.80	99.94%	914.25	0.06%
Total Business Incentives	16,347,242.83	16,350,449.80	99.98%	3,206.97	0.02%
Total Business Programs	20,404,492.99	20,510,952.51	99.48%	106,459.52	0.52%
Total Services and Initiatives	34,765,723.08	35,024,312.51	99.26%	258,589.43	0.74%
Supporting Services					
Supporting Services	2,360,673.54	2,522,354.00	93.59%	161,680.46	6.41%
Total Supporting Services	2,360,673.54	2,522,354.00	93.59%	161,680.46	6.41%
Subtotal Non-Incentives (Prior to Tax)	9,942,157.29	10,339,943.71	96.15%	397,786.42	3.85%
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)	9,273,656.97	9,671,443.71	95.89%	397,786.74	4.11%
Total Tax on Non-Incentive Without PI	436,974.72	455,718.49	95.89%	18,743.77	4.11%
Performance Incentive Award (Inclusive of Tax)	0.00	700,000.00	0.00%	700,000.00	100.00%
Subtotal Non-Incentives Billed	9,710,631.69	10,827,162.20	89.69%	1,116,530.51	10.31%
Subtotal Residential and Business Customer Incentives	24,119,350.67	24,122,302.00	99.99%	2,951.33	0.01%
Subtotal Transformational Incentives	3,064,888.66	3,084,420.80	99.37%	19,532.14	0.63%
Subtotal Customer and Transformational incentives	27,184,239.33	27,206,722.80	99.92%	22,483.47	0.08%
Sub-Total Estimated Contractor Costs	36,894,871.02	38,033,885.00	97.01%	1,139,013.98	2.99%
Performance Awards in Excess of Target Levels ¹		0.00			
Total Estimated Contractor Costs, including Performance Awards in Excess of Target Levels		38,033,885.00			

¹ Performance Award waived in PY15.

Note: PY15 percent spent does not reflect approved expenditures for contract close-out activities, including Annual Report. For Annual Report purposes, budget spent will not reflect approximately \$235K in actuals related to these activities.

Bill Saver Program (On-Bill Financing and On-Bill Repayment Options)

In PY15, the Program contract included funding for the Bill Saver 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. 8. Bill Saver Program budgets and PY15 expenditures are detailed in **Table 16**. Although some Bill Saver deliverables were developed in PY15, delays outside of program control resulted in continued program launch postponements, and, ultimately in the program being cancelled. As a result, at year-end, the Bill Saver Program had utilized 2% of its allotted funds. A more detailed discussion on the Bill Saver Program can be found in the Program Overview.

Table 16 Program Expenditures and Unspent Funds (in \$)					
	Total Expenditures	PY15 Budget	Percent Spent	Unspent	Percent Unspent
Block 1 - Ongoing OBF Program Administration					
Contractor Training, Management & Operations	0.00	197,350.00	0.00%	197,350.00	100.00%
IT Tool Development	0.00	25,500.00	0.00%	25,500.00	100.00%
Marketing & Outreach	0.00	40,600.00	0.00%	40,600.00	100.00%
Program Management / Admin	0.00	41,605.00	0.00%	41,605.00	100.00%
Total Block 1 - Ongoing OBF Program Administration	0.00	305,055.00	0.00%	305,055.00	100.00%
Block 2 - OBF Additional Program Development					
Program Development	5,236.25	78,600.00	6.66%	73,363.75	93.34%
Contractor Training, Management & Operations	2,233.75	7,000.00	31.91%	4,766.25	68.09%
IT Tool Development	5,133.75	77,050.00	6.66%	71,916.25	93.34%
Total Block 2 - OBF Additional Program Development	12,603.75	162,650.00	7.75%	150,046.25	92.25%
Block 3 - OBR Program Development (OBR & GEMS/OBR)					
Program Development	0.00	57,850.00	0.00%	57,850.00	100.00%
Contractor Training, Management & Operations	0.00	3,800.00	0.00%	3,800.00	100.00%
IT Tool Development	0.00	29,575.00	0.00%	29,575.00	100.00%
Total Block 3 - OBR Program Development (OBR & GEMS/OBR)	0.00	91,225.00	0.00%	91,225.00	100.00%
Block 4 - Additional Marketing Support to Bill Saver Program					
Marketing Plan Development & Rollout	0.00	33,300.00	0.00%	33,300.00	100.00%
Advertising	0.00	51,500.00	0.00%	51,500.00	100.00%
Total Block 4 - Additional Marketing Support to Bill Saver Program	0.00	84,800.00	0.00%	84,800.00	0.00%
Subtotal Block 1 - Ongoing OBF Program Administration	0.00	305,055.00	0.00%	305,055.00	100.00%
Subtotal Block 2 - OBF Additional Program Development	12,603.75	162,650.00	7.75%	150,046.25	92.25%
Subtotal Block 3 - OBR Program Development (OBR & GEMS/OBR)	0.00	91,225.00	0.00%	91,225.00	100.00%
Subtotal Block 4 - Additional Marketing Support to Bill Saver Program	0.00	84,800.00	0.00%	84,800.00	100.00%
OBF Program Total (prior to tax)	12,603.75	643,730.00	1.96%	631,126.25	98.04%
Total Tax on OBF program	593.87	30,333.00	1.96%	29,739.13	98.04%
OBF Program Total (inclusive of tax)	13,197.62	674,063.00	1.96%	660,865.38	98.04%

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 PY15 were:

- **First Year** – 118,167,139 kWh
(45.3% in Residential and 54.7% in Business programs)
- **Lifetime** – 1,327,245,454 kWh
(38.4% in Residential and 61.6% for Business programs)

The difference in percentage contributions between first year and lifetime savings between residential and business portfolios is due to residential measures having a relatively shorter life (notably the Peer Group Comparison, which has only a 1 year useful life). Residential measures have an average measure life of 9.5 years in PY15, up from 8.0 years in PY14, while business measures have an average measure life of 12.7 years in PY15, up from 12.6 years in PY14.

Program Peak Demand reduction for PY15 was:

- **Peak Demand** – 20,253 kW (52.0% from Residential and 48.0% 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 Savings (Program Level) by Budget Category
- **Table 18:** Cumulative Annual Electric Savings (System Level) by Budget Category
- **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)
CBEEM	459	1,404	\$ 7,030,329	4,186	31,309,741	341,108,400	\$ 0.225	\$ 0.021
BEEM	3,136	168,681	\$ 3,444,904	3,352	22,156,918	322,324,303	\$ 0.155	\$ 0.011
BHTR	1,165	1,449,810	\$ 3,892,420	2,157	10,572,117	151,956,594	\$ 0.368	\$ 0.026
BESM	35	35	\$ 386,715	25	614,147	2,697,249	\$ 0.630	\$ 0.143
Business Totals	4,795	1,619,930	\$ 14,754,368	9,721	64,652,923	818,086,546	\$ 0.228	\$ 0.018
REEM	10,581	5,053,918	\$ 8,739,792	9,885	51,076,574	492,033,352	\$ 0.171	\$ 0.018
RHTR	3,206	43,209	\$ 451,303	612	2,139,060	15,566,539	\$ 0.211	\$ 0.029
RESM	1,150	1,150	\$ 172,500	34	291,973	1,459,867	\$ 0.591	\$ 0.118
CESH	2	423	\$ 1,388	1	6,610	99,150	\$ 0.210	\$ 0.014
Residential Totals	14,939	5,098,700	\$ 9,364,982	10,532	53,514,217	509,158,908	\$ 0.175	\$ 0.018
Total	19,734	6,718,630	\$ 24,119,351	20,253	118,167,139	1,327,245,454	\$ 0.204	\$ 0.018

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive \$)	Driven Investment Ratio (TRC/Incentive \$)	Benefit Test (TRB/TRC)
CBEEM	\$ 59,630,700	\$ 25,139,882	8.5	3.6	2.4
BEEM	\$ 58,650,985	\$ 9,670,922	17.0	2.8	6.1
BHTR	\$ 31,176,778	\$ 3,898,107	8.0	1.0	8.0
BESM	\$ 474,099	\$ 458,314	1.2	1.2	1.0
Business Totals	\$ 149,932,561	\$ 39,167,226	10.2	2.7	3.8
REEM	\$ 93,788,203	\$ 30,427,471	10.7	3.5	3.1
RHTR	\$ 3,025,731	\$ 615,017	6.7	1.4	4.9
RESM	\$ 246,460	\$ 345,000	1.4	2.0	0.7
CESH	\$ 18,993	\$ 1,388	13.7	1.0	13.7
Residential Totals	\$ 97,079,387	\$ 31,388,877	10.4	3.4	3.1
Total	\$ 247,011,948	\$ 70,556,102	10.2	2.9	3.5

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)
CBEEM	459	1,404	\$ 7,030,329	5,582	41,746,321	454,811,199	\$ 0.168	\$ 0.015
BEEM	3,136	168,681	\$ 3,444,904	4,372	29,231,134	428,183,342	\$ 0.118	\$ 0.008
BHTR	1,165	1,449,810	\$ 3,892,420	2,179	10,678,906	153,491,509	\$ 0.364	\$ 0.025
BESM	35	35	\$ 386,715	27	646,471	2,839,210	\$ 0.598	\$ 0.136
Business Totals	4,795	1,619,930	\$ 14,754,368	12,159	82,302,831	1,039,325,260	\$ 0.179	\$ 0.014
REEM	10,581	5,053,918	\$ 8,739,792	12,513	64,653,891	622,827,028	\$ 0.135	\$ 0.014
RHTR	3,206	43,209	\$ 451,303	612	2,139,060	15,566,539	\$ 0.211	\$ 0.029
RESM	1,150	1,150	\$ 172,500	37	317,362	1,586,812	\$ 0.544	\$ 0.109
CESH	2	423	\$ 1,388	2	10,169	152,538	\$ 0.136	\$ 0.009
Residential Totals	14,939	5,098,700	\$ 9,364,982	13,163	67,120,482	640,132,917	\$ 0.140	\$ 0.015
Total	19,734	6,718,630	\$ 24,119,351	25,322	149,423,313	1,679,458,177	\$ 0.161	\$ 0.014

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive \$)	Driven Investment Ratio (TRC/Incentive \$)	Benefit Test (TRB/TRC)
CBEEM	\$ 79,507,600	\$ 25,139,882	11.3	3.6	3.2
BEEM	\$ 77,888,948	\$ 9,670,922	22.6	2.8	8.1
BHTR	\$ 31,491,694	\$ 3,898,107	8.1	1.0	8.1
BESM	\$ 499,052	\$ 458,314	1.3	1.2	1.1
Business Totals	\$ 189,387,294	\$ 39,167,226	12.8	2.7	4.8
REEM	\$ 118,719,251	\$ 30,427,471	13.6	3.5	3.9
RHTR	\$ 3,025,731	\$ 615,017	6.7	1.4	4.9
RESM	\$ 267,888	\$ 345,000	1.6	2.0	0.8
CESH	\$ 29,221	\$ 1,388	21.1	1.0	21.1
Residential Totals	\$ 122,042,091	\$ 31,388,877	13.0	3.4	3.9
Total	\$ 311,429,385	\$ 70,556,102	12.9	2.9	4.4

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

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 Year)	Lifetime Energy Impact (kWh - Life)	First Year Impact Cost (\$/kWh)	Lifetime Impact Cost (\$/kWh)
CBEEM	459	1,404	\$7,030,329	5,033	37,629,795	409,868,745	\$0.19	\$0.02
BEEM	3,136	168,681	\$3,444,904	3,947	26,401,923	386,765,345	\$0.13	\$0.01
BHTR	1,165	1,449,810	\$3,892,420	1,972	9,662,219	138,884,470	\$0.40	\$0.03
BESM	35	35	\$386,715	24	585,796	2,596,738	\$0.66	\$0.15
Business Totals	4,795	1,619,930	\$14,754,368	10,976	74,279,732	938,115,297	\$0.20	\$0.02
REEM	10,581	5,053,918	\$8,739,792	11,310	58,452,216	563,118,499	\$0.15	\$0.02
RHTR	3,206	43,209	\$451,303	551	1,925,956	14,022,230	\$0.23	\$0.03
RESM	1,150	1,150	\$172,500	33	286,350	1,431,750	\$0.60	\$0.12
CESH	2	423	\$1,388	2	9,254	138,810	\$0.15	\$0.01
Residential Totals	14,939	5,098,700	\$9,364,982	11,896	60,673,776	578,711,289	\$0.15	\$0.02
Total	19,734	6,718,630	\$24,119,351	22,872	134,953,508	1,516,826,586	\$0.18	\$0.02

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB/Incentive \$)	Driven Investment Ratio (TRC/Incentive \$)	Benefit Test (TRB/TRC)
CBEEM	\$71,655,234	\$25,139,882	10.2	3.6	2.9
BEEM	\$70,352,876	\$9,670,922	20.4	2.8	7.3
BHTR	\$28,494,520	\$3,898,107	7.3	1	7.3
BESM	\$456,567	\$458,314	1.2	1.2	1
Business Totals	\$170,959,198	\$39,167,226	11.6	2.7	4.4
REEM	\$107,322,494	\$30,427,471	12.3	3.5	3.5
RHTR	\$2,725,320	\$615,017	6	1.4	4.4
RESM	241,707	\$345,000	1.4	2	0.7
CESH	\$26,578	\$1,388	19.1	1	19.1
Residential Totals	\$110,316,100	\$31,388,877	11.8	3.4	3.5
Total	\$281,275,298	\$70,556,102	11.7	2.9	4

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 134,953,508 kWh per year (1.5% of PY15 utility sale, **Table 33**), while Customer Peak Demand Savings was 22,872 kW (1.4% of 2015 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 1,610,400 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 by Island					
Island	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
Hawai'i Island	18,816,675	9.00%	20,510,176	80.63%	16,536,858
Lāna'i	97,623	9.85%	107,236	76.53%	82,068
Maui	16,031,019	9.96%	17,627,708	78.46%	13,830,444
Moloka'i	65,559	9.78%	71,967	76.94%	55,375
O'ahu	99,942,633	11.17%	111,106,225	78.90%	87,662,395
Total	134,953,508	10.72%	149,423,313	79.08%	118,167,139
Percent of Customer Level Savings			111%		88%

Table 21 Demand Impacts (kW) by Impact Level and by Island					
Island	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
Hawai'i Island	3,319	9.00%	3,618	81.29%	2,941
Lāna'i	16	9.74%	18	77.77%	14
Maui	2,653	9.96%	2,917	78.60%	2,293
Moloka'i	12	9.71%	14	77.65%	11
O'ahu	16,871	11.17%	18,755	79.95%	14,995
Total	22,872	10.71%	25,322	79.98%	20,253
Percent of Customer Level Savings			111%		89%

Table 22 Energy Impacts (kWh) Impact Level and by Program					
Program	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
BEEM	26,401,923	10.72%	29,231,134	75.80%	22,156,918
CBEEM	37,629,795	10.94%	41,746,321	75.00%	31,309,741
BESM	585,796	10.36%	646,471	95.00%	614,147
BHTR	9,662,219	10.52%	10,678,906	99.00%	10,572,117
Business Programs	74,279,732	10.80%	82,302,831	78.55%	64,652,923
REEM	58,452,216	10.61%	64,653,891	79.00%	51,076,574
CESH	9,254	9.89%	10,169	65.00%	6,610
RESM	286,350	10.83%	317,362	92.00%	291,973
RHTR	1,925,956	11.06%	2,139,060	100.00%	2,139,060
Residential Programs	60,673,776	10.63%	67,120,482	79.73%	53,514,217
Total	134,953,508	10.72%	149,423,313	79.08%	118,167,139
Percent of Customer Level Savings			111%		88%

Table 23 Demand Impacts (kW) by Impact Level and by Program					
Program	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
BEEM	3,947	10.75%	4,372	76.69%	3,352
CBEEM	5,033	10.90%	5,582	75.00%	4,186
BESM	24	9.00%	27	95.00%	25
BHTR	1,972	10.53%	2,179	99.00%	2,157
Business Programs	10,976	10.78%	12,159	79.95%	9,721
REEM	11,310	10.63%	12,513	79.00%	9,885
CESH	2	10.06%	2	65.00%	1
RESM	33	10.83%	37	92.00%	34
RHTR	551	11.11%	612	100.00%	612
Residential Programs	11,896	10.65%	13,163	80.01%	10,532
Total	22,872	10.71%	25,322	79.98%	20,253
Percent of Customer Level Savings			111%		89%

CFLs & LEDs – Market Shift Continues Toward LEDs

The Program continued to reduce its dependency on CFLs in PY15. There were 960,740 total CFLs incentivized, a 29% decrease from the 1,347,684 CFLs incentivized in PY14. The shift to LED is evident when comparing CFL and LED energy savings, shown in **Table 24**, to the overall PY15 Program savings. CFLs contributed 13% (15,197,149 kWh) while LEDs contributed 28% (32,627,562 kWh) to the 118,167,139 Program level first year kWh saved in PY15 (**Table 17**). CFL and LED savings remain a significant contributing measure to the Program, also shown in **Table 24**.

Incentives for business CFLs were, for all intents and purposes ended in PY15, as the non-residential accounts participating in the Multifamily Direct Install Program constitute the CFLs incentivized on O‘ahu, while the balance (only 140 lamps) were a PY14 carryover. Due to higher baseline lighting efficiencies implemented in PY14, the combined Residential and Business CFL impact remained steady at 32% of energy and 30% in demand reduction achieved. LED impact continued to increase, driven by maturing LED technology and market penetration. Combined Residential and Business LED impact rose from 14% of energy and 16% of demand reduction achieved in PY13 to 26% and 23% respectively in PY14 to 40% of energy and 35% of demand reduction achieved in PY15. The Program continues to shift incentives away from the remaining CFLs (those in the residential portfolio) in favor of LEDs.

In **Table 24**, it is important to note that CBEEM projects were tracked within the Program database as a single project and did not reflect total lamp counts incentivized. Thus, the total LED count for business of 121,293 is not the total quantity of LED lamps incentivized in PY15.

Table 24
CFL & LED Statistics

CFL					LED				
County Comparison	Business	Residential	Total	%	County Comparison	Business	Residential	Total	%
Honolulu	10,897	667,428	678,325	70.6%	Honolulu	76,292	535,242	611,534	60.3%
Hawai'i	23	152,118	152,141	15.8%	Hawai'i	21,578	191,361	212,939	21.0%
Maui	117	130,157	130,274	13.6%	Maui	23,423	166,067	189,490	18.7%
Total	11,037	949,703	960,740	100.0%	Total	121,293	892,670	1,013,963	100.0%
Cost-Effectiveness					Cost-Effectiveness				
CFL Incentives	\$41,613	\$1,039,470	\$1,081,084		LED Incentives	\$3,141,778	\$2,999,380	\$6,141,158	
CFL kWh First Year	593,004	14,604,145	15,197,149		LED kWh First Year	15,069,240	17,558,322	32,627,562	
First Yr \$/kWh	\$0.070	\$0.071	\$0.071		First Yr \$/kWh	\$0.208	\$0.171	\$0.188	
CFL kWh Lifetime	2,916,308	86,881,014	89,797,322		LED kWh Lifetime	223,003,064	263,374,834	486,377,898	
Lifetime \$/kWh	\$0.014	\$0.012	\$0.012		Lifetime \$/kWh	\$0.014	\$0.011	\$0.013	
Energy Comparison					Demand Comparison				
CFL Program kWh	593,004	14,604,145	15,197,149		CFL Program kW	88	2,063	2,151	
LED Program kWh	15,069,240	17,558,322	32,627,562		LED Program kW	2,470	2,497	4,967	
Portfolio kWh	15,662,244	32,162,467	47,824,711		Portfolio kW	2,558	4,560	7,118	
CFL % of Energy	4%	45%	32%		CFL % of Demand	3%	45%	30%	
LED % of Energy	96%	55%	68%		LED % of Demand	97%	55%	70%	
Incentive Comparison									
CFL Incentives	\$41,613	\$1,039,470	\$1,081,084						
LED Incentives	\$3,141,778	\$2,999,380	\$6,141,158						
Portfolio Incentives	\$3,183,391	\$4,038,850	\$7,222,241						
CFL % of Incentives	1%	26%	15%						
LED % of Incentives	99%	74%	85%						

* CFL and LED counts inclusive of direct install and home energy kit programs. Business LED counts do not include total custom lighting project lamp counts. Each CBEEM rebate was counted as a single project in PY15.

CFL counts dropped by 29% compared to PY14 participation numbers whereas LEDs have increased 37%. LEDs will continue to increase their role in the Program-achieved savings. See **Table 25** for CFL impact details. As mentioned earlier, of the 11,037 Business CFLs, 10,897 (98.7%) were installed in multifamily units (e.g. residential units), which happened to be commercially metered.

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	1,345,684	1,348,036
PY2015	11,037	949,703	960,740
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
PY2015	593,004	14,604,145	15,197,149
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
PY2015	54	15	16

Measure Contribution toward Savings Impacts

In PY15, the Program incentivized 83 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. High Efficiency HVAC was the third most impactful category measured by lifetime energy. **Table 26** provides a summary of all measure categories and their respective energy impact for PY15.

- **#1 Contributor - High-Efficiency Lighting** – 45% of first year (down from 46% in PY14) and 49% lifetime energy savings (up from 39% in PY14).
- **#2 Contributor – Customized Project Measures** - 26% first year and 25% lifetime energy savings. Non-prescriptive lighting projects constituted the majority of projects in this category.
- **#3 Contributor – High-Efficiency HVAC** - 8% first year and 11% lifetime energy savings. Chillers, VFDs and Variable Refrigerant Flow Air Conditioners were the most significant contributors to this category.

Rank	Category	Apps Processed	%	Measure Quantity	Program Demand (kW)	%	Program Energy (kWh 1st Year)	%	Program Energy (kWh - Life)	%	Incentives	%	Lifetime Cost (\$/kWh)
1	High Efficiency Lighting	41,083	48.2%	2,036,009	8,019	39.6%	52,873,505	44.7%	646,461,228	48.7%	\$ 8,742,931	36.2%	\$ 0.014
2	Customized Project Measures	963	1.1%	1,405,842	4,224	20.9%	30,791,287	26.1%	331,175,911	25.0%	\$ 6,941,412	28.8%	\$ 0.021
3	High Efficiency HVAC	4,388	5.2%	5,079	2,026	10.0%	9,136,025	7.7%	149,307,326	11.2%	\$ 1,985,155	8.2%	\$ 0.013
4	High Efficiency Water Heating	2,904	3.4%	2,915	686	3.4%	3,417,859	2.9%	60,425,033	4.6%	\$ 1,536,058	6.4%	\$ 0.025
5	Energy Auction	32	0.0%	32	362	1.8%	3,837,308	3.2%	47,715,450	3.6%	\$ 1,014,132	4.2%	\$ 0.021
6	High Efficiency Appliances	4,881	5.7%	4,719	98	0.5%	2,088,979	1.8%	29,065,581	2.2%	\$ 348,535	1.4%	\$ 0.012
7	Energy Awareness, Measurement and Control Systems	5,095	6.0%	3,220,140	3,720	18.4%	12,192,370	10.3%	20,965,871	1.6%	\$ 2,496,913	10.4%	\$ 0.119
8	High Efficiency Motors	78	0.1%	2,946	98	0.5%	893,419	0.8%	13,401,285	1.0%	\$ 194,340	0.8%	\$ 0.015
9	High Efficiency Water Pumping	214	0.3%	223	71	0.4%	848,062	0.7%	12,214,007	0.9%	\$ 117,583	0.5%	\$ 0.010
10	Energy Conservation - Plug Load	5,566	6.5%	7,463	90	0.4%	789,192	0.7%	3,945,961	0.3%	\$ 140,438	0.6%	\$ 0.036
11	High Efficiency Air Conditioning	1,437	1.7%	1,834	236	1.2%	237,428	0.2%	3,618,719	0.3%	\$ 84,430	0.4%	\$ 0.023
12	Commercial Kitchen	24	0.0%	39	40	0.2%	235,229	0.2%	3,275,496	0.2%	\$ 56,850	0.2%	\$ 0.017
13	Energy Conservation - Hot Water	16,398	19.3%	20,980	530	2.6%	629,881	0.5%	3,149,406	0.2%	\$ 110,520	0.5%	\$ 0.035
14	Building Envelope Improvements	31	0.0%	31	49	0.2%	148,951	0.1%	1,489,514	0.1%	\$ 77,878	0.3%	\$ 0.052
15	Transformer	8	0.0%	17	3	0.0%	26,412	0.0%	845,173	0.1%	\$ 7,935	0.0%	\$ 0.009
16	Business Design, Audits and Commissioning	10	0.0%	10	0	0.0%	9,819	0.0%	98,194	0.0%	\$ 73,640	0.3%	\$ 0.750
17	Energy Kit	1,977	2.3%	7,562	1	0.0%	11,412	0.0%	91,298	0.0%	\$ 124,323	0.5%	\$ 1.362
18	Energy Studies	6	0.0%	6	0	0.0%	0	0.0%	0	0.0%	\$ 19,750	0.1%	\$ 0
19	Accounting	57	0.1%	2,783	0	0.0%	0	0.0%	0	0.0%	\$ 46,528	0.2%	\$ 0
	Total	85,152	100%	6,718,630	20,253	100%	118,167,139	100%	1,327,245,454	100%	\$ 24,119,351	100%	\$ 0.018

Program Level impacts (first year) were greatest in the Residential Rate Schedule “R” with 53,484,908 kWh or 45% of savings, of which 69% was realized on O’ahu. The O’ahu Residential rate class provided the greatest savings of 36,835,984 kWh per year of all the rate schedules (31% of PY15 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	Other*	Total	%
Hawai’i Island	8,805,089	1,577,528	2,821,980	2,332,263	0	977,136	22,862	16,536,858	14.0%
Lāna’i	32,412	0	49,657	0	0	0	0	82,068	0.1%
Maui	7,787,606	552,641	1,701,481	3,782,696	0	0	6,020	13,830,444	11.7%
Moloka’i	23,817	7,728	15,919	4,093	0	0	3,818	55,375	0.0%
O’ahu	36,835,984	5,097,630	21,770,501	20,664,654	3,161,611	77,001	55,014	87,662,395	74.2%
Total	53,484,908	7,235,527	26,359,538	26,783,705	3,161,611	1,054,136	87,714	118,167,139	100.0%
Percent	45.3%	6.1%	22.3%	22.7%	2.7%	0.9%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

Demand impact had similar results with the Residential Rate schedule customers providing 10,527 kW or 52% of the demand savings. O’ahu Residential Rate Customers provided 7,445 kW, the greatest savings of all the rate schedules (37% of PY15 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	Other*	Total	%
Hawai’i Island	1,638	323	506	323	0	148	3	2,941	14.5%
Lāna’i	10	0	4	0	0	0	0	14	0.1%
Maui	1,427	90	224	551	0	0	1	2,293	11.3%
Moloka’i	7	1	2	0	0	0	0	11	0.1%
O’ahu	7,445	1,104	2,934	2,973	515	14	10	14,995	74.0%
Total	10,527	1,519	3,670	3,847	515	162	14	20,253	100.0%
Percent	52.0%	7.5%	18.1%	19.0%	2.5%	0.8%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

Program Level Energy Impacts by Program and Rate Class

Table 29 shows Business and Residential program energy contributions (first year kWh) by rate class.

- **# 1 Contributor - Residential Energy Efficiency Measures (REEM) within the Residential Rate Schedule “R”**
 - 50,988,979 first year kWh (43% of total program)
 - The top three contributors toward this value were residential LED lighting, then CFLs and then Peer Group Comparison. **See Table 57.**
- **# 2 Contributor – Customized Business Energy Efficiency Measures (CBEEM) within the Business Large Customer Rate Schedule “P”**
 - 16,197,081 kWh (14% of total program). **See Table 47** for more a breakdown of CBEEM categories
 - Schedule “P” Customers are the biggest energy consumers and they undertake the largest energy-savings projects.

Table 29 Program Energy Impact (first year kWh) by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	38,746	771,902	10,819,363	8,557,670	1,967,737	1,220	280	22,156,918	18.8%
CBEEM	14,470	963,853	11,921,952	16,197,081	1,159,468	1,052,917	0	31,309,741	26.5%
BESM	0	0	231,456	382,692	0	0	0	614,147	0.5%
BHTR	21,402	5,487,962	3,382,807	1,645,540	34,406	0	0	10,572,117	8.9%
Business Programs	74,617	7,223,718	26,355,578	26,782,983	3,161,611	1,054,136	280	64,652,923	54.7%
REEM	50,988,979	7,584	2,562	722	0	0	76,726	51,076,574	43.2%
CESH	6,610	0	0	0	0	0	0	6,610	0.0%
RESM	291,464	509	0	0	0	0	0	291,973	0.2%
RHTR	2,123,238	3,716	1,398	0	0	0	10,708	2,139,060	1.8%
Residential Programs	53,410,291	11,809	3,960	722	0	0	87,434	53,514,217	45.3%
Total	53,484,908	7,235,527	26,359,538	26,783,705	3,161,611	1,054,136	87,714	118,167,139	100.0%
Percent	45.3%	6.1%	22.3%	22.7%	2.7%	0.9%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

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”**
 - 9,872 kW (49% of total program)
 - The top three contributors toward this value, ranked by kW from **Table 57**, were Peer Group Comparison, LED lighting, and Residential CFLs.
- **# 2 Contributor – Customized Business Energy Efficiency Measures (CBEEM) within the Large Customer Rate Schedule “P”**
 - 2,169 kW (11% of total program)

Table 30 Program Demand Impact (kW) by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	7	113	1,537	1,408	288	0	0	3,352	16.6%
CBEEM	2	164	1,470	2,169	219	161	0	4,186	20.7%
BESM	0	0	25	0	0	0	0	25	0.1%
BHTR	3	1,239	637	270	8	0	0	2,157	10.7%
Business Programs	12	1,516	3,670	3,847	515	162	0	9,721	48.0%
REEM	9,872	2	0	0	0	0	10	9,885	48.8%
CESH	1	0	0	0	0	0	0	1	0.0%
RESM	34	0	0	0	0	0	0	34	0.2%
RHTR	607	1	0	0	0	0	4	612	3.0%
Residential Programs	10,514	3	0	0	0	0	14	10,532	52.0%
Total	10,527	1,519	3,670	3,847	515	162	14	20,253	100.0%
Percent	52.0%	7.5%	18.1%	19.0%	2.5%	0.8%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

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”**
 - 58,351,756 kWh (43% of total program)
- **# 2 Contributor – Customized Business Energy Efficiency Measures (CBEEM) within the Business Large Customer Rate Schedule “P”**
 - 19,461,939 kWh (14% of total program)
 - Schedule “P” Customers are the biggest energy consumers and they undertake the largest energy-savings projects.

Table 31 Customer Energy Impact (kWh) by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	44,231	909,559	12,833,899	10,252,401	2,360,034	1,463	336	26,401,923	19.6%
CBEEM	17,417	1,158,313	14,315,339	19,461,939	1,390,625	1,286,162	0	37,629,795	27.9%
BESM	0	0	223,438	362,358	0	0	0	585,796	0.4%
BHTR	19,647	5,013,600	3,092,513	1,505,198	31,261	0	0	9,662,219	7.2%
Business Programs	81,295	7,081,472	30,465,189	31,581,896	3,781,920	1,287,625	336	74,279,732	55.0%
REEM	58,351,756	8,698	2,935	822	0	0	88,005	58,452,216	43.3%
CESH	9,254	0	0	0	0	0	0	9,254	0.0%
RESM	285,852	498	0	0	0	0	0	286,350	0.2%
RHTR	1,911,723	3,343	1,258	0	0	0	9,632	1,925,956	1.4%
Residential Programs	60,558,586	12,539	4,193	822	0	0	97,637	60,673,776	45.0%
Total	60,639,881	7,094,010	30,469,381	31,582,718	3,781,920	1,287,625	97,973	134,953,508	100.0%
Percent	44.9%	5.3%	22.6%	23.4%	2.8%	1.0%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

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”**
 - 11,295 kW (49% of total program)
- **# 2 Contributor – Customized Business Energy Efficiency Measures (CBEEM) within the Business Large Customer Rate Schedule “P”**
 - 2,606 kWh (11% of total program)

Table 32 Customer Demand Impact by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	8	131	1,792	1,671	345	0	0	3,947	17.3%
CBEEM	2	198	1,767	2,606	263	197	0	5,033	22.0%
BESM	0	0	24	0	0	0	0	24	0.1%
BHTR	3	1,131	583	247	7	0	0	1,972	8.6%
Business Programs	14	1,459	4,167	4,524	615	197	0	10,976	48.0%
REEM	11,295	2	0	0	0	0	12	11,310	49.4%
CESH	2	0	0	0	0	0	0	2	0.0%
RESM	33	0	0	0	0	0	0	33	0.1%
RHTR	546	1	0	0	0	0	3	551	2.4%
Residential Programs	11,877	3	0	0	0	0	15	11,896	52.0%
Total	11,890	1,462	4,167	4,524	615	197	15	22,872	100.0%
Percent	52.0%	6.4%	18.2%	19.8%	2.7%	0.9%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

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 Hawai'i 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.

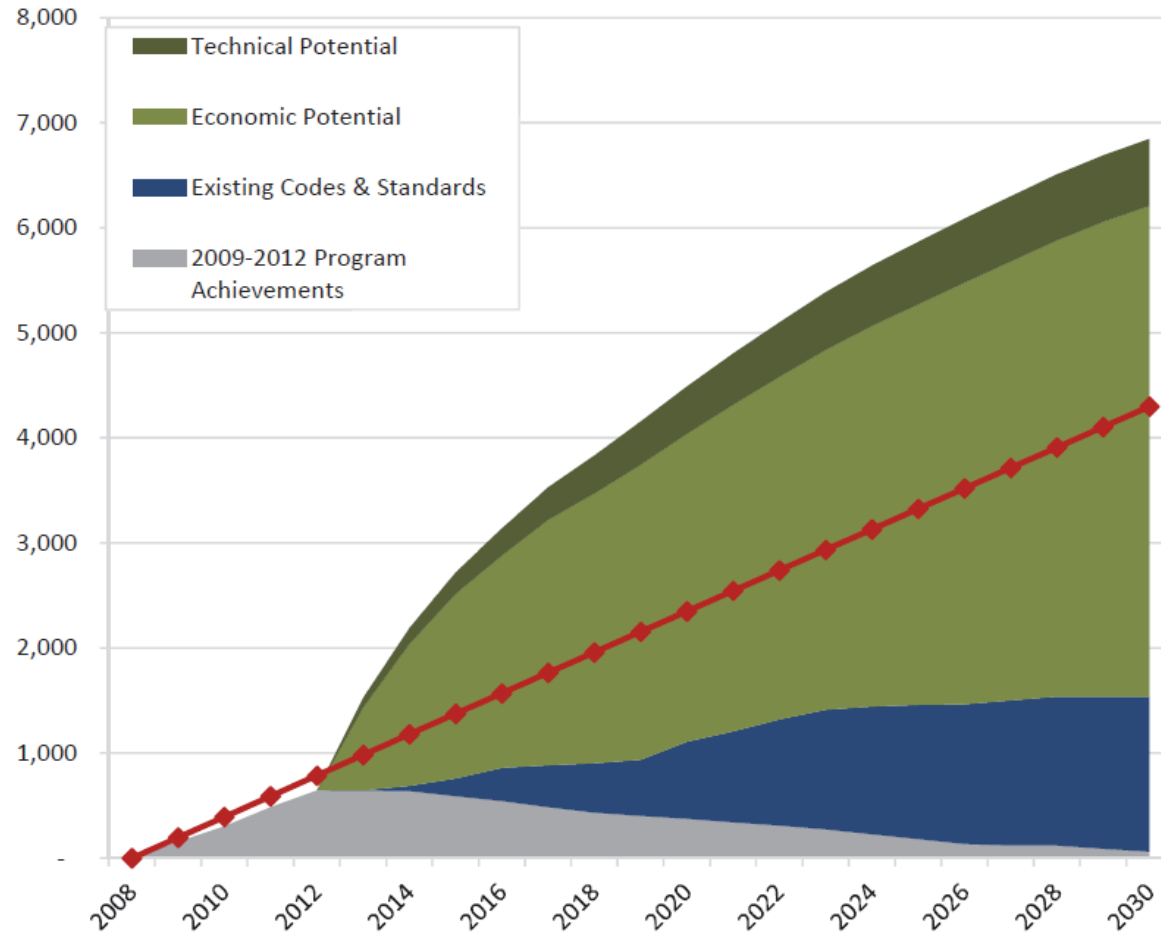
Key Findings

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 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. Hawai'i Energy will capture many of these actions through its 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 Hawai'i from 2000 to 2030. The items shown are:

Electrical Energy Usage Estimates

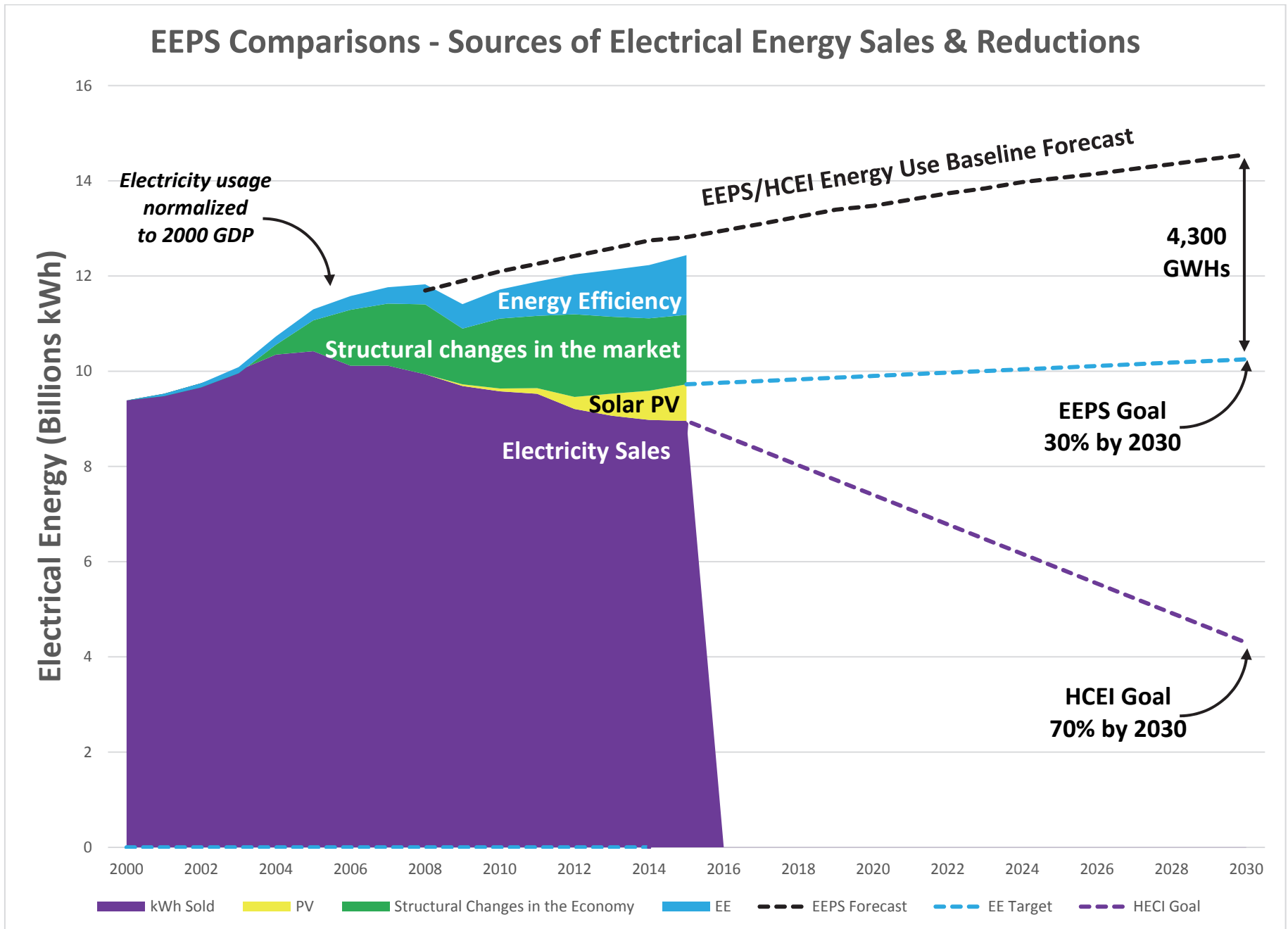
- A. *EEPS / HCEI / IRP Electrical Usage Baseline Forecast* (orange dashed line) – This is the original electrical energy forecast for the HECO companies based on the Integrated Resource Plan 3.
- B. *Economic Factor (GDP Normalized)* (green area) – This line is based on a simple Hawai'i State Gross Domestic Product (GDP) relation to electricity sales 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.

Electrical Sales & Reduction Items

- A. *Energy Efficiency* (light blue area) – 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.
- B. *Solar PV Production* (yellow area) – This line adds in the energy use that distributed PV systems are estimated to generate. In 2015, it is estimated that the PV systems generated 767 GWh. (Installed capacity provided in HEI 2015 Annual Report: http://media.corporate-ir.net/media_files/IROL/10/101675/HEI_2015_Annual_Report_Bookmarked.pdf. Assumed 4.8 sun hours and 0.9 conversion factor.)

Actual Electricity Sales (dark green 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. The dashed portion of this line is a straight-line visualization of where actual electricity sales should be in 2030 using the EEPS baseline.

Figure 5



Hawai'i 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 118,167,139 kWh/year. This is made up of both a discounted value of customer level savings “net” and credited utility system losses.

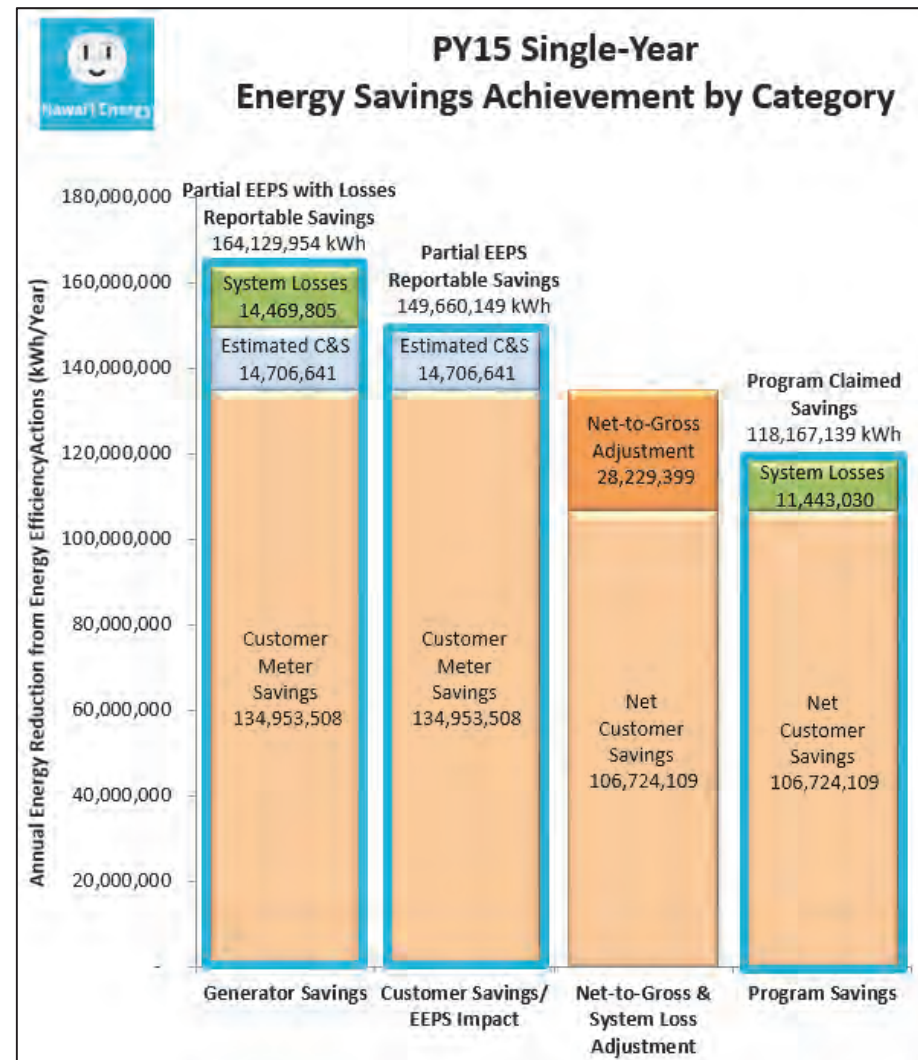
The customer level savings realized is discounted by two items:

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 PY15, 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 149,660,149 kWh/year. The PY14 codes and standards impact was used since there was no change in the energy code. The 149.6 GWh/year is limited to the projects tracked and incentivized by Hawai'i Energy. There are more energy-reducing projects that are implemented outside of Hawai'i Energy involvement that could be incorporated into EEPS savings.

The PY15 Partial EEPS with losses Reportable Savings would be 164,129,954 kWh/year. This is generator-level savings that includes utility system losses of 14,469,805 kWh/year.

Figure 6
Single-Year Energy Savings Achievement By Category



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

TRM increases from 2013 to 2014 were used to estimate percent savings reduction due to code increases. The percent savings due to code were then applied to their respective PY15 measures to calculate energy (kWh) reduction due to code. The sum of these savings is 14.7 GWh, with about 8.7 attributable to business lighting changes.

2013 to 2015 Major Code & Baseline Changes to Measures	Effect on Program Savings	Reduced GWh
Lighting - Screw In (Business only)	-28%	8.6
Lighting - Linear	-22%	0.14
Appliances	-25%	2.13
Air Conditioning Units	-11%	3.82
Motors	-10%	0.007
Water Heating	0%	-
2013 to 2015 Codes & Standards Adjustment		14.7

The residential screw-in lighting impact was calculated to be 11.9 GWh but was left off of the initial C&S impact calculation. The 11.9 GWh is a conservative, one-year estimated impact, made up of 9.0 GWh CFLs and 2.9 GWh LEDs impact. The total difference between 2009 and 2015 CFL lighting savings in Table 25 is about 40 GWh, of which a 9.0 GWh impact would be 23%. Non-code changes in the energy calculation, such as run-time hours, would be accountable for the remaining difference.

The 14.7 GWh codes & standards adjustment is only 1% of the 1,459 GWh *Structural changes in the market* calculated in the EEPS **Figure 5**. The structural changes include codes & standards, market driven, naturally occurring, fuel conversions, cogeneration and other savings factors. Adding the 11.9 residential lighting impact brings the total to 26.6 GWh, still less than 2% of the structural changes. This 1-2% codes impact is probably too conservative and may warrant revisiting the codes & standards adjustment calculation going forward.

Portfolio Impacts Relative to Load

Tables 33, 33a and 34 show the Program and Customer Level impacts as compared to PY15 electricity sales. Monthly data available from DBEDT's data warehouse enabled the Program to calculate electricity sales, power generated and power purchased by Program Year for a relevant comparison to Program savings. Peak demand, shown in **Table 34**, comes from the HEI 10k report and is reported on calendar year.

For PY 15, customer level savings were equivalent to 1.5% of the 2015 annual energy sales and 1.4% of the peak demand for the utility customers.

Table 33
Energy Impacts vs. Sales

Island	PY 2015 kWh Sales*	Customer Level Savings	% of Island Sales	% of Total Sales	Program Level Savings	% of Island Sales	% of Total Sales
Hawai'i	1,073,037,108	18,816,675	1.8%	0.2%	16,536,858	1.6%	0.2%
Lāna'i	27,762,641	97,623	0.4%	0.0%	82,068	0.3%	0.0%
Maui	1,086,574,823	16,031,019	1.5%	0.2%	13,830,444	1.3%	0.2%
Moloka'i	28,608,873	65,559	0.2%	0.0%	55,375	0.2%	0.0%
O'ahu	6,794,291,562	99,942,633	1.5%	1.1%	87,662,395	1.3%	1.0%
Total	9,010,275,007	134,953,509		1.5%	118,167,139		1.3%

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

Table 33a
HECO Sales vs. Generated & Purchased

HECO Consolidated Operating Statistics*	kWh/Yr	%
Net Generated and Purchased	9,779,094,069	100.0%
Sales	9,010,275,007	92.1%
System Losses and Use	768,819,062	7.9%

*DBEDT Monthly Energy Trends

Table 34
Demand Impacts vs. Sales

Island	2015 kW Peak*	Customer Level Reduction	% of Island Peak	% of Total Peak	Program Level Reduction	% of Island Peak	% of Total Peak
Hawai'i	191,500	3,319	1.7%	0.2%	2,941	1.5%	0.2%
Lāna'i	5,100	16	0.3%	0.0%	14	0.3%	0.0%
Maui	202,200	2,653	1.3%	0.2%	2,293	1.1%	0.1%
Moloka'i	5,600	12	0.2%	0.0%	11	0.2%	0.0%
O'ahu	1,206,000	16,871	1.4%	1.0%	14,995	1.2%	0.9%
Total	1,610,400	22,872		1.4%	20,254		1.3%

* HEI 2015 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 \$ 247,011,948. **Table 35 & 36** shows the measures and their relative contributions.

The top three measure categories, shown in **Table 35**, provided 85% 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 \$120,932,980 (49.0%).
- *Customize Projects* – The second measure to offer significant contribution at \$59,177,225 (24.0%) were customized projects.
- *High-Efficiency HVAC* – The third largest measure contributing to the TRB at \$30,456,327 (12.3%) 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 44.9% of the TRB value. They are LED Lighting, Custom – High Efficiency Lighting, and LED Specialty.

- *LED Lighting* – The largest contributor to the TRB at \$49,581,396 (20.1%).
- *Custom – High Efficiency Lighting* – The second measure to offer significant contribution at \$41,054,386 (16.6%) were customized projects.
- *LED Specialty* - The third largest measure contributing to the TRB at \$20,174,496 (8.2%).

The net TRB of \$247,011,948 is based on the Program's new TRB calculation in PY15 (**Figure 7**) based on guidelines to use an initial \$0.161/kWh avoided cost figure in 2015 and escalate it at 3% per year. This is further explained in the *Development of Avoided Costs* section at the end of this report.

Figure 7
New Utility Avoided Cost and Non-Utility Impacts

Hawaii Energy - PY15 - 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.
PY15	2016	1	1.00		\$ 0.161	\$ -	\$ 0.1610	\$ -	\$ 0.1610
PY16	2017	2	0.94		\$ 0.166	\$ -	\$ 0.1564	\$ -	\$ 0.3174
PY17	2018	3	0.89		\$ 0.171	\$ -	\$ 0.1520	\$ -	\$ 0.4694
PY18	2019	4	0.84		\$ 0.176	\$ -	\$ 0.1477	\$ -	\$ 0.6171
PY19	2020	5	0.79	\$ 904	\$ 0.181	\$ 716	\$ 0.1435	\$ 716	\$ 0.7606
PY20	2021	6	0.75	\$ 986	\$ 0.187	\$ 737	\$ 0.1395	\$ 1,453	\$ 0.9001
PY21	2022	7	0.70	\$ 856	\$ 0.192	\$ 603	\$ 0.1355	\$ 2,056	\$ 1.0356
PY22	2023	8	0.67	\$ 750	\$ 0.198	\$ 499	\$ 0.1317	\$ 2,555	\$ 1.1673
PY23	2024	9	0.63	\$ 663	\$ 0.204	\$ 416	\$ 0.1280	\$ 2,971	\$ 1.2953
PY24	2025	10	0.59	\$ 590	\$ 0.210	\$ 349	\$ 0.1243	\$ 3,320	\$ 1.4196
PY25	2026	11	0.56	\$ 527	\$ 0.216	\$ 294	\$ 0.1208	\$ 3,615	\$ 1.5404
PY26	2027	12	0.53	\$ 474	\$ 0.223	\$ 250	\$ 0.1174	\$ 3,864	\$ 1.6578
PY27	2028	13	0.50	\$ 1,020	\$ 0.230	\$ 507	\$ 0.1141	\$ 4,371	\$ 1.7719
PY28	2029	14	0.47	\$ 1,066	\$ 0.236	\$ 500	\$ 0.1108	\$ 4,871	\$ 1.8827
PY29	2030	15	0.44	\$ 964	\$ 0.244	\$ 426	\$ 0.1077	\$ 5,297	\$ 1.9904
PY30	2031	16	0.42	\$ 875	\$ 0.251	\$ 365	\$ 0.1047	\$ 5,662	\$ 2.0951
PY31	2032	17	0.39	\$ 795	\$ 0.258	\$ 313	\$ 0.1017	\$ 5,975	\$ 2.1968
PY32	2033	18	0.37	\$ 724	\$ 0.266	\$ 269	\$ 0.0988	\$ 6,244	\$ 2.2956
PY33	2034	19	0.35		\$ 0.274	\$ -	\$ 0.0960	\$ 6,244	\$ 2.3916
PY34	2035	20	0.33		\$ 0.282	\$ -	\$ 0.0933	\$ 6,244	\$ 2.4849
PY35	2036	21	0.31		\$ 0.291	\$ -	\$ 0.0907	\$ 6,244	\$ 2.5756
PY36	2037	22	0.29		\$ 0.300	\$ -	\$ 0.0881	\$ 6,244	\$ 2.6637
PY37	2038	23	0.28		\$ 0.308	\$ -	\$ 0.0856	\$ 6,244	\$ 2.7493
PY38	2039	24	0.26		\$ 0.318	\$ -	\$ 0.0832	\$ 6,244	\$ 2.8325
PY39	2040	25	0.25		\$ 0.327	\$ -	\$ 0.0808	\$ 6,244	\$ 2.9133

*EEPS (2013-0056) Avoided Capacity Cost factored by 76% to reflect contribution of kW reductions achieved on O'ahu 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 \$70,556,102. See **Table 37** for a comparison of incremental TRC to total project cost. The largest customer investments were Customized Project Measures at \$25,718,149 (36.5%), followed by High-Efficiency Lighting at \$16,177,127 (22.9%) and High-Efficiency Water Heating at \$11,180,680 (15.8%) and. See **Table 35** for details.

Table 35
Portfolio Total Resource Benefit and Costs (TRB & TRC)

Category	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
	kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
High Efficiency Lighting	8,019	39.6%	52,873,505	44.7%	646,461,228	48.7%	12.2	7.5	\$120,932,980	49.0%	\$16,177,127	22.9%	\$8,742,931	36.2%
Customized Project Measures	4,224	20.9%	30,791,287	26.1%	331,175,911	25.0%	10.8	2.3	\$59,177,225	24.0%	\$25,718,149	36.5%	\$6,941,412	28.8%
High Efficiency HVAC	2,026	10.0%	9,136,025	7.7%	149,307,326	11.2%	16.3	3.1	\$30,456,327	12.3%	\$9,735,452	13.8%	\$1,985,155	8.2%
High Efficiency Water Heating	686	3.4%	3,417,859	2.9%	60,425,033	4.6%	17.7	1	\$11,615,512	4.7%	\$11,180,680	15.8%	\$1,536,058	6.4%
Energy Auction	362	1.8%	3,837,308	3.2%	47,715,450	3.6%	12.4	7.2	\$7,272,127	2.9%	\$1,014,132	1.4%	\$1,014,132	4.2%
High Efficiency Appliances	98	0.5%	2,088,979	1.8%	29,065,581	2.2%	13.9	4.3	\$4,377,697	1.8%	\$1,014,715	1.4%	\$348,535	1.4%
Energy Awareness, Measurement and Control Systems	3,720	18.4%	12,192,370	10.3%	20,965,871	1.6%	1.7	1.6	\$4,366,269	1.8%	\$2,796,018	4.0%	\$2,496,913	10.4%
High Efficiency Motors	98	0.5%	893,419	0.8%	13,401,285	1.0%	15	3.8	\$2,299,959	0.9%	\$610,044	0.9%	\$194,340	0.8%
High Efficiency Water Pumping	71	0.4%	848,062	0.7%	12,214,007	0.9%	14.4	1.5	\$2,005,829	0.8%	\$1,299,075	1.8%	\$117,583	0.5%
Energy Conservation - Plug Load	90	0.4%	789,192	0.7%	3,945,961	0.3%	5	4.7	\$664,665	0.3%	\$140,438	0.2%	\$140,438	0.6%
High Efficiency Air Conditioning	236	1.2%	237,428	0.2%	3,618,719	0.3%	15.2	25.5	\$1,856,706	0.8%	\$72,672	0.1%	\$84,430	0.4%
Commercial Kitchen	40	0.2%	235,229	0.2%	3,275,496	0.2%	13.9	6.5	\$631,750	0.3%	\$97,135	0.1%	\$56,850	0.2%
Energy Conservation - Hot Water	530	2.6%	629,881	0.5%	3,149,406	0.2%	5	7.8	\$858,622	0.3%	\$110,520	0.2%	\$110,520	0.5%
Building Envelope Improvements	49	0.2%	148,951	0.1%	1,489,514	0.1%	10	1.1	\$373,442	0.2%	\$340,356	0.5%	\$77,878	0.3%
Transformer	3	0.0%	26,412	0.0%	845,173	0.1%	32	2.1	\$95,828	0.0%	\$45,266	0.1%	\$7,935	0.0%
Business Design, Audits and Commissioning	0	0.0%	9,819	0.0%	98,194	0.0%	10	0.3	\$13,941	0.0%	\$50,000	0.1%	\$73,640	0.3%
Energy Kit	1	0.0%	11,412	0.0%	91,298	0.0%	8	0.1	\$13,070	0.0%	\$124,323	0.2%	\$124,323	0.5%
Accounting	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$46,528	0.2%
Energy Studies	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$30,000	0.0%	\$19,750	0.1%
Total	20,253	100.0%	118,167,139	100.0%	1,327,245,454	100.0%	11.2	3.5	\$247,011,948	100.0%	\$70,556,102	100.0%	\$24,119,351	100.0%

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 generating it (kWh reductions)
- Avoiding the need for increased power plant capacity (Peak kW reductions)

The TRB/TRC ratio of 3.5 indicates that society is getting a 3.5 times return (or 350%) 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 the TRB/TRC columns in **Tables 36** for details.

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	%
T8 To T8 Low Wattage	74	0.4%	321,517	0.3%	4,501,234	0.3%	14.0	242.9	\$ 967,697	0.4%	\$ 3,984	0.0%	\$ 54,522	0.2%
Combination Oven	3	0.0%	12,632	0.0%	151,586	0.0%	12.0	159.4	\$ 31,880	0.0%	\$ 200	0.0%	\$ 500	0.0%
Fluorescent Delamping	39	0.2%	374,102	0.3%	5,237,424	0.4%	14.0	34.6	\$ 893,687	0.4%	\$ 25,840	0.0%	\$ 15,145	0.1%
VFD Pump For Chilled Water / Condenser Water	142	0.7%	524,936	0.4%	7,874,046	0.6%	15.0	30.2	\$ 1,799,631	0.7%	\$ 59,585	0.1%	\$ 56,080	0.2%
Whole House Fan	222	1.1%	162,105	0.1%	3,242,105	0.2%	20.0	29.5	\$ 1,789,451	0.7%	\$ 60,720	0.1%	\$ 37,950	0.2%
Metal Halide	1	0.0%	9,149	0.0%	128,089	0.0%	14.0	26.5	\$ 21,702	0.0%	\$ 818	0.0%	\$ 1,105	0.0%
VFD Fan For Ahu	26	0.1%	83,735	0.1%	1,256,019	0.1%	15.0	24.6	\$ 304,980	0.1%	\$ 12,422	0.0%	\$ 7,838	0.0%
Steam Cooker	7	0.0%	32,061	0.0%	384,736	0.0%	12.0	22.3	\$ 81,447	0.0%	\$ 3,654	0.0%	\$ 2,250	0.0%
LED Exit Signs	33	0.2%	276,138	0.2%	4,231,019	0.3%	15.3	22.2	\$ 735,537	0.3%	\$ 33,145	0.0%	\$ 23,075	0.1%
VFD - Ahu	297	1.5%	701,028	0.6%	10,515,413	0.8%	15.0	21.0	\$ 2,970,009	1.2%	\$ 141,263	0.2%	\$ 89,125	0.4%
LED Specialty	1,166	5.8%	7,034,190	6.0%	105,481,287	7.9%	15.0	13.4	\$ 20,174,496	8.2%	\$ 1,501,841	2.1%	\$ 1,077,032	4.5%
Fluorescent Delamping With Reflectors	65	0.3%	522,300	0.4%	7,312,198	0.6%	14.0	13.2	\$ 1,302,170	0.5%	\$ 98,840	0.1%	\$ 49,115	0.2%
Split Systems	41	0.2%	361,895	0.3%	5,428,423	0.4%	15.0	12.0	\$ 937,663	0.4%	\$ 78,309	0.1%	\$ 135,032	0.6%
Custom - Guest Room Controls	142	0.7%	332,758	0.3%	4,991,369	0.4%	15.0	11.5	\$ 1,412,781	0.6%	\$ 123,028	0.2%	\$ 75,364	0.3%
CFL Omni-Directional	159	0.8%	1,113,935	0.9%	5,569,677	0.4%	5.0	11.3	\$ 961,380	0.4%	\$ 85,402	0.1%	\$ 85,402	0.4%
CFL	1,988	9.8%	14,055,054	11.9%	84,058,689	6.3%	6.0	10.9	\$ 15,480,280	6.3%	\$ 1,414,941	2.0%	\$ 986,176	4.1%
Water Cooler Timers	66	0.3%	874,295	0.7%	6,992,629	0.5%	8.0	10.8	\$ 1,189,811	0.5%	\$ 109,725	0.2%	\$ 109,770	0.5%
Reach-In Freezer	4	0.0%	36,375	0.0%	436,499	0.0%	12.0	10.7	\$ 74,568	0.0%	\$ 6,964	0.0%	\$ 4,150	0.0%

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	%
Packaged Units	63	0.3%	364,176	0.3%	5,462,645	0.4%	15.0	10.1	\$ 1,057,513	0.4%	\$ 104,527	0.1%	\$ 152,480	0.6%
Rid-A-Fridge (Freezer)	2	0.0%	41,296	0.0%	578,137	0.0%	14.0	10.1	\$ 85,714	0.0%	\$ 8,520	0.0%	\$ 4,540	0.0%
Showerhead	374	1.8%	476,049	0.4%	2,380,245	0.2%	5.0	10.1	\$ 629,721	0.3%	\$ 62,143	0.1%	\$ 62,143	0.3%
LED Omni Directional	636	3.1%	4,603,507	3.9%	69,040,831	5.2%	15.0	10.0	\$ 12,529,955	5.1%	\$ 1,258,744	1.8%	\$ 516,068	2.1%
Custom - Industrial Equipment	20	0.1%	176,623	0.1%	2,573,538	0.2%	14.6	9.8	\$ 446,069	0.2%	\$ 45,380	0.1%	\$ 45,380	0.2%
Fluorescent T12 To T8 Low Wattage	666	3.3%	3,502,359	3.0%	49,033,021	3.7%	14.0	9.5	\$ 9,836,626	4.0%	\$ 1,035,787	1.5%	\$ 1,240,798	5.1%
Rid-A-Fridge (Refrigerator)	14	0.1%	365,930	0.3%	5,123,023	0.4%	14.0	9.1	\$ 759,537	0.3%	\$ 83,110	0.1%	\$ 42,810	0.2%
Window Film	22	0.1%	82,975	0.1%	829,745	0.1%	10.0	8.9	\$ 192,151	0.1%	\$ 21,700	0.0%	\$ 14,147	0.1%
Custom Lighting	0	0.0%	844	0.0%	11,812	0.0%	14.0	8.3	\$ 1,589	0.0%	\$ 192	0.0%	\$ 192	0.0%
Fluorescent T12 To T8 Standard	49	0.2%	252,340	0.2%	3,532,757	0.3%	14.0	6.6	\$ 712,832	0.3%	\$ 108,085	0.2%	\$ 112,605	0.5%
ECM Refrigeration	58	0.3%	536,300	0.5%	8,044,502	0.6%	15.0	6.3	\$ 1,373,010	0.6%	\$ 217,554	0.3%	\$ 91,545	0.4%
LED Linear	543	2.7%	2,353,107	2.0%	32,943,496	2.5%	14.0	6.2	\$ 7,076,927	2.9%	\$ 1,138,030	1.6%	\$ 1,138,030	4.7%
Residential Custom	128	0.6%	862,153	0.7%	8,870,122	0.7%	10.3	6.0	\$ 1,607,861	0.7%	\$ 267,922	0.4%	\$ 269,122	1.1%
Kitchen Ventilation	26	0.1%	150,915	0.1%	2,263,721	0.2%	15.0	5.7	\$ 437,034	0.2%	\$ 76,500	0.1%	\$ 48,650	0.2%
Ceiling Fans	14	0.1%	75,323	0.1%	376,614	0.0%	5.0	5.6	\$ 67,255	0.0%	\$ 11,952	0.0%	\$ 46,480	0.2%
Custom - Energy Auction	362	1.8%	4,311,076	3.6%	52,369,113	3.9%	12.1	5.6	\$ 7,880,094	3.2%	\$ 1,413,433	2.0%	\$ 1,409,431	5.8%
LED Lighting	2,552	12.6%	18,116,678	15.3%	271,750,177	20.5%	15.0	5.5	\$ 49,581,396	20.1%	\$ 9,032,010	12.8%	\$ 3,102,208	12.9%
Advance Power Strips	90	0.4%	789,192	0.7%	3,945,961	0.3%	5.0	4.7	\$ 664,665	0.3%	\$ 140,438	0.2%	\$ 140,438	0.6%
Faucet Aerator	156	0.8%	153,832	0.1%	769,162	0.1%	5.0	4.7	\$ 228,901	0.1%	\$ 48,378	0.1%	\$ 48,378	0.2%
Chillers	453	2.2%	2,803,718	2.4%	56,074,358	4.2%	20.0	4.4	\$ 9,794,709	4.0%	\$ 2,212,020	3.1%	\$ 422,605	1.8%
Refrigerator W/ Trade In	65	0.3%	1,560,622	1.3%	21,848,707	1.6%	14.0	4.2	\$ 3,252,827	1.3%	\$ 781,560	1.1%	\$ 217,125	0.9%
Room Occupancy Sensors	7	0.0%	66,184	0.1%	529,474	0.0%	8.0	4.0	\$ 94,341	0.0%	\$ 23,740	0.0%	\$ 23,425	0.1%
Split Systems (VRF)	146	0.7%	1,335,298	1.1%	20,029,472	1.5%	15.0	4.0	\$ 3,432,893	1.4%	\$ 862,644	1.2%	\$ 543,446	2.3%
Transformer (Single-Phase)	0	0.0%	1,381	0.0%	44,183	0.0%	32.0	3.7	\$ 5,064	0.0%	\$ 1,380	0.0%	\$ 420	0.0%
Clothes Washer	12	0.1%	90,059	0.1%	1,080,712	0.1%	12.0	3.6	\$ 196,612	0.1%	\$ 55,220	0.1%	\$ 25,100	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 Specialty	4	0.0%	28,159	0.0%	168,956	0.0%	6.0	3.3	\$ 31,124	0.0%	\$ 9,506	0.0%	\$ 9,506	0.0%
Window AC W/ Trade In	29	0.1%	105,031	0.1%	1,260,367	0.1%	12.0	3.3	\$ 284,822	0.1%	\$ 86,765	0.1%	\$ 46,760	0.2%
Custom - Appliances	29	0.1%	215,350	0.2%	2,244,273	0.2%	10.4	3.3	\$ 436,332	0.2%	\$ 131,303	0.2%	\$ 52,521	0.2%
Custom - High Efficiency Lighting	3,168	15.6%	23,895,343	20.2%	233,398,392	17.6%	9.8	2.7	\$ 41,054,386	16.6%	\$ 15,196,132	21.5%	\$ 4,687,686	19.4%
Solar Attic Fan	5	0.0%	143,655	0.1%	718,273	0.1%	5.0	2.5	\$ 113,088	0.0%	\$ 45,600	0.1%	\$ 15,200	0.1%
ECM Fan Coil	41	0.2%	357,119	0.3%	5,356,783	0.4%	15.0	2.4	\$ 926,948	0.4%	\$ 392,490	0.6%	\$ 102,795	0.4%
Custom - Chiller Or Central Plant Controls	125	0.6%	891,607	0.8%	15,459,252	1.2%	17.3	2.3	\$ 2,689,689	1.1%	\$ 1,145,114	1.6%	\$ 170,064	0.7%
Custom - Lighting Controls	29	0.1%	224,515	0.2%	4,092,585	0.3%	18.2	2.2	\$ 690,611	0.3%	\$ 320,612	0.5%	\$ 44,700	0.2%
Custom - Refrigeration Controls	0	0.0%	22,795	0.0%	227,954	0.0%	10.0	2.2	\$ 32,362	0.0%	\$ 15,000	0.0%	\$ 5,468	0.0%
Transformer (Three-Phase)	3	0.0%	25,031	0.0%	800,990	0.1%	32.0	2.1	\$ 90,765	0.0%	\$ 43,886	0.1%	\$ 7,515	0.0%
VFD Pool Pumps	6	0.0%	163,651	0.1%	1,947,838	0.1%	11.9	2.0	\$ 298,576	0.1%	\$ 146,325	0.2%	\$ 44,063	0.2%
Custom - High Efficiency Water Heating	155	0.8%	772,620	0.7%	9,974,463	0.8%	12.9	1.7	\$ 2,073,147	0.8%	\$ 1,223,314	1.7%	\$ 334,933	1.4%
VRF Air Conditioners	823	4.1%	2,712,554	2.3%	40,688,310	3.1%	15.0	1.6	\$ 9,761,019	4.0%	\$ 6,164,541	8.7%	\$ 533,050	2.2%
Heat Pump Water Heater	26	0.1%	205,471	0.2%	2,054,712	0.2%	10.0	1.5	\$ 378,850	0.2%	\$ 257,400	0.4%	\$ 40,700	0.2%
Refrigerator	5	0.0%	31,072	0.0%	435,002	0.0%	14.0	1.5	\$ 83,006	0.0%	\$ 54,080	0.1%	\$ 42,500	0.2%
Custom - EMS HVAC Controls	39	0.2%	291,234	0.2%	4,368,516	0.3%	15.0	1.5	\$ 785,418	0.3%	\$ 507,462	0.7%	\$ 47,500	0.2%
Custom - High Efficiency Water Pumping	25	0.1%	221,636	0.2%	2,216,363	0.2%	10.0	1.5	\$ 398,545	0.2%	\$ 271,138	0.4%	\$ 130,000	0.5%
Domestic Water Booster Packages	65	0.3%	684,411	0.6%	10,266,169	0.8%	15.0	1.5	\$ 1,707,253	0.7%	\$ 1,152,750	1.6%	\$ 73,520	0.3%
LED Refrigerated Case Lighting	37	0.2%	243,940	0.2%	2,931,088	0.2%	12.0	1.4	\$ 531,242	0.2%	\$ 382,440	0.5%	\$ 284,745	1.2%
Peer Group Comparison	3,605	17.8%	10,938,766	9.3%	10,938,766	0.8%	1.0	1.2	\$ 2,608,174	1.1%	\$ 2,185,929	3.1%	\$ 2,185,929	9.1%
Submetering (Condo)	49	0.2%	379,310	0.3%	3,034,477	0.2%	8.0	1.2	\$ 568,284	0.2%	\$ 479,000	0.7%	\$ 143,700	0.6%
Custom - High Efficiency HVAC	353	1.7%	2,295,373	1.9%	36,727,882	2.8%	16.0	1.1	\$ 6,709,202	2.7%	\$ 6,094,202	8.6%	\$ 652,347	2.7%
Solar Water Heating	621	3.1%	2,773,162	2.3%	55,413,012	4.2%	20.0	1.1	\$ 10,759,031	4.4%	\$ 10,150,800	14.4%	\$ 1,290,062	5.3%
Reach-In Refrigerator	0	0.0%	2,360	0.0%	28,322	0.0%	12.0	0.8	\$ 4,960	0.0%	\$ 6,117	0.0%	\$ 1,200	0.0%
Solar Water Heating Tune-Up	34	0.2%	291,973	0.2%	1,459,867	0.1%	5.0	0.7	\$ 246,460	0.1%	\$ 345,000	0.5%	\$ 172,500	0.7%

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	%
Cool Roof	26	0.1%	65,977	0.1%	659,768	0.0%	10.0	0.6	\$ 181,291	0.1%	\$ 318,656	0.5%	\$ 63,731	0.3%
Ice Machine	0	0.0%	886	0.0%	10,632	0.0%	12.0	0.5	\$ 1,860	0.0%	\$ 3,700	0.0%	\$ 100	0.0%
Heat Pump	5	0.0%	142,269	0.1%	1,422,686	0.1%	10.0	0.5	\$ 217,005	0.1%	\$ 407,680	0.6%	\$ 11,797	0.0%
Energy Study	0	0.0%	9,819	0.0%	98,194	0.0%	10.0	0.3	\$ 13,941	0.0%	\$ 50,000	0.1%	\$ 73,640	0.3%
Accounting*	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 0	0.0%	\$ 2,064	0.0%
Contractor Reward	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 6,509	0.0%	\$ 6,509	0.0%
Energy Audits	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 30,000	0.0%	\$ 19,750	0.1%
Custom - Water Pumping	13	0.1%	106,073	0.1%	1,156,077	0.1%	10.9	0.0	\$ 207,352	0.1%	\$ 0	0.0%	\$ 47,570	0.2%
Incentives For Kits and/or Pop-Up Retail	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 122,363	0.2%	\$ 122,363	0.5%
Accounting – Custom Energy Kits*	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 0	0.0%	\$ 12,254	0.1%
Custom - Submetering	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 1,500	0.0%	\$ 37,650	0.2%
Custom - Benchmarking	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 19,864	0.0%	\$ 19,864	0.1%
Custom	0	0.0%	25,834	0.0%	387,516	0.0%	15.0	0.0	\$ 52,739	0.0%	\$ 0	0.0%	\$ 6,417	0.0%
Ladder Charge	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 17,275	0.0%	\$ 17,275	0.1%
Accounting – Freight*	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 0	0.0%	\$ 32,211	0.1%
Total	20,253	100%	118,167,139	100%	1,327,245,454	100%	11.2	3.5	\$ 247,011,948	100%	\$ 70,556,102	100%	\$ 24,119,351	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 (\$)
Custom - High Efficiency Lighting	\$15,219,654.35	\$15,219,654.35	\$ 0.00
LED Lighting	\$13,750,170.00	\$9,032,088.00	\$4,718,082.00
VRF Air Conditioners	\$12,335,105.97	\$6,167,552.99	\$6,167,552.99
Chillers	\$11,060,100.00	\$2,212,020.00	\$8,848,080.00
Solar Water Heating	\$10,150,800.00	\$10,150,800.00	\$ 0.00
Custom - High Efficiency HVAC	\$6,094,202.00	\$6,094,202.00	\$ 0.00
Fluorescent T12 to T8 Low Wattage	\$2,937,594.00	\$1,045,645.20	\$1,891,948.80
Refrigerator w/ Trade In	\$2,606,400.00	\$ 781,920.00	\$1,824,480.00
Peer Group Comparison	\$2,185,929.36	\$2,185,929.36	\$ 0.00
CFL	\$1,882,580.00	\$1,414,940.60	\$ 467,639.40
Split Systems (VRF)	\$1,725,287.50	\$ 862,643.75	\$ 862,643.75
LED Specialty	\$1,641,767.00	\$1,502,147.00	\$ 139,620.00
Domestic Water Booster Packages	\$1,537,000.00	\$1,152,750.00	\$ 384,250.00
LED Omni Directional	\$1,536,836.00	\$1,258,852.00	\$ 277,984.00
Custom - Energy Auction	\$1,413,432.65	\$1,413,432.65	\$ 0.00
Cool Roof	\$1,274,624.00	\$ 318,656.00	\$ 955,968.00
Custom - High Efficiency Water Heating	\$1,223,314.00	\$1,223,314.00	\$ 0.00
LED Linear	\$1,146,040.00	\$1,146,040.00	\$ 0.00
Custom - Chiller or Central Plant Controls	\$1,145,114.40	\$1,145,114.40	\$ 0.00
VFD - AHU	\$ 565,052.50	\$ 141,263.13	\$ 423,789.38
Packaged Units	\$ 522,636.00	\$ 104,527.20	\$ 418,108.80
Custom - EMS HVAC Controls	\$ 507,462.00	\$ 507,462.00	\$ 0.00
Submetering (Condo)	\$ 479,000.00	\$ 479,000.00	\$ 0.00
Heat Pump	\$ 407,680.00	\$ 407,680.00	\$ 0.00
ECM Fan Coil	\$ 392,490.00	\$ 392,490.00	\$ 0.00
Split Systems	\$ 391,547.00	\$ 78,309.40	\$ 313,237.60
LED Refrigerated Case Lighting	\$ 386,464.00	\$ 386,464.00	\$ 0.00
Solar Water Heating Tune-up	\$ 345,300.00	\$ 345,300.00	\$ 0.00
Custom - Lighting Controls	\$ 320,612.00	\$ 320,612.00	\$ 0.00
Window AC w/ Trade In	\$ 304,925.00	\$ 86,765.00	\$ 218,160.00
Clothes Washer	\$ 276,100.00	\$ 55,220.00	\$ 220,880.00
Custom - High Efficiency Water Pumping	\$ 271,138.40	\$ 271,138.40	\$ 0.00

Table 37 (cont'd)			
Total vs. Incremental Measure Cost			
Measure	Measure Total Cost (\$)	Measure Incremental (\$)	Difference (\$)
Refrigerator	\$ 270,400.00	\$ 54,080.00	\$ 216,320.00
Residential Custom	\$ 267,922.44	\$ 267,922.44	\$ 0.00
Heat Pump Water Heater	\$ 257,400.00	\$ 257,400.00	\$ 0.00
VFD Pump for Chilled Water / Condenser Water	\$ 238,340.00	\$ 59,585.00	\$ 178,755.00
ECM Refrigeration	\$ 217,554.00	\$ 217,554.00	\$ 0.00
T8 to T8 Low Wattage	\$ 199,200.00	\$ 3,984.00	\$ 195,216.00
VFD Pool Pumps	\$ 175,425.00	\$ 146,325.00	\$ 29,100.00
Fluorescent T12 to T8 Standard	\$ 144,650.00	\$ 108,084.50	\$ 36,565.50
Advance Power Strips	\$ 140,437.92	\$ 140,437.92	\$ 0.00
Custom - Appliances	\$ 131,302.65	\$ 131,302.65	\$ 0.00
Custom - Guest Room Controls	\$ 123,027.61	\$ 123,027.61	\$ 0.00
Incentives for Kits and/or Pop-up Retail	\$ 122,362.80	\$ 122,362.80	\$ 0.00
Water Cooler Timers	\$ 109,725.00	\$ 109,725.00	\$ 0.00
Energy Study	\$ 100,000.00	\$ 50,000.00	\$ 50,000.00
Fluorescent Delamping with Reflectors	\$ 98,840.00	\$ 98,840.00	\$ 0.00
Window Film	\$ 86,801.56	\$ 21,700.39	\$ 65,101.17
CFL Omni-Directional	\$ 85,401.80	\$ 85,401.80	\$ 0.00
Rid-A-Fridge (Refrigerator)	\$ 83,110.00	\$ 83,110.00	\$ 0.00
Kitchen Ventilation	\$ 76,500.00	\$ 76,500.00	\$ 0.00
Showerhead	\$ 62,142.71	\$ 62,142.71	\$ 0.00
Whole House Fan	\$ 60,720.00	\$ 60,720.00	\$ 0.00
Energy Audits	\$ 60,000.00	\$ 30,000.00	\$ 30,000.00
Ceiling Fans	\$ 59,760.00	\$ 11,952.00	\$ 47,808.00
VFD Fan for AHU	\$ 49,689.75	\$ 12,422.44	\$ 37,267.31
Faucet Aerator	\$ 48,377.56	\$ 48,377.56	\$ 0.00
Solar Attic Fan	\$ 45,600.00	\$ 45,600.00	\$ 0.00
Custom - Industrial Equipment	\$ 45,380.00	\$ 45,380.00	\$ 0.00
Transformer (Three-Phase)	\$ 43,886.00	\$ 43,886.00	\$ 0.00
LED Exit Signs	\$ 33,145.00	\$ 33,145.00	\$ 0.00
Fluorescent Delamping	\$ 25,840.00	\$ 25,840.00	\$ 0.00
Room Occupancy Sensors	\$ 23,740.00	\$ 23,740.00	\$ 0.00

Table 37 (cont'd)			
Total vs. Incremental Measure Cost			
Measure	Measure Total Cost (\$)	Measure Incremental (\$)	Difference (\$)
Custom - Benchmarking	\$ 19,863.87	\$ 19,863.87	\$ 0.00
Ladder Charge	\$ 17,275.00	\$ 17,275.00	\$ 0.00
Custom - Refrigeration Controls	\$ 15,000.00	\$ 15,000.00	\$ 0.00
CFL Specialty	\$ 9,506.20	\$ 9,506.20	\$ 0.00
Rid-A-Fridge (Freezer)	\$ 8,520.00	\$ 8,520.00	\$ 0.00
Metal Halide	\$ 8,176.00	\$ 817.60	\$ 7,358.40
Reach-In Freezer	\$ 6,964.01	\$ 6,964.01	\$ 0.00
Contractor Reward	\$ 6,508.51	\$ 6,508.51	\$ 0.00
Reach-In Refrigerator	\$ 6,117.19	\$ 6,117.19	\$ 0.00
Ice Machine	\$ 3,700.00	\$ 3,700.00	\$ 0.00
Steam Cooker	\$ 3,654.00	\$ 3,654.00	\$ 0.00
Custom - Submetering	\$ 1,500.00	\$ 1,500.00	\$ 0.00
Transformer (Single-Phase)	\$ 1,380.00	\$ 1,380.00	\$ 0.00
Combination Oven	\$ 200.00	\$ 200.00	\$ 0.00
Custom Lighting	\$ 191.65	\$ 191.65	\$ 0.00
Accounting	\$ 0.00	\$ 0.00	\$ 0.00
Accounting-Custom Energy Kits	\$ 0.00	\$ 0.00	\$ 0.00
Accounting-Freight	\$ 0.00	\$ 0.00	\$ 0.00
Residential Transformation	\$ 0.00	\$ 0.00	\$ 0.00
Business Transformation	\$ 0.00	\$ 0.00	\$ 0.00
Custom - Water Pumping	\$ 0.00	\$ 0.00	\$ 0.00
Totals	\$ 99,631,596	\$ 70,605,680	\$ 29,025,916

Island Equity

The Island Equity target is based on incentive dollars spent as compared to the contribution of each County towards the Public Benefits fee. **Table 38** compares the electric utility sales with the percent of business and residential energy savings at the Program and Customer levels.

Table 38 Program and Customer Level Island Equity by Business and Residential												
PY15 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
Hawai'i	Hawai'i	1,064,784,764	11.9%	7,742,018	12.0%	0.7%	8,794,840	16.4%	0.8%	16,536,858	14.0%	1.6%
Honolulu	O'ahu	6,754,083,311	75.2%	50,796,491	78.6%	0.8%	36,865,904	68.9%	0.5%	87,662,395	74.2%	1.3%
Maui	Lāna'i, Maui, Moloka'i	1,137,630,399	12.7%	6,114,414	9.5%	0.5%	7,853,473	14.7%	0.7%	13,967,887	11.8%	1.2%
	Lāna'i	25,817,288	0.3%	49,657	0.1%	0.2%	32,412	0.1%	0.1%	82,068	0.1%	0.3%
	Maui	1,083,128,503	12.1%	6,037,017	9.3%	0.6%	7,793,426	14.6%	0.7%	13,830,444	11.7%	1.3%
	Moloka'i	28,684,608	0.3%	27,740	0.0%	0.1%	27,635	0.1%	0.1%	55,375	0.0%	0.2%
Total		8,976,231,014	100.0%	64,652,923	100.0%	0.7%	53,514,217	100.0%	0.6%	118,167,139	100.0%	1.3%
PY15 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
Hawai'i	Hawai'i	1,064,784,764	11.9%	8,606,525	11.6%	0.8%	10,210,150	16.8%	1.0%	18,816,675	13.9%	1.8%
Honolulu	O'ahu	6,754,083,311	75.2%	58,469,854	78.7%	0.9%	41,472,779	68.4%	0.6%	99,942,633	74.1%	1.5%
Maui	Lāna'i, Maui, Moloka'i	1,137,630,399	12.7%	7,203,354	9.7%	0.6%	8,990,847	14.8%	0.8%	16,194,200	12.0%	1.4%
	Lāna'i	25,817,288	0.3%	60,212	0.1%	0.2%	37,411	0.1%	0.1%	97,623	0.1%	0.4%
	Maui	1,083,128,503	12.1%	7,109,483	9.6%	0.7%	8,921,536	14.7%	0.8%	16,031,019	11.9%	1.5%
	Moloka'i	28,684,608	0.3%	33,659	0.0%	0.1%	31,900	0.1%	0.1%	65,559	0.0%	0.2%
Total		8,976,231,014	100.0%	74,279,732	100.0%	0.8%	60,673,776	100.0%	0.7%	134,953,508	100.0%	1.5%

*Reported total sales by county in HEI's 2015 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 38.7%. The next highest incentive recipient rate schedule is "P" with 21.6%. 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: 70.4% of incentive funds on O'ahu, 16.6% on Hawai'i, 11.5% on Maui, 0.7% on Lāna'i and 0.7% on Moloka'i as shown in **Table 39**.

Table 39 Island Incentive Spending by Rate Schedule									
	R	G	J	P	DS	F	Other*	Total	%
Hawai'i Island	\$ 2,068,432	\$ 589,910	\$ 670,211	\$ 474,707	\$ 0	\$ 201,867	\$ 2,950	\$ 4,008,078	16.6%
Lāna'i	\$ 170,386	\$ 0	\$ 9,860	\$ 0	\$ 0	\$ 0	\$ 0	\$ 180,246	0.7%
Maui	\$ 1,677,915	\$ 152,538	\$ 315,903	\$ 624,755	\$ 0	\$ 0	\$ 770	\$ 2,771,881	11.5%
Moloka'i	\$ 168,383	\$ 1,870	\$ 3,079	\$ 980	\$ 0	\$ 0	\$ 1,155	\$ 175,467	0.7%
O'ahu	\$ 5,255,600	\$ 1,973,591	\$ 4,690,375	\$ 4,115,350	\$ 910,989	\$ 15,912	\$ 21,862	\$ 16,983,680	70.4%
Total	\$9,340,715	\$2,717,909	\$5,689,428	\$5,215,792	\$910,989	\$217,780	\$26,737	\$24,119,351	100.0%
Percent	38.7%	11.3%	23.6%	21.6%	3.8%	0.9%	0.1%	100.0%	

*Other combines the less frequently assigned rate codes for PY15

Table 40 shows the island equity by program category. In total, energy savings was distributed as follows: 74.2% in Honolulu, 14.0% in Hawai'i and 11.8% in Maui counties.

Table 40 Island Equity Energy Savings by Program Category (kWh)								
Program	Hawai'i Island/ County	Lāna'i	Maui	Moloka'i	Maui County	O'ahu C&C Honolulu	Total	%
BEEM	2,277,130	49,657	3,972,040	27,740	4,049,436	15,830,352	22,156,918	18.8%
CBEEM	2,522,716	0	1,346,649	0	1,346,649	27,440,375	31,309,741	26.5%
BESM	221,636	0	9,819	0	9,819	382,692	614,147	0.5%
BHTR	2,720,536	0	708,508	0	708,508	7,143,072	10,572,117	8.9%
Business Programs	7,742,018	49,657	6,037,017	27,740	6,114,414	50,796,491	64,652,923	54.7%
REEM	8,764,963	32,412	7,575,078	27,635	7,635,125	34,676,486	51,076,574	43.2%
CESH	3,868	0	0	0	0	2,742	6,610	0.0%
RESM	25,469	0	35,265	0	35,265	231,239	291,973	0.2%
RHTR	540	0	183,083	0	183,083	1,955,437	2,139,060	1.8%
Residential Programs	8,794,840	32,412	7,793,426	27,635	7,853,473	36,865,904	53,514,217	45.3%
Total	16,536,858	82,068	13,830,444	55,375	13,967,887	87,662,395	118,167,139	100%
%	14.0%	0.1%	11.7%	0.0%	11.8%	74.2%	100%	

Table 41 shows island equity by incentive dollars spent. The actual incentive spending received by each island is broken down as follows: 70.4% in Honolulu, 16.6% in Hawai'i and 13% in Maui counties.

Table 41 Island Equity Incentives by Program Category								
Program	Hawai'i Island/County	Lāna'i	Maui	Moloka'i	Maui County	O'ahu C&C Honolulu	Total	%
BEEM	\$ 399,473	\$ 9,860	\$ 594,501	\$ 5,929	\$ 610,290	\$ 2,435,141	\$ 3,444,904	14.3%
CBEEM	\$ 478,832	\$ 0	\$ 282,086	\$ 0	\$ 282,086	\$ 6,269,412	\$ 7,030,329	29.1%
BESM	\$ 181,510	\$ 0	\$ 17,500	\$ 0	\$ 17,500	\$ 187,705	\$ 386,715	1.6%
BHTR	\$ 889,895	\$ 0	\$ 198,660	\$ 0	\$ 198,660	\$ 2,803,866	\$ 3,892,420	16.1%
Business Programs	\$ 1,949,710	\$ 9,860	\$ 1,092,746	\$ 5,929	\$ 1,108,535	\$ 11,696,123	\$ 14,754,368	61.2%
REEM	\$ 2,042,095	\$ 170,386	\$ 1,591,513	\$ 169,538	\$ 1,931,436	\$ 4,766,261	\$ 8,739,792	36.2%
CESH	\$ 819	\$ 0	\$ 0	\$ 0	\$ 0	\$ 569	\$ 1,388	0.0%
RESM	\$ 15,300	\$ 0	\$ 21,000	\$ 0	\$ 21,000	\$ 136,200	\$ 172,500	0.7%
RHTR	\$ 154	\$ 0	\$ 66,622	\$ 0	\$ 66,622	\$ 384,527	\$ 451,303	1.9%
Residential Programs	\$ 2,058,368	\$ 170,386	\$ 1,679,135	\$ 169,538	\$ 2,019,058	\$ 5,287,556	\$ 9,364,982	38.8%
Total	\$4,008,078	\$180,246	\$2,771,881	\$175,467	\$3,127,593	\$16,983,680	\$24,119,351	100%
%	16.6%	0.7%	11.5%	0.7%	13.0%	70.4%	100%	

BUSINESS PROGRAM

Overall Impacts

For PY15, Hawai'i Energy's Business program achieved savings of 64,652,923 kWh (first year), 818,086,546 lifetime kWh and 9,721 kW with \$14,754,368 in incentives. In relative terms, 61.2% of Hawai'i Energy's incentives (\$14,754,368 out of \$24,119,351 of direct incentives) captured 54.7% of kWh (first year), 61.6% of lifetime kWh and 48.0% of kW demand first year savings, respectively, with a Total Resource Benefit to Cost ratio of 3.8.

Table 42 provides a detailed breakdown by budget category. For PY15, Hawai'i Energy's Business program realized results by continuing to offer programs, services, measures and related incentives to address opportunities in the marketplace and accelerate the adoption of energy-efficient technologies.

Table 42 Business Program Impacts Summary															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
CBEEM	1,404	4,186	43.1%	31,309,741	48.4%	341,108,400	41.7%	10.9	2.4	\$ 59,630,700	39.8%	\$ 25,139,882	64.2%	\$ 7,030,329	47.6%
BEEM	168,505	3,352	34.5%	22,156,918	34.3%	322,324,303	39.4%	14.5	6.1	\$ 58,650,985	39.1%	\$ 9,670,922	24.7%	\$ 3,444,904	23.3%
BHTR	1,449,810	2,157	22.2%	10,572,117	16.4%	151,956,594	18.6%	14.4	8.0	\$ 31,176,778	20.8%	\$ 3,898,107	10.0%	\$ 3,892,420	26.4%
BESM	35	25	0.3%	614,147	0.9%	2,697,249	0.3%	4.4	1.0	\$ 474,099	0.3%	\$ 458,314	1.2%	\$ 386,715	2.6%
Total	1,619,754	9,721	100%	64,652,923	100%	818,086,546	100%	12.7	3.8	\$ 149,932,561	100%	\$ 39,167,226	100%	\$ 14,754,368	100%

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

Midstream Program

Originally launched in PY14, the midstream commercial lighting program or *Lighting Distributor Instant Rebate* flourished in PY15. The Program provided incentive funding to local and national lighting distributors on prescriptive lighting measures (e.g., reduced-wattage T8s and LED lamps), enabling them to offer customers discounts at the point of purchase. By the end of PY15, the Program had enrolled 16 lighting distributors, who advanced \$555,523 in Hawai'i Energy incentives for energy-efficient lighting products that generated 5,603,039 kWh in energy savings and 736 kW in demand savings. The program is still growing and is expected to significantly surpass these results in PY16. Hawai'i Energy is optimistic that this could be one of its most successful and cost-effective programs in the coming years.

Small Business Direct Install Lighting (SBDIL)

The Program covered the costs of lighting retrofits for 816 small businesses and restaurants in PY15, who in turn helped the Program achieve 137,603,431 kWh - Life in customer level savings. While the original budget allocation for this offer was \$2,121,215, the Program transferred funds from lesser-performing programs throughout the year to accommodate for the continued demand for these types of projects in the marketplace. At the close of the year, Hawai'i Energy was able to cover \$3,877,472 of retrofit costs for SBDIL participants, an investment that will generate over \$42.6 M in lifetime cost savings for these businesses.

Overall Expenditures

The Hawai'i Energy commercial team continued its focus beyond the BEEM and CBEEM Program in PY15, 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	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
Business (C&I) Programs					
Ops and Management					
BEEM	\$1,393,523.65	\$1,395,000.00	99.89%	\$1,476.35	0.11%
CBEEM	\$1,136,884.61	\$1,170,000.00	97.17%	\$33,115.39	2.83%
BESM	\$201,037.48	\$206,275.00	97.46%	\$5,237.52	2.54%
BHTR	\$536,761.78	\$566,164.71	94.81%	\$29,402.93	5.19%
Total Business Programs	\$3,268,207.52	\$3,337,439.71	97.93%	\$69,232.19	2.07%
Business Evaluation	\$142,280.77	\$175,829.00	80.92%	\$33,548.23	19.08%
Business Outreach	\$646,761.87	\$647,234.00	99.93%	\$472.13	0.07%
Total Business Non-Incentives	\$4,057,250.16	\$4,160,502.71	97.52%	\$103,252.55	2.48%
Business Incentives					
BEEM	\$3,444,903.51	\$3,444,908.00	100.00%	\$4.49	0.00%
CBEEM	\$7,030,329.00	\$7,030,329.00	100.00%	\$ -	0.00%
BESM	\$386,715.40	\$386,716.00	100.00%	\$0.60	0.00%
BHTR	\$3,892,420.37	\$3,894,708.00	99.94%	\$2,287.63	0.06%
Subtotal Business Incentives	\$14,754,368.28	\$14,756,661.00	99.98%	\$2,292.72	0.02%
Business Transformational	\$1,592,874.55	\$1,593,788.80	99.94%	\$914.25	0.06%
Total Business Incentives	\$16,347,242.83	\$16,350,449.80	99.98%	\$3,206.97	0.02%
Total Business Programs	\$20,404,492.99	\$20,510,952.51	99.48%	\$106,459.52	0.52%

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

Clean Energy Allies are those trade allies that step up and formalize their relationship with the Hawai'i Energy program. Through their orientation training and on-going involvement with the program, they are well versed in Hawai'i Energy's offerings and events year round. Hawai'i Energy recognizes that their engagement with our staff and the marketplace offers greater opportunities to transform the market. As shown in Table 44, approximately 60% of Customer Lifetime Savings achieved in PY15 were brought to the program through these allies. Over the years, Hawai'i Energy has taken on a more strategic approach with these allies.

For full details on the Clean Energy Ally Program, see *Clean Energy Ally (CEA) Program* in the Transformational Section.

See **Table 44** for performance by trade ally. Those trade allies that have signed on as Hawai'i 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 1 st Yr)	Customer Level Energy Savings (kWh - Life)	Cumulative Customer Level Energy Savings	Incentives
<i>Direct From Applicants</i>	997	4,351	29,466,878	369,499,785	39.4 %	\$ 5,145,325
Johnson Controls	86	1,405	9,669,472	93,743,884	10.0 %	\$ 1,444,253
Matrix Energy Services Inc.	93	451	4,689,150	58,418,167	6.2 %	\$ 1,051,379
Grainger	382	444	3,446,715	51,801,680	5.5 %	\$ 263,671
Chelsea Group	8	232	2,019,340	39,848,372	4.2 %	\$ 370,096
EMCC	918	452	2,767,912	37,877,779	4.0 %	\$ 690,417
Graybar Electric Co.	471	310	2,204,482	31,596,558	3.4 %	\$ 198,515
AMM Electrical And Lighting Maintenance	1,084	469	2,225,852	31,420,585	3.3 %	\$ 900,884
Energy Industries	97	193	1,492,903	18,310,327	2.0 %	\$ 236,414
Henriques Electric	407	275	1,205,893	17,495,750	1.9 %	\$ 440,715
Koo Electric Service	937	196	1,030,258	14,612,550	1.6 %	\$ 434,466
Nakoa Companies Inc.	363	148	745,457	10,790,398	1.2 %	\$ 300,342
Correa Electric, LLC	275	148	724,693	10,551,060	1.1 %	\$ 250,950
Light Bulbs Plus, LLC	47	79	640,863	9,614,793	1.0 %	\$ 63,750
Pono Energy Solutions	556	143	550,756	7,813,314	0.8 %	\$ 317,181
Photonworks Engineering, LLP	1	31	267,977	7,235,379	0.8 %	\$ 44,020
W Services LLC	2,130	80	899,708	7,197,660	0.8 %	\$ 66,645
American Electric	2	70	287,198	6,862,548	0.7 %	\$ 51,841
Pacific Energy Concepts	7	91	520,601	6,773,813	0.7 %	\$ 89,428
Green Synergy	6	91	678,479	6,736,792	0.7 %	\$ 113,106
The Light Bulb Source	82	62	517,772	6,229,044	0.7 %	\$ 49,375
Paradise Lighting	250	79	518,381	5,848,355	0.6 %	\$ 166,891
Honeywell	11	0	568,220	5,581,438	0.6 %	\$ 475,732
21st Century	14	89	700,691	5,471,425	0.6 %	\$ 95,427
Pioneer Electric Inc.	14	46	391,219	5,351,905	0.6 %	\$ 62,824
Honeywell MFDI Field Technicians	10,757	260	815,023	4,142,423	0.4 %	\$ 141,685
Hawai'i Building Maintenance	1	26	151,881	3,493,263	0.4 %	\$ 26,033
S H Electric, LLC	122	39	234,084	3,392,093	0.4 %	\$ 134,407
Aesolutions, LLC	25	3	217,635	3,046,887	0.3 %	\$ 65,977
Green Building Hawai'i, LLC	15	44	274,810	2,936,707	0.3 %	\$ 49,471
Big Energy Savers	85	48	295,995	2,769,996	0.3 %	\$ 104,450
<i>Remaining Allies</i>	1,138	622	4,059,435	51,650,568	5.5 %	\$ 908,698
Totals	21,381	10,976	74,279,732	938,115,297	100.0 %	\$ 14,754,368

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 chillers, 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

Accomplishments

ENERGY STAR® LED Lamps

The continuing maturation of LED products in the marketplace, better customer acceptance and the ease of participation through the Lighting Distributor Instant Rebate (LDIR) program lead to the continued success of LED lamps installed in Program Year 2015. This LED offering achieved energy savings of 8,604,897 kWh this past year or 38.8% 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.

Chillers and Chiller Plant Improvements

The BEEM program continues to have success in driving upgrades in HVAC equipment. New chillers and chiller plant improvements such as variable frequency drives (VFDs) on chiller pumps, fans and air handling units were the second largest contributors to the success of the BEEM program. In PY15 Chillers and VFDs installed in HVAC systems produced energy savings of 4,113,417 kWh or 18.7% of the total BEEM program energy savings.

Impacts

For PY15, the BEEM Program achieved savings of 22,156,918 kWh (first year) and 3,352 kW savings with \$3,444,904 in incentives.

Table 45 provides further details.

- **# 1 Contributor to BEEM – LED Lighting (39.9% Lifetime kWh)**

LED lighting (including specialty and omni-directional lamps, exit signs and refrigerated case lighting) was the largest contributor to BEEM Program savings, with lifetime energy and demand savings of 128,434,371 kWh and 1,097 kW, respectively.

- **# 2 Contributor to BEEM – Chillers (23.5% Lifetime kWh)**

Chillers and chiller plant improvements including VFDs on pumps, fans and air handling units were the second largest contributor to the BEEM Program savings with lifetime energy and demand savings of 75,719,836 kWh and 918 kW, respectively.



Honolulu International Airport

Honolulu, Hawai'i

Hawai'i Energy continued its work with energy performance contractor Johnson Controls on their project with State of Hawai'i's Department of Transportation to modernize and upgrade electrical equipment at the Honolulu International Airport. For the project phases completed during PY15, DOT received \$1,255,726 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 8.5 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.

Category	Units	Program Demand (kW)	%	Program Energy (kWh First Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)
LED Specialty	26,302	540	16.1%	4,030,324	18.2%	60,454,860	18.8%	15.0
Chillers	67	453	13.5%	2,803,718	12.7%	56,074,358	17.4%	20.0
LED Omni Directional	55,738	397	11.9%	3,271,281	14.8%	49,069,212	15.2%	15.0
Split Systems (VRF)	539	146	4.4%	1,335,298	6.0%	20,029,472	6.2%	15.0
Fluorescent T12 To T8 Low Wattage	32,176	163	4.9%	1,318,018	5.9%	18,452,249	5.7%	14.0
LED Lighting	7,166	109	3.3%	941,036	4.2%	14,115,540	4.4%	15.0
VFD - AHU	118	297	8.9%	701,028	3.2%	10,515,413	3.3%	15.0
Domestic Water Booster Packages	19	65	1.9%	684,411	3.1%	10,266,169	3.2%	15.0
ECM Refrigeration	1,077	58	1.7%	536,300	2.4%	8,044,502	2.5%	15.0
VFD Pump For Chilled Water / Condenser Water	22	142	4.2%	524,936	2.4%	7,874,046	2.4%	15.0
Fluorescent Delamping With Reflectors	4,895	65	2.0%	522,300	2.4%	7,312,198	2.3%	14.0
Water Cooler Timers	4,443	66	2.0%	745,848	3.4%	5,966,788	1.9%	8.0
Packaged Units	109	63	1.9%	364,176	1.6%	5,462,645	1.7%	15.0
Split Systems	166	41	1.2%	361,895	1.6%	5,428,423	1.7%	15.0
ECM Fan Coil	1,869	41	1.2%	357,119	1.6%	5,356,783	1.7%	15.0
Fluorescent Delamping	3,230	39	1.2%	374,102	1.7%	5,237,424	1.6%	14.0
T8 To T8 Low Wattage	3,320	74	2.2%	321,517	1.5%	4,501,234	1.4%	14.0
Custom - Ems HVAC Controls	1	39	1.2%	291,234	1.3%	4,368,516	1.4%	15.0
LED Exit Signs	1,007	31	0.9%	267,585	1.2%	4,102,714	1.3%	15.3
Submetering (Condo)	958	49	1.5%	379,310	1.7%	3,034,477	0.9%	8.0
Kitchen Ventilation	15	26	0.8%	150,915	0.7%	2,263,721	0.7%	15.0
CFL Omni-Directional	8,565	53	1.6%	370,082	1.7%	1,850,410	0.6%	5.0
Advance Power Strips	2,722	34	1.0%	298,635	1.3%	1,493,173	0.5%	5.0
Heat Pump	18	5	0.1%	142,269	0.6%	1,422,686	0.4%	10.0
VFD Fan For AHU	19	26	0.8%	83,735	0.4%	1,256,019	0.4%	15.0
Showerhead	2,973	160	4.8%	194,750	0.9%	973,750	0.3%	5.0
VFD Pool Pumps	11	5	0.2%	62,764	0.3%	938,966	0.3%	15.0
Window Film	22	22	0.7%	82,975	0.4%	829,745	0.3%	10.0
Refrigerator W/ Trade In	85	2	0.1%	58,153	0.3%	814,142	0.3%	14.0
Transformer (Three-Phase)	13	3	0.1%	25,031	0.1%	800,990	0.2%	32.0
Cool Roof	9	26	0.8%	65,977	0.3%	659,768	0.2%	10.0
Fluorescent T12 To T8 Standard	1,283	3	0.1%	44,037	0.2%	616,513	0.2%	14.0

Table 45
BEEM Program Impacts

Category	Units	Program Demand (kW)	%	Program Energy (kWh First Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)
Room Occupancy Sensors	1,166	7	0.2%	65,801	0.3%	526,411	0.2%	8.0
CFL	1,183	26	0.8%	172,058	0.8%	516,174	0.2%	3.0
LED Refrigerated Case Lighting	442	13	0.4%	72,802	0.3%	364,008	0.1%	5.0
VRF Air Conditioners	29	7	0.2%	21,869	0.1%	328,037	0.1%	15.0
Faucet Aerator	5,403	44	1.3%	44,955	0.2%	224,774	0.1%	5.0
Solar Water Heating	1	3	0.1%	10,047	0.0%	150,705	0.0%	15.0
Rid-A-Fridge (Refrigerator)	28	0	0.0%	9,941	0.0%	139,181	0.0%	14.0
Metal Halide	28	1	0.0%	9,149	0.0%	128,089	0.0%	14.0
CFL Specialty	1,074	3	0.1%	20,297	0.1%	121,785	0.0%	6.0
Clothes Washer	49	1	0.0%	8,411	0.0%	100,931	0.0%	12.0
Window AC W/ Trade In	51	1	0.0%	4,285	0.0%	51,425	0.0%	12.0
Transformer (Single-Phase)	4	0	0.0%	1,381	0.0%	44,183	0.0%	32.0
Ceiling Fans	63	1	0.0%	3,402	0.0%	17,011	0.0%	5.0
Refrigerator	12	0	0.0%	1,047	0.0%	14,657	0.0%	14.0
Rid-A-Fridge (Freezer)	2	0	0.0%	716	0.0%	10,027	0.0%	14.0
Custom - High Efficiency HVAC	2	0	0.0%	0	0.0%	0	0.0%	0
Accounting	11	0	0.0%	0	0.0%	0	0.0%	0
Total	168,505	3,352	100%	22,156,918	100%	322,324,303	100%	14.5

Table 45 (cont'd)							
BEEM Program Impacts – TRB, TRC & Incentives							
Category	TRB/TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
LED Specialty	20.6	\$ 10,883,620	18.6%	\$ 529,225	5.5%	\$ 249,616	7.2%
Chillers	4.4	\$ 9,794,709	16.7%	\$ 2,212,020	22.9%	\$ 422,605	12.3%
LED Omni Directional	11.8	\$ 8,616,360	14.7%	\$ 729,736	7.5%	\$ 369,260	10.7%
Split Systems (VRF)	4.0	\$ 3,432,893	5.9%	\$ 862,644	8.9%	\$ 543,446	15.8%
Fluorescent T12 To T8 Low Wattage	84.9	\$ 3,276,697	5.6%	\$ 38,611	0.4%	\$ 243,622	7.1%
LED Lighting	4.9	\$ 2,452,383	4.2%	\$ 503,880	5.2%	\$ 104,655	3.0%
VFD - AHU	21.0	\$ 2,970,009	5.1%	\$ 141,263	1.5%	\$ 89,125	2.6%
Domestic Water Booster Packages	1.5	\$ 1,707,253	2.9%	\$ 1,152,750	11.9%	\$ 73,520	2.1%
ECM Refrigeration	6.3	\$ 1,373,010	2.3%	\$ 217,554	2.2%	\$ 91,545	2.7%
VFD Pump For Chilled Water / Condenser Water	30.2	\$ 1,799,631	3.1%	\$ 59,585	0.6%	\$ 56,080	1.6%
Fluorescent Delamping With Reflectors	13.2	\$ 1,302,170	2.2%	\$ 98,840	1.0%	\$ 49,115	1.4%
Water Cooler Timers	15.6	\$ 1,040,092	1.8%	\$ 66,600	0.7%	\$ 66,645	1.9%
Packaged Units	10.1	\$ 1,057,513	1.8%	\$ 104,527	1.1%	\$ 152,480	4.4%
Split Systems	12.0	\$ 937,663	1.6%	\$ 78,309	0.8%	\$ 135,032	3.9%
ECM Fan Coil	2.4	\$ 926,948	1.6%	\$ 392,490	4.1%	\$ 102,795	3.0%
Fluorescent Delamping	34.6	\$ 893,687	1.5%	\$ 25,840	0.3%	\$ 15,145	0.4%
T8 To T8 Low Wattage	242.9	\$ 967,697	1.6%	\$ 3,984	0.0%	\$ 54,522	1.6%
Custom - Ems HVAC Controls	1.5	\$ 785,418	1.3%	\$ 507,462	5.2%	\$ 47,500	1.4%
LED Exit Signs	23.5	\$ 709,539	1.2%	\$ 30,210	0.3%	\$ 20,140	0.6%
Submetering (Condo)	1.2	\$ 568,284	1.0%	\$ 479,000	5.0%	\$ 143,700	4.2%
Kitchen Ventilation	5.7	\$ 437,034	0.7%	\$ 76,500	0.8%	\$ 48,650	1.4%
CFL Omni-Directional	11.2	\$ 319,398	0.5%	\$ 28,460	0.3%	\$ 28,460	0.8%
Advance Power Strips	3.9	\$ 251,513	0.4%	\$ 64,021	0.7%	\$ 64,021	1.9%
Heat Pump	0.5	\$ 217,005	0.4%	\$ 407,680	4.2%	\$ 11,797	0.3%
VFD Fan For AHU	24.6	\$ 304,980	0.5%	\$ 12,422	0.1%	\$ 7,838	0.2%
Showerhead	10.1	\$ 263,058	0.4%	\$ 25,975	0.3%	\$ 25,975	0.8%
VFD Pool Pumps	5.0	\$ 151,982	0.3%	\$ 30,525	0.3%	\$ 15,113	0.4%
Window Film	8.9	\$ 192,151	0.3%	\$ 21,700	0.2%	\$ 14,147	0.4%
Refrigerator W/ Trade In	4.0	\$ 121,209	0.2%	\$ 30,600	0.3%	\$ 8,500	0.2%
Transformer (Three-Phase)	2.1	\$ 90,765	0.2%	\$ 43,886	0.5%	\$ 7,515	0.2%
Cool Roof	0.6	\$ 181,291	0.3%	\$ 318,656	3.3%	\$ 63,731	1.9%

Table 45 (cont'd)
BEEM Program Impacts – TRB, TRC & Incentives

Category	TRB/TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
Fluorescent T12 To T8 Standard	50.5	\$ 97,135	0.2%	\$ 1,925	0.0%	\$ 6,445	0.2%
Room Occupancy Sensors	4.0	\$ 93,678	0.2%	\$ 23,320	0.2%	\$ 23,320	0.7%
CFL	5.8	\$ 80,774	0.1%	\$ 13,841	0.1%	\$ 3,506	0.1%
LED Refrigerated Case Lighting	0.5	\$ 64,778	0.1%	\$ 130,260	1.3%	\$ 32,565	0.9%
VRF Air Conditioners	1.4	\$ 81,943	0.1%	\$ 56,980	0.6%	\$ 4,650	0.1%
Faucet Aerator	3.3	\$ 65,444	0.1%	\$ 19,873	0.2%	\$ 19,873	0.6%
Solar Water Heating	5.2	\$ 34,133	0.1%	\$ 6,600	0.1%	\$ 2,362	0.1%
Rid-A-Fridge (Refrigerator)	8.4	\$ 20,635	0.0%	\$ 2,465	0.0%	\$ 1,270	0.0%
Metal Halide	26.5	\$ 21,702	0.0%	\$ 818	0.0%	\$ 1,105	0.0%
CFL Specialty	3.3	\$ 22,434	0.0%	\$ 6,852	0.1%	\$ 6,852	0.2%
Clothes Washer	3.4	\$ 18,362	0.0%	\$ 5,390	0.1%	\$ 2,450	0.1%
Window AC W/ Trade In	3.1	\$ 11,621	0.0%	\$ 3,700	0.0%	\$ 1,980	0.1%
Transformer (Single-Phase)	3.7	\$ 5,064	0.0%	\$ 1,380	0.0%	\$ 420	0.0%
Ceiling Fans	5.4	\$ 3,038	0.0%	\$ 567	0.0%	\$ 2,205	0.1%
Refrigerator	1.5	\$ 2,797	0.0%	\$ 1,920	0.0%	\$ 1,300	0.0%
Rid-A-Fridge (Freezer)	19.8	\$ 1,487	0.0%	\$ 75	0.0%	\$ 75	0.0%
Custom - High Efficiency HVAC	0.0	\$ 0	0.0%	\$ 100,000	1.0%	\$ 7,500	0.2%
Accounting	0	\$ 0	0.0%	\$ 0	0.0%	\$ 733	0.0%
Total	6.1	\$ 58,650,985	100%	\$ 9,670,922	100%	\$ 3,444,904	100%

Expenditures

The original budget for the BEEM program as presented in Hawai'i Energy PY15 Annual Plan was \$4,711,800, split between Operations at \$1,150,000 and Incentives at \$3,561,800. Hawai'i Energy made several transfers between other program budgets until the final PY15 for the BEEM program was \$4,839,908 as shown in **Table 46**. By the end of the program year Hawai'i Energy had 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	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
BEEM Operations	\$1,393,523.65	\$1,395,000.00	99.89%	\$1,476.35	0.11%
BEEM Incentives	\$3,444,903.51	\$3,444,908.00	100.00%	\$4.49	0.00%
Total BEEM	\$4,838,427.16	\$4,839,908.00	99.97%	\$1,480.84	0.03%

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.



County of Hawai'i
Hawai'i Island

The County of Hawai'i is a leader in the movement to reduce light pollution across the globe for its harmful effects on ecosystems in parks and protected areas. Other counties, states and even international groups have followed their example in developing and integrating Dark Sky-friendly LED technology.

This year, the County replaced 6,291 streetlights with Dark Sky-friendly LEDs, resulting in significant glare reduction and benefits for native surrounding wildlife and the observatories on Mauna Kea. Evening traffic safety has also improved as the LEDs are much easier to differentiate from the yellow, low-pressure sodium bulbs that have always blended in with yellow caution signals. Following the County's example, many private organizations are pursuing similar lighting opportunities in parking lots and subdivision lighting throughout the island. The project is expected to save the County 1,615,439 kWh and reduce demand by 244.2 kW, or approximately \$583,735.00 per year in energy costs.

Accomplishments

ENERGY STAR® LED Fixtures

Both the quality and availability of LED products continued to increase this program year. This led 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. As the burgeoning LED market starts to mature, Hawai'i energy plans to move more LED lighting measures to the prescriptive rebate program making it easier for customers to understand and ultimately participate.

Energy Auction

A number of the proposed projects that Hawai'i Energy approved in the Energy Efficiency Auction in PY14 could not be completed within the program year, so Hawai'i Energy authorized the companies to complete the projects in PY15. Notable initiatives included a direct install program that was very successful in getting participation from grocery stores, a plug load program at schools, and smart thermostat program targeting small businesses. The completion of these projects generated 4,311,076 kWh in energy savings and 362 kW in demand savings in PY15.

Smart Business \$ense Program

Hawai'i Energy sought to provide a "one-stop shop" service by offering small business owners a variety of easy-to-install energy-saving upgrades all at once. The offer included replacement thermostats as well as hot water efficiency devices (pre-rinse spray nozzles and faucet aerators) and was targeted at a hard-to-reach market segment not currently

served by existing Hawai'i Energy programs. Initially designed for the Energy Auction in PY14, this initiative continued into PY15 and ultimately delivered 273 thermostats, 10 pre-rinse spray nozzles and 45 aerators, which accounted for a total of 4,053,983 lifetime kWh of energy savings.

Impacts

For PY15, the CBEEM Program achieved savings of 31,309,741 kWh (first year) and 4,186 kW savings with \$7,030,329 in incentives.

Table 47 provides a detailed breakout of the program.

- #1 Contributor to CBEEM – LED Lighting (62.1% Lifetime kWh)**
 LED Commercial Lighting was the largest contributor to CBEEM Program savings with lifetime energy and demand savings of 211,674,586 kWh and 2,959 kW, respectively.
- #2 Contributor to CBEEM – Energy Auction (15.4% Lifetime kWh)**
 The continuation of the Energy Auction projects started in PY14 was the second largest contributors to CBEEM Program savings with lifetime energy and demand savings of 52,369,113 kWh and 362 kW, respectively.

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	%
High Efficiency Lighting	380	2,959	70.7%	22,343,642	71.4%	211,674,586	62.1%	9.5	2.5	\$ 37,114,673	62.2%	\$ 14,814,309	58.9%	\$ 4,305,863	61.2%
Energy Auction	42	362	8.6%	4,311,076	13.8%	52,369,113	15.4%	12.1	5.6	\$ 7,880,094	13.2%	\$ 1,413,433	5.6%	\$ 1,409,431	20.0%
High Efficiency HVAC	106	353	8.4%	1,912,681	6.1%	36,345,190	10.7%	19.0	1.1	\$ 6,647,589	11.1%	\$ 5,908,390	23.5%	\$ 559,035	8.0%
Chiller Or Central Plant Controls	3	125	3.0%	891,607	2.8%	15,459,252	4.5%	17.3	2.3	\$ 2,689,689	4.5%	\$ 1,145,114	4.6%	\$ 170,064	2.4%
High Efficiency Water Heating	854	155	3.7%	772,620	2.5%	9,974,463	2.9%	12.9	1.7	\$ 2,073,147	3.5%	\$ 1,223,314	4.9%	\$ 334,933	4.8%
Guest Room Controls	6	142	3.4%	332,758	1.1%	4,991,369	1.5%	15.0	11.5	\$ 1,412,781	2.4%	\$ 123,028	0.5%	\$ 75,364	1.1%
Lighting Controls	2	29	0.7%	224,515	0.7%	4,092,585	1.2%	18.2	2.2	\$ 690,611	1.2%	\$ 320,612	1.3%	\$ 44,700	0.6%
Industrial Equipment	2	20	0.5%	176,623	0.6%	2,573,538	0.8%	14.6	9.8	\$ 446,069	0.7%	\$ 45,380	0.2%	\$ 45,380	0.6%
Appliances	6	29	0.7%	215,350	0.7%	2,244,273	0.7%	10.4	3.3	\$ 436,332	0.7%	\$ 131,303	0.5%	\$ 52,521	0.7%
Water Pumping	2	13	0.3%	106,073	0.3%	1,156,077	0.3%	10.9	0	\$ 207,352	0.3%	\$ 0	0.0%	\$ 27,570	0.4%
Refrigeration Controls	1	0	0.0%	22,795	0.1%	227,954	0.1%	10.0	2.2	\$ 32,362	0.1%	\$ 15,000	0.1%	\$ 5,468	0.1%
Total	1,404	4,186	100%	31,309,741	100%	341,108,400	100%	10.9	2.4	\$ 59,630,700	100%	\$ 25,139,882	100%	\$ 7,030,329	100%

Expenditures

The original budget for the CBEEM program as presented in Hawai'i Energy PY15 Annual Plan was \$7,301,459, split between Operations at \$1,170,000 and Incentives at \$6,131,459. Hawai'i Energy made several transfers between other program budgets until the final PY15 for the CBEEM program was \$8,200,329 as shown in **Table 48**. By the end of the program year Hawai'i Energy 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	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
CBEEM Operations	\$1,136,884.61	\$1,170,000.00	97.17%	\$33,115.39	2.83%
CBEEM Incentives	\$7,030,329.00	\$7,030,329.00	100.00%	\$ -	0.00%
Total BEEM	\$8,167,213.61	\$8,200,329.00	99.60%	\$33,115.39	0.40%

Business Energy Services & Maintenance (BESM)

Objective

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

Many large commercial facilities, such as hotels and multi-level office buildings, lack information to determine whether their chiller plants are running efficiently. Through this unique 100% incentive, the Program continued to encourage these customers to install metering and data logging systems that can provide real-time and trend data and reflect actual tons of cooling and measured efficiency (in kW per ton). The metering equipment makes it possible for customers to understand the current operational and performance metrics of their chiller plants and allows them to set meaningful energy efficiency goals and track progress toward those goals. In addition, Hawai'i Energy's engineers can use this data to compare the chiller performance of various businesses on O'ahu and the neighbor islands, in an effort to benchmark performance and track the energy efficiency improvements directly influenced by the data received from this program. The Program incentivized one central chiller plant benchmarking project in PY15, with a total incentive expenditure of \$80,433.

Water and Wastewater Facilities

Hawai'i Energy continued its commitment to the water and wastewater sector in Hawai'i and to assisting in promotion of the water-energy nexus. Support for this initiative took two forms: financial incentives for water and energy saving projects, and education/training for industry professionals.

Water and wastewater facilities are 24/7 facilities that have specific technical requirements, high capital costs and long procurement process. After a successful collaboration with the Hawai'i Department of Water Supply (DWS) in PY14 on Phase 1 of their island-wide leak detection system, Hawai'i Energy committed to 50% matching funds in PY15 for procurement and installation of additional leak detectors in order to maximize the coverage area. Phase II included the deployment of 423 leak loggers and antennas, bringing the total number of loggers to 883. Another significant incentive was given to a small, private water company, also on the Big Island, for installation of a pressure-reducing valve (PRV) station. The water company, which serves a private residential development, has dealt with problems related to excessively high water pressure in its system for years. Not only does the high water pressure cause leaks in the system, but each subsequent point of failure then bleeds water at an excessive rate, often undetected. The PRV mitigates both problems, while still delivering the required water pressure to customers.

Impacts

For PY15, the BESM program achieved energy savings of 2,697,249 lifetime kWh, primarily from the completion of the leak detection system deployed on the Island of Hawai'i. Hawai'i Energy expended \$386,715 in incentives in this program, mostly driven at encouraging future energy efficiency projects.

Although BESM projects do not always provide direct savings, the studies and actions are designed to set the groundwork for saving in the future. This year a number of projects happened to immediately solve a problem and provided savings in the first year. In relative terms, 2.6% of Hawai'i Energy's BESM incentives (\$386,715 out of \$14,754,368) captured only 0.3% lifetime kWh, but this program reached customers that would otherwise have not participated in the energy efficiency programs. **Table 49** provides a detailed breakout of BESM impacts.

- **#1 Contributor to BESM – Water and Wastewater Facilities (82.2% Lifetime kWh)**

Water and wastewater facility improvements on the neighbor islands were the largest contributor to the BESM Program with lifetime energy savings of 2,697,249 kWh. On the island of Hawai'i, the Program helped fund a system-wide leak detection project for the main water supply system and the purchase of a pressure-reducing valve on a small, private water supply system. In addition, the Program assisted with some process changes resulting from an energy study for a small water company on Maui.

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	%
Custom - High Efficiency Water Pumping	1	25	100.0%	221,636	36.1%	2,216,363	82.2%	10.0	1.5	\$ 398,545	84.1%	\$ 271,138	59.2%	\$ 130,000	33.6%
Custom - High Efficiency HVAC	2	0	0.0%	382,692	62.3%	382,692	14.2%	1.0	0.7	\$ 61,613	13.0%	\$ 85,812	18.7%	\$ 85,812	22.2%
Energy Study	10	0	0.0%	9,819	1.6%	98,194	3.6%	10.0	0.3	\$ 13,941	2.9%	\$ 50,000	10.9%	\$ 73,640	19.0%
Custom - Submetering	3	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 1,500	0.3%	\$ 37,650	9.7%
Energy Audits	6	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 30,000	6.5%	\$ 19,750	5.1%
Custom - Benchmarking	12	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 19,864	4.3%	\$ 19,864	5.1%
Custom - Water Pumping	1	0	0.0%	0	0.0%	0	0.0%	0	0	\$ 0	0.0%	\$ 0	0.0%	\$ 20,000	5.2%
Total	35	25	100%	614,147	100%	2,697,249	100%	4.4	1.0	\$ 474,099	100%	\$ 458,314	100%	\$ 386,715	100%

Expenditures

The original budget for the BESM program as presented in Hawai'i Energy PY15 Annual Plan was \$1,400,000, split between Operations at \$620,000 and Incentives at \$780,000. Hawai'i Energy made several transfers between other program budgets until the final PY15 for the BESM program was \$592,991 as shown in **Table 50**. By the end of the program year Hawai'i Energy distributed nearly all BESM operation and incentive budgets due to the popularity and demand for the Program offerings, in particular the work with water and wastewater facilities on Hawai'i Island. See **Table 50** for details.

Table 50 BESM Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
BESM Operations	\$201,037.48	\$206,275.00	97.46%	\$5,237.52	2.54%
BESM Incentives	\$386,715.40	\$386,716.00	100.00%	\$0.60	0.00%
Total BEEM	\$587,752.88	\$592,991.00	99.12%	\$5,238.12	0.88%

Business Hard-To-Reach (BHTR)

Objective

The objective of this program is 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

Small Business Direct Install Lighting Retrofits

The Small Business Direct Install Lighting (SBDIL) program saw its most successful year since inception. This offering targets 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 provides full energy-efficient lighting retrofits to restaurants and small businesses in Hawai'i, Honolulu and Maui counties at no cost to the customer. Trade allies recruit small businesses to participate, perform audits and execute the retrofits.

This direct installation approach achieved customer level energy and demand savings of 137,603,431 lifetime energy and 1,958kW in PY15. At an average utility rate of \$0.31 per kWh this is a \$42,613,306 in lifetime energy cost reduction for the businesses!



Keoki's Coffee and Donkey Balls

Kailua-Kona, Hawai'i

This quaint coffee and gift shop was one of many businesses that received a free lighting retrofit through the Hawai'i Energy Small Business Direct Install Lighting program this year. Keoki's Coffee upgraded to LEDs throughout their store. The store owner Jeanne Kimi was so happy the results she wrote a note to Hawai'i Energy saying "With the change of my lights to LED, through the SBDIL program, my HELCO bill over the last two months has been down \$128 - \$150 less. Now with this new AC, I hope to save even more."

Impacts

For PY15, the BHTR program achieved savings of 151,956,594 lifetime kWh and 2,157 kW savings with \$3,892,420 in incentives. This is by far the most successful year for this program since its inception. **Table 51** provides the detailed measures contributing to this program.

Table 51 BHTR Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Yr)	%	Program Energy (kWh – Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
LED Specialty	17,499	614	28.5%	2,921,274	27.6%	43,787,542	28.8%	15.0	11.0	\$ 9,064,196	29.1%	\$ 825,589	21.2%	\$ 825,589	21.2%
LED Linear	8,201	543	25.2%	2,353,107	22.3%	32,943,496	21.7%	14.0	6.2	\$ 7,076,927	22.7%	\$ 1,138,030	29.2%	\$ 1,138,030	29.2%
Fluorescent T12 To T8 Low Wattage	11,341	502	23.3%	2,184,341	20.7%	30,580,771	20.1%	14.0	6.6	\$ 6,559,929	21.0%	\$ 997,176	25.6%	\$ 997,176	25.6%
Custom - High Efficiency Lighting	1,403,919	209	9.7%	1,551,700	14.7%	21,723,807	14.3%	14.0	10.3	\$ 3,939,713	12.6%	\$ 381,824	9.8%	\$ 381,824	9.8%
LED Omni Directional	4,078	196	9.1%	1,032,139	9.8%	15,470,307	10.2%	15.0	21.0	\$ 3,090,173	9.9%	\$ 146,808	3.8%	\$ 146,808	3.8%
Fluorescent T12 To T8 Standard	964	46	2.1%	208,303	2.0%	2,916,243	1.9%	14.0	5.8	\$ 615,697	2.0%	\$ 106,160	2.7%	\$ 106,160	2.7%
LED Refrigerated Case Lighting	796	24	1.1%	171,139	1.6%	2,567,079	1.7%	15.0	1.8	\$ 466,464	1.5%	\$ 252,180	6.5%	\$ 252,180	6.5%
Reach-In Freezer	15	4	0.2%	36,375	0.3%	436,499	0.3%	12.0	10.7	\$ 74,568	0.2%	\$ 6,964	0.2%	\$ 4,150	0.1%
CFL	215	6	0.3%	30,567	0.3%	427,940	0.3%	14.0	31.7	\$ 88,636	0.3%	\$ 2,795	0.1%	\$ 2,795	0.1%
Custom	2	0	0.0%	25,834	0.2%	387,516	0.3%	15.0	0	\$ 52,739	0.2%	\$ 0	0.0%	\$ 6,417	0.2%
Steam Cooker	3	7	0.3%	32,061	0.3%	384,736	0.3%	12.0	22.3	\$ 81,447	0.3%	\$ 3,654	0.1%	\$ 2,250	0.1%
Combination Oven	1	3	0.1%	12,632	0.1%	151,586	0.1%	12.0	159.4	\$ 31,880	0.1%	\$ 200	0.0%	\$ 500	0.0%
LED Exit Signs	64	2	0.1%	8,554	0.1%	128,305	0.1%	15.0	8.9	\$ 25,998	0.1%	\$ 2,935	0.1%	\$ 2,935	0.1%
Reach-In Refrigerator	4	0	0.0%	2,360	0.0%	28,322	0.0%	12.0	0.8	\$ 4,960	0.0%	\$ 6,117	0.2%	\$ 1,200	0.0%
Custom Lighting	16	0	0.0%	844	0.0%	11,812	0.0%	14.0	8.3	\$ 1,589	0.0%	\$ 192	0.0%	\$ 192	0.0%
Ice Machine	1	0	0.0%	886	0.0%	10,632	0.0%	12.0	0.5	\$ 1,860	0.0%	\$ 3,700	0.1%	\$ 100	0.0%
Contractor Reward	9	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 6,509	0.2%	\$ 6,509	0.2%
Accounting	1	0	0.0%	0	0.0%	0	0.0%	0	0	\$ 0	0.0%	\$ 0	0.0%	\$ 332	0.0%
Ladder Charge	2,681	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 17,275	0.4%	\$ 17,275	0.4%
Total	1,449,810	2,157	100%	10,572,117	100%	151,956,594	100%	14.4	8.0	\$ 31,176,778	100%	\$ 3,898,107	100%	\$ 3,892,420	100%

Small Business Direct Install Lighting Program – Customer-Level Impacts

Customers participating in the SBDIL program are projected to save a combined \$2,960,998 in operating expenses per year and \$42,613,306 over the life of the lighting measures installed. This is money that they can invest into their businesses, driving more job growth and profitability. See **Table 52** for further details.

Table 52 SBDIL Customer Level Impacts by Island							
	Hawai'i	Lāna'i	Maui	Moloka'i	O'ahu	Total	Program Cost/ kWh
SBDIL – Lighting Retrofits							
Customers	117	0	29	0	450	596	
Measures	641	0	189	0	3,145	3,975	
kW Reduction	351	0	51	0	946	1,348	
kWh - First Year	1,652,952	0	274,276	0	4,079,719	6,006,946	\$ 0.464
kWh - Life	23,893,791	0	3,937,031	0	58,183,728	86,014,550	\$ 0.032
Incentives	\$ 652,307	\$ 0	\$ 97,276	\$ 0	\$ 2,039,829	\$ 2,789,412	
SBDIL – Restaurant Lighting							
Customers	37	0	15	0	168	220	
Measures	253	0	90	0	1,111	1,454	
kW Reduction	178	0	43	0	389	611	
kWh - First Year	851,707	0	339,617	0	2,363,144	3,554,467	\$ 0.306
kWh - Life	12,471,053	0	4,867,319	0	34,250,509	51,588,881	\$ 0.021
Incentives	\$ 234,550	\$ 0	\$ 94,030	\$ 0	\$ 759,479	\$ 1,088,060	
Total							
Customers	154	0	44	0	618	816	
Measures	894	0	279	0	4,256	5,429	
kW Reduction	529	0	94	0	1,335	1,958	
kWh - First Year	2,504,659	0	613,892	0	6,442,863	9,561,413	\$ 0.406
kWh - Life	36,364,844	0	8,804,350	0	92,434,237	137,603,431	\$ 0.028
Incentives	\$ 886,857	\$ 0	\$ 191,306	\$ 0	\$ 2,799,309	\$ 3,877,472	
Financial Benefits							
Average "G" Rate	\$ 0.324	\$ 0.344	\$ 0.285	\$ 0.365	\$ 0.231	\$ 0.310	
Annual Savings	\$ 810,533	\$ 0	\$ 174,763	\$ 0	\$ 1,486,433	\$ 2,960,998	
Lifetime Savings	\$ 11,768,027	\$ 0	\$ 2,506,422	\$ 0	\$ 21,325,503	\$ 42,613,306	
Simple Payback (years)	1.1	0	1.1	0	1.9	1.3	
IRR	91%	0%	91%	0%	53%	76%	

Expenditures

The original budget for the BHTR program as presented in Hawai'i Energy's PY15 Annual Plan was \$3,062,215, split between Operations at \$620,000 and Incentives at \$2,442,215. Hawai'i Energy made several transfers between other program budgets until the final PY15 budget for the BHTR program was \$4,460,872.71 as shown in **Table 53**. By the end of the program year Hawai'i Energy distributed nearly all BHTR operation and incentive budgets due to the popularity and demand for the Program offerings, in particular the Small Business Direct Install Lighting offer. **See Table 53** for details.

See **Table 53** for details.

Table 53 BHTR Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
BHTR Operations	\$536,761.78	\$566,164.71	94.81%	\$29,402.93	5.19%
BHTR Incentives	\$3,892,420.37	\$3,894,708.00	99.94%	\$2,287.63	0.06%
Total BHTR	\$4,429,182.15	\$4,460,872.71	99.29%	\$31,690.56	0.71%

RESIDENTIAL PROGRAM

Overall Impacts

Impacts

For PY15, Hawai'i Energy's Residential program achieved savings of 53,514,217 kWh (first year), 509,158,908 lifetime kWh energy savings and 10,532 kW savings with \$9,364,982 in incentives. In relative terms, 39% of Hawai'i Energy's incentives (\$9,364,982 of \$24,119,351 in direct incentives) captured 38% of the program's lifetime energy savings (509,158,908 of 1,327,245,454 kWh) and 52% of the program's demand savings (10,532 of 20,253 kW).

See **Table 54** for a summary of the Residential Program's impacts.

Table 54 Residential Program Impacts Summary															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1 st Year)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
REEM	5,053,918	9,885	93.9%	51,076,574	95.4%	492,033,352	96.6%	9.6	3.1	\$ 93,788,203	96.6%	\$ 30,427,471	96.9%	\$ 8,739,792	93.3%
RHTR	43,209	612	5.8%	2,139,060	4.0%	15,566,539	3.1%	7.3	4.9	\$ 3,025,731	3.1%	\$ 615,017	2.0%	\$ 451,303	4.8%
RESM	1,150	34	0.3%	291,973	0.5%	1,459,867	0.3%	5.0	0.7	\$ 246,460	0.3%	\$ 345,000	1.1%	\$ 172,500	1.8%
CESH	423	1	0.0%	6,610	0.0%	99,150	0.0%	15.0	13.7	\$ 18,993	0.0%	\$ 1,388	0.0%	\$ 1,388	0.0%
Total	5,098,700	10,532	100%	53,514,217	100%	509,158,908	100%	9.5	3.1	\$ 97,079,387	100%	\$ 31,388,877	100%	\$ 9,364,982	100%

Highlights

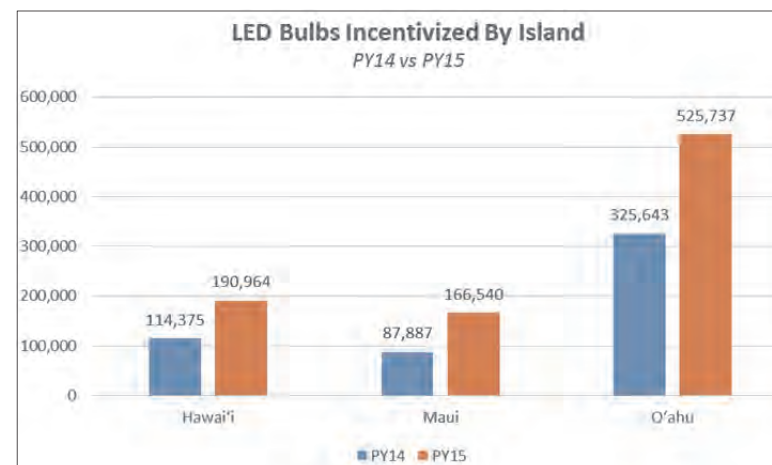
Perhaps the most significant change from PY14 to PY15 in the residential sector was the transition from CFLs to LEDs as the optimal energy-saving lighting measure. As technology improved and products became more widely available, Hawai'i Energy shifted its focus to promote LEDs, which offer more energy savings and significantly greater lifespan than their CFL counterparts. Whereas in PY14 LEDs accounted for 14% of the residential portfolio's first-year energy savings, in PY15 they made up 32% of the program's savings. CFLs meanwhile accounted for 57% of PY14's residential energy savings, to just 26% in PY15. It is worth noting that CFLs remain a significant source of energy and demand savings as Hawai'i Energy accelerates the phase-out of inefficient incandescent bulbs.

Another highlight from PY15 was the continued success of the Residential Hard-To-Reach (RHTR) program, whose Multifamily Direct Install (MFDI) program made great strides in its first full year of operation after its initial implementation mid-PY14. The program, which brings energy-efficient technologies to multifamily housing and areas with high concentrations of low-income residents, nearly tripled the number of individual units reached and more than tripled the first-year energy savings over last year.

Lighting Transition: CFL to LED

The shift in Hawai'i Energy's portfolio from CFLs to LEDs reflected market-wide trends that saw LED bulbs become cheaper and more widely available while producing higher quality light output. The effect of these market trends was an increase in LED sales, leading to increased savings and allowing for lower per-unit incentive levels. Whereas in PY14 the program offered an average incentive of \$5.09 per bulb, resulting in 527,905 units sold, in PY15 the program was able to achieve 874,680 in bulb sales while offering an average incentive of just \$3.43 per bulb.

Dominating the residential LED market were omnidirectional 7-13 Watt A19 bulbs, which consumers often purchase to replace traditional 60-100 Watt incandescent bulbs. These A19 LEDs made up 70% of the units incentivized in PY15. LEDs' increased popularity was seen across all islands, with each island seeing at least a 60% boost in rebated LEDs over PY14.



Multifamily Direct Install Program

The Energy Smart for Homes (ES4H) program saw continued success in its first full year of operation, completing installations of energy-efficient technologies in 4,225 individual residential units at 61 participating multifamily properties. The program was especially successful in reaching the individually-metered, individually-owned multifamily market through its "Clip N Save" flyer and by reaching out directly to homeowners associations.

By distributing these "Clip N Save" flyers, Hawai'i Energy's Energy Smart 4 Homes program made significant strides in reaching the individually-owned, individually-metered multifamily market.

Go Green For FREE!
Residents of **PROPERTY NAME** are eligible for the FREE energy efficient program **ENERGY SMART 4 HOMES**

Presented by **Hawai'i Energy**
YOUR CONSERVATION & EFFICIENCY PROGRAM

FREE Water Fixtures

FREE SMART Power Strip

FREE Lighting

FREE installation included
REDUCE electric utility costs
LOWER Water and sewer fees
CONSERVE ENERGY

The implementation & delivery of this program has been authorized by the Property Owner, Manager, and/or Management Company of **MANAGEMENT COMPANY**
2014-15 Water Rd. Box 2000, HONOLULU, HI 96813

Please see reverse for additional information.

YES!! I would like to save energy and lower my monthly utility bills by participating in this program.

Unit No. _____

Print Name _____

Signature _____

Preferred day(s) of installation*
(circle all that apply): Mon Tue Wed Thu Fri Sat
*while all efforts will be made to accommodate the indicated preference(s), the Program cannot guarantee availability on the days requested.

~ Clip and submit completed form to Site Manager ~

Overall Expenditures

Expenditures

In PY15 the program distributed 99.99% of residential incentive funds (based on final budget allocations), reaching 88.5% of the first year kWh savings target. PY15 ended with a total incentive spend of \$9,364,982.39, leaving a surplus of just \$658.61. This effort reflects Hawai'i Energy's ability to rapidly adjust incentive offerings and quickly adjust to market needs and drivers. As the program year progressed, Hawai'i Energy responded to these market trends by transferring incentive allocations from residential to business programs and expanding or curtailing initiatives as needed.

The Residential Energy Efficiency Measures (REEM) program, which represents the backbone of the residential portfolio, was especially successful in responding to the marketplace and distributing its incentives in the most efficient manner possible. With a diverse portfolio including lighting, water heating and peer group comparison reports (among others), the REEM program was able to tailor its incentive offerings according to the needs of the market. Most importantly, these incentives led to the realization of 93% of the REEM program's annual kWh savings target.

See **Table 55** for further details on final budgets and spending.

Table 55 Residential Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
Residential Programs					
Operations and Management					
REEM	\$2,411,366.09	\$2,413,000.00	99.93%	\$1,633.91	0.07%
CESH	\$21,515.00	\$22,000.00	97.80%	\$485.00	2.20%
RESM	\$33,945.11	\$100,000.00	33.95%	\$66,054.89	66.05%
RHTR	\$353,294.59	\$357,594.00	98.80%	\$4,299.41	1.20%
Total Residential Programs	\$2,820,120.79	\$2,892,594.00	97.49%	\$72,473.21	2.51%
Residential Evaluation	\$171,886.20	\$200,212.00	85.85%	\$28,325.80	14.15%
Residential Outreach	\$532,226.60	\$564,281.00	94.32%	\$32,054.40	5.68%
Total Residential Non-Incentives	\$3,524,233.59	\$3,657,087.00	96.37%	\$132,853.41	3.63%
Residential Incentives					
REEM	\$8,739,791.56	\$8,739,792.00	100.00%	\$0.44	0.00%
CESH	\$1,388.03	\$1,389.00	99.93%	\$0.97	0.07%
RESM	\$172,500.00	\$172,500.00	100.00%	\$0.00	0.00%
RHTR	\$451,302.80	\$451,960.00	99.85%	\$657.20	0.15%
Subtotal Residential Incentives	\$9,364,982.39	\$9,365,641.00	99.99%	\$658.61	0.01%
Residential Transformational	\$1,472,014.11	\$1,490,632.00	98.75%	\$18,617.89	1.25%
Total Residential Incentives	\$10,836,996.50	\$10,856,273.00	99.82%	\$19,276.50	0.18%
Total Residential Programs	\$14,361,230.09	\$14,513,360.00	98.95%	\$152,129.91	1.05%

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, Hawai'i 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 Hawai'i Energy by signing on as Clean Energy Allies, a program initiated in PY14.

Trade Ally Program Outreach and Feedback

Hawai'i Energy solicits feedback on a daily basis when contractors call in for work orders or when the program delivers applications to retailers. These conversations with trade allies provide insight into how Hawai'i Energy can support them and has led to developing self-service materials and the use of web tools within the trade ally program.

Program representatives engaged in multiple retail and commercial events with our partners in order to spread the word about Hawai'i Energy offerings. One in particular was a "Counter Day" event in February, held with local distributors Ferguson and Servco at Ferguson's retail facility, highlighting the benefits of the Geospring™ hybrid heat pump water heater. The target audience for this event was the plumbing community; reaching plumbers where they get their supplies allowed Program staff to educate them on the specific customer benefits of heat pump technology and ultimately brought new contractors into our program. Additionally, Hawai'i Energy continues to host semi-annual solar contractor meetings in O'ahu, Maui and Hawai'i and remains active with the Hawai'i Solar Energy Association (HSEA).

Ongoing Quality Assistance

In PY15, 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.

See **Table 56** for details on residential project drivers and referrals

Table 56 Residential Project Sources				
Trade Allies	Customer Level Demand Savings (kW)	Customer Level Energy Savings (kWh First Year)	Customer Level Energy Savings (kWh - Life)	Contribution to Customer Level Savings - Life
Costco	2,541	17,904,712	221,889,813	37.7
Home Depot	1,868	13,310,264	120,853,122	20.6
City Mill	339	2,378,498	25,648,490	4.4
Alternate Energy	398	1,277,863	19,146,345	3.3
Lowe's	140	1,175,673	12,652,072	2.2
Sears	44	731,439	9,790,194	1.7
Alternate Energy - O'ahu	106	477,960	9,424,740	1.6
Ponchos Solar Service- O'ahu	102	475,361	8,887,210	1.5
Techniart, Inc.	62	725,392	7,479,448	1.3
Honeywell MFDI Field Technicians	422	1,275,588	6,447,113	1.1
Pono Home	103	485,548	5,341,028	0.9
Solar Help Hawai'i	57	261,928	4,952,565	0.8
Air Source LLC	94	313,742	4,706,130	0.8
Haleakala Solar - O'ahu	50	225,761	4,399,435	0.7
Haleakala Solar Inc. - Maui	50	235,028	4,353,205	0.7
Best Buy	14	288,611	4,015,266	0.7
Hawaiian Solar & Plumbing	42	190,175	3,758,680	0.6
Remaining Allies	5,676	20,445,629	114,087,730	19.4
Residential Program Totals	12,108	62,179,170	587,832,585	100

Residential Energy Efficiency Measures (REEM)

Objectives

The Residential Energy Efficiency Measures program represents the largest program within Hawai'i Energy's residential portfolio, both in terms of incentives distributed and energy savings achieved. The REEM program consisted of six major initiatives in PY15:

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

Each initiative includes numerous energy efficiency measures, the savings from which are substantiated by an independent evaluation, measurement and verification (EM&V) process.

Impacts

In PY15, as in PY14, three measures dominated the first-year savings derived from the REEM program and the residential portfolio at large: CFL and LED lighting, as well as peer group comparison reports.

As mentioned above, in PY15, LED lighting surpassed CFLs as the most impactful lighting measure, reflecting nationwide market trends. Meanwhile, Hawai'i Energy ramped up its peer group comparison report contract in PY15, nearly doubling the first-year savings impact (10,938,766 kWh vs 5,756,406 kWh) over PY14's program.

When examining *lifetime* energy savings, LEDs dominate the REEM portfolio even more. Their 15-year average measure life means that savings are realized for a longer period than CFLs, whose six-year average life limits their lifetime impact. In contrast, the peer group comparison reports are attributed energy savings for only one year, limiting their deemed lifetime impact.

The three largest contributors to the REEM Program's lifetime savings were:

- **#1 Contributor to REEM – LEDs (52.4% of Lifetime kWh – Up from 28.1% in PY14)**

For the first time, LEDs have surpassed CFLs as the biggest contributor to residential energy efficiency programs. LEDs were the largest contributor to the REEM Program's lifetime savings with lifetime energy and demand savings of 257,634,638 kWh and 2,443 kW, respectively, and accounted for 33.6% of REEM first year energy savings, up from 15.1% in PY14. The overall unit count of LEDs incentivized increased to 874,680 from 527,905 in PY14.



Hawai'i Energy's Solar Water Heating program continued to contribute a significant portion of the residential portfolio's savings in PY15. Hawai'i Energy inspects 50% of its rebated solar water heating installations, ensuring quality, longevity and optimal efficiency.

- **#2 Contributor to REEM – CFLs (16.9% of Lifetime kWh – Down from 43.8% in PY14)**

CFLs were the second largest contributor to the REEM Program savings with lifetime energy and demand savings of 83,114,575 kWh and 1,956 kW, respectively. Units incentivized decreased to 932,203 in PY15, from 1,328,146 in PY14.

- **#3 Contributor to REEM – Solar Water Heating (11.2% of Lifetime kWh – Up from 9.3% in PY14)**

Solar water heating remains a significant contributor to Hawai'i Energy's residential portfolio and for many homes in Hawai'i, it represents the single greatest opportunity to reduce consumption and save money on their electricity bill. With a 20-year average measure life, it is the third largest contributor to the REEM program's lifetime energy savings. Whereas solar water heating only accounted for 5.4% of PY15's first year savings, it accounted for 11.2% of its lifetime savings. 1,537 Solar Water Heaters receiving rebates in PY15, down slightly from 1,689 in PY14.

See **Table 57** for a full breakdown of REEM measures, incentives and their impacts.

Table 57
REEM Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
LED Lighting	874,680	2,443	24.70%	17,175,643	33.60%	257,634,638	52.40%	15	5.5	\$47,129,012	50.30%	\$8,528,130	28.00%	\$2,997,553	34.30%
CFL	932,203	1,956	19.80%	13,852,429	27.10%	83,114,575	16.90%	6	10.9	\$15,310,869	16.30%	\$1,398,305	4.60%	\$979,875	11.20%
Solar Water Heating	1,537	618	6.30%	2,763,115	5.40%	55,262,307	11.20%	20	1.1	\$10,724,899	11.40%	\$10,144,200	33.30%	\$1,287,700	14.70%
VRF Air Conditioners	3,100	816	8.30%	2,690,685	5.30%	40,360,273	8.20%	15	1.6	\$9,679,076	10.30%	\$6,107,561	20.10%	\$528,400	6.00%
Refrigerator w/ Trade In	2,335	66	0.60%	1,525,422	2.90%	21,355,916	4.30%	14	4.2	\$3,192,938	3.40%	\$790,800	2.60%	\$245,975	2.60%
Peer Group Comparison	3,211,849	3,605	36.50%	10,938,766	21.40%	10,938,766	2.20%	1	1.2	\$2,608,174	2.80%	\$2,185,929	7.20%	\$2,185,929	25.00%
Rid-A-Fridge (Refrigerator)	425	14	0.10%	355,989	0.70%	4,983,843	1.00%	14	9.2	\$738,902	0.80%	\$80,645	0.30%	\$41,540	0.50%
Whole House Fan	506	222	2.20%	162,105	0.30%	3,242,105	0.70%	20	29.5	\$1,789,451	1.90%	\$60,720	0.20%	\$37,950	0.40%
Residential Custom	5	11	0.10%	305,114	0.60%	2,746,025	0.60%	9	6.3	\$428,316	0.50%	\$68,350	0.20%	\$68,350	0.80%
LED Omni Directional	7,754	22	0.20%	152,627	0.30%	2,289,407	0.50%	15	1.9	\$418,800	0.40%	\$217,112	0.70%	\$0	0.00%
Heat Pump Water Heater	143	26	0.30%	205,471	0.40%	2,054,712	0.40%	10	1.5	\$378,850	0.40%	\$257,400	0.80%	\$40,700	0.50%
Window AC w/ Trade In	1,175	27	0.30%	100,745	0.20%	1,208,942	0.20%	12	3.3	\$273,201	0.30%	\$83,065	0.30%	\$44,780	0.50%
LED Specialty	3,609	10	0.10%	70,995	0.10%	1,064,922	0.20%	15	1.3	\$194,806	0.20%	\$144,360	0.50%	\$0	0.00%
Water Cooler Timers	2,875	0	0.00%	128,446	0.30%	1,025,841	0.20%	8	3.5	\$149,718	0.20%	\$43,125	0.10%	\$43,125	0.50%
VFD Pool Pumps	193	1	0.00%	100,887	0.20%	1,008,872	0.20%	10	1.3	\$146,594	0.20%	\$115,800	0.40%	\$28,950	0.30%
Clothes Washer	453	11	0.10%	81,648	0.20%	979,781	0.20%	12	3.6	\$178,250	0.20%	\$49,830	0.20%	\$22,650	0.30%
Solar Attic Fan	304	5	0.10%	143,655	0.30%	718,273	0.10%	5	2.5	\$113,088	0.10%	\$45,600	0.10%	\$15,200	0.20%
Advance Power Strips	1,492	15	0.20%	134,105	0.30%	670,526	0.10%	5	0	\$112,944	0.10%	\$0	0.00%	\$0	0.00%
Rid-A-Fridge (Freezer)	54	2	0.00%	40,579	0.10%	568,110	0.10%	14	10	\$84,228	0.10%	\$8,445	0.00%	\$4,465	0.10%
Refrigerator	77	1	0.00%	7,071	0.10%	98,933	0.10%	14	1.5	\$18,890	0.00%	\$12,320	0.10%	\$3,850	0.30%
Ceiling Fans	1,265	13	0.10%	71,921	0.10%	359,603	0.10%	5	5.6	\$64,217	0.10%	\$11,385	0.00%	\$44,275	0.50%
Faucet Aerator	578	0	0.00%	47,309	0.10%	236,544	0.00%	5	0	\$35,988	0.00%	\$0	0.00%	\$0	0.00%
Showerhead	289	0	0.00%	21,463	0.00%	107,314	0.00%	5	0	\$16,327	0.00%	\$0	0.00%	\$0	0.00%
Room Occupancy Sensors	21	0	0.00%	383	0.00%	3,063	0.00%	8	1.6	\$663	0.00%	\$420	0.00%	\$105	0.00%
Accounting – Custom Energy Kits	289	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$0	0.00%	\$12,254	0.10%
Accounting-Freight	2,469	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$0	0.00%	\$32,211	0.40%
Accounting	1	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$0	0.00%	(\$15)	0.00%
Incentives For Kits and/or Pop-Up Retail	3,595	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$73,970	0.20%	\$73,970	0.80%
Total	5,053,918	9,885	100%	51,076,574	100%	492,033,352	100%	9.6	3.1	\$93,788,203	100%	\$30,427,471	100%	\$8,739,792	100%

Expenditures

In PY15, the REEM program utilized virtually 100% of available incentive funds, based on final budget allocations. This final allocation reflects the program's ability to constantly adjust its incentives and budgets in response to market needs and drivers. See **Table 58** for details.

*Percent spent based on final budget allocations.

Table 58 REEM Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
REEM Operations	\$2,411,366.09	\$2,413,000.00	99.93%	\$1,633.91	0.07%
REEM Incentives	\$8,739,791.56	\$8,739,792.00	100.00%	\$0.44	0.00%
Total REEM	\$11,151,157.65	\$11,152,792.00	99.99%	\$1,634.35	0.01%

Accomplishments

Popular Offerings

Figure 8 summarizes consumer participation for selected REEM measures.

Quality Customer Support

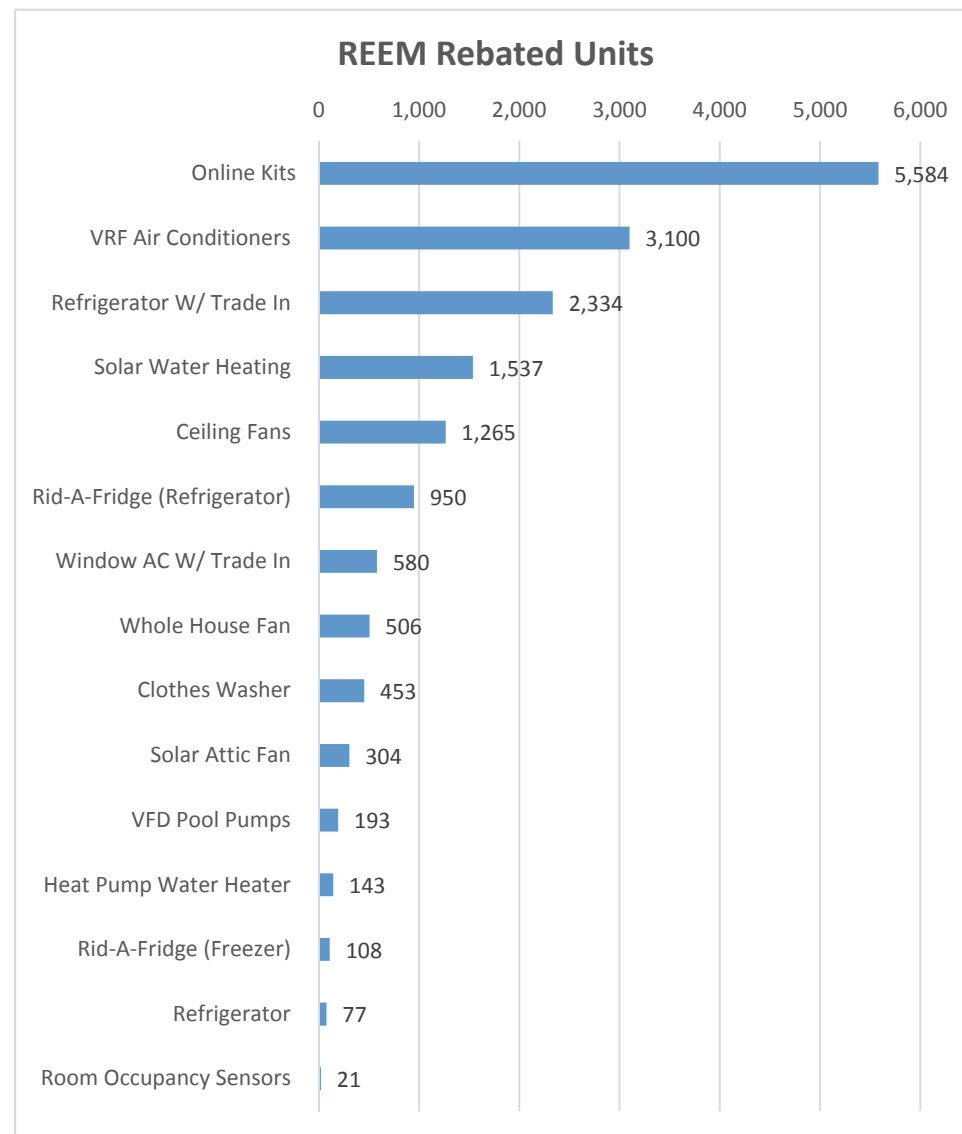
During PY15, Hawai'i Energy's residential call center handled 12,009 customer calls. More than any other topic, customers called to discuss ENERGY STAR® rebate programs, typically seeking to learn more about these technologies and rebate processes. The second-most discussed topic was Hawai'i Energy's solar programs, as customers sought to understand different solar technologies and the benefits of solar water heating, followed by peer group comparison reports. Customers that received these reports often called to discuss options for reducing their energy consumption and lowering their electricity bills.

Customer Experience Management

PY15 marked Hawai'i Energy's fifth year of implementing its customer experience management tool, Medallia. When a customer receives a Hawai'i Energy rebate, Medallia sends them an automated email survey that solicits feedback on every phase of their experience, including field service, satisfaction with the rebate process and overall willingness to recommend Hawai'i Energy's programs. The Program sent out 4,797 surveys in PY15, which generated a response rate of 26% and an overall satisfaction rating averaging 9.1 out of 10.

In terms of official complaints, Hawai'i Energy logged only four in PY15, down from nine in PY14 and six in PY13. Complaints revolved around customer perception issues and at the end of their calls the customers left with a better understanding of the program's value.

Figure 8



Accomplishments by Measure Offering

High-Efficiency Water Heating (HEWH)

For PY15, the HEWH program achieved a savings of 57,317,020 lifetime kWh and 644 kW savings with \$1,328,400 in incentives.

- Solar Water Heating (SWH) Instant Rebate and Interest Buy-Down Program – As mentioned above, thanks to its 20-year deemed measure life, solar water heating is the third biggest contributor to REEM lifetime energy savings. With 1,537 solar thermal systems installed and incentivized either directly or through participating lenders, the Program saw steady performance in PY15. At the close of the year, the Program had 72 participating contractors approved to install rebated solar water heaters.

The solar interest buy-down option (SIBD) remained a selling tool for some the program's participating contractors, however, when given the option, customers typically opt for a no-financing solution. PY15 saw just 11 installations of solar water heaters take advantage of this financing option, all in Hawai'i and Maui counties.

Solar water heating has successfully permeated Hawai'i's residential market to a point that many eligible homes have installed systems, despite the ongoing perception that photovoltaic (PV) distributed generation should be prioritized (in terms of load-order) over demand-side measures. Recognizing this, Hawai'i Energy has adjusted its incentives and continued its solar water heater tune-up program to ensure the quality, longevity and energy savings of the systems installed across the islands. The Tune-Up program is described in greater detail below in the Residential Energy Services and Maintenance (RESM) section.

- Solar Water Heating Inspections – 50% of installations were inspected in PY15. 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 administrative costs, while not sacrificing quality.
- Heat Pump Water Heaters – Although heat pump water heaters represented a small portion of the HEWH program, with just 143 units incentivized, they remain a viable option for smaller households. Hawai'i Energy continues to work with retailers to increase exposure and spark demand for this valuable technology.
- Participating Contractor Meetings – Hawai'i Energy continues to meet regularly with its network of Participating Contractors on O'ahu , Maui and Hawai'i islands. These half-day sessions provide a forum to update contractors on program results, review existing offerings and go over the PV Water Heating offering which was new for PY15. The meetings provide Hawai'i Energy with an invaluable opportunity to review best practices and receive honest program feedback.

See **Table 59** for details of the High-Efficiency Water Heating offers.

Table 59 REEM High Efficiency Water Heating Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1 st Yr.)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost (\$)	%	Incentives	%
Solar Water Heating	1,537	618	95.9%	2,763,115	93.1%	55,262,307	96.4%	20.0	1.1	\$ 10,724,899	96.6%	\$ 10,144,200	97.5%	\$ 1,287,700	96.9%
Heat Pump Water Heater	143	26	4.1%	205,471	6.9%	2,054,712	3.6%	10.0	1.5	\$ 378,850	3.4%	\$ 257,400	2.5%	\$ 40,700	3.1%
Total	1,743	644	100%	2,968,587	100%	57,317,020	100%	19.3	1.1	\$ 11,103,749	100%	\$ 10,401,600	100%	\$ 1,328,400	100%

See **Table 60** for details on solar water heating systems installed by island.

Table 60 Solar Water Heating System Installations by Island							
Island	Units	%	Program Demand (kW)	Program Energy (kWh 1 st Yr.)	Program Energy (kWh – Life)	Incentives	%
Hawai'i	228	15%	92	409,883	8,197,662	\$193,650	15%
Lāna'i	2	0%	1	3,595	71,909	\$2,000	0%
Maui	278	18%	112	499,770	9,995,394	\$229,300	18%
O'ahu	1,029	67%	414	1,849,867	36,997,342	\$862,750	67%
Total	1,537	100%	618	2,763,115	55,262,307	\$1,287,700	100%

See **Table 61** for a list of participating contractors that completed solar water heater installations in PY15, sorted by county.

Table 61 Participating Solar Water Heater Contractors by County		
Honolulu	Maui	Hawai'i
Affordable Solar Contracting Allen's Plumbing Alternate Energy Apollo Solar Building Energy Group C&J Solar Solutions Commercial Plumbing, Inc. Energy Unlimited, Inc. EnergyPro Hawai'i Grand Solar Haleakala Solar Hawaiian Energy Systems, Inc. Hawaiian Isle Electric LLC Hi-Power Solar, LLC Hi-Tech Plumbing Corporation Island Solar Service, Inc. Knight's Plumbing, Inc. Larry's Plumbing & Solar, Inc. M. Torigoe Plumbing, Inc. Pacific Energy Strategies, LLC Photonworks, LLP Poncho's Solar Service PV Tech Sedna Aire Hawai'i Solar Help Hawai'i Solar Services Hawai'i Sun King TNH Plumbing True Green Solar, LLC Williams Plumbing	Allen's Plumbing Alternate Energy Haleakala Solar, Inc. Hi-Power Solar, LLC Maui Pacific Solar, Inc. Poncho's Solar Service Sonshine Solar Corp. South Pacific Plumbing, LLC Steve's Plumbing Service, Inc. Sun King Sunny Solutions, Inc.	Affordable Solar Contracting Calvin's Plumbing Ced's Plumbing Drainpipe Plumbing & Solar Hawaiian Solar & Plumbing Keith Shigehara Plumbing, Inc. Kona Solar Service, LLC Poncho's Solar Service Royal Flush Plumbing RT's Plumbing, Inc. Solar Aide Company

High-Efficiency Lighting

For PY15, the High-Efficiency Lighting Program achieved savings of 344,106,605 lifetime kWh energy and 4,430 kW savings with \$3,977,533 in incentives.

As LEDs emerged as the most energy-efficient lighting technology in the lighting market, Hawai'i Energy's adjusted its lighting program accordingly. LEDs overtook CFLs as the primary source of energy savings in the lighting market and the Program rebated 874,680 units, representing a 66% increase over PY14 and a 203% increase over PY13. In regards to CFLs, the average incentive per bulb dropped from \$1.27 in PY14 to \$1.05 in PY15 and the Program incentivized 932,203 bulbs, down from 1,328,146 in PY14.

Hawai'i Energy continued to foster program participation with lighting manufacturers (including CREE, Feit, Leedarsen, Philips, GE, TCP and Webco) as well as maintained partnerships with smaller manufacturers, such as Batteries Plus, Acuity and Greenlite, whose products have contributed valuable savings to the residential lighting portfolio.

In PY15, Hawai'i Energy also continued to build partnerships with retailers of all sizes and in all corners of Honolulu, Maui and Hawai'i counties. In addition to big box stores such as Costco and Home Depot, which account for a large portion of lighting sales, great strides were made in distributing rebated products to smaller stores, including several locally owned and operated businesses.

See **Table 62** for details.

Table 62 REEM High Efficiency Lighting Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1 st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
LED Lighting	874,680	2,443	55.1%	17,175,643	55.0%	257,634,638	74.9%	15.0	5.5	\$ 47,129,012	74.7%	\$ 8,528,130	82.9%	\$ 2,997,553	75.4%
CFL	932,203	1,956	44.1%	13,852,429	44.3%	83,114,575	24.2%	6.0	10.9	\$ 15,310,869	24.3%	\$ 1,398,305	13.6%	\$ 979,875	24.6%
LED Omni Directional*	7,754	22	0.5%	152,627	0.5%	2,289,407	0.7%	15.0	1.9	\$ 418,800	0.7%	\$ 217,112	2.1%	\$ 0	0.0%
LED Specialty	3,609	10	0.2%	70,995	0.2%	1,064,922	0.3%	15.0	1.3	\$ 194,806	0.3%	\$ 144,360	1.4%	\$ 0	0.0%
Room Occupancy Sensors	21	0	0.0%	383	0.0%	3,063	0.0%	8.0	1.6	\$ 663	0.0%	\$ 420	0.0%	\$ 105	0.0%
Total	1,818,267	4,430	100%	31,252,076	100%	344,106,605	100%	11.0	6.1	\$ 63,054,150	100%	\$ 10,288,327	100%	\$ 3,977,533	100%
*Omni directional and LED specialty lamps noted above were part of the online kit distribution.															

Online Kits

In PY15, Hawai'i Energy once again offered customers energy saving kits through an online store. The Program successfully ran two separate online kit promotions, each with a different set of measures aimed at saving energy and reducing customers' bills. After a successful distribution in PY14, the Program facilitated a similar program for PY15. The Program worked with an online retail vendor, Techniart, Inc., to create and manage the store platform, including data compilation and the provision, packing and shipping of the kits.

- First Promotion (Lighting and Power Strips)

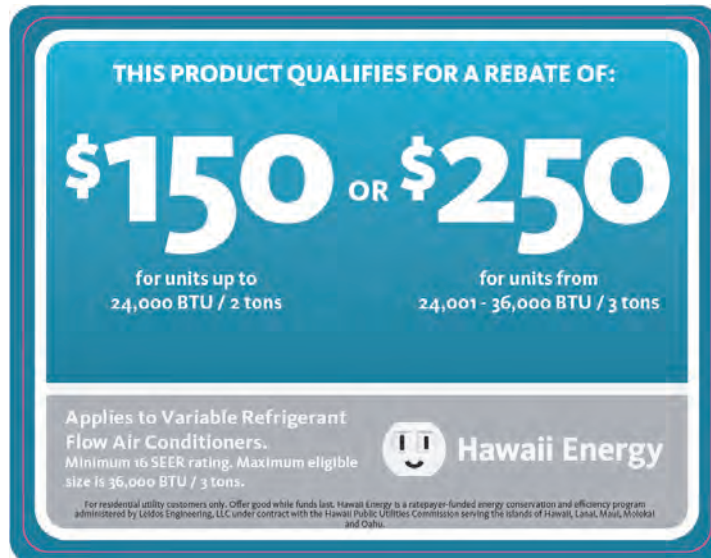
Two different types of kits were offered during the first promotion:

- Standard Kit (Free, no cost to the customer): Three (3) ENERGY STAR® rated A19 bulbs
- Advanced Kit (Customer copay \$10): Three (3) ENERGY STAR® rated BR30 LED bulbs and one (1) advanced power strip

- Second Promotion (Lighting and Water-Saving Measures)

The kit distributed during the second promotion included water-saving devices, which are a cost-effective and an easy way for customers to save energy through reducing hot water usage. The "Water + Energy Saver Kit" (Water Kit) was offered at no cost to the customer (including shipping) and included: two A19 LED bulbs, one low-flow showerhead with massage and pause features, two low-flow faucet aerators, one toilet tank displacement bag and two leak detection dye tablets.

5,584 kits were distributed through the two promotions, containing over 18,000 energy and water saving measures for an overall customer-level savings of 725,392 first-year kWh.



The Program distributes point-of-purchase signage (shown above) to local retailers for them to use as they promote the various ENERGY STAR® appliances eligible for rebates.

High-Efficiency Air Conditioning

For PY15, the High-Efficiency Air Conditioning (HEAC) Program achieved lifetime energy savings of 45,889,196 kWh, representing a 95% increase over PY14's 23,552,656 lifetime kWh and a 412% increase over PY13. Hawai'i Energy was able to achieve these savings with \$654,825 in incentives, only a 45% increase over PY14. The program's energy savings growth so markedly outpaced spending, which is a testament to Hawai'i Energy's commitment to finding and promoting the most cost-effective energy-efficient technologies available.

The program's biggest strides in PY15 came through increased volume in Variable Refrigerant Flow (VRF) Split Air Conditioning systems, which accounted for 80.7% of the HEAC program's incentives distributed and 88% of its lifetime energy savings. These VRF systems played a much larger role in the PY15 portfolio than they did in PY14, when they accounted for 64.7% of incentives and 53.8% of lifetime energy savings. The 3,100 units rebated in PY15 was nearly double the number rebated in PY14, which can likely be attributed to several procedural changes made to the VRF rebate process late in PY14. Based on feedback from manufacturers and distributors, Hawai'i Energy streamlined its rebate application process and simplified the qualification requirements to make them more transparent to consumers. The jump in quantity may also be partly attributable to record setting high temperatures during the summer, prompting consumers to seek the most energy-efficient methods of cooling their homes.

The window air conditioner “Trade-Up” program more than doubled in units rebated (580) in just its second year of implementation. The unusually hot summer likely contributed to these efforts as well, as old window units failed to keep up and consumers replaced them with more energy-efficient units. Both VRF and window air conditioners surpassed their targets established in the PY15 Annual Plan.

Qualifying whole house fans and solar attic fans both saw bumps in sales over PY14 as well, further buoying the High Efficiency Air Conditioning Program’s performance. Ceiling fans, meanwhile, saw a drop in units incentivized as the program changed the qualifications to require ceiling fans to include energy-efficient light kits. The 1,265 units incentivized represent a drop from 2,901 in PY14.

See **Table 63** for details.

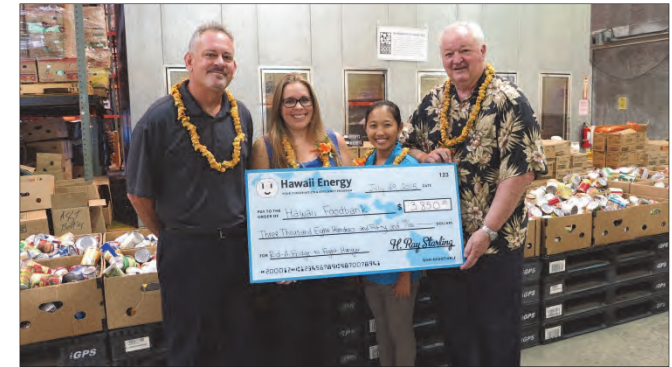
Table 63 REEM High Efficiency Air Conditioning Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
VRF Air Conditioners	3,100	816	75.3%	2,690,685	84.9%	40,360,273	88.00%	15	1.6	\$9,679,076	81.2%	\$6,107,561	97.3%	\$528,400	80.7%
Whole House Fan	506	222	20.5%	162,105	5.1%	3,242,105	7.10%	20	29.5	\$1,789,451	15.0%	\$60,720	1.0%	\$37,950	5.8%
Window AC w/ Trade-In	580	27	2.5%	100,745	3.2%	1,208,942	2.60%	12	5.2	\$273,201	2.3%	\$83,065	0.8%	\$44,780	4.4%
Solar Attic Fan	304	5	0.5%	143,655	4.5%	718,273	1.60%	5	2.5	\$113,088	0.9%	\$45,600	0.7%	\$15,200	2.3%
Ceiling Fans	1,265	13	1.2%	71,921	2.3%	359,603	0.80%	5	5.6	\$64,217	0.5%	\$11,385	0.2%	\$44,275	6.8%
Total	6,350	1,084	100%	3,169,111	100%	45,889,196	100%	14.5	1.9	\$11,919,034	100%	\$6,308,464	100%	\$670,605	100%

High-Efficiency Appliances

For PY15, the High-Efficiency Appliances program achieved lifetime energy savings of 28,995,515 kWh and demand savings of 95 kW savings with \$363,210 in incentives.

- Refrigerator Trade Up – The refrigerator “Trade-Up” program remained a staple of Hawai‘i Energy’s High Efficiency Appliance program, accounting for 4.3% of the REEM portfolio’s lifetime energy savings and 72.5% of the High Efficiency Appliances program savings. While the 2,335 rebates distributed in PY15 is less than PY14 (3,482), the decline was due in part to the shut-down of the recycling facility in Hawai‘i County, which severely limited the program’s availability on that island. The program also lowered the incentive amount for PY15 to better reflect the energy savings these trade-ups achieve.
- Secondary Refrigerator/Freezer Recycling – Hawai‘i Energy’s “Rid-A-Fridge” rebate experienced steady performance in PY15 and remained a valuable incentive for residents to rid themselves of their inefficient refrigerators and freezers. These appliances, which are often found in garages and carports for extra food storage, constitute an important opportunity to reduce energy consumption and lower bills. By offering a \$50 (O‘ahu) or \$65 (Maui and Hawai‘i) rebate and coordinating with haulers and recyclers, Hawai‘i Energy was able to influence the recycling of over 500 refrigerators and freezers in PY15, achieving a lifetime energy savings of 5,551,953 kWh.

The Program also continued its rebate donation program in which Rid-A-Fridge participants could donate their rebate to their local food bank. This year, 57 participants (11 in Maui and 46 in O‘ahu) opted to donate their rebates, for a total of \$3,015 going to feed Hawai‘i’s hungry.



Hawai‘i Energy team members present a donation check to the Hawai‘i Foodbank for the donations collected through the Rid-A-Fridge program.

- VFD Pool Pumps – Hawai‘i Energy’s VFD pool pump rebate program displayed steady performance in PY15, with 193 units rebated, down slightly from 209 in PY14. The program accounted for 1,008,872 kWh of lifetime energy savings.
- Clothes Washers – In the ongoing effort to make the biggest possible energy savings impact with public benefit funding, Hawai‘i Energy discontinued its rebates on high efficiency clothes washers in PY15. The program rebated 453 units that were grandfathered from PY14’s program, resulting in 979,781 lifetime kWh savings and 11 kW of demand savings.

See **Table 64** for details.

Table 64
REEM High Efficiency Appliances Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Refrigerator w/Trade-In	2,335	66	69.50%	1,525,423	72.20%	21,355,916	73.70%	14	4.2	\$3,192,938	73.20%	\$790,800	72.60%	\$245,975	67.70%
Rid-A-Fridge (Refrigerator)	425	14	14.90%	355,989	16.90%	4,983,843	17.20%	14	9.2	\$738,902	16.90%	\$80,645	7.90%	\$41,540	12.40%
VFD Pool Pumps	193	1	1.10%	100,887	4.80%	1,008,872	3.50%	10	1.3	\$146,594	3.40%	\$115,800	11.60%	\$28,950	9.00%
Clothes Washer	453	11	11.70%	81,648	3.90%	979,781	3.40%	12	3.6	\$178,250	4.10%	\$49,830	4.70%	\$22,650	6.70%
Rid-A-Fridge (Freezer)	54	2	1.70%	40,579	1.90%	568,110	2.00%	14	10	\$84,228	1.90%	\$8,445	0.80%	\$4,465	1.20%
Refrigerator	77	1	1.20%	7,070	0.30%	98,994	0.30%	14	1.5	\$18,890	0.40%	\$12,320	1.10%	\$3,850	1.10%
Total	4,116	95	100%	2,111,597	100%	28,995,515	100%	13.7	4	\$4,359,802	100%	\$1,057,840	100%	\$347,430	100%

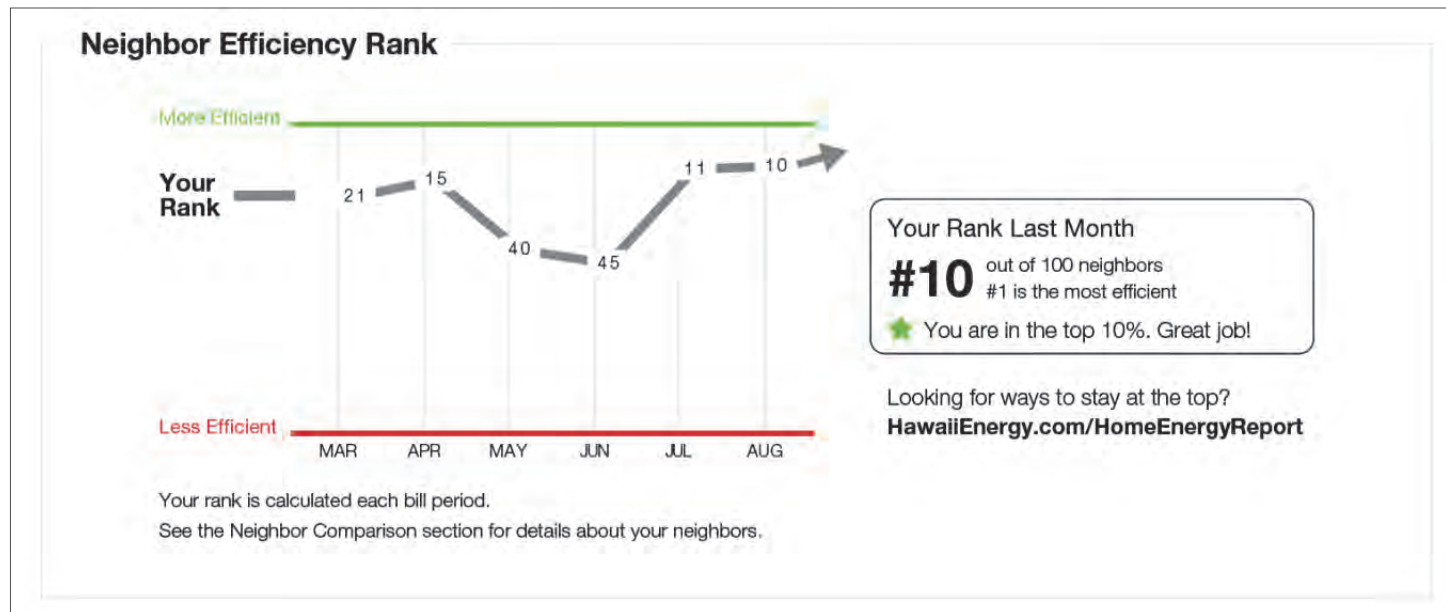
Energy Awareness, Measurement and Control Systems

For PY15, the Energy Awareness, Measurement and Control Systems Program achieved lifetime energy savings of 11,067,212 kWh and demand savings of 3,605 kW, representing a 54% increase in lifetime energy savings and an 84% increase in demand savings over PY14.

- **Peer Group Comparison** – The performance improvements among Energy Awareness, Measurement and Control Systems over the previous program year is largely attributable to an expansion of Hawai'i Energy's peer group comparison report program. The program distributed personalized home energy reports (HERs), giving customers insight into their electricity consumption and how it compares to that of similar households. This encourages customers to take charge of their energy usage and save money on electric bills.

This program year, Hawai'i Energy expanded the distribution of paper-mailed HERs to an additional 110,000 households on O'ahu, Hawai'i Island and Maui, ultimately distributing reports to over 85% of homes across the three counties. Furthermore, Hawai'i Energy enhanced its website with two new online services: the *Dare to Compare* tool and an online version of the Home Energy Reports designed to provide customers with immediate insights into their energy consumption and educate them on ways to save.

These program expansions accounted for an additional 5,182,360 kWh of energy savings and 1,648 kW of demand savings over PY14.



Home Energy Reports were distributed both online and in paper format and included data on household energy usage, neighbor comparisons and information on how to save electricity and lower bills. The program's expansion in PY15 accounted for an additional 5,182,360 kWh of savings over PY14.

- **Water Cooler Timers** – Hawai'i Energy continued its water cooler timer offer and worked with a vendor to engage water delivery companies in distributing timers to their residential customers. The vendor also distributed timers directly to customers at community events. A total of 2,875 timers were delivered to residents, achieving a lifetime energy savings of 1,025,841 kWh.

See **Table 65** for details on PY15's Energy Awareness Measurement and Control Systems program.

Table 65 Energy Awareness Measurement and Control Systems Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1 st Yr.)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Peer Group Comparison	3,211,849	3,605	100.0%	10,938,766	98.8%	10,938,766	91.4%	1.0	1.2	\$ 2,608,174	94.6%	\$ 2,185,929	98.1%	\$ 2,185,929	98.1%
Water Cooler Timers	2,875	0	0.0%	128,446	1.2%	1,025,841	8.6%	8.0	3.5	\$ 149,718	5.4%	\$ 43,125	1.9%	\$ 43,125	1.9%
Total	3,214,724	3,605	100%	11,067,212	100%	11,964,607	100%	1.1	1.2	\$ 2,757,892	100%	\$ 2,229,054	100%	\$ 2,229,054	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

In PY15, the CESH program explored participation in new residential market opportunities such as decorative lighting and central air conditioning. The Program took a deep dive into two unique residential efficiency upgrades.

Residential Lighting

The first custom project was a residential lighting upgrade. This was a unique opportunity to work with a local contractor to incentivize specialty lamps purchased outside of Hawai'i Energy's standard upstream lighting program. A total of 422 decorative MR16, G4 and G8 base lamps were upgraded from halogen to LED, for an overall program-level savings of 3,868 first-year kWh.

Central Air Conditioning

The second CESH project was a central A/C upgrade from an existing four-ton, 9 SEER unit to a three-ton, 16.5 SEER unit. A customized incentive was issued for this project because there were no residential incentives for central air conditioning systems. However, the Program recognized that there were significant energy savings when replacing the existing technology to the more efficient system. The customer provided the following information to assist in the savings calculation:

- Baseline information on old A/C system
- PV installation date and generation data
- Set points for existing & new systems (temperature, timer On/Off settings, hours run per day, approximate time during day)

Attributing savings to the new central A/C system proved difficult because of the PV generation, electric vehicle (EV) charging and an electrostatic air filtration system that works in conjunction with 24/7 A/C. However, a conservative savings estimate was calculated and reasonably verified by comparing the applicant home's 24/7 air conditioning with a prescriptive VRF system savings.

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

Table 66 CESH Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh 1 st Yr.)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit		Total Resource Cost		Incentives	
LED Specialty	422	1	50.8%	3,868	58.5%	58,026	58.5%	15.0	13.0	\$ 10,665	56.2%	\$ 819	59.0%	\$ 819	59.0%
Residential Custom	1	1	49.2%	2,742	41.5%	41,123	41.5%	15.0	14.6	\$ 8,328	43.8%	\$ 569	41.0%	\$ 569	41.0%
Total	423	1	100%	6,610	100%	99,150	100%	15.0	13.7	\$ 18,993	100%	\$ 1,388	100%	\$ 1,388	100%

Expenditures

See **Table 67** for details on PY15's CESH expenditures.

Table 67 CESH Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
CESH Operations	\$21,515.00	\$22,000.00	97.80%	\$485.00	2.20%
CESH Incentives	\$1,388.03	\$1,389.00	99.93%	\$0.97	0.07%
Total CESH	\$22,903.03	\$23,389.00	97.92%	\$485.97	2.08%

Residential Energy Services & Maintenance (RESM)

Objectives

Residential Energy Services and Maintenance offers target ally-driven service offerings to enhance energy savings persistence and bootstrap fledgling energy services businesses trying to secure a toehold in Hawai'i. For PY15, the Program continued its Solar Water Heater Tune-Up offering, which achieved lifetime savings of 1,459,867 kWh and 34 kW with a total incentive of \$172,500.

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, while requiring contractors to follow a key maintenance checklist to address system performance and longevity. This format proved successful once again this year, exceeding the initial target of 1,000 tune-ups and finishing the year with a final count of 1,150 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 conducted tune-ups on similar systems to those seen in PY14. The average age of systems serviced was 9.2 years old (9.3 in PY14), with the oldest system being 37 years old (38 in PY14). Additionally, there were 46 systems over 20 years old and 12 systems over 30 years old. The sunshine zone locations of tuned-up systems were consistent with PY14 as well, with 25% of systems falling in 500+ zones and 62% falling in 400-450 zones.

Overall system condition once again ranked high, with approximately 82% of all systems rated as “Good” or “Excellent” by the contractors. However, several key performance indicators suggested that although the systems are visually sound, the effectiveness and necessity of regular maintenance is crucial to system longevity. For instance, over 50% 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 over half of the participant systems were not functioning at capacity before their tune-up. Furthermore, 55% 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, this has been a highly successful offering for Hawai'i Energy, contractors and most importantly, the customer, providing sustained business and increased system longevity. Based upon data collected this year, we have been able to improve SWH program delivery by sharing best practices with our contractors. In PY16 we will continue to analyze solar fraction, sizing requirements in the hotter sunshine zones and share new practices and improvement with our trade allies. Hawai'i Energy will also continue with the design and implementation of an educational campaign surrounding proper use of timers with contractors in order to increase program penetration.

A flyer for the Solar Water Heater Tune-Up program. The background is blue. At the top, it says "SOLAR WATER HEATER TUNE-UP" in large white letters, with a wrench icon. Below that, "\$150 instant rebate" is written in large white letters. To the right is an illustration of a house with solar panels on the roof and a red water heater inside. Below the illustration, it says "Offer valid January 4 - May 31, 2016 or while funding lasts." Further down, it states "Hawaii Energy recommends maintenance tune-ups for solar water heating systems every 3-5 years. A regularly maintained system can drastically increase the life of your investment." Then, "Call one of our participating contractors to schedule your tune-up today to receive a \$150 rebate! Rebates are:" followed by a bulleted list: "• Issued on a first come, first served basis;" "• Available for all solar water heating systems in Hawaii, Honolulu and Maui counties that are at least 3 years old (systems tuned up and rebated in 2015 or 2014 are not eligible);" "• Limited to maintenance services described on the Tune-Up Checklist." Below the list, it says "Learn more about this and other rebate offers by visiting hawaiienergy.com/tune-up." At the bottom is the Hawaii Energy logo with the tagline "Your Conservation & Efficiency Partner". At the very bottom, it says "Questions? Call 537-5577 (Oahu) or 1-877-231-8222 (toll-free neighbor island)." and a small disclaimer: "Hawaii Energy is the registered service mark of Hawaii Energy, LLC. All other marks are the property of their respective owners. All other marks are the property of their respective owners. All other marks are the property of their respective owners."/>

**SOLAR WATER HEATER
TUNE-UP**

\$150
instant rebate

Offer valid January 4 - May 31, 2016
or while funding lasts.

Hawaii Energy recommends maintenance tune-ups for solar water heating systems every 3-5 years. A regularly maintained system can drastically increase the life of your investment.

Call one of our participating contractors to schedule your tune-up today to receive a \$150 rebate! Rebates are:

- Issued on a first come, first served basis;
- Available for all solar water heating systems in Hawaii, Honolulu and Maui counties that are at least 3 years old (systems tuned up and rebated in 2015 or 2014 are not eligible);
- Limited to maintenance services described on the Tune-Up Checklist.

Learn more about this and other rebate offers by
visiting hawaiienergy.com/tune-up.

Hawaii Energy
Your Conservation & Efficiency Partner

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

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Participating contractors were equipped with this flyer (which they could also co-brand upon request) to help drive participation for the tune-up offer.

Impacts

For details, see **Table 68**.

Table 68 RESM Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1 st Yr.)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Solar Water Heating Tune-Up	1,150	34	100.0%	291,973	100.0%	1,459,867	100.0%	5.0	0.7	\$ 246,460	100.0%	\$ 345,000	100.0%	\$ 172,500	100.0%
Total	1,150	34	100%	291,973	100%	1,459,867	100%	5.0	0.7	\$ 246,460	100%	\$ 345,000	100%	\$ 172,500	100%

Expenditures

In PY15, the RESM program spent \$206,445.11, or 75.76% of the incentive budget.* See **Table 69** for details.

Table 69 RESM Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
RESM Operations	\$33,945.11	\$100,000.00	33.95%	\$66,054.89	66.05%
RESM Incentives	\$ 172,500.00	\$172,500.00	100.00%	\$ -	0.00%
Total RESM	\$206,445.11	\$272,500.00	75.76%	\$66,054.89	24.24%

*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 Hawai'i residents that have traditionally been underserved. This incentive category specifically addresses landlord/tenant barriers through direct installation of energy saving technologies.

Accomplishments

Multifamily Direct Install Program

PY15 marked the first full year of Hawai'i Energy's Energy Smart for Homes (ES4H) program, which targets energy savings in the typically hard-to-reach multifamily residential sector. Multifamily customers account for roughly 31% of all residential sector electricity sales in Hawai'i (Figure ES-3, *2014 Energy Efficiency Potential Study*). These customers are more likely to rent their homes and often possess neither the ability nor the authority to make capital investments in energy efficiency. Furthermore, the program targets customers who may lack the financial means or the information to implement these energy-efficient measures absent the program's influence.



In addition to receiving the energy-saving devices, participants in the Energy Smart 4 Homes program also receive free installation by a licensed contractor.

Hawai'i Energy's strategy of market analysis and segmentation, followed by direct outreach to property owners, managers and housing associations saw continued success in PY15. In its first full year of operation, the ES4H program reached 61 multifamily properties, with 4,225 individual units receiving energy saving retrofits.

This program year, greater emphasis was placed on outreach to the individually-metered, individually-owned multifamily market segment. The owners of these units usually make up an Association of Apartment Owners (AOAO), but lack a central point of contact for outreach purposes, as might be the case when a manager is in place to make decisions on behalf of the entire property. In order to overcome this barrier, Hawai'i Energy implemented the "Clip N Save" program, wherein coupons were distributed to individual units and collected by the property's central office, and if enough units expressed interest, the homeowners were notified and the installations were scheduled.

Further contributing to ES4H's accomplishments in PY15 was its success in reaching communities that are underserved and too-often overlooked in promoting energy- and cost-saving technologies. Hawai'i Energy reached out to the 'Ohana Ola O Kahumana and 'Ulu Ke Kukui communities in Wai'anae on O'ahu, two affiliated communities whose collective mission is to "create a healthy, inclusive and productive farm-based community with homeless families, people with disabilities and youth." As a 501(c)(3) non-profit, any reduction in operating costs directly impacts the communities' ability to serve their residents. In addition to vocational training and temporary employment, the communities provide housing to the residents they support. These residences presented a significant opportunity for the installation of energy-efficient measures and in retrofitting 120 housing units between the two communities, the ES4H program provided significant energy- and cost-savings to the organization.

Despite these achievements, significant energy savings in the multifamily sector remains on the table. One challenge the program encountered in PY15 was in achieving uptake through communication with property and building managers alone. In PY16, the program will target property owners, especially those who own multiple properties throughout O‘ahu with a high proportion of low-income residents. By reaching out to these property owners, the program has the potential to reach a significant number of hard-to-reach residents through one point of contact. The program will also directly approach financial institutions, who have the ability to reach these multifamily real estate investors at the point of financing. These financial institutions are in an ideal position to inform investors of the ES4H program and its potential to save their tenants money on their energy bills.

Pop-Up Retail

The Program also tested the pop-up retail store model in collaboration with a national lighting manufacturer and distributor, MegaLight, Inc. They provided LED lamps, coordinated the venues, and sent staff members to serve at the event booths and compile sales data at the end of events. Hawai‘i Energy provided staff training, marketing materials and supplemental staff to assist at the events. Two types of LED lamp packages were offered:

- Free Distribution: Up to two (2) ENERGY STAR® A19 LED bulbs per customer
- MegaPack Kit (\$10 customer copay): Two (2) A19 LED bulbs and one (1) BR30 LED bulb

Two events were held in PY15 to distribute LEDs. The first was held at the Salvation Army’s Thanksgiving event. This lunch event held at the Neil S. Blaisdell Center targeted hard-to-reach residential customers. The second pop-up shop was held at Ala Moana’s “Shop-A-Lea” event in March 2015. The booth was located in a high traffic area of the lower food court and targeted hard-to-reach local residents that might not adopt energy saving measures absent the program’s influence. Over the course of the two events, nearly 5,900 LED lamps were distributed for an overall Program Level savings of 147,460 first-year kWh.

Pono Home

In a groundbreaking program conducted in partnership with Energy Excelerator and Kanu Hawai‘i, Hawai‘i Energy provided funding for Pono Home to offer free “direct installs” of efficiency measures such as LED lamps, high-efficiency shower heads, faucet aerators and advanced power strips to homes on O‘ahu and Maui. The pilot targeted low-income, single family homes and was conducted from March to May 2016. Among others, the goals of this pilot included educating residents about energy and water efficiency, assisting low-income residents and reaching populations that have previously been difficult to reach with energy efficiency programs. A total of 12,252 measures (including 10,175 light bulbs, 1,695 water conservation fixtures and 382 advanced power strips) were retrofitted in 579 homes.

The Program also deployed a post-installation online survey to evaluate the effectiveness of the educational aspects of the program and received a response rate of 22% (129 survey responses), in which several participants shared their experiences before and after the service. Overall, the survey showed that the service was very educational to residents, that people were highly satisfied with the products installed and the service performed.



Hawai‘i Energy administered two pop-up retail events in PY15. In addition to high-efficiency LED bulbs, customers received information on the energy and cost-saving impacts of lighting measures, as well as Hawai‘i Energy’s other incentive offerings.

Impacts

PY15 was a watershed year for the RHTR program. Whereas in PY14 the program accounted for 606,361 kWh of first year energy savings, in PY15 the program contributed 2,139,060 first year kWh to Hawai'i Energy's residential portfolio. That same progress was realized in terms of lifetime kWh (15,566,539 to 4,415,256) and demand (612 kW to 159 kW) as well. Perhaps most impressive, however, is the cost-effectiveness with which this growth took place. The RHTR program, traditionally a nearly cost-neutral program, improved its TRB/TRC ratio from 1.1 in PY14 to 4.9 in PY15. This shift is thanks in large part to the MFDI program's measure mix, which is heavy in lighting and showerhead/aerator measures that tip the scale towards cost-effectiveness.

See **Table 70** for details.

Table 70 RHTR Program Impacts															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1 st Yr)	%	Program Energy (kWh - Life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit	%	Total Resource Cost	%	Incentives	%
Residential Custom	579	116	19.0%	554,298	25.9%	6,082,973	39.1%	11.0	5.9	\$ 1,171,216	38.7%	\$ 199,004	32.4%	\$ 200,204	44.4%
CFL Omni-Directional	17,084	106	17.4%	743,853	34.8%	3,719,267	23.9%	5.0	11.3	\$ 641,982	21.2%	\$ 56,942	9.3%	\$ 56,942	12.6%
LED Omni Directional	5,896	21	3.4%	147,460	6.9%	2,211,905	14.2%	15.0	2.5	\$ 404,623	13.4%	\$ 165,088	26.8%	\$ 0	0.0%
Advance Power Strips	3,249	41	6.6%	356,453	16.7%	1,782,262	11.4%	5.0	3.9	\$ 300,208	9.9%	\$ 76,416	12.4%	\$ 76,416	16.9%
Showerhead	4,028	213	34.8%	259,836	12.1%	1,299,180	8.3%	5.0	9.7	\$ 350,336	11.6%	\$ 36,168	5.9%	\$ 36,168	8.0%
Faucet Aerator	7,709	113	18.4%	61,569	2.9%	307,844	2.0%	5.0	4.5	\$ 127,469	4.2%	\$ 28,505	4.6%	\$ 28,505	6.3%
LED Specialty	309	1	0.2%	7,729	0.4%	115,936	0.7%	15.0	11.5	\$ 21,208	0.7%	\$ 1,848	0.3%	\$ 1,008	0.2%
CFL Specialty	416	1	0.2%	7,862	0.4%	47,172	0.3%	6.0	3.3	\$ 8,690	0.3%	\$ 2,654	0.4%	\$ 2,654	0.6%
Accounting	12	0	0.0%	0	0.0%	0	0.0%	0	0	\$ 0	0.0%	\$ 0	0.0%	\$ 1,014	0.2%
Accounting-Freight	0	0	0.0%	0	0.0%	0	0.0%	0	0	\$ 0	0.0%	\$ 0	0.0%	\$ 0	0.0%
Incentives For Kits And/Or Pop-Up Retail	3,932	0	0.0%	0	0.0%	0	0.0%	0	0.0	\$ 0	0.0%	\$ 48,393	7.9%	\$ 48,393	10.7%
Total	43,209	612	100%	2,139,060	100%	15,566,539	100%	7.3	4.9	\$ 3,025,731	100%	\$ 615,017	100%	\$ 451,303	100%

Expenditures

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

Table 71 RHTR Program Expenditures					
	Total Expenditures	PY15 R4 Budget	Percent Spent	Unspent	Percent Unspent
RHTR Operations	\$353,294.59	\$357,594.00	98.80%	\$4,299.41	1.20%
RHTR Incentives	\$451,302.80	\$451,960.00	99.85%	\$657.20	0.15%
Total RHTR	\$804,597.39	\$809,554.00	99.39%	\$4,956.61	0.61%

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. Through collaboration with local and mainland entities, Hawai'i Energy identifies strategic intervention points within existing market channels to create lasting impact through innovative behavior change campaigns, pilot and research projects, professional development and outreach.

Now in its fifth year, the Program's market transformation efforts continue to become more robust and meaningful, as strong customer and participant relationships and increased knowledge of market nuances have led to the development of more specialized, thoughtful offerings. By collaborating with several key subcontractors, the Program met and exceeded its goals for behavior modification, professional development, technical training and technical pilots to increase the adoption of energy efficiency measures and practices in PY15. See **Table 72** for details on the Transformational achievements.

The Program continued to build on successful projects from previous years in PY15, exploring ways to refine methodologies, encourage greater participation and deepen community impact, as well as continue its special focus on servicing "hard-to-reach" ratepayers who are traditionally underserved by energy efficiency and conservation programs. For reporting purposes, Transformational initiatives are organized into three support segments - behavior modification, technical training and professional development - with key projects in each segment outlined in the following sections.

Notably, in PY15 the Transformational program expanded its development of logic models for key initiatives. These program logic models help to guide program execution and develop meaningful performance metrics on an ongoing basis and will enable the Transformational program to better evaluate effectiveness of its projects and subcontractors based on measurements that are closely and strategically linked to intended outcomes.

Table 72 Transformational Metrics			
Behavior Modification			
Community Based Social Marketing (CBSM)	Minimum 12,600	Target 18,000	431
“Sharing the Aloha” - Community Workshops			3,559
“Sharing the Aloha” - Customized Workshops			136
Kanu - Social Media / Transformative Messaging			23,945
UH Sustainability Summit – SEM track			33
TOTAL ACHIEVED:			28,104
Professional Development			
Selling Energy Workshops	Minimum 560	Target 800	362
Selling Energy Special Presentations			83
Selling Energy Online Trainings			205
Hawai’i Energy Fellowship Program			8
K-12 Educator Training and Development - Workshops			173
TOTAL ACHIEVED:			831
Technical Training			
AEE - Certified Energy Manager	Minimum 140	Target 200	17
AEE - Certified Energy Auditor			16
IES - Introduction to Lighting & High-End Residential			34
IFMA Hawai’i - Facility Technical Trainings			193
UH Maui - Building Operator Certification I			24
UH Maui - Building Operator Certification II			8
UH Maui - Water and Wastewater			8
UH MOC - Building Operator Certification I			11
UH MOC - Building Operator Certification II			15
TOTAL ACHIEVED:			326
Pilot & Trade Ally Programs			
Clean Energy Ally	175	250	272
Benchmarking	105	150	264
Codes & Standards	1 action	2 actions	2 actions
Demand Response	1 action	2 actions	2 actions
Smart Grid	1 action	1 action	1 action
Electric Vehicle	1 action	2 actions	2 actions

With the exception of "actions", all counts reflect the number of participants in each offering.

Behavior Modification

The goal of behavior modification programs is to inspire residents and businesses to take actionable measures to reduce their energy consumption by first helping them understand their energy use. In PY15 we continued to expand efforts in “hard-to-reach” areas, testing various communication methods like social media, in-person workshops and gamification.

Sharing the Aloha

The Program continued to offer the popular “Sharing the Aloha” workshops – an engaging, interactive blend of financial and energy education designed to help residents connect energy-saving behaviors with lower household electric bills. Workshops were facilitated by longtime community educator Helen Wai and hosted by various community organizations, housing and condominium associations, government agencies and local employers throughout the Program’s service areas.

Participants in these workshops often include those who identify as low-income, may live in a multi-family unit, have multiple jobs, reside in a geographically-isolated area, or for other reasons have had difficulties engaging in Hawai‘i Energy’s offerings and/or little exposure to energy education. Therefore, establishing strong community connections has been a crucial part of expanding the “Sharing the Aloha” series. This year, the Program worked closely with several large organizations (including Monsanto, Hawai‘i Public Housing Authority, Low-Income Home Energy Assistance Program, Nānākuli High School and Queen Lili‘uokalani Children’s Center) to broaden the Program’s reach into these demographics, experimenting with different workshop formats to make it easier for groups to host. For example, some presentations were shortened to fit during lunch hour slots and in some instances, employers even offered health and wellness credits to those who attended. The positive reception of these adjusted presentations in some cases led to additional opportunities within the organizations’ networks.

Overall, 3,695 participants attended 117 workshops in PY15, bringing the Program’s total “Sharing The Aloha” attendance to more than 15,000 over the past five years. The Program looks to identify more opportunities to scale the “Sharing the Aloha” course in PY16 in order to improve cost-effectiveness and maximize our reach into diverse markets.



“Sharing the Aloha” sessions are designed to help break down the often-technical concepts of energy usage and electricity billing and bring this knowledge directly to where residents live and work. Many participants remark on how empowered they feel to make the small, but impactful energy-efficient choices outlined in the course.

Community-Based Social Marketing (CBSM) Projects Within AOAOs

The Program continued its CBSM pilot projects from PY14, which sought to encourage energy saving behavior changes on both residential and commercial levels within the Association of Apartment Owners (AOAO) market sector. CBSM is a methodology to achieve lasting changes through targeting specific actions that have a meaningful impact on energy use. This step-by-step process begins with the selection of the target audience and the behaviors, then focuses on identifying barriers and benefits to these target behaviors. The next step is to select the behavior change tools to overcome those barriers identified. The tools are then piloted to using an empirical research methodology. Hawai'i Energy staff selected this sector in an effort to overcome key challenges in implementing energy efficiency projects, and the goal of the pilots was to develop scalable social marketing campaigns to further promote energy efficiency and conservation as well as local capacity to implement CBSM initiatives.

Residents and building managers at three similar multifamily buildings were first surveyed, interviewed and asked to participate in focus groups to help identify the behaviors most easily addressable through pilot experiments. Although the feedback provided resulted in multiple options for pilot experiments, the Program ultimately chose to start with an experiment targeting behaviors related to managing water use because of the close association between water usage and energy savings.

During the water use management pilot, the Program segmented each building's population into five test and control groups with the ultimate goal of having every resident replace their existing showerhead with a high-efficiency model (and surrender their old model) as well as reduce their shower time. Each group, depending on their determined parameters, received different amounts of information regarding the pilot and may or may not have received an accompanying energy-saving device. At the close of the pilot, all residents received a follow-up mail survey that asked them to provide feedback on their experience.

The effectiveness of the pilot was measured by the number of old showerheads returned by residents and the responses to the evaluation survey mailed to recipients of the pilot materials. Although the response rate in both areas was low, the Program did find that residents simply did not want to replace their old, working showerhead right away and opted to keep their new (free) showerhead and install it when their current showerhead broke. Similarly, residents who did not receive a showerhead for free through the pilot were not likely to purchase a new model to install on their own.

Research derived from the pilot produced valuable insights and processes for engagement in the AOAO market. Low engagement during the water use management pilot could be attributed to a number of factors, including a high level of vacancy in buildings due to the time of year, miscommunication or misunderstanding of process to replace and return showerhead, or the strategy not effectively engaging residents. The lessons learned from this process are that it is time and labor-intensive to facilitate, so implementation timing is important, in addition to up-front support from each building's board of directors prior to engaging residents.



Action Research developed several flyers like the one above to accompany the materials distributed during the water usage management pilot.

Due to time constraints, the Program was not able to execute pilot experiments for every suggested option; however, Action Research (the pilot implementation subcontractor) developed ready-to-implement materials in the event that the Program would like to conduct further research into behaviors related to lighting and cooling. The Program also developed engagement guidelines for working with building managers to achieve commercial energy savings in the AOA sector.

Increasing Energy Literacy

Hawai'i Energy recognizes that developing an energy-literate population is a significant challenge that requires a long-term approach, specifically among the "hard-to-reach" population. As such, the Program continued its collaboration with Kanu Hawai'i (Kanu), a local non-profit focused on community engagement through environmentally sustainable practices, to find ways to scale existing initiatives and bring energy concepts and vocabulary into casual communication environments.

Social Media Messaging

Social media and electronic communication are powerful tools for cost-effectively reaching the community with energy saving information and offerings. Kanu serves well over 100,000 people annually across its website and social media sites and has found success in intentionally using a more "local" style of communication to engage their community of followers. By working with Hawai'i Energy to develop energy-themed messages and interspersing them with other creative content, Kanu has been extremely effective in connecting with Hawai'i's residents and starting conversations on energy-related topics. Over the past four years, Kanu and Hawai'i Energy have developed a library of strategically designed, engaging, technically-accurate social media content that is continually published online throughout the year. The Program continued to refine and add to this library in PY15, which included:

- Creating 12 new internet memes (graphics) and making enhancements to over 100 existing memes (to reflect current energy-saving calculations);
- Revising 80 educational videos for easier viewing on cell phones and other mobile devices; and
- Developing a special informational campaign (which included one video and four new memes) about electric vehicles

Together these assets (video, memes, etc.) were engaged with 23,945 times online, as outlined below:

Reach	Post Clicks	Likes, Comments, Shares	Engagement	Sticky %	Average engagement from target areas	Target Region Engagement
602,825	17,562	11,374	28,906	4.80%	92%	23,945

Reach refers to the number of times a post is viewed.

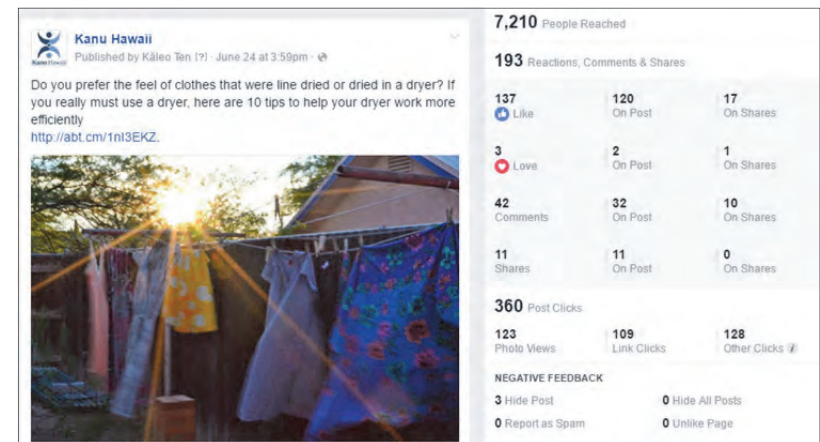
Engagement is defined as a link click, video view, "like", "comment" and/or a "share" on a social media posting, an email reply, or an SMS response/enrollment.

Sticky % refers to the percentage of people that convert from a viewer to someone who engages with the information presented as defined above

As the social media landscape continues to evolve, the Program actively works with Kanu to utilize user data to refine content, paying close attention to who is likely to engage with the content and their preferred methods of consumption. For example, content was tailored to appeal to a wide range of ages and geographic locations, resulting in a diverse distribution that mirrors the population. PY15 posts delivered an almost perfect distribution of engagement per county based on that county's population representation in the state, with no county being either over- or underrepresented. Similarly, between the ages of 17 and 64, Kanu also had a nearly even age distribution with no one age group over- or underrepresented.

In addition, the Program utilized feedback given last year to experiment with different types of messages and distribution formats:

- **Local “equivalencies”** – Measures with lower amounts of annual savings (<\$40) drew comments on the insignificance of those amounts over one year. Memes were revised to show the dollar savings as the equivalent of a Hawai‘i-themed item that local residents would be familiar with, such as shave ice or chocolate covered macadamia nuts. The added humor and tangibility of the comparisons resulted in positive responses and the same technique was also applied to several educational videos.
- **Shortened videos** – Feedback on existing videos implied that people were getting too many tips at once. On that basis, videos were shortened to no more than sixty seconds and centered on one memorable, actionable tip and the accompanying annual dollar savings. Furthermore, the content was customized for each island, incorporating the differing electric rates and unique island identifiers.
- **Interactive Posts** – One of the most successful Facebook posts this year featured a photo of clothes line-drying in the setting sun and asked users to indicate which type of drying method they prefer – line or machine. The post implied that line-drying is better (as it uses no energy) and had a link to ways to make machine dryers more energy-efficient should line-drying not be the preferred method. This post yielded 25 comments, some “reply to comment” discussions and 11 shares where we could see that some of the conversations about line-drying continued. The comments indicated that this particular post was successful for a couple of reasons: 1) landscape views, particularly of sunsets, tend to elicit emotional responses, and 2) the question resonated with many people.



Large-Scale Public Collaboration with Zippy’s Hawai‘i

The Program was also able to bring energy education to a large audience through a collaboration with popular local fast-food restaurant chain, Zippy’s. This effort focused on educating residents on ways to save electricity and promoting Hawai‘i Energy’s offerings through energy-saving tips and games, reaching an audience that might not be reached through social media efforts. Both Kanu and the Program worked closely with Zippy’s staff to develop content for their double-sided Keiki Menus and tray liners (for express locations). The menus and tray liners featured “Will The Cat” – the illustrated character featured in Hawai‘i Energy memes – as well as activities, energy-saving tips and a tear-off contest entry form for a prize drawing. There was also a space to sign up for emails from Hawai‘i Energy, which allowed the Program to track engagement.

Overall, the results were promising and the Program will continue to refine this type of engagement in the coming program year. In total, 29,000 Keiki Menus and 100,000 tray liners were distributed throughout the program year. Kanu received 1,032 contest entry forms, with over 20% opting in to “receive information and energy saving tips from Hawai‘i Energy via email.” Some opportunities for improvement include streamlining menu/liner distribution processes within Zippy’s, as well as creating a piece that can be distributed to all customers, rather than just a select group. (For more details on this project, see the *Marketing & Communications* section.)

Workplace Energy Challenge

Kanu also continued to refine the curriculum for its 60-day online energy education system, or “Energy Challenge”, which was offered last program year to employers as a way to inspire friendly competition for energy-savings in the home among employees. This gamification approach is intended to provide the incentive, inspiration and information needed to cut electric bills, save money and help make Hawai‘i less dependent on imported oil.

In PY14, the curriculum included 19 topics featuring short videos and forms with action item checklists and was piloted at five organizations. The Program used lessons learned from the pilot to build out the curriculum and address several key issues, outlined below:

ISSUE #1: Participant difficulties in providing requested electric utility account information

Providing utility account information greatly enhances the user experience, as it allows for more accurate monitoring and insight into usage patterns. However, many participants do not have their account information on hand at the time of registering or may be reluctant to provide it. To circumvent this, Kanu built a custom address-to-utility account number Application Program Interface (API) to correlate participant addresses with their account numbers. The information is only stored and used by Hawai‘i Energy and a USPS address validator was integrated to ensure only correct addresses were entered.

ISSUE #2: Participants having restricted access to the internet and/or web content

Kanu developed a Short Message Service (SMS) delivery system to send lessons and reminders via phone messaging (in addition to email and web-based platforms) to increase convenience and frequency of use.

ISSUE #3: Continually-dropping engagement rates throughout the course

An online dashboard (shown below) was created to show real-time feedback on course progression, tracking course activity and group competitions. Every course action (i.e. watching videos, downloading tip sheets and taking quizzes) was tracked, helping users visually organize engagement over time and stay interested in their progress.



ISSUE #4: Limited ability to analyze behavior change over time

To help participants stay diligent about making energy-efficient choices after completing the challenge, Kanu developed both time-based and season-based follow-up curriculums. The time-based model would engage participants one year after their challenge with quarterly messages suggesting different energy-saving actions to take within that quarter. (For instance, clearing a water heater twice a year would generate reminder emails in the 6th and 12th months of

the quarterly emails.) The season-based model would provide energy efficiency tips in conjunction with the time of year (i.e. air conditioning in the summer or holiday lights in the winter months).

The Program plans to deploy the updated energy challenge curriculum in PY16.

Collaborative Projects and Sponsorships

The Aloha+ Challenge and the Energy Dashboard

Hawai'i Energy continued support for Hawai'i Green Growth's *Aloha+ Challenge*, a statewide commitment to six sustainability targets for 2030 endorsed by the State Legislature in 2014. Hawai'i Energy supported Hawai'i Green Growth's online dashboard development and maintenance as well as its regular assemblies of stakeholders, decision-makers and industry professionals. Key priorities this year included greater business and tourism engagement, particularly through the Smart Sustainable Communities Study Team and Roundtable.

Student Energy Summit and Energy Innovation Design Challenge

Hawai'i Energy was the key sponsor for Blue Planet Foundation's inaugural Student Energy Summit held in November 2015 on O'ahu. This event empowered youth across the state to take control of their energy future by framing education, conversation and innovation on some of Hawai'i's most pressing energy challenges and opportunities. The goals of this summit were to:

1. **Educate** students about energy issues in Hawai'i;
2. **Inspire** students with the knowledge, leadership, and problem-solving skills to understand and challenge our current energy system;
3. **Encourage** students to collaborate with policy, grassroots, business, and community leaders to discuss current issues and create innovative solutions; and
4. **Unite** like-minded students motivated to lead Hawai'i towards a sustainable energy future.



Nearly 100 students (K-12) representing 34 schools from all major islands attended. Blue Planet worked with local science teachers to develop an experiential learning curriculum, which included interactive sessions around current energy issues and culminated with a design-thinking challenge to encourage critical thinking through a variety of lenses, including economics and policy, technology and engineering, energy storage and transportation.

Post-summit, students had the option of teaming up for the Energy Innovation Design Challenge, where they were asked to develop actionable solutions for Hawai'i's energy challenges and supported by a small stipend to help bring their ideas to life.

Fourth Annual Hawai'i Sustainability in Higher Education Summit

As the University of Hawai'i (UH) is one of the state's largest energy consumers, Hawai'i Energy continues to support the system in many of its energy reduction initiatives, including the annual Sustainability in Higher Education Summit. Since its inception, the event has helped UH leadership develop and refine campus-wide sustainability policies, which have included setting specific targets for energy efficiency and launching the UH System Office of Sustainability.

This year, Hawai'i Energy facilitated a series of workshops on Strategic Energy Management, which were designed to assist representatives from the university system and private and public sectors in identifying opportunities for strategically implementing energy efficiency projects. The Program arranged for Wendell Brase, Vice-Chancellor and head of the award-winning sustainability program at the University of California-Irvine, to deliver a presentation on best practices for integrating energy-efficient technologies in a complex university system. The outcome of these working groups was the identification and shared vision of short- and long-term next steps to integrate energy efficiency projects and funding mechanisms.

Maui Economic Development Board (MEDB)

The Program supported MEDB's annual STEM (Science, Technology, Engineering and Math) Conference and Green Kidz Mini-Conference to promote and encourage energy education and careers in the energy industry in Hawai'i. A Program team member hosted a session at the Mini Green Kidz Conference to educate approximately 75 fourth grade students on energy-efficient choices in the home and school. In addition, two Hawai'i Energy staff participated in MEDB's Industry Professionals session to promote careers in energy efficiency and conservation, with approximately 250 students in attendance.

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, expanding internship offerings and training energy salespeople.

Teacher Education and Community Engagement

For the 5th year in a row, Hawai'i Energy continued its efforts to bring energy education into classrooms and communities through the National Energy Education Development (NEED) Project. The NEED Project brings over 35 years of experience in energy education and tailors their lessons and materials to Hawai'i education standards and climatic 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.

Throughout PY15, 161 teachers across Honolulu, Hawai'i and Maui counties participated in energy trainings, hosted eight Energy Expos, and distributed home energy kits to students. The Program also implemented a mentoring program for teachers and supported the Project's Hawai'i Teacher Advisory Board (TAB).



Trainings

For the past five years, the Program has focused on building the base of participating educators in the NEED teacher training program. With over 1,000 unique teachers from across the Hawaiian Islands having participated, the Program focused on leveraging teacher influence to gain deeper and more targeted engagement in local communities.

This year, NEED developed workshops focused primarily on energy conservation and efficiency and the measurement of energy use in the home and classroom, a shift from previously held Basic Energy workshops. The workshops include training, sample curriculum and energy learning kits for classroom use, along with professional development credit hours and reimbursement for a substitute teacher. Five one-day energy efficiency workshops were held on Hawai'i Island, Maui and O'ahu with a total of 161 teachers participating, exceeding our goal of 150 participants, and reaching approximately 16,931 students.

Energy Expos

In PY15 Hawai'i Energy and the NEED Project continued to support Energy Expos, student-led, teacher-hosted community events in which parents and community members learn about saving energy in the home. The Energy Expos also serve as a platform for students to showcase energy efficiency knowledge and projects while promoting Hawai'i Energy offerings to ratepayers. A total of 8 Energy Expos with an estimated 750 attendees including parents, teachers, students, and local community members were held in PY15. The Expos received positive feedback from community members and school administrators.

Home Energy Kit Pilot

This year the Program also piloted a home energy kit initiative with teachers and students. The kits contained two LED bulbs, one kitchen faucet aerator, one bathroom faucet aerator, one high-efficiency showerhead and one advanced power strip. The Program worked with a third-party vendor to supply, package and allocate 289 kits to participating classrooms, where teachers would distribute the kits and educational curriculum to students for use in their homes. The kits augmented classroom lessons on energy efficiency and allowed the students to apply lessons learned at home. The impact of the education and kits along with the installation rate of the measures were evaluated by a survey sent to participants. Surveys indicated lower-than-expected installation rates for water measures; however, in PY16 the Program will be utilizing educational materials developed in the CBSM pilot to improve installation rates for showerheads and aerators distributed with energy saving kits.

Mentor Teachers

The Program received feedback from teachers that they would like more peer support for integrating energy efficiency into their curriculum and hosting energy awareness events. In response, Hawai'i Energy in collaboration with NEED, recruited 5 experienced teachers, previously trained by the Project's energy workshops, to support educators seeking guidance in implementation of energy efficiency in their classroom and communities. Each mentor attended and presented information at one NEED workshop a year, outlining their skills and experience and offering specialized support to attendees post-training.

Teachers Advisory Board

Hawai'i Energy and The National Energy Education Development (NEED) Project staff convened the 4th annual Hawai'i Teacher Advisory Board (TAB) meeting with 6 motivated and experienced Hawai'i



Energy Expos allow students and teachers to bring the NEED curriculum into their communities. Expos feature activities facilitated by students, allowing them time to engage their families and friends in what they've been learning at school.

teachers. The purpose of the meeting was to evaluate progress in the last program year and to create on-going conversations to generate ideas for future implementation. In addition, the Program selected and funded four teachers, two from Hawai'i Island, one from Maui and one from O'ahu, to attend The NEED Project's annual National Energy Conference for Educators in July 2015. These teachers had the opportunity to dig deeper into the NEED curriculum with peers from across the country and learn from well-seasoned NEED facilitators, providing them the opportunity to bring their experience and lessons learned back to their own schools.

Hawai'i Energy Fellowship Program

Hawai'i Energy remains dedicated to growing workforce capacity in the energy sector in Hawai'i through our collaboration with Kupu RISE (Rewarding Internships for Sustainable Employment). In PY15, Hawai'i Energy developed a fellowship program for eight young professionals who served in a paid internship capacity and worked on various Business, Residential and Transformational projects. Each Fellow had primary, secondary and tertiary responsibilities, along with guidance from energy industry professionals. Their experiences were educational, inspiring, and they were able to contribute meaningful work that helped advance Hawai'i Energy's goals.

Fellows worked on a variety of initiatives including:

- Hawai'i Energy's Small Business Direct Install Lighting (SBDIL) program, performing a total of 179 post-inspections across O'ahu;
- CBSM research and implementation of behavioral pilots within their respective universities or assigned market sectors;
- Increasing awareness on the importance of energy efficiency and the Hawai'i Clean Energy Initiative;
- Developing manuals to implement an office energy-saving campaign at Hawai'i Pacific University and the University of Hawai'i at Mānoa;
- Supporting Hawai'i Energy's Clean Energy Ally (CEA) program, recruiting new members and engaging and supporting existing members;
- Developing retail displays for marketing purposes;
- Supporting Hawai'i Energy's K-12 educational program, helping to develop educational materials and assisting with Energy Expos and teacher training workshops.

To close out the year, the fellows gave final presentations and reports to summarize their experience, work performed and recommendations for how to expand programs to benefit Hawai'i ratepayers. In the future Hawai'i Energy will look for ways to cost-effectively expand the number of students who can participate and the diversity of projects that they support.

Comments from the Fellows...

"Sustainability has become a huge part of my life and it will not end with this fellowship. I plan to continue in this field for as long as needed, which I believe is an extreme necessity for society and for the world."

"This fellowship has taught me many valuable skills that I can continue to develop as a graduate student before I begin to pursue a career in sustainable development. Thanks to my fantastic partner and all of the mentors we had during this experience, I've gained a better understanding of the importance of team work, time management, organization and collaboration."

Energy Efficiency Sales Professional In-Person and Online Trainings & Events

Educating professionals in energy efficiency sales and advocacy leads to greater end-user demand, as it draws the connection between energy efficiency and business profitability, allowing sales professionals to be more effective at getting projects approved. Selling Energy, formerly Energy Efficiency Funding Group (EEFG), is a training and education services firm based in California and its principal, Mark Jewell, is a nationally-recognized expert on selling energy efficiency. In our fifth year working with Mark Jewell, Hawai'i Energy continued with the successful combination of in-person workshops, online training courses and special events targeting specific business sectors.

In PY15, 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 workshop series was a great success, with a total participant count of 362 attendees. Approximately half of registrants were energy efficiency product/service salespeople who have the ability to influence a broad sphere of energy end-users. Additionally, the Program logged a total of 205 online course views, representing a diverse audience from 37 different organizations.

Jewell also presented at the following special events to a total of 83 key stakeholders:

- Breakfast event for business leaders in the commercial real estate market and supported by Chamber of Commerce Hawai'i on *Leveraging Efficiency to Increase Your Real Estate Portfolio Value*;
- Networking event for past participants in Mark Jewell's training courses, the "Ninja Network" and Clean Energy Allies;
- One-on-one coaching sessions for the winners of an earlier promotional contest;
- Breakfast event to supplement lighting controls workshop series with IES – *Positioning Lighting Proposals as High-Yield, Low-Risk Financial Investments*;
- Breakfast presentation to board of directors/presidential leadership at Kamehameha Schools on *Merits of Energy Efficiency*; and
- Evening event for business leaders of Carrier Hawai'i on *Reframing Energy Efficiency as a High-Yield, Low-Risk Investment*.

Survey results once again confirmed that attendees learned a wide array of practical skills and techniques that they found both inspiring and relevant to their current work. Additionally, nearly all attendees reported that they would recommend the workshop they attended to a friend or colleague. In PY16, Hawai'i Energy will continue to develop its market sector based resources for energy sales professionals and Clean Energy Allies.



Carrier Hawai'i, a local air conditioning distributor, hosted a private coaching session with Mark Jewell for their employees.

Other Educational Initiatives & Support

Hawai'i Energy strongly believes that collaboration is key to maximizing impact through leveraging influence of teachers, community members, students and industry professionals. The Program participated in a number of initiatives to build relationships and to enrich programs with education about the importance of energy conservation and efficiency:

- Presented to teachers at the **Kamehameha Schools** Kapālama Campus on energy conservation and efficiency and the integration of energy education into classroom curriculum.
- Judged a 12th grade Economics class project at **Kamehameha School's** Kapālama Campus. 80 students were challenged to propose energy savings solutions for their school, based on impact, feasibility, financial investment and payback. Winning teams were recognized and awarded energy-saving prizes from Hawai'i Energy.
- Presented at a Hawai'i Department of Education **Ka Hei**³ workshop for public school teachers on the energy situation in Hawai'i and provided an overview of Program offerings. Also collaborated with Ka Hei and Pono Home to install energy-saving devices coupled with educational signage in 15 classrooms and common areas at Honowai Elementary School.
- Hosted a half-day of energy efficiency sessions for 24 **Girl Scouts** at a STEM event to illustrate how a career in the energy industry connects to STEM. The sessions provided a brief overview of Hawai'i's energy situation and offered energy-saving measures that students can implement in their homes.
- Attended the annual **"Schools of the Future"** conference for educators at the Hawai'i Convention Center. The conference allowed the Program to build relationships with teachers, learn about emerging themes in pedagogy that could be applied to the Program's mission, increase brand awareness, and foster collaboration among educators and community partners, specifically promoting NEED Energy workshops and Hawai'i Energy Expos.

³A five-year comprehensive energy and sustainability program, launched in 2014 by the Hawai'i Department of Education, that seeks to integrate innovative energy technology with meaningful learning experiences, all while reducing energy costs. More information at <http://www.hawaiipublicschools.org/ConnectWithUs/Organization/SchoolFacilities/Pages/Ka-Hei.aspx>.

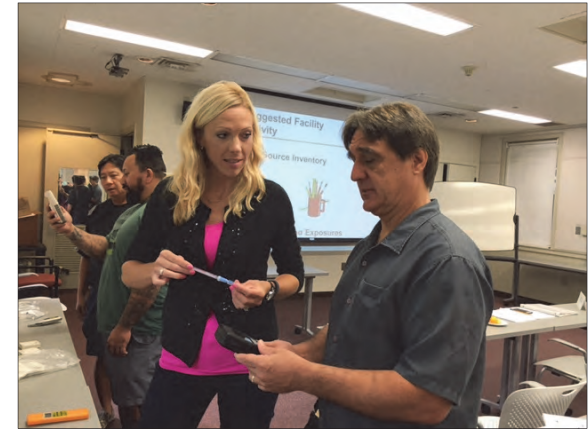
Technical Trainings

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.

Building Operator Certification (BOC®)

Hawai'i Energy collaborated with the University of Hawai'i at Mānoa Outreach College (UHMOC) and the Sustainable Living Institute of Maui (SLIM) to bring the nationally-recognized BOC® energy efficiency training and certification program (Levels I and II) to Hawai'i Island, Maui and O'ahu. BOC® workshops target the facility maintenance workforce and provide skills and knowledge to implement energy efficiency practices at their workplaces. This year, the Program made the course more accessible to Hawai'i Island professionals by working with SLIM to host a Level I course in Kona. The Program also offered a Level II course in PY15, which emphasized preventative maintenance and more targeted training.

43 participants attended the Level I courses and 16 attended Level II. Participants came from all types of facility maintenance backgrounds, including resorts, condominiums, medical centers and state and military facilities. These workshops have been well-received by the employers of the participants and demand for future sessions has increased. Next year, the Program will explore options for live streaming courses offered in order to cost-effectively extend the reach to Hawai'i Island attendees.



The BOC® course provides hands-on instruction from local energy industry experts, including learning how to operate monitoring devices as shown above.

Certified Energy Management (CEM) and Certified Energy Auditor (CEA) Trainings

Hawai'i Energy has worked with the Association of Energy Engineers (AEE) to hold training seminars and certification programs in Hawai'i over the last five years. These programs continue to strengthen the workforce in Hawai'i by improving skill sets and offering attendees the opportunity to gain the Certified Energy Manager (CEM) and Certified Energy Auditor (CEA) designation, which fosters their professional development. A total of 17 participants attended the CEM training and 16 participants attended the CEA training. This year AEE continued with its more interactive teaching style and included the added study hour each day to help participants with homework problems and questions. Positive comments and feedback from the participants suggested that the course was well-received.

Lighting Workshops

The Program supported the professional development of 34 lighting professionals in a workshop series provided by Illuminating Engineering Society (IES). IES seeks to improve the lighted environment in Hawai'i by bringing together those with lighting knowledge and by translating that knowledge into actions that benefit the public. It builds upon a century of excellence to create a membership dedicated to promoting the art and science of quality lighting to its members, allied professional organizations and the public.

IES provided two workshops: "Fundamentals of Lighting" and "High-End Residential Lighting," which collectively covered topics such as: lighting terms and technologies; design processes; legislation regarding energy codes and efficiency; how to assess existing lighting installations and how to design lighting installations for homes and multifamily buildings.

Operations and Maintenance Workshop Series

Hawai'i Energy provided tuition support for 193 qualified individuals to attend the International Facility Management Association (IFMA) technical training program for facilities professionals living and working in Honolulu, Hawai'i and Maui counties. These workshops were hosted by the IFMA-Hawai'i Chapter and facilitated by David Wylie of ASWB Engineering, a California-based firm specializing in energy management consulting. The workshop offered best practices for maintaining a variety of systems, including new technology. Training covered a variety of topics including: chilled water systems and cooling towers, air handling systems efficiency, adjustable speed drives and energy management systems.

The purpose of these trainings was to provide technical knowledge and training to support the professional development of facilities workers whose primary responsibility is to ensure that large buildings are operating smoothly and at peak efficiency. The target audience included personnel who directly support large facilities such as hotels, resorts, office building, high-rise multi-family buildings, hospital, military, airports, industrial production, manufacturing plants and large educational institutions.

Energy Systems Integration Pilots

To maximize impact in PY15, Hawai'i Energy refined its efforts in studying Energy Systems Integration. The Program combined the Demand Response and Smart Grid pilot projects from PY14 into one study, while continuing to support electric vehicle (EV) initiatives, codes and standards, benchmarking and the water/wastewater sector.

Load Shifting and Smart Grid Pilots

The Program's research on shifting load and responding to peak demand expanded in PY15 to include attempting to control when demand occurs as well as improving the data quality and reliability from previous pilots. The purpose for the PY15 Demand Response (DR) pilot was to expand testing of the load shifting capability of residential heat pump water heaters (HPWH) while measuring the energy reduction relative to standard electric resistance water heaters (SERWH). In PY14, Hawai'i Energy found that water heating load could be shifted outside of the utility peak demand period by replacing standard electric resistance water heaters with heat pump water heaters. In PY15, the goal was to go beyond the 5-9 PM peak and shift the water heating load to the solar day, when excess renewable energy is available, thereby smoothing out the infamous "duck curve".

Additionally, the Smart Grid pilot was enhanced to build upon the lessons learned from PY14 and to expand implementation of the Home Energy Management System (HEMS). In PY14, Smart Grid pilot participants were able to view their whole-home energy usage on a near real-time basis. The goal for PY15 was to start to disaggregate the total load into individual components in order to demonstrate to consumers when and where they use energy. With strong synergies between the two pilots, the Hawai'i Energy team merged the DR and Smart Grid pilot efforts for greater impact utilizing smart meter homes for electrical load shifting, as well as beginning to provide the same homes with individual appliance energy use data.



The GE Geospring® model pictured here with one of our pilot families has various operating modes that offer different levels of efficiency and can be controlled remotely via the web or smart phone application by addition of the GE Connect Plus module.

This combined pilot was a collaborative effort between Hawai'i Energy, multiple vendors and subcontractors, Hawaiian Electric's smart grid team and the participants themselves. Four qualified participant homes were selected from a pool of 50 previous Hawai'i Energy participants whose homes had been upgraded with a HECO utility smart meter and who were identified as having a standard electric resistance water heater. In addition:

- Homes with photovoltaic (PV) systems were excluded, since complete energy consumption data would not be readily available.
- Homes must have had at least 300 kWh per month of energy consumption to ensure regular household occupancy.
- If a resident was not the homeowner during the pilot period, the occupant must have had the homeowner's approval to participate.
- The home's existing electric resistance water heater space must be adequate to fit the new heat pump water heater, which is physically larger than the existing tank.

In exchange for their participation, each participant received installation of a new heat pump water heater, in-home display and smart plugs, as well as a one-year maintenance contract, at no cost.

The Program selected ZigBee-compliant in-home displays and smart plugs (provided by CEIVA Energy), ENERGY STAR®-certified GE® Geospring heat pump water heaters (as the replacements for electric resistance water heaters) and software platform Virtual Peaker to program individual heating schedules into each heater and collect both standard and custom heat pump data points.

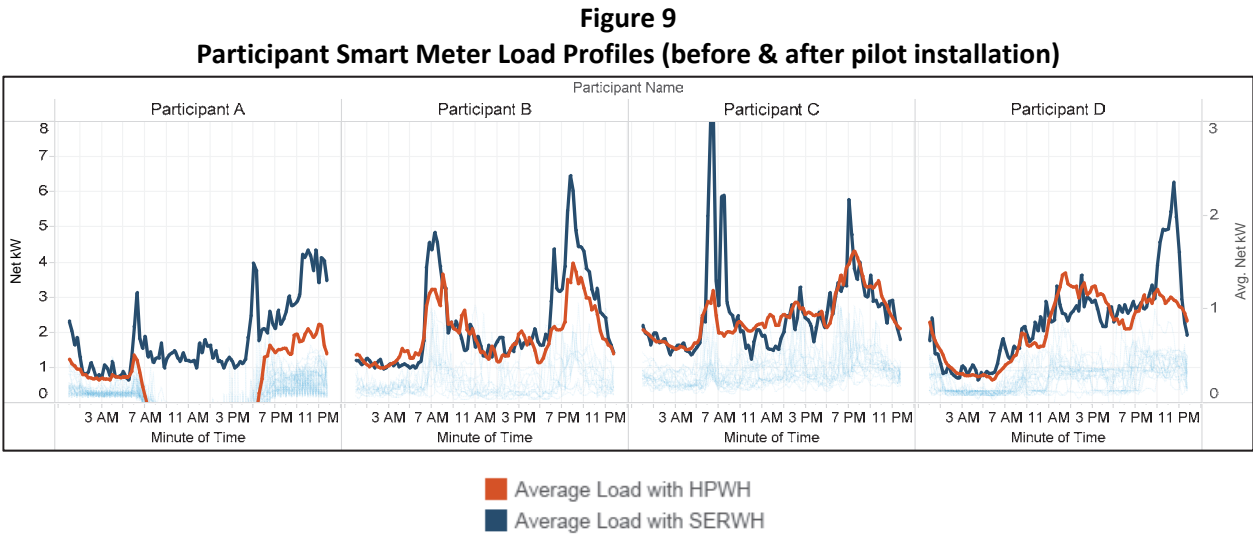
Building upon the lessons learned from the previous DR and SG pilots, Hawai'i Energy:

- Utilized robust and reliable metering for hot water use, tank temperatures, power and energy
- Focused on heat pump energy savings by eliminating simultaneous water reduction measures
- Existing water heater location was considered for heat pump retrofit early in candidate selection process. Primary interests were space size, ventilation and condensate drain availability.
- Proper HAN provision processes were combined with Program understanding of unique smart meter logic, Zigbee channel selection and overall utility smart meter integration.

Although Hawai'i Energy will not be pursuing additional load shifting or smart grid pilots in PY16, the Program will focus on collaboration with the utility in identifying and quantifying the value of demand response, load shifting, smart grid and other non-efficiency benefits.

Load Shifting Results

Following installation, the four HPWH units were programmed to run at 140°F in hybrid mode (heat pump as the primary heat source with electric-resistance backup). Hybrid mode was selected to ensure sufficient hot water production. The GeoSpring heat pump worked well to provide adequate hot water while reducing water heating energy. In one home, water heating energy was individually measured and showed a 38% energy reduction. **Figure 9** shows the difference between load profile curves for participant homes with a standard electric resistance water heater vs. HPWH. Most notably, the multiple daily energy spikes due to electric element water heating have been reduced, if not eliminated.



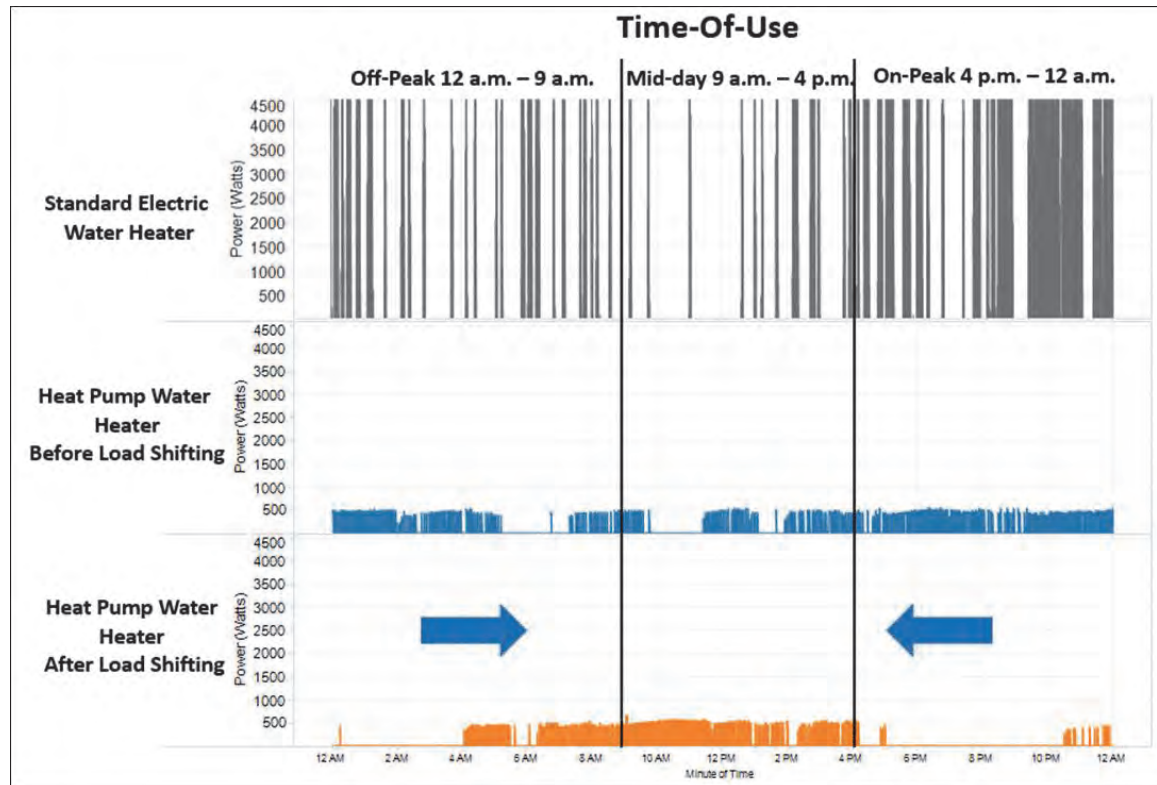
After five weeks, two of the tanks were scheduled for initial load shifting events according to the *Conservative Curtailment Schedule*. The other two homes had communication issues and the team worked to fix these in order to gather complete data before scheduling.

The primary goals of the *Conservative Curtailment Schedule* were to ensure adequate hot water was available during high demand times and to shift the majority of heating to the solar day using only the heat pump/compressor system (rather than the electric element). The initial load shifting schedule worked ideally in the first of the two homes. **Figure 10** shows the water heating demand load has not only been reduced by the HPWH but also shifted from ‘On-Peak’ period to ‘Mid-day’ and ‘Off-Peak’.

Conservative Curtailment Schedule

Exp. 2	HP Setpoint (°F)	Mode	Start Time	Duration (hours)
Experiment				
Solar Day Heating	140	HP Only	9:00	8
Utility Peak Curtailment	120	Hybrid	17:00	4
Overnight Loss Reduction	120	HP Only	21:00	7
Minimal Morning Heating	130	HP Only	4:00	1
Minimal Morning Heating	120	Hybrid	5:00	4

Figure 10
Water Heater Load Profiles by Time-Of-Use



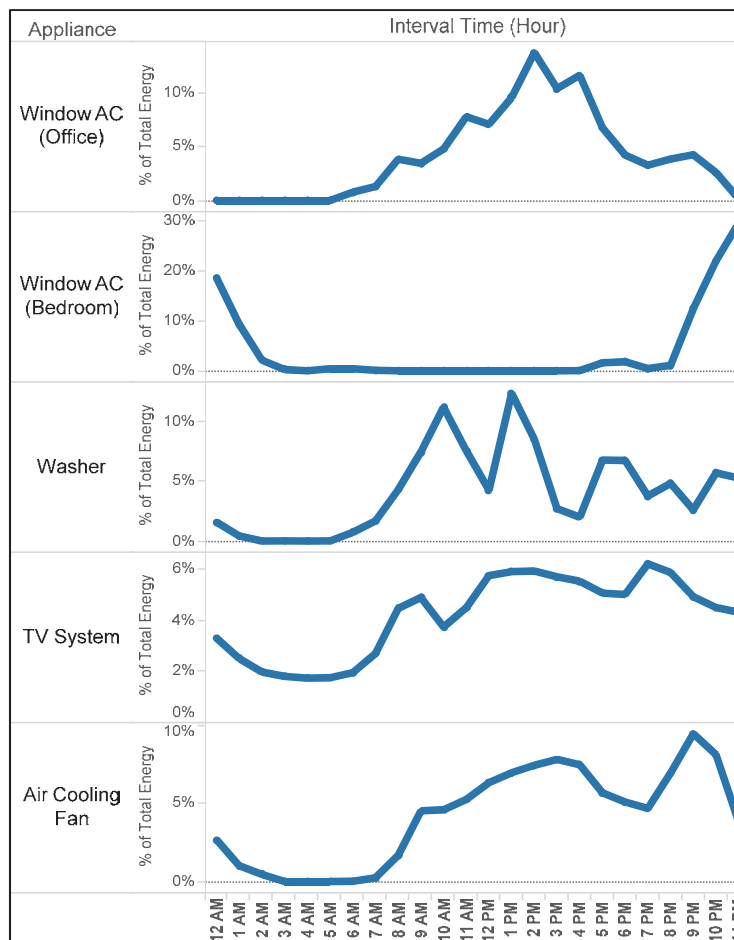
The second home required frequent electric-resistance backup heating due to higher than expected hot water usage. Therefore, subsequent load shifting events were customized for each home.

The overall takeaway was that each home's pattern of hot water use would require a unique HPWH heating schedule to optimize efficient heating and load shifting. Additional testing of load shifting events are planned for the first quarter of PY16. One focus of this continued testing will be to find a schedule that is generally optimal for all participants to reduce electric resistance run time and shift the majority of the water heating load to the solar day.

Smart Grid Results

Each participant home was outfitted with a new in-home display (IHD) as well as two smart plugs. The IHD display provided a visual representation of real-time energy consumption for the smart plug appliances and the whole home. As a result, participants saw a disaggregated display of their total home energy load. **Figure 11** is an example of average appliance load profiles of two window air-conditioners, one washer, one TV entertainment system, and one living room pedestal fan that were measured by Zigbee-compatible smart plugs. This allowed the program to evaluate load shifting potentials of residential appliances while providing additional tools for the participants to monitor their home appliances.

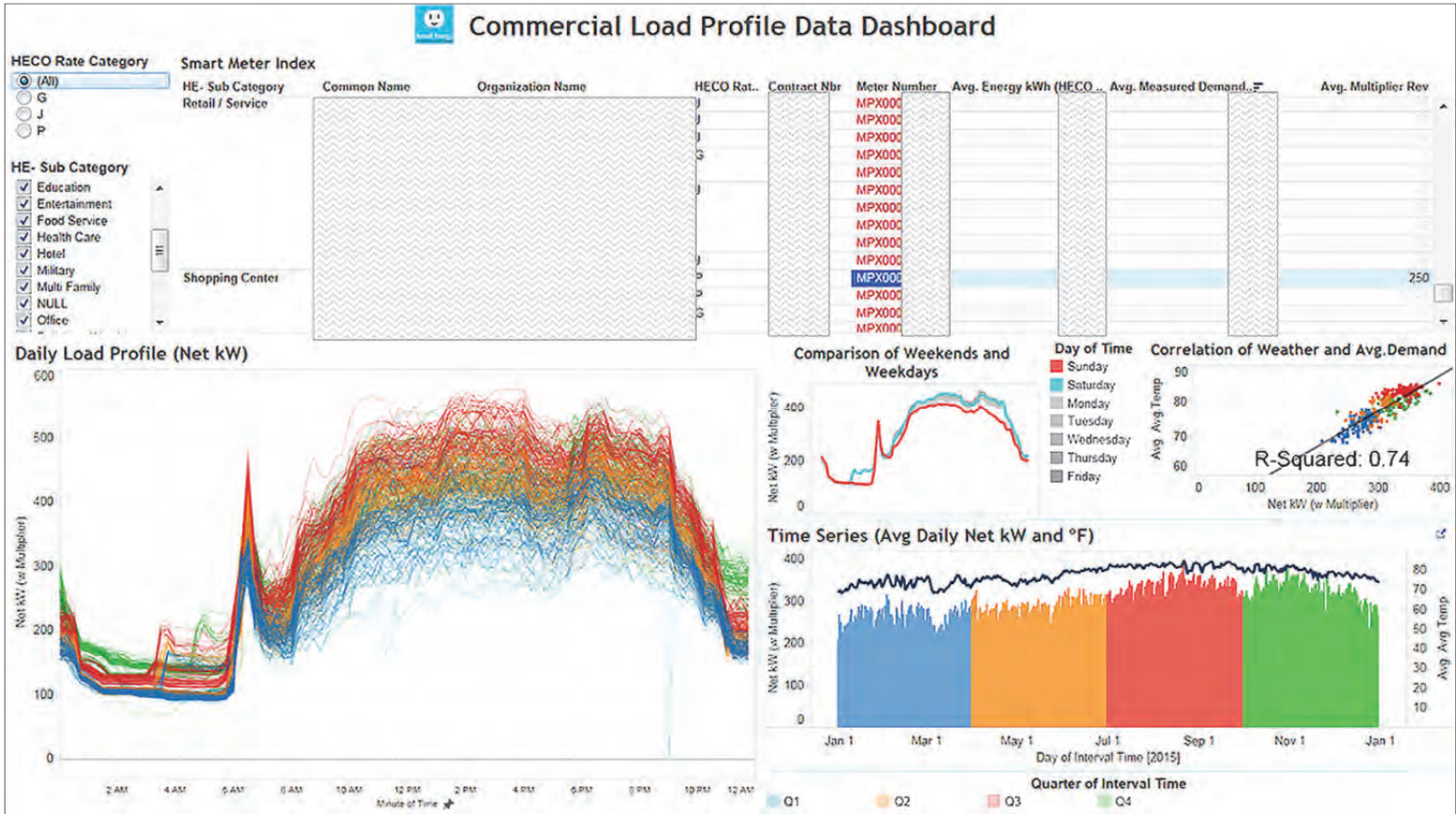
Figure 11
Appliance Load Profiles Monitored By Smart Plugs



Additional Smart Grid Data Analysis

In addition to the combined pilot, Hawai'i Energy leveraged existing smart meter data and the Program's advanced analytics to facilitate collaboration with the utility. Upon request from HECO's Demand Response team, the Program analyzed the 15-minute interval data from over 400 commercial customers. By combining this data with the Program's customer segment data, Hawai'i Energy created a dynamic load profile dashboard that quickly identifies the commercial load profile characteristics of smart grid customers. A sample dashboard for an O'ahu shopping mall is displayed in **Figure 12**.

Figure 12
Sample Dynamic Load Profile Dashboard of O'ahu Shopping Mall



Electric Vehicles

As people in Hawai'i look to reduce their cost of living, switching from their internal combustion vehicle to an electric vehicle has become a popular option. However, some EV owners may not realize the full impact of charging their electric vehicle on their home energy bill. Hawai'i Energy's goal is to help consumers identify different ways to offset this additional electrical load. This program year Hawai'i Energy created a pilot to address the crossroads between electric vehicles and energy efficiency to raise awareness by producing new marketing materials as well as offering an energy saving kit specifically for EV drivers.

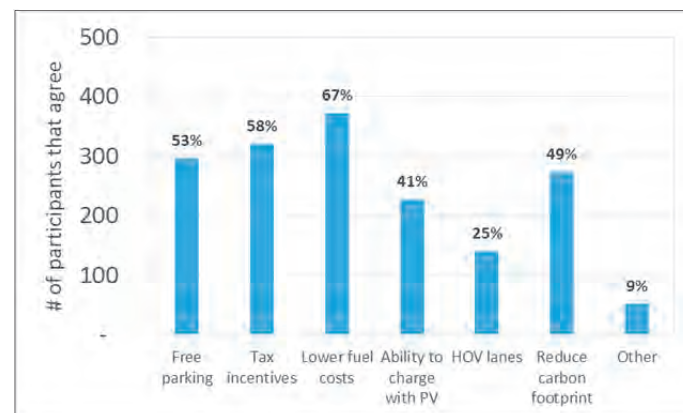
Negawatt Kits

In order to help offset some of the costs that come with charging an EV at home, Hawai'i Energy provided a free energy-saving "Negawatt" kit to new and existing EV owners. Unlike the PY14 EV kit promotion, which was limited to a total quantity of 50 participants and fulfilled in-house by the Hawai'i Energy staff, the PY15 EV kit promotion was upgraded to online fulfillment with a goal of distributing 500 kits. The offer launched in and the Program received over 500 requests within the first week, ending with a total of 554 participants. (For specific details on the marketing campaign used to launch this offer, see Marketing & Communications section.) With an estimated 3,400 electric vehicle owners in Hawai'i, Maui and Honolulu counties, Hawai'i Energy estimates it was able to penetrate about 15% of the EV population.

The Negawatt Kit (valued at \$68) has the potential to save each participant up to \$150 per year. The Program leveraged the opportunity to collect valuable consumer data by requesting that participants complete a short online survey in order to receive the offer. According to one of the survey questions (shown at right), the majority of the participants agreed that lower fuel costs, tax incentives, and free parking are some of the most appealing aspects to purchasing an electric vehicle. The Program also found through the survey that about 60% of EV drivers also have a photovoltaic system at their home, 68% charge their vehicles at home (in comparison to free and paid charging stations) and that for every 10 electric vehicle owners, 9 of them would recommend others to purchase one.

EV + EE Video

While many would agree on the benefits of driving an EV (such as federal rebates, dedicated EV parking stalls, HOV lane use and more), there are additional benefits introduced when considering energy efficiency. Hawai'i Energy and Kanu Hawai'i collaborated to develop a brief, animated video to help consumers make the connection between electric vehicles and energy efficiency. The video shows that implementing efficiency measures at home can potentially offset the amount of energy required to charge electric vehicles, to the point where customers can essentially drive for free.



Data collected through the online store survey question shows that a majority of participants purchased their EV for lower fuel costs and tax incentives.

Doing these three things saves about the same energy as the average EV commute
(in other words you drive for free)

1. Upgrade to a solar water heater
2. Upgrade to an ENERGY STAR® fridge
3. Upgrade two bulbs to LEDs

The newly-developed EV+EE educational video highlights several energy-saving tips like the one above, illustrating the connection between owning an EV and still reducing environmental impact through energy efficiency.

Codes and Standards

In PY15 the Program supported the counties with code compliance assistance while also exploring an incentive program for early code adoption. Assisting with code compliance began with the development of 2006 IECC Commercial building Designer and code official Plan Reviewer Checklists. The checklists organize code requirements by component and system, listing them in a quick-reference and review format. Hard copies of these forms were distributed at State Building Code Council meetings and at the IECC 2015 trainings held by DBEDT and are available on the Hawai'i Energy website. The Hawai'i Energy Codes Compliance Study for Maui, Hawai'i and Honolulu counties is also available online. The Program offered training and collaboration to county building officials in using the checklists to identify projects where the Program could again intervene to improve compliance in low-scoring areas such as retail lighting or window solar heat gain coefficient (SHGC) requirements.

The Designer checklists were intended to be submitted with plans to the planning department, where plan reviewers would verify energy code compliance using the Plan Reviewer checklist. Over 100 checklists were disseminated to building designers, building industry trade allies, plan reviewers and building officials at IECC 2015 code trainings and state code council meetings. A total of 634 checklists and 141 compliance studies have been downloaded from the Hawai'i Energy website since they were added in December 2015.

The second aim of the Program's PY15 codes and standards efforts was to design a potential incentive for facilities designing to IECC 2015 code levels before the code is adopted and enforced. The Program evaluated several areas of potential codes influence and chose one to implement, in the form of a prescriptive financial incentive for early code adoptions in chillers, to be launched in PY16. The previous prescriptive chiller requirement was 15% better than IECC 2006. The new prescriptive chiller requirement is to meet or exceed IECC 2015 levels. By implementing IECC 2015, chiller efficiency requirements (rated by kW per ton) will become more stringent, both in the part-load and full-load operating conditions for all sizes of chillers, as seen in **Figure 13**. As counties begin to adopt IECC 2015, the Program will raise incentive requirements above and beyond the new code, which can be done by referencing another jurisdiction's code that is beyond IECC 2015 (e.g. California's Title 24 Energy Code in some technologies) or increasing requirements by a known percent (e.g. incentivizing lighting power densities that are 10% beyond code).

In PY16, the Program will continue its support of energy codes and standards primarily through collaboration with other entities. Leveraging other's legislative influence will be one method of helping to move IECC 2015 along the counties' adoption processes. The Program will also identify key HERS raters and home builders to begin discussing the next incentive steps (for example, incentivizing 100% LED lighting in new homes) to influence the residential market toward net-zero energy (NZE) homes.

Finally, the Program will continue to maintain simple educational tools to support IECC 2015, including the checklists and potentially an interactive web tool that can be used to understand the IECC 2015 requirements for chillers.

Figure 13
Program incentive level comparison: Previous vs. IECC 2015

		Units: kW/Ton			
Path	Code Level	< 150 Tons		>= 150 Ton	
		FL	IPLV	FL	IPLV
Path A	Previous	1.2560	1.0680	1.4060	1.1960
	IECC 2015	1.1880	0.8760	1.1880	0.8570
Path B	Previous	1.2560	1.0680	1.4060	1.1960
	IECC 2015	1.2370	0.7600	1.2370	0.7450

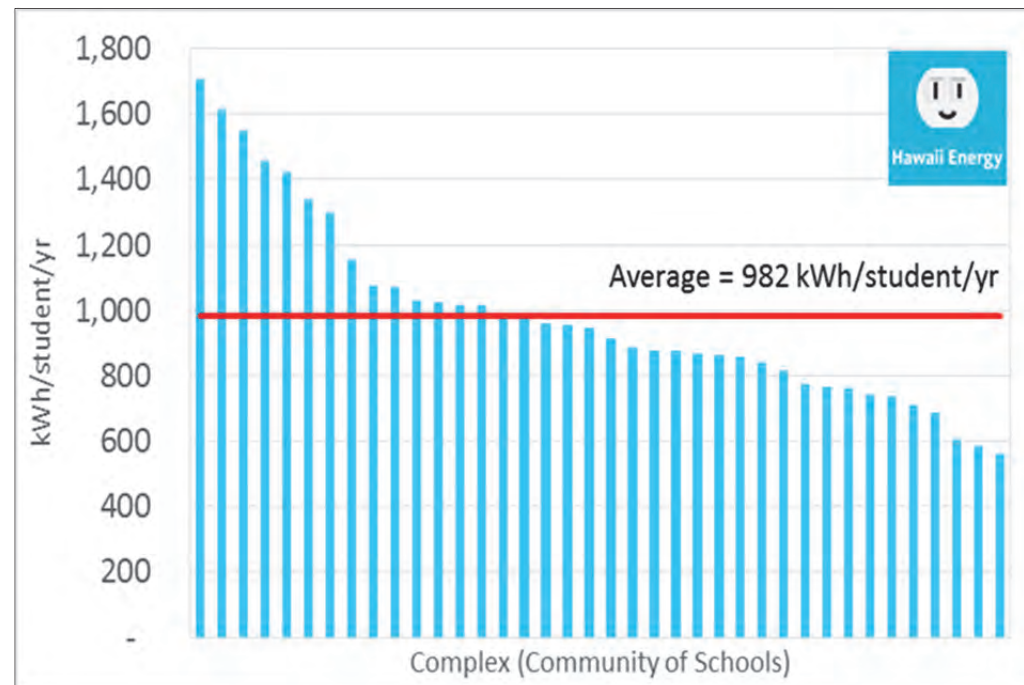
Benchmarking

When commercial facilities look to improve their energy consumption and lower their operating costs, energy benchmarking is a smart place to start. Benchmarking your property allows you to determine how your property is performing relative to peers and can be used for tracking and reporting progress year-over-year. For a facility with multiple locations, it can be used to prioritize efforts for energy efficiency improvements. This year, Hawai'i Energy offered benchmarking services for a second year in a row with a goal of adding 150 new benchmarks to the existing portfolio. In doing so, it allows the program to have a better understanding of how different sectors are consuming energy and target ones that have the higher potential for savings.

Hawai'i Energy completed 264 benchmarks in PY15. These benchmarks include K-12 schools, hotels, movie theaters, retail and grocery stores. Of these 264 benchmarks, 226 of them were Department of Education (DOE) schools where the energy use intensity was defined as the energy consumption per student enrolled per year (kWh/student/yr). Using this data, Hawai'i Energy was able to identify the most energy intensive schools and complexes and plans to share this with the DOE in hopes of providing information that can leverage targeted energy efficiency projects.

Figure 14 shows a chart of each complex's energy consumption ranked in terms of highest to lowest kWh per student. A complex is a community of schools which typically include an elementary school, intermediate school, and high school while some complexes may have multiple of each. In this analysis, the data shows that the average school will consume about 982 kWh/student/yr., or 5.5 kWh per student per school day. Looking at this information could help stakeholders determine how to prioritize energy efficiency efforts in Hawai'i's public schools.

Figure 14
Hawai'i DOE School Complex's Average Yearly Energy Usage (in kWh per student)



Water/Wastewater Initiative

Hawai'i Energy continued its commitment to the water and wastewater sector in Hawai'i and to assisting in promotion of the water-energy nexus. Support for this initiative took two forms: financial incentives for water and energy saving projects, and education/training for industry professionals.

After a successful collaboration with the Hawai'i Department of Water Supply (DWS) in PY14 on Phase 1 of their island-wide leak detection system, Hawai'i Energy committed to 50% matching funds in PY15 for procurement and installation of additional leak detectors in order to maximize the coverage area. Phase II included the deployment of 423 leak loggers and antennas, bringing the total number of loggers to 883. These leak loggers can detect and pinpoint underground water leaks from line breaks as they happen, rather than waiting until the water surfaces, which may never occur. One example of success ensued on January 27, 2016 when the system detected a massive leak in North Kona. The leak, a result of a radial crack in a 2.25" iron pipe, was estimated to be leaking at 78 gallons per minute. Hawai'i DWS also estimates that the leak had been ongoing for potentially two years or more prior to the installation of the leak loggers. Due to the porous nature of the ground, this water leak never surfaced, and could have continued for years into the future had it not been detected by the newly installed equipment. Within days of identifying the leak, HDWS field crew had repaired the broken pipe.

Another significant incentive was given to a small, private water company, also on the Big Island, for installation of a pressure-reducing valve (PRV) station. The water company, which serves a private residential development, has dealt with problems related to excessively high water pressure in its system for years. Not only does the high water pressure cause leaks in the system, but each subsequent point of failure then bleeds water at an excessive rate, often undetected. The PRV mitigates both problems, while still delivering the required water pressure to customers. It is expected that a large reduction in leakage volume will result in less pumpage at the well site, and therefore significant energy savings. With construction recently completed in June 2016, data will continue to be collected and analyzed in future months. This project, which for multiple reasons had struggled for years to get off the ground, might still be stalled if not for the financial assistance from Hawai'i Energy.

Finally, Hawai'i Energy contributed to the education of water and wastewater industry professionals and awareness for energy efficiency and conservation in two forms. First, Hawai'i Energy sponsored tuition funding for entry-level water and wastewater operators through the Sustainable Living Institute of Maui (SLIM) at UH Maui College and provided an expert in energy efficiency to teach several course modules in spring 2016. Second, Hawai'i Energy put on a full-day workshop on water system energy efficiency at the annual AWWA/HWEA Pacific Water Conference in February 2016.

Clean Energy Ally (CEA) Program

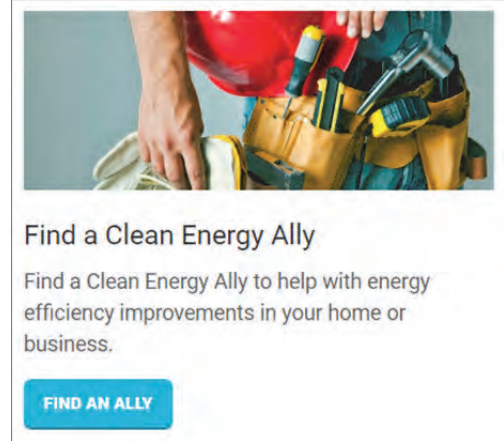
PY15 marked the second full year of the Clean Energy Ally program, a network of individuals and companies on the front lines of selling, designing, financing, installing and maintaining energy efficiency measures. Allies include product manufacturers, wholesale and retail suppliers, equipment contractors, architects, engineers and electricians who receive training on Program incentives and application processes. Through their direct contact with utility customers, Allies help Hawai'i Energy meet performance goals and implement energy efficiency projects in both residential and commercial markets. The Program registered and trained 272 new Allies in PY15, a 57% increase over last year.

As in previous years, Allies apply through an online application process, agree to follow program rules and procedures and are educated on Hawai'i Energy programs. New Allies are onboarded through a live orientation webinar (delivered weekly), which includes a presentation on Hawai'i Energy program structure, detailed information on incentives and a Q&A session.

Sales & Marketing Support

The Program relies heavily on Allies to promote offers, drive participation and ultimately, meet energy-saving goals. Extensive work was done this year to equip them with adequate sales and marketing tools to help them achieve their own business goals while advocating for energy efficiency. These tools include:

- **Marketing Kit** – a free kit including Hawai'i Energy-branded car door magnets, a large banner for trade shows and events, window clings and co-branded brochures.
- **Retail point-of-purchase displays** – Allies who sell energy-efficient products may request wall, shelf or other point-of-purchase displays. Hawai'i Energy provided design, printing and installation.
- A listing on the **“Find A Contractor” directory** on the Hawai'i Energy website
- **Co-op advertising funds** – a cash subsidy to offset the cost of pre-approved, co-branded radio, print, TV or digital advertising, up to \$2,500 per Ally. 7 businesses participated in PY15 for a total payout of \$10,956.65.



Hawai'i Energy's first-ever commercial retail display was installed this year at midstream lighting distributor Grainger's O'ahu retail location.

Events & Education

The Program hosted a number of events for Allies throughout PY15, providing them with opportunities to learn about incentive offerings, engage with Hawai'i Energy staff and network with industry colleagues and potential customers.

Chamber of Commerce of Hawai'i

Hawai'i Energy collaborated with the Chamber for a third year to enhance event offerings for Clean Energy Allies. This year, Hawai'i Energy was the title sponsor for several Chamber networking and educational sessions.

Sponsoring popular Chamber networking events gave CEAs access to a pool of attendees that the Program may have otherwise not been able to reach and the chance to explore potential partnerships for cross and up-selling energy efficiency products and services. The Program also received valuable exposure as we were able to distribute literature, have a visual presence (banners, logo inclusion on promotional emails, etc.) and have one of our leadership team members briefly address the crowd. This year, Hawai'i Energy sponsored the two largest Chamber networking events of the year – a sold-out holiday party in December that drew 175 attendees and a “Step Into Spring” event in May, which had 137 attendees.

The Program also worked with the Chamber to host an array of educational events, tailored for Allies in specific market sectors to improve their sales skills and generate leads. Several of them are outlined below:

- “Increasing the Value of Your Real Estate Asset through Energy Efficiency” – presentation by efficiency sales consultant Mark Jewell to commercial real estate property owners and management companies.
- “Plate Up Your Profits” – geared toward restaurant/foodservice customers in central and west O'ahu, featuring presentations by Hawai'i Energy and a number of other organizations (United States Department of Agriculture, Innovate Hawai'i, Honolulu Board of Water Supply) offering funding for energy-efficient kitchen upgrades. An additional event was held in Waikiki to bring commercial kitchen equipment distributors and customers together to learn about incentives for ENERGY STAR® kitchen equipment.
- “Energy Efficiency in the Manufacturing Sector” – in collaboration with Innovate Hawai'i (an assistance program for local manufacturers), Hawai'i Energy and the Chamber hosted events in Kona, Hilo and on Maui to educate manufacturing industry professionals on combining Hawai'i Energy incentives with State grants for maximum energy savings.

Lunch & Learn

The Program launched the Lighting Distributor Instant Rebate program with a first-ever Lunch & Learn event in July 2015. More than 150 contractors, vendors, distributors and lighting professionals were able to network, receive exclusive information about the new midstream incentive and register for the Clean Energy Ally and midstream programs. As a result of the luncheon, the first four distributors signed on (which grew to twelve by the end of the year) and generated large interest amongst many end users.



What The Allies Had To Say...

“Rebate programs relate to good incentives for utility customers which translate to healthy marketing and sales.”

“The information about training sessions and opportunities in the program, it keeps me and my co-workers on top of what’s happening while our company figures out how to expand and economically deliver in Hawai‘i.”

“Being able to give the customer their rebate is not only a great sales tool for us, but knowing we are working with Hawai‘i Energy, customers can have confidence in our products and installations.”

“It [CEA membership] can serve a similar advantage as a ‘seal of approval’ that gives customers an added feeling of trust.”

“Customers have come to expect state and federal rebates for purchases of energy-efficient products. The CEA and particularly the Hawai‘i Energy rebate has been very important as a way to validate energy efficiency of their purchase.”

Clean Energy Ally Survey

Hawai‘i Energy worked with local market research firm Anthology Marketing to survey Allies and gain a better understanding of their needs and how to structure future program offerings. A total of 218 (about 44%) of all Clean Energy Allies participated and provided feedback on topics like benefits, program structure and processes.

A large majority of the Allies surveyed (82%) said they consistently mention the Hawai‘i Energy program and/or incentives in their sales approach, with 51% of Allies ranking this the most important benefit of CEA membership. Having access to Hawai‘i Energy experts for project assistance was ranked as the second most important benefit, with 60% saying they actively utilized this. The survey also showed that a slight majority of participants (53%) would have no problem recommending becoming a Clean Energy Ally to another business.

Allies were also given the option of providing feedback on potential improvement areas. Although there were a wide variety of answers, some of the repeated themes included the need to streamline processes (i.e. project approvals, training on Program applications, new Ally registration) and to improve end-use customer education on Hawai‘i Energy offerings as from the Ally perspective, the incentives seem less credible coming from a third party. And, when asked to rank future training topics, 57% ranked Program training (on incentives, applications, worksheets, etc.) as the most important.

Overall, membership in the CEA network is generally seen as a positive aspect of the Program and although there is room for improvement, Allies are utilizing the current slate of benefits.

Gathering direct feedback is an invaluable part of growing the CEA program and Hawai‘i Energy plans to discuss and address (while evaluating for feasibility) the data collected in PY16.

MARKETING & COMMUNICATIONS

Overview/Introduction

Whether through word-of-mouth or Program-generated messages, marketing the Hawai'i Energy program is an important piece in raising awareness and driving participation. As research conducted in PY14 showed relatively low awareness of Hawai'i Energy amongst customers, the Program spent time in PY15 revisiting and evaluating its marketing and communications strategies. The overall goal for marketing and communications efforts has always been to increase customer awareness of and participation in all Hawai'i Energy offerings, the results of the study pushed Hawai'i Energy to not only identify fundamental improvement opportunities, but explore new methods of communication and messaging.

The Program enlisted local creative agency Wall-to-Wall Studios to assess the research and begin the long process of addressing branding challenges in order to set Hawai'i Energy up for success in years to come. Equipped with the knowledge from the first few sessions with Wall-to-Wall, the Program began to refine current processes and explored opportunities to reach new audiences, including increasing our digital presence, supporting and utilizing the Clean Energy Ally network and magnifying our public image as a leading resource on energy conservation and efficiency in Hawai'i.

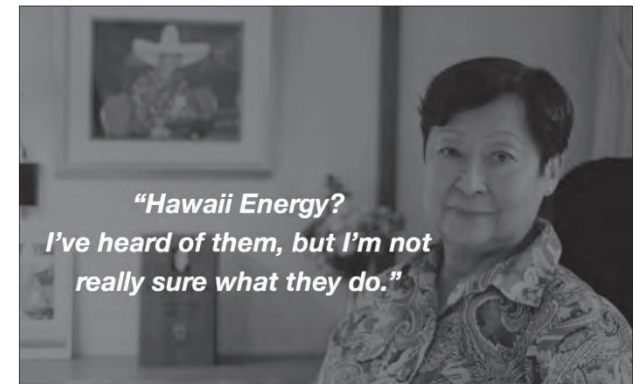
Refreshing the Hawai'i Energy Brand – Foundational Work

The market research conducted in PY14 revealed that while customers “care a lot” about energy conservation and efficiency, many have either: (1) not heard of Hawai'i Energy at all, (2) assume the program is a service of the utility, or (3) are unclear of the program's scope of work. In addition, those that have participated in program offerings often fail to recognize Hawai'i Energy beyond the financial incentives and show little to no awareness of any of the other ways the Program touches the community (e.g. market transformation efforts). These findings further highlighted the significant branding challenges Hawai'i Energy continues to face in the marketplace and the need for a fundamental examination of current brand awareness strategies.

The Program selected Wall-to-Wall Studios to provide long-term strategic guidance on refreshing the Program's brand and improving its dissemination into the marketplace. The process began with an internal group *brand audit*, led by Wall-to-Wall and attended by Hawai'i Energy team members representing all facets of Program operations in an effort to gain consensus and clarity toward a shared organizational vision. The audit allowed team members to assess challenges and lay the foundation to develop a solid *brand promise* – a core vision that drives future program goals and marketing messages.

The results of the audit session indicated that the Program faces a two-fold challenge when communicating its messages:

- 1) Hawai'i Energy is **many different things to many different audiences**; and
- 2) Hawai'i Energy communicates our vision by **describing many things we do**, which makes it very hard to have a concise, memorable message.



Wall-to-Wall's work during this phase included in-depth research on the current communication methods of the Program as well as those of similar organizations in Hawai'i. As a result, they proposed a simple, yet clear messaging approach that follows a three-step progression, in which we first assume target audiences know little to nothing about Hawai'i Energy and subsequently provide more detailed information *as the relationship with the customer develops over time*. With these suggestions in mind, Wall-to-Wall developed several draft concepts for executing a strategic branding campaign - public-facing messages to be distributed through various forms of advertising and outreach - to launch the "new" Hawai'i Energy.

The Program will continue its work with Wall-to-Wall in PY16, utilizing these developed resources to launch the completed branding campaign and strategically align all marketing messages moving forward. Through the branding campaign, we intend to create an emotional connection to our audiences that will drive energy literacy and education, program awareness, and ultimately, program participation.

Key PY15 Projects

Maintaining a high production value from in-house resources is crucial to keeping marketing efforts cost-effective. From small and large-scale promotional campaigns to providing innovative services to support Clean Energy Allies, the Program utilized a variety of tactics to help achieve overall energy-saving goals, increase brand awareness and drive program participation, strategically selecting communication channels based on cost-effectiveness, reach and relevance. Examples of how marketing and communications support was applied to several key PY15 offers are outlined in the following sections.

Supporting a Growing Clean Energy Ally Network

As the Clean Energy Ally (CEA) network continues to grow, much of the Program's marketing and communications efforts have been dedicated to the recruitment and retention of Allies, who essentially serve as brand ambassadors, delivering program incentives and the message of energy efficiency to end-use customers. The Ally network is comprised of businesses of varying sizes, resource levels, needs and target markets, so the Program remained flexible in PY15 in determining how best to support them, relying heavily on feedback from Allies. Several key methods are outlined below.

Special Events

Hawai'i Energy offered financial and coordination assistance for Ally-hosted events, such as in-store promotions and workshops. The Program also leveraged its membership with the Chamber of Commerce of Hawai'i to host several networking events for Allies on all islands to meet with industry peers and potential customers.

Visual Marketing

Visual marketing support was the most frequently-provided marketing benefit to Allies in PY15. Digital files of Hawai'i Energy's logo and Clean Energy seal were made available for Allies to include in their marketing materials, provided usage was compliant with Hawai'i Energy's branding guidelines. To support new Allies and/or those with limited marketing budgets, the Program also developed a starter kit of ready-made promotional items (including co-branded brochures, window clings, vehicle magnets and trade show signage) that was available for free upon request via the Hawai'i Energy website. Larger projects included contributing over \$8,300 toward the purchase of radio, television, digital and print ad space through a co-op advertising program and installing the Program's first-ever commercial retail display to promote the Lighting Distributor Instant Rebate program (Midstream).



Ally Testimonials

Hawai'i Energy also produced a series of video testimonials in which five current Allies shared how being an Ally has positively impacted their business. Allies spoke on how aligning with Hawai'i Energy provides credibility when selling energy-efficient products and their appreciation for training opportunities and technical support. The videos were featured on the Hawai'i Energy website, social media pages and included in monthly newsletters.

Business Program: Customer-Focused Marketing

Modeling after successful efforts from other efficiency programs, the Program began the shift to a more customer-focused marketing approach for the Business program. Moving away from emphasizing the amount of rebates distributed or energy saved, the Program experimented with ways to show how Hawai'i Energy helped maximize *community* impact by helping end-use customers achieve their goals.

Customer Testimonials

A prime example of this new approach was leveraging positive customer experiences and strong relationships to enhance our collection of testimonials, which have proven to be some of the most powerful tools in driving new participation. A testimonial presents an honest, unbiased voice about Hawai'i Energy's program and allows potential customers to establish trust. In PY15, online versions of previously-developed case studies were added to the website and the Program launched its "Customer Stories" video series with two shorts, produced in-house, featuring the Boys & Girls Club of Hawai'i and Hawai'i Pacific University. The central theme of both videos was illustrating how these organizations are now able to add more value to their communities – whether by providing services to more members or students or simply demonstrating the effects of making positive small changes in their business.

In addition, the Program used space in an existing radio advertising campaign to produce a 60-second testimonial spot featuring Russell Hata, CEO of local foodservice product distributor Y.Hata and retailer ChefZone. The spot aired on nine different stations across O'ahu , Maui and Hawai'i island and reached over 420,000 listeners.

Lighting Lunch & Learn

The launch of the Lighting Distributor Instant Rebate (Midstream) program provided a great opportunity for the Program to facilitate conversations between customers, contractors, distributors and the Hawai'i Energy team. In collaboration with lighting distributor Graybar, the Program hosted its inaugural "Lunch & Learn" event for representatives from these sectors to network and learn about the new rebate offer. The event drew over 150 attendees who provided valuable operational feedback both at the event and in the weeks following.



Hawai'i Energy's first-ever Lunch & Learn event took place in and covered lighting incentives, primarily the Lighting Distributor Instant Rebate.

Residential Program: Infusing Creativity into “Tried and True” Offers

The success of PY14 residential offers meant that the portfolio of rebate offerings did not change much in PY15, which presented a unique marketing challenge as the Program was tasked to find new ways to make existing offers attractive. As the offers were expanded to accommodate high demand and make them accessible to more ratepayers, the Program sought to instill new creativity and find cost-effective ways to promote them.



Online Kits

Building off a successful launch in PY14, the Program expanded its online pop-up store to distribute free and \$10 energy-saving “starter” kits for residential customers to host not one, but two openings – one in November and another in April. (See “Online Kits” in *Residential Energy Efficiency Measures* section for a detailed description of the kit offers.) As this is one of the few offers available to any and all ratepayers, the Program developed an integrated marketing campaign to promote both launches that included a mix of paid advertising (radio/digital), earned media coverage, an email campaign, website graphics and portal integration and social media promotion.

November 2015: Basic (free) and Advanced (\$10) home toolkits

- **Advertising** – radio morning show interviews on KSSK and Island 98.5; digital web banner display (224,986 impressions) and Facebook ads (65,015 impressions)
- **Public Relations/Earned Media** – News release pitched to major local media outlets, coverage included:
 - Honolulu Star-Advertiser – “Swapping bulbs, appliances can ease energy costs” (Nov. 22, 2015)
 - BigIslandNow.com – “Hawai’i Energy Offers Free Energy Saving Kits” (Nov. 24, 2015)
- **Email Campaign** – articles in monthly e-newsletter to over 10,500 residential list subscribers with link to online store portal
- **Website** – landing page portal tied to online store order form, store page graphics and copy, URL tracking and conversion code setup
- **Social Media** – scheduled posts with links to online store page, continuous customer engagement through comments and sharing

Out of the 2,354 free and 1,186 advanced kits ordered over the four-week promotion, the Program was able to track 1,108 orders (31%) from digital ads.

April 2016: Water + Energy Saver Kit (free)

- **Advertising (digital)** – web banner (96,643 impressions) and Facebook ads (16,537 impressions)
- **Public Relations/Earned Media:**
 - Honolulu Star Advertiser – “Hawai’i Energy Offering Money Saving Kits” (Apr. 15, 2016)
 - BigIslandNow.com – “Hawai’i Energy Offers Ratepayers Free Energy Saving Kits” (Apr. 13, 2016)
 - MauiNow.com – “Program Offers Free Energy Savings Kits for Earth Month” (Apr. 14, 2016)

- *Email Campaign* – one-time promotional e-blast to residential subscriber list (10,800 subscribers); resulted in more than 860 clicks to the store page
- *Website* – landing page portal tied to online store order form, store page graphics and copy, URL tracking and conversion code setup
- *Social Media* – scheduled posts with links to online store page, continuous customer engagement through comments and sharing

The April store opening lasted three weeks and also included a kit designed specifically for electric vehicle owners (see “Electric Vehicle initiative” section for more details). Both kits were distributed simultaneously as a promotion for Earth Month. The Program received 2,083 water kit and 573 EV kit orders, with 183 water kit orders (9%) and 503 EV kit orders (88%) resulting from digital advertising. (Note: A majority of digital impressions were allocated to promoting EV kits due to the smaller eligibility pool.)

Solar Water Heater Tune-Up

For the third year in a row, Hawai‘i Energy launched a limited-time Solar Water Heater (SWH) Tune-Up rebate program to help offset the cost of maintenance for existing SWH systems, available from January to June 2016. As this rebate is distributed through participating contractors, the Program invested a majority of marketing & communications efforts into updating co-branded marketing materials and the Program website. See below for a list of the key marketing tactics that helped contribute to over 1,000 tune-ups delivered within the six-month timeframe.

- *Public Relations/Earned Media*
 - Lahaina News – “Hawai‘i Energy Offers Limited Time \$150 Solar Water Heating Tune-up Rebate” (Jan. 14, 2016)
 - MauiNow.com – “Hawai‘i Energy Offers Solar Water Heating Tune-up Rebate” (Jan. 4, 2016)
- *Social Media* – frequent posts with links to Hawai‘i Energy website and customer service phone numbers for inquiries/scheduling
- *Website* – Updated content at Hawai‘iEnergy.com/tune-up and homepage carousel graphics
- *Contractor Sales Tools* – co-branded flyer and checklist, joint promotion at outreach events

Transformational Program: Branding Our Behavior Change Efforts

The Program provides marketing and communication resources to aid Transformational programs in educating and empowering customers to incorporate energy-efficient actions into their daily lives. Several key support tactics are outlined below.

Education/Training

The Program worked closely with Transformational subcontractors to develop and facilitate educational sessions throughout the year, including teacher workshops, efficiency sales trainings and national certification courses. Marketing and communications support included:

- *Recruitment* – Email and social media campaigns to announce new opportunities and Hawai‘i Energy tuition subsidies; design and/or review of promotional collateral pieces; pitching announcements to media outlets and “added value” media opportunities, such as radio interviews
- *Course material* – Design and/or review of course workbooks and PowerPoint presentations (to ensure branding consistency)
- *Event logistics* – Hawai‘i Energy-branded tablecloths, banners, pens and other giveaway items for event-day use; event-planning services when necessary

Kanu Memes

As in previous years, the Program collaborated with subcontractor Kanu Hawai'i to continue developing a library of illustrations ("memes") themed around saving energy in Hawai'i for distribution via online channels (i.e. social media, videos, websites). Extensive work was done throughout the year to refine content/messaging, visual branding and distribution methods for 87 new memes. Thanks to Kanu's large following on social media, the memes were distributed to an average of 5,000 Facebook users per month.

Full mo' better



The Program advertised the pilot to current grid customers through an email campaign as well as graphics deployed on in-home devices.

Pilot Projects

Heat Pump Water Heater Demand Response Research

The Program launched a research project this year focused on using new technologies in heat pump water heaters to study demand response. The project involved select smart-metered residential customers receiving a brand new heat pump water heater (to replace an electric resistance unit) that could: 1) store heated water to use at later times and 2) send water/electricity usage data to an electronic tabletop display somewhere else in the home.

To recruit for this year's pilot, the Program targeted participants who received display devices (which also show real-time energy data for other areas of the home) last year through the smart grid pilot since they already owned and were familiar with the in-home display. (See *Market Transformation, "Energy Systems Integration Pilots"* for more details.) A personalized email campaign was selected as the best communication method based on the demographics of the recruitment pool (i.e. homeowners in a higher-income area, tech-savvy, energy-conscious, etc.). The campaign consisted of two messages – one initial recruitment message and one reminder email – with strategically-placed language that positioned the offer as approachable, exclusive and extremely money-saving, despite the somewhat heavy commitment. Conscious of the cost of procuring and installing the water heaters, the Program offered just five participant spots, which were filled successfully after receiving requests from 10 households.

Electric Vehicle Initiative

Hawai'i Energy maintains an ongoing initiative to provide educational material on electric vehicles, specifically on how energy efficiency and conservation play a role in purchasing an EV. The Program's EV information page (www.Hawai'iEnergy.com/EV) was refreshed this year with new statistics and calculations, as well as a printable infographic illustrating the costs associated with owning/operating an EV on O'ahu and how energy efficiency tools can help offset these expenses.

In addition, the Program offered a free home toolkit with items selected specifically for EV owners through our online store during the April promotion to coincide with the suggestions provided in the infographic. The kit was branded as the "Negawatt" kit, emphasizing the importance of creating "negative" energy usage (by utilizing energy-saving devices) to offset the amount of electricity required to charge an electric vehicle.

Ongoing Brand Awareness Initiatives

In addition to supporting offer-related promotions, Hawai'i Energy continuously works to increase the level of awareness of the Hawai'i Energy brand across the state. While this work touches all parts of program operations, the Program utilized three key marketing and communications tactics – public relations, community outreach and paid advertising – to maintain ongoing exposure of the Hawai'i Energy brand to customers.

Public Relations

An effective public relations strategy is necessary to maintaining a positive and respected image at minimal cost. The Program's goal is to generate an effective blend of owned and earned media coverage* through public relations efforts to maximize exposure and credibility of the Hawai'i Energy brand, while consistently positioning ourselves as a thought-leader on energy conservation and efficiency in Hawai'i.

This program year, through solid working relationships with local media outlets, Hawai'i Energy secured coverage spanning television, radio, newspapers, magazines, websites and trade publications. The estimated total reach of all earned media coverage for PY14 was more than 7.6 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 Program's Estimated Publicity Value totaled more than \$198,000.

**Owned media is any public-facing communication channel that a brand controls, such as website and official social media content and news releases. Earned media is communication about the brand by customers, who share messages and create "buzz" (i.e. word-of-mouth promotion).*

Owned Media

Hawai'i Pacific University (HPU) received over \$109,000 in incentives for completing numerous energy efficiency projects at its newly-renovated Aloha Tower Marketplace campus, including installing CFL and LED interior and exterior lighting, submetering and ENERGY STAR® refrigerators for student dorms, window film, air conditioning water source packaged units and variable frequency drives (VFD) in cooling towers.

The Program coordinated a public check presentation attended by HPU President Geoffrey Bannister and PUC Commissioner Lorraine Akiba, at which time HPU was honored for their extensive commitment to energy efficiency. The following coverage resulted from the news release:

- Building Industry Hawai'i – "HPU Check Presentation" (Dec. 1, 2015)
- Hawai'i Pacific University (shared release) – "Hawai'i Energy presents six-figure rebate to HPU for Aloha Tower Marketplace improvements" (Oct. 19, 2015)



Hawai'i Energy presented HPU with their rebate check as part of their Sustainability Week kick-off. In attendance were Hawai'i Public Utilities Commission Commissioner Lorraine H. Akiba, HPU President Geoffrey Bannister and Hawai'i Energy Program Director Ray Starling. The project is expected to save HPU \$125,633 in annual energy costs each year going forward.

Additionally, the Program distributed a news release announcing the amount of donations collected in PY14 for the Maui Food Bank, Hawai'i Food Basket and Hawai'i Food Bank through the Rid-A-Fridge refrigerator recycling program. MauiNow.com covered the story and mentioned how Maui Food Bank received \$1,170 in customer donations among highlighting the benefits of participating in the Rid-A-Fridge program.

Earned Media

Building and maintaining relationships with key stakeholders and media contacts allows the Program to increase its presence within the local energy conversation. This takes effort and is a continuous work in progress; however one measure of success is when the Program's work is publicized positively without initiation from our communications team. Examples of this are below:

- “Hawai'i Airport Energy Upgrade Project to Save \$500M Over 20 Years” (Pacific Business News, Nov. 2015) – Hawai'i Energy was featured as part of a larger story highlighting the large amount of energy-saving work being done at the Honolulu International Airport. The article mentioned the impact of the Program's \$4.3 million incentive on furthering additional projects.
- “Heat Triggers Record Energy Use” (Honolulu Star-Advertiser, Sept. 2015) – Shan Wirt, Hawai'i Energy's Marketing & Communications Manager was approached for this story addressing extremely high summer temperatures and their correlation to record-high energy usage across the state. The article mentioned the Program's Window AC Trade-Up rebate as a way to provide residents with physical relief as well as monetary savings.

Program Positioning

Strategic positioning allows the Program to define itself within the marketplace amongst similar organizations, industry peers and as it relates to consumers. While not tied directly to energy-saving or financial goals, a good investment in leveraging positioning opportunities helps develop an image of credibility, individuality and intelligence, which in turn leads customers to respect (and often subsequently utilize) the services Hawai'i Energy offers.

Strategic positioning takes many forms, but is most commonly recognized or consumed through mass media. Note that not all positioning opportunities are initiated by the Program. The two examples of positioning articles developed in PY15 below are examples of the media approaching the Program with an opportunity.

- “Hawai'i Energy Program Saves Almost \$1B Over Last Six Years” (Pacific Business News, October 2015) – Program Director Ray Starling reflects on the success of the Hawai'i Energy program in this and previous program years.
- “Social Capital: Ray Starling on Energy Efficiency” (Pacific Business News, October 2015) – Highlighted on the front cover of the hard copy edition of the weekly newspaper, the article featured Program Director Ray Starling in a discussion on the State's energy efficiency goals, the program's push for the adoption of LEDs and how Hawai'i Energy has helped ratepayers including businesses become more energy-efficient.

As this is an ongoing process, the Program will continue to seek and capitalize on positioning opportunities throughout future program years.



Outreach

Hawai'i Energy maintains the important practice of participating in community events as a means of engaging face-to-face with customers, gathering project leads and gaining valuable feedback about brand awareness and program operations.

The Program participated in 49 events in PY15 across all three counties, with an estimated 122,000 (cumulative) attendees. The mix of events ranged from large business trade shows and energy industry-related conferences to well-attended community fairs with residential audiences. Hawai'i Energy's strategy for outreach has always been to maximize resources in efforts to increase brand awareness and ultimately drive participation in the program. Largely due to concerted efforts by the team to build relationships and acquire event referrals, the Program was able to increase the number of events attended by 9% and gain exposure to an estimated 12% more attendees since PY14.

Collaborating with the Chamber of Commerce of Hawai'i

Hawai'i Energy joined forces with the Chamber of Commerce of Hawai'i (COCH) for a second year to enhance event offerings and utilize their unique network of business professionals to further Hawai'i Energy's messages. The Program was the title sponsor of seven events, which included networking mixers, panel presentations and smaller-scale gatherings on the neighbor islands. Working with COCH allowed team members and Clean Energy Allies to meet members of the Chamber's network and introduce Hawai'i Energy to an audience whom we may not have been able to reach otherwise. (For more details, see "Clean Energy Allies" in Transformational section.)

Paid Advertising

The Program purchased a mix of radio, print and digital advertising space in PY15 as a method of keeping the brand top-of-mind with customers and promoting incentive offerings. Seeking to maximize the available advertising budget, the Program designed custom campaigns with several media outlets and looked for timely opportunities throughout the year to integrate advertising with current marketing campaigns. In addition to those outlined in the previous sections, several examples of customized ad placements are described below.

Radio

Through a custom campaign with iHeart Media, the Program was featured on the weekly "Community Matters" Sunday morning radio show, hosted by well-known local personality Rick Hamada. The show was offered as a new opportunity for the Program to achieve a large reach as it airs on all six iHeart-affiliated stations on O'ahu (92.3 FM KSSK, 93.9 FM KHJZ, 98.5 FM KDNN, 101.9 FM KUCD, 830 AM KHVH, and 990 AM KIKI) to approximately 16,700 listeners and online iHeart Radio sites. The segment featured Transformational Program Specialist Chelsea Harder discussing several of the Program's behavior change initiatives, including community-based social marketing projects in AOAOs and multi-family housing units, as well as the Program's efforts to integrate energy education within Hawai'i's schools.



Print

Despite print advertising continuing to be one of the most expensive options, the Program was able to secure several lower-cost opportunities throughout PY15. For example, The Program collaborated with local monthly trade magazine *Building Management Hawai'i* to put together an “advertorial” campaign in which Hawai'i Energy staff contributed articles addressing technical issues in the building and construction industry. Featured articles included “Common Areas Driving up Your Bills?” and “Build Energy Efficiency into Your Next Project” and were distributed to approximately 110,000 readers across O'ahu per issue.

The Program also produced a ½ page branding ad for Pacific Business News' annual Solar and Renewable Energy issue to maintain a strong presence among solar service providers.

Digital

With more and more consumers turning online to make purchases and gather information, the Program looked for ways to incorporate more digital advertising in PY15. Advertising on web-based platforms (e.g. traditional website banner ads, social media, videos, etc.) allows the Program to not only target specific customer demographics (based on usage patterns), but intensively track click rates and conversions (a.k.a. how many users make a purchase through clicking on an ad), providing a wealth of customer data back to the Program. Web-based advertising is quick, easily customizable and does not require much overhead costs, making it one of the most cost-effective methods of advertising.

Last January, Hawai'i Energy launched its first-ever ENERGY STAR® appliance giveaway contest with the goal of stimulating excitement and conversations around energy-efficient refrigerators, as well as increasing program awareness. The “New Year, New Fridge” giveaway was open to all residential ratepayers in Hawai'i, Honolulu and Maui counties, with one ENERGY STAR® refrigerator available per county.

This was the first time the Program has ever offered a prize of this dollar value, so we facilitated the entry process and a majority of our promotional efforts online to maximize reach and use the opportunity to build a larger social media following. Hawai'i Energy worked with local media agency Hawai'i News Now to build an online entry portal within the Hawai'i Energy Facebook page and place web banner ads on targeted sites to track visits to the entry page and/or the Hawai'i Energy website. Combined with some promotional radio spots and online media coverage on the neighbor islands, we received a total of 358 contest entries, 176 Facebook “likes” and over 879,000 impressions throughout the contest period. Three winners were randomly selected, with one winner from each of the three counties.



Contest entries for the “New Year, New Fridge” giveaway were facilitated through the Hawai'i Energy Facebook page. Participants were encouraged to “like” the page as well as subscribe to the Hawai'i Energy e-newsletter.

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. Hawai'i 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 Hawai'i Energy. It is organized by program, end use and measure. It describes how the Program estimates energy savings from each measure. The PY15 TRM represents a total of 74 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 Hawai'i specific data, when and where available. Where Hawai'i 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)
- *Energy Efficiency Potential Study* (HECO IRP-4, HECO 2014 DSM Docket)
- *California Commercial Building End-Use Survey* (prepared for the California Energy Commission by Itron, Inc., March 2006)
- *TRM Review/Report* (Evergreen Economics, June 2013)
- *Third Party Evaluation NTG Recommendation Memo* (Evergreen Economics, January 2013)
- The Database for Energy Efficiency Resources (California Public Utilities Commission, 2004 – 2005; updated version 2007-2008)
- ENERGY STAR® Partner Resources
- Field verification of measure performance
- Other energy efficiency program design information (e.g. Efficiency Maine, Focus on Energy, etc.)

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

Program Level savings are those directly attributed to Hawai'i Energy actions (i.e. separating out the impacts that are a result of other influences, such as consumer self-motivation or free-riders⁴).

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 the distribution of energy from the power plant to the site, which result in larger savings at the power plant than at the customer site. The Program applies a "system loss factor" (provided by HECO, MECO and HELCO) to account for this larger impact on the system. System loss factors 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		
O'ahu	Maui	Hawai'i
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 of a particular measure on the system. The resulting System Level savings numbers are 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

Determining Program Level savings also includes applying a Net-to-Gross (NTG) ratio to System Level energy savings numbers. Updated Net-to-Gross values were adopted prior to PY13 based on verified PY12 results, per request of the Program's third-party evaluator. These values recognize the differences in Program-driven savings between the various categories of measures. The evaluation can be found at www.hawaienergy.com/information-reports. Hawai'i Energy utilizes the combined Program total NTG ratio of 78%. The values used in PY15 are provided in **Table 76**.

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

⁴ 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.

Development of Avoided Costs

As mentioned previously, the primary overall economic benefit to the State of Hawai'i is the avoided cost of 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

Table 77 shows the 20 year utility avoided cost. The energy and capacity utility avoided costs were provided through 2033 and then extrapolated. The avoided cost for PY15 was calculated based on new guidelines to use an initial \$0.161/kWh avoided cost figure for 2015 and escalate it at 3% per year. The capacity impact was based on the utility revised avoided costs, shown in **Table 77b**. The capacity avoided cost for the Program takes into account a prorated demand value based on O'ahu demand achievements of 76%. No capacity savings was used for Maui County as the out years do not materially impact the NPV TRB.

Table 77 20 Year Utility Avoided Cost					
			Discount Rate		
			6%	Utility Avoided Cost	
PY	Year	Measure Life	NPV Multiplier	\$/kW/yr.	\$/kWh/yr.
PY15	2015	1	1.00		\$ 0.161
PY16	2016	2	0.94		\$ 0.166
PY17	2017	3	0.89		\$ 0.171
PY18	2018	4	0.84		\$ 0.176
PY19	2019	5	0.79		\$ 0.181
PY20	2020	6	0.75	\$ 904	\$ 0.187
PY21	2021	7	0.70	\$ 986	\$ 0.192
PY22	2022	8	0.67	\$ 856	\$ 0.198
PY23	2023	9	0.63	\$ 750	\$ 0.204
PY24	2024	10	0.59	\$ 663	\$ 0.210
PY25	2025	11	0.56	\$ 590	\$ 0.216
PY26	2026	12	0.53	\$ 527	\$ 0.223
PY27	2027	13	0.50	\$ 474	\$ 0.230
PY28	2028	14	0.47	\$ 1,020	\$ 0.236
PY29	2029	15	0.44	\$ 1,066	\$ 0.244
PY30	2030	16	0.42	\$ 964	\$ 0.251
PY31	2031	17	0.39	\$ 875	\$ 0.258
PY32	2032	18	0.37	\$ 795	\$ 0.266
PY33	2033	19	0.35	\$ 724	\$ 0.274
PY34	2034	20	0.33	\$ 629	\$ 0.282
*NPV = Net Present Value					

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			HELCO		
P2_100vs110			H2_100vs110		
Year	Energy \$/MWH	Capacity \$/KW-yr	Year	Energy \$/MWH	Capacity \$/KW-yr
2014	192	0	2014	225	0
2015	196	0	2015	226	0
2016	230	0	2016	232	0
2017	233	0	2017	241	0
2018	243	0	2018	248	0
2019	253	0	2019	258	0
2020	260	1,189	2020	271	0
2021	273	1,298	2021	280	0
2022	295	1,126	2022	306	0
2023	297	987	2023	319	0
2024	314	872	2024	332	0
2025	326	776	2025	346	0
2026	328	694	2026	359	0
2027	346	624	2027	376	0
2028	357	1,342	2028	390	0
2029	358	1,403	2029	407	0
2030	373	1,269	2030	425	0
2031	391	1,151	2031	448	0
2032	397	1,046	2032	465	0
2033	420	953	2033	493	0
Levelized 273 \$/MWH		Levelized 812 \$/kW-yr	Levelized 296 \$/MWH		Levelized 0 \$/kW-yr
MECO					
M2_100vs110					
Year	Energy \$/MWH	Capacity \$/KW-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 PY15 Annual Report, the Hawai'i Energy team would like to thank the PUC and the people of Hawai'i for the opportunity and privilege to serve as your Public Benefits Fee Administrator over the past seven years. 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 Hawai'i's No. 1 most valuable grid resource. We especially appreciate the confidence you have placed in us by awarding Hawai'i Energy a three year contract to cover PY16 – PY18.

As we launch our first program year under the second PBFA contract, we are excited to launch Hawai'i Energy 2.0. The new three year contract will allow for new, innovative programs that have the potential to be more effective with additional time to plan and implement over multiple years.

We look forward to increased collaboration with our Clean Energy Allies, energy stakeholders, and the businesses and residents of Hawai'i to deliver low cost programs that accelerate Hawai'i's path to 100% clean energy.

ATTACHMENTS

Attachment A: Acronym List

A list of the commonly used Hawai'i Energy acronyms

Attachment B: PY15 Program Participation List

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

Attachment C: PY15 Contract Renewal Proposal

Renewal Proposal for the period of July 1, 2015 to June 30, 2016, reflecting requirements and direction received from the Public Utilities Commission's Renewal Guidelines and PUC staff.

Attachment D: PY15 Annual Plan

The Program's annual plan, which provides Leidos' strategies and plans for administration and delivery of the Hawai'i Energy portfolio for PY14 (July 1, 2014 to June 30, 2015). Through this plan, Hawai'i Energy set forth overall strategies to increase program participation, maximize energy savings, and encourage the development of energy efficiency materials.

Attachment E: PY15 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: PY15 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 - 2015)

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.