

ANNUAL REPORT

PROGRAM
YEAR | 2016



Hawai'i Energy



leidos

ANNUAL REPORT

Program Year 2016

July 1, 2016 – June 30, 2017

Submitted to the Hawai'i Public Utilities Commission by:

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Hawaii Energy's mission is to empower island families and businesses to make smart energy choices that reduce energy consumption, save money and pursue a 100% clean energy future.

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

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A MESSAGE FROM THE EXECUTIVE DIRECTOR



The Hawai'i Energy program had an incredible Program Year 2016, achieving the highest level of kilowatt hour (kWh) savings since the program's inception eight years ago. The results are even more impressive given a 30% lower budget than last program year. As a result, the Hawai'i Energy program had its lowest cost of acquired savings since the introduction of hard to reach programs 5 years ago. As detailed in this Annual Report, covering July 1, 2016 through June 30, 2017, the Hawai'i Energy efficiency programs will deliver 141 million kWh in first year savings and 1.76 billion kWh in lifetime energy savings.

Why is this important? Living in Hawai'i, we believe that preservation and prosperity go hand in hand. Protecting the environment is vital to the future health of our islands. Being more efficient and reducing wasteful energy use is something we must collectively prioritize as an island community. We have to protect what makes Hawai'i special and achieving a 100% clean energy future is an important piece.

Energy efficiency will allow Hawai'i to reach its 100% clean energy goals faster and cheaper. This is evidenced by the Hawai'i Energy total program cost of 1.3¢ per kWh (total program costs / total lifetime kWh benefit). The kWh reductions achieved in Program Year 2016 will save an estimated equivalent of 2.9 million barrels of oil and 1.7 million tons of greenhouse gas emissions. As a State, we should consider increasing investment in these cost effective programs in which every resident or business, renter or owner, can participate and in the process reduce their bill and their energy footprint.

With so many of our island residents struggling to make ends meet and businesses dealing with higher and higher operating costs, the savings realized through participation in the Hawai'i Energy programs will yield approximately \$440 million over the life of the installed measures. That is money that stays right here in our local economy as well, serving as a multiplier while stimulating growth and creating jobs.

When we talk about the great year Hawai'i Energy had last year, it doesn't reflect that our role is to make it easy for everyone in Hawai'i to play their part in the clean energy movement. The real heroes are the families and businesses that invested in these energy efficiency products and services that allowed the program to achieve new heights. Hawai'i Energy was there along the way to encourage and reward practical, energy-saving decisions.

In the hard to reach markets such as multifamily units, we continued our aggressive engagement of our Energy Smart 4 Homes direct install program. One example of our work can be found at the Senior Residence at Kapolei, a 60 unit affordable housing community. Since this property was built using funding through HUD's Section 202 Supportive Housing for the Elderly program, residency is restricted to persons who earn 50% of the Area Median Income (AMI) or less. Hawai'i Energy installed free energy efficiency equipment in 76 senior residences which will provide a total annual bill savings of \$6,500 which is so important, but even more so for those below the AMI.

Hawai'i Energy helped over 800 underserved small businesses last year with our direct install lighting program. At the corner of Hualalai and Kino'ole Streets in Hilo stands a community institution rooted in family since 1964, K's Drive-In, one of the program participants this past year. Manager Ryan Kadota shared that with all the extra costs being here in Hawai'i and these costs continually rising that participating in the program was fast, easy, and that energy efficiency will help the business deal with some of these costs.

I am proud of the accomplishments this past program year, and for all of you that played a part in this, I hope you are as well.

Respectfully submitted,
Brian Kealoha

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, Inc.(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.

On November 15, 2015, the PUC issued a competitive Request for Proposal (RFP) soliciting proposals and pricing for a follow-on contract for Program Administrator services for the Hawai'i Energy Efficiency Program. Leidos, Inc. submitted a proposal and was selected to negotiate a contract with the PUC. A three year contract with two three year options was signed on June 27, 2016 and Hawai'i Energy 2.0 was launched. The three-year contract provided some funding flexibility between program years, but budgets, reporting, and measurement and verification were still completed on an annual basis. In addition, milestone performance based awards were established, and these metrics were measured on a cumulative three year basis. As in previous contracts, 70% of the contract value was designated for direct incentives in the form of direct cash incentives or services.

PROGRAM OVERVIEW, OBJECTIVES & ORGANIZATION

The Hawai'i Energy program had a successful launch to Hawai'i Energy 2.0 with a strong PY16. By making smart energy choices, our island families and businesses are able to reduce energy consumption, save money and achieve our 100% clean energy future. Together with our business community, the energy industry, and the families of Hawai'i, Hawai'i Energy helped reduce energy consumption by 160 Megawatt hours. This equates to over \$35 million in first year energy savings and over \$440 million over the life of the measures installed in PY16.

PY16 was also the first year in the new three-year format of the Hawai'i Energy contract and programs. While the new format has been important for the flexibility that was needed this year with the overdrive in the business programs, the program and associated budgets, reporting, and measurement and verification are still annually based. What has been extremely helpful with the three-year contract and planning horizon is the ability to influence longer lead projects, such as new construction and large comprehensive projects, by having budget clarity and certainty for the next two years.

In PY15 the program had been operating and delivering to a \$38 million annual budget, which was reduced by almost 1/3 at the start of PY16. After contract award in March and before the start of PY16, Leidos, as the Public Benefit Fee Administrator, began addressing the decreased budgets, reducing headcount by leaving vacant positions unfilled and implementing several rounds of workforce reductions. For the launch of the new Program Year, Hawai'i Energy reduced many incentives to manage to this lower budget. This didn't change the fact that many projects were already committed and in various stages of design/construction. As a result, we saw a significant increase in program applications in the business sector and rolled forward \$3.4 million from PY17 and PY18 to PY16 to accommodate the overdrive.

Having this increased flexibility allowed us to achieve 21,365,000 kWh more than what was forecasted at the start the year and help the State achieve the targets laid out in the Energy Efficiency Portfolio Standard (EEPS). This incremental increase for PY16 improved the ratio of incentives to time & materials (T&M) as well as lowered the overall program cost per kWh, both in terms of first year and lifetime costs. In administering the Hawai'i Energy program for the past seven years, we understand and appreciate that while obtaining the kWh and kW goals is critical and required, the objectives of this work scope extends well beyond into driving sustainable market transformation, ensuring customer equity, broadening participation, and accomplishing all of these objectives in a cost-effective manner across the portfolio.

Based on data from a Lawrence Berkeley National Laboratory study in 2015 Hawai'i (e.g. Hawai'i Energy) ranked among the best in the nation in program administrator cost per unit of saved electricity over a period from 2009 to 2013 and has continually improved since then. In the context of saved lifetime energy savings to the electric grid system, Hawai'i Energy delivered 35% more savings with 20% less budget in PY16 than it did in PY15 yielding a 41% reduction in cost per lifetime kWh. The cost-effectiveness of the program has improved over the past few years, and most notably again this year with a 19% reduction in cost per kWh. It is also important to note the State of Hawai'i has the highest participant cost in the country, which is the cost to customers of performing upgrades or purchasing equipment. This is a big reason why Hawai'i Energy programs are so critical to improve the financial return on projects and drive customers to take action and make smart energy choices.

Business Program Highlights

Hawai'i Energy's Business program achieved savings of 85,272,390 kWh (first year), 1,188,857,171 lifetime kWh and 10,525 kW with \$13,124,111 in incentives. This represented a substantial uptick in program participation even with multiple reductions in incentives throughout the year.

Hawai'i Energy's midstream program grew substantially in PY16 and generated over 30 million kWh in program level savings and over 2,200 kW in program level demand savings. A total of 26 lighting distributors enrolled in the Program and advanced \$2,313,354 in Hawai'i Energy incentives for energy-efficient lighting products.

Additionally, Hawai'i Energy's Small Business Direct Install Lighting (SBDIL) program reached over 700 small businesses in PY16 and generated over \$30 million in lifetime bill savings for these customers. Due to budget reductions, many customers now had to invest in the retrofit instead of it being completely paid for, as incentives for this hard to reach market were cut by about 20%. While participation in the offer decreased by about 100 customers from PY15, the program was still able to hit its goals for PY16. The program also made improvements to the functionality of the AMPLIFY lighting audit tool and database, which allowed SBDIL contractors to submit their lighting projects online and also added an automated invoice feature.

In PY16, Hawai'i Energy launched the Strategic Energy Management (SEM) program. The intent of the program is to establish an enhanced continual improvement approach to energy management so that more energy efficiency measures can be implemented, while also addressing a number of the barriers that larger customers encounter in moving forward with a comprehensive energy strategy. Finding the right customers that will commit to this approach is important to drive long-term, deeper savings, at a low resource acquisition cost. With help from Vermont Energy Investment Corporation (VEIC), the Program established a customer criteria checklist for recruiting SEM candidates. With this information, Hawai'i Energy was able to secure participants for the first cohort. PY16 established the foundation blocks that will result in actions taken in PY17 and PY18 by these existing participants that will drive increased savings in those respective years.

Hawai'i Energy helped establish the necessary groundwork that now makes it possible for the University of Hawai'i to proceed with a large-scale, long-term approach to energy-saving projects on campus. Numerous steps and investments were needed in order to put the university on the door step of this historic commitment to energy efficiency and ultimately reach our goal of a net-zero energy university system.

- Matt Lynch, Sustainability Coordinator, University of Hawai'i

Hawai'i Energy is also implementing FirstFuel's FirstAdvisor Solution platform to accelerate and reinforce commercial customer engagement across 4,000 small to medium sized businesses, by providing personalized and actionable analytics. The platform screens data analytics to deliver customer targeting based on energy use. This year focused mainly on data integration and analytics, with the Program's Energy Advisors starting to use these benchmarking tools to motivate their customers to reduce the energy intensity in their facilities in the last few months of PY16.

Residential Program Highlights

In PY16, Hawai'i Energy's residential programs achieved savings of 55,544,003 first year kWh, 569,844,927 lifetime kWh, and 8,054 kW in demand with \$7,181,153 in incentives.

The success of Hawai'i Energy's residential programs in PY16 can largely be attributed to the Program's new approach to influencing the market for energy efficiency. With *Hawai'i Energy 2.0*, the Program focused on customer segmentation, leveraging program and customer data, and conforming program offerings to the perspective of the customer. By aligning offerings to their consumer channel, Hawai'i Energy was able to streamline rebate processes and better target messaging efforts.

In PY16, Hawai'i Energy offered energy-saving products and kits through the introduction of an online marketplace, allowing customers to purchase heavily discounted lights, water-saving measures, and power strips directly from the Hawai'i Energy website year-round. The program also offered two separate promotional kits, plus one optional bonus-kit, each including a different mix of energy-saving products at heavily discounted prices. The results were a total of 1,987 promotional kits were sold, including over 10,000 LED bulbs, 865 advanced power strips, and 3,464 water-saving devices.

Hawai'i Energy also continued a number of successful programs from past years. The upstream lighting program with participating retailers achieved over 1 million lamps rebated, representing an increase of over 50% from PY15. The program rebated 1,373,817 LED bulbs and 288,493 CFL bulbs, resulting in lifetime energy savings of 404,914,447 kWh. Hawai'i Energy also continued the Energy Smart 4 Homes (ES4H) multifamily direct installation program, installing energy-saving products in hard-to-reach multifamily properties. The program provided turnkey delivery and installation of in-unit energy-saving measures to 5,122 residential dwellings, an increase of 897 units from PY15.

The popular Rid-A-Fridge/Freezer program, which offers customers the option to donate their rebate to the Hawai'i Food Bank (O'ahu) and the Maui Food Bank (Maui), influenced the recycling of 238 refrigerators and freezers, resulting in lifetime energy savings of 2,509,122 kWh. Additionally, 37 participants donated their rebates to the Hawai'i Foodbank and Maui Foodbank, for a total of \$1,970 in donations.

A very effective tool for both savings as well as increasing awareness about Hawai'i Energy and energy conservation is the peer group comparison report. In PY16, the program distributed 883,671 printed Home Energy Reports to 235,062 households, accounting for over 14,000,000 kWh in first year energy savings.

Hawai'i Energy also worked with local contractors to continue solar water heating installation and tune-up programs. These efforts resulted in over 1,200 installations and over 2,100 solar water heater tune-ups, translating to over 2,500,000 kWh in first year energy savings.

New in PY16, the A/C Tune-Up program was introduced through participating contractors to encourage residents to keep their central- and split-A/Cs running at optimal efficiency. It turned out to be a popular program which incentivized over 600 A/C Tune-Ups in just six months, accounting for over 200,000 kWh in first year energy savings. As part of the launch, the program offered a series of webinars to educate Clean Energy Allies (CEAs) on the program, as well Hawai'i Energy's other residential and business offerings. Online orientation offered a flexible way to provide information on our programs, instead of requiring physical attendance.

Transformational Program Highlights

While the program did not achieve all of its transformational program metrics, PY16 was still a busy and successful year. With reduced budgets, some of the past program service providers and delivery mechanisms needed to be reassessed, and in some cases, not renewed. However the program is now well-positioned to achieve the goals for PY17 and PY18. Some highlights from PY16 include:

Behavioral Modification, Student Outreach, Community Education

- Hawai'i Energy launched a new community workshop called Energy Unplugged. The "Energy UNPLUGGED" workshops are an energetic local-style introductory course to the concept of energy conservation. Participants are transformed into Energy Entrepreneurs as they learn how to put money back in their pockets simply by changing their habits.

- Helen Wai continued presenting energy literacy workshops and delivered over 500 participant-hours in workshops to hard-to-reach communities. One highlight came from one of the two workshops given to Alternative Structures International, an organization that provides transitional housing to families with the goal of moving them to permanent living arrangements. The event organizer expressed gratitude about the speaker's relatability of the topics to the attendees, most of whom don't normally pay utility bills but will soon have this as a housing requirement.
- Hawai'i Energy combined efforts with the ES4H multi-family direct install program and community workshops to offer a full suite of customer engagement. Examples of this workshop include those held in collaboration with Catholic Charities (Hale Wai Vista) and Fairway Gardens (AOAO).
- The program conducted ad hoc workshops to close to two hundred Hawai'i Public Housing Authority (HPHA) Section 8 Housing Choice voucher recipients. As large groups of recipients waited to be called in for their paperwork submittals, Hawai'i Energy conducted the workshops to educate attendees with tips to save money on their electric bill.
- Hawai'i Energy was one of the main sponsors for the Boy Scouts of Hawai'i's Ellison Onizuka Day of Exploration which supported both transformational and marketing efforts. This traditional Makahiki was free to the public and was infused with science, technology, engineering, & mathematics (STEM) based activities that brought in a crowd of over 7,300 people. Hawai'i Energy staff presented two workshops to enthusiastic boy scouts and their parents, using hands-on activities, visual aids, and simple math exercises to explain energy conservation and efficiency practices.
- Concluded the Hawai'i Energy Challenge 2017, implemented by Kanu Hawai'i. The course aims to directly and measurably increase energy literacy in underserved Hawai'i ratepayers and hard-to-reach communities. Kanu recruited 221 participants for the challenge, with 49% of the households in Maui county and Hawai'i Island. Engagement came through partnerships with community/resident and nonprofit groups such as Parents & Children Together (PACT), Hawaiian Community Assets, and Na Hanona Kulike o Maui. Participant feedback was very positive and afforded the important take-away that text messages provided the highest "return on investment" relative to active engagement, when compared to email newsletters.
- Blue Planet Foundation in collaboration with Hawai'i Energy hosted their second annual two-day Student Energy Summit, nearly doubling attendance and engaging nearly 200 students (over 1,400 participant hours) throughout Hawai'i's six major islands, while training 10 facilitators in energy efficiency curriculum. This year the summit focused on energy efficiency and incorporated a design thinking challenge with continual follow-on activities, including an assignment for students to create a video to develop an actionable solution for one of Hawai'i's energy challenges.
- Launched "Close It for the Climate" pilot campaign with Blue Planet Foundation. Staff members visited stores in Waikiki to encourage businesses to pledge to reduce energy waste by closing their doors when air conditioning is running. The pilot period was scheduled for September 1-10 during the International Union for Conservation of Nature (IUCN) World Conservation Congress. Legislation was introduced the following session in an attempt to also address this wasteful practice.
- Participated in a school awards assembly at Honowai Elementary for the Opterra Ka Hei program, which had an attendance of about 700 students. Many of these students previously participated in home energy audits that were taught in a classroom setting. Hawai'i Energy awarded energy-efficient direct-installation retrofit kits to two students who wrote essays on energy conservation and efficiency.
- Hawai'i Energy was also one of the title sponsors for the Maui Economic Development Board (MEDB) STEM conference. The 8th annual conference was held in Honolulu for the first time and attracted over 1,000 participants, from more than 30 Hawai'i public and private middle and high schools, with over 500 students and 300 teachers taking part in breakout sessions led by industry partners and engaging in hands-on STEM activities. Hawai'i Energy staff co-presented with the Blue Planet Foundation on educator professional development sessions and energy efficiency education in student workshops.

Professional and Workforce Development Trainings

- **IFMA Sustainable Facilities Professional (SFP) Credential**

Hawai'i Energy partnered with the University of Hawai'i - West O'ahu and the International Facilities Management Association (IFMA), with additional funding support from Trane and Carrier companies, to hold the very first IFMA Sustainability Facility Professional® (SFP®) Professional Development Certification Training. Attendees included current facilities management professionals, as well as full-time students of UHWO and UH Maui College interested in facilities management careers.

- **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 Maui and O'ahu. BOC® workshops target the facility maintenance workforce and provide skills and knowledge to implement energy efficiency practices at their workplaces with 36 participants attending the Level I courses. With the closure of the Hawai'i Commercial & Sugar (HC&S) mill in December 2016, a cohort of dislocated workers from HC&S were also recruited for BOC 1. Eleven participants in the HC&S cohort successfully completed the BOC Level 1 training.

Policy and Code-Related Work

- Hawai'i Energy took a wide approach to influencing and advancing energy codes and standards in PY16. A coalition of entities including Hawai'i Energy joined the Hawai'i State Energy Office in successfully advocating for State adoption of the 2015 International Energy Conservation Code (IECC), while also identifying potential new energy code measures applicable to Hawai'i that have been successfully implemented in other jurisdictions. In addition to advocating for updated energy codes, The Program will prepare the marketplace for the subsequent energy code transition. The first way the Program prepared the marketplace was to assist customers in exceeding compliance with the 2015 IECC in advance of the new code being adopted. Second, the Program collaborated with the State Energy Office to bring code-related trainings to the energy industry, including a session on Maui in conjunction with the American Institute of Architects (AIA).
- The program published four print pieces to support and encourage code compliance by highlighting key changes in the recently adopted 2015 IECC energy code. Two residential pieces summarize key changes for new home construction, one for air conditioned homes and one for homes meeting the Tropical Zone code. The commercial code print piece highlights major changes to the commercial building energy code, while the commercial retail print piece provides specific details for retail spaces. This piece was motivated by the program's previous energy code compliance study that revealed a lack of compliance in the retail sector, predominantly due to track lighting systems.
- As part of encouraging energy-efficient new construction projects on O'ahu, the Program participated in Habitat for Humanity's Build-A-Thon project - a model Accessory Dwelling Unit (ADU) exhibited at the Hawai'i State Capitol. Team members helped construct the unit, developed a special incentive program, created signage and print collateral, setup a website landing page and filmed two video spots to promote energy-efficient technologies and residential rebates to potential ADU homeowners. Hawai'i Energy made it a point of emphasis to promote ADU's in an attempt to help boost energy efficiency while our island community continues to tackle its housing crisis. It is important that renters minimize their income spent on energy costs.

Clean Energy Ally Support

- Hawai'i Energy hosted the first annual Clean Energy Ally (CEA) Kickoff breakfast event. Over 100 CEAs attended the program year launch event at the Ala Moana hotel. Hawai'i Energy announced revised program offerings, incentive changes and answered technical questions. With the reduced budget in PY16, the Program had the opportunity to address the reduced incentives head-on, while providing other mechanisms to support the CEAs as described below. The event was live streamed for those unable to attend in person.
- In an effort to align CEA sales with the Program's sector/segment focus, Hawai'i Energy offered online sales training by Mark Jewell of Selling Energy. Mark is a subject matter expert, coach, speaker and best-selling author focused on overcoming barriers to implementing energy efficiency projects. The 3-hour online webinar provided training on how to best use the Segment Guides and effectively target various market segments, enabling Allies to write more compelling proposals and close more sales.
- Coupled with the online training, Allies received access to Selling Energy's online, industry-specific digital knowledge database. This powerful online resource empowers Energy Professionals to transform their sales approach to effectively connect the dots between efficiency projects and the bottom line. Segment Guides addressed selling solutions to grocery stores, hotels, hospitals, offices and the armed forces.
- Launched co-op funding programs to provide CEAs with financial support for program related advertisements or technical training events.

Program Marketing and Branding

With the launch of Hawai'i Energy 2.0, we increased our efforts to improve the awareness around the many benefits of energy efficiency and how Hawai'i Energy can help families and businesses make smart energy choices. The goal of increasing our marketing and branding is to be top of mind when customers are making investment decisions so that they can take advantage of the programs Hawai'i Energy offers and be rewarded for making smart energy choices. This was coupled with our continued targeted marketing efforts on specific programs, technologies, and offers through the use of email, social media, direct mail, radio advertising, utility bill inserts and in-store displays. Here are a few of the highlights from this past year:

- The Program completed major work on its "Hawai'i Energy 2.0" branding campaign, taking the lessons learned in PY15 and infusing them into internal and external messaging. Together with our creative agency, the Program developed a brand position statement that would function as a guiding principle for all Program communication moving forward.
- The Program also entered the development stages of a comprehensive, multi-channel advertising campaign to roll out the refreshed brand to the public. Emphasizing the use of humorous language and memorable design, the primary goals of the campaign are to create top-of-mind awareness and establish a personality that would set the brand apart from traditional, more "corporate" organizations. The campaign includes TV, radio and digital advertising, social media content, "out-of-home" billboard-type display ads at local shopping complexes, an updated website design and a custom-built Hawai'i Energy mascot.
- The Program continued to enhance its role as a collaborative, trusted advisor and identifying those in its network who can act as force multipliers. By strategically engaging with key external stakeholders in the business community, the Program worked to establish itself as *the* expert on energy efficiency in Hawai'i.

Next Steps

Energy efficiency continues to be the cheapest resource in the clean energy portfolio. Our efforts will be focused on executing the near-term PY17 Annual Plan, while continuously reviewing long-term directions, and taking into consideration feedback expressed by stakeholders through docket filings, Technical Advisory Group (TAG) meetings, and other public forums. One theme that has emerged is the need for better integration of Hawai'i Energy's annual plans and the utility company's plans.

The collaboration between Hawai'i Energy and the utilities continues to progress. Additionally, as Integrated Demand-Side Management evolves into a grid resource, continued collaboration and coordination will be necessary. Valuation of energy efficiency to the grid, from a time and locational perspective, also continue to be a key focus discussion area in our collaboration efforts. More information is needed by Hawai'i Energy around temporal and locational values to best support the utility's efforts.

We look forward to working on these issues under the Commission's guidance.

Program Achievements

- The Program invested a total of \$29,545,748.24 (**Table 16**) to deliver 2,262,474,777 kWh (system-level, **Table A1**) over the measure lives resulting in a cost per kWh of \$0.0130. The total Program Levelized Cost of Saved Energy (CSE) in PY16 was \$0.0206/kWh, as calculated in **Table 1** below.
- Delivered \$20,305,264 in incentives (**Table 16**) driving customer bill savings of \$34,962,625 annually and over \$440,908,685 over the life of the measures installed. See **Table 2** for details of customer energy cost savings by island and rate tariff.
- A first year Program level savings of 140,816,393 kWh (**Table 16**).

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	12.5	12.5
Total Program Budget Less Direct Install Programs	C*	\$28,392,885	\$29,953,476
Annual kWh Saved at Customer Level	D	159,858,118	159,858,118
	$A*(1+A)^B$	0.124	0.124
	$(1+A)^B-1 \div$	1.072	1.072
$Capital Recovery Factor = [A * (1 + A)^B]/[(1 + A)^B - 1]$	Capital Recovery Factor	0.116	0.116
	C	\$28,392,885	\$29,953,476
$Levelized CSE = \frac{C \times (Capital Recovery Factor)}{D}$	Capital Recovery Factor x	0.116	0.116
	D ÷	159,858,118	159,858,118
	Levelized CSE	\$0.0206	\$0.0217
Transformational Costs		Cost*	
Total Program PY16 Expenditures		\$	29,545,748
RTRAN incentives		\$	783,190
BTRAN incentives		\$	777,401
			<u>\$28,392,885</u>
*Total Program Budget = Contractor Costs plus Performance Award Claim.			

Table 2 Customer Energy Cost Savings by Island and by Rate Schedule									
First-Year Energy Cost Savings									
Island	R	G	J	P	DS	F	Other	Total	kWh - 1st yr
Oahu	\$9,857,725	\$1,147,270	\$7,085,802	\$3,094,413	\$601,381	\$0	\$9,375	\$21,795,966	108,450,389
Hawaii Island	\$2,996,945	\$335,440	\$2,968,798	\$258,820	\$0	\$198,705	\$0	\$6,758,708	25,043,801
Maui	\$2,402,686	\$83,729	\$2,370,895	\$1,472,844	\$0	\$0	\$0	\$6,330,154	26,101,432
Molokai	\$24,558	\$3,130	\$7,403	\$6,054	\$0	\$0	\$561	\$41,706	148,757
Lanai	\$23,063	\$1,351	\$11,677	\$0	\$0	\$0	\$0	\$36,091	113,739
Total	\$15,304,977	\$1,570,920	\$12,444,575	\$4,832,131	\$601,381	\$198,705	\$9,936	\$34,962,625	159,858,118
Customer Lifetime Energy Cost Savings									
Island	R	G	J	P	DS	F	Other	Total	kWh - Lifetime
Oahu	\$105,958,529	\$15,736,543	\$95,906,305	\$41,801,381	\$9,698,025	\$0	\$136,545	\$269,237,327	1,366,216,240
Maui	\$27,493,174	\$1,270,416	\$35,021,096	\$22,020,039	\$0	\$0	\$0	\$85,804,725	357,429,859
Hawaii Island	\$32,418,188	\$4,658,130	\$42,963,853	\$3,247,273	\$0	\$1,987,054	\$0	\$85,274,498	319,654,564
Molokai	\$128,761	\$39,386	\$59,227	\$84,474	\$0	\$0	\$6,701	\$318,549	1,190,868
Lanai	\$142,209	\$33,772	\$97,604	\$0	\$0	\$0	\$0	\$273,585	858,179
Total	\$166,140,861	\$21,738,247	\$174,048,084	\$67,153,168	\$9,698,025	\$1,987,054	\$143,246	\$440,908,685	2,045,349,709

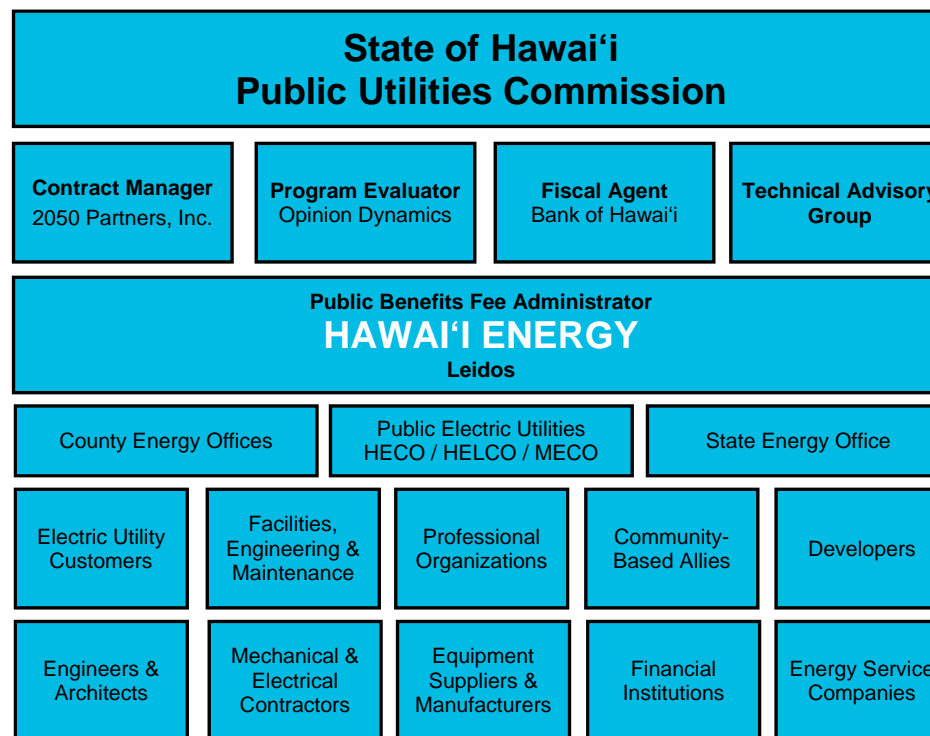
Table 3 Effective Average Utility Rate for Participants* (\$/kWh)							
Island	R	G	J	P	DS	F	Other
Oahu	\$0.24348	\$0.22756	\$0.18192	\$0.15633	\$0.14560	\$0.23164	\$0.19776
Hawaii Island	\$0.29680	\$0.31754	\$0.24684	\$0.21419	\$0.00000	\$0.30368	\$0.27581
Maui	\$0.27117	\$0.27955	\$0.23784	\$0.21122	\$0.00000	\$0.26318	\$0.25259
Lanai	\$0.31768	\$0.33730	\$0.31444	\$0.29072	\$0.00000	\$0.32879	\$0.31779
Molokai	\$0.30131	\$0.35596	\$0.27732	\$0.20301	\$0.00000	\$0.30624	\$0.28877

*Average per kWh customer electric cost based on actual participants' total bill energy costs for calendar year 2016

Oversight and Support

During PY16, Hawai'i Energy collaborated with a wide range of support organizations and oversight entities. These oversight entities were comprised of the PUC, Contract Manager (2050 Partners, Inc.), 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:

- **Association of Energy Engineers** – Provided technical training for Certified Energy Managers.
- **Blue Planet Foundation** – Provided workshops and presentations to assist communities, organizations, students and educators in the areas of financial literacy and energy efficiency. Also provide social media messaging and video services.
- **Helen N. Wai, LLC** – Provided “*Sharing the Aloha*” workshops to assist communities and organizations in the areas of financial literacy and energy efficiency.
- **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. Also provided Marketing and Transformational Program support services.
- **Kanu Hawai'i** – Provided transformational social media messaging and 60-day Energy Challenge implementation support.
- **Kupu** – Provided energy efficiency interns for Program through Rewarding Internships for Sustainable Employment (RISE) program.
- **Oracle** – Provided peer group comparison Home Energy Reports to residences in Maui County, Hawai'i County and select parts of Honolulu County
- **Sun Hedge** – Provided services in developing tools and trainings to help those engaged in energy efficiency sales and services.
- **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.
- **Vermont Energy Investment Corporation** – Provided support for Business Program design, codes training, and SEM efforts.
- **Vivian Ward Affairs** - Provided “*Energy Unplugged*” workshops to assist communities and organizations in the areas of financial literacy and energy efficiency.
- **Wall-to-Wall** – Provided branding and website re-design services.
- **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.

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 PY16 are:

1. First Year Energy Reduction (Program Level)
2. Peak Demand Reduction (Program Level)
3. Total Resource Benefit (Program Level)
4. Market Transformation
 - a. Behavior Modification
 - b. Professional Development & Technical Training
 - c. Energy in Decision Making
 - d. Codes and Standards
 - e. Clean Energy Collaboration
5. Island Equity (Maui & Hawai'i participation targets)

Table 4 expands on the PY16 Annual Plan Performance Goals & Incentive Table by providing the claimed actual results. Percent of Target and calculated Award Claim are also provided for a comprehensive view of the goals, metrics and Program performance for PY16.

Over the course of PY16, Hawai'i Energy kept the PUC informed of increased demand for the business program, and the need to carry forward funding was expressed early in the program year. In March of 2017, carry-forward funding for the business program of \$3,218,428 was approved along with an additional \$200,000 in business T&M to accommodate the incremental effort to handle the added project administration. In concert with this carry-forward, program goals were increased by 18,076,738 kWh, 3,047 kW and \$49,235,971 in TRB and constituted the revised PY16 targets.

Table 4
Performance Indicators

Performance Indicators				Goals	Actual	Metrics		Award			Actual	Actual
Resource Acquisition					21,365,059			Fraction of Award	Award Milestone	Target Award		
					119,451,334			70%	75%	\$677,006		
	KEY FOCUS AREAS		Milestone	Target	Results	Metrics		Award Breakout	Milestone Award Breakout	Target Award Breakout	% of Target	Award Claim
	Energy Efficiency & Conservation		75%	100%								
	• First Year Energy Reduction		103,146,054	137,528,072	140,816,393	kWh		15%	\$108,804	\$145,072.65	102%	\$145,072.65
	• Peak Demand Reduction		15,303	20,404	18,578	kW		15%	\$108,804	\$145,072.65	91%	\$132,089.77
	• Total Resource Benefit		\$233,770,797	\$311,694,396	\$312,887,982	\$		40%	\$290,145	\$386,860.40	100%	\$386,860.40
Resource Acquisition Award								70%	\$507,754	\$677,006		
Market Transformation & Customer Satisfaction	Customer Equity							Fraction of Award	Award Milestone	Target Award		
								17%	75%	\$164,416		
	KEY FOCUS AREAS		Milestone	Target	Results	Metrics		Award Breakout	Milestone Award Breakout	Target Award Breakout	% of Target	Award Claim
	Economically Disadvantaged		75%	100%								
	• Small Business Direct Install		4,500,000 / 525	6,000,000 / 700	7,266,982 / 706	kWh/customers served		7%	\$50,775.43	\$67,700.57	100%	\$67,700.57
	• Multifamily Direct Install		787,500 / 3,150	1,050,000 / 4,200	1,433,985 / 5,122							
	Island Equity											
	• County of Hawaii		NA	13%	14.60%	Target spend must be met in Hawaii & Maui Counties for Milestone and Target Award					109.0%	
	• County of Maui		NA	13%	13.75%			10%	NA	\$96,715.10	103.9%	\$96,715.10
	• City & County of Honolulu		NA	74%	71.65%						-	
	Market Transformation							Fraction of Award	Award Milestone	Target Award		
								10%	NA	\$96,715		
	KEY FOCUS AREAS		Milestone	Target	Results	Metrics		Award Breakout	Milestone Award Breakout	Target Award Breakout	% of Target	Award Claim
	Behavior Modification			100%								
	• Workshops and Presentations		NA	2,000	3452.5	Number of participant-hours of Training		4%	NA	\$38,686.04	100%	\$38,686.04
	• Gamification Campaigns and Competitions		NA	200	455	Number of Participants						
	• Social Media and Mobile Messaging		NA	3,250	20,952	Number of online conversions						
	Professional Development & Technical Training			100%								
	• Clean Energy Ally Support		NA	8,370	8,028.5	Number of participant-hours of training	4%	NA	\$38,686.04	0.00%	\$0	
	• Targeted Ally Training Opportunities		NA									
	• Targeted Participant Training Opportunities		NA									
	• Educator Training and Grants.		NA									
	• Degree Program Support.		NA									
	• Vocational Training.		NA									
	Energy in Decision Making			100%								
	• Strategic Energy Management (SEM)		NA	2	2	Number of SEM participating institutions		1%	NA	\$9,671.51	100%	\$9,671.51
	• Benchmarking		NA	12/60	13/76	12 online sector benchmark resources/Number of benchmarking queries						
	Codes and Standards			100%								
	• Codes Identification and Adoption		NA	3	22	Advocacy Events		1%	NA	\$9,671.51	100%	\$9,671.51
	• Exceeding Code Compliance		NA	36	37	Number of customers assisted						
	• Code-Related Training		NA	50	222	Number of participant-hours of Training						
	Clean Energy Collaboration											
	• Promotion of the Benefits of Equipment being DR Ready		TBD	TBD: Utility/PUC Needs		TBD	0%	NA	0	100%	\$0.00	
	• Coordinated Engagement with Customers		TBD									
	• Innovation and Emerging Technologies		TBD									
	Customer Satisfaction							Fraction of Award	Award Milestone	Target Award		
								3%	NA	\$29,015		
	KEY FOCUS AREA		Milestone	Target	Results	Metrics		Award Breakout	Milestone Award Breakout	Target Award Breakout	% of Target	Award Claim
				100%								
	• Application Processing Customer Experience		NA	> 8.5	9.1	Overall customer satisfaction score		3%	NA	\$29,014.53	100%	\$29,014.53
Market Transformation and Customer Satisfaction Award								30%	\$50,775.00	\$290,145.00	30%	
Total Performance Award								100%	\$558,530.00	\$967,151.00		\$915,482.08

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

Target: 137,528,072 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 140,819,286 kWh currently equates to 1,427,593 MMBTUs or avoided use of 223,539 BBLs of liquid fossil fuels in Hawai'i; see **Table 5** and **Table 6**.

Table 5				
Estimation of Potential Fossil Fuel Avoidance				
Potential Barrels (BBLs) of Fossil Fuels Avoided in PY15				
Annual Program Level Energy Savings Achievement		140,816,393	kWh/Yr.	
Average Program Attribution to System Level Impact	÷	79.6%		
System Level Gross Generation Energy Impact		176,842,767	kWh/Yr.	
Electrical Generation Source Distribution				
Renewable Energy Generated (2016 RPS Report)		2,283,120,000	kWh/Yr.	
Less avg. 4.6% T&D Losses (HEI 10K 2016)	x	95.4%		
Est. of Renewable Energy Sold		2,178,096,480	kWh/Yr.	24.6%
Est. Fossil-Fueled Energy Sold	+	6,667,239,520	kWh/Yr.	75.4%
Total Energy Sold (2016 RPS Report)		8,845,336,000	kWh/Yr.	
Customer-Sited - Grid Connected Renewable DG		782,785,000	kWh/Yr.	8.8%
System Level Gross Generation Energy Impact		176,842,767	kWh/Yr.	
% System Average Fossil-Fuel Generation	x	75.4%		
Reduction Target Impact in Fossil Fuel-Generation		133,296,585	kWh	
Energy Avoided into Generators				
Fossil-Fuel Energy Generated		133,296,585	kWh	
Avg. System Generating Heat Rate (HEI 10K 2016)	x	10,710	BTU/kWh	
Energy Required for Fossil-Fueled Electricity Production		1,427,606,428,972	BTU/Yr.	
Generation Liquid Fossil Fuel Mix				
Energy in BBL of Low Sulfur Fuel Oil (est.)		6,200,000	BTU/BBL	79.0%
Energy in BBL of #2 Fuel Oil (Diesel) (est.)		5,860,000	BTU/BBL	18.0%
Energy in BBL of Naphtha (HEI 10K 2016)		5,335,500	BTU/BBL	3.0%
Average System BTU/BBL		6,112,865	BTU/BBL	100.0%
Energy Required for Fossil-Fueled Electricity Production		1,427,606,428,972	BTU/Yr.	
Average System BTU/BBL	÷	6,112,865	BTU/BBL	
Number of Barrels of Fossil-Fuel Avoided		233,541	BBLs/Yr.	
Number of Barrels of Fossil-Fuel Avoided		233,541	BBLs/Yr.	
Estimated Cost per BBL for Fossil Fuels	x	\$ 53	per BBL	
Potential Fossil Fuel Cost Savings to State		\$ 12,377,689	per year	

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 6**.

The reduction of emissions was equivalent to removing over 26,000 passenger vehicles from the roads.

The fossil fuel reduction was the equivalent of the generating output of over 411,500 PV solar panels.

Table 6		
PY16 - Potential Green House Gas Equivalencies Avoided		
System Level Gross Generation Energy Impact	176,842,767	kWh/Yr.
Green House Gas Reduction* (www.epa.gov/egrid)		
Energy in kWh	176,842,767	kWh/year
Energy in MWh	176,843	MWh/year
CO2 - Carbon Dioxide	139,385	Tons per Year
CH4 - Methane	8	Tons per Year
N2O - Nitrous Oxide	2	Tons per Year
Green House Gas Equivalencies**		
Less Passenger Vehicles	26,252	
Less miles/year driven (avg passenger vehicle)	297,855,584	
Wind turbines installed	31	
Acres of US forest CO2 sequestered in one year	117,644	
Fossil Fuel Reduction Comparison to PV and SWH		
Rooftop PV Panels (300W) to offset same energy usage	411,570	
Solar Water Heating Systems to offset same energy usage	77,361	
** Power Profiler - HICC - Oahu - Excel tool and Website http://oaspub.epa.gov/powpro/ept_pack.charts		
*** EPA's Greenhouse Gas Equivalencies Calculator https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator		

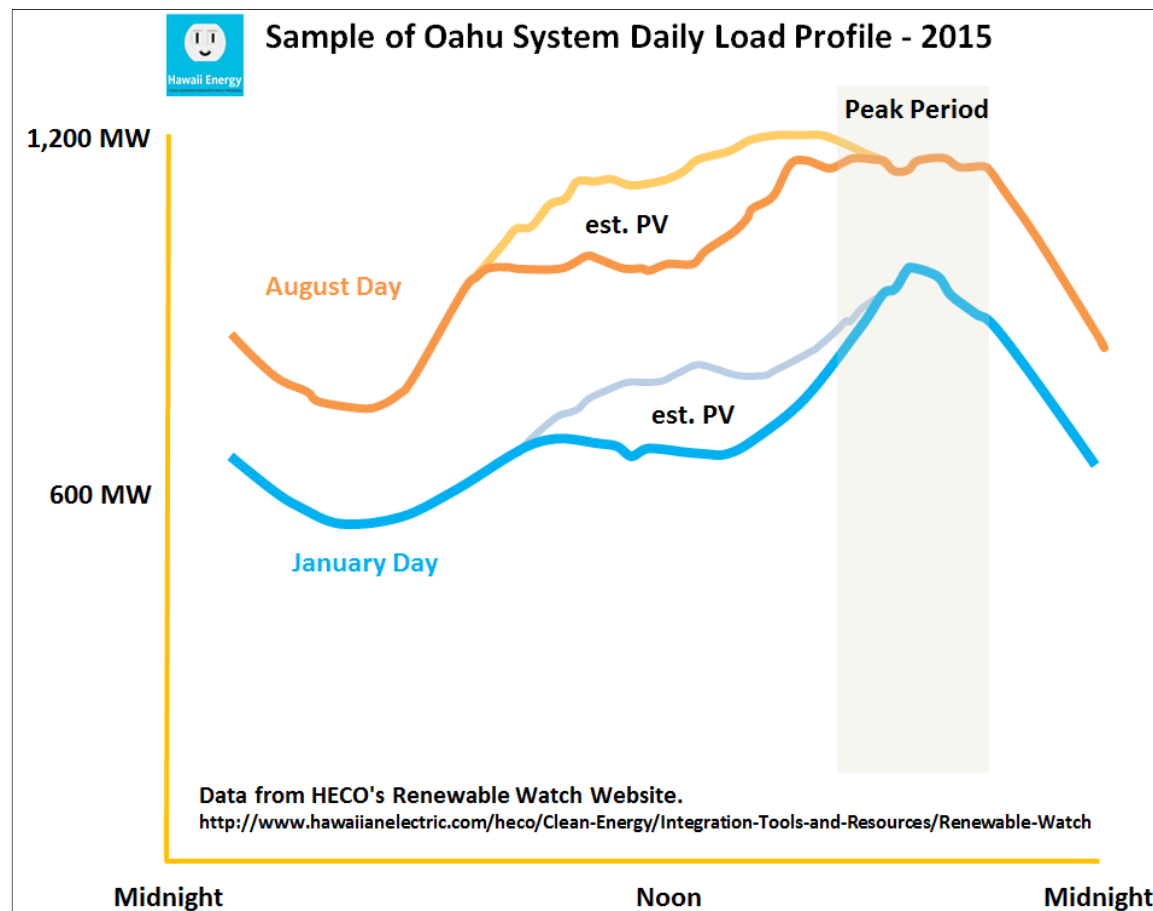
Performance Indicator #2: Peak Demand Savings

Target: 20,404 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.

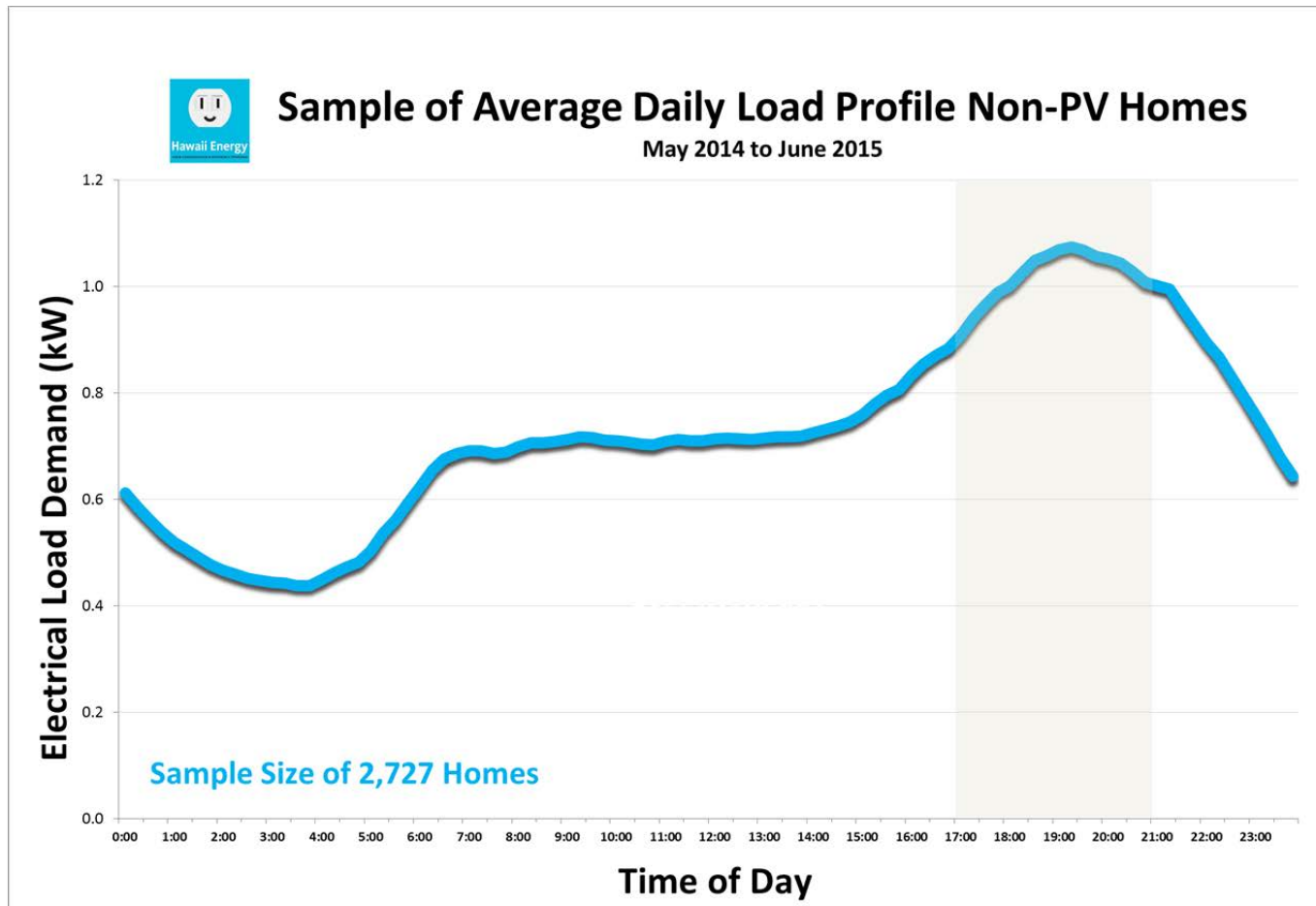
Program participants benefit from lower electrical costs and all customers benefit from the avoided cost to provide additional units of generation to meet increasing electrical peak demand. The initial PY16 target of 17,356 kW was increased to 20,404 with March 2017 carry-forward funding for the business program. The Program achieved 91% of this target, reducing peak demand by 18,578 kW. This is equivalent to the average peak power consumption of 18,578 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



Two issues drive the Program's ability to plan (e.g. predict) kW performance. First, the measure mix of prescriptive measures and second, the degree to which custom projects have unique operating hours and utility peak coincident factors. Given that 31% of incentive spend and 23% of the demand savings claim is based on projects that employ project-unique operating hours, specifically CBEEM and SBDIL projects, there are limitations to which the Program can plan or predict actual peak demand reduction results. To the degree peak demand can be anticipated for any particular prescriptive measure, the Program will solicit advisement from Contract Manager to evaluate current assumptions.

Figure 3
Average Home Daily Demand (Load) Profile



Performance Indicator #3: Total Resource Benefit (TRB)

Target: \$ 311,694,396

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.

The initial PY16 target of \$262,458,426 was increased to \$311,694,396 with the March 2017 carry forward funding for the business program. The Program achieved 100.4% of this target, with a TRB of \$312,887,982

Table 7 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 7 Example of the TRB Calculation using Look Up Table												
									kW Target	kWh Target		Project Cost
									25	25,000		\$45,000
									TRB			
Year	Measure Life	NPV Multiplier	Utility Avoided Cost \$/kW/yr	\$/kWh/yr	NPV for each Year \$/kW/yr	\$/kWh/yr.	Cumulative NPV \$/kW/yr	\$/kWh/yr	Capacity Benefit	Energy Benefit	Total Resource Benefit	TRB/TRC Ratio
2016	1	1	\$0	\$0.166	\$0	\$0.1658	\$0	\$0.1658	\$0	\$4,146	\$4,146	0.09
2017	2	\$0.94	\$0	\$0.171	\$0	\$0.1611	\$0	\$0.3270	\$0	\$8,174	\$8,174	0.18
2018	3	\$0.89	\$0	\$0.176	\$0	\$0.1566	\$0	\$0.4835	\$0	\$12,089	\$12,089	0.27
2019	4	\$0.84	\$0	\$0.181	\$0	\$0.1521	\$0.00	\$0.6357	\$0	\$15,892	\$15,892	0.35
2020	5	\$0.79	\$904	\$0.187	\$716.05	\$0.1478	\$716.05	\$0.7835	\$17,901	\$19,588	\$37,489	0.83
2021	6	\$0.75	\$986	\$0.192	\$736.80	\$0.1437	\$1,452.85	\$0.9272	\$36,321	\$23,180	\$59,501	1.32
2022	7	\$0.70	\$856	\$0.198	\$603.45	\$0.1396	\$2,056.30	\$1.0668	\$51,407	\$26,669	\$78,077	1.74
2023	8	\$0.67	\$750	\$0.204	\$498.79	\$0.1356	\$2,555.09	\$1.2024	\$63,877	\$30,060	\$93,937	2.09
2024	9	\$0.63	\$663	\$0.210	\$415.97	\$0.1318	\$2,971.06	\$1.3342	\$74,277	\$33,355	\$107,632	2.39

Performance Indicator #4: Market Transformation

Targets: Transformational Programs

Transformational efforts are those that involve education, training and other legislative support activities that may not result in immediate or direct, quantifiable energy savings. The focus of this year's target is to develop community partnerships and leverage their reach in delivering energy education to specific "hard-to-reach" communities and industries. Other priorities included advocacy and education around adoption of the International Energy Conservation Code (IECC) version 2015, which was signed into law by Governor David Ige in March, 2017. The move toward a more stringent energy conservation code will have far-reaching benefits in influencing new construction and retrofits that save energy and money for the life of the building.

Figure 4 provides a list of the Market Transformation programs for PY16.

Figure 4
Summary of Transformational Programs

		Target	Results
Behavior Modification	Workshops and Presentations	2,000 participant hours	3,346
	Gamification Campaigns and Competitions	200 participants	455
	Social Media and Mobile Messaging	3,250 online conversions	20,952
Professional Development & Technical Training	Clean Energy Ally Support		
	Targeted Ally Training Opportunities		
	Targeted Participant Training Opportunities	8,370 participant hours	8,015
	Educator Training and Grants		
	Degree Program Support		
	Vocational Training		
Energy In Decision-Making	Strategic Energy Management (SEM)	2 institutions	2
	Benchmarking	12 online resources out of 60 queries	13/76
Codes and Standards	Codes Identification and Adoption	3 advocacy events	22
	Exceeding Code Compliance	36 customers assisted	37
	Code-Related Training	50 participant hours	222

Performance Indicator #5: Island Equity (Broad Participation)

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

The Island Equity target is intended to promote the equitable participation in the Program among the counties. For PY16, "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.

The program achieved the targeted percentages for Island Equity this performance period with 71.7% of incentives spent in Honolulu county, 14.6% in Hawai'i county and 12.7% in Maui county. See Table 13 for full details.

Table 8 lists the results of the PY16 contributions to the PBF by island and county.

Table 8 PY2016 Contributions to PBF				
Island	Residential Program Investment	Business Program Investment	PBFA Investment	%
Hawai'i Island	\$2,158,534	\$1,502,517	\$3,661,051	13.4%
Lāna'i	\$71,414	\$50,798	\$122,212	0.4%
Maui	\$1,949,732	\$1,447,149	\$3,396,881	12.4%
Moloka'i	\$57,023	\$39,945	\$96,968	0.4%
O'ahu	\$8,814,890	\$11,242,879	\$20,057,769	73.4%
Totals	\$13,051,593	\$14,283,288	\$27,334,881	100%
County	Residential Program Investment	Business Program Investment	PBFA Investment	%
Hawai'i	\$2,158,534	\$1,502,517	\$3,661,051	13.4%
Maui	\$2,078,169	\$1,537,892	\$3,616,061	13.2%
Honolulu	\$8,814,890	\$11,242,879	\$20,057,769	73.4%
Totals	\$13,051,593	\$14,283,288	\$27,334,881	100%

Performance Award for Achieving Targets

Under the latest PBFA Contract, a Program Performance Award was established over a three-year term, separate from, and in addition to, budgets for Services and Initiatives, and Incentives. A fixed annual award amount for each program year was established. The Performance Award is apportioned across various Performance Indicators, including Resource Acquisition (net savings impacts), Economically Disadvantaged Impacts, Island Equity and Market Transformation.

Indicators for Resource Acquisition and Economically Disadvantaged Impacts are milestone based, with milestone targets at 75 percent of the annual (or cumulative) goals and at the remaining 25% of the target amount (or portion thereof). Island Equity and Market Transformation Indicators must meet 100% of the annual target goal and are not cumulative (total awards not met are forfeited). A total of \$967,151 in performance amounts (inclusive of tax) was allotted for PY16.

Table 4 shows the maximum target award and the breakdown of performance metrics for achievement.

Performance Amount Claim Summary

The Program’s Performance Amount Claim for PY16, is \$915,482.08 (including tax) or 95% 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), Economically Disadvantaged impacts, Island Equity, and Market Transformation results are contained in **Table 4**.

Cumulative Annual Electric Energy Savings (Program-Level) Amount Claim: \$145,072.65

The Program Energy Reduction was 140,816,393 kWh, which was 102% of the target of 137,528,072 kWh in the award claim of \$145,072.65. This amount is calculated from \$108,804.49 for meeting the minimum level and \$36,268.16 for the remaining savings of 29,862,834 kWh awarded at a rate of \$0.001214/kWh achieved beyond the minimum.

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

Table 9 Energy Reduction Award Claim			
Cumulative Annual Electric Energy Savings	Milestone	Target	
Energy Reduction Award Potential	\$108,804	\$145,072.65	
Energy Reduction Award Pools in Metrics %	75%	100%	
Energy Reduction Goals (kWh)	103,146,054	137,528,072	
Energy Reduction Goals Pools in Metrics %	75%	100%	
Incentive Calculations	Meet Milestone	Target less Milestone	Total
Pool Award Potential	\$108,804	\$36,268	\$145,073
Energy Goal Pools (kWh)	103,146,054	34,382,018	137,528,072
Award Amount / Rate (\$/kWh)	\$0.001055	\$0.001055	
Energy Achievement (kWh)	103,146,054	34,382,018	140,816,393
Award Amount / Rate (\$/kWh)	\$0.001055	\$0.001055	
Energy Achievement Award Calculation	\$108,804.49	\$36,268.16	\$145,072.65
Energy Reduction Performance Award Claim			\$145,072.65

Peak Demand Savings Award Claim: \$132,089.77

The Combined Peak Demand Reduction was 18,578 kW, which was 91% of the target savings level resulting in an award claim of \$132,089.77. This award is calculated from \$108,804.49 for meeting the minimum level and \$23,285.28 for meeting the target. Levels are awarded at a rate of \$7.11001/kW achieved.

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

Table 10 Demand Reduction Award Claim Summary			
Combined Annual Electric Demand Savings	Milestone	Target	
Demand Reduction Award Potential	\$ 108,804	\$ 145,073	
Demand Reduction Award Pools in Metrics %	75%	100%	
Demand Reduction Goals (kW)	15,303	20,404	
Demand Reduction Goals Pools in Metrics %	75%	100%	
Incentive Calculations	Meet Milestone	Target less Milestone	Total
Pool Award Potential	\$ 108,804.49	\$ 36,268.16	\$ 145,072.65
Demand Goal Pools (kW)	15,303	5,101	20,404
Award Amount / Rate (\$/kW)	\$ 7.11001	\$ 7.11001	
Demand Savings Achievement (kW)	15,303	3,275	18,578
Award Amount / Rate (\$/kW)	\$ 7.11001	\$ 7.11001	
Demand Savings Achievement Award Calculation	\$ 108,804.49	\$ 23,285.28	\$ 132,089.77
Demand Reduction Performance Award Claim			\$ 132,089.77

Total Resource Benefit (TRB) Award Claim: \$386,860.40

The TRB achievement of \$312,887,982 NPV is 100.4% of the target amount. This award claim of \$386,860.40 is calculated from \$290,145 for meeting the minimum level and \$96,715.00 for the remaining 25% awarded at a rate of \$3,868.60/percent achieved beyond the minimum level up to the award target.

See calculations in **Table 11** for details.

Table 11 TRB Award Claim Calculation			
TRB Target Metrics	Milestone	Target	
TRB Award Potential	\$ 290,145	\$ 386,860	
TRB Award Pools in Metrics %	75%	100%	
TRB Goals (\$)	\$ 233,770,797	\$ 311,694,396	
TRB Goals Pools in Metrics %	75%	100%	
Incentive Calculations	Meet Milestone	Target less Milestone	Total
Pool Award Potential	\$ 290,145.30	\$ 96,715.10	\$ 386,860.40
TRB Goal Pools in Metrics %	75%	25%	100.00%
Award Amount / Rate (\$/%)	\$ 3,868.60	\$ 3,868.60	
TRB Achievement in \$			\$ 312,887,982
TRB Goals in \$			\$ 311,694,396
TRB Savings Achievement in Metrics %	75%	25.00%	100.38%
Award Amount / Rate (\$/%)	\$ 3,868.60	\$ 3,868.60	
TRB Energy Achievement Award Calculation	\$ 290,145.30	\$ 96,715.10	\$ 386,860.40
TRB NPV of Utility Cost Reduction Performance Award Claim			\$ 386,860.40

Economically Disadvantaged Award Claim: \$67,700.57

The Economically Disadvantaged award is based on the achievement of two Small Business Direct Install (SBDIL) metrics and two Multifamily Direct Install (MFDI) metrics. The metrics were SBDIL energy reduction (kWh), SBDIL customers served (total count), MFDI energy reduction (kWh), and MFDI customers served (total count).

In agreement with the Contract Manager and the HPUC, each of the four metrics accounted for 25% of the total Economically Disadvantaged award claim. In PY16, the Program exceeded each of the four metrics, as shown in **Table 12**, resulting in the total award claim of \$67,700.57.

Table 12 Economically Disadvantaged Award Claim Calculation			
Target Metrics	Milestone	Target	
Award Potential	\$ 50,775.43	\$67,701	
Award Pools in Metrics %	75%	100%	
SBDIL - kWh Target	4,500,000	6,000,000	
SBDIL - Customers Served Target	525	700	
MFDI - kWh Target	787,500	1,050,000	
MFDI - Customers Served Target	3,150	4,200	
Incentive Calculations	Meet Milestone	Target less Milestone	Total Achieved
Pool Award Potential	\$ 50,775.43	\$ 16,925.14	\$ 67,700.57
Goal Pools in Metrics %	75%	25%	100.00%
Award Amount / Rate (\$/%)	\$ 77.01	\$ 677.01	
SBDIL - kWh Achievement	4,500,000	2,766,982	7,266,982
SBDIL - kWh Target	4,500,000	1,500,000	6,000,000
Target met?	Yes	Yes	
Award - 25%	\$ 12,693.86	\$ 4,231.29	\$ 16,925.14
SBDIL - Customers Served Achievement	525	181	706
SBDIL - Customers Served Target	525	175	700
Target met?	Yes	Yes	
Award - 25%	\$ 12,693.86	\$ 4,231.29	\$ 16,925.14
MFDI - kWh Achievement	787,500	646,485	1,433,985
MFDI - kWh Target	787,500	262,500	1,050,000
Target met?	Yes	Yes	
Award - 25%	\$ 12,693.86	\$ 4,231.29	\$ 16,925.14
MFDI - Customers Served Achievement	3,150	1,972	5,122
MFDI - Customers Served Target	3,150	1,050	4,200
Target met?	Yes	Yes	
Award - 25%	\$ 12,693.86	\$ 4,231.29	\$ 16,925.14
Economically Disadvantaged Performance Award Claim			\$ 67,700.57

Island Equity (Broad Participation) Award Claim: \$96,715.10

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 $\frac{\% \text{ Incentive Spend}}{\% \text{ PBF Target}}$, is equal to or greater than 80% for Hawai'i and Maui counties. Distribution of PBF contributions was very close to the PBF target in the approved PY16 Annual Plan. Although Hawai'i and Maui counties contributed more than the approved plan, both counties received not only incentives greater than the target, but greater than their total contribution. For example, shown in **Table 13**, Hawai'i County contributed 13.4% of total PBF funds and the Program distributed 14.6% of incentives to Hawai'i County, therefore achieving a spend-to-contribution ratio of 109%. Nevertheless, island equity is measured against the PBF Target, therefore in the case of Hawai'i Island, the ratio was 112.3%. Maui County witnessed a similar outcome. See **Table 13** for details.

Table 13 Island Equity Award Claim Calculation										
County	PY16 PBF Contribution (\$)	PY16 PBF Contribution (%)	PBF Target (%) [*]	Incentive Spend (\$) ^{**}	Incentive Spend (%) ^{**}	$\frac{\% \text{ Incentive Spend}}{\% \text{ PBF Contribution}}$	$\frac{\% \text{ Incentive Spend}}{\% \text{ PBF Target}}$	Target Range	Met Minimum	Award Claim
Honolulu	\$ 20,057,769	73.4%	74.0%	\$15,666,906	71.7%	97.6%	96.8%	-	Yes	
Hawai'i	\$ 3,661,051	13.4%	13.0%	\$3,193,384	14.6%	109.0%	112.3%	≥ 80%	Yes	
Maui	\$ 3,616,062	13.2%	13.0%	\$3,005,566	13.7%	103.9%	105.7%	≥ 80%	Yes	
Total	\$ 27,334,882	100.00%	100.00%	\$21,865,855	100.00%					\$96,715
Island Equity Performance Award Claim										\$96,715.10

The PY16 PBF contribution is based on 1.5% of total utility electric sales as per Hawai'i PUC Order 33764 and reduced for the application of the Green Infrastructure Fee.

^{*}From Table 4

^{**}Incentives include Direct & Transformational Incentives (e.g. 100% incentives spend)

BUDGET PROGRESSION & EXPENDITURES

PY16 Annual Plan Budget

Pursuant to the Program's approved PY16 Annual Plan, the Program's initial budget for the program year was \$27.1M, comprised of \$17.3M in Incentives, \$8M in Non-Incentives, and \$1.8M in Transformational Incentives. As detailed in **Table 14** approximately 47% of the services and initiatives budget was allocated to Residential Programs and 53% to Business Programs.

Budget Transfers and Reallocations

The new three year contract, continued to provide the program the discretion to transfer funds within certain areas without a formal contractual request, consistent with historical guidance. 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, 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. Both of these budgetary mechanisms proved especially critical this year, given significantly reduced budgets and incentive spend consistent with prior year levels. As result, the program had to transfer funds much earlier than previous years, in order to "buy" time to continue operations. Six of the nine transfers completed in PY16, were related to the Program's funding challenges. Specifics of the internal transfers are detailed in **Table 14**.

Table 14 PY16 Annual Plan Budget (in \$)			
Activity	Non-Incentive	Incentive	Total
Residential Programs			
REEM	1,055,000	6,466,580	7,521,580
CREEM	65,000	76,500	141,500
RESM	25,000	254,500	279,500
RHTR	290,000	1,028,780	1,318,780
Total Residential Programs	1,435,000	7,826,360	9,261,360
Residential Market Evaluation	78,055	0	78,055
Residential Outreach	785,000	0	785,000
Total Residential Services and Initiatives	2,298,055	7,826,360	10,124,415
Business Programs			
BEEM	625,000	3,846,975	4,471,975
CBEEM	585,000	2,118,647	2,703,647
BESM	135,000	321,250	456,250
BHTR	375,000	3,152,038	3,527,038
Total Business Programs	1,720,000	9,438,910	11,158,910
Business Market Evaluation	72,626	0	72,626
Business Outreach	340,000	0	340,000
Total Business Services and Initiatives	2,132,626	9,438,910	11,571,536
Total Residential and Business Services and Initiatives	4,430,681	17,265,270	21,695,951
Transformational Programs			
Residential Transformational Programs	0	851,373	851,373
Business Transformational Programs	0	898,627	898,627
Total Transformation Services and Initiatives	0	1,750,000	1,750,000
Total Supporting Services	1,847,708	0	1,847,708
Total Infrastructure/Facility Fee	476,404	0	476,404
Total Tax on Non-Incentive	318,286	0	318,286
Performance Amount	967,151	0	967,151
Total Estimated Contractor Costs *	8,040,230	19,015,270	27,055,500

Program Base/Enhancement Budget Breakout

Base Proposal	7,500,000	17,500,000	25,000,000
Enhancements	540,230	1,515,270	2,055,500
Base Proposal & Enhancements	8,040,230	19,015,270	27,055,500

Internal Budget Transfers

- October 2016** – Transferred Business Incentive budget as follows: FROM BEEM (\$500,000) and BHTR (1.5M) TO CBEEM (2M). Funds were moved in order to keep the custom projects offering solvent through the end of the year, based on current backlog. Projections showed a slower burn rate for BEEM and BHTR projects, allowing for a temporary transfer of funds to CBEEM. Given reduced budgets and incentive spend consistent with prior year levels, we had to transfer funds much earlier than previous years. These transfers only “bought” us time to continue operations. Based on spend rates and projections, we projected depleting all Business incentive funding before program year-end and foresaw the strong possibility that even with a 10% transfer from Residential Programs, money would have to be pulled in from follow-on years.
- November 2016** – Transferred Business Incentive budget as follows: FROM CBEEM (\$600,000) and BESM (\$300,000) TO BEEM (\$715,000) and BHTR (\$185,000). Funds were moved from CBEEM and BESM to BEEM and BHTR in order to continue with offerings in these areas, based on program backlog. Previous forecast included large custom projects coming to fruition before year-end. Completion schedules for these custom projects slipped into the 2017 calendar year, while BEEM and BHTR project outlooks improved. As a result, this reallocation moved funds back to BEEM and BHTR from CBEEM. The single biggest contributor to the custom project variance was the Honolulu City and County’s decision to halt its LED exterior lighting project. Other custom projects at a hotel, bottling company, and a major warehouse retailer were also delayed.
- January 2017** - Reallocated funds, moving 10% of the total Residential budget to Business incentives. Budget transfers were made in Residential and Business Incentives: FROM REEM Incentives (\$1,097,579) TO BEEM (\$440,000), CBEEM (\$440,000), and BHTR (\$217,579). The reallocations among the various Business Incentive categories were based on the current Business Program forecast through February. The reallocations were completed with the understanding that the Residential funds would be restored in PY16 to pre-budget R3 levels with roll forward funds. This was different than in previous years where the reallocation from Residential to Business was final as the programs were run on an annual basis and roll forward funds were not available.
- February 2017** – Transferred Business Incentive budget as follows: FROM CBEEM (\$79,000), BESM (\$21,000), and BHTR (\$15,000) TO BEEM (\$115,000). Funds were moved in order to continue with offerings in this area, based on current backlog, and the limited funds available.
- March 2017** - Rolled forward 3.2M in Business Incentives and 200K in Business T&M from PY17 budget to PY16. Transferred Business T&M budget as follows: BEEM (+175,000), CBEEM (+76,000), BESM (-60,000), TAX (+9,000). Transferred Residential Incentive budget as follows: REEM (+1,097,579). Transferred Business Incentives as follows: BEEM (+910,000), CBEEM (+678,428), BESM (-250), and BHTR (+532,671). The Residential Incentive budget changes replenished the 10% transfer out of Residential incentives that occurred in January 2017 (R3). Allocations of the carry-forward funding within Business Incentives aligned budgets with imminent projects in the forecast, including Small Business Direct Install Lighting (SBDIL) and prescriptive and custom projects, and were preferential to where payment was acutely needed, all else being equal. This is often the case with participating small businesses and/or contractors who have been designated as 3rd party payees and therefore have made significant cost outlays in labor and materials.
- May 2017** – Transferred Residential T&M budget as follows: REEM (+270,000), CREEM (-64,000), RESM (-5,000), RHTR (-91,000), Res Eval (-55,000), and Res Outreach (-55,000). Transferred Residential Incentive budget as follows: REEM (+20,000), CREEM (-76,500), RESM (+10,000), RHTR (-445,000). Transferred Business T&M budget as follows: BEEM (+35,000), CBEEM (-40,000), BESM (-35,000), Bus Eval (+15,000), and Bus Outreach (+25,000). Transferred Business Incentive budget as follows: BEEM (+551,500), CBEEM (-170,000), and BHTR (+110,000). Residential T&M transfers were completed, to reflect the latest corresponding incentive budget shifts and spend. Within Residential Incentives, funding was transferred mainly out of RHTR, as a result of efforts and participation not coming to fruition in PY16. Additionally, CREEM incentives were reduced as a result of slower than anticipated residential custom project identification. Business T&M transfers were completed, to reflect the latest corresponding

incentive budget shifts and spend. Within Business Incentives, funding was transferred into BEEM, to accommodate some large Department of Education projects, as well as a mix of smaller lighting efforts with cash flow and time sensitivities. Funds were also distributed to BHTR to help fund continued robust activity in the SBDIL program. Moreover, funds were transferred out of CBEEM, shifting larger custom projects to next year.

- **June 2017** – Transferred Business Incentive budget as follows: BEEM (-185,000), CBEEM (-25,000), and BHTR (+210,000). Funding was transferred to help fund robust SBDIL program activity. Funding allocations are preferential to where payment is acutely needed, all else being equal. This is often the case with participating small businesses and/or contractors who have been designated as 3rd party payees and therefore have made significant cost outlays in labor and materials.
- **August 2017** – Completed several small transfers within Residential and Business Operations to align funding to final year operations spend.

Table 15															
Budget Progression 7/1/16 - 6/30/17															
	Annual Plan Budget	IT (10/2016)	PY16 BAO 10/2016 (R1)	IT (11/2016)	PY16 BAO 11/2016 (R2)	IT (1/2017)	PY16 BAO 1/2017 (R3)	IT (2/2017)	PY16 BAO 2/2017 (R4)	IT from PY17 & PY18 (3/2017)	IT from PY17 & PY18 (3/2017)	PY16 BAO 3/2017 (R5)	T&M Transfers (5/2017)	IT (5/2017)	PY16 BAO 5/2017 (R6)
Residential Programs															
Operations & Management															
REEM	1,055,000		1,055,000		1,055,000		1,055,000		1,055,000			1,055,000	270,000		1,325,000
CREEM	65,000		65,000		65,000		65,000		65,000			65,000	(64,000)		1,000
RESM	25,000		25,000		25,000		25,000		25,000			25,000	(5,000)		20,000
RHTR	290,000		290,000		290,000		290,000		290,000			290,000	(91,000)		199,000
Total Residential Programs	1,435,000	-	1,435,000	-	1,435,000	-	1,435,000	-	1,435,000	-	-	1,435,000	110,000	-	1,545,000
Residential Market Evaluation	78,055		78,055		78,055		78,055		78,055			78,055	(55,000)		23,055
Residential Outreach	785,000		785,000		785,000		785,000		785,000			785,000	(55,000)		730,000
Total Res Ops & Management	2,298,055	-	2,298,055	-	2,298,055	-	2,298,055	-	2,298,055	-	-	2,298,055	-	-	2,298,055
Residential Incentives															
REEM	6,466,580		6,466,580		6,466,580	(1,097,579)	5,369,001		5,369,001		1,097,579	6,466,580		20,000	6,486,580
CREEM	76,500		76,500		76,500		76,500		76,500			76,500		(76,500)	-
RESM	254,500		254,500		254,500		254,500		254,500			254,500		10,000	264,500
RHTR	1,028,780		1,028,780		1,028,780		1,028,780		1,028,780			1,028,780		(445,000)	583,780
Subtotal Residential Incentives	7,826,360	-	7,826,360	-	7,826,360	(1,097,579)	6,728,781	-	6,728,781	-	1,097,579	7,826,360	-	(491,500)	7,334,860
Residential Transformational	851,373		851,373		851,373		851,373		851,373			851,373			851,373
Total Residential Incentives	8,677,733	-	8,677,733	-	8,677,733	(1,097,579)	7,580,154	-	7,580,154	-	1,097,579	8,677,733	-	(491,500)	8,186,233
Total Residential Programs	10,975,788	-	10,975,788	-	10,975,788	(1,097,579)	9,878,209	-	9,878,209	-	1,097,579	10,975,788	-	(491,500)	10,484,288
Business Programs															
Operations & Management															
BEEM	625,000		625,000		625,000		625,000		625,000	175,000		800,000	35,000		835,000
CBEEM	585,000		585,000		585,000		585,000		585,000	76,000		661,000	(40,000)		621,000
BESM	135,000		135,000		135,000		135,000		135,000	(60,000)		75,000	(35,000)		40,000
BHTR	375,000		375,000		375,000		375,000		375,000			375,000			375,000
Total Business Programs	1,720,000	-	1,720,000	-	1,720,000	-	1,720,000	-	1,720,000	191,000	-	1,911,000	(40,000)	-	1,871,000
Business Market Evaluation	72,626		72,626		72,626		72,626		72,626			72,626	15,000		87,626
Business Outreach	340,000		340,000		340,000		340,000		340,000			340,000	25,000		365,000
Total Bus Ops & Management	2,132,626		2,132,626		2,132,626	-	2,132,626	-	2,132,626	191,000	-	2,323,626	-	-	2,323,626
Business Incentives															
BEEM	3,846,975	(500,000)	3,346,975	715,000	4,061,975	440,000	4,501,975	115,000	4,616,975		910,000	5,526,975		551,500	6,078,475
CBEEM	2,118,647	2,000,000	4,118,647	(600,000)	3,518,647	440,000	3,958,647	(79,000)	3,879,647		678,428	4,558,075		(170,000)	4,388,075
BESM	321,250		321,250	(300,000)	21,250	-	21,250	(21,000)	250		(250)	-		-	-
BHTR	3,152,038	(1,500,000)	1,652,038	185,000	1,837,038	217,579	2,054,617	(15,000)	2,039,617		532,671	2,572,288		110,000	2,682,288
Subtotal Business Incentives	9,438,910	-	9,438,910	-	9,438,910	1,097,579	10,536,489	-	10,536,489	-	2,120,849	12,657,338	-	491,500	13,148,838
Business Transformational	898,627		898,627		898,627		898,627		898,627			898,627			898,627
Total Business Incentives	10,337,537	-	10,337,537	-	10,337,537	1,097,579	11,435,116	-	11,435,116		2,120,849	13,555,965		491,500	14,047,465
Total Business Programs	12,470,163	-	12,470,163	-	12,470,163	1,097,579	13,567,742	-	13,567,742	191,000	2,120,849	15,879,591	-	491,500	16,371,091
Total Supporting Services	1,847,708	-	1,847,708	-	1,847,708	-	1,847,708	-	1,847,708	-	-	1,847,708	-	-	1,847,708
Total Infrastructure/Facility Fee	476,404	-	476,404	-	476,404	-	476,404	-	476,404	-	-	476,404	-	-	476,404
Subtotal Non-Incentive (Prior to Tax)	6,754,793		6,754,793		6,754,793		6,754,793		6,754,793	191,000		6,945,793	-		6,945,793
Total Tax on Non-Incentive	318,286		318,286		318,286		318,286		318,286	9,000		327,286	-		327,286
Performance Amount (Inclusive of Tax)	967,151		967,151		967,151		967,151		967,151	-		967,151	-		967,151
Subtotal Non-Incentives	8,040,30	-	8,040,230	-	8,040,230	-	8,040,230	-	8,040,230	200,000	-	8,240,230	-	-	8,240,230
Subtotal Residential and Business Customer Incentives	17,265,270	-	17,265,270	-	17,265,270	-	17,265,270	-	17,265,270	-	3,218,428	20,483,698	-	-	20,483,698
Subtotal Transformational Incentives	1,750,000	-	1,750,000	-	1,750,000	-	1,750,000	-	1,750,000	-	-	1,750,000	-	-	1,750,000
Subtotal Customer and Transformational Incentives	19,015,270	-	19,015,270	-	19,015,270	-	19,015,270	-	19,015,270	-	3,218,428	22,233,698	-	-	22,233,698
Total Estimated Contractor Costs	27,055,500	-	27,055,500	-	27,055,500	-	27,055,500	-	27,055,500	200,000	3,218,428	30,473,928	-	-	30,473,928

IT = Incentive Transfer
BAO = Budget as of (date)

(cont'd)									
Budget Progression 7/1/16 - 6/30/17									
	T&M Transfers (5/2017)	IT (5/2017)	PY16 BAO 5/2017 (R7)	T&M Transfers (6/2017)	IT (6/2017)	PY16 BAO 6/2017 (R8)	T&M Transfers (8/2017)	IT (8/2017)	PY16 BAO (8/2017) (R9)
Residential Programs									
Operations & Management									
REEM	(3,000)		1,322,000			1,322,000	(8,683)		1,313,317
CREEM	-		1,000			1,000	(837)		163
RESM	(4,000)		16,000			16,000	(464)		15,536
RHTR	-		199,000			199,000	(1,614)		197,386
Total Residential Programs	(7,000)	-	1,538,000	-	-	1,538,000	(11,598)	-	1,526,402
Residential Market Evaluation	7,000		30,055			30,055			30,055
Residential Outreach	-		730,000	-		730,000	11,598		741,598
Total Res Ops & Management	-	-	2,298,055	-	-	2,298,055	-	-	2,298,055
Residential Incentives									
REEM			6,486,580			6,486,580			6,486,580
CREEM			-			-			-
RESM			264,500			264,500			264,500
RHTR			583,780			583,780			583,780
Subtotal Residential Incentives	-	-	7,334,860	-	-	7,334,860	-	-	7,334,860
Residential Transformational			851,373			851,373			851,373
Total Residential Incentives	-	-	8,186,233	-	-	8,186,233	-	-	8,186,233
Total Residential Programs	-	-	10,484,288	-	-	10,484,288	-	-	10,484,288
Business Programs									
Operations & Management									
BEEM			835,000			835,000	41,000		876,000
CBEEM			621,000			621,000	(20,000)		601,000
BESM			40,000			40,000			40,000
BHTR			375,000			375,000			375,000
Total Business Programs	-	-	1,871,000	-	-	1,871,000	21,000	-	1,892,000
Business Market Evaluation			87,626			87,626			87,626
Business Outreach			365,000			365,000	(21,000)		344,000
Total Bus Ops & Management	-	-	2,323,626	-	-	2,323,626	-	-	2,323,626
Business Incentives									
BEEM			6,078,475		(185,000)	5,893,475			5,893,475
CBEEM			4,388,075		(25,000)	4,363,075			4,363,075
BESM			-			-			-
BHTR			2,682,288		210,000	2,892,288			2,892,288
Subtotal Business Incentives	-	-	13,148,838	-	-	13,148,838	-	-	13,148,838
Business Transformational			898,627			898,627			898,627
Total Business Incentives	-	-	14,047,465	-	-	14,047,465	-	-	14,047,465
Total Business Programs	-	-	16,371,091	-	-	16,371,091	-	-	16,371,091
Total Supporting Services	-	-	1,847,708	-	-	1,847,708	-	-	1,847,708
Total Infrastructure/Facility Fee	-	-	476,404	-	-	476,404	-	-	476,404
Subtotal Non-Incentive (Prior to Tax)	-		6,945,793	-		6,945,793	-		6,945,793
Total Tax on Non-Incentive	-		327,286	-		327,286	-		327,286
Performance Amount (Inclusive of Tax)	-		967,151	-		967,151	-		967,151
Subtotal Non-Incentives	-	-	8,240,230	-	-	8,240,230	-	-	8,240,230
Subtotal Residential and Business Customer Incentives	-	-	20,483,698	-	-	20,483,698	-	-	20,483,698
Subtotal Transformational Incentives	-	-	1,750,000	-	-	1,750,000	-	-	1,750,000
Subtotal Customer and Transformational Incentives	-	-	22,233,698	-	-	22,233,698	-	-	22,233,698
Total Estimated Contractor Costs	-	-	30,473,928	-	-	30,473,928	-	-	30,473,928

Portfolio Expenditures

Throughout the year, the Program continuously reviewed operational needs and leveraged funding to drive program value in light of reduced program budgets. At year-end, the Program had utilized almost 100% of budgeted Incentives (includes roll forward funds), 99% of budgeted Non-Incentives (excludes performance amounts), and 98% of budgeted Transformational Incentives. Details of final PY16 expenditures and unspent funds by program categories are shown in **Table 16**. Specific discussions related to each Residential and Business program are provided within those respective sections.

Table 16 Program Expenditures and Unspent Funds					
	<u>Total Expenditures</u>	<u>PY16 Budget (R9)</u>	<u>Percent Spent</u>	<u>Unspent</u>	<u>Percent Unspent</u>
Residential Programs					
Residential Program Ops and Management					
REEM	1,313,316.15	1,313,317.00	100.00%	0.85	0.00%
CREEM	162.50	163.00	99.69%	0.50	0.31%
RESM	15,535.15	15,536.00	99.99%	0.85	0.01%
RHTR	197,385.92	197,386.00	100.00%	0.08	0.00%
Total Residential Programs	1,526,399.72	1,526,402.00	100.00%	2.28	0.00%
Residential Evaluation	29,987.50	30,055.00	99.78%	67.50	0.22%
Residential Outreach	741,595.29	741,598.00	100.00%	2.71	0.00%
Total Residential Non-Incentives	2,297,982.51	2,298,055.00	100.00%	72.49	0.00%
Residential Incentives					
REEM	6,444,202.43	6,486,580.00	99.35%	42,377.57	0.65%
CREEM	-	-	0.00%	-	0.00%
RESM	262,675.00	264,500.00	99.31%	1,825.00	0.69%
RHTR	474,276.05	583,780.00	81.24%	109,503.95	18.76%
Subtotal Residential Incentives	7,181,153.48	7,334,860.00	97.90%	153,706.52	2.10%
Residential Transformational	783,190.40	851,373.00	91.99%	68,182.60	8.01%
Total Residential Incentives	7,964,343.88	8,186,233.00	97.29%	221,889.12	2.71%
Total Residential Programs	10,262,326.39	10,484,288.00	97.88%	221,961.61	2.12%

(cont'd)					
Program Expenditures and Unspent Funds					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
<u>Business Programs</u>					
Business Programs Ops and Management					
BEEM	875,900.39	876,000.00	99.99%	99.61	0.01%
CBEEM	600,455.93	601,000.00	99.91%	544.07	0.09%
BESM	32,632.28	40,000.00	81.58%	7,367.72	18.42%
BHTR	369,588.19	375,000.00	98.56%	5,411.81	1.44%
Total Business Programs	1,878,576.79	1,892,000.00	99.29%	13,423.21	0.71%
Business Evaluation	87,277.60	87,626.00	99.60%	348.40	0.40%
Business Outreach	340,738.93	344,000.00	99.05%	3,261.07	0.95%
Total Business Non-Incentives	2,306,593.32	2,323,626.00	99.27%	17,032.68	0.73%
Business Incentives					
BEEM	5,887,495.89	5,893,475.00	99.90%	5,979.11	0.10%
CBEEM	4,354,447.44	4,363,075.00	99.80%	8,627.56	0.20%
BESM	-	-	0.00%	-	0.00%
BHTR	2,882,167.56	2,892,288.00	99.65%	10,120.44	0.35%
Subtotal Business Incentives	13,124,110.89	13,148,838.00	99.81%	24,727.11	0.19%
Business Transformational	777,400.96	898,627.00	86.51%	121,226.04	13.49%
Total Business Incentives	13,901,511.85	14,047,465.00	98.96%	145,953.15	1.04%
Total Business Programs	16,208,105.17	16,371,091.00	99.00%	162,985.83	1.00%
Total Services and Initiatives	26,470,431.56	26,855,379.00	98.57%	384,947.44	1.43%
<u>Supporting Services</u>					
Supporting Services	1,768,415.16	1,847,708.00	95.71%	79,292.84	4.29%
Total Supporting Services	1,768,415.16	1,847,708.00	95.71%	79,292.84	4.29%
<u>Infrastructure/Facility Fee</u>					
Infrastructure/Facility Fee	476,403.96	476,404.00	100.00%	0.04	0.00%
Total Infrastructure/Facility Fee	476,403.96	476,404.00	100.00%	0.04	0.00%
Subtotal Non-Incentives (Prior to Tax)	6,849,394.95	6,945,793.00	98.61%	96,398.05	1.39%
Total Tax on Non-Incentive	322,743.56	327,286.00	98.61%	4,542.44	1.39%
Performance Amount (Inclusive of Tax)	507,754.00	967,151.00	52.50%	459,397.00	47.50%
<i>Subtotal Non-Incentives Billed</i>	<i>7,679,892.51</i>	<i>8,240,230.00</i>	<i>93.20%</i>	<i>560,337.49</i>	<i>6.80%</i>
<i>Subtotal Residential and Business Customer Incentives</i>	<i>20,305,264.37</i>	<i>20,483,698.00</i>	<i>99.13%</i>	<i>178,433.63</i>	<i>0.87%</i>
<i>Subtotal Transformational Incentives</i>	<i>1,560,591.36</i>	<i>1,750,000.00</i>	<i>89.18%</i>	<i>189,408.64</i>	<i>10.82%</i>
<i>Subtotal Customer and Transformational incentives</i>	<i>21,865,855.73</i>	<i>22,233,698.00</i>	<i>98.35%</i>	<i>367,842.27</i>	<i>1.65%</i>
Sub-Total Estimated Contractor Costs	29,545,748.24	30,473,928.00	96.95%	928,179.76	3.05%
Total Estimated Contractor Costs		30,473,928.00			

PORTFOLIO IMPACTS

Introduction

Three levels of energy and demand savings are used to show how the 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). The PY2016 annual report *Portfolio Impacts* section has been reorganized to highlight the Program Level Savings, relocating the Customer and System Level Savings tables and descriptions to **Appendix A**.

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 PY16 were:

- **First Year** – 140,816,323 kWh
(39% in Residential and 61% in Business programs)
- **Lifetime** – 1,758,702,099 kWh
(32% in Residential and 68% 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 10.3 years in PY16, up from 9.5 years in PY15 and 8.0 years in PY14, while business measures have an average measure life of 13.9 years in PY16, up from 12.7 years in PY15 and 12.6 years in PY14.

Program Peak Demand reduction for PY16 was:

- **Peak Demand** – 18,578 kW (43.0% from Residential and 57.0% from Business)

Table 17 provides 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 Level. For the Customer Level or System Level Savings, see **Appendix A**.

Table 17 Cumulative Annual Electric Savings (Program Level) by Budget Category								
Program	Apps Processed	Quantity of Energy-Efficient Equipment (Units)	Incentives (\$)	Demand Impact (kW)	First Year Energy Impact (kWh First Year)	Lifetime Energy Impact (kWh - Life)	First Year Impact Cost (\$/kWh)	Lifetime Impact Cost (\$/kWh)
BEEM	830	509,234	\$5,887,496	5,452	53,269,643	799,089,796	\$0.11	\$0.01
CBEEM	336	2,037	\$4,354,447	3,500	23,438,710	272,800,531	\$0.19	\$0.02
BHTR	2,789	4,707,159	\$2,882,168	1,573	8,564,037	116,966,844	\$0.34	\$0.03
BESM	0	0	\$0	0	0	0	\$0	\$0
Business Totals	3,955	5,218,430	\$13,124,111	10,525	85,272,390	1,188,857,171	\$0.15	\$0.01
REEM	7,720	4,450,641	\$6,444,202	7,633	53,767,121	560,728,312	\$0.12	\$0.01
RHTR	3,228	32,937	\$474,276	343	1,023,996	6,170,401	\$0.46	\$0.08
RESM	2,780	2,780	\$262,675	78	752,885	2,946,214	\$0.35	\$0.09
CREEM	0	0	\$0	0	0	0	\$0	\$0
Residential Totals	13,728	4,486,358	\$7,181,153	8,054	55,544,003	569,844,927	\$0.13	\$0.01
Total	17,683	9,704,788	\$20,305,264	18,578	140,816,393	1,758,702,099	\$0.14	\$0.01

Program	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB / Incentive \$)	Driven Investment Ratio (TRC / Incentive \$)	Benefit Test (TRB/TRC)
BEEM	\$134,398,981	\$40,085,394	22.8	6.8	3.4
CBEEM	\$50,487,126	\$59,237,126	11.6	13.6	0.9
BHTR	\$22,175,191	\$3,177,730	7.7	1.1	7
BESM	\$0	\$0	0	0	0
Business Totals	\$207,061,298	\$102,500,251	15.8	7.8	2
REEM	\$104,118,987	\$45,093,269	16.2	7	2.3
RHTR	\$1,211,909	\$485,527	2.6	1	2.5
RESM	\$495,788	\$834,000	1.9	3.2	0.6
CREEM	\$0	\$0	0	0	0
Residential Totals	\$105,826,684	\$46,412,796	14.7	6.5	2.3
Total	\$312,887,982	\$148,913,047	15.4	7.3	2.1

Savings at Program Levels

Measure Contribution toward Savings Impacts

In PY16, the Program incentivized 75 measures in 17 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 savings. **Table 18** provides a summary of all measure categories and their respective energy impact for PY16.

- **#1 Contributor - High-Efficiency Lighting** – 52.7% of first year (up from 45% in PY15) and 60.7% lifetime energy savings (up from 49% in PY15).
- **#2 Contributor – Customized Project Measures** – 22.3% first year and 22.1% lifetime energy savings. Non-prescriptive lighting projects constituted the majority of projects in this category.
- **#3 Contributor – High-Efficiency HVAC** – 6.1% first year and 7.9% lifetime energy savings. Chillers, Package Units and VFDs and were the most significant contributors to this category.

Table 18 Contribution by Measure Category in Order of Lifetime Energy Impact													
Rank	Category	Apps		Measure Quantity	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh - Life)		Incentives		Lifetime Cost (\$/kWh)
		Total	%		kW	%	kWh	%	kWh	%	\$	%	
1	High-Efficiency Lighting	31,160	39.1%	2,228,775	8,524	45.9%	74,166,990	52.7%	1,067,240,491	60.7%	\$7,814,603	38.5%	\$0.01
2	Customized Project Measures	2,747	3.4%	4,642,289	4,502	24.2%	31,467,701	22.3%	388,141,722	22.1%	\$6,124,236	30.2%	\$0.02
3	High-Efficiency HVAC	3,949	5.0%	4,358	1,780	9.6%	8,609,437	6.1%	139,565,259	7.9%	\$2,076,641	10.2%	\$0.02
4	High-Efficiency Water Heating	3,570	4.5%	3,572	623	3.4%	3,183,520	2.3%	52,760,500	3.0%	\$1,050,094	5.2%	\$0.02
5	Energy Awareness, Measurement and Control Systems	2,506	3.1%	2,761,732	1,903	10.2%	16,957,427	12.0%	32,569,118	1.9%	\$1,576,603	7.8%	\$0.05
6	High-Efficiency Appliances	3,336	4.2%	3,249	77	0.4%	1,874,059	1.3%	26,236,828	1.5%	\$328,835	1.6%	\$0.01
7	High-Efficiency Motors	47	0.1%	3,994	123	0.7%	1,128,062	0.8%	16,920,924	1.0%	\$297,940	1.5%	\$0.02
8	High-Efficiency Water Pumping	196	0.2%	198	92	0.5%	1,054,773	0.7%	15,369,526	0.9%	\$101,235	0.5%	\$0.01
9	Energy Kit	1,140	1.4%	11,057	36	0.2%	262,343	0.2%	3,314,122	0.2%	\$0	0.0%	\$0.00
10	Energy Conservation - Hot Water	18,161	22.8%	24,286	546	2.9%	650,791	0.5%	3,253,955	0.2%	\$130,590	0.6%	\$0.04
11	Consumer Electronics	1,272	1.6%	7,657	60	0.3%	521,383	0.4%	3,167,923	0.2%	\$109,605	0.5%	\$0.04
12	High-Efficiency Air Conditioning	496	0.6%	556	183	1.0%	140,817	0.1%	2,696,510	0.2%	\$36,060	0.2%	\$0.01
13	Building Envelope Improvements	12	0.0%	12	58	0.3%	227,260	0.2%	2,272,602	0.1%	\$35,410	0.2%	\$0.02
14	Energy Conservation - Plug Load	4,715	5.9%	4,906	42	0.2%	375,035	0.3%	1,875,173	0.1%	\$141,959	0.7%	\$0.08
15	Commercial Kitchen	51	0.1%	87	23	0.1%	151,174	0.1%	1,857,551	0.1%	\$26,925	0.1%	\$0.01
16	Commercial Industrial Processes	20	0.0%	49	5	0.0%	45,622	0.0%	1,459,895	0.1%	\$13,820	0.1%	\$0.01
17	Accounting	6,271	7.9%	7,983	0	0.0%	0	0.0%	0	0.0%	\$437,001	2.2%	\$0
18	Energy Efficiency Equipment Grants	28	0.0%	28	0	0.0%	0	0.0%	0	0.0%	\$3,707	0.0%	\$0
	Total	79,677	100%	9,704,788	18,578	100%	140,816,393	100%	1,758,702,099	100%	\$20,305,264	100%	\$0.01

Measure impacts are further parsed in **Appendix A**, for Program level and Customer level impacts by dimensions including rate schedule, island, and program. For details, see the tables in **Appendix A**.

CFLs & LEDs – Market Shift Toward LEDs Successful

In PY16, the Program rapidly phased out the residential upstream CFL offer, limiting the number of rebated CFLs to 288,000. The Multifamily Direct Install program contributed the remaining 16,200 lamps, which were attributed to either the business or residential program as appropriate based on the meter rate schedule. Finally, the Program also processed a handful of lingering CFL rebates for the Department of Education. . There were a total of 304,248 CFLs incentivized, a 68% decrease from the 960,740 CFLs incentivized in PY15. For comparison, there were over 1,900,000 LED lamps incentivized in PY16. **Table 19** continues to show the downward trend of CFL lamps incentivized through the Program.

Table 19			
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	3,102	1,611,941	1,615,043
PY2014	2,352	1,345,684	1,348,036
PY2015	11,037	949,703	960,740
PY2016	4,160	300,088	304,248
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	358,654	51,124,525	51,483,179
PY2014	271,577	36,067,136	36,338,713
PY2015	593,004	14,604,145	15,197,149
PY2016	83,006	4,504,341	4,587,347
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	116	32	32
PY2014	115	27	27
PY2015	54	15	16
PY2016	20	15	15

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.

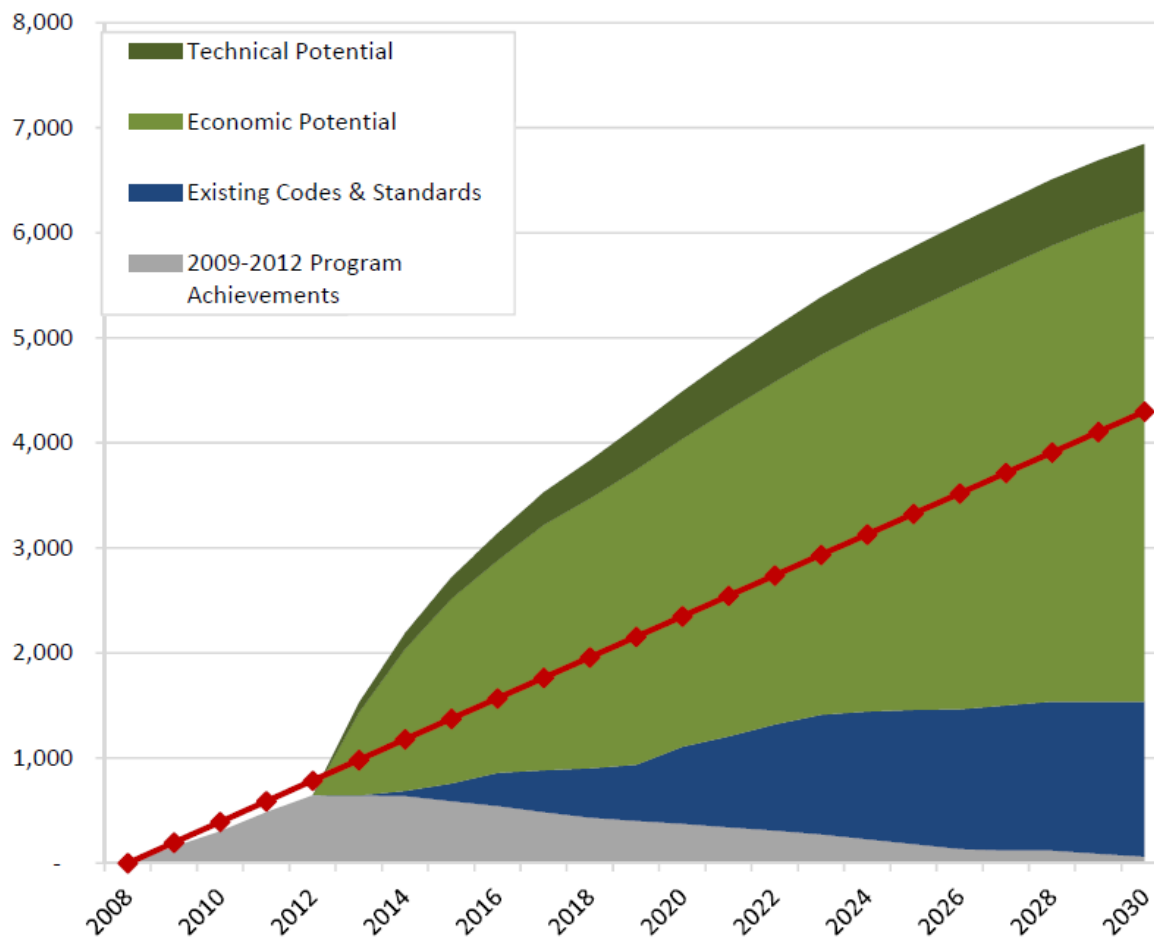
Key Findings

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 Seventh 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 address some of these needs 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

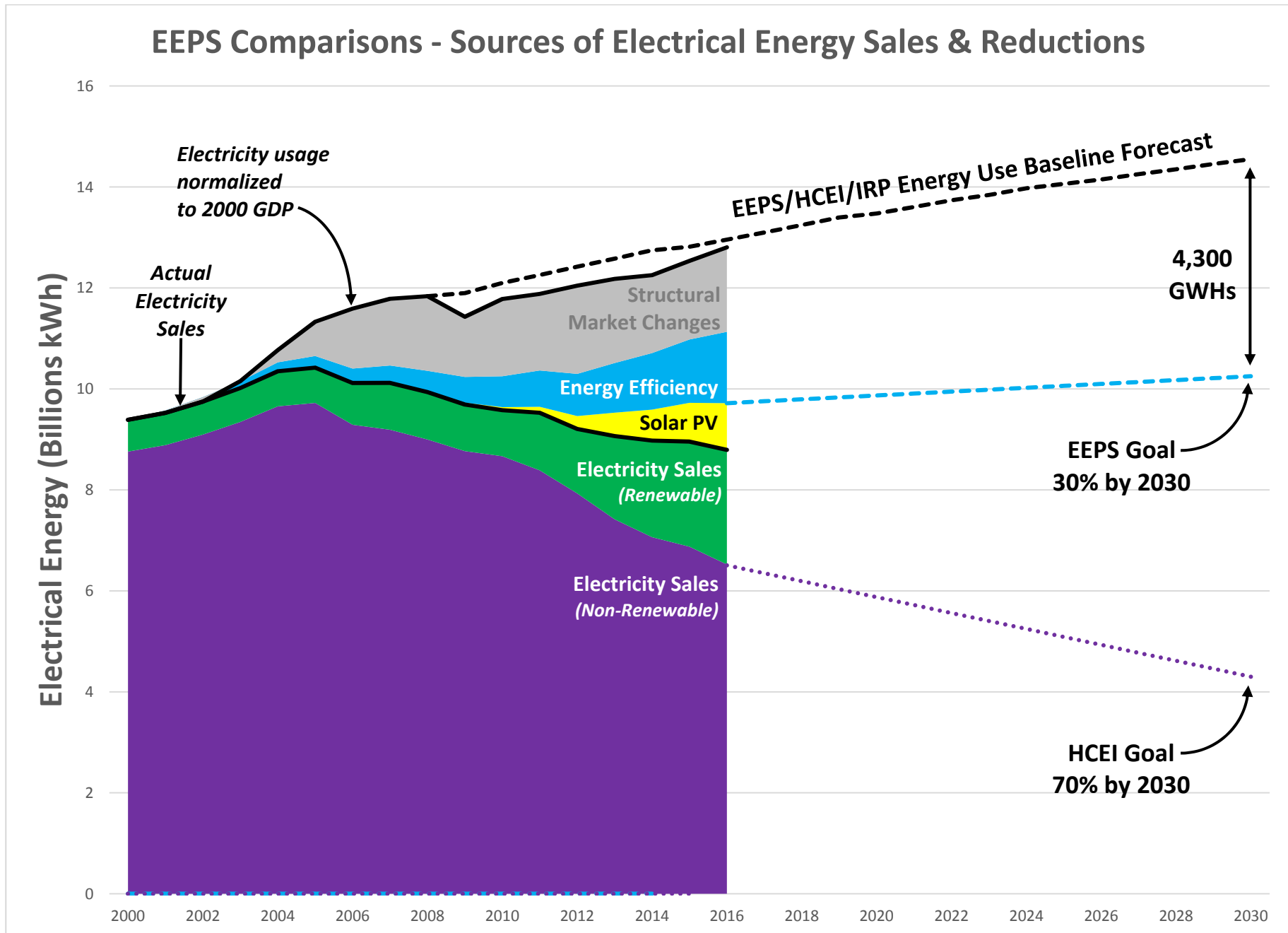
- A. *Estimated Electricity Use* (top black solid line) – The solid line atop the five shaded areas model the actual energy use by normalizing energy use to the Hawai'i State Gross Domestic Product (GDP) in the year 2000.
- B. *EEPS / HCEI / IRP Electrical Usage Baseline Forecast* (top black dashed line) – This is the original electrical energy forecast for the HECO companies based on the Integrated Resource Plan 3.

Electrical Sales & Reduction Items

- A. *Actual Electricity Sales* (bottom black solid line) – This is the actual annual sales for HECO, MECO and HELCO. There is a pronounced flattening of sales in 2004 and 2005 when sales actually started to decline prior to the 2008 economic downturn. Sales are comprised of two components; renewable and non-renewable sources.
 - a. *Non-Renewable* (purple area) – This area is inferred by the utilities' RPS compliance of ~26% of kWh sales. Therefore, approximately 74% of kWh sales are supplied via non-renewable source. The purple dashed line is a visualization of where actual electricity sales from non-renewable sources should trend leading to 2030 using the EEPS baseline.
 - b. *Renewable* (green area) – This area is based on the Utilities' RPS compliance and is presently ~26% of kWh sales.
- B. *Solar PV Production* (yellow area) – This line adds in the energy use that distributed PV systems are estimated to generate. In 2016, it is estimated that the PV systems generated 924 GWh¹.
- C. *Energy Efficiency* (light blue area) – This area 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. The light-blue dashed line is a visualization of where a combination of Market Changes and Energy Efficiency should trend leading to 2030 using the EEPS baseline.
- D. *Structural Market Changes* (grey area) – Not accounted for by either energy efficiency or PV, this is estimated reductions due to improved equipment, codes, standards and shifts in the marketplace.

¹ Based on Hawaiian Electric Industries' 2016 Annual Report, which cited 586MW of installed PV; 4.8 sun hours and 0.9 conversion factor was assumed.

Figure 5 EEPS Comparisons



Portfolio Impacts Relative to Load

Table 20, Table 21 and Table 22 show the Program and Customer Level impacts as compared to PY16 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 22**, comes from the HEI 10k report and is reported on calendar year.

For PY 16, customer level savings were equivalent to 1.82% of the 2016 annual energy sales and 1.3% of the peak demand for the utility customers.

Table 20 Energy Impacts vs. Sales							
Island	PY 2016 kWh Sales*	Customer Level kWh Savings	% of Island Sales	% of Total Sales	Program Level kWh Savings	% of Island Sales	% of Total Sales
Hawai'i	1,059,047,406	25,043,801	2.36%	0.28%	21,741,880	2.05%	0.25%
Lāna'i	30,403,223	113,739	0.37%	0.001%	113,349	0.37%	0.001%
Maui	1,047,422,198	26,101,432	2.49%	0.30%	22,450,284	2.14%	0.26%
Moloka'i	28,141,370	148,757	0.53%	0.002%	139,551	0.50%	0.002%
O'ahu	6,626,967,777	108,450,389	1.64%	1.23%	96,371,329	1.45%	1.10%
Total	8,791,981,974	159,858,118		1.82%	140,816,393		1.60%
* DBEDT - Monthly Energy Trends - http://dbedt.hawaii.gov/economic/energy-trends-2/							

Table 21 HECO Sales vs. Generated & Purchased		
HECO Consolidated Operating Statistics*	kWh/Yr	%
Net Generated and Purchased	9,534,200,095	100.00%
Sales	8,791,981,974	92.22%
System Losses and Use	742,218,121	7.78%
*DBEDT Monthly Energy Trends		

Table 22 Demand Impacts vs. Sales							
Island	2016 kW Peak*	Customer Level kW Reduction	% of Island Peak	% of Total Peak	Program Level kW Reduction	% of Island Peak	% of Total Peak
Hawai'i	188,500	2,989	1.59%	0.19%	2,624	1.39%	0.16%
Lāna'i	5,700	10	0.18%	0.00%	10	0.18%	0.00%
Maui	201,000	3,137	1.56%	0.20%	2,707	1.35%	0.17%
Moloka'i	5,700	22	0.39%	0.00%	20	0.35%	0.00%
O'ahu	1,192,000	14,764	1.24%	0.93%	13,217	1.11%	0.83%
Total	1,592,900	20,922		1.31%	18,578		1.17%
* HEI 2016 10K Report (Noncoincident and nonintegrated)							

Figure 6
Utility Avoided Cost and Non-Utility Impacts

Demonstration 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.
PY16	2016	1	1.00		\$ 0.166	-	\$ 0.1658	-	\$ 0.1658
PY17	2017	2	0.94		\$ 0.171	-	\$ 0.1611	-	\$ 0.3270
PY18	2018	3	0.89		\$ 0.176	-	\$ 0.1566	-	\$ 0.4835
PY19	2019	4	0.84		\$ 0.181	-	\$ 0.1521	-	\$ 0.6357
PY20	2020	5	0.79	\$ 904.0	\$ 0.187	\$ 716	\$ 0.1478	\$ 716	\$ 0.7835
PY21	2021	6	0.75	\$ 986.0	\$ 0.192	\$ 737	\$ 0.1437	\$ 1,453	\$ 0.9272
PY22	2022	7	0.70	\$ 856.0	\$ 0.198	\$ 603	\$ 0.1396	\$ 2,056	\$ 1.0668
PY23	2023	8	0.67	\$ 750.0	\$ 0.204	\$ 499	\$ 0.1356	\$ 2,555	\$ 1.2024
PY24	2024	9	0.63	\$ 663.0	\$ 0.210	\$ 416	\$ 0.1318	\$ 2,971	\$ 1.3342
PY25	2025	10	0.59	\$ 590.0	\$ 0.216	\$ 349	\$ 0.1281	\$ 3,320	\$ 1.4623
PY26	2026	11	0.56	\$ 527.0	\$ 0.223	\$ 294	\$ 0.1244	\$ 3,615	\$ 1.5867
PY27	2027	12	0.53	\$ 474.0	\$ 0.230	\$ 250	\$ 0.1209	\$ 3,864	\$ 1.7076
PY28	2028	13	0.50	\$ 1,020.0	\$ 0.236	\$ 507	\$ 0.1175	\$ 4,371	\$ 1.8251
PY29	2029	14	0.47	\$ 1,066.0	\$ 0.244	\$ 500	\$ 0.1142	\$ 4,871	\$ 1.9393
PY30	2030	15	0.44	\$ 964.0	\$ 0.251	\$ 426	\$ 0.1109	\$ 5,297	\$ 2.0503
PY31	2031	16	0.42	\$ 875.0	\$ 0.258	\$ 365	\$ 0.1078	\$ 5,662	\$ 2.1581
PY32	2032	17	0.39	\$ 795.0	\$ 0.266	\$ 313	\$ 0.1048	\$ 5,975	\$ 2.2628
PY33	2033	18	0.37	\$ 724.0	\$ 0.274	\$ 269	\$ 0.1018	\$ 6,244	\$ 2.3646
PY34	2034	19	0.35		\$ 0.282	\$ -	\$ 0.0989	\$ 6,244	\$ 2.4635
PY35	2035	20	0.33		\$ 0.291	\$ -	\$ 0.0961	\$ 6,244	\$ 2.5596
PY36	2036	21	0.31		\$ 0.300	\$ -	\$ 0.0934	\$ 6,244	\$ 2.6530
PY37	2037	22	0.29		\$ 0.308	\$ -	\$ 0.0907	\$ 6,244	\$ 2.7438
PY38	2038	23	0.28		\$ 0.318	\$ -	\$ 0.0882	\$ 6,244	\$ 2.8319
PY39	2039	24	0.26		\$ 0.327	\$ -	\$ 0.0857	\$ 6,244	\$ 2.9176
PY40	2040	25	0.25		\$ 0.337	\$ -	\$ 0.0833	\$ 6,244	\$ 3.0009

* EEPS 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.

Total Resource Cost (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 \$ 312,887,982. **Table 23** shows the measures and their relative contributions.

The top three measure categories, shown in **Table 23**, provided 91% 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 \$184,502,009 (59.0%).
- *Customize Projects* – The second measure to offer significant contribution at \$70,971,771 (22.7%) were customized projects.
- *High-Efficiency HVAC* – The third largest measure contributing to the TRB at \$27,807,954 (8.9%) was High-Efficiency HVAC.

The top three measures (These can cross categories, for example High-Efficiency Lighting in Customized Projects), shown in **Appendix A**, provided 58.7% of the TRB value. They are LED Lighting, LED Omi Directional, and Custom Lighting.

- *LED Lighting* – The largest contributor to the TRB at \$106,506,845 (34%).
- *LED Omni-Directional* – The second measure to offer significant contribution at \$50,089,531 (16%) were customized projects.
- *Custom Lighting* - The third largest measure contributing to the TRB at \$27,087,379 (8.7%).

The net TRB of \$312,887,982 is based on the Program's latest TRB calculation, revised in PY15 (**Figure 6**) 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.

Total Resource Cost (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. See **Appendix A** for a comparison of incremental TRC to total project cost at the measure level.

PY16 Program Savings were achieved with an estimated TRC of \$148,913,047, as shown in **Table 23**. The largest customer investments or TRC were in the categories of Customized Project Measures at \$61,947,398 (41.6%), followed by High-Efficiency Lighting at \$42,373,726 (28.5%), and High-Efficiency HVAC at \$26,011,514 (17.5%). See **Table 23** for details

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 2.1 indicates that society is getting a 2.1 times return (or 210%) on their investment. Currently this does not include the benefits of avoided transmission and distribution costs or any "externalities" that bring benefit to society, such as reductions in air and water emissions. Refer to the TRB/TRC columns in **Table 23** for details. **Appendix A** lists the TRB/TRC ratio for individual measures.

The largest customer investments or TRC were in the categories of LED Lighting at \$24,010,753 (16.1%), followed by Custom Miscellaneous at \$22,754,709 (15.3%) and Custom Lighting at \$17,951,641 (12.1%).

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	8,524	45.9%	74,166,990	52.7%	1,067,240,491	60.7%	14.4	4.4	\$184,502,009	59.0%	\$42,373,726	28.5%	\$7,814,603	38.5%
Customized Project Measures	4,502	24.2%	31,467,701	22.3%	388,141,722	22.1%	12.3	1.1	\$70,971,771	22.7%	\$61,947,398	41.6%	\$6,124,236	30.2%
High-Efficiency HVAC	1,780	9.6%	8,609,437	6.1%	139,565,259	7.9%	16.2	1.1	\$27,807,954	8.9%	\$26,011,514	17.5%	\$2,076,641	10.2%
High-Efficiency Water Heating	623	3.4%	3,183,520	2.3%	52,760,500	3.0%	16.6	1	\$10,148,581	3.2%	\$9,751,140	6.5%	\$1,050,094	5.2%
Energy Awareness, Measurement And Control Systems	1903	10.2%	16,957,427	12.0%	32,569,118	1.9%	1.9	2.7	\$5,253,141	1.7%	\$1,975,253	1.3%	\$1,576,603	7.8%
High-Efficiency Appliances	77	0.4%	1,874,059	1.3%	26,236,828	1.5%	14	1.4	\$3,904,812	1.2%	\$2,808,085	1.9%	\$328,835	1.6%
High-Efficiency Motors	123	0.7%	1,128,062	0.8%	16,920,924	1.0%	15	3.5	\$2,897,411	0.9%	\$817,868	0.5%	\$297,940	1.5%
High-Efficiency Water Pumping	92	0.5%	1,054,773	0.7%	15,369,526	0.9%	14.6	3.1	\$2,535,731	0.8%	\$830,400	0.6%	\$101,235	0.5%
Energy Kit	36	0.2%	262,343	0.2%	3,314,122	0.2%	12.6	2.6	\$601,777	0.2%	\$235,620	0.2%	\$0	0.0%
Energy Conservation - Hot Water	546	2.9%	650791	0.5%	3253955	0.2%	5	6.5	\$886,095	0.3%	\$137,274	0.1%	\$130,590	0.6%
Consumer Electronics	60	0.3%	521,383	0.4%	3,167,923	0.2%	6.1	0.7	\$563,019	0.2%	\$834,118	0.6%	\$109,605	0.5%
High-Efficiency Air Conditioning	183	1.0%	140,817	0.1%	2,696,510	0.2%	19.1	26.2	\$1,473,402	0.5%	\$56,145	0.0%	\$36,060	0.2%
Building Envelope Improvements	58	0.3%	227,260	0.2%	2,272,602	0.1%	10	2	\$514,186	0.2%	\$257,658	0.2%	\$35,410	0.2%
Energy Conservation - Plug Load	42	0.2%	375,035	0.3%	1,875,173	0.1%	5	2	\$315,510	0.1%	\$154,871	0.1%	\$141,959	0.7%
Commercial Kitchen	23	0.1%	151,174	0.1%	1,857,551	0.1%	12.3	1.2	\$346,818	0.1%	\$299,654	0.2%	\$26,925	0.1%
Commercial Industrial Processes	5	0.0%	45,622	0.0%	1,459,895	0.1%	32	2.5	\$165,765	0.1%	\$66,516	0.0%	\$13,820	0.1%
Energy Efficiency Equipment Grants	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$3,826	0.0%	\$3,707	0.0%
Accounting	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$351,981	0.2%	\$437,001	2.20%
Total	18,578	100%	140,816,393	100%	1,758,702,099	100%	12.5	2.1	\$312,887,982	100%	\$148,913,047	100%	\$20,305,264	100%

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 24** compares the electric utility sales with the percent of business and residential energy savings at the Program and Customer levels.

Table 24 Island Equity by Business and Residential												
PY2016 Program Level Energy Savings by Business and Residential % of Total												
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 Island	1,059,047,406	12.0%	12,488,341	14.6%	1.2%	9,253,539	16.7%	0.9%	21,741,880	15.4%	2.1%
Honolulu	O'ahu	6,626,967,777	75.4%	58,397,198	68.5%	0.9%	37,974,130	68.4%	0.6%	96,371,329	68.4%	1.5%
Maui	Lāna'i, Maui, Moloka'i	1,105,966,791	12.6%	14,386,850	16.9%	1.3%	8,316,334	15.0%	0.8%	22,703,184	16.1%	2.1%
	Lāna'i	30,403,223	0.3%	33,930	0.0%	0.1%	79,420	0.1%	0.3%	113,349	0.1%	0.4%
	Maui	1,047,422,198	11.9%	14,299,058	16.8%	1.4%	8,151,226	14.7%	0.8%	22,450,284	15.9%	2.1%
	Moloka'i	28,141,370	0.3%	53,863	0.1%	0.2%	85,688	0.2%	0.3%	139,551	0.1%	0.5%
Total		8,791,981,974	100.0%	85,272,390	100.00%	1.0%	55,544,003	100.0%	0.6%	140,816,393	100.0%	1.6%
PY2016 Customer Level Energy Savings by Business and Residential % of Total												
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 Island	1,059,047,406	12.0%	14,960,681	14.9%	1.4%	10,083,120	16.9%	1.0%	25,043,801	15.7%	2.4%
Honolulu	O'ahu	6,626,967,777	75.4%	67,964,611	67.8%	1.0%	40,485,778	67.9%	0.6%	108,450,389	67.8%	1.6%
Maui	Lāna'i, Maui, Moloka'i	1,105,966,791	12.6%	17,342,259	17.3%	1.6%	9,021,669	15.1%	0.8%	26,363,928	16.5%	2.4%
	Lāna'i	30,403,223	0.3%	41,142	0.0%	0.1%	72,597	0.1%	0.2%	113,739	0.1%	0.4%
	Maui	1,047,422,198	11.9%	17,235,806	17.2%	1.6%	8,865,626	14.9%	0.8%	26,101,432	16.3%	2.5%
	Moloka'i	28,141,370	0.3%	65,312	0.1%	0.2%	83,445	0.1%	0.3%	148,757	0.1%	0.5%
Total		8,791,981,974	100.0%	100,267,552	100.0%	1.10%	59,590,567	100.0%	0.70%	159,858,118	100.0%	1.80%
* DBEDT - Monthly Energy Trends - http://dbedt.hawaii.gov/economic/energy-trends-2/												

Table 25 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 35.3%. The next highest incentive recipient rate schedule is "J" with 31.0%. Schedule "J" customers are General Service Demand users with greater than 5,000 kWh and less than 300 kW per month. In contrast, in PY15, the second highest incentive recipient rate schedule was "P" with 21.6%. Schedule "P" customers are Large Power Service users with demand greater than 300 kW per month.

The impact of the actual incentives distributed within each island is: 72.3% of incentive funds on O‘ahu, 14.4% on Hawai‘i, 13.1% on Maui, < 0.01% on Lāna‘i and 0.10% on Moloka‘i as shown in **Table 25**.

Table 25 Island Incentive Spending by Rate Schedule									
Island	R	G	J	P	DS	F	Other	Total	%
Hawai‘i Island	\$1,085,899	\$409,747	\$1,004,741	\$325,368	\$0	\$99,857	\$0	\$2,925,612	14.40%
Lāna‘i	\$5,459	\$567	\$2,666	\$0	\$0	\$0	\$0	\$8,692	0.00%
Maui	\$995,545	\$65,869	\$766,340	\$824,186	\$0	\$0	\$0	\$2,651,940	13.10%
Moloka‘i	\$5,816	\$2,235	\$15,300	\$4,533	\$0	\$0	\$506	\$28,390	0.10%
O‘ahu	\$5,074,903	\$1,624,999	\$4,507,575	\$2,733,451	\$744,768	\$0	\$4,936	\$14,690,631	72.30%
Total	\$7,167,621	\$2,103,417	\$6,296,622	\$3,887,538	\$744,768	\$99,857	\$5,442	\$20,305,264	100.00%
Percent	35.30%	10.40%	31.00%	19.10%	3.70%	0.50%	0.00%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Table 26 shows the island equity by program category. In total, energy savings was distributed as follows: 68.4% in Honolulu, 15.4% in Hawai‘i and 16.1% in Maui counties.

Table 26 Island Equity Energy Savings by Program Budget Category								
Program	Hawai‘i Island/County	Lāna‘i	Maui	Moloka‘i	Maui County	O‘ahu Honolulu	Total	%
BEEM	9,601,577	30,627	11,676,275	53,863	11,760,764	31,907,302	53,269,643	37.80%
CBEEM	1,822,578	3,303	2,273,441	0	2,276,744	19,339,388	23,438,710	16.60%
BESM	0	0	0	0	0	0	0	0.00%
BHTR	1,064,187	0	349,342	0	349,342	7,150,509	8,564,037	6.10%
Business Programs	12,488,341	33,930	14,299,058	53,863	14,386,850	58,397,198	85,272,390	60.60%
REEM	9,169,923	49,194	8,100,445	85,436	8,235,075	36,362,123	53,767,121	38.20%
CREEM	0	0	0	0	0	0	0	0.00%
RESM	83,615	0	50,782	252	51,034	618,236	752,885	0.50%
RHTR	0	30,226	0	0	30,226	993,771	1,023,996	0.70%
Residential Programs	9,253,539	79,420	8,151,226	85,688	8,316,334	37,974,130	55,544,003	39.40%
Total	21,741,880	113,349	22,450,284	139,551	22,703,184	96,371,329	140,816,393	100%
%	15.40%	0.10%	15.90%	0.10%	16.10%	68.40%	100%	

Table 27 shows island equity by incentive dollars spent. The actual incentive spending received by each island is broken down as follows: 72.3% in Honolulu, 14.4% in Hawai'i and 13.2% in Maui counties.

Table 27								
Island Equity Incentives by Program Budget Category								
Program	Hawai'i Island/County	Lāna'i	Maui	Moloka'i	Maui County	O'ahu Honolulu	Total	%
BEEM	\$1,083,593	\$2,666	\$1,132,230	\$22,068	\$1,156,964	\$3,646,939	\$5,887,496	29.0%
CBEEM	\$338,190	\$567	\$433,935	\$0	\$434,502	\$3,581,756	\$4,354,447	21.4%
BESM	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.0%
BHTR	\$423,275	\$0	\$89,025	\$0	\$89,025	\$2,369,868	\$2,882,168	14.2%
Business Programs	\$1,845,058	\$3,233	\$1,655,190	\$22,068	\$1,680,491	\$9,598,562	\$13,124,111	64.6%
REEM	\$1,048,879	\$3,379	\$976,600	\$6,222	\$986,201	\$4,409,123	\$6,444,202	31.7%
CREEM	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.0%
RESM	\$31,675	\$0	\$20,150	\$100	\$20,250	\$210,750	\$262,675	1.3%
RHTR	\$0	\$2,080	\$0	\$0	\$2,080	\$472,196	\$474,276	2.3%
Residential Programs	\$1,080,554	\$5,459	\$996,750	\$6,322	\$1,008,531	\$5,092,069	\$7,181,153	35.4%
Total	\$2,925,612	\$8,692	\$2,651,940	\$28,390	\$2,689,021	\$14,690,631	\$20,305,264	100.0%
%	14.40%	0.00%	13.10%	0.10%	13.20%	72.30%	100%	

BUSINESS PROGRAM

Overall Impacts

For PY16, Hawai'i Energy's Business program achieved savings of 85,272,390 kWh (first year), 1,188,857,171 lifetime kWh and 10,525 kW with \$13,124,111 in incentives. In relative terms, 64.6% of Hawai'i Energy's incentives (\$13,124,111 out of \$20,305,264 of direct incentives) captured 60.6% of kWh (first year), 67.6% of lifetime kWh and 56.7% of kW demand first year savings, respectively, with a Total Resource Benefit to Cost ratio of 2.0.

While not the only criteria, increasing the cost-effectiveness of program delivery was a primary driver in rethinking, reorganizing, and redesigning the entire Business Program portfolio. As a result, the Program selected and implemented the optimum portfolio of measures and programs to maximize the cost-effectiveness of the overall portfolio for PY16. This was accomplished through an extensive assessment of the current market conditions across the islands, the near-term economic market potential of each potential solution, and the relative value and merit of each potential measure and program element to meet multiple program objectives.

Table 28 provides a detailed breakdown by budget category. For PY16, 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 28 Business Program Impacts Summary															
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	%			\$	%	\$	%	\$	%
BEEM	509,234	5,452	51.80%	53,269,643	62.50%	799,089,796	67.20%	15	3.4	\$134,398,981	64.90%	\$40,085,394	39.10%	\$5,887,496	44.90%
CBEEM	2,037	3,500	33.30%	23,438,710	27.50%	272,800,531	22.90%	11.6	0.9	\$50,487,126	24.40%	\$59,237,126	57.80%	\$4,354,447	33.20%
BHTR	4,707,159	1,573	14.90%	8,564,037	10.00%	116,966,844	9.80%	13.7	7.0	\$22,175,191	10.70%	\$3,177,730	3.10%	\$2,882,168	22.00%
BESM	0	0	0.00%	0	0.00%	0	0.00%	0	0.0	\$0	0.00%	\$0	0.00%	\$0	0.00%
Total	5,218,430	10,525	100%	85,272,390	100%	1,188,857,171	100%	13.9	2.0	\$207,061,298	100%	\$102,500,251	100%	\$13,124,111	100%

Highlights

With *Hawai'i Energy 2.0*, business programs utilized a multi-pronged approach in day-to-day operations based upon a channel, sector, and end-use technology paradigm. The PY16 program channels were: **retail (upstream and midstream), trade ally-driven, and direct install**.

A number of the Program's offerings 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. Key strategies implemented in PY16 that advance program delivery, but also increased energy impact, include:

- **Enhanced Alignment with Customer Segments.** Critical to our success is keeping the Program aligned to customer motivations and needs. Each business type was provided a segment expert Energy Advisor to provide credible value to the customer's energy management decisions.

- **Continued increase of Midstream and Upstream Participation.** By shifting the incentive from the individual consumer purchase to the decision-makers who determine the availability of products, the Program impacts a larger share of product sales than possible through individual customer-facing incentives. Since competition keeps prices in line, most of the incentive value is passed along to the consumer.
- **Deeper Clean Energy Ally Engagement.** Through deeper engagement, education, and competitive alignment with Clean Energy Allies, improved energy literacy and sales capacity will help the Program drive greater promotion and sales of higher efficiency equipment and services. We created the Business Alliance Manager position in PY16 to drive the CEA engagement further, which is captured in the CEA section of this Annual Report.
- **Deeper Customer Engagement.** By shifting the engagement to more immediate and more interactive media, the Program will better and more frequently engage the customer, better impacting behavioral actions and uptake of hard technology program measures. This is highlighted further in the marketing section of this Annual Report.
- **Process Efficiency Improvements and Automation.** In PY16 the program continued streamlining processes and systems, making it a more user-friendly experience.
- **Close Management of Incentives against Market Shifts.** Through aggressive and continual realignment of incentive levels to changing product pricing, demand levels, and technology advances, the Program in PY16 made a number of incentive adjustments (detailed later in this section) to maximize budget while protecting against excessive free-ridership.
- **Faster Assessment and Incorporation of New Technologies.** The consolidation of programs and our increased focus on new emerging technologies will provide a better foundation to quickly identify, assess, and incorporate new technologies and approaches into all four programs. We worked closely with groups on the leading edge of innovation, such as the Elemental Excelsior, to incorporate their startup companies into our programs.

Midstream Program

Originally launched in PY14, the midstream commercial lighting program or *Lighting Distributor Instant Rebate* continued to flourish in PY16. The Program provided incentive funding to local and national lighting distributors for prescriptive lighting measures (e.g., LED direction and omni-directional lamps and linear LED lamps), enabling them to offer customers discounts at the point of purchase. By the end of PY16, the Program had enrolled 26 lighting distributors, who advanced \$2,313,354 in Hawai'i Energy incentives for energy-efficient lighting products that generated 30,715,796 kWh in program level energy savings and 2,231 kW in program level demand savings. The program is still growing and is expected to significantly surpass these results in PY17. Hawai'i Energy is optimistic that this could be one of its most successful and cost-effective programs in the coming years.

In PY16, Hawai'i Energy also instituted a "minimum customer contribution" (MCC) amount for the program to help to reduce free-ridership. The MCC ensures that even if the price of LED lamps drop in the marketplace to the same level or lower than the incentive, the incentive automatically reduces to make sure that customers still have some cost or a "stake in the game."

Small Business Direct Install Lighting (SBDIL)

The Small Business Direct Install Lighting (SBDIL) program continued to be an important piece of the overall business portfolio, and specifically, of hard to reach efforts. As a result of budget constraints, in PY16, the SBDIL Program had to decrease incentives, but was still able to cover a large portion of the costs of lighting retrofits, and in some cases, the entire cost of the retrofit. In PY16, 706 small businesses and restaurants had their lamps retrofitted in the SBDIL Program. This will result in the customers saving 101,940,609 kWh over the life of the lighting system. Hawai'i Energy provided \$2,584,772 of retrofit costs for SBDIL participants, an investment that will generate over \$30,947,334 in lifetime cost savings for these businesses.

Overall Expenditures

Given its constrained budget for PY16, the Business program primarily focused on the BEEM, CBEEM and BHTR programs in order to maximize savings and customer reach. The Business Energy Service and Maintenance (BESM) category did not see any activity in PY16, with most of the offerings placed on hold for the entire year. See **Table 29** for the detailed expenditures.

Table 29 Business Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
<u>Business Programs</u>					
Operations and Management					
BEEM	\$875,900.39	\$876,000.00	99.99%	\$99.61	0.01%
CBEEM	\$600,455.93	\$601,000.00	99.91%	\$544.07	0.09%
BESM	\$32,632.28	\$40,000.00	81.58%	\$7,367.72	18.42%
BHTR	\$369,588.19	\$375,000.00	98.56%	\$5,411.81	1.44%
Total Business Programs	\$1,878,576.79	\$1,892,000.00	99.29%	\$13,423.21	0.71%
Business Evaluation	\$87,277.60	\$87,626.00	99.60%	\$348.40	0.40%
Business Outreach	\$340,738.93	\$344,000.00	99.05%	\$3,261.07	0.95%
Total Business Non-Incentives	\$2,306,593.32	\$2,323,626.00	99.27%	\$17,032.68	0.73%
Business Incentives					
BEEM	\$5,887,495.89	\$5,893,475.00	99.90%	\$5,979.11	0.10%
CBEEM	\$4,354,447.44	\$4,363,075.00	99.80%	\$8,627.56	0.20%
BESM	\$0.00	\$0.00	0.00%	\$0.00	0.00%
BHTR	\$2,882,167.56	\$2,892,288.00	99.65%	\$10,120.44	0.35%
Subtotal Business Incentives	\$13,124,110.89	\$13,148,838.00	99.81%	\$24,727.11	0.19%
Business Transformational	\$777,400.96	\$898,627.00	86.51%	\$121,226.04	13.49%
Total Business Incentives	\$13,901,511.85	\$14,047,465.00	98.96%	\$145,953.15	1.04%
Total Business Programs	\$16,208,105.17	\$16,371,091.00	99.00%	\$162,985.83	1.00%

Given the constrained budget, incentive reductions had to be made. While some of the reductions were coupled with declining costs of certain types of equipment, such as LED lighting, other reductions or eliminations may have a longer term impact to the achievement of EEPS. Below is a complete list of commercial program incentive reductions that occurred in PY16.

Figure 7 Commercial Portfolio Incentive Reductions

Item	When	Incentive (per unit)		% cut	Comments
		From	To		
PROGRAM REDESIGNS & CATEGORICAL REDUCTIONS					
SBDIL Redesign - from covering full project cost to switch to a customized incentive	Sept 26, 2016	Free (to Customer)	\$0.28	≈20%	More flexibility in structuring projects, but in some cases a small co-payment is required from the customer
Customized Incentive Lighting < 5 years	Beginning PY16	\$0.10	\$0.08	20%	
Customized Incentive Lighting > 5 years	Beginning PY16	\$0.15	\$0.12	20%	
Customized Incentive Non- Lighting < 5 years	Beginning PY16	\$0.10	\$0.08	20%	
Customized Incentive Non- Lighting < 5 years	Beginning PY16	\$0.20	\$0.12	40%	
MEASURE-LEVEL REDUCTIONS					
Low-Flow Rinse Nozzles for Restaurants	Beginning PY16	Free	N/A	100%	Measure Eliminated
Water Cooler Timers	Beginning PY16	Free	N/A	100%	Measure Eliminated
Cool Roofs	Beginning PY16	\$0.20	N/A	100%	Measure Eliminated
Chiller Selection Study	Beginning PY16	\$2,500	N/A	100%	Measure Eliminated
Energy Audits	Beginning PY16	\$5,000	N/A	100%	Measure Eliminated
Energy Studies	Beginning PY16	\$15,000	N/A	100%	Measure Eliminated
Design Assistance	Beginning PY16	\$15,000	N/A	100%	Measure Eliminated
Pulse Start Metal Halide Fixtures	Beginning PY16	\$25-\$50	N/A	100%	Measure Eliminated
LED T8 Linear Tubes Type A and B	Beginning PY16	Custom	\$5.00	≈50%	Converted to prescriptive
LED T8 Linear Tubes Type C	Beginning PY16	Custom	\$10.00	≈50%	Converted to prescriptive
Standard T8 Replacing T12 2 ft	Beginning PY16	\$5.00	\$3.00	40%	
Standard T8 Replacing T12 3 ft	Beginning PY16	\$6.00	\$4.00	33%	
Reduced Wattage T8 Replacing T12 4 ft	Beginning PY16	\$10.00	\$2.00	80%	
Reduced Wattage T8 Replacing T8 (32W) 4 ft	Beginning PY16	\$5.50	\$2.00	64%	
Dimmable LED Omni-Directional A19	Beginning PY16	\$7.50	\$3.00	60%	
Non-Dimmable LED Omni-Directional A19	Beginning PY16	\$5.00	\$3.00	40%	
Pin Mount Dimmable LED Omni-Directional A19	Beginning PY16	\$7.50	\$5.00	33%	
Dimmable Reflector LED Lamps MR16, PAR, BR	Beginning PY16	\$10.00	\$7.00	30%	
Non-Dimmable Reflector LED Lamps (MR16, PAR, BR)	Beginning PY16	\$9.00	\$7.00	24%	
LED T8 Linear Tubes 2 ft Type A and B	Feb 20, 2017	Custom	\$4.00	≈50%	Converted to prescriptive
LED T8 Linear Tubes 2 ft Type C	Feb 20, 2017	Custom	\$6.00	≈50%	Converted to prescriptive
LED Troffers	Feb 20, 2017	Custom	\$20-\$50	≈50%	Converted to prescriptive
LED Corn Cob HID Replacements	Feb 20, 2017	Custom	\$25-\$50	≈50%	Converted to prescriptive
Dimmable and Non-Dimmable LED Omni-Directional (A19)	Feb 20, 2017	\$3.00	\$2.00	33%	
Dimmable and Non-Dimmable Reflector LED Lamps (MR16, PAR, BR)	Feb 20, 2017	\$7.00	\$6.00	14%	
Air Conditioning Chillers	Beginning PY17	\$50	\$45	10%	
Air Conditioning Package and Splits	Beginning PY17	\$200	\$175	13%	
Air Conditioning Inverter Driven Compressors (VRF)	Beginning PY17	\$300	\$250	17%	
More frequent reductions in LED incentives based on the market	PY17 - Dates TBD	Various	TBD	TBD	

Business Trade Allies

Background

Business trade allies include product manufacturers, wholesale and retail suppliers, equipment contractors, architects, engineers and electricians. These individuals and companies are 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.

Through their orientation training and on-going involvement with the program, business trade allies 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 30**, approximately 80% of Customer Lifetime Savings achieved in PY16 were brought to the program through these allies. Over the years, Hawai'i Energy has taken on a more strategic approach with these allies.

See **Table 30** for performance by trade ally. For full details on business trade allies, see *Clean Energy Ally (CEA) Program* section.

Table 30 Business 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 (%)
<i>Direct From Applicants</i>	3,280	19,473,074	286,898,118	20.50%
Alpha Electric Supply Inc.	823	11,332,771	170,593,830	12.20%
The Light Bulb Source	546	7,381,678	110,381,161	7.90%
HD Supply Facilities Maintenance, Ltd	516	7,213,431	108,201,470	7.70%
Grainger	407	5,487,083	80,969,553	5.80%
EMCC	371	2,708,483	37,967,676	2.70%
Koo Electric Service	361	2,755,117	36,894,739	2.60%
Dial Electric Supply	194	2,374,566	34,014,970	2.40%
Johnson Controls	283	1,716,469	27,903,422	2.00%
AEsolutions, LLC	175	1,561,361	21,554,573	1.50%
Opterra	97	1,320,444	19,806,655	1.40%
Regency Lighting	184	1,227,644	18,414,655	1.30%
E Solutions	180	1,576,043	15,760,430	1.10%
Avail Services	126	1,192,539	15,611,900	1.10%
Graybar Electric Co.	82	1,042,851	15,579,763	1.10%
Energy Industries	160	1,013,402	14,621,820	1.00%
American Electric	283	1,755,304	14,103,829	1.00%
Nakoa Companies, Inc.	148	984,506	13,192,671	0.90%
Light Bulbs Plus, LLC	59	806,833	11,889,634	0.80%
AMM Electrical And Lighting Maintenance	141	846,142	11,849,742	0.80%
Trane	105	631,014	11,440,575	0.80%
Doonwood Engineering, Inc.	67	720,523	10,674,599	0.80%
Forest City	129	761,197	10,328,857	0.70%
TK Process Hawai'i, LLC	98	652,121	9,781,817	0.70%
W Services, LLC	107	1,200,825	9,606,600	0.70%
Team Going Green	115	1,015,086	9,497,548	0.70%
Hawaiian Dredging Construction Co., Inc.	170	625,756	9,386,337	0.70%
Layton Construction	103	666,563	9,115,841	0.70%
Onity	76	569,250	8,538,750	0.60%
Bulbs.Com	40	555,800	8,289,547	0.60%
S H Electric, LLC	99	562,425	7,873,945	0.60%
<i>remaining allies</i>	2,693	18,537,249	228,048,213	16.3%
Business Program Totals	12,215	100,267,552	1,398,793,242	100.00%

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. The BEEM program consisted of several offerings in PY16. Channels and end-use technologies included the following:

- Midstream
 - High-Efficiency Lighting
- Trade Ally-Provided
 - High-Efficiency Lighting
 - High-Efficiency HVAC
 - High-Efficiency Motors
 - High-Efficiency Water Heating
 - High-Efficiency Water Pumping
 - Envelope Improvements
 - Scheduling & Control Systems
 - High-efficiency Equipment & Appliances
 - Refrigeration Improvements
- Traditional Retail
 - High Efficiency Equipment & Appliances

Accomplishments

In PY16, the bulk of savings and dollar impacts came from High-Efficiency Lighting and HVAC. As a result, these areas are addressed in greater depth below.

High-Efficiency Lighting - 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 led to the continued success of LED lamps and fixtures installed in PY16. This allowed Hawai'i Energy to reduce incentive levels for LEDs without significantly impacting customer participation. This resulted in a combined contribution of all LED offerings, including directional, omnidirectional, linear tube and specialty LEDs achieving energy savings of 39,069,767 kWh this past year or 73.3% of the total BEEM program energy savings. This was a considerable increase from the previous year, which was the result of moving a number of LED measures that were previously treated as custom measures into the prescriptive lighting program in the BEEM program.

High-Efficiency HVAC

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 PY16, chillers and VFDs installed in HVAC systems produced energy savings of 3,780,669 kWh or 7.1% of the total BEEM program energy savings.

Operational Improvements

In PY16 Hawai'i Energy continued to improve the functionality of the AMPLIFY lighting audit tool and database used to support both the SBDIL and the midstream lighting program. For SBDIL contractors that use the AMPLIFY tool to submit lighting projects, the Program added an automated invoice feature. This feature automatically creates an invoice the contractors use to bill the customer and the Program, based on the lighting audit entered into AMPLIFY. This feature eliminates the need for contractors to manually create a separate invoice and also ensures the accuracy of the invoice.

The AMPLIFY database was also expanded in PY16 to certify lamps submitted by lighting distributors in Hawai'i Energy's midstream lighting program as being listed by either ENERGY STAR®, DesignLights Consortium (DLC), or LED Lighting Facts®. This ensures the quality of the lamps incentivized under the midstream program. In PY17 Hawai'i Energy expects to roll out this functionality directly to the participating distributors to allow them to certify their lamps before submitting them to Hawai'i Energy.

Impacts

For PY16, the BEEM Program achieved savings of 53,269,643 kWh (first year) and 5,452 kW savings with \$5,887,496 in incentives. **Table 31** provides further details.



Photo by: HAWAIIANA MANAGEMENT COMPANY



Nauru Tower is one of Oahu's premiere luxury condominiums, located minutes from Ala Moana Beach Park. Residents of this 44-story building have enjoyed many efficiency upgrades over the years, thanks to a collaborative effort between building management, their board and Hawai'i Energy.

By utilizing the savings from their energy bills to finance future projects, Nauru Tower has been able to complete such projects as: new cooling towers, CO sensors and a lighting retrofit in the parking garage, booster pumps, heat pump water heaters, and most recently, large upgrades to the central plant in PY16 (pictured above).

Table 31 BEEM 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 Omni-Directional	300,190	1,590	29.2%	20,201,961	37.9%	303,029,415	37.9%	15	4.6	\$48,637,466	36.2%	\$10,506,650	26.2%	\$1,694,622	28.8%
LED Lighting	69,057	1,075	19.7%	12,379,943	23.2%	185,699,143	23.2%	15	9.6	\$30,338,718	22.6%	\$3,176,025	7.9%	\$545,982	9.3%
LED Linear	108,464	552	10.1%	5,684,973	10.7%	85,274,599	10.7%	15	2.6	\$14,239,130	10.6%	\$5,423,200	13.5%	\$587,481	10.0%
Chillers	39	431	7.9%	2,751,057	5.2%	55,021,149	6.9%	20	0.8	\$9,530,703	7.1%	\$12,095,852	30.2%	\$472,747	8.0%
Custom	4,708	391	7.2%	2,935,313	5.5%	44,029,702	5.5%	15	5.6	\$7,916,122	5.9%	\$1,412,400	3.5%	\$470,800	8.0%
Packaged Units: 15% Better Than Code	205	276	5.1%	1,338,414	2.5%	20,076,203	2.5%	15	3.2	\$4,127,720	3.1%	\$1,279,275	3.2%	\$595,604	10.1%
VFD Pump For Chilled Water / Condenser Water	50	279	5.1%	1,029,612	1.9%	15,444,175	1.9%	15	7.6	\$3,529,801	2.6%	\$466,650	1.2%	\$109,800	1.9%
Domestic Water Booster Packages	18	90	1.6%	944,726	1.8%	14,170,894	1.8%	15	3.4	\$2,356,662	1.8%	\$693,000	1.7%	\$70,560	1.2%
ECM Refrigeration	2,609	93	1.7%	863,069	1.6%	12,946,035	1.6%	15	4.2	\$2,209,588	1.6%	\$527,018	1.3%	\$221,765	3.8%
Split Systems: VRF	256	63	1.2%	566,638	1.1%	8,499,571	1.1%	15	1.9	\$1,460,919	1.1%	\$758,110	1.9%	\$245,424	4.2%
LED Exit Signs	2,023	65	1.2%	550,853	1.0%	8,262,788	1.0%	15	23.7	\$1,440,249	1.1%	\$60,690	0.2%	\$40,460	0.7%
Water Cooler Timers	5,930	88	1.6%	993,219	1.9%	7,945,751	1.0%	8	15.6	\$1,385,051	1.0%	\$88,950	0.2%	\$88,950	1.5%
Anti-Sweat Heater Controls	630	47	0.9%	449,698	0.8%	5,396,382	0.7%	12	16.4	\$927,787	0.7%	\$56,700	0.1%	\$63,000	1.1%
Submetering (Condo)	1,055	55	1.0%	508,337	1.0%	4,066,699	0.5%	8	1.4	\$733,812	0.5%	\$527,500	1.3%	\$158,250	2.7%
ECM Fan Coil	1,385	30	0.6%	264,993	0.5%	3,974,889	0.5%	15	2.4	\$687,823	0.5%	\$290,850	0.7%	\$76,175	1.3%
LED Specialty	1,059	28	0.5%	252,037	0.5%	3,780,556	0.5%	15	12.9	\$649,919	0.5%	\$50,523	0.1%	\$30,223	0.5%
Split Systems: 15% Better Than Code	116	34	0.6%	245,847	0.5%	3,687,700	0.5%	15	1.3	\$668,878	0.5%	\$504,395	1.3%	\$93,503	1.6%
VFD - AHU	55	64	1.2%	179,857	0.3%	2,697,849	0.3%	15	3.5	\$696,433	0.5%	\$197,808	0.5%	\$31,200	0.5%
Window Film	11	56	1.0%	224,092	0.4%	2,240,924	0.3%	10	2.6	\$505,482	0.4%	\$195,658	0.5%	\$32,310	0.5%

(cont'd) BEEM 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	%			\$	%	\$	%	\$	%
Fluorescent Delamping	1,184	20	0.4%	129,448	0.2%	1,812,268	0.2%	14	36	\$340,796	0.3%	\$9,472	0.0%	\$6,078	0.1%
Solar Water Heating	2	26	0.5%	88,380	0.2%	1,767,605	0.2%	20	29.1	\$383,630	0.3%	\$13,200	0.0%	\$81,217	1.4%
Fluorescent T8 To T8 Low Wattage	4,889	34	0.6%	109,695	0.2%	1,535,736	0.2%	14	1.3	\$370,980	0.3%	\$293,340	0.7%	\$18,084	0.3%
Transformer (Three-Phase)	48	5	0.1%	45,362	0.1%	1,451,576	0.2%	32	2.5	\$164,803	0.1%	\$66,171	0.2%	\$13,740	0.2%
Fluorescent Delamping with Reflectors	848	8	0.1%	86,913	0.2%	1,216,786	0.2%	14	11.8	\$200,517	0.1%	\$16,960	0.0%	\$8,290	0.1%
Heat Pump	8	4	0.1%	113,424	0.2%	1,134,244	0.1%	10	0.3	\$173,008	0.1%	\$533,040	1.3%	\$9,377	0.2%
Packaged Units: VRF	17	16	0.3%	68,481	0.1%	1,027,219	0.1%	15	0.8	\$218,767	0.2%	\$268,819	0.7%	\$35,788	0.6%
Refrigerator W/ Trade In	79	2	0.0%	54,051	0.1%	756,719	0.1%	14	1.2	\$112,660	0.1%	\$91,200	0.2%	\$10,200	0.2%
Fluorescent T12 To T8 Low Wattage	658	5	0.1%	45,914	0.1%	642,794	0.1%	14	2.8	\$110,416	0.1%	\$39,480	0.1%	\$6,580	0.1%
Room Occupancy Sensors	930	5	0.1%	52,269	0.1%	418,150	0.1%	8	4	\$74,412	0.1%	\$18,600	0.0%	\$18,600	0.3%
VFD Pool Pumps	8	2	0.0%	20,120	0.0%	299,366	0.0%	14.9	5.8	\$48,401	0.0%	\$8,400	0.0%	\$4,875	0.1%
VRF Air Conditioners	21	5	0.1%	17,773	0.0%	266,598	0.0%	15	0.5	\$61,209	0.0%	\$112,017	0.3%	\$3,650	0.1%
Custom - Submetering	102	3	0.1%	22,016	0.0%	176,130	0.0%	8	0.7	\$33,439	0.0%	\$51,000	0.1%	\$15,300	0.3%
LED Refrigerated Case Lighting	193	5	0.1%	32,025	0.1%	160,126	0.0%	5	0.2	\$28,036	0.0%	\$176,395	0.4%	\$9,210	0.2%
Rid-A-Fridge (Refrigerator)	12	0	0.0%	4,289	0.0%	60,053	0.0%	14	18.4	\$8,903	0.0%	\$485	0.0%	\$485	0.0%
Cool Roof	1	1	0.0%	3,168	0.0%	31,678	0.0%	10	0.1	\$8,705	0.0%	\$62,000	0.2%	\$3,100	0.1%
Heat Pump Water Heater	2	0	0.0%	2,741	0.0%	27,415	0.0%	10	1.4	\$5,055	0.0%	\$3,600	0.0%	\$600	0.0%
Window AC W/ Trade-In	19	0	0.0%	1,321	0.0%	15,848	0.0%	12	0.9	\$3,581	0.0%	\$3,875	0.0%	\$675	0.0%
CFL	30	1	0.0%	5,218	0.0%	15,654	0.0%	3	6.3	\$2,450	0.0%	\$390	0.0%	\$60	0.0%
Reach-In Freezer Solid Door	1	0	0.0%	724	0.0%	8,692	0.0%	12	0.4	\$1,520	0.0%	\$3,500	0.0%	\$250	0.0%
Transformer (Single-Phase)	1	0	0.0%	260	0.0%	8,319	0.0%	32	2.8	\$962	0.0%	\$345	0.0%	\$80	0.0%
Whole House Fan	1	0	0.0%	304	0.0%	6,087	0.0%	20	28	\$3,359	0.0%	\$120	0.0%	\$75	0.0%
Ceiling Fans	14	0	0.0%	759	0.0%	3,794	0.0%	5	1.1	\$677	0.0%	\$630	0.0%	\$490	0.0%
Solar Attic Fan	2	0	0.0%	258	0.0%	1,292	0.0%	5	0.7	\$197	0.0%	\$300	0.0%	\$100	0.0%
Refrigerator	1	0	0.0%	88	0.0%	1,226	0.0%	14	0.3	\$234	0.0%	\$800	0.0%	\$50	0.0%
Non-Qualifying Equipment	2,101	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$11,688	0.2%
No Catalog Entry	202	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$0	0.0%
Total	509,234	5,452	100.0%	53,269,643	100.0%	799,089,796	100%	15	3.4	\$134,398,981	100.0%	\$40,085,394	100.0%	\$5,887,496	100.0%

Expenditures

The original budget for the BEEM program as presented in the Hawai'i Energy PY16 Annual Plan was \$4,471,975, split between Operations at \$625,000 and Incentives at \$3,846,975, (see **Table 14**). Hawai'i Energy made several transfers between other program budgets until the final PY16 budget for the BEEM program was \$6,769,475 as shown in **Appendix B**. 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.

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. Because of the technical expertise required for most measures delivered under the CBEEM program, it is entirely driven by the trade ally channel. Some examples of custom technologies include, but are not limited to, exterior lighting fixtures, horticultural lighting fixtures, energy management systems, exhaust ventilation control systems, refrigeration upgrades, and HVAC controls.

Accomplishments

High-Efficiency Lighting - LED Fixtures

Both the quality and availability of LED products continued to increase this program year, as prices continued to decline. 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, the Program plans to move more LED lighting measures to the prescriptive rebate program, making it easier for customers to understand and ultimately participate.

Adjustments from the Annual Plan

In the PY16 Annual Plan Hawai'i Energy noted that a significant amount of the incentive budget had been committed to a multi-year energy management system project being planned for military housing. As with many very complex projects, the timing of the project was delayed on the customer side and the incentive was never paid. The project is still planned for completion in PY17, but due to the delay, Hawai'i Energy revised our commitment to the project to the lower incentive level currently in effect. This did not adversely affect Program goals as there was sufficient demand in the CBEEM program in PY16 to make up for the loss of this project.

The Program also indicated in the PY16 plan a rollout of an auction-based energy efficiency program similar to the one Hawai'i Energy conducted in PY14. However, with the tight budget and demand from the normal CBEEM program sufficient to entirely expend the incentive budget, Hawai'i Energy elected not to utilize additional resources to develop and implement an energy efficiency auction.

Impacts

For PY16, the CBEEM Program achieved savings of 23,438,710 kWh (first year) and 3,500 kW savings with \$4,354,447 in incentives. The savings and expenditures in this program were considerably less than the previous year, and as was discussed in the previous section this was the result of moving a number of LED measure that were previously treated as custom measures into the prescriptive lighting program in the BEEM program. **Table 32** provides a detailed breakout of the program.

Table 32 CBEEM 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	%			\$	%	\$	%	\$	%
Custom Lighting	1,180	2,135	61.00%	14,533,727	62.00%	147,078,587	53.90%	10.1	1.5	\$27,087,379	53.70%	\$17,951,641	30.30%	\$2,634,753	60.50%
Custom HVAC	822	788	22.50%	4,362,749	18.60%	71,373,653	26.20%	16.4	1	\$13,576,021	26.90%	\$13,498,976	22.80%	\$888,789	20.40%
Custom Controls	10	233	6.70%	2,062,253	8.80%	20,622,532	7.60%	10	2	\$3,701,320	7.30%	\$1,843,705	3.10%	\$328,304	7.50%
Custom Miscellaneous	5	148	4.20%	773,724	3.30%	12,734,268	4.70%	16.5	0.1	\$2,439,391	4.80%	\$22,754,709	38.40%	\$136,906	3.10%
Custom Refrigeration	9	89	2.50%	893,611	3.80%	11,424,918	4.20%	12.8	1.6	\$1,933,605	3.80%	\$1,232,726	2.10%	\$169,271	3.90%
Custom Pumps & Motors	3	41	1.20%	451,970	1.90%	4,954,189	1.80%	11	0.8	\$888,806	1.80%	\$1,047,649	1.80%	\$72,461	1.70%
Custom Water Heating	2	51	1.50%	227,584	1.00%	3,373,119	1.20%	14.8	1.3	\$707,905	1.40%	\$541,463	0.90%	\$98,625	2.30%
Custom Appliances	4	8	0.20%	72,330	0.30%	874,697	0.30%	12.1	0.5	\$152,700	0.30%	\$325,797	0.50%	\$13,160	0.30%
Custom High-Efficiency Lighting	1	7	0.20%	60,761	0.30%	364,568	0.10%	6	0	\$0	0.00%	\$40,460	0.10%	\$13,297	0.30%
Accounting	1	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$0	0.00%	(\$1,117)	0.00%
Total	2,037	3,500	100%	23,438,710	100%	272,800,531	100%	11.6	0.9	\$50,487,126	100%	\$59,237,126	100%	\$4,354,447	100%

Expenditures

The original budget for the CBEEM program as presented in Hawai'i Energy PY16 Annual Plan was \$2,703,647, split between Operations at \$585,000 and Incentives at \$2,118,647, (see **Table 14**). Hawai'i Energy made several transfers between other program budgets until the final PY16 for the CBEEM program was \$4,964,075, as shown in **Appendix B**. 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. **Appendix B** for details.

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). However with the very tight budget for PY16 and the significant overdrive in the BEEM and CBEEM program, most of the offering, in the BESM program were put on hold for the year. There was some work done on the SEM program, which will be discussed below.

Accomplishments

Strategic Energy Management (SEM)

The intent of the program is to establish an enhanced continual improvement approach to energy management so that more energy efficiency measures can be implemented. SEM goes beyond a project-by-project approach using continuous improvement across the organization to maximize energy efficiency. Our SEM approach uses elements based on the ISO (International Organization for Standardization) 50001 energy management standard so that it is grounded in a strong foundation. This makes it both a resource acquisition and market transformation effort. Most of the energy savings from SEM will occur after the customer has fully implemented the approach in years two and three of the Program. SEM is a very cost-effective approach for the short and long term.

Hawai'i Energy has helped us make smart decisions regarding investments in energy-efficient technologies. Coupled with the incentives, it has allowed us to do more projects in schools than we would have been able to with just our standard budget.

Dann Carlson, Assistant Superintendent for School Facilities and Support Services, Hawai'i State Department of Education

In PY16, Hawai'i Energy contracted with Vermont Energy Investment Corporation (VEIC) to provide their expertise and experience in SEM. With help from VEIC Hawai'i Energy established a customer criteria checklist for recruiting SEM candidates. VEIC also made recommendations on outreach presentation materials for an SEM pilot program. With this information Hawai'i Energy reached out to several customers to determine their interest in the program. The Program was able to recruit some interested parties, and the SEM process was initiated. The initial participants are the University of Hawai'i and Kamehameha Schools, with other potential customers coming from the hospitality sector. More information on the SEM program can be found in the Transformational Program section of this report.

Impacts

As discussed above, for PY16, the BESM program did not achieve any energy or demand savings. Hawai'i Energy expended \$32,632 in operations setting up the SEM program for two participants. One participant, a large private school, is now requiring vendors to meet current Hawai'i Energy criteria when specifying new equipment for purchase. The school will be designating their energy manager to work closely with Hawai'i Energy to prioritize buildings for energy saving retrofits and to plan trainings for their facilities teams regarding energy efficient operation & maintenance of equipment. The school has also requested workshops for appropriate faculty & staff to begin building a culture of energy efficiency. These PY16 conversations have set in motion the conversations and approvals necessary to make major capital improvement purchases as energy efficient as possible. In PY17, the Program will use more advanced analytics to correlate on-site activities to energy consumption to see what impact a change in these activities can have on energy use.

Expenditures

The original budget for the BESM program as presented in Hawai'i Energy PY16 Annual Plan was \$456,250, split between Operations at \$135,000 and Incentives at \$321,250. However almost all of this money was transferred to the BEEM and CBEEM programs to cover the overdrive in those programs until the total BESM program budget was \$40,000, as shown in **Appendix B**. By the end of the program year, Hawai'i Energy had spent \$32,632.28 of the budget setting up the SEM program. See **Appendix B** for details.

Business Hard-To-Reach (BHTR)

Objective

The objective of this program is to help targeted geographic areas and sectors that have been traditionally underserved, such as retail, restaurants, other small businesses and commercially metered multifamily (for more information on the *Energy Smart 4 Homes* (ES4H) multi-family direct install program (see complete description in the RHTR section of this report). Additionally, this program conducted more aggressive outreach to lighting and electrical contractors with training, promotional materials and frequent communications on program updates. Channels and end-use technologies addressed in the BHTR program include:

- Trade Ally-Provided
 - Kitchen Equipment
 - Special Initiatives
- Traditional Retail
 - Kitchen Equipment
- Program Direct Install
 - Commercially Metered Multifamily Direct Install
 - Small Business Direct Install Lighting (SBDIL)

Accomplishments

In PY16, the bulk of savings and dollar impacts came from the SBDIL program. As a result, this area is addressed in greater depth below.

Small Business Direct Install Lighting Retrofits

The Small Business Direct Install Lighting (SBDIL) program continued to successfully deliver energy and bill savings to customer in PY16. 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 little to no cost to the customer. Trade allies recruit businesses to participate, perform audits and execute the retrofits.

This direct installation approach achieved customer level energy and demand savings of 101,940,609 kWh of lifetime energy and 1,128 kW in PY16. At an average utility rate of \$0.304 per kWh, this is a \$30,947,334 in lifetime energy cost reduction for the businesses.

To increase the effectiveness of the lighting contractors participating in the SBDIL program, Hawai'i Energy hired a consultant in PY16 to develop tools and provide training in energy efficiency sales and services. The consultant developed proposal tools for Microsoft Word that quickly creates a simple one page proposal, a PowerPoint presentation that can be customized for each contractor and used during the sales pitch, sample marketing pitches, testimonial frameworks and other marketing and sales tools. All of these tools will be made available to participating SBDIL contractors in PY17. In addition, direct training by the consultant will be available to participating contractors.

Impacts

For PY16, the BHTR program achieved savings of 116,966,844 lifetime kWh and 1,573 kW savings with \$2,882,168 in incentives. **Table 33** provides the detailed measures contributing to this program.

Table 33 BHTR Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh First Year)		Program Energy (kWh - Life)		Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Custom - High-Efficiency Lighting	4,635,545	611	38.9%	5,093,678	59.5%	71,311,488	61.0%	14	9.7	\$12,568,523	56.7%	\$1,297,872	40.8%	\$1,297,872	45.0%
LED Linear	37,258	295	18.7%	1,239,067	14.5%	17,346,941	14.8%	14	5.6	\$3,767,725	17.0%	\$671,750	21.1%	\$666,782	23.1%
LED Lighting	7,728	136	8.6%	696,956	8.1%	9,853,485	8.4%	14.1	9.3	\$1,991,068	9.0%	\$213,920	6.7%	\$202,604	7.0%
LED Omni-Directional	4,907	88	5.6%	526,514	6.1%	7,587,792	6.5%	14.4	14.8	\$1,452,065	6.5%	\$98,441	3.1%	\$98,390	3.4%
Fluorescent T12 To T8 Low Wattage	1,528	83	5.3%	312,426	3.6%	4,373,959	3.7%	14	6.1	\$993,615	4.5%	\$163,513	5.1%	\$163,513	5.7%
LED Refrigerated Case Lighting	2,152	13	0.8%	88,226	1.0%	1,235,163	1.1%	14	1.7	\$228,522	1.0%	\$136,092	4.3%	\$136,122	4.7%
LED Specialty	868	11	0.7%	71,367	0.8%	1,015,516	0.9%	14.2	17.5	\$193,088	0.9%	\$11,051	0.3%	\$11,051	0.4%
Fluorescent T12 To T8 Standard	262	14	0.9%	48,760	0.6%	682,645	0.6%	14	5	\$158,091	0.7%	\$31,440	1.0%	\$31,440	1.1%
Advance Power Strips	1,655	15	1.0%	134,196	1.6%	670,982	0.6%	5	1.9	\$112,919	0.5%	\$59,396	1.9%	\$53,728	1.9%
Ice Machine	35	6	0.4%	54,969	0.6%	659,628	0.6%	12	1.1	\$115,429	0.5%	\$105,000	3.3%	\$4,000	0.1%
Showerhead	3,132	157	10.0%	100,371	1.2%	501,856	0.4%	5	4.5	\$188,682	0.9%	\$42,196	1.3%	\$40,790	1.4%
CFL Omni-Directional	3,698	10	0.6%	69,888	0.8%	349,441	0.3%	5	4.9	\$60,229	0.3%	\$12,193	0.4%	\$12,193	0.4%
Steam Cooker	2	7	0.4%	28,476	0.3%	341,707	0.3%	12	6.5	\$72,338	0.3%	\$11,154	0.4%	\$1,500	0.1%
Kitchen Ventilation	1	2	0.2%	14,489	0.2%	217,338	0.2%	15	4.7	\$41,959	0.2%	\$9,000	0.3%	\$3,500	0.1%
Hot Food Holding Cabinet	4	3	0.2%	17,354	0.2%	208,248	0.2%	12	2.9	\$41,020	0.2%	\$14,000	0.4%	\$3,200	0.1%
Reach-In Refrigerator Solid Door	31	2	0.1%	16,918	0.2%	203,013	0.2%	12	0.3	\$35,550	0.2%	\$107,000	3.4%	\$9,200	0.3%
Reach-In Freezer Solid Door	9	1	0.1%	11,348	0.1%	136,172	0.1%	12	0.7	\$23,814	0.1%	\$36,000	1.1%	\$2,325	0.1%
Faucet Aerator	5,444	116	7.4%	22,003	0.3%	110,014	0.1%	5	3.8	\$99,958	0.5%	\$26,245	0.8%	\$23,545	0.8%
Reach-In Freezer Glass Door	1	0	0.0%	4,258	0.0%	51,098	0.0%	12	6	\$8,939	0.0%	\$1,500	0.0%	\$150	0.0%
CFL Specialty	418	1	0.1%	7,900	0.1%	47,398	0.0%	6	3.2	\$8,732	0.0%	\$2,759	0.1%	\$2,759	0.1%
LED Exit Signs	15	1	0.0%	2,236	0.0%	31,304	0.0%	14	6.8	\$6,678	0.0%	\$975	0.0%	\$975	0.0%
Electric Griddle	2	0	0.0%	1,668	0.0%	20,022	0.0%	12	0.5	\$4,212	0.0%	\$9,000	0.3%	\$2,500	0.1%
Reach-In Refrigerator Glass Door	1	0	0.0%	970	0.0%	11,634	0.0%	12	0.6	\$2,036	0.0%	\$3,500	0.1%	\$300	0.0%
Ladder Charge	1,273	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$8,911	0.3%	\$8,911	0.3%
CFL Exchange	14	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$1,357	0.0%	\$1,354	0.0%
Accounting	1,176	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$103,466	3.3%	\$103,466	3.6%
Total	4,707,159	1,573	100.0%	8,564,037	100.0%	116,966,844	100.0%	13.7	7	\$22,175,191	100.0%	\$3,177,730	100.0%	\$2,882,168	100.0%

Small Business Direct Install Lighting Program – Customer-Level Impacts

Customers participating in the SBDIL program are projected to save a combined \$2,206,125 in operating expenses per year and \$30,947,334 over the life of the lighting measures installed. This is money that they can re-invest into their businesses, driving more job growth and profitability. See **Table 34** for further details.

Table 34 SBDIL Customer Level Impacts by Island							
	Hawai'i Island	Lāna'i	Maui	Moloka'i	O'ahu	Total	Program Cost (\$/kWh)
SBDIL - Lighting Retrofits							
Customers	124	0	20	0	419	563	
Measures	374	0	89	0	2,652	3,115	
kW Reduction	177	0	19	0	594	790	
kWh - First Year	832,624	0	85,530	0	4,186,874	5,105,027	\$0.39
kWh - Life	11,657,958	0	1,197,419	0	58,817,380	71,672,758	\$0.03
Incentives	\$367,626	\$0	\$49,204	\$0	\$1,563,108	\$1,979,938	
SBDIL - Restaurant Lighting							
Customers	14	0	6	0	123	143	
Measures	71	0	38	0	825	934	
kW Reduction	26	0	34	0	278	338	
kWh - First Year	137,270	0	223,979	0	1,800,706	2,161,955	\$0.28
kWh - Life	1,922,266	0	3,135,706	0	25,209,880	30,267,852	\$0.02
Incentives	\$52,199	\$0	\$35,921	\$0	\$516,713	\$604,834	
Total							
Customers	138	0	26	0	542	706	
Measures	445	0	127	0	3,477	4,049	
kW Reduction	203	0	53	0	872	1,128	
kWh - First Year	969,894	0	309,509	0	5,987,579	7,266,982	\$0.36
kWh - Life	13,580,224	0	4,333,125	0	84,027,260	101,940,609	\$0.03
Incentives	\$419,825	\$0	\$85,125	\$0	\$2,079,822	\$2,584,772	
Financial Benefits							
Average "G" Rate	\$0.32	\$0.34	\$0.28	\$0.36	\$0.23	\$0.30	
Annual Savings	\$307,980	\$0	\$86,523	\$0	\$1,362,534	\$2,206,125	
Lifetime Savings	\$4,312,264	\$0	\$1,211,325	\$0	\$19,121,243	\$30,947,334	
Simple Payback (years)	1.4	0	1	0	1.5	1.2	
IRR	73%	0%	102%	0%	66%	85%	

Expenditures

The original budget for the BHTR program as presented in Hawai'i Energy's PY16 Annual Plan was \$3,527,038, split between Operations at \$375,000 and Incentives at \$3,152,038, (see **Table 14**). Hawai'i Energy made several transfers between other program budgets until the final PY16 budget for the BHTR program was \$3,267,288 as shown in **Appendix B**. 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 **Appendix B** for details.



"A happy hen will lay a happy egg!" says Jon Herron, General Manager of Mikilua Poultry Farm in Wai'anae, O'ahu. "Lights are one of the most important factors in egg production, next to water and feed." The LED lighting they received through Hawai'i Energy's Small Business Direct Install program helps keeps their birds comfortable and stimulates behaviors in the hens that translate into better eggs. With the number of local egg farms across the state slowly shrinking, Mikilua's commitment to energy efficiency has not only boosted their egg production, but kept operating costs low and staying in business affordable.

RESIDENTIAL PROGRAM

Overall Impacts

Impacts

In PY16, Hawai'i Energy's residential programs achieved savings of 55,544,003 first year kWh, 569,844,927 lifetime kWh, and 8,054 kW in demand with \$7,181,153 in incentives. The residential programs accounted for 39% of Hawai'i Energy's total first year energy savings and 43% of the Program's total demand savings with 35% of the Program's incentives.

See **Table 35** for a summary of the residential program's impacts.

Table 35 Residential Program Impacts Summary															
Category	Units	Program Demand (kW)	%	Program Energy (kWh 1st Year)	%	Program Energy (kWh - life)	%	Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)	%	Total Resource Cost (TRC)	%	Incentives	%
REEM	4,450,641	7,633	94.8%	53,767,121	96.8%	560,728,312	98.4%	10.4	2.3	\$104,118,987	98.4%	\$45,093,269	97.2%	\$6,444,202	89.7%
RHTR	32,937	343	4.3%	1,023,996	1.8%	6,170,401	1.1%	6	2.5	\$1,211,909	1.1%	\$485,527	1.0%	\$474,276	6.6%
RESM	2,780	78	1.0%	752,885	1.4%	2,946,214	0.5%	3.9	0.6	\$495,788	0.5%	\$834,000	1.8%	\$262,675	3.7%
CREEM	0	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$0	0.0%
Total	4,486,358	8,054	100%	55,544,003	100%	569,844,927	100%	10.3	2.3	\$105,826,684	100%	\$46,412,796	100%	\$7,181,153	100%

Highlights

The success of Hawai'i Energy's residential programs in PY16 can largely be attributed to the Program's new approach to influencing the market for energy efficiency. With *Hawai'i Energy 2.0*, the Program focused on customer segmentation, leveraging program and customer data, and conforming program offerings to the perspective of the customer. By aligning offerings to their consumer channel, Hawai'i Energy was able to streamline rebate processes and better target messaging efforts. The consumer channels *Hawai'i Energy 2.0* focused on were: **trade ally-installed measures, direct consumer purchases (retail and online), direct install in hard-to-reach sectors and program communicated education/behavioral programs.**

Within each of these consumer channels, Hawai'i Energy was able to respond to feedback from consumers and trade allies, expanding offerings and reaching new heights with existing ones.

Residential A/C Tune-Up (Trade Ally)

Responding to feedback from both customers and contractors, Hawai'i Energy explored the energy-saving potential of a program that provides incentives to residential customers for conducting a qualifying maintenance on their air conditioning system. After consulting with several industry experts, investigating

nationwide efficiency program best practices, and conducting a Hawai'i-specific engineering review of the savings potential, Hawai'i Energy offered customers a \$75 instant rebate when they hired a participating contractor to conduct a qualifying service on their central or split air conditioning unit.

The program encourages residents to keep their air conditioners running at peak performance, reducing energy consumption. In order to participate, contractors must attend a mandatory webinar provided by Hawai'i Energy, explaining the details of the program as well as the tune-up requirements. In order to qualify, tune-ups must fulfill a strict list of energy-saving requirements.

The program saw immediate success. In just six months, Hawai'i Energy incentivized over 600 air conditioner tune-ups, resulting in over 200,000 first year kWh savings. As of the end of PY16, Hawai'i Energy had partnered with 10 different HVAC contractors to conduct these tune-ups, and the Program continues to offer training sessions to enlist greater contractor participation.

Consumer Electronics (Direct Consumer Purchases)

In Hawai'i, electronics (TVs, DVRs, computers, etc.) make up about 15% of all residential energy use, and about half of that comes from televisions alone (2014 Energy Efficiency Potential Study). Recognizing this opportunity, Hawai'i Energy conducted engineering reviews of energy-saving qualifications, surveyed local retailer inventories and consulted with energy efficiency industry experts in developing the midstream Consumer Electronics program for PY16. The aim of the program is to influence both consumers and retailers alike in their decisions to buy and sell electronics in Hawai'i.

Hawai'i Energy worked with the retailers Sears® and Best Buy® to promote the most efficient televisions and audio equipment on the market. By offering a small incentive to retailers for each ENERGY STAR® qualified television and home audio system they sell, Hawai'i Energy influenced retailer stocking, displaying, and upstream purchase decisions by significantly improving profits on these traditionally low-margin products. In Hawai'i, where supply chain considerations can have a significant impact on product availability, this midstream incentive model has the potential to improve the overall efficiency of electronics on product floors.

Simultaneously, Hawai'i Energy inserted promotional materials in stores, directing customers to buy the most efficient products available. By nudging customers and incentivizing retailers, Hawai'i Energy is able to influence both the supply- and demand-side of the consumer electronics market.

In PY16, the Program incentivized and promoted the sale of over 6,000 ENERGY STAR® televisions and over 1,000 ENERGY STAR® home audio systems through Sears® and Best Buy® stores. Aligning marketing efforts with retail holidays like Black Friday and the Super Bowl, Hawai'i Energy promoted energy efficiency during some of the biggest purchasing periods of the year. These ENERGY STAR® products add up to a savings of over 500,000 first year kWh over baseline models.

Cooling system must run a minimum of 15 minutes to be accurate

Total Tune-Up Cost <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	Instant Rebate Amount <div style="border: 1px solid black; padding: 2px; font-weight: bold;">\$75</div>	Final Cost to Customer <div style="border: 1px solid black; height: 20px; width: 100%;"></div>
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Step 2. System Details and Checklists								
(To Be Filled Out by Participating Contractor)			Indoor Checklist			Yes	No	NA
Brand:	Type (Circle):	Central Split	Thermostat is operating properly					
Condenser Serial Number:			Existing filter has been cleaned or has recently been changed					
Condenser Model Number:			Drains & pans free of biological growth and obstructions					
Cooling Capacity (tons):			Evaporator coil has been cleaned					
Refrigerant (Circle): R-22 R-410A Other _____			Ductwork free of leaks (as applicable)					
Name Plate Charge (lb):			Fan(s) or blower(s) have tight connection with shaft(s)					
Amount of Charge Added (oz):			Fan(s) in proper position and rotate freely					
Amount of Charge removed (oz):			Wiring connections have been tightened					
Pre Tune-up Refrigerant Pressure (psi):		High Low	Bearings and motor(s) are lubricated (as applicable)					
Post Tune-up Refrigerant Pressure (psi):		High Low	Outdoor Checklist			Yes	No	NA
Pre Tune-up Supply Air Temp. (°F):			Condenser coil has been cleaned.					
Post Tune-up Supply Air Temp (°F):			Fins are clean, straightened, & open					
Notes:			Fan(s) or blower(s) have tight connection with shaft(s)					
			Fan(s) in proper position and rotate(s) freely					
			Wiring connections have been tightened					
			Bearings and motor(s) are lubricated (as applicable)					

Launching a new rebate requires customers and contractors to provide thorough data on their old and new units through the application process to ensure accurate energy savings statistics.



Televisions like the one above were accompanied in stores by Hawai'i Energy signage advertising the rebate and promoting the ENERGY STAR® certification.

Multifamily Direct Install

Hawai'i Energy's Energy Smart for Homes (ES4H) program falls within its hard-to-reach budgets, as multifamily households face unique challenges and disincentives in making energy efficiency investments. In PY16, the program again demonstrated that these challenges can be overcome when joining forces with the right community partners. This year, Hawai'i Energy worked with financial institutions, non-profits, government agencies, and for-profit contractors in an effort to install energy-efficient equipment in multifamily residences. The Program reached 5,122 multifamily households at 181 participating multifamily properties, saving customers over 1,000,000 kWh from their annual energy bills in the process. For more details on the program's accomplishments, see the section below titled "Residential Hard-To-Reach (RHTR)."

Peer Group Comparison Reports (Program-Communicated Education/Behavioral Programs)

In PY16, Hawai'i Energy's Peer Group Comparison Report program reached more customers than ever before, reaching all eligible customers in Hawai'i, Honolulu, and Maui Counties. 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. Recognizing this communication channel as an additional messaging opportunity, Hawai'i Energy customized these reports with energy saving tips and rebate offerings. By expanding the program's reach and providing customers with specific energy-saving actions they could take immediately, the Program found that the reports garnered a strong response from customers, increasing energy savings and program awareness. At less than 0.5%, the Hawai'i Energy program maintains one of the lowest opt out rates in the nation for these types of programs. Additionally, these reports serve as a topic of conversation at outreach events as families often recognize Hawai'i Energy from the mailers and come to talk with our staff about how they have been scoring.

Overall Expenditures

Expenditures

In PY16, the residential program distributed over 97% of its allocated incentive budget, based on final allocations. The year ended with a total of \$7,181,153.48 in resource acquisition incentives spent, leaving a surplus of \$153,706.52. The bulk of this surplus comes from the Residential Hard-to-Reach (RHTR) budget, where the program laid the groundwork for a number of bulk purchase appliance programs for underserved residents, but did not distribute 100% of the incentives prior to the end of PY16 (June 30, 2017). This groundwork has already come to fruition in the first few months of PY17.

This level of incentive distribution reflects Hawai'i Energy's ability to adjust its programs throughout the year in response to market needs and drivers. As the program year progressed, Hawai'i Energy responded to these market trends by making adjustments to the plan, and expanding or curtailing initiatives as needed. Most importantly, these expenditures led to the realization of residential energy and demand savings targets. The residential program saved over 96% of the original goal for first year kWh, 101% of the original goal for lifetime kWh, and 102% of the original goal for kW.

See **Table 36** for further details on final budgets and spending.

Table 36 Residential Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
Residential Programs					
Operations and Management					
REEM	\$1,313,316.15	\$1,313,317.00	100.00%	\$0.85	0.00%
CREEM	\$162.50	\$163.00	99.69%	\$0.50	0.31%
RESM	\$15,535.15	\$15,536.00	99.99%	\$0.85	0.01%
RHTR	\$197,385.92	\$197,386.00	100.00%	\$0.08	0.00%
Total Residential Programs	\$1,526,399.72	\$1,526,402.00	100.00%	\$2.28	0.00%
Residential Evaluation	\$29,987.50	\$30,055.00	99.78%	\$67.50	0.22%
Residential Outreach	\$741,595.29	\$741,598.00	100.00%	\$2.71	0.00%
Total Residential Non-Incentives	\$2,297,982.51	\$2,298,055.00	100.00%	\$72.49	0.00%
Residential Incentives					
REEM	\$6,444,202.43	\$6,486,580.00	99.35%	\$42,377.57	0.65%
CREEM	\$0.00	\$0.00	0.00%	\$0.00	0.00%
RESM	\$262,675.00	\$264,500.00	99.31%	\$1,825.00	0.69%
RHTR	\$474,276.05	\$583,780.00	81.24%	\$109,503.95	18.76%
Subtotal Residential Incentives	\$7,181,153.48	\$7,334,860.00	97.90%	\$153,706.52	2.10%
Residential Transformational	\$783,190.40	\$851,373.00	91.99%	\$68,182.60	8.01%
Total Residential Incentives	\$7,964,343.88	\$8,186,233.00	97.29%	\$221,889.12	2.71%
Total Residential Programs	\$10,262,326.39	\$10,484,288.00	97.88%	\$221,961.61	2.12%

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.

Highlights

Almost all of the Residential Program's success in PY16 came in partnership with a trade ally, and the highlights of these partnerships are too many to list. One ongoing partnership that continues to serve Hawai'i residents year after year is with Refrigerant Recycling based in Kapolei. As a key contributor to Hawai'i Energy's Refrigerator/Freezer Rid-A-Fridge and Window A/C offerings, Refrigerant Recycling provides Hawai'i residents an often-overlooked energy efficiency service: the proper recycling of old, inefficient appliances. Just as important as upgrading to efficient appliances to reduce energy use is the

proper disposal of old units to prevent them from being resold and plugged in elsewhere, and ensure they are disposed of in an environmentally-conscious manner. Refrigerant Recycling does both of these things for Hawai'i Energy, exemplifying the importance of efficiency throughout the product lifecycle.

Ongoing Quality Assistance

Hawai'i Energy's relationship with its residential trade allies is a two-way street, offering professional training, trade meetings, and cooperative marketing to participating businesses as they deliver energy efficiency directly to Hawai'i residents. An ongoing effort exemplifying this relationship is Hawai'i Energy's Solar Contractor Meetings. With meetings in Hilo, Kona, Kahului and Honolulu in PY16, Hawai'i Energy provided professional training, program updates, and solicited valuable feedback from contractors on customer needs and market trends. This year, a popular topic of discussion was Hawai'i Energy's marketing efforts and their impact on contractor business. The meetings also served as a forum to discuss new ways to promote "efficiency first" among customers seeking to install distributed generation systems.

See **Table 37** for details on residential project drivers and referrals.

Table 37 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	3,171	22,306,833	322,646,615	56.60%
Home Depot	827	5,954,501	72,443,282	12.70%
Alternate Energy	273	1,064,494	17,797,297	3.10%
City Mill	172	1,206,226	14,360,052	2.50%
Lowes	108	906,314	9,233,963	1.60%
Sears	36	655,715	8,667,302	1.50%
Poncho's Solar Service	91	406,438	8,128,751	1.40%
Haleakala Solar	71	317,678	6,353,568	1.10%
Best Buy	62	658,233	5,488,600	1.00%
Honeywell MFDI Field Technicians	330	946,910	5,376,863	0.90%
Sam's Club	54	380,133	4,524,407	0.80%
Techniart Inc	36	330,460	3,654,706	0.60%
Navy Exchange (NEX)	10	243,955	3,412,585	0.60%
Read Lighting	32	224,909	3,373,632	0.60%
Air Masters	55	200,715	3,010,718	0.50%
Ace	31	219,079	2,638,577	0.50%
Air Source LLC	48	175,371	2,630,561	0.50%
Remaining Allies	2,647	19,346,540	76,110,770	13.4
Residential Program Totals	8,054	55,544,501	569,852,248	100.00%

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 several offerings in PY16. Below is each consumer channel and associated offering(s):

- Program Communication
 - Behavioral Energy Awareness / Responsibility
- Upstream
 - High-Efficiency Electronics
 - High-Efficiency Lighting
- Traditional Retail
 - High-Efficiency Appliances
 - High-Efficiency HVAC
- Online Retail
 - Energy Savings Kits
- Trade Ally Provided
 - High-Efficiency Appliances
 - High-Efficiency HVAC
 - High-Efficiency Water Heating

In PY16, Hawai'i Energy's plan also included scheduling and control systems through the upstream channel, and direct-to-consumer enhancements through any and all channels. As part of the Scheduling and Control Systems initiative, Hawai'i Energy began offering highly discounted advanced power strips through City Mill stores, an effort whose impacts will be counted toward PY17. The direct-to-consumer enhancements were planned to allow for special offerings, including specialty LED lighting, the results of which are included in the High-Efficiency Lighting initiative. These initiatives are comprised of numerous energy efficiency measures, the savings from which are substantiated by an independent evaluation, measurement, and verification (EM&V) process.

Impacts

As in years past, the bulk of energy savings within the REEM portfolio derive from Hawai'i Energy's upstream lighting program and the peer group comparison report program. In terms of first year energy savings, Hawai'i Energy's upstream lighting program contributed over 31,279,769 of REEM's total 53,767,121 kWh. Meanwhile, the peer group comparison program contributed 14,984,156 first year kWh.

In terms of *lifetime* energy savings, upstream lighting dominates the portfolio as well, contributing over 75% of the portfolio's 560,728,312 lifetime kWh. The solar water heating program also remains a significant contributor to lifetime savings, with a 20-year measure life. For many Hawai'i homes, solar water heating represents the greatest opportunity for energy bill savings, when switching from a traditional electric resistance water heater.

In addition to energy savings, the REEM portfolio contributed 7,633 kW in peak demand savings. Upstream lighting (58.2%) was the biggest contributor to demand savings.

See **Table 38** for a full breakdown of REEM measures, incentives, and their impacts.

Table 38 REEM Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh 1st Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
LED Lighting	1,373,817	3,839	50.30%	26,994,296	50.20%	404,914,447	72.20%	15	3.6	\$74,071,499	71.10%	\$20,607,255	45.70%	\$3,247,303	50.40%
Solar Water Heating	1,267	509	6.70%	2,278,316	4.20%	45,566,322	8.10%	20	1.1	\$8,843,174	8.50%	\$8,362,200	18.50%	\$710,850	11.00%
VRF Air Conditioners	2,414	581	7.60%	2,116,056	3.90%	31,740,843	5.70%	15	0.7	\$7,287,594	7.00%	\$9,948,487	22.10%	\$414,200	6.40%
CFL	288,493	605	7.90%	4,285,473	8.00%	25,712,836	4.60%	6	8.2	\$4,736,665	4.50%	\$576,986	1.30%	\$189,804	2.90%
Refrigerator W/ Trade In	2,230	66	0.90%	1,605,354	3.00%	22,474,954	4.00%	14	1.3	\$3,346,063	3.20%	\$2,676,000	5.90%	\$285,250	4.40%
Peer Group Comparison	2,754,015	1,710	22.40%	14,984,156	27.90%	14,984,156	2.70%	1	1.7	\$2,173,051	2.10%	\$1,251,103	2.80%	\$1,251,103	19.40%
LED	10,192	28	0.40%	200,240	0.40%	3,003,607	0.50%	15	2.3	\$549,449	0.50%	\$235,620	0.50%	\$0	0.00%
TV	6,638	58	0.80%	481,758	0.90%	2,890,548	0.50%	6	0.7	\$518,301	0.50%	\$788,263	1.70%	\$94,859	1.50%
Whole House Fan	414	182	2.40%	132,524	0.20%	2,650,481	0.50%	20	29.4	\$1,462,910	1.40%	\$49,680	0.10%	\$31,050	0.50%
Rid-A-Fridge (Refrigerator)	412	6	0.10%	153,614	0.30%	2,150,597	0.40%	14	19.2	\$318,847	0.30%	\$16,585	0.00%	\$16,585	0.30%
Heat Pump Water Heater	106	19	0.30%	152,325	0.30%	1,523,253	0.30%	10	1.5	\$280,859	0.30%	\$190,800	0.40%	\$31,800	0.50%
VFD Pool Pumps	172	1	0.00%	89,927	0.20%	899,266	0.20%	10	1	\$130,668	0.10%	\$129,000	0.30%	\$25,800	0.40%
Window AC W/ Trade In	724	17	0.20%	62,059	0.10%	744,704	0.10%	12	1	\$168,290	0.20%	\$170,045	0.40%	\$27,245	0.40%
Rid-A-Fridge (Freezer)	64	1	0.00%	25,609	0.00%	358,525	0.10%	14	20.2	\$53,155	0.10%	\$2,625	0.00%	\$2,625	0.00%
Advance Power Strips	865	7	0.10%	62,103	0.10%	310,515	0.10%	5	0	\$52,327	0.10%	\$0	0.00%	\$0	0.00%
Soundbar	1,019	2	0.00%	39,625	0.10%	277,375	0.00%	7	1	\$44,718	0.00%	\$45,855	0.10%	\$14,746	0.20%
Showerhead	866	0	0.00%	35,305	0.10%	176,527	0.00%	5	0	\$26,857	0.00%	\$0	0.00%	\$0	0.00%
Faucet Aerator	2,598	0	0.00%	32,811	0.10%	164,057	0.00%	5	0	\$24,963	0.00%	\$0	0.00%	\$0	0.00%
Solar Attic Fan	199	0	0.00%	27,511	0.10%	137,557	0.00%	5	0.7	\$20,928	0.00%	\$29,850	0.10%	\$9,950	0.20%
Ceiling Fans	127	1	0.00%	7,230	0.00%	36,148	0.00%	5	1.1	\$6,455	0.00%	\$5,715	0.00%	\$4,445	0.10%
Refrigerator	9	0	0.00%	828	0.00%	11,594	0.00%	14	0.3	\$2,212	0.00%	\$7,200	0.00%	\$450	0.00%
Accounting-Freight	1,987	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$0	0.00%	\$27,756	0.40%
Accounting-Custom Energy Kits	1,987	0	0.00%	0	0.00%	0	0.00%	0	0	\$0	0.00%	\$0	0.00%	\$58,381	0.90%
Total	4,450,615	7,633	100%	53,767,121	100%	560,728,312	100%	10.4	2.3	\$104,118,987	100%	\$45,093,269	100%	\$6,444,202	100%

Expenditures

Based on final budget allocations, Hawai'i Energy distributed over 99% of the funds allocated to the REEM portfolio. This level of expenditure reflects the program's ability to adjust offerings, promote or curtail programs, and manage budgets effectively in response to market trends.

See **Appendix C** for a summary of REEM program expenditures.

Accomplishments

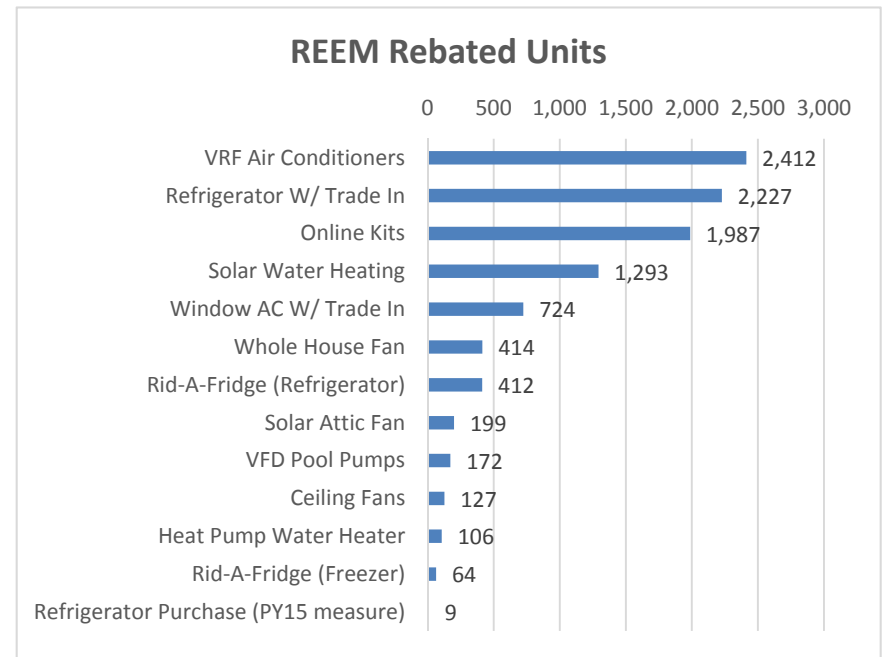
Popular Offerings

Figure 8 summarizes consumer participation for selected REEM measures.

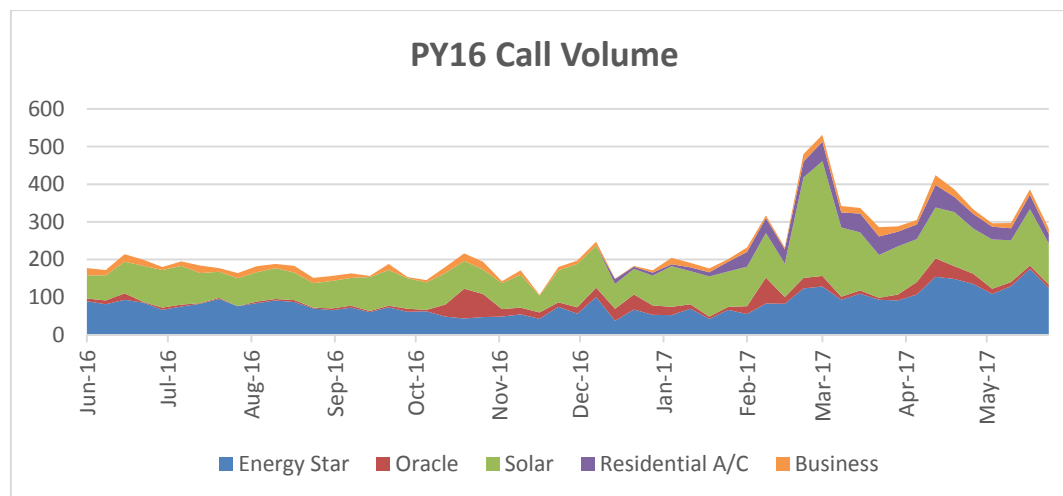
Quality Customer Support

During PY16, Hawai'i Energy's residential call center handled 12,544 customer calls. This was consistent with last year's total of 12,009. The bulk of these calls pertained to Solar Water Heating (5,429) and ENERGY STAR® rebate programs (4,555). In addition to these popular rebate programs, customers called to discuss residential air conditioning rebates, peer group comparison reports, and to learn new ways they could save on their homes' electricity bills. Hawai'i Energy's trained Energy Advisors educate customers every day on the various ways to save energy, through both program offerings and behavioral modifications that can be enacted that right away. See **Figure 9** for a chart showing Hawai'i Energy's call center volume throughout the year.

Figure 8 Select REEM Participation



**Figure 9
PY16 Call Volume**



Customer Experience Management

PY16 marked Hawai'i Energy's sixth 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 3,649 surveys in PY16, which generated a response rate of 27.1% and an overall satisfaction rating averaging 9.1 out of 10.

In terms of official complaints, Hawai'i Energy logged only five in PY16, consistent with previous years. Complaints typically revolved around customer perception of incentive programs and dissatisfaction with the content of peer group comparison reports. After discussing these issues at length with program representatives, customers typically left with a greater understanding of program requirements, and the value of Hawai'i Energy's offerings.

Accomplishments by Measure Offering

High-Efficiency Water Heating (HEWH)

- Solar Water Heating (SWH) Instant Rebate and Interest Buy-Down Program – The solar water heating program performed well in PY16, slightly exceeding the original goal of 1,200 installations. This represents a decrease of about 300 units from PY15. This decrease was expected after the incentive was decreased from \$750 to \$500 due to reduced budgets.

The solar interest buy-down option (SIBD) saw increased participation in PY16, with 25 customers opting to apply their \$500 incentive to their financing with participating lenders. This is a significant increase from 11 customers in PY15. Of these 25 customers, all but one was based on Hawai'i or Maui islands.

Hawai'i Energy has been successful in educating customers on the value of solar water heating, and prioritizing solar water heating in the loading order ahead of photovoltaic distributed generation. The Program's message of "efficiency first" has resonated with customers, ultimately saving them money.

- Solar Water Heating Inspections – Hawai'i Energy inspected 10% of all installations in PY16. This was down from 50% in PY15 due to budget reductions. Nevertheless, the Program was able to inspect enough installations to ensure that program standards were being met, and solar water heating systems were installed to optimize performance. The Program selects systems to be inspected based on contractor history. For example, if a contractor is new to the program, their installations will typically be inspected at a higher rate until they have established a history of quality work.
- Heat Pump Water Heaters - Although heat pump water heaters represented a small portion of the HEWH program, with just 106 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.



High-performing contractors are recognized for their work at regular solar water heating contractor meetings throughout the year.

- **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, and review existing offerings. In PY16, contractors expressed an appreciation for Hawai‘i Energy’s marketing efforts, which produced a noticeable lift in their services, especially the Solar Water Heating Tune-Up program.

See **Table 39** for details of the High-Efficiency Water Heating offers.

Table 39 REEM High-Efficiency Water Heating Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh 1st Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Solar Water Heating	1,267	509	96.3%	2,278,316	93.7%	45,566,322	96.8%	20	1.1	\$8,843,174	96.9%	\$8,362,200	97.8%	\$710,850	95.7%
Heat Pump Water Heater	106	19	3.7%	152,325	6.3%	1,523,253	3.2%	10	1.5	\$280,859	3.1%	\$190,800	2.2%	\$31,800	4.3%
Total	1,373	529	100%	2,430,641	100%	47,089,575	100%	19.4	1.1	\$9,124,033	100%	\$8,553,000	100%	\$742,650	100%

See **Table 40** for details on solar water heating systems installed by island.

Table 40 Solar Water Heating System Installations by Island							
Island	Units	%	Program Demand (kW)	Program Energy (kWh 1 st Yr.)	Program Energy (kWh – Life)	Incentives	%
O‘ahu	856	68%	346	1,546,403	30,928,065	\$480,800	68%
Hawai‘i	160	13%	63	283,405	5,668,105	\$90,050	13%
Maui	250	20%	100	446,721	8,934,415	\$139,250	20%
Moloka‘i	1	0%	0	1,787	35,738	\$750	0%
Total	1,267	100%	509	2,278,316	45,566,322	\$710,850	100%

See **Table 41** for a list of participating contractors that completed solar water heater installations in PY16, sorted by county.

Table 41 Participating Solar Water Heater Contractors by County		
Honolulu	Maui	Hawai'i
AFFORDABLE SOLAR CONTRACTING ALLEN'S PLUMBING - OAHU ALTERNATE ENERGY - OAHU APOLLO SOLAR BUILDING ENERGY GROUP C&J SOLAR SOLUTIONS ENERGY UNLIMITED, INC. ENERGYPRO HAWAII GRAND SOLAR HALEAKALA SOLAR - OAHU HAWAII ENERGY CONNECTION, LLC HAWAIIAN ENERGY SYSTEMS INC HI-POWER SOLAR, LLC HI-TECH PLUMBING CORPORATION HO'A SOLAR INC ISLAND SOLAR SERVICE, INC. - OAHU M. TORIGOE PLUMBING, INC. PACIFIC ENERGY STRATEGIES, LLC. PONCHO'S SOLAR SERVICE- OAHU PV TECH SEDNA AIRE HAWAII SOLAR COOL HAWAII SOLAR HELP HAWAII SOLAR SERVICES HAWAII STEVE'S PLUMBING SERVICE, INC SUN KING - OAHU TNH PLUMBING TRUE GREEN SOLAR, LLC	ACCURATE PLUMBING ALLEN'S PLUMBING - MAUI ALTERNATE ENERGY - MAUI HALEAKALA SOLAR, INC. - MAUI HI-POWER SOLAR, LLC MAUI PACIFIC SOLAR, INC. PERRIN PLUMBING, LLC PONCHO'S SOLAR SERVICE - MAUI SONSHINE SOLAR CORP. SOUTH PACIFIC PLUMBING, LLC STEVE'S PLUMBING SERVICE, INC SUN KING - MAUI SUNNY SOLUTIONS, INC. RISING SUN, LLC	DRAINPIPE PLUMBING & SOLAR HAWAII ENERGY CONNECTION, LLC HAWAIIAN SOLAR & PLUMBING KEITH SHIGEHARA PLUMBING, INC. KONA SOLAR SERVICE, LLC PONCHO'S SOLAR SERVICE - BIG ISL PRO PLUMBING AND SOLAR LLC RT'S PLUMBING, INC SOLAR AIDE COMPANY

High-Efficiency Lighting

In PY16, the High-Efficiency Lighting program achieved energy savings of 31,279,769 first year kWh and 4,444 kW of demand savings with \$3,437,107 in incentives.

Consistent with the PY16 plan, this year marked the end of Hawai'i Energy's promotion of compact fluorescent (CFL) bulbs, with LED technology making up the lion's share of expenditures and savings in PY16. As of January of 2017, ENERGY STAR® no longer certifies CFL lights, and Hawai'i Energy's CFL incentives began to dwindle as retailer stock became depleted. As of the end of PY16, nearly all retailer stock on island had been depleted, and the Program now only incentivizes the purchase of LEDs, which save more energy and last longer than their CFL predecessors.

The plan also discussed lowering the average incentive per LED bulb to \$2.26 to keep up with market pricing trends and mitigate free-ridership. These trends played out as anticipated, and the average incentive per bulb ended at \$2.36, down from \$3.42 in PY15. Hawai'i Energy also worked with retailers to ensure that program signage and promotional material were prominent in stores, increasing customer influence and program awareness.

See **Table 42** for details.

Table 42 REEM High-Efficiency Program Lighting Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh 1st Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
LED Lighting	1,373,817	3,839	86.4%	26,994,296	86.3%	404,914,447	94.0%	15	3.6	\$74,071,499	94.0%	\$20,607,255	97.3%	\$3,247,303	94.5%
CFL	288,493	605	13.6%	4,285,473	13.7%	25,712,836	6.0%	6	8.2	\$4,736,665	6.0%	\$576,986	2.7%	\$189,804	5.5%
Total	1,662,310	4,444	100%	31,279,769	100%	430,627,282	100%	13.8	3.7	\$78,808,164	100%	\$21,184,241	100%	\$3,437,107	100%

High-Efficiency HVAC

For PY16, the High-Efficiency Air Conditioning program achieved first year energy savings of 2,345,380 kWh and demand savings of 780 kW with \$477,495 in incentives.

The bulk of these savings are attributed to high-efficiency VRF Split air conditioners, accounting for about 90% of residential HVAC savings with 87% of residential HVAC incentives. The success of the VRF offering during the summer months early in the program year necessitated that the program be paused mid-year due to budget constraints. After researching market saturation levels and reviewing program requirements, Hawai'i Energy will reintroduce the VRF program in PY17 with more strenuous efficiency requirements.

Hawai'i Energy's other residential HVAC offerings saw steady performance in PY16, offering customers a diverse set of options depending on their cooling needs. Other offerings include Whole House Fans, Solar Attic Fans, and the popular Window A/C Trade-In program wherein customers receive an incentive to purchase a new ENERGY STAR® model and recycle their old, inefficient model. See **Table 43** for details.

Table 43
REEM High-Efficiency Air Conditioning Program Impacts

Category	Units	Program Demand (kW)		Program Energy (kWh 1st Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
VRF Air Conditioners	2,414	581	74.4%	2,116,056	90.2%	31,740,843	89.9%	15	0.7	\$7,287,594	81.5%	\$9,948,487	97.6%	\$414,200	86.7%
Whole House Fan	414	182	23.3%	132,524	5.7%	2,650,481	7.5%	20	29.4	\$1,462,910	16.4%	\$49,680	0.5%	\$31,050	6.5%
Window AC W/ Trade In	357	17	2.2%	62,059	2.6%	744,704	2.1%	12	1	\$168,290	1.9%	\$160,650	1.6%	\$17,850	3.7%
Solar Attic Fan	199	0	0.0%	27,511	1.2%	137,557	0.4%	5	0.7	\$20,928	0.2%	\$29,850	0.3%	\$9,950	2.1%
Ceiling Fans	127	1	0.2%	7,230	0.3%	36,148	0.1%	5	1.1	\$6,455	0.1%	\$5,715	0.1%	\$4,445	0.9%
Total	3,511	780	100%	2,345,380	100%	35,309,733	100%	15.1	0.9	\$8,946,178	100%	\$10,194,382	100%	\$477,495	100%

High-Efficiency Appliances

In PY16, the High-Efficiency Appliances program achieved first year energy savings of 1,875,332 kWh and demand savings of 75 kW with \$340,105 in incentives.

- **Refrigerator Trade Up** – The refrigerator “Trade-Up” program remained a staple of Hawai‘i Energy’s High-Efficiency Appliance program, accounting for 4.0% of the REEM portfolio’s lifetime energy savings and 85.6% of the High-Efficiency Appliance program’s savings. The 2,230 refrigerator trade-in rebates in PY16 represented steady performance from PY15. For most of the year, the rebate remained at a reduced amount (\$100), but low uptake early in the program year revealed that the original rebate amount of \$150 was necessary to push consumers toward ENERGY STAR® models. After evaluating program data and conferring with retailers and customers, the rebate amount was increased to its original level, and customers responded nearly immediately. Nearly 65% of the total rebates provided came in the last six months of the program year.
- **Secondary Refrigerator/Freezer Recycling** – Hawai‘i Energy’s “Rid-A-Fridge” rebate experienced slightly decreased performance in PY16, but 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 (neighbor islands) rebate and coordinating with haulers and recyclers, Hawai‘i Energy was able to influence the recycling of 238 refrigerators and freezers in PY16, achieving a lifetime energy savings of 2,509,122 kWh. This was down from over 500 in PY15. The decline is due in large part to logistical challenges faced this year, including the closure of the Hawai‘i County scrap yard for multiple months and capacity problems at the Oahu recycling facility. As the year came to a close, however, the Hawai‘i County facility was back on line and the Oahu recycler had increased its truck fleet servicing the island.

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, 37 participants (8 in Maui County and 29 on O‘ahu) opted to donate their rebates, for a total of \$1,970 going to feed Hawai‘i’s hungry.

- **VFD Pool Pumps** – Hawai‘i Energy’s VFD pool pump rebate program displayed steady performance in PY16, with 172 units rebated, down slightly from 193 in PY15. The program accounted for 899,266 kWh of lifetime energy savings.

The PY16 Plan discussed moving many appliance rebates from direct-to-the-customer to midstream and upstream. The Program laid the groundwork for this effort in PY16, and in PY17 will roll out several offerings through midstream and upstream channels, including clothes washers, dryers, and smart thermostats.

See **Table 44** for details.

Table 44 REEM High-Efficiency Appliances Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh 1st Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Refrigerator W/ Trade In	2,230	66	89.1%	1,605,354	85.6%	22,474,954	86.8%	14	1.3	\$3,346,063	86.9%	\$2,676,000	94.2%	\$285,250	83.9%
Rid-A-Fridge (Refrigerator)	412*	6	8.2%	153,614	8.2%	2,150,597	8.3%	14	19.2	\$318,847	8.3%	\$16,585	0.6%	\$16,585	4.9%
VFD Pool Pumps	172	1	1.2%	89,927	4.8%	899,266	3.5%	10	1	\$130,668	3.4%	\$129,000	4.5%	\$25,800	7.6%
Rid-A-Fridge (Freezer)	64*	1	1.4%	25,609	1.4%	358,525	1.4%	14	20.2	\$53,155	1.4%	\$2,625	0.1%	\$2,625	0.8%
Refrigerator	9	0	0.2%	828	0.0%	11,594	0.0%	14	0.3	\$2,212	0.1%	\$7,200	0.3%	\$450	0.1%
Window AC W/ Trade In	367	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$9,395	0.3%	\$9,395	2.8%
Total	3,254	75	100%	1,875,332	100%	25,894,936	100%	13.8	1.4	\$3,850,945	100%	\$2,840,805	100%	\$340,105	100%

*Includes recycle/hauler rebate (2 rebates for each refrigerator/freezer recycled).

High-Efficiency Electronics

As mentioned above, Hawai'i Energy introduced a midstream consumer electronics program into its portfolio in PY16. With a small incentive to retailers, Hawai'i Energy was able to place promotional material in stores to influence retailer stocking decisions as well as consumer purchasing decisions. Hawai'i Energy worked with Sears® and Best Buy® in PY16 to promote ENERGY STAR® qualified televisions and home audio equipment, rewarding retailers for stocking the most efficient products, and encouraging consumers to opt for efficiency when making their purchasing choices.

The result was over 6,000 ENERGY STAR® televisions and over 1,000 ENERGY STAR® soundbars sold over an 8-month span. Hawai'i Energy's marketing team timed their promotional efforts to coincide with Black Friday and the Super Bowl – the most popular television purchasing periods of the year – to ensure that energy efficiency was top-of-mind when customers shopped for their electronics. Program incentive dollars have proven effective at securing prominent placement for the most efficient products and also increasing exposure to Hawai'i Energy promotional signage on the sales floor. The programs have also been popular with sales staff as they align with loyalty rewards initiatives and support their commission based customer engagement.

The PY16 plan includes participation in the ENERGY STAR® Products Platform (ESRPP) program, which similarly distributes incentives directly to retailers for the promotion of ENERGY STAR® products. Hawai'i Energy's Consumer Electronics program accomplishes these same goals, albeit more cost-effectively and in a manner that caters to Hawai'i's customer base.

Energy Savings Kits

Hawai'i Energy continued its suite of online offerings in PY16, offering limited-time promotional energy saving kits through its online store. For the first time, Hawai'i Energy also began hosting a permanent online marketplace on its website, offering customers the ability to purchase individual items outside of the temporary kit promotions.

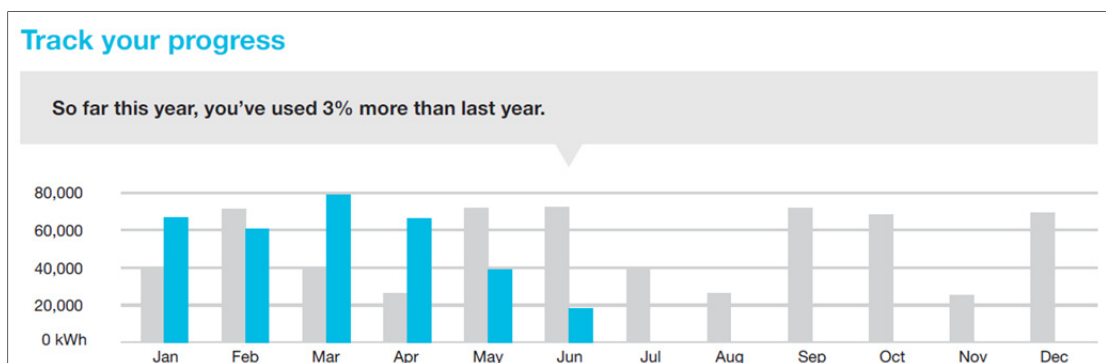
- **Promo Kit 1:** The first promotional kit was offered in November of 2016, including a box of four highly discounted LED A19 bulbs and a Tier I advanced power strip with free shipping. Hawai'i Energy sold 865 of these kits in a successful month-long campaign. 67% of these kits were distributed to O'ahu customers, 22% to those on Hawai'i Island, with the remaining kits going to customers on Maui, Moloka'i and Lāna'i.
- **Promo Kit 2:** The second offer took place in February of 2017, and included highly discounted LED lighting (four A19 80W equivalent bulbs and two A21 100W equivalent bulbs) as well as a complete suite of water-saving devices, including a high-efficiency showerhead, kitchen faucet aerator, and two bathroom aerators. Unique to this offering, purchasing this kit gave customers the option to purchase a "Bonus" kit of six LED globe bulbs, should the primary kit not meet their full lighting needs. Both kits were popular among customers, with 866 customers purchasing the Energy & Water kit, and 256 of those opting to also purchase the "Bonus" kit. Distribution among the islands was similar to the Promo 1 kits.



Behavioral Energy Awareness/Responsibility

The Energy Awareness, Measurement and Control Systems category consisted of just one program in PY16, albeit one of the most impactful, and most recognizable offerings provided by Hawai'i Energy. The peer group comparison report continued to be one Hawai'i Energy's the most discussed programs, with customers frequently contacting the call center, approaching the Hawai'i Energy booth at various events, and talking to their neighbors about their most recent report.

In PY16, Hawai'i Energy distributed 883,671 paper-mailed personalized home energy reports (HERs) to 235,062 unique customers, including about 20,000 new households. Of the total recipient pool, 69% were on O'ahu, 17% were on the island of Hawai'i, 13% on Maui, with the remaining ~1% split between Moloka'i and Lāna'i. Based on estimated savings impacts, these reports accounted for nearly 15,000,000 kWh in first year energy savings, or about 28% of total REEM savings. The program



Included in each Home Energy Report is a graph displaying that customer's energy usage as compared to previous months.

also offered customers the ability to elect an email delivery option, and the program distributed 9,352 reports via email in PY16.

See **Table 45** for details.

Table 45 Energy Awareness, Measurement and Control Systems Program Impacts															
Category	Unique Customers	Program Demand (KW)		Program Energy (kWh 1st Year)		Program Energy (kWh - life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Peer Group Comparison	235,062	1,710	100%	14,984,156	100%	14,984,156	100%	1	1.7	\$2,173,051	100%	\$1,251,103	100%	\$1,251,103	100%
Total	235,062	1,710	100%	14,984,156	100%	14,984,156	100%	1	1.7	\$2,173,051	100%	\$1,251,103	100%	\$1,251,103	100%

Custom Residential Energy Efficiency Measures (CREEM)

Summary

In the Annual Plan, Hawai'i Energy discussed plans to implement an Energy Efficiency Auction, wherein bids would be solicited for companies to present new and innovative energy-saving technologies for the Hawai'i market. After reviewing the administrative costs required to oversee and manage the auction and bid-evaluation process, it was determined that these costs would ultimately prevent Hawai'i Energy from fulfilling its obligations in other areas of the Program. However, the Program laid groundwork and conducted market research to implement an Emerging Technologies offering in PY17, which will aim to bring the newest energy efficiency technologies to Hawai'i residents, without the prohibitive overhead of an auction process.

The plan also allowed for \$75,000 of incentives toward "unique program offerings," including expanding lighting offerings. Hawai'i Energy worked with retailers through its upstream lighting program, ensuring incentives were provided for even the more obscure bulb types. This is in part the reason for a slightly higher incentive per bulb than anticipated during the program year (\$2.36 vs. \$2.26). Ultimately, these incentives were counted within the upstream lighting program (REEM), and in PY16, no incentives were distributed as part of the CREEM budget.

Residential Energy Services & Maintenance (RESM)

Objectives

The Residential Energy Services & Maintenance (RESM) program aims to provide customers with incentives for services and maintenance to their homes' biggest energy consuming equipment, and keep it running effectively and efficiently. Recognizing that the upkeep of homes' HVAC and solar water heating systems is just as important as the on-label efficiency ratings of the products themselves, Hawai'i Energy teams with contractors on all islands to offer incentives for those very services.

In PY16, the program consisted of two offerings: a Solar Water Heater Tune-Up program and a Residential A/C Tune-Up program. The A/C Tune-Up program was a new offering for PY16, and saw immediate success. Both offerings are delivered through the **Trade Ally** consumer channel, and Hawai'i Energy was able to streamline processes by applying a channel-specific approach to program implementation.

Accomplishments

Solar Water Heating Tune-Up Program

In PY16, the program offered a \$100 rebate on qualifying solar water heating tune-ups. Despite lowering the incentive from PY15 (\$150), Hawai'i Energy was able to maintain a high level of participation thanks to engagement with contractors and customers about the value of regular system upkeep.

After the Tune-Up program got off to a slow start, Hawai'i Energy undertook a targeted marketing campaign to customers with solar water heating who had not yet participated. Analyzing residential water heating data from numerous sources, the Program identified the households most likely to need a solar tune-up, and directed marketing efforts accordingly. These efforts reminded customers that regular maintenance keeps systems running longer, and helps them stay energy-efficient. Thanks to this targeted campaign, the program rebated 2,161 solar water heater tune-ups during the program year, 58% of which came in the last three months of the Program year.

The average age of the systems receiving tune-ups was 10 years, up from 9.2 in PY15. Forty-nine units were over 20 years old, and 16 were over 30 years old. Overall, the condition of the units was good, with only 20% of units receiving a "fair" or "poor" rating. Nevertheless, contractors reported that the systems they tuned up were typically long-overdue for maintenance, and their services would improve efficiency and prolong system lives.

Residential A/C Tune-Up Program

As mentioned previously, Hawai'i Energy's Residential A/C Tune-Up program was new for PY16, and in just 6 months, incentivized over 600 tune-ups of central and split air conditioning units, saving over 200,000 first-year kWh in the process. As a measure within the **Trade Ally** channel, Hawai'i Energy was able to rely on the sales efforts of participating contractors to target neighborhoods with a high concentration of central air conditioning, including 'Ewa Beach and Kapolei.

The A/C Tune-Up program has been well received by customers and contractors alike, with many reporting that their services were long-overdue. The \$75 incentive, paid directly to contractors and passed along to customers through an instant deduction on their bill, has been just enough to push customers to maintain their HVAC systems on a regular basis.

A poorly maintained air conditioning system can use more energy than an old, inefficient system that has been maintained well over its life. Hawai'i Energy's A/C Tune-Up offering helps residents keep their A/Cs operating at peak performance and efficiency.

Impacts

Overall, the RESM program's two offerings contributed energy savings of 752,885 first year kWh and 2,946,214 lifetime kWh to the residential portfolio, accounting for about 1.3% and 0.5% (respectively) of all residential savings.

For details, see **Table 46**.

Table 46 RESM Program Impacts															
Category	Units	Program Demand (kW)		Program Energy (kWh 1st Year)		Program Energy (kWh - Life)		Average Measure Life (Years)	TRB/ TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Solar Water Heating Tune-Up	2,161	64	82.1%	548,332	72.8%	2,741,661	93.1%	5	0.7	\$462,856	93.4%	\$648,300	77.7%	\$216,250	82.3%
Residential A/C	619	14	17.9%	204,553	27.2%	204,553	6.9%	1	0.2	\$32,932	6.6%	\$185,700	22.3%	\$46,425	17.7%
Total	2,780	78	100%	752,885	100%	2,946,214	100%	3.9	0.6	\$495,788	100%	\$834,000	100%	\$262,675	100%

Expenditures

See **Appendix C** for details on expenditures within the RESM budget.

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 financial and landlord/tenant barriers to installing energy-saving technologies through direct installation.

Accomplishments

Multifamily Direct Install Program (Hard-To-Reach channel)

PY16 was a highly successful year for Hawai'i Energy's Energy Smart for Homes (ES4H) program, wherein a suite of energy efficiency equipment is directly installed, free of charge, in multifamily residences. 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.



A Hawai'i Energy technician installs a faucet aerator at a property participating in the Energy Smart 4 Homes program. These measures are an important portion of the ES4H package, helping residents to reduce both energy and water usage.

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 PY16. The program reached 181 multifamily properties, with 5,122 individual units receiving energy saving retrofits.

This year, Hawai'i Energy focused on partnering with various community organizations to conduct outreach to prospective property owners, managers, and residents. For example, Hawai'i Energy approached various financial institutions to introduce them to the program offerings, recognizing that many landlords and owners were investors who had secured financing for their properties through their banks. The financial institutions were able to recommend Hawai'i Energy's program to their investors as a value proposition for prospective renters.

Hawai'i Energy also partnered with non-profits like Catholic Charities of Hawai'i, who owns and operates various multifamily properties catering to members of the community that face specific challenges, and have been especially underserved by traditional energy efficiency programs. The Mary Jane Home in Kailua, for example, offers housing and educational opportunities to pregnant women who are in need of a safe, affordable place to live during their pregnancy. This property includes six private residences, and offers group counseling and classes on infant care and childbirth.

Prior to Hawai'i Energy's involvement, the operators of Mary Jane Home struggled with increasing electricity bills, ultimately cutting into the services they could provide their tenants. Hawai'i Energy conducted full energy efficiency retrofits at the Mary Jane Home in February 2017, and discovered that the property's lighting was not only inefficient, it was also adversely impacting residents' comfort, and increasing cooling costs. With numerous ceiling fans, each with multiple 75W and 100W incandescent bulbs, the electricity used by these bulbs, as well as the heat produced by them had a compounding effect

on the property's utility costs. After Hawai'i Energy's retrofit of lighting, water measures, and power strips, Catholic Charities and the Mary Jane Home were able to take their savings from their electricity bill and reinvest it into their residents.

As a special initiative, Hawai'i Energy also partnered with Hawai'i-based startup Pono Home, which offers a suite of home efficiency and maintenance services, in an effort to increase the program's reach to new customers. Pono Home conducted energy efficiency retrofits in over 600 housing units administered by the Hawai'i Public Housing Authority (HPHA) and the Department of Hawaiian Home Lands (DHHL). By partnering with Pono Home, Hawai'i Energy was able to expand its offerings beyond the scope of properties traditionally reached by the MFDI program.

Impacts

Overall, the RHTR program accounted for energy savings of over 1,000,000 first year kWh. The MFDI program alone accounted for nearly 2,000,000 kWh, but not all of that is attributed to the RHTR budget. Each year, about 35% of the impacts and expenditures from MFDI are accounted for in the Business Hard-To-Reach (BHTR) budget, as many residential multifamily customers fall under master-metered "commercial" rate codes.

See **Table 47** for a summary of impacts under the RHTR budget.

Expenditures

See **Appendix C** for a summary of expenditures and unspent funds within RHTR.

Table 47 RHTR Program Impacts															
Category	Units	Program Demand (KW)		Program Energy (kWh 1st Yr)		Program Energy (kWh - life)		Average Measure Life (Years)	TRB/TRC	Total Resource Benefit (TRB)		Total Resource Cost (TRC)		Incentives	
		kW	%	kWh	%	kWh	%			\$	%	\$	%	\$	%
Showerhead	3,842	231	67.3%	364,762	35.6%	1,823,811	29.6%	5	12.6	\$442,678	36.5%	\$35,126	7.2%	\$33,940	7.2%
Advance Power Strips	3,251	27	7.9%	240,838	23.5%	1,204,191	19.5%	5	2.1	\$202,592	16.7%	\$95,475	19.7%	\$88,231	18.6%
CFL Omni-Directional	9,425	25	7.3%	178,122	17.4%	890,611	14.4%	5	4.8	\$153,504	12.7%	\$31,667	6.5%	\$31,667	6.7%
LED Lighting	1,538	5	1.6%	38,470	3.8%	577,056	9.4%	15	7.8	\$105,560	8.7%	\$13,553	2.8%	\$12,344	2.6%
LED Specialty	1,411	5	1.5%	35,294	3.4%	529,405	8.6%	15	13.5	\$96,844	8.0%	\$7,163	1.5%	\$7,163	1.5%
Faucet Aerator	8,404	42	12.3%	95,538	9.3%	477,690	7.7%	5	3.1	\$102,958	8.5%	\$33,707	6.9%	\$32,316	6.8%
Rid-A-Fridge (Refrigerator)	54	1	0.3%	25,503	2.5%	357,042	5.8%	14	17.8	\$52,935	4.4%	\$2,970	0.6%	\$2,970	0.6%
CFL Specialty	2,156	6	1.7%	40,746	4.0%	244,476	4.0%	6	3.1	\$45,036	3.7%	\$14,334	3.0%	\$14,228	3.0%
Rid-A-Fridge (Freezer)	10	0	0.1%	4,723	0.5%	66,119	1.1%	14	17.8	\$9,803	0.8%	\$550	0.1%	\$550	0.1%
Accounting	2,832	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$248,515	51.2%	\$248,515	52.4%
CFL Exchange	14	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$2,469	0.5%	\$2,354	0.5%
Total	32,937	343	100%	1,023,996	100%	6,170,401	100%	6	2.5	\$1,211,909	100%	\$485,527	100%	\$474,276	100%

TRANSFORMATIONAL PROGRAM

Introduction

Hawai'i Energy's market transformation program recognizes that long-term change in behavior toward choices that save energy can best happen when consumers are motivated and empowered with information on the economic, social and environmental benefits of these choices. The program 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, market transformation programs provide strategic intervention points within the market to generate long term efficiencies and sustained impact.

Market transformation efforts are an important complement to Hawai'i Energy's various resource acquisition programs, as they help create force multipliers that drive the adoption of efficiency measures. By collaborating with several key subcontractors and organizations, the Program had notable successes in program areas including energy literacy in hard-to-reach communities, professional development for Clean Energy Allies (CEAs), building operations and maintenance professionals, data-driven pilot programs to increase the institutional investment in energy efficiency measures, and the adoption of a more rigorous state energy conservation code.

The Program continued to build on successful projects from previous years in PY16, further developing initiatives that encourage greater participation, grow community impact, and leverage force multipliers. In the "hard-to-reach" ratepayer sector, the Program continued efforts to bring energy efficiency into homes and businesses. For reporting purposes, transformational initiatives are organized into four support segments - behavior modification, professional development and technical training, energy in decision-making, codes and standards, clean energy collaboration, and energy in decision-making, with key projects in each segment outlined in **Table 48**.

Table 48 Market Transformation Metrics			
Key Focus Area		Target	Achieved
Behavior Modification			
Workshops & Presentations	"Energy Unplugged" Workshops	2,000	512.0
	"Sharing the Aloha" Workshops		512.0
	Blue Planet Foundation Student Workshops and Energy Summit		2,264.0
	HPHA		65.0
	Maui Economic Development Board STEM Conference		42.0
	ReNEW Rebuild Hawai'i Forum Support		32.5
	Occidental Underwriters/Trane Earth Day		25.0
Total Workshops & Presentations			3,425.5
Gamification Campaign	Kanu Hawai'i Energy Challenge	200	221.0
	Blue Planet Foundation Challenges		234.0
Total Gamification Campaign			455.0
Social Media and Mobile Messaging	HE Website Online Conversions	3,250	1,140.0
	Hawai'i Energy Newsletters & Promos		10,776.0
	HE Videos		9,036.0
Total Social Media and Mobile Messaging			20,952.0
Professional Development & Technical Training			
Clean Energy Ally Support & Training	Clean Energy Ally Support & Training	8,370	1,627.5
Targeted Technical Training Opportunities	Building Operator Certification (BOC®)		2,251.0
	Certified Energy Manager (CEM) Training		1,064.0
	Water/Wastewater Entry-Level Operator Training		591.0
	Advanced LED Lighting and Controls		128.0
	IFMA Sustainable Facilities Professional (SFP) Credential		800.0
Targeted Participant Trainings	Program Trainings (Sector Specific)		566.5
	University of Hawai'i Sustainability in Higher Education Summit		50.0
Educator Training and Grants	Blue Planet Foundation Student Energy Summit		192.5
	Maui Economic Development Board STEM Conference		42.0
Energy Industry Development and Vocational Training	Hawai'i Energy Fellows Program		716.0
Total Professional Development & Technical Training			8,028.5
Energy In Decision-Making			
Strategic Energy Management (SEM)	Strategic Energy Management (SEM) Pilot Program	2	2
Benchmarking	Benchmarking and Data Analytics: In-House EUI Reports & First Fuel	12/60	13/76
Codes and Standards			
Codes Identification & Adoption	Advocacy and Legislative Support	3	22
Exceeding Code Compliance	Accessory Dwelling Unit (ADU) Pilot Program	36	37
Code-Related Training	AIA & IES Trainings; Blue Planet Foundation	50	222
Clean Energy Collaboration			
Promotion of the benefits of Equipment being DR-Ready		N/A	N/A
Coordinated Engagement with Customers			
Innovation and Emerging Technologies			

Behavior Modification

PY16 offered a multifaceted approach in motivating behavior change in Hawai'i residents and businesses, with innovative ways to convey energy efficiency information and help make informed decisions about energy consumption. The behavior modification focus area was subject to metrics for achieving specified participant hours, a metric that combined the amount of people served and the length of time each person engaged in an activity. (Example: a qualifying workshop with 20 attendees that lasted 2 hours would yield 40 participant hours.) The Program targeted 2,000 behavior modification participant hours during the program year and achieved a total of 3,478 participant hours. The goal was attained and surpassed through community and student workshops, and sponsorships of community events and initiatives.

A common theme in PY16 was the individual's commitment to change in order to make a collective difference, and as one workshop instructor lightheartedly commented, "Many hands make *light* work."

Workshops & Presentations

Community Workshops

Community workshops continued to be the tent-pole program for teaching energy literacy to underserved, hard-to-reach communities and were facilitated by local instructors with strong community relationships. The workshops utilized two different, compelling delivery formats to engage residents about the importance of energy efficiency and provide guidance on how to lower monthly electric bills.

The "Energy UNPLUGGED" workshops were conceived as an energetic local-style introductory course to the concept of energy usage. Participants were transformed into "energy entrepreneurs," learning how to put money back in their pockets simply by changing their habits. The workshop flipped the traditional script of saving money into the idea of working smarter to make money, thereby having additional "energy income" for more local favorite expenses such as yearly vacation trips to Las Vegas, a bigger monthly family cell phone plan, or daily plate lunches. The workshop also introduced a humorous and appealing "Top Ten" list of energy habits of an energy entrepreneur. Using the list as a teaching technique was an intuitive and fun way to process the concepts so that it was easier for the participants to remember the information. The workshops ranged in sizes from a large audience at Mililani community center for senior residents, to a smaller more intimate presentation to Tokelauan community leaders, a small community from coral atolls located north of Samoa.

In addition, the "Sharing the Aloha" workshops were a popular mainstay in PY16 and a sought-after series merging energy and finance in a way that brought technical energy concepts into a more relatable format. The workshops focused on native Hawaiian communities and transitional housing groups. Highlights of this series included educating native Hawaiians interested in buying a house on the benefits of long-term savings from energy conservation and efficiency and presentations to an organization that provides transitional housing to families with the goal of moving them to permanent living arrangements. Organizers of these events expressed gratitude about the facilitator's relatability of the topics to the attendees, most of whom wouldn't normally pay utility bills, but would soon have this responsibility.



In addition, ad hoc energy literacy workshops on common and easy tips to save money on electric bills, were delivered by Hawai'i Energy staff to almost 200 Hawai'i Public Housing Authority (HPHA) Section 8 Housing Choice voucher recipients. The Program conducted these workshops at improvised HPHA meeting rooms and at an outdoor overflow tent, as large groups of recipients waited to be called in for application processing.

Community Education Support

The Program continued to support collaborative efforts to raise awareness and educate the community about energy efficiency through sponsorships and presentations. As in previous years, the Program sponsored activities and organizations that reached students, educators, and other core groups with the ability to educate their peers and broader community about the importance of energy conservation and efficiency.

Student Workshops

Hawai'i Energy collaborated with the Blue Planet Foundation to teach energy efficiency concepts to students in the classroom. Blue Planet Foundation kicked off the Program's educational efforts with the second annual Student Energy Summit in November 2016. The two-day summit doubled the attendance from the previous year, bringing over 200 students and over 40 schools from across the state, all with the intent of solving tomorrow's energy challenges using today's tools and resources. Two-thirds of the summit was comprised of energy-efficiency topics including a smart energy classroom designed to help students understand energy loads of a typical classroom and the requirements and issues of cooling buildings. Students engaged with facilitators through many hands-on activities using scavenger hunts to measure energy-consuming equipment, posters to visually express ideas and questions, and building materials to help design prototypes of thermally-efficient classrooms.

The summit acted as a springboard for subsequent activities throughout the program year:

- Using design thinking principles, the Energy Innovation Design Challenge spurred students to develop an actionable solution for a specific issue in the community. Teams of students from participating schools created three- to five- minute videos on how get businesses, schools, or individuals to use energy more wisely.
- The Student Energy Ambassador (SEA) Change program was introduced for student energy leaders to track and implement energy projects at their schools; SEA Change students then posted to social media platforms to promote awareness and to track their efforts.

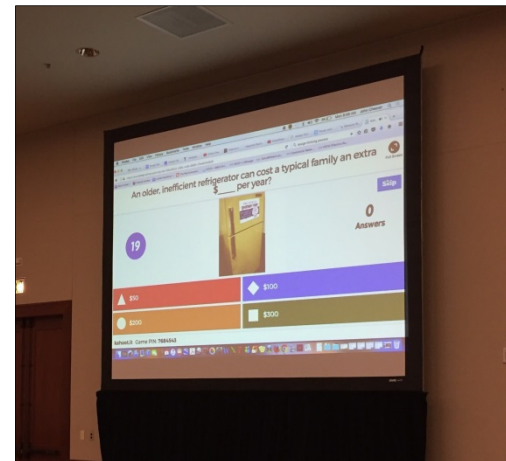
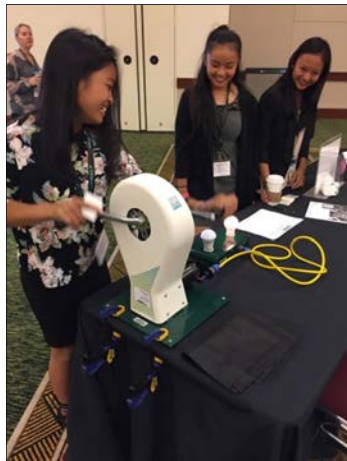


Energy efficiency concepts were also routinely presented to students at public, private, and charter schools and nonprofit organizations. Blue Planet Foundation coordinated numerous classroom workshops ranging in length from a one-hour lesson to a longer full-semester project. One project for the School for Examining Essential Questions of Sustainability (SEEQS) used project-based learning methods to evaluate the potential for high-efficacy lighting at a local O'ahu mall. The SEEQS students planned and implemented field activities to calculate the number of inefficient light fixtures in common areas and retail stores and subsequently determined how much energy and money could be saved using LED lighting. This project used a classroom idea and transformed it into a real-life application to help businesses become more energy-efficient.

STEM

Hawai'i Energy's student education program seeks to equip our future leaders with a foundation of energy literacy and to enhance problem solving skills for tackling Hawai'i's current and future energy challenges through collaborative efforts with nonprofit entities and sponsorships of community-led events in Science, Technology, Engineering, and Math (STEM). As a result, the Program was one of the main sponsors for the Ellison Onizuka Day of Exploration, an event hosted by the Aloha Council of the Boy Scouts of America. This free event was infused with STEM-based activities that brought in a crowd of over 7,300 people. Hawai'i Energy staff developed a curriculum called *Energy Scouts* and presented two workshops to enthusiastic Scouts and their parents using hands-on activities, visual aids, and simple math exercises to explain energy conservation and efficiency practices.

Hawai'i Energy was also one of the title sponsors for the Maui Economic Development Board (MEDB) STEM conference. The 8th annual conference was held in Honolulu for the first time and attracted over 1,000 participants. More than 30 Hawai'i public and private middle and high schools were represented, and over 500 students and 300 teachers participated in break-out sessions led by industry partners and engaged in hands-on STEM activities. Hawai'i Energy and Blue Planet Foundation staff co-presented on energy efficiency education in student workshops. Additionally, the Hawai'i Energy team participated in the industry and student networking session where students interviewed and engaged with industry professionals in short 5-minute intervals, asking questions about career pathways, advice, and personal experiences.



High school students from across the state learned about energy efficiency and energy industry career opportunities through Hawai'i Energy's interactive displays, presentations and networking activities at the annual Hawai'i STEM conference.

The Aloha+ Challenge and the Energy Dashboard

The Program continued its efforts and sponsorship with Hawai'i Green Growth and its 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, including data for the energy and workforce development sectors, and maintenance as well as its regular assemblies of stakeholders, decision-makers and industry professionals. The sponsorship supported the International Union of the Conservation of Nature's 2016 congress, a premier global conservation conference in Honolulu, which attracted 10,000 scientists, researchers and policymakers. The conference incorporated a robust legislative/policy agenda and community engagement, both of which are local priorities.

ReNEW Rebuild Hawai'i

Hawai'i Energy also participated in ReNEW Rebuild Hawai'i, a consortium of public and private stakeholders sharing information on best practices and services in the energy sector, which formally relaunched in PY16. The inaugural May 2017 ReNEW Rebuild Hawai'i forum brought together industry professionals, nonprofit organizations, state officials, and consultants to provide a discussion on affordable energy for Hawai'i's low- and fixed-income communities. The forum addressed existing low-income programs and accessibility to these programs, case studies, and future market opportunities. The Program presented on current offerings in the hard-to-reach sector, including success stories in the multi-family direct install program, community collaboration projects, and transformational events to educate communities on energy efficiency and conservation practices.

VERGE Hawai'i Conference

In June of 2017, the Program sponsored the VERGE Hawai'i Conference. Hawai'i Energy also presented at the event, leading a four-hour workshop to tackle the roadmap for achieving deep efficiency, inclusive of energy codes. Additionally, program staff participated on several panels such as "New Technologies and Innovative Strategies for Energy Efficiency," "Holistic Tech Strategies to Reducing Energy Use Intensity in Hawai'i," and "Integrated Demand-Side Management: Effective Strategies for Engaging Customers." Hawai'i Energy also had a highly popular efficiency-themed photo booth that was shared on social media in conjunction with fun messages, to increase the Program's brand awareness.


Gamification Campaigns & Competitions

Hawai'i Energy Challenge

Gamified learning environments provided a fun and effective way to amplify behavior change. The goals in PY16 were to engage, educate, and entertain participants using a variety of platforms and through multiple interactions. The highlight of the gamification efforts was attributed to Hawai'i Energy's continued collaboration with Kanu Hawai'i (Kanu), a local nonprofit organization, to execute the *Hawai'i Energy Challenge*, a competition aimed to increase energy literacy of residents of hard-to-reach communities. This competition leveraged Kanu's expertise in software development and its large community following to onboard 221 participants from community-based organizations, such as Parents and Children Together (PACT), Hawaiian Community Assets, Na Hanona Kulike O Pililani, and members of the Lāna'i community.

The look and feel of this challenge was to have a local "Hawai'i kine" messaging approach incorporating off-beat and humorous videos, text messaging with a local bent, and e-mail newsletters to promote constant digital conversations. Participants started out by watching funny educational videos starring a local comedian about ways to save and conserve energy at home. Energy workbooks were then downloaded to further study each energy efficiency topic and participants were asked to take short quizzes from what they had learned. The goals were to have participants watch all of the videos, download and review the topic workbooks, and take all of the quizzes. As each of these items were finished, participants earned scores in forms of stars.

Furthermore, to sustain engagement and encourage participants to interface with the energy efficiency curriculum, Kanu Hawai'i built a short message service (SMS) texting platform that had the ability to send out automated trivia text messages and receive participant responses to quick ad hoc quizzes. Additionally, weekly newsletters were e-mailed as a complementary tool to spur more visits to the course curriculum. The results indicated an overwhelmingly positive experience for participants, especially when watching the videos. As one participant wrote, "The videos were the best part, they showed simple ways to conserve energy, to be mindful of the energy we use, the items around the house that use the most and the alternative items that use less energy..." Also, during exit surveys, the text messaging platform delivered the highest engagement channel to keep participants interested in the challenge, with over 90% of all text messages being read. The platform proved to be the most productive communication channel and drove people to the Hawai'i Energy site to find information in preparation for trivia days and quizzes.



Hawaii's Bestest Energy Savings Course!


Logout

Welcome Tony - [Edit Profile](#)

"Lanai Community" - [View Group Stats](#)

Started Course: Aug 30, 2017

Watch the Intro Video




★★★★★

5%

Earn a higher score by watching videos, downloading checklists, and especially taking quizzes. [More Info...](#)


Here are your videos

Refrigerators & Freezers




Page Viewed


Dishwashers, Faucets & Shower Heads



Kitchen & Laundry Appliances




Power Strips, Timers, & Energy Monitors




Page Viewed


Microwaves, Stoves & Ovens




TVs & Stereos




Light Dimmers & Skylights




CDs, Music Players, & Cable Boxes




Window A/C




Fans, Shading, Timing Ventilation




Computers, Peripherals & Servers




Video Game Systems




Humidifiers and Dehumidifiers




Detailed Look at Bulb Types




Hot Water Heaters




Ceiling & Split A/C




Chest Freezers & Ice Makers



Pool Pumps, Pool Heaters & Hot Tubs



Energy Guides, Dry Aids, Radiators, Trunks & Appliances



Here are your topic workbooks - [Download all of them as one PDF](#)

Participants by Island		
Hawaii Island	27	12.9%
Maui	53	25.2%
Lanai	22	10.5%
Molokai	1	0.5%
Oahu	107	51.0%
Total Participants	210	

Social Media & Mobile Messaging

'Small Kine' Ridiculous Video and Infographics

In today's electronically connected world, social media is a critical tool for generating awareness about the Program and helping drive participation. Given the importance of a social media presence, Hawai'i Energy collaborated with Blue Planet Foundation to design a viral video that communicated energy waste in an exaggerated manner and was released through social media channels. The 'Small Kine' Ridiculous waste viral video showed multiple silly and ridiculous wasteful actions, like using a whole roll of plastic film to wrap a spam musubi, applying an entire tube of sunscreen on your body or fully drenching a shave ice with too much syrup. These were actions a normal person would never do, but in contrast, the end of the clip revealed a couple leaving all the lights on after they leave the house – illustrating how people may not think about energy waste as being ridiculous.

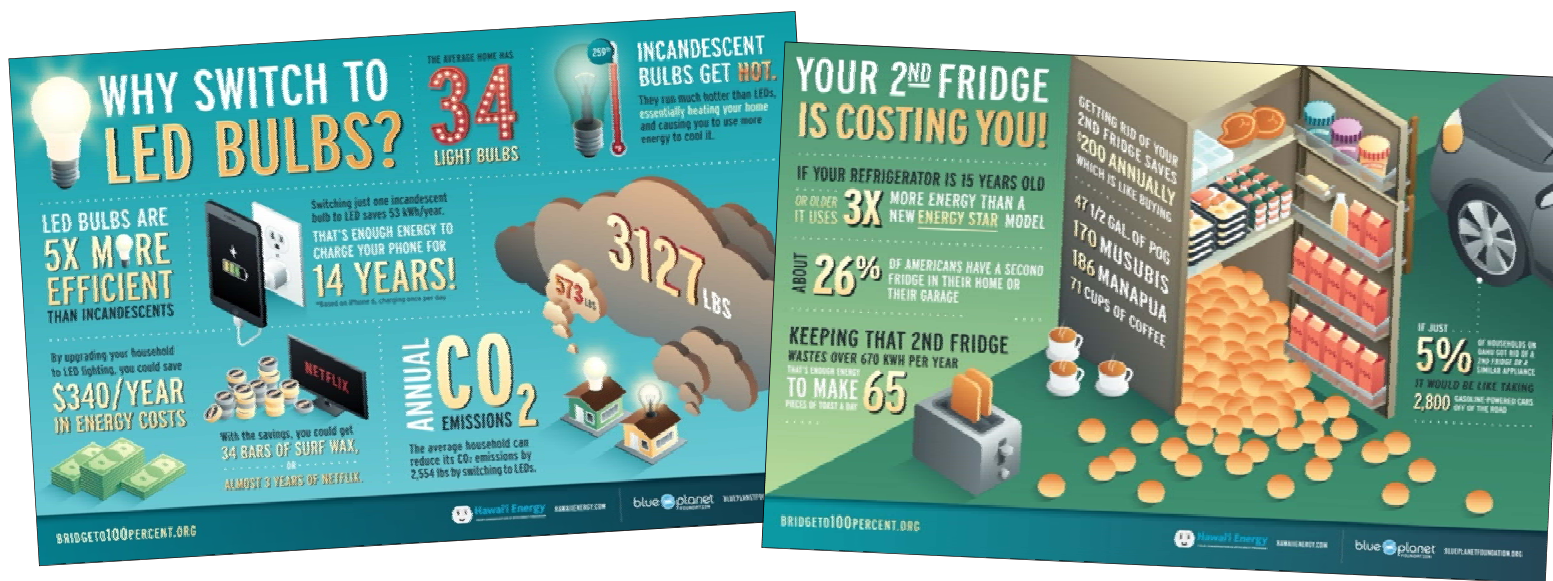
The video was also broadcast as a public service announcement through one of the local television stations, and its highly successful launch was viewed thousands of times through social media platforms, with over 98,000 partial views (people watching some or most of the video) and, conservatively, at least 2,500 full length views (people watching the entire video). To expand its reach, the video was promoted by external market 'influencers,' users with large followings. The video also provided a link to a landing page asking the viewer to take the pledge of getting rid of ridiculous energy waste; over 125 individuals clicked through and took the pledge within the first month. You can view the campaign at blueplanetfoundation.org/ridiculous.

Be. Less. Ridiculous.

Watch the video. Share the ridiculousness. Take the pledge.



The "Small Kine Ridiculous" campaign featured local talent, locations and Hawai'i-specific scenarios to help make the message relevant to a Hawai'i audience. Pictured above, a snack shop worker pours a ridiculous amount of syrup on his customer's shave ice.



To further public understanding of energy efficiency topics and drive residents to Hawai'i Energy program offerings, visual materials developed as compelling infographics (pictured on previous page) were conceived utilizing Hawai'i Energy and Blue Planet Foundation resources for content and creatively executed by a graphic design consultant. The infographics transformed complex and technical concepts into palatable, engaging tools to serve as conversation pieces for all demographics. Examples include the reasons for and positive impacts from switching to LED light bulbs from incandescent light bulbs; the creative analogies of comparing the energy waste costs of a second home refrigerator to the purchase of local foods; an alphabetic A to Z poster for students to realize the importance of energy efficiency and conservation; hip and trendy visually appealing coasters with energy efficiency trivia; and a room-by-room house infographic of energy efficiency tips and Hawai'i Energy program offerings. A full social media rollout of these infographics was not implemented in PY16, because of the long product life of these pieces. The distribution of these pieces through multiple social media channels will be performed in the upcoming program year.

"Hawai'i Energized"

Hawai'i Energy introduced an in-house produced web video series called *Hawai'i Energized* which focused on informing and educating Hawai'i residents on energy efficiency concepts, interviewing community stakeholders, and highlighting energy efficiency projects across Hawai'i. These short, fun, and entertaining videos hosted by Hawai'i Energy staff were disseminated through the website and social media channels, such as Facebook, Instagram, and Vimeo. The series was viewed over 1,300 times over various platforms. For more on the show, see the Marketing & Communications section.

Professional Development

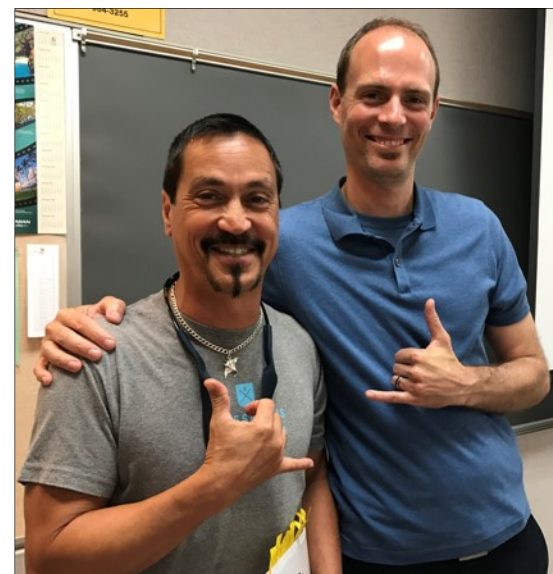
Professional development offerings target those who are in positions of influence to affect energy decisions at home and in businesses. These include energy sales professionals, those entering or currently in the energy workforce, and teachers. The Market Transformation Program continued several successful projects educating K-12 students, expanded internship offerings, and trained energy salespeople. For details on professional development and training as it pertains to Clean Energy Allies (CEAs), please refer to Clean Energy Ally section.

Targeted Technical Training Opportunities

Targeted technical trainings are offered to CEAs, sales professionals, 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 Maui and O'ahu. BOC® workshops target the facility maintenance workforce and provide skills and knowledge to implement energy efficiency practices at their workplaces.



NOTES FROM TRAINING PARTICIPANTS:

"I liked the instructor's real life examples that he included in the teachings."

"The math discussion was great! I really enjoyed the mathematical discussions and the calculation practice."

"Information that I learned will prove to be very useful in the future."

36 participants attended the Level I courses. 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.

With the closure of the Hawai'i Commercial & Sugar (HC&S) mill in December 2016, a cohort of dislocated workers from HC&S were also recruited for BOC 1. With a mix of professional experience as millwrights, power plant operators, electricians and maintenance workers, the HC&S cohort brought a camaraderie and dedication to learning new skills in energy efficiency that they will be able to reference and apply as they seek new positions at other facilities on Maui. Eleven participants in the HC&S cohort successfully completed the BOC Level 1 training.

Certified Energy Manager (CEM) 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 six 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) designation, which fosters their professional development. The CEM program is also ANSI (American National Standards Institute) accredited, based on the International Standard ANSI/ISO/IEC 17024. Both standards are well-recognized within the industry for personnel certification accreditation. Topics include energy auditing, energy codes and standards, building energy use and performance, energy accounting, rate structures, economic analysis methods, life-cycle cost accounting, maintenance, lighting, HVAC systems, controls, insulation, and third-party building certifications. A record-high total of 28 participants attended the CEM training, coming from a variety of backgrounds including utility employees, state employees, consulting firms, HVAC companies and other Energy Services companies. Due to the diversity of the students, they have the ability to influence a multitude of energy end-users toward energy-efficient operations and capital investment.

Water/Wastewater Entry Level Operator Training



Hawai'i Energy continued its support of the water and wastewater sector via training for industry professionals. The Program provided tuition subsidies for a 90-hour training originally developed at the University of Hawai'i – Maui College (UHMC) under a U.S. Department of Labor grant with the objective of preparing unemployed and underemployed workers to replace water and wastewater operators who are approaching retirement. The course prepares prospective water/wastewater operators for entry-level examinations, provides continuing education credits for current water/wastewater operators, and provides training about energy efficiency measures and equipment at wastewater facilities as well as sustainability issues related to land, water and natural treatment systems. Two of the applicants are employed with water treatment companies, one is employed with the County of Maui, and the others were unemployed, dislocated workers from HC&S. There was no prerequisite for these applicants and any interested applicant was accepted.

Lighting Training at UH Maui

The Sustainable Living Institute of Maui (SLIM) at UHMC partnered with Hawai'i Energy to host an energy-efficient lighting course, *Lighting Audits to Lighting Retrofits*. The training included a PowerPoint presentation, handouts and multiple lighting worksheets to analyze comparisons in lighting quality, efficiency and cost.

The course was designed to enhance the material covered in the high performance lighting module in the Building Operator Certification course and to provide updates on the latest technology and best practices in this quickly-evolving field. (The course was open to all, regardless of whether one had completed the BOC). The instructional material included upgrades in lighting quality and lighting options that are now available in LED, and how to conduct a lighting audit and light retrofit.

Participants are in positions to make a difference in energy use for their facilities and work projects. Large resort, hospital and other commercial building facilities are large energy users and value these trainings which help minimize their energy use, and manage costs through energy efficiency and lighting trainings. Evaluations were very positive and participants expressed plans to apply what they learned to current projects in their work.

Lighting Controls Workshop

The Program supported the professional development of 38 lighting professionals in a workshop provided by the Illuminating Engineering Society (IES) on "Wireless Lighting Controls." 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.

Addressing high demand for more technical training on lighting controls, the workshop focused on proper specification and design of a lighting control system for maximum savings of energy and money for the customer, the future of wireless controls, cybersecurity concerns, making the financial case, and understanding how to measure performance to validate investment in high-performance lighting.

Instructor articulated the information very well and was very willing to answer any and all questions that we had. I feel more confident that I can apply the information provided to assess, audit and install LED lighting in the future. Lighting is the low hanging fruit of saving energy.

- Workshop participant, *Lighting Audits to Lighting Retrofits*

IFMA Sustainable Facilities Professional (SFP) Credential

Hawai'i Energy partnered with the University of Hawai'i – West O'ahu and the International Facilities Management Association (IFMA) with additional funding support from Trane and Carrier companies to hold the very first IFMA Sustainability Facility Professional® (SFP®) Professional Development Certification Training. Attendees included current facilities management professionals, as well as full-time students of UHWO and UH Maui College interested in facilities management careers. This 40-hour course, which focuses on environmental and energy stewardship and sustainability in facilities management, was delivered over three weekends spanning from October to November 2016. The 20 participants who achieved this prestigious credential will be able to play a key leadership role in creating, managing and operating sustainable facilities and be an informed champion and steward of the built environment in their workplace and community.



Targeted Trainings

In PY16, Energy Advisors continued to strategically target diverse market sectors to share program offerings and make the case for energy efficiency with stakeholders and decision-makers. Presentations and informal gatherings were tailored for potential customers such as Building Owners and Managers Association (BOMA), the Chamber of Commerce, the Illuminating Engineering Society (IES), Marriott-Starwood Resorts, the State of Hawai'i, and several AOAOs, sometimes in partnership with trade allies such as Graybar and Admor.

Fifth 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's summit was held at UH-West O'ahu. Hawai'i Energy facilitated a working session on Strategic Energy Management, which was designed to assist representatives from the university system and private and public sectors in identifying opportunities for strategically implementing energy efficiency projects. The session focused on peer-to-peer sharing between facilities and operations staff of best practices in energy and resource efficiency, as well as strengthening energy efficiency policies outlined in University of Hawai'i EP 4.202 (Executive Sustainability Policy).

Educator Training & Grants

Educator Training

Throughout the program year, Hawai'i Energy sponsored or was directly involved in multiple learning events for educators. At the previously mentioned Maui Economic Development Board (MEDB) STEM conference, Hawai'i Energy and the Blue Planet Foundation co-presented educator professional development sessions. The program also participated in events like the Charter Schools Summit, and the National Energy Education Development (NEED) energy expos facilitated by individual teachers at their respective schools. Through these events, educators were given the resources to integrate energy efficiency into classroom lesson plans.

Hawai'i Energy also collaborated with Blue Planet Foundation in conveying energy literacy through fun, accessible, and interactive ways. Project-based learning methods necessitated teachers and students to actively engage in a project to help solve real-world challenges in the community. As part of the aforementioned SEEQs project, teachers provided guidance materials to facilitate problem solving and active participation from the students. Additionally, online tools that used a gamified learning environment and helpful online resources to encourage energy policy advocacy were incorporated into the numerous presentations by Blue Planet Foundation and Hawai'i Energy staff to public, private, and charter schools across Maui, Hawai'i and O'ahu.

Energy Industry Workforce Development and Vocational Training

Hawai'i Energy Fellowship Program

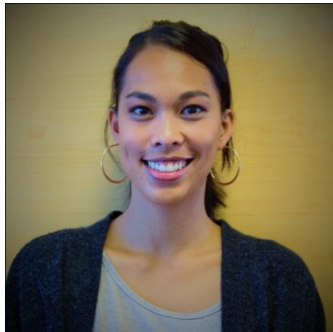
Through its collaboration with Kupu RISE (Rewarding Internships for Sustainable Employment), the Program remained committed to growing workforce capacity in the Hawai'i energy sector. In PY16, Hawai'i Energy developed a fellowship program for three young professionals who served in a paid internship capacity and supported various Business, Marketing 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 contributed 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 52 post-inspections across O'ahu;
- Increasing awareness on the importance of energy efficiency and the Hawai'i Clean Energy Initiative;
- Supporting Hawai'i Energy's Clean Energy Ally (CEA) program, recruiting an additional 15 new members and engaging and supporting existing members;
- Assisting the Marketing and Communications (MARCOM) program with outreach events, social media marketing and drafting e-newsletters

At the conclusion of the fellowship program, one of the fellows was offered a full-time position at Hawai'i Energy to continue to work toward meeting program operational goals for PY17. In the future, the Program will look for ways to cost-effectively maintain the number of young professionals who can participate and the diversity of projects that they support.



This fellowship gave me the opportunity to learn and develop valuable skills that I will continue to build on and use throughout my career. I am grateful that this fellowship has given me first-hand experience of what it is like to collaborate and work in a professional organization. With a great leadership team and supportive mentors that have guided me along the way, it has become apparent to me that I would like to continue to pursue a career in sustainability and help Hawai'i reach its goals of 100% clean energy by 2045.

– Jacqueline, 2016 Hawai'i Energy Fellow

Energy in Decision-Making

Strategic Energy Management (SEM)

In PY16, Hawai'i Energy formally kicked off its Strategic Energy Management (SEM) pilot efforts. The objective of the pilot is to design a comprehensive program that provides continual guidance to larger organizations to affect ongoing improvements in their energy management practices. Providing more comprehensive services to these end-use customers empowers them to make better decisions concerning their energy consumption over the immediate and long term, so that more energy efficiency measures can be implemented.

Recognizing the critical importance of building a strong foundation, the Program contracted with Vermont Energy Investment Corporation (VEIC) to assist with pilot design and initial implementation. VEIC has significant experience in SEM and was able to provide insight into best practices utilized throughout the nation. The goals of the initial pilot year were twofold:

1. Develop robust framework for Strategic Energy Management program
2. Utilize SEM framework to recruit and engage with two participant organizations

The following milestones were accomplished in PY16:

1. Framework Development: SEM evolves into CEI

Early in PY16, we recognized that the broader definition of SEM needed to be refined. Based on our analysis work with VEIC, it was determined that the larger SEM efforts would likely prove difficult to execute initially due to the absence of large-scale industrial customers in Hawai'i. To address this, we worked closely with VEIC to narrow the focus to more closely align with the approach of Continuous Energy Improvement (CEI) programs. This more focused approach targets a handful of “good candidate” commercial customers to engage with us on the following activities:

- Curriculum, energy modeling and simplified marketing material development;
- Individual and onsite SEM workshops and trainings (accelerated to 1 week);
- Pre/post energy data modeling support and analytics;
- Energy coaching support services; and
- Surveys and case studies for continuous improvement and future program expansion.

“Good Candidate” participants were identified based on a few key characteristics. These included the customer’s energy intensity footprint, being in a sector or industry that can easily benefit from SEM energy improvements, and previous strong engagement with Hawai'i Energy programs.

2. Creating Tools and Resources

Tracking energy usage, projects, and progress is an important aspect of both SEM and CEI. As part of the framework, Hawai'i Energy began developing a set of tools and resources to assist large institutions to comprehensively plan for effective energy management as a critical part of their business decision-making. This additional transparency will help to increase both the number and the impact of energy efficiency projects that are considered as part of the strategic vision. Some of these tools include:

- Participant Recruitment Criteria worksheet;

- Customer – Hawai'i Energy communication and incentive workflow;
- Four Continuous Energy Improvement Customer Presentation slide decks for education, healthcare, hospitality, and industrial sectors; and
- Regression modelling analysis workflow.

Participating Organizations

The PY16 program goal was to recruit two organizations to participate in CEI. These efforts were initiated with the Kamehameha Schools and the University of Hawai'i. Characteristics that made these institutions attractive for a CEI pilot include:

- Geographically spread campuses;
- Internal organizational complexities;
- Diverse and competing priorities (including energy management);
- Organizational readiness to incorporate CEI/SEM;
- Scalable size;
- Experience with continuous improvement; and
- Some initial capability to measure energy reduction.

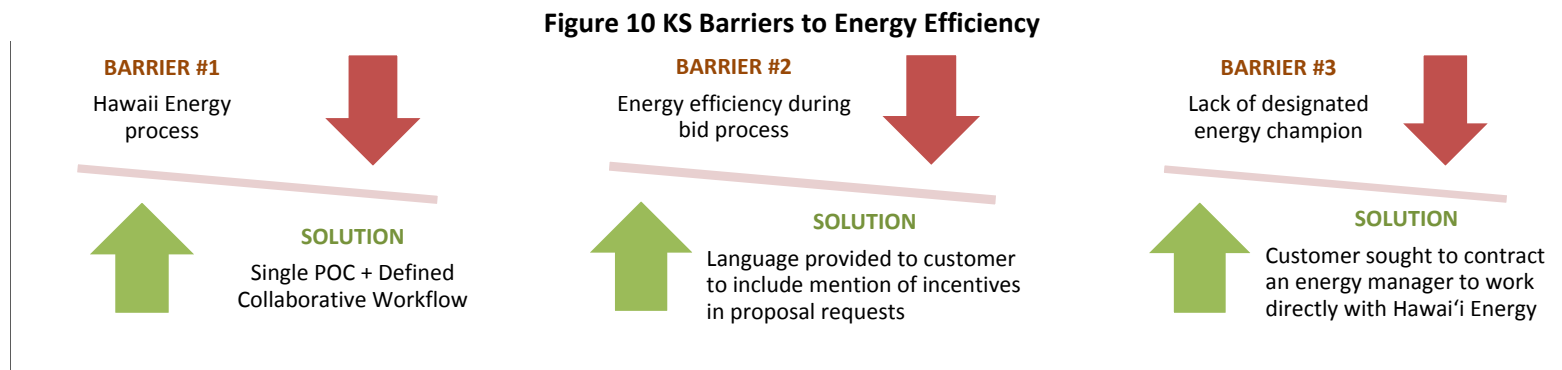
Each institution identified a Sustainability Manager as a point of contact for initial conversations that provided useful insight into the design of this pilot initiative.

University of Hawai'i (UH)

The Program worked with the UH Sustainability Coordinator to discuss a project scope to meet energy needs of UH within a potential CEI Plan that included Hawai'i Energy and the electric utility. A wide net was cast for the scope of CEI at UH, which included demand response, demand-side management and energy conservation measures. At the end of the program year, UH was still in the process of identifying potential projects or buildings for a CEI pilot and evaluating the possibility of including this in an energy performance contract.

Kamehameha Schools (KS)

Meeting with the KS Sustainability Manager provided organizational insight and resulted in a preliminary plan to overcome barriers to energy efficiency that were identified. These are highlighted in **Figure 10** below.



Plans for Continuity

In PY17, Hawai'i Energy will continue to raise individual and organizational mindfulness towards energy. The processes established and criteria defined in PY16 will pave the way for recruitment and continued partnerships for CEI in the coming years. This approach will lead to deeper and more meaningful energy efficiency throughout participating organizations.

Benchmarking and Data Analytics

PY16 marked the third consecutive year that Hawai'i Energy has pursued more comprehensive benchmarking initiatives. Measuring and analyzing a building's energy consumption through benchmarking assists owners and operators by showing how energy is being used relative to their peers, in order to help them make more informed decisions about how to lower costs. This year, the Program's in-house benchmarking continued to be a cornerstone of these initiatives, but Hawaii Energy also began work with FirstFuel to expand utilization of more advanced data analytics for customer engagement.

This year's benchmarking efforts focused on the following:

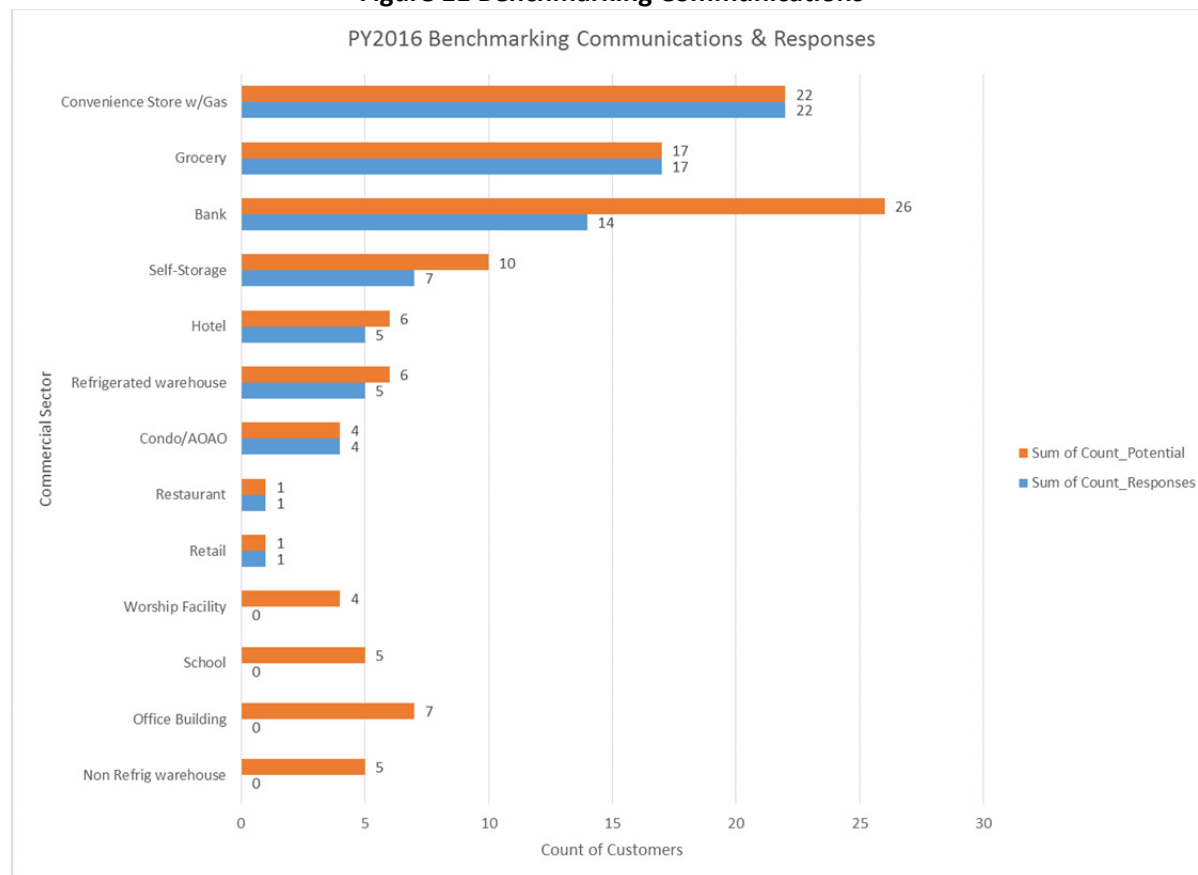
1. Create and provide benchmark reports for 12 business sectors
2. Utilize benchmark reports to prompt 60 customers into energy efficiency discussions

In-house Energy Use Intensity (EUI) Benchmark Report Communications

As in previous years, the in-house benchmarks were presented as an EUI comparison against other similar facilities in the same sector. This year, these efforts specifically targeted customers who have been unresponsive to past Hawai'i Energy outreach. Hawai'i Energy engineers benchmarked the customers against similar facilities, providing a strategic comparison for customers to better understand the context of their energy use.

Program Energy Advisors were then able to leverage the power of benchmarked data as an entryway to a meeting discussing energy efficiency. A total of 114 customers spanning 13 commercial sectors were contacted by an Energy Advisor with their customized benchmarking analysis, shown in **Figure 11**. 76 customers responded with varying levels of interest for further follow-up with the Program. The chart below shows the respondent

Figure 11 Benchmarking Communications



breakdown by industry sector.

Key Takeaways

The highest potential to continue conversations toward energy-saving projects appeared to come from banks and convenience stores. This was due to both having multiple branches or stores managed by a single facilities person, in this case 14 banks and 22 convenience stores. One grocery store chain also showed interest in using the benchmarking data, along with a chain of self-storage warehouses.

There were several lessons learned in this initial effort to employ benchmarking data analytics as a conversation-starter in customer engagement. One common barrier the Program found was that customers lacked time and personnel to focus on basic energy issues and improvements. In PY17, the Program will seek to expand Energy Advisors' sector-specific expertise in order to provide focused attention and useful information for decision makers to move forward with efficiency projects. Another lesson learned was the importance of identifying an appropriate contact within the managing organization to whom to send the benchmarking analyses. As mentioned earlier, 76 out of 114 customers responded to the emailed analyses positively, representing a 67% response rate. The team noted that the locations that did not respond were primarily ones that the Program has not worked with in the past. Advisors over these sectors will make a concerted effort in PY17 to build relationships within these industries and communities in order to leverage the valuable information contained in the benchmarking data.

Access

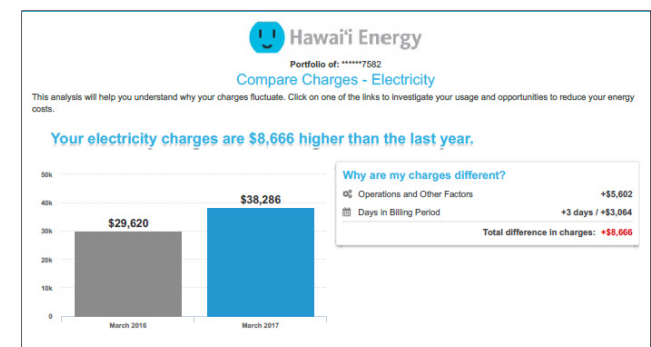
The Program provided public access to benchmarking graphs and links to relevant U.S. Department of Energy resources for each sector, at <https://hawaiienergy.com/benchmarking>. Hawai'i Energy will continue to use these tools for commercial program targeting in PY17.

FirstFuel Reports

Hawai'i Energy partnered with FirstFuel to perform more advanced data analytics in PY16. FirstFuel's FirstAdvisor tools and resources are designed to accelerate and reinforce commercial customer engagement by providing personalized and actionable analytics. This year's focus was mainly on data integration and analytics for approximately 4,000 customer accounts. The Program began more active utilization of the FirstAdvisor tool in the last few months of the program year.

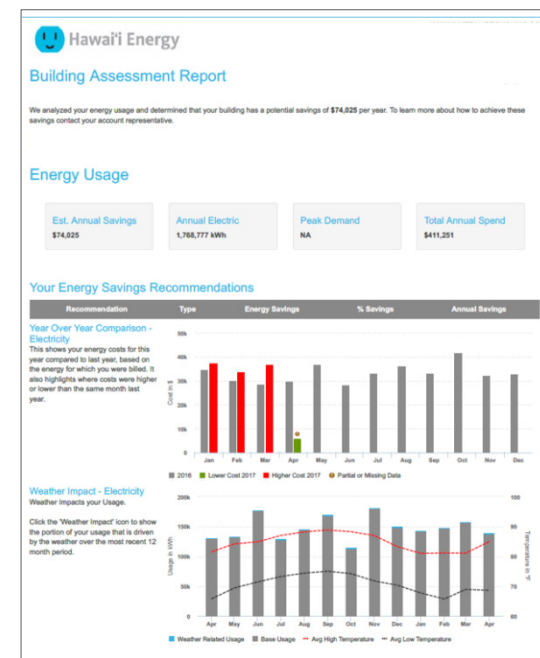
75 FirstFuel reports were generated and sent to businesses within all customer sectors that showed high energy use and utility cost. The specified sectors included AOA/Condo, Hotel, School, Healthcare, Industrial, Retail, Manufacturing, Warehouses, Government and Cold Storage. Those customers selected within the sectors were further narrowed to target those that lacked participation in Hawai'i Energy programs. The goal of the reports was to solicit participation from customers where long lighting and HVAC run hours, manufacturing processes and other energy-intensive activities in multi-floor facilities, increase electricity use beyond what is typically seen.

Information from two types of reports was generated to reach out to those targeted customers. The first report titled "Utility Comparison Charges", showed a comparison of electrical use and dollar cost for a selected month in 2016 to that of the same month in 2017. This information was sent via email to the customer and also included an introductory letter from Hawai'i Energy. The following is an example of how the monthly energy use and dollar cost was shown in the report for the customer.



The second report titled “Building Assessment Report,” was generated by utilizing HECO 2016 and current 2017 utility data to compare the energy use pattern of a facility. The assessment incorporated weather data within a 10 mile radius of the facility address, and correlated energy use due to weather conditions as well as operational factors. The report also included energy savings recommendations based on the type of facility for each customer. The following is an example of the “Building Assessment Report” that was sent to each customer.

Of the 75 FirstFuel reports sent to customers, 17% percent responded with participation in Hawai‘i Energy programs. The report showing the increase of energy use between the prior year and current year provided value to facility operators, who in some cases were not aware of the year-to-year rise in energy cost. This prompted an interest in improving the energy efficiency of their facility and receiving potential rebates for reducing energy use. Overall, the reports provided an insight of their month-to-month energy usage and awareness of potential ways to reduce the energy footprint of their facility. While initial efforts have demonstrated the potential for increased customer engagement, we remain constrained by the limited availability of interval data. We will continue with these efforts in PY17 but will be incorporating Hawai‘i Energy participation data to improve analysis and associated customer recommendations.



Codes and Standards

Hawai‘i Energy took a wide approach to influencing and advancing energy codes and standards in PY16. The plan was to support the Hawai‘i State Energy Office in advocating for State adoption of the 2015 IECC, while also identifying potential new energy code measures applicable to Hawai‘i that have been successfully implemented in other jurisdictions. In addition to advocating for updated energy codes, the Program will prepare the marketplace for the subsequent energy code transition. The first way the Program prepared the marketplace was to assist customers in exceeding compliance to the 2015 IECC in advance of the new code being adopted. Second, the Program collaborated with the State Energy Office to bring code-related trainings to the energy industry.

Codes identification and adoption: 2015 IECC Adopted in Hawai‘i

In December, 2016, Hawai‘i Energy provided written and oral testimony to the Department of Accounting and General Services (DAGS) in support of the state adopting the 2015 IECC with Hawai‘i amendments as approved by the State Building Code Council (SBCC). On March 20, 2017, Governor David Ige signed HAR 3-181.1 into law, effective 10 days from the date of signing. Generally, state agencies must design to the new code one year after the effective date, meaning new construction projects for State buildings will be designed to meet the new code as of April 2018.

Impact of Hawai‘i Energy’s Code Adoption Efforts

The State and counties of Hawai‘i have an inconsistent track record when it comes to energy code adoption. Prior to 2017, the last energy code to be adopted was 2006 IECC, adopted in 2010 by the State and subsequently by the counties. Next, the 2009 IECC was approved by the SBCC, but did not go through the Administrative Rule process necessary for the Governor’s signature. The County of Kauai subsequently adopted the 2009 IECC. The 2012 IECC failed to get signed into law after being approved by the SBCC. Thus, the official energy code for the State of Hawai‘i in 2017 remained as the 2006 IECC until March 31, 2017, when the 2015 IECC became effective, having been signed into law 10 days prior.

The 2015 IECC had been approved by the SBCC in July of 2015, notably becoming State law less than two years later. The long-term benefits of this decision are staggering, with one study estimating over 1,900 gigawatt hours (GWh) in savings to the people of Hawai'i in year 2030. Equally notable are the prominent transformational efforts by Hawai'i Energy and its partners in raising awareness and rallying State legislators and decision makers to adopt the 2015 IECC, which is a big step forward in achieving the State's 100% clean energy goals.

Exceeding Compliance to the 2015 IECC

Following the state's adoption of IECC 2015 in PY16, Hawai'i Energy piloted a topical solution to assist residents to exceed code compliance while using current program measures. With a high demand and limited supply of affordable housing options across the state, Hawai'i Energy initiated an energy efficiency pilot to reach homeowners interested in building an accessory dwelling unit (ADU). An ADU is considered to be a smaller, separate living space with bathroom, kitchen and sleeping areas and constructed on a single-family lot as either an attached or detached unit from the main home. The unit may be used to house extended family or serve as a long-term rental. To offset some of the construction costs and incentivize the adding of ADUs to the housing supply, the City and County of Honolulu waived many of the permitting fees for prospective homeowner builders.

The initial effort started with co-sponsoring and volunteering for the ADU Build-A-Thon at the State Capitol grounds. The Build-A-Thon event was coordinated by the Hawai'i Appleseed Center for Law and Economic Justice, a local nonprofit, and the Leeward affiliate of Habitat for Humanity. An ADU was built by volunteers and contractors in four days and was outfitted with energy-efficient appliances and devices, attracting hundreds of visitors and press coverage over the next couple of weeks.



Hawai'i Energy team members volunteered their time for the constructing of a model ADU at the Hawai'i State Capitol during the Habitat for Humanity Build-A-Thon. To jump-start efforts to collect pledges for its "GrADUate" offer, the completed ADU featured several visual markers around the interior, targeted at public visitors, identifying energy-saving measures, such as smart strips, ceiling fans and appliances.

To build on the momentum, Hawai'i Energy created a pilot program reaching out to homeowners involved in the City's ADU permitting process to raise awareness and nudge them toward energy-efficient alternatives. Termed the GrADUate program, a pledge form was mailed to homeowners inviting them to "graduate" to the next level of savings through energy efficiency. The form contained a list of energy-efficient options that exceed code compliance, such as pledging to install at least 80% high efficacy lighting or installing products like ENERGY STAR® appliances. Next to each energy-efficient product was an estimated yearly bill savings and the homeowner chose the products that were of most interest to them.

Code Related Training

Hawai'i Energy collaborated with the State Energy Office to provide training on the 2015 IECC and future impacts to Program rebates. Two trainings were conducted, one with the Maui region of the American Institute of Architects (AIA) and the other with the Illuminating Engineering Society (IES) in Honolulu. Both organizations, aware of the upcoming code changes, requested training on the 2015 IECC, particularly on lighting and HVAC changes. The Program presented on the current criteria to be eligible for rebates and the potential differences as the energy code minimum requirements increase with the new code. To fill the gap between code adoption and implementation, the Program provided energy code educational resources, including quick-reference print-pieces and the existing Hawai'i Energy comprehensive 2015 IECC checklists. These training and educational efforts are an important step toward improving code compliance and will be increasingly important as counties adopt the code.

COMMERCIAL RETAIL GUIDE					
2015 Hawai'i Energy Code Compliance					
Energy Code Provision	Provision Number	Summary	New Building	Alteration / Buildout	Why it Matters
RETAIL LIGHTING					
Interior Controls	C405.2.1	Occupancy sensors must be installed for all interior lighting	●	●	Occupancy sensors reduce wasted lighting energy as well as reduce the HVAC load.
Automatic Time Switch	C405.2.2	Time switch controls must be installed for all interior lighting (except for emergency egress lighting)	●	●	Automatic time switch controls installed in spaces not containing occupancy sensors saves lighting energy.



ABOVE: Three print pieces and a Commercial Retail Guide were created in PY16 to highlight major changes to the energy code in three building types: Commercial, Residential-Air Conditioned, and Residential-Tropical. The simple layout and attractive photographs starkly contrast traditional code literature. BELOW: A scene from the "Energy Codes" instructional video.

Hawai'i Energy also worked with the Blue Planet Foundation to create a 10-minute video highlighting major changes in the residential energy code. The video successfully uses the humor of two local comedians with the expertise and experience of a Hawai'i Energy staff member to capture the audience's attention and take viewers on a walk-through of an actual home to learn about the built-in energy-efficient features.



Legislative Support

Hawai'i Energy and the Blue Planet Foundation held 22 advocacy events for energy efficiency legislation and 2015 IECC adoption at State and county levels. These efforts were classified in three categories: Legislative testimony and bill introduction, legislative informational briefings, and media outreach.

Legislative Testimony & Bill Introduction

Hawai'i Energy supported the two state legislative bills relating to energy efficiency by providing written and oral testimony in multiple legislative hearings on House Bills (HB) HB1249 and HB1294. The bills included monthly operating cost disclosure for new homes, developing strategies to maximize energy efficiency in residences, and addressing air conditioning of commercial buildings with open doors.

Although both bills were ultimately deferred, conversations with stakeholders led the Program to form a new committee for the energy industry through which interested stakeholders can continue the conversation around these and similar topics. The investigative committee on Energy-efficient Codes Coordination was proposed by the Program to the SBCC in order to provide insight and support to the SBCC regarding the latest practices as energy technology advances and further integrates with our homes and buildings. With the expected increase in energy efficiency legislation, this new committee will provide a collaborative space to blend of expert energy advice from a diverse pool of industry stakeholders.

On April 11, 2017, the SBCC Chair established the proposed investigative committee and authorized Hawai'i Energy's Ramsey Brown as committee chair. The seven total legislative testimony and bill introduction events also included the previously mentioned testimony in support of the 2015 IECC to the SBCC and Department of Accounting and General Services (DAGS).

Legislative Informational Briefings

In support of the legislative bill efforts, 11 informational briefing events were held, including distributing memos on House Bill 1249 and several briefings on the energy code and an efficiency financing method to the PUC, Hawaiian Electric, Howard Hughes Development Corp., and the Building Owners and Managers Association (BOMA) Hawaii leadership.

In collaboration with the Program, Blue Planet Foundation also met with stakeholders to identify potential concerns with county-level adoption of 2015 IECC and to discuss next steps for introduction to County Councils. Stakeholders included the Building Industry Association (BIA) President Gladys Marrone and Chair, Tim Waite, City and County of Honolulu Chief Resilience Officer, Josh Stanbro; and on Maui, county councilmembers, County of Maui (COM) building officials, and Glen Ueno and Jarvis Chin of Maui County Development Services Administration, Department of Public Works.

Media Outreach

Hawai'i Energy and Blue Planet Foundation reached out to the media to raise awareness around the 2015 IECC and energy codes in four specific events. A Star-Advertiser Editorial Board media briefing resulted in an editorial published July 16, 2016, titled ["Green power making most of green light?"](#), featuring Hawai'i Energy's Ramsey Brown. Blue Planet Foundation also disseminated strategic emails and created timely social media posts enlisting testimony in support of bills HB1249 and HB1294. Following their efforts, ten individuals submitted testimony in support of HB1249 and eleven in support of HB1294. Blue Planet Foundation also coordinated with the Program to draft and send out a press release announcing Governor Ige's signing of the Hawai'i Administrative Rule adopting 2015 IECC with Hawai'i amendments.



Continuing Energy Code Efforts

In PY17, the Program will focus on urging and supporting the counties to adopt the 2015 IECC. As in PY16, Hawai'i Energy will continue to be a regular attendee at the monthly State building Code Council (SBCC) meetings to provide feedback and updates regarding energy matters to the council. Maximizing energy efficiency in homes will continue to play a key role in the Program's codes and standards work, along with advocating for multifamily energy efficiency for the half of Hawai'i's residents that live in apartments and condominiums.

Hawai'i Energy will continue to produce appealing and memorable educational tools for building owners and industry contractors to improve awareness of, and compliance with, the 2015 IECC.

Clean Energy Collaboration

PY16 realized the formation and establishment of a Collaboration Framework to cooperatively work with the Hawaiian Electric Companies (Companies) to help increase the effectiveness of both parties' Demand-Side Management (DSM) efforts, in order to achieve the most efficient use of customer dollars through shared learnings, alignment on common endeavors, and identification of new partnership opportunities. The focus areas of this collaboration were Hawai'i Energy and HECO Programs, Planning and Outreach, and ongoing meetings between Hawai'i Energy and the Companies. Meeting discussions revolved around various real-time and future projects, activities such as data sharing and analytics, marketing promotions, customer and trade ally education, and technology vetting.

There have been a number of joint collaborative initiatives between Hawai'i Energy and the Companies. In recognition of the Companies' concerns around information co-jointly presented to the customer was understandable, awareness around energy efficiency was increased by including Hawai'i Energy and several of the Companies' departments, including key account managers, members of education and consumer affairs, corporate communications and demand response teams. Additionally, several of the Companies' vice presidents and managers along with Hawai'i Energy's managers met to discuss continued coordination on customer education, how to better coordinate with industry and the Program's CEAs, and ways to reduce confusion and increase program participation and awareness. Highlights of the collaboration initiatives from these meetings were:

- In response to the Companies' desire to work closely with Hawai'i Energy's Clean Energy Allies, Hawai'i Energy invited the Companies to participate in the Clean Energy Ally (CEA) breakfast that provided an overview of the programs to contractors and allowed the Companies to better understand program offerings and communicate directly with the many CEAs that help promote the Hawai'i Energy program.
- Additionally, Hawai'i Energy invited the Companies to participate in the "Cup of Joe" event targeting the hospitality sector, which included small and large hotel managers and engineers and CEAs that serve this market. The Cup of Joe event was designed to facilitate discussions around the barriers around implementing energy efficiency and the offerings from the CEAs to help customers address these issues.
- Hawai'i Energy's energy advisors and the Companies' key account managers met at the start of the year. Since both the advisors and the account managers are assigned sectors, this allowed staff to meet their counterpart and exchange information and ideas. From that meeting, multiple joint calls were made with Hawai'i Energy and the Companies to customers.
- The Companies shared Hawai'i Energy information and collateral at some of their community outreach events to help increase awareness about energy efficiency and Hawai'i Energy programs.
- The Companies and Hawai'i Energy agreed to increase cross-promotion of energy efficiency on social media.

- The Companies hosted a technology briefing for Hawai'i Energy via their membership with the Electric Power Research Institute (EPRI) to identify potential pilots or programs with Integrated Demand-Side Management (energy efficiency and demand response) capabilities.
- The Companies invited Hawai'i Energy to have an exhibit and free education booth at their Clean Energy Fair.
- As part of the effort to minimize customer confusion and maximize collaboration, the Companies have scheduled a briefing for the Hawai'i Energy team for early PY17. The briefing will provide additional details and answer questions around its filing of the Power Supply Improvement Plan and the Grid Modernization Strategy. Also scheduled for PY17, Hawai'i Energy invited the Companies to provide training on their electric bill to the Clean Energy Allies. Ensuring that contractors properly understand the elements of the electric bill when communicating savings estimates is important to avoid customer issues that affect both Hawai'i Energy and the Companies.

Both Hawai'i Energy and the Companies have a designated point of contact for the collaboration framework. On the Companies' side, the main point of contact is with the Demand Response (DR) team. This has proven to be very valuable as the area of greatest intersection now and into the immediate future is distributed energy resources and demand response. Without an approved DR offering, most of the collaboration in PY16 has been focused on a pilot project utilizing grid interactive water heating. Discussion continues to evolve with this technology and its potential application in low income and multi-family residences. Another area of focus has been the integration of smart thermostats. This will continue to evolve in PY17.

Both parties expect the collaboration to evolve and increase once a DR program is approved, technologies selected, and customer coordination is required. In order to maximize the value stacking that can occur for customers with DR and EE incentives around technologies such as advanced lighting controls, building automation systems, and smart thermostats, more information is needed by Hawai'i Energy around temporal and locational values to best support the Companies' efforts in DR.

The design of energy efficiency programs and measures will always consider the ability to provide the utility with flexibility and control of loads. The ability to add Demand Response capability can be as simple as purchasing a DR-enabled thermostat or as complex as redesigning the electrical distribution system in a new building or renovation to allow separation for more load control. The Hawai'i Energy team continues to coordinate incentives, education, and the Clean Energy Ally Network to assist the utilities in the promotion of integrated energy efficiency and DR.

Valuation of energy efficiency to the grid, from a time and locational perspective, will continue to be a key focus discussion area in the collaboration meetings, as well as the Technical Advisory Group (TAG) and Energy Efficiency Portfolio Standard Technical Working Group (EEPS TWG) meetings. As energy efficiency and Integrated Demand-Side Management evolves into a grid resource and not just a reduction in the denominator to achieve 100% clean energy, continued collaboration and coordination will be necessary. Many families and businesses in Hawai'i already look to Hawai'i Energy as a trusted advisor, even without a "24/7" presence, which raises the importance of consistent messaging around energy efficiency and demand response.

In PY16 the collaboration took a big step forward and Hawai'i Energy remains committed to the goals of the collaboration framework for PY17 and beyond.

CLEAN ENERGY ALLY PROGRAM

Introduction

Launched in PY14, the Clean Energy Ally program empowers Allies to more effectively sell energy efficiency projects and promote Hawai'i Energy program benefits. Clean Energy Allies (CEAs) allow the Program to increase its reach in promoting services and offerings directly to potential customers. CEAs help Hawai'i Energy meet resource acquisition goals and implement energy efficiency projects in both residential and commercial markets.

Clean Energy Ally program recruitment continued in PY16 and currently there are over 700 individual Clean Energy Allies representing 375 companies providing energy efficiency sales and services to electric utility customers. To support our CEAs Hawai'i Energy launched new programs, formed an advisory group to increase feedback for program improvement and formalized a Business Alliances Manager role dedicated to assisting Clean Energy Allies. The Clean Energy Ally program hosted over 25 educational, technical, and professional development trainings, hosted ten networking events with CEAs and potential customers, and Clean Energy Allies logged over 2,500 hours in various trainings. Most importantly, the success of the CEA program over the years and the increase in participation led to the banner year the Program had in PY16 kWh savings.

Clean Energy Ally Program Kick-off Breakfast

Feedback from Clean Energy Allies indicates that Allies value communication and open dialogue about the Program. On July 27, 2016 Hawai'i Energy hosted the first annual Clean Energy Ally Kickoff breakfast event. Over 100 Clean Energy Allies attended the Program Year launch event at the Ala Moana hotel. Allies enjoyed a complimentary breakfast and team members announced revised program offerings and answered technical questions.

At the event, Allies had the opportunity to network with other trade allies, hear updates on Program changes, including a question and answer session, and interact with Program staff. With the reduced budget in PY16, Hawai'i Energy had the opportunity to address concerns about the reduced incentives head-on while providing other mechanisms to support the CEAs as described below. The event was live-streamed for those unable to attend in person.



The kickoff event is designed to be a feedback mechanism for Allies as much as a networking opportunity. Hawai'i Energy Advisors were assigned tables so that each group was able to voice any concerns or feedback directly to a team member.

CEA Support

Contractors have shared with the Program that aside from the incentive funding, growing their business is the biggest motivator to sell energy efficiency. When polled on the greatest benefits received from Hawai'i Energy to help them grow their businesses, Allies' top responses were:

- The willingness of Hawai'i Energy staff to work closely with them on their projects
- Educational opportunities like sales trainings and technical seminars that increase knowledge and support career growth
- New programs that drive more customer participation, like the Lighting Distributor Instant Rebate program
- Timely Program communication
- Help in business expansion and starting new revenue streams

Being plugged in to the Hawai'i Energy Clean Energy Ally program means Allies can take advantage of services designed to help them close more energy efficiency sales and grow their business. Allies receive program training and communications, sales and marketing support from co-op advertising and co-op event funding, gain access to networking events and can sign up for specialized educational offerings like professional development sales courses or technical trainings.

Program Training

As in previous years, Allies apply to the Clean Energy Ally program through an online application process, agree to follow program rules and procedures and are educated on Hawai'i Energy programs. New Allies are on-boarded through a presentation on the Hawai'i Energy program which includes detailed information on incentives, application processes, specific programs (e.g., Lighting Distributor Instant Rebate program, Small Business Direct Install program) and opportunity for Q&A. For project submittal and customer coordination, Trade Allies are referred to individual Energy Advisors covering the market sector of their particular project.

Throughout the program year, as Allies have questions on submittal practices or technical requirements for specific programs, additional training is provided. This year trainings for participating Lighting Distributor Instant Rebate program Allies were held both in-person and via webinar. The trainings ensure Trade Allies are comfortable and knowledgeable with submittal processes, technical requirements verification, and minimum customer contribution rules. The Program's reach-back processing team participates in the calls to answer technical questions on the submittal process and Allies have expressed appreciation on the clear communication and enhanced training that assists them to submit projects more accurately and quickly.

I have been a trade ally with Hawaii Energy since 2009. They have been a great partner in helping educate and provide the best energy solutions for our Customers. There is no doubt in my mind without their support and funding, we would not have been successful in reducing our Customer's energy load and help them recognize huge cost advantages and savings. This funding helps bring the community together in recognizing the benefits that Hawaii Energy provides with their incentive programs. We are proud supporters for the Hawaii Clean Energy Initiative.

- Glenn Sameshima, Manager, Gexpro

On our Residential Program side, Hawai'i Energy staff held multiple solar contractor meetings and visited top participating contractors on the islands of Hawai'i, Maui and O'ahu. The meetings and site visits provided a forum for contractor feedback and an opportunity to exchange experiences and ideas

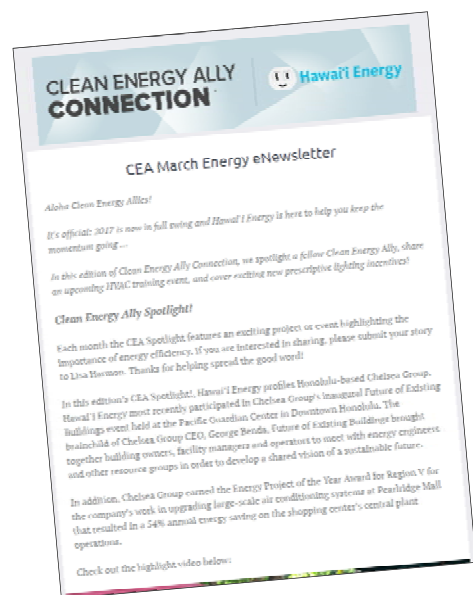
related to current Hawai'i Energy programs and emerging industry issues and trends. Program staff highlighted successes from the first half of its program year, introduced new/upcoming programs, provided legislative updates, and discussed joint cooperative marketing programs through the Clean Energy Ally program. A recurring theme is the renewed business development focus on energy efficiency as the landscape changes for solar photovoltaic opportunities.

In addition, as new program offerings were launched in our Residential Program, Hawai'i Energy employed an online training platform to broadcast information to residential CEAs. The new air conditioning (AC) Tune-Up program presented an opportunity to move from traditional in-person trainings to online trainings via webinars. The webinars allowed for better CEA reach and more scheduling flexibility to train new allies. Coupled with the requirement to sign up as a CEA on the Hawai'i Energy website, the webinars were mandatory in order to participate in the AC Tune-Up program and were successful in furnishing both detailed program instructions and providing new and updated program content. A total of 29 CEAs and staff experienced the new webinar training format.

Communication

Keeping in touch with Trade Allies is a top priority and this year Hawai'i Energy formalized the role of a Business Alliances Manager. In Hawai'i Energy 2.0, the Business Alliances Manager interacts often and directly with Clean Energy Allies to increase communication and collaboration. The Business Alliances Manager provides Clean Energy Allies with personalized attention and guidance on Program offerings. Personal phone calls with Clean Energy Allies are common to discuss new technologies, keep a finger on the pulse of the market, and provide guidance to the appropriate resource for new projects. Serving as an information conduit, the Business Alliances Manager is the feedback loop to solicit input and feedback from Trade Allies that improved our programs and processes to better serve Allies and the businesses and families they serve.

The Program also launched a Clean Energy Ally advisory group. The role of the informal advisory group is to provide key market information, feedback and recommendations to Hawai'i Energy via conference calls, surveys and/or round table discussions. The information is provided back to the Program team for use in program enhancements and improvements. This year Ally feedback helped to shape events, and improved application processes and types of trainings offered.



On a large scale, mass email marketing proved to be an effective tool for reaching Allies. An example is the PY16 launch of the monthly newsletter, “Clean Energy Ally Connection.” The e-newsletter is key to informing Allies on important Program happenings, such as incentive changes, educational opportunities and networking events.

Sales and Marketing Support

Clean Energy Allies were equipped with sales and marketing tools to help them achieve their own business goals while advocating for energy efficiency. Through the Hawai'i Energy website, lead generation support is provided in the Hawai'i Energy online vendor directory. Trade allies have a business listing in the directory where customers looking for a contractor or vendor for energy efficiency goods and/or services find contact information and a hyper-link to Allies' websites. The directory is searchable by island, technology and market sector. Trade ally feedback has been extremely positive, with many vendors reporting sales which originated from directory leads.

We just got another order for O'ahu late last week....The project came through the Hawai'i Energy website!! You guys are awesome.

- Ken Patterson, President, Advanced Energy Innovations, Inc.

The Program provided financial support to Clean Energy Allies for co-op funding for advertising or events. Co-op funding paid for a portion of the events that encouraged business-to-business and customer learning opportunities.

Co-op advertising is a cash subsidy to offset the cost of pre-approved, co-branded radio, print, TV or digital advertising, up to \$2,500 per Ally per year. 12 Businesses participated in co-op advertising in PY16 for a total payout of over \$17,000.

Co-op event funding can subsidize educational offerings incorporated into other industry events such customer focused “lunch and learns,” professional association meetings (IES, ASHRAE, etc.) and trade shows. The co-op event funding is available at up to \$2,500 per Ally per year. Hawai‘i Energy staff always attends the events to present on program offerings and participate in Q&A. Two of our Lighting Distributor Instant rebate program participants, Graybar and HD Supply, held lunch and learns to educate their customers on the benefits of energy efficiency and the Lighting Distributor Instant Rebate program. The events reached hospitality, health care and non-profit customers who are good candidates for prescriptive lighting retrofits.

WatBot, an energy consultancy firm, organized an energy efficiency education event targeted to the private school sector. The event brought together Kamehameha Schools, ‘Iolani, Punahou and Mid-Pacific Institute to learn about energy efficiency benefits, program incentives, and interact with their peers on energy projects. Hawai‘i Energy presented on energy efficiency and made new contacts with key decision-makers in the education sector.

Hawai‘i Energy funding helped Carrier Hawai‘i present an energy efficiency engineering seminar targeted to engineers, design build contractors, energy consultants, HVAC sales professionals and facility and building managers. The seminar covered education on high performance air and water cooled chillers, impact of variable speed screw compression on water- and air-cooled chillers and leveraging the Hawai‘i Energy program.

On a post-event survey of 56 of the respondents, over 90% rated the event 9 or better on a 1-10 rating scale. Participant survey results were positive and when asked how likely they will be to continue using techniques and knowledge in this workshop, 99% said “Definitely” or “Likely.” In a sentence or two, we asked Carrier Hawai‘i Engineering Seminar participants on how the training will move their projects forward and/or leverage the success of their project.



WE ASKED: How will this training move your projects forward?

“I will make sure my customers are aware of available energy efficiency rebates.”

“Evaluate the use of rebates in cost effectiveness of projects for replacement of equipment.”

“Take a look at lighting, not just HVAC projects.”

“Educating clients about rebates/incentives for efficiency upgrades (LED Lighting, etc.)”

Networking

In order to facilitate projects through customer to trade Ally interaction, the program offered multiple networking opportunities. The Program designed and hosted events and for the fourth year renewed its Chamber of Commerce sponsorship. Through the sponsorship, Hawai'i Energy launched a partnership with Innovate Hawai'i to promote energy efficiency investments to manufacturing business owners. Seminars took place on Maui, the Big Island and O'ahu, with each session featuring the Program's offerings and benefits of energy efficiency. Hawai'i Energy also sponsored the Chamber's popular annual Holiday Party and Step Into Spring networking events. Networking opportunities (pictured below, at right) are popular with our Clean Energy Allies for cross-promotion of energy efficiency products and services with other Allies, and as a chance to meet new customers in Hawai'i's business community.

In addition, in PY16 Hawai'i Energy launched "Cup of Joe" coffee hours to deepen relationships with trade allies, answer program related questions and facilitate customer and trade ally interaction. Two coffee hours were held in PY16 to try this out this concept. Both sessions were a success as they were a great opportunity for allies and customers to "talk story" about the issues and challenges customers face and the potential solutions the industry has to these challenges. One of the coffee hours included Hawaiian Electric key account manager participation to further enhance collaboration efforts in educating customers on energy efficiency and clean energy topics.



Professional Development and Technical Training

In an effort to align Clean Energy Ally sales with the Program's sector/segment focus, Hawai'i Energy offered online sales training by Mark Jewell of Selling Energy. Mark is a subject matter expert, coach, speaker and best-selling author focused on overcoming barriers to implementing energy efficiency projects. The three-hour online webinar provided training on how to best use sector-specific Segment Guides and effectively target various market segments, enabling Allies to write more compelling proposals and close more sales.

Coupled with the online training, Allies received access to Selling Energy's online, industry-specific digital database. This powerful online resource empowers Energy Professionals to transform their sales approach to effectively connect the dots between efficiency projects and the bottom line. Segment Guides addressed selling solutions to grocery stores, hotels, hospitals, and offices, and armed Allies with the insider intelligence, business acumen, and the confidence needed to get into the mindset of the customer, in order to reframe the project's benefits such that they actually matter to the customer. Allies were granted access to this digital database containing a trove of insights, examples of compelling non-energy benefits, and other important talking points for over two-dozen segments.

The Program tapped local industry expert and energy efficiency guru Mike Hedge to provide Allies with HVAC technical training through a series titled, “Finding and Selling Energy Conservation Measures in HVAC.” The course (pictured at right) targeted toward HVAC salespeople, facilities and asset managers and energy professionals interested in learning how to turn energy conservation measures in HVAC systems into compelling proposals with investment-grade economic analysis. 70 people attended the courses which were held at three local HVAC distributors – ADMOR, COSCO and Carrier Hawai‘i. In addition to technical training, the four-hour course promoted networking and cross-collaboration amongst Allies.

Professional development and technical trainings are the cornerstones of the Clean Energy Ally program and aim to continually raise the bar of energy efficiency knowledge and project execution. Allies have responded positively to the Program’s offerings, as indicated by their responses to evaluation surveys at the end of each course. One example is that, when asked to describe how they might apply what they learned to their professional roles, Allies said:



“Using language on net operating income (NOI) for buildings to show EE projects will increase net asset value.”

“Explaining why lowest up front cost isn’t the best decision”

“Economic analysis, spreadsheet, power quality and harmonics.”

“The presentation had real-world insights into user decisions and engineering insights.”

“Using life-cycle longevity instead of lowest bid to make proposal.”

Mitsubishi Electric is striving to make the world a better place. We currently market and sell extremely efficient Inverter-Driven Variable Refrigerant Flow Air Conditioning equipment in Hawaii, which significantly reduces the air conditioning electrical consumption. The Rebate Programs available to our customers help drive awareness and use of this innovative product. This included new applications as well as replacement of older energy gobbling equipment. Further, the professional development programs sponsored by Hawaii Energy have helped us identify and assist them to become better stewards of our precious power resources.

- Rory Itano, P.E., Regional Sales Manager, Mitsubishi Electric U.S.

MARKETING & COMMUNICATIONS

Introduction

The start of Hawai'i Energy's 8th year provided a natural catalyst for change and advancement within its marketing and communications strategy. With new program leadership on board and a team primed for the transition to Hawai'i Energy 2.0, the Program capitalized on the opportunity to introduce a refreshed brand concept and place special emphasis on creatively yet cost-effectively maximizing marketing dollars.

In tandem with executing the branding initiative, the Program's marketing & communications strategy focused on enhancing Hawai'i Energy's public image as a collaborative, trusted advisor and creating "force multipliers" (entities or people who can carry Hawai'i Energy's messages to their networks) to increase program awareness, participation and empowerment. This group includes such targets as Clean Energy Allies, past/present customers, like-minded community organizations, members of the media, Hawai'i Energy team members and other external stakeholders.

The following sections outline the major progress of the branding initiative in PY16 and the efforts made to infuse Hawai'i Energy's new identity and position into all facets of program marketing.

Program Branding & Awareness

In reference to **Figure 12**, which outlines the phases of the "Hawai'i Energy 2.0" brand campaign execution, the Program completed Phases 2 -4 during PY16. Following the initial brand audit sessions in PY15 (Phase 1) and additional rounds of feedback from team members, Hawai'i Energy and Wall-to-Wall Studios began working on creative material development and planning for the internal/external launches that would ultimately take place. As a first step, Wall-to-Wall Studios (Wall-to-Wall) developed a "brand position statement" – an internal-facing statement meant to serve as main guiding principle for our efforts moving forward. The Hawai'i Energy brand position statement is summarized as:

"Hawai'i Energy empowers island families & businesses to make smart energy choices."

In addition to the position statement, the Program worked with Wall-to-Wall on establishing several goals and themes for the creative development stages, outlined below:

- **GOAL 1:** *Establish a unique brand personality.*

Given the Program's ongoing challenge of being mistaken for the utility, it was important that the brand campaign address this in order to ultimately achieve greater awareness. Through the use of humor, more contemporary/less formal language and a positive, friendly tone throughout the campaign, the Program sought to establish a unique "personality" for Hawai'i Energy that would help differentiate it from other similar organizations.

- **GOAL 2:** *Re-energize the Hawai'i Energy brand.*

The early planning stages involved discussion on whether to entirely rebrand the Program, which would include renaming it and developing new logo graphics. This was decided against due to the popularity of the current logo ("Pluggy") image and that it would allow the Program to focus more of its creative resources on ad and website production. However, other small changes helped to re-energize (rather than completely overhaul) the brand, including: adding Hawaiian diacritical markings to Program communications to localize the image and selecting an advertising concept that uses outlets.

- **GOAL 3:** *Create top-of-mind awareness.*

Although not everyone who views a Hawai'i Energy ad has a need for our services at that time, it was important that campaign messaging was strong and memorable enough to stay top-of-mind. This helps to establish emotional currency – the idea behind wanting to share about Hawai'i Energy with friends/family, learn more about the brand, or take action when necessary.

- **GOAL 4:** *Understand Hawai'i Energy's role.*

In addition to name recognition, the campaign was designed to educate audiences on how Hawai'i Energy can help them. Thus, campaign materials all involved some sort of tie-in (some subtle, some not) to an element associating the Program with everyday actions.

- **GOAL 5:** *Entice viewers to go online to learn more.*

Updating the Hawai'i Energy website was a large priority for PY16, as the Program always looks for ways to improve customer service and accessibility to information. Thus, the brand campaign included a major website redesign and focused on driving audiences to visit the updated site.

Figure 12 - Phases of "Hawaii Energy 2.0" Branding Campaign Execution (provided by Wall-to-Wall Studios)

Phase 1 – Discover - COMPLETED

Kick-off meeting to define campaign goals, understand the job parameters and develop the strategic criteria and project timeline.

Phase 2 – Define - COMPLETED

Wall-to-Wall will investigate creative directions that meet the criteria defined in the kick-off meeting. With clearly-defined target audiences and knowledge of the competitive landscape and Hawaii Energy's goals and position, the Wall-to-Wall team will formulate a strategic brief and recommendations for the Commission to review.

Phase 3 – Design - COMPLETED

The team will develop initial creative visual/design concepts and draft copy based on the creative brief(s) approved by Hawaii Energy.

Phase 4 – Develop - COMPLETED

Wall-to-Wall will refine the selected creative concept based on Hawaii Energy's feedback. As this is an iterative phase, there may be several rounds of presentations and revisions.

Phase 5 – Deploy – scheduled for PY17

Wall-to-Wall will finalize the deliverables and prepare for production and launch strategy.

Results from 2016 Awareness Study

Midway through the year, the Program received the results of the market research study conducted by the Hawai'i Public Utilities Commission measuring changes in brand awareness levels since the Program's inception. While levels were generally favorable (as compared to other energy efficiency-related brands across the country given the Program's age and budget), the study also acknowledged that: 1) unaided familiarity among respondents had dropped over the last eight years, and 2) approximately 35% of respondents still associate Hawai'i Energy with their utility company or other energy service provider². Looking at this study in addition to other market research conducted over the Program's life shows parallels between the Program's investment in marketing and branding efforts and the levels of awareness. As the Program continues to look for ways to deepen impact and streamline operations, an

² Hawai'i Energy Awareness Study, Opinion Dynamics, 2017, pages 3 - 22.

investment in branding (and thus, greater awareness) helps to break down barriers to customer participation, ensure a positive public image and attract the support and talent the Program seeks in potential collaborators.

Starting With the Internal Transition

As the design and development stages of creative production (i.e. advertisements, website, etc.) were taking place behind-the-scenes, Program staff began an initiative to foster the internal cultural shift that would occur as part of the brand refresh. This is a key component of ensuring a successful public rollout. As team members are Hawai'i Energy's greatest ambassadors, spending the necessary reflection time to connect their individual actions, purposes and passions with that of Hawai'i Energy's brand identity helped equip staff to better advocate for and market Hawai'i Energy. Team members received guidance from Wall-to-Wall Studios on how to integrate this new brand personality into their everyday work, and spent time this year learning more about the various ways Hawai'i Energy impacts the community.

Energy Action Month

An example of a comprehensive investment in branding was Hawai'i Energy's involvement with the national Energy Action Month and first-ever Energy Efficiency Day campaigns. The Program facilitated a statewide proclamation for "Energy Efficiency Day" by Governor David Ige, which received news coverage on three TV morning shows as well as in local newspapers. The Program also supplemented this with an email campaign (sent to 11,700+ subscribers with a record-high 37% open-rate) and a team canvassing event in downtown Honolulu during the busy lunch hour.

Throughout the month, the Program distributed a full suite of social media content, including energy-saving tips and videos of Program events, all while encouraging viewers to get involved and save energy. These efforts were recognized by the national organizers as "leading the charge" and some of our tactics were used as examples for the next round of the annual campaign.



External Stakeholder Engagement

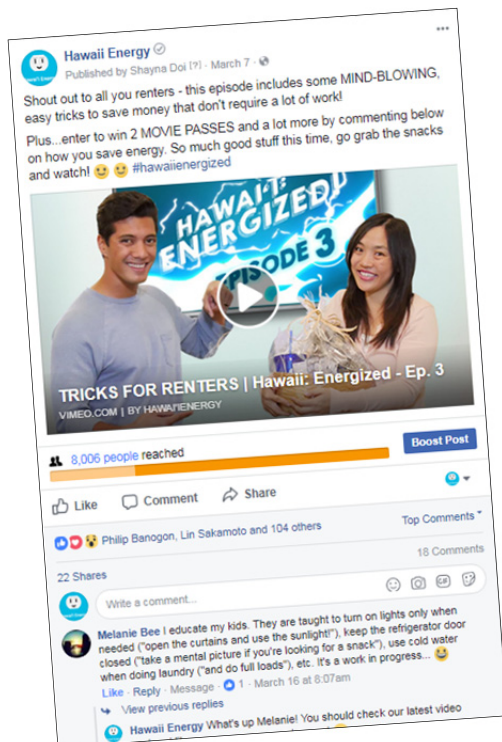
Hawai'i Energy also hired a Communications Specialist to strengthen and build relationships with local government & community leaders, like-minded organizations and members of the media. This strategically-selected group of "VIPs" were identified as potential champions who could help the Program solidify its position as *the* expert on energy efficiency in Hawai'i. Program leadership is encouraged to engage with this group of VIPs on a regular basis through presentations, networking opportunities, event sponsorships and sharing of resources. In turn, Hawai'i Energy has become more top-of-mind for business leaders and has received more opportunities to collaborate on showing the impact of energy efficiency to a larger audience.



As the primary spokesperson for Hawai'i Energy, Executive Director Brian Kealoha attended many speaking engagements and public appearances throughout PY16. Pictured: Addressing attendees at the annual Chamber of Commerce of Hawai'i Holiday party (l), and appearing on local news promoting the joint "Close It For The Climate" campaign with Blue Planet Foundation's Jeff Mikulina (r).



Video case studies featuring the County of Hawai'i and Hawai'i Pacific University (top); snippets from "Hawai'i: Energized!" web series promo on social media (bottom)



New for PY16, elevating in-house video production capabilities was crucial to cost-effectively supplementing stakeholder engagement efforts. As mentioned in the PY16 Annual Plan, a large part of our efforts to increase branding and awareness relies on making information about energy efficiency accessible to the average person – minimizing industry jargon and presenting it in fun, creative and engaging ways. In today's world, video is the most successful and widespread method of information distribution, due largely in part to the influence of social media. The Program's ability to quickly produce high-quality video content in-house allows for more frequent distribution of content, and thus, more opportunities to establish the Hawai'i Energy brand on online platforms and as a presentation tools for team members. With a focus in PY16 on highlighting Hawai'i Energy's community involvement and contributions to conversations in the energy space, the Program's videos garnered large levels of interest from other businesses and social media influencers, putting the Program in the position to leverage our network as a valuable marketing target.

Paramount to these efforts was a new web series called "Hawai'i: Energized!" – a quarterly show designed to address customer questions, highlight outstanding customers, share energy-saving tips and engage in thoughtful discussion with local experts & community leaders. The show is produced and distributed completely with in-house resources. In addition to releasing four full-length (5-10 min) episodes throughout the year, the Program also infused the show into other marketing campaigns for cross-promotion, such as:

- Several 1-2 minute football-themed spots filmed at a local electronics retailer to promote ENERGY STAR® televisions and sound bars;
- Episode content highlighting National Energy Action Month and Energy Efficiency Day;
- A special episode filmed on-location at the State capitol to promote Accessory Dwelling Units (and energy-saving opportunities within these units); and
- A timely climate change-themed episode in response to public concerns over environmental protection after the United States withdrew from the Paris Agreement.

Overwhelming positive response and word-of-mouth traction from social media, trade allies and amongst the local business community led to the show becoming one of the most well-recognized initiatives for Hawai'i Energy in PY16.



Ad Campaign Creative Development

As a culmination to the work being done in-house and with Wall-to-Wall Studios, the Program also spent PY16 preparing for the launch of a new advertising campaign to finally bring the refreshed Hawai'i Energy brand to the mass market. The campaign includes the following to be released at the start of PY17:

- Four (4) 30-second commercial spots, to be shown during daily news programming on all four local network affiliates and major cable networks; in “preview” segments for movies in local theaters, on social media and external Program presentations³
- Three (3) “out-of-home,” billboard-type public display ads at Ala Moana Shopping Center, Ward Entertainment Center and Pearlridge Center
- Two (2) 15-second social media videos (to be used as ads or content whenever necessary)
- A series of web display ads (banners) pointing users to a custom landing page at HawaiiEnergy.com
- A refreshed website design and navigation for HawaiiEnergy.com
- A custom-built Hawai'i Energy mascot costume of the character “Pluggy”

A major tenet of the campaign is to create a memorable impression of Hawai'i Energy for consumers – not necessarily to immediately participate in Hawai'i Energy programs, but rather to entice viewers to learn more about the Program through a creative use of humor and thoughtful imagery. By having memorable – and at times slightly disruptive – ads, the brand is more likely to stay top-of-mind for consumers.

Supporting Program Delivery

The ultimate goal of Hawai'i Energy's long-term investment in branding is that it will ultimately increase awareness of the many lasting benefits of energy efficiency and drive customer participation and adoption of technologies. The two concepts go hand-in-hand; high levels of branding and awareness help pave the way for customer transactions, and an increase in participation (especially good customer experiences) often fosters a positive brand image and word-of-mouth sharing. While branding messaging focuses on general recognition, the Program continues to simultaneously use a variety of marketing tactics to directly support program goal attainment in the Residential, Business, and Transformational markets. Tactics differ slightly in each area, especially as the Program continually seeks to implement innovative outreach methods, but ultimately, if there is a greater uptake in efficiency and conservation, as well as program participation, but a lesser uptake in brand recognition, we will still see this as success. Several successful initiatives from PY16 are outlined below.

Residential

A multi-pronged approach drove residential participation this year via direct mail, print and radio, monthly email communications, working with supply chain partners and community outreach. Program goals were monitored throughout the year to anticipate and direct marketing tactics needed to reach energy savings targets while educating residents on how to reduce their electric bills.

³ Total estimated impressions for TV, movie theater and social media spots is 15,434,973 throughout a four-month period.

Email

Early in the program year, a monthly email campaign strategy was adopted to alternate between a promotional email that directly advertised program offerings, and an educational email that would provide energy-saving tips to island residents. The subscription list grew to almost 65,000 email addresses by adding emails from existing participants across all programs. Open rates were extremely successful at an average of 30% (vs. an industry average of 18.25%) and accounted for heavy traffic to rebate pages and promotional kit sales in our newly-launched online Energy Marketplace. In addition to the email campaigns, the marketing section of the peer comparison reports was utilized to enhance any existing promotions and messaging that were occurring at the same time.

Promotional email campaigns were primarily distributed in tandem with various retail seasons and new rebate offer launches throughout the year. The consumer electronics program was launched on Black Friday and included unique store signage and social media campaigns in addition to circulating an e-blast that received a high open rate (29% by the Monday after Thanksgiving) and over 1,000 click-throughs to the Hawai'i Energy website. Additional email campaigns included:

- Seasonal messages featuring various rebates/offers, such as Home Energy Kits in the online marketplace (winter) as the energy-saving tips for the Super Bowl and cooling measures (summer)
- National ENERGY STAR® promotions like a refrigerator giveaway contest on BobVila.com
- Refrigerator-themed messages featuring the Trade-Up and Rid-A-Fridge programs

Every email included links to upcoming events, as well as timely videos like Blue Planet Foundation's "Small Kine Ridiculous" video. Periodic newsletters were also sent as needed to the local distributors, retailers, contractors and other residential trade allies working directly to install incentivized measures. At the end of PY16, efforts were underway to build the data analytics model to specifically target customers most likely to participate in the various programs offered based on existing demographics.



In addition to the monthly e-newsletters, participants in the programs received triggered emails acknowledging receipt of the rebate application, along with a customer service survey upon check issuance to gauge satisfaction with their program experience. At year end, the overall Customer Satisfaction Score was 9.1 out of 10, an 11% increase over the target score of 8.5.

Direct Mail

In February, over 23,000 letters were sent in a direct mail campaign to previous solar water heating rebate recipients to advertise the solar water heating tune-up program. The overall response rate was 6%, an usually high rate as direct mail campaigns typically garner response rates of 2-3%. Incoming application rates doubled as a result.

Advertising: Print, Radio, Digital and Social Media

The Residential team utilized paid advertising to supplement in-house promotional efforts for solar water heating and refrigerator rebates. Print campaigns took place from April through June to further drive participation rates in the solar water heating programs. CEAs reported increased

Sample digital and print advertisements promoting residential rebate offers

project volume from both the direct mail effort for the tune-ups, as well as the print ads that were placed in each of the island papers across O‘ahu, Hawai‘i and Maui Counties, and were notably pleased with the efforts the programs contributed towards their business. For Earth Day and continuing for the summer, the refrigerator programs received a boost with print and radio ads featuring the Trade-Up and Rid-a-Fridge programs along with a special advanced power strip promotion encouraging customers to “buy now.” Customized 30-second back-to-back scripts were created and launched across top performing radio stations in the market, and included a special announcement by radio personality Michael W. Perry on KSSK (FM 92.3). Call volume rates were up to over 350 calls per week from customers inquiring about these program offers.

An extensive digital campaign was launched May 1 including search and display ads to ensure that customers were directed to the Hawai‘i Energy website when appliances, refrigerators, freezers, renewable and alternate energy, and utilities. Social media ads were targeted at interest areas of home appliances, energy-efficient/efficiency, utilities, appliances, eco-friendly, recycling, and waste management. These tactics will be continued for a longer period as longer durations are needed to see overall effectiveness, but the initial click-through-rate for the search ads are very effective at 2-6% compared to a national average of 2%.

Bill Inserts

In February, over 330,000 bill inserts were developed and included with all residential electric bills across islands. This insert (pictured at right) was created in a comprehensive manner to serve a dual purpose of being the residential programs brochure that was used at all outreach events to inform

customers of the program offerings. Due to high print volumes, this was an extremely cost-effective way to utilize a traditionally more costly collateral piece.

Multi-Family Recruitment

The multi-family direct installation program, *Energy Smart 4 Homes*, had a complete makeover of collateral to complement an intensive, ongoing recruitment effort. The collateral pieces (pictured at right) consisted of a specialized program handout, along with tenant notification hang tags, property flyers and tenant leave-behind pieces all in accordance with Hawai‘i Energy brand guidelines.

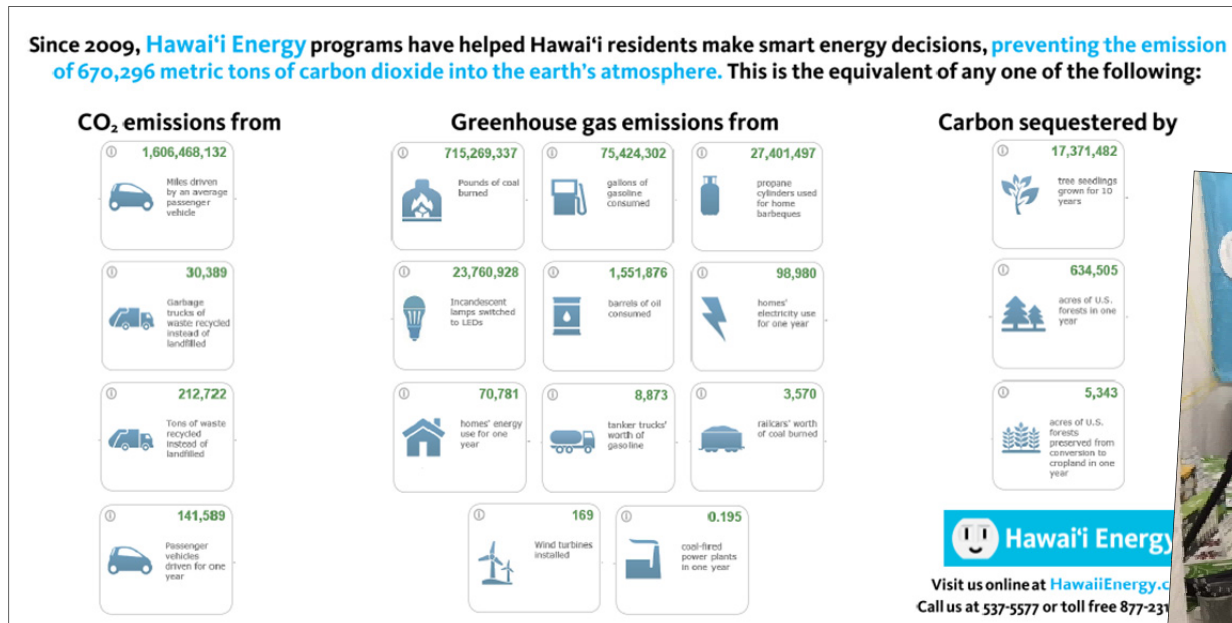
Recruitment efforts continued and were refined heading into the third year of the offer, as detailed in the residential hard-to-reach section. Marketing efforts worked hand-in-hand with the new community partners by placing ads in community association and bank newsletters and websites.

searching for keywords such as home

Collateral Materials

The standard rebate applications are provided at all retail locations and to the contractors administering programs throughout the year. Additionally, the Program utilizes a number of print pieces to enhance promotion for these offers, including:

- store signage for various appliances and displays in accordance with retailer requirements;
- educational handouts and worksheets
- CEA vehicle magnets
- banners and signs for events
- event giveaways



Continuing to participate in community outreach events throughout the year provides the Program the opportunity to answer customer questions in-person, educate on energy efficiency concepts, and market rebates and services. Pictured at left, a custom-made banner for the Moloka'i Earth Day Festival.



Outreach Events

Throughout the year, community events beyond our transformational workshops continued to be a great way for Hawai'i Energy to connect to families. From the annual Children & Youth Day at the Hawai'i State Capitol to the Moloka'i Earth Day Festival, the Program was able to reach and connect to people with our messaging and continue to receive requests from various groups to help educate and promote energy awareness.

The Building Industry Association (BIA) Home Show at the Neal Blaisdell Center continues to be a great venue for us to connect with thousands of residents looking for ways to upgrade their home and save energy at the same time. This year, we featured a lighting display to show the different type of LED bulbs (shapes, watts, dimmable) that proved to be popular, especially along-side displays of current promotions in retail stores.

Business

With a reduced budget for incentives, the primary emphasis of marketing the business program in PY16 shifted from acquiring participants to beginning to position the Program as a trusted advisor in the business community. Incentive programs were consistently on track to meet or exceed goal throughout the year, and this provided opportunities for the Program to message the benefits (other than rebates) that a business relationship with Hawai'i Energy might provide, such as long-term guidance/strategic planning assistance and marketing value.

Clean Energy Allies As “Force Multipliers”

The Program invested in the Clean Energy Ally network in PY16 as it is the primary mechanism for building business relationships and promoting our offers in the marketplace. A large majority of customers in the business sector learn about Hawai'i Energy through an Ally (e.g. contractor, engineer, building manager, etc.).

As a result of a strong launch year and feedback from Allies, supporting the CEA program is now more about providing them with more meaningful benefits, and feedback and added value opportunities. The Program approached this year with even more diligence in ensuring communication and trust between Allies and the Program remained clear and strong, which included allowing Allies to receive first notice on incentive level changes (via frequent email campaigns) and the Program's positions on local issues.

The Program also hosted the first-ever Clean Energy Ally Kickoff Breakfast, an event designed to provide incentive updates and networking opportunities to Allies at the start of the program year. Utilizing in-house resources and expertise to coordinate, market and facilitate the event helped the Program cost-effectively accommodate the large number of Allies. Furthermore, at the request of the Allies following the kickoff event, the Program added more strategic networking opportunities such as quarterly “Cup of Joe” coffee hours and community presentations to supplement these efforts.

Another Ally benefit, Hawai'i Energy's co-op marketing initiative, was expanded this year to include subsidies for event costs in addition to traditional advertising. A win-win for both sides, co-op funding allows the Program to capitalize on the reach of Allies' advertising initiatives while adding credibility to Allies' offers. Many Allies took advantage of the \$2,500 incentive to co-brand their advertisements – and now events – with Hawai'i Energy in PY16, either through a mention in the ad text or by having a Hawai'i Energy team member present at their event.



A multi-channel promotional campaign that included several email blasts, a promotional video, and content on the Hawai'i Energy website and social media (in addition to personal invitations from staff) helped drive attendance at the CEA Kickoff.



A sample ad financed through Hawai'i Energy's Co-op Advertising offer, which required participants to include the Clean Energy Ally logo on their ads. This print ad ran in the Honolulu Star-Advertiser.

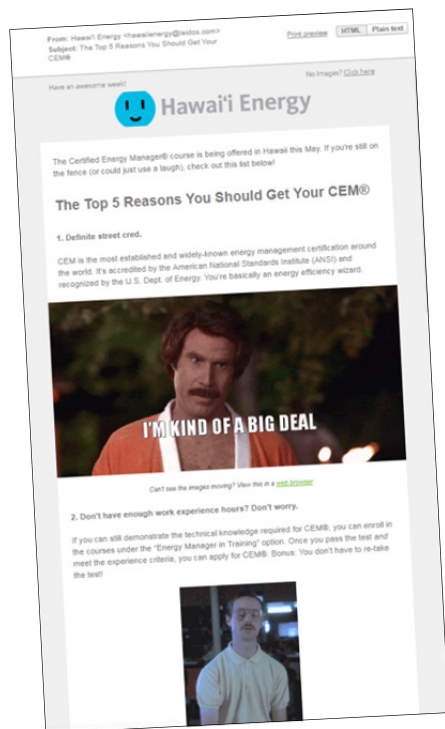
Furthermore, in line with the new branding strategy, storytelling became an important marketing theme, with resources dedicated to researching and showcasing a holistic view of what it means for a business to complete an energy efficiency project. Telling a complete story of how a business may also benefit from elements like increased safety, equipment longevity, a better customer experience, or simply the ability to make a bigger community impact helps relate the technical “nuts & bolts” of the project to the general public. This storytelling mindset was infused into social media and website content, digital case study profiles, presentations and monthly e-newsletters.

Transformational

Hawai‘i Energy has seen much success over the years by joining forces with other sustainability-minded organizations to bring energy efficiency concepts to a wider audience. This year in particular, the Program’s work with Blue Planet Foundation and Kanu Hawai‘i focused on developing creative, co-branded marketing tools, such as educational videos, infographics, print materials, and even facilitating a workplace employee energy challenge (see Transformational section). While each of these initiatives were developed to achieve Transformational goals, collaborating with these organizations (and thus, co-branding these projects) allowed Hawai‘i Energy to reap additional public exposure, own resources that can be used for future education and most importantly, strengthen the working relationship with fellow community organizations and leaders.



Hawai‘i Energy took the opportunity in PY16 to catch up with and film a video case study of If The Shoe Fits, a past recipient of LED lighting through the SBDIL program on Maui. In addition to seeing more than 50% in monthly energy savings, owner Teri Edmonds’ store is significantly cooler and the new lights enhance the look of the products in the store.



The Program also utilized marketing & communications to support the recruitment and facilitation of technical trainings, such as the Building Operator Certification® and Certified Energy Manager® seminars in PY16. As such offerings are designed for a specific audience, the Program relied on targeted email and social media campaigns, as well as scripted, concerted efforts by Energy Advisors to promote them and encourage participation. In addition, the marketing and communications staff was also on-hand at these events to capture positive feedback to be used for promotional purposes for repeat events in the future.

This year, the Program’s refreshed brand identity was the catalyst toward experimenting with humorous tones within the copy of email campaigns, particularly this one which encouraged “on the fence” subscribers to attend CEM training.

APPENDIX A – PORTFOLIO IMPACTS

Introduction

The PY2016 annual report *Portfolio Impacts* section has been reorganized to highlight the Program Level Savings, relocating the System and Customer Level Savings tables and descriptions to **Appendix A**. These two levels of energy and demand savings are described below.

4. **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.
5. **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).

Table A1 and Table A2 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 System and Customer Level Savings.

Table A1 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 Year)	Lifetime Energy Impact (kWh - Life)
BEEM	830	509,234	\$5,887,496	7,269	71,026,191	1,065,453,062
CBEEM	336	2,037	\$4,354,447	4,666	31,251,613	363,734,042
BHTR	2,789	4,707,159	\$2,882,168	1,586	8,646,096	118,115,322
BESM	0	0	\$0	0	0	0
Business Totals	3,955	5,218,430	\$13,124,111	13,521	110,923,900	1,547,302,425
REEM	7,720	4,450,641	\$6,444,202	9,208	64,076,517	705,799,544
RHTR	3,228	32,937	\$474,276	343	1,023,996	6,170,401
RESM	2,780	2,780	\$262,675	85	818,353	3,202,406
CESH	0	0	\$0	0	0	0
Residential Totals	13,728	4,486,358	\$7,181,153	9,635	65,918,867	715,172,351
Total	17,683	9,704,788	\$20,305,264	23,156	176,842,767	2,262,474,777

Program	First Year Impact Cost (\$/kWh)	Lifetime Impact Cost (\$/kWh)	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB / Incentive \$)	Driven Investment Ratio (TRC / Incentive \$)	Benefit Test (TRB/TRC)
BEEM	\$0.08	\$0.01	\$179,198,637	\$40,085,394	30.4	6.8	4.5
CBEEM	\$0.14	\$0.01	\$67,316,168	\$59,237,126	15.5	13.6	1.1
BHTR	\$0.33	\$0.02	\$22,391,497	\$3,177,730	7.8	1.1	7
BESM	\$0	\$0	\$0	\$0	0	0	0
Business Totals	\$0.12	\$0.01	\$268,906,301	\$102,500,251	20.5	7.8	2.6
REEM	\$0.10	\$0.01	\$131,218,529	\$45,093,269	20.4	7	2.9
RHTR	\$0.46	\$0.08	\$1,211,909	\$485,527	2.6	1	2.5
RESM	\$0.32	\$0.08	\$538,895	\$834,000	2.1	3.2	0.6
CESH	\$0	\$0	\$0	\$0	0	0	0
Residential Totals	\$0.11	\$0.01	\$132,969,332	\$46,412,796	18.5	6.5	2.9
Total	\$0.12	\$0.01	\$401,875,634	\$148,913,047	19.8	7.3	2.7

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

Table A2 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)
BEEM	830	509,234	\$5,887,496	6,575	4,274,186	964,109,610
CBEEM	336	2,037	\$4,354,447	4,209	28,193,259	328,118,607
BHTR	2,789	4,707,159	\$2,882,168	1,431	7,800,107	106,565,026
BESM	0	0	\$0	0	0	0
Business Totals	3,955	5,218,430	\$13,124,111	12,215	100,267,552	1,398,793,242
REEM	7,720	4,450,641	\$6,444,202	8,323	57,930,854	638,111,198
RHTR	3,228	32,937	\$474,276	308	921,408	5,554,608
RESM	2,780	2,780	\$262,675	76	738,305	2,890,661
CESH	0	0	\$0	0	0	0
Residential Totals	13,728	4,486,358	\$7,181,153	8,708	59,590,567	646,556,467
Total	17,683	9,704,788	\$20,305,264	20,923	159,858,118	2,045,349,709

Program	First Year Impact Cost (\$/kWh)	Lifetime Impact Cost (\$/kWh)	Total Resource Benefit (TRB)	Total Resource Cost (TRC)	Driven Benefit Ratio (TRB / Incentive \$)	Driven Investment Ratio (TRC / Incentive \$)	Benefit Test (TRB/TRC)
BEEM	\$0.09	\$0.01	\$162,140,996	\$40,085,394	27.5	6.8	4
CBEEM	\$0.15	\$0.01	\$60,712,647	\$59,237,126	13.9	13.6	1
BHTR	\$0.37	\$0.03	\$20,206,839	\$3,177,730	7	1.1	6.4
BESM	\$0	\$0	\$0	\$0	0	0	0
Business Totals	\$0.13	\$0.01	\$243,060,482	\$102,500,251	18.5	7.8	2.4
REEM	\$0.11	\$0.01	\$118,626,255	\$45,093,269	18.4	7	2.6
RHTR	\$0.52	\$0.09	\$1,090,765	\$485,527	2.3	1	2.2
RESM	\$0.36	\$0.09	\$486,437	\$834,000	1.9	3.2	0.6
CESH	\$0	\$0	\$0	\$0	0	0	0
Residential Totals	\$0.12	\$0.01	\$120,203,456	\$46,412,796	16.7	6.5	2.6
Total	\$0.13	\$0.01	\$363,263,939	\$148,913,047	17.9	7.3	2.4

Savings at Customer and Program Levels

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

- **Table A3:** Energy (kWh) Reduction by Impact Level and by Island
- **Table A4:** Demand (kW) Reduction by Impact Level and Island
- **Table A5:** Energy (kW) Reduction by Impact Level and Program
- **Table A6:** Demand (kW) Reduction by Impact Level and Program

Table A3					
Energy (kWh) Reduction 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	25,043,801	9.00%	27,297,743	79.65%	21,741,880
Lāna'i	113,739	9.96%	125,067	90.63%	113,349
Maui	26,101,432	9.96%	28,701,134	78.22%	22,450,284
Moloka'i	148,757	9.96%	163,574	85.31%	139,551
Oahu	108,450,389	11.16%	120,555,248	79.94%	96,371,329
Total	159,858,118	10.62%	176,842,767	79.63%	140,816,393
Percent of Customer Level Savings			111%		88%

Table A4					
Demand (kW) Reduction 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	2,989	9.00%	3,258	80.52%	2,624
Lāna'i	10	9.96%	11	89.96%	10
Maui	3,137	9.96%	3,449	78.49%	2,707
Moloka'i	22	9.96%	25	83.01%	20
Oahu	14,764	11.16%	16,413	80.53%	13,217
Total	20,923	10.67%	23,156	80.23%	18,578
Percent of Customer Level Savings			111%		89%

Table A5					
Energy (kWh) Reduction by Impact Level and Program					
Program	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
BEEM	64,274,186	10.51%	71,026,191	75.00%	53,269,643
CBEEM	28,193,259	10.85%	31,251,613	75.00%	23,438,710
BESM	0	0%	0	0%	0
BHTR	7,800,107	10.85%	8,646,096	99.05%	8,564,037
Business Programs	100,267,552	10.63%	110,923,900	76.87%	85,272,390
REEM	57,930,854	10.61%	64,076,517	83.91%	53,767,121
CESH	0	0%	0	0%	0
RESM	738,305	10.84%	818,353	92.00%	752,885
RHTR	921,408	11.13%	1,023,996	100.00%	1,023,996
Residential Programs	59,590,567	10.62%	65,918,867	84.26%	55,544,003
Total	159,858,118	10.62%	176,842,767	79.63%	140,816,393
Percent of Customer Level Savings			111%		88%

Table A6					
Demand (kW) Reduction by Impact Level and Program					
Program	Customer Level Savings	System Losses	System Level Savings	Net-to-Gross Ratio	Program Level Savings
BEEM	6,575	10.55%	7,269	75.00%	5,452
CBEEM	4,209	10.86%	4,666	75.00%	3,500
BESM	0	0%	0	0%	0
BHTR	1,431	10.81%	1,586	99.20%	1,573
Business Programs	12,215	10.69%	13,521	77.84%	10,525
REEM	8,323	10.63%	9,208	82.90%	7,633
CESH	0	0%	0	0%	0
RESM	76	10.81%	85	92.00%	78
RHTR	308	11.17%	343	100.00%	343
Residential Programs	8,708	10.65%	9,635	83.59%	8,054
Total	20,923	10.67%	23,156	80.23%	18,578
Percent of Customer Level Savings			111%		89%

Measure Contribution toward Savings Impacts

Measure impacts are parsed out in the below tables for Program level and Customer level impacts by dimensions including rate schedule, island, and program:

- **Table A7:** Program Level Energy Impacts (kWh) by rate schedule
- **Table A8:** Program Level Demand Impacts (kW) by rate schedule
- **Table A9:** Program Level Energy Impacts (first year kWh) by program and rate class
- **Table A10:** Program Level Demand Impacts (kW) by program and rate class
- **Table A11:** Customer Level Energy Impacts (kWh) by program rate class
- **Table A12:** Customer Level Demand Impacts by program and rate class

Table A7 Program Energy Impact by Rate Schedule									
Island	R	G	J	P	DS	F	Other*	Total	%
Hawai'i Island	9,265,117	1,083,180	9,865,379	993,293	0	534,911	0	21,741,880	15.40%
Lāna'i	79,420	3,303	30,627	0	0	0	0	113,349	0.10%
Maui	8,146,687	265,739	8,275,768	5,762,091	0	0	0	22,450,284	15.90%
Moloka'i	84,002	7,252	22,016	24,594	0	0	1,686	139,551	0.10%
O'ahu	37,973,752	5,213,683	33,130,776	16,562,698	3,450,262	0	40,158	96,371,329	68.40%
Total	55,548,978	6,573,157	51,324,566	23,342,676	3,450,262	534,911	41,844	140,816,393	100.00%
Percent	39.40%	4.70%	36.40%	16.60%	2.50%	0.40%	0.00%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Table A8 Program Demand Impact by Rate Schedule									
Island	R	G	J	P	DS	F	Other*	Total	%
Hawai'i Island	1,269	220	871	183	0	81	0	2,624	14.10%
Lāna'i	7	1	3	0	0	0	0	10	0.10%
Maui	1,128	42	684	854	0	0	0	2,707	14.60%
Moloka'i	11	1	3	6	0	0	0	20	0.10%
O'ahu	5,640	726	3,781	2,394	664	0	11	13,217	71.10%
Total	8,054	989	5,342	3,437	664	81	11	18,578	100.00%
Percent	43.40%	5.30%	28.80%	18.50%	3.60%	0.40%	0.10%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Table A9									
Program Energy Impact by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	25,134	736,492	38,912,596	12,357,888	1,199,902	0	37,632	53,269,643	37.80%
CBEEM	0	680,255	9,325,100	10,673,947	2,224,498	534,911	0	23,438,710	16.60%
BESM	0	0	0	0	0	0	0	0	0.00%
BHTR	5,736	5,137,216	3,084,712	310,511	25,862	0	0	8,564,037	6.10%
Business Programs	30,869	6,553,962	51,322,408	23,342,345	3,450,262	534,911	37,632	85,272,390	60.60%
REEM	53,751,335	11,942	2,158	0	0	0	1,686	53,767,121	38.20%
CESH	0	0	0	0	0	0	0	0	0.00%
RESM	751,055	1,499	0	331	0	0	0	752,885	0.50%
RHTR	1,015,718	5,753	0	0	0	0	2,525	1,023,996	0.70%
Residential Programs	55,518,108	19,195	2,158	331	0	0	4,211	55,544,003	39.40%
Total	55,548,978	6,573,157	51,324,566	23,342,676	3,450,262	534,911	41,844	140,816,393	100.00%
Percent	39.40%	4.70%	36.40%	16.60%	2.50%	0.40%	0.00%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Table A10									
Program Demand Impact by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	4	91	3,281	1,861	204	0	10	5,452	29.30%
CBEEM	0	99	1,363	1,513	444	81	0	3,500	18.80%
BESM	0	0	0	0	0	0	0	0	0.00%
BHTR	2	795	698	63	16	0	0	1,573	8.50%
Business Programs	6	985	5,342	3,437	664	81	10	10,525	56.60%
REEM	7,631	2	0	0	0	0	0	7,633	41.10%
CESH	0	0	0	0	0	0	0	0	0.00%
RESM	78	0	0	0	0	0	0	78	0.40%
RHTR	340	2	0	0	0	0	1	343	1.80%
Residential Programs	8,048	4	0	0	0	0	1	8,054	43.40%
Total	8,054	989	5,342	3,437	664	81	11	18,578	100.00%
Percent	43.40%	5.30%	28.80%	18.50%	3.60%	0.40%	0.10%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Table A11 Customer Energy Impact by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	30,514	887,318	46,988,101	14,883,999	1,439,119	0	45,135	64,274,186	40.20%
CBEEM	0	818,627	11,213,832	12,838,491	2,667,984	654,325	0	28,193,259	17.60%
BESM	0	0	0	0	0	0	0	0	0.00%
BHTR	5,159	4,683,979	2,805,192	282,513	23,263	0	0	7,800,107	4.90%
Business Programs	35,673	6,389,923	61,007,125	28,005,003	4,130,366	654,325	45,135	100,267,552	62.70%
REEM	57,912,716	13,731	2,466	0	0	0	1,941	57,930,854	36.20%
CESH	0	0	0	0	0	0	0	0	0.00%
RESM	736,513	1,468	0	323	0	0	0	738,305	0.50%
RHTR	913,961	5,175	0	0	0	0	2,271	921,408	0.60%
Residential Programs	59,563,190	20,375	2,466	323	0	0	4,212	59,590,567	37.30%
Total	59,598,863	6,410,298	61,009,591	28,005,327	4,130,366	654,325	49,347	159,858,118	100.00%
Percent	37.30%	4.00%	38.20%	17.50%	2.60%	0.40%	0.00%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Table A12 Customer Demand Impact by Rate Class									
Program	R	G	J	P	DS	F	Other*	Total	%
BEEM	5	110	3,961	2,242	245	0	12	6,575	31.40%
CBEEM	0	119	1,639	1,820	532	99	0	4,209	20.10%
BESM	0	0	0	0	0	0	0	0	0.00%
BHTR	2	726	632	57	14	0	0	1,431	6.80%
Business Programs	7	955	6,232	4,119	791	99	12	12,215	58.40%
REEM	8,320	3	0	0	0	0	0	8,323	39.80%
CESH	0	0	0	0	0	0	0	0	0.00%
RESM	76	0	0	0	0	0	0	76	0.40%
RHTR	306	2	0	0	0	0	1	308	1.50%
Residential Programs	8,702	4	0	0	0	0	1	8,708	41.60%
Total	8,709	959	6,232	4,119	791	99	13	20,923	100.00%
Percent	41.60%	4.60%	29.80%	19.70%	3.80%	0.50%	0.10%	100.00%	

*Other combines the less frequently assigned rate codes for PY16

Portfolio Total Resource Benefit and Total Resource Cost

TRC Test

The TRB/TRC ratio for individual measures is listed below in **Table A13**.

Table A13 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 %	
LED Lighting	5,056	27.2%	40,109,666	28.5%	601,044,130	34.2%	15	4.4	\$106,506,845	34.0%	\$24,010,753	16.1%	\$4,008,233	19.7%
LED Omni Directional	1,678	9.0%	20,728,475	14.7%	310,617,207	17.7%	15	4.7	\$50,089,531	16.0%	\$10,605,091	7.1%	\$1,793,011	8.8%
Custom Lighting	2,135	11.5%	14,533,727	10.3%	147,078,587	8.4%	10.1	1.5	\$27,087,379	8.7%	\$17,951,641	12.1%	\$2,634,753	13.0%
LED Linear	846	4.6%	6,924,040	4.9%	102,621,540	5.8%	14.8	3	\$18,006,855	5.8%	\$6,094,950	4.1%	\$1,254,263	6.2%
Custom HVAC	788	4.2%	4,362,749	3.1%	71,373,653	4.1%	16.4	1	\$13,576,021	4.3%	\$13,498,976	9.1%	\$888,789	4.4%
Custom - High Efficiency Lighting	618	3.3%	5,154,439	3.7%	71,676,055	4.1%	13.9	9.4	\$12,568,523	4.0%	\$1,338,332	0.9%	\$1,311,169	6.5%
Chillers	431	2.3%	2,751,057	2.0%	55,021,149	3.1%	20	0.8	\$9,530,703	3.0%	\$12,095,852	8.1%	\$472,747	2.3%
Solar Water Heating	536	2.9%	2,366,696	1.7%	47,333,927	2.7%	20	1.1	\$9,226,803	2.9%	\$8,375,400	5.6%	\$792,067	3.9%
Custom	391	2.1%	2,935,313	2.1%	44,029,702	2.5%	15	5.6	\$7,916,122	2.5%	\$1,412,400	0.9%	\$470,800	2.3%
VRF Air Conditioners	585	3.2%	2,133,829	1.5%	32,007,441	1.8%	15	0.7	\$7,348,803	2.3%	\$10,060,504	6.8%	\$417,850	2.1%
CFL	606	3.3%	4,290,691	3.0%	25,728,490	1.5%	6	8.2	\$4,739,115	1.5%	\$577,376	0.4%	\$189,864	0.9%
Package Units: 15% Better Than Code	276	1.5%	1,338,414	1.0%	20,076,203	1.1%	15	3.2	\$4,127,720	1.3%	\$1,279,275	0.9%	\$595,604	2.9%
Custom Controls	233	1.3%	2,062,253	1.5%	20,622,532	1.2%	10	2	\$3,701,320	1.2%	\$1,843,705	1.2%	\$328,304	1.6%
VFD Pump For Chilled Water / Condenser Water	279	1.5%	1,029,612	0.7%	15,444,175	0.9%	15	7.6	\$3,529,801	1.1%	\$466,650	0.3%	\$109,800	0.5%
Refrigerator W/ Trade In	69	0.4%	1,659,405	1.2%	23,231,673	1.3%	14	1.2	\$3,458,723	1.1%	\$2,767,200	1.9%	\$295,450	1.5%
Domestic Water Booster Packages	90	0.5%	944,726	0.7%	14,170,894	0.8%	15	3.4	\$2,356,662	0.8%	\$693,000	0.5%	\$70,560	0.3%
Custom Miscellaneous	148	0.8%	773,724	0.5%	12,734,268	0.7%	16.5	0.1	\$2,439,391	0.8%	\$22,754,709	15.3%	\$136,906	0.7%
ECM Refrigeration	93	0.5%	863,069	0.6%	12,946,035	0.7%	15	4.2	\$2,209,588	0.7%	\$527,018	0.4%	\$221,765	1.1%

Table A13 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	%
Peer Group Comparison	1,710	9.2%	14,984,156	10.6%	14,984,156	0.9%	1	1.7	\$2,173,051	0.7%	\$1,251,103	0.8%	\$1,251,103	6.2%
Custom Refrigeration	89	0.5%	893,611	0.6%	11,424,918	0.6%	12.8	1.6	\$1,933,605	0.6%	\$1,232,726	0.8%	\$169,271	0.8%
Whole House Fan	182	1.0%	132,828	0.1%	2,656,568	0.2%	20	29.4	\$1,466,269	0.5%	\$49,800	0.0%	\$31,125	0.2%
LED Exit Signs	65	0.4%	553,089	0.4%	8,294,092	0.5%	15	23.5	\$1,446,927	0.5%	\$61,665	0.0%	\$41,435	0.2%
Split Systems: VRF	63	0.3%	566,638	0.4%	8,499,571	0.5%	15	1.9	\$1,460,919	0.5%	\$758,110	0.5%	\$245,424	1.2%
Water Cooler Timers	88	0.5%	993,219	0.7%	7,945,751	0.5%	8	15.6	\$1,385,051	0.4%	\$88,950	0.1%	\$88,950	0.4%
Fluorescent T12 To T8 Low Wattage	88	0.5%	358,339	0.3%	5,016,752	0.3%	14	5.4	\$1,104,030	0.4%	\$202,993	0.1%	\$170,093	0.8%
Anti-Sweat Heater Controls	47	0.3%	449,698	0.3%	5,396,382	0.3%	12	16.4	\$927,787	0.3%	\$56,700	0.0%	\$63,000	0.3%
LED Specialty	44	0.2%	358,697	0.3%	5,325,478	0.3%	14.8	13.7	\$939,850	0.3%	\$68,737	0.0%	\$48,437	0.2%
Custom Pumps & Motors	41	0.2%	451,970	0.3%	4,954,189	0.3%	11	0.8	\$888,806	0.3%	\$1,047,649	0.7%	\$72,461	0.4%
Showerhead	388	2.1%	500,439	0.4%	2,502,194	0.1%	5	8.5	\$658,217	0.2%	\$77,322	0.1%	\$74,729	0.4%
VFD - Ahu	64	0.3%	179,857	0.1%	2,697,849	0.2%	15	3.5	\$696,433	0.2%	\$197,808	0.1%	\$31,200	0.2%
Window Film	56	0.3%	224,092	0.2%	2,240,924	0.1%	10	2.6	\$505,482	0.2%	\$195,658	0.1%	\$32,310	0.2%
ECM Fan Coil	30	0.2%	264,993	0.2%	3,974,889	0.2%	15	2.4	\$687,823	0.2%	\$290,850	0.2%	\$76,175	0.4%
LED	28	0.2%	200,240	0.1%	3,003,607	0.2%	15	2.3	\$549,449	0.2%	\$235,620	0.2%	\$0	0.0%
Submetering (Condo)	55	0.3%	508,337	0.4%	4,066,699	0.2%	8	1.4	\$733,812	0.2%	\$527,500	0.4%	\$158,250	0.8%
Split Systems: 15% Better Than Code	34	0.2%	245,847	0.2%	3,687,700	0.2%	15	1.3	\$668,878	0.2%	\$504,395	0.3%	\$93,503	0.5%
Custom Water Heating	51	0.3%	227,584	0.2%	3,373,119	0.2%	14.8	1.3	\$707,905	0.2%	\$541,463	0.4%	\$98,625	0.5%
TV	58	0.3%	481,758	0.3%	2,890,548	0.2%	6	0.7	\$518,301	0.2%	\$788,263	0.5%	\$94,859	0.5%
Fluorescent Delamping	20	0.1%	129,448	0.1%	1,812,268	0.1%	14	36	\$340,796	0.1%	\$9,472	0.0%	\$6,078	0.0%
Rid-A-Fridge (Refrigerator)	7	0.0%	183,407	0.1%	2,567,692	0.1%	14	19	\$380,685	0.1%	\$20,040	0.0%	\$20,040	0.1%

Table A13 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	%
Fluorescent Delamping With Reflectors	8	0.0%	86,913	0.1%	1,216,786	0.1%	14	11.8	\$200,517	0.1%	\$16,960	0.0%	\$8,290	0.0%
Fluorescent T12 To T8 Standard	14	0.1%	48,760	0.0%	682,645	0.0%	14	5	\$158,091	0.1%	\$31,440	0.0%	\$31,440	0.2%
CFL Omni-Directional	35	0.2%	248,010	0.2%	1,240,051	0.1%	5	4.9	\$213,733	0.1%	\$43,859	0.0%	\$43,859	0.2%
Faucet Aerator	159	0.9%	150,352	0.1%	751,761	0.0%	5	3.8	\$227,879	0.1%	\$59,952	0.0%	\$55,861	0.3%
Transformer (Three-Phase)	5	0.0%	45,362	0.0%	1,451,576	0.1%	32	2.5	\$164,803	0.1%	\$66,171	0.0%	\$13,740	0.1%
Advance Power Strips	49	0.3%	437,138	0.3%	2,185,688	0.1%	5	2.4	\$367,838	0.1%	\$154,871	0.1%	\$141,959	0.7%
Heat Pump Water Heater	20	0.1%	155,067	0.1%	1,550,668	0.1%	10	1.5	\$285,914	0.1%	\$194,400	0.1%	\$32,400	0.2%
Fluorescent T8 To T8 Low Wattage	34	0.2%	109,695	0.1%	1,535,736	0.1%	14	1.3	\$370,980	0.1%	\$293,340	0.2%	\$18,084	0.1%
VFD Pool Pumps	3	0.0%	110,047	0.1%	1,198,632	0.1%	10.9	1.3	\$179,069	0.1%	\$137,400	0.1%	\$30,675	0.2%
Window AC W/ Trade In	17	0.1%	63,379	0.0%	760,552	0.0%	12	1	\$171,872	0.1%	\$173,920	0.1%	\$27,920	0.1%
Package Units: VRF	16	0.1%	68,481	0.0%	1,027,219	0.1%	15	0.8	\$218,767	0.1%	\$268,819	0.2%	\$35,788	0.2%
LED Refrigerated Case Lighting	18	0.1%	120,251	0.1%	1,395,289	0.1%	11.6	0.8	\$256,558	0.1%	\$312,487	0.2%	\$145,332	0.7%
Solar Water Heating Tune-Up	64	0.3%	548,332	0.4%	2,741,661	0.2%	5	0.7	\$462,856	0.1%	\$648,300	0.4%	\$216,250	1.1%
Heat Pump	4	0.0%	113,424	0.1%	1,134,244	0.1%	10	0.3	\$173,008	0.1%	\$533,040	0.4%	\$9,377	0.0%
Rid-A-Fridge (Freezer)	1	0.0%	30,332	0.0%	424,644	0.0%	14	19.8	\$62,957	0.0%	\$3,175	0.0%	\$3,175	0.0%
Steam Cooker	7	0.0%	28,476	0.0%	341,707	0.0%	12	6.5	\$72,338	0.0%	\$11,154	0.0%	\$1,500	0.0%
Reach-In Freezer Glass Door	0	0.0%	4,258	0.0%	51,098	0.0%	12	6	\$8,939	0.0%	\$1,500	0.0%	\$150	0.0%
Kitchen Ventilation	2	0.0%	14,489	0.0%	217,338	0.0%	15	4.7	\$41,959	0.0%	\$9,000	0.0%	\$3,500	0.0%
Room Occupancy Sensors	5	0.0%	52,269	0.0%	418,150	0.0%	8	4	\$74,412	0.0%	\$18,600	0.0%	\$18,600	0.1%
CFL Specialty	7	0.0%	48,646	0.0%	291,875	0.0%	6	3.1	\$53,768	0.0%	\$17,092	0.0%	\$16,987	0.1%
Hot Food Holding Cabinet	3	0.0%	17,354	0.0%	208,248	0.0%	12	2.9	\$41,020	0.0%	\$14,000	0.0%	\$3,200	0.0%
Transformer (Single-Phase)	0	0.0%	260	0.0%	8,319	0.0%	32	2.8	\$962	0.0%	\$345	0.0%	\$80	0.0%

Table A13														
TRC Measure Values (cont'd)														
Measure	Program Demand		Program Energy		Program Energy		Average Measure Life (Yrs)	TRB/ TRC	Total Resource Benefit		Total Resource Cost		Incentives	
	(kW)	%	(kWh 1st Yr)	%	(kWh - Life)	%			(TRB)	%	(TRC)	%		%
Ice Machine	6	0.0%	54,969	0.0%	659,628	0.0%	12	1.1	\$115,429	0.0%	\$105,000	0.1%	\$4,000	0.0%
Ceiling Fans	1	0.0%	7,988	0.0%	39,941	0.0%	5	1.1	\$7,133	0.0%	\$6,345	0.0%	\$4,935	0.0%
Soundbar	2	0.0%	39,625	0.0%	277,375	0.0%	7	1	\$44,718	0.0%	\$45,855	0.0%	\$14,746	0.1%
Solar Attic Fan	0	0.0%	27,770	0.0%	138,848	0.0%	5	0.7	\$21,125	0.0%	\$30,150	0.0%	\$10,050	0.0%
Custom - Submetering	3	0.0%	22,016	0.0%	176,130	0.0%	8	0.7	\$33,439	0.0%	\$51,000	0.0%	\$15,300	0.1%
Reach-In Freezer Solid Door	1	0.0%	12,072	0.0%	144,864	0.0%	12	0.6	\$25,334	0.0%	\$39,500	0.0%	\$2,575	0.0%
Reach-In Refrigerator Glass Door	0	0.0%	970	0.0%	11,634	0.0%	12	0.6	\$2,036	0.0%	\$3,500	0.0%	\$300	0.0%
Custom Appliances	8	0.0%	72,330	0.1%	874,697	0.0%	12.1	0.5	\$152,700	0.0%	\$325,797	0.2%	\$13,160	0.1%
Electric Griddle	0	0.0%	1,668	0.0%	20,022	0.0%	12	0.5	\$4,212	0.0%	\$9,000	0.0%	\$2,500	0.0%
Reach-In Refrigerator Solid Door	2	0.0%	16,918	0.0%	203,013	0.0%	12	0.3	\$35,550	0.0%	\$107,000	0.1%	\$9,200	0.0%
Refrigerator	0	0.0%	916	0.0%	12,820	0.0%	14	0.3	\$2,446	0.0%	\$8,000	0.0%	\$500	0.0%
Residential A/C	14	0.1%	204,553	0.1%	204,553	0.0%	1	0.2	\$32,932	0.0%	\$185,700	0.1%	\$46,425	0.2%
Cool Roof	1	0.0%	3,168	0.0%	31,678	0.0%	10	0.1	\$8,705	0.0%	\$62,000	0.0%	\$3,100	0.0%
CFL Exchange	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$3,826	0.0%	\$3,707	0.0%
Accounting-Custom Energy Kits	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$58,381	0.3%
No Catalog Entry	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$0	0.0%
Accounting-Freight	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$27,756	0.1%
Non-Qualifying Equipment	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$0	0.0%	\$11,688	0.1%
Accounting	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$351,981	0.2%	\$350,864	1.7%
Ladder Charge	0	0.0%	0	0.0%	0	0.0%	0	0	\$0	0.0%	\$8,911	0.0%	\$8,911	0.0%
Total	18,578	100%	140,816,393	100%	1,758,702,099	100%	12.5	2.1	\$312,887,982	100%	\$148,913,047	100.0%	\$20,305,264	100%

TRC

See **Table A14** below for a comparison of incremental TRC to total project cost.

Table A14			
Total vs. Incremental Measure Cost			
Measure	Measure Total Cost (\$)	Measure Incremental Cost (\$)	Difference (\$)
LED Lighting	\$24,026,547.86	\$16,242,035.11	\$7,784,512.75
Custom Miscellaneous	\$22,754,709.00	\$22,754,709.00	\$0.00
Custom Lighting	\$17,940,193.34	\$17,951,641.14	(\$11,447.80)
Custom HVAC	\$13,498,975.55	\$13,498,975.55	\$0.00
Chillers	\$12,095,852.00	\$2,423,170.40	\$9,672,681.60
LED Omni Directional	\$10,605,091.00	\$8,503,628.00	\$2,101,463.00
VRF Air Conditioners	\$10,064,254.32	\$5,032,127.16	\$5,032,127.16
Solar Water Heating	\$8,405,000.00	\$8,408,400.00	(\$3,400.00)
LED Linear	\$6,094,950.00	\$5,007,490.00	\$1,087,460.00
Refrigerator w/ Trade In	\$2,770,050.00	\$830,880.00	\$1,939,170.00
Custom Controls	\$1,843,705.00	\$1,843,705.00	\$0.00
Custom - High Efficiency Lighting	\$1,338,331.85	\$1,338,331.85	\$0.00
Package Units: 15% Better Than Code	\$1,279,275.01	\$255,855.00	\$1,023,420.01
Peer Group Comparison	\$1,251,103.36	\$1,251,103.36	\$0.00
Custom Refrigeration	\$1,232,725.85	\$1,232,725.85	\$0.00
Custom Pumps & Motors	\$1,047,649.44	\$1,047,649.44	\$0.00
TV	\$788,262.50	\$788,262.50	\$0.00
Split Systems: VRF	\$758,109.90	\$379,054.95	\$379,054.95
Domestic Water Booster Packages	\$693,000.00	\$519,750.00	\$173,250.00
Solar Water Heating Tune-up	\$648,300.00	\$648,300.00	\$0.00
CFL	\$577,376.00	\$433,090.50	\$144,285.50
Custom Water Heating	\$541,463.00	\$541,463.00	\$0.00
Heat Pump	\$533,040.00	\$533,040.00	\$0.00
Submetering (Condo)	\$527,500.00	\$527,500.00	\$0.00
ECM Refrigeration	\$527,018.00	\$527,018.00	\$0.00
Split Systems: 15% Better Than Code	\$504,395.00	\$182,547.40	\$321,847.60
VFD Pump for Chilled Water / Condenser Water	\$466,650.00	\$116,662.50	\$349,987.50
Accounting	\$351,980.79	\$351,980.79	\$0.00

Table A14 (cont'd)
Total vs. Incremental Measure Cost

Measure	Measure Total Cost (\$)	Measure Incremental Cost (\$)	Difference (\$)
Custom Appliances	\$325,797.48	\$325,797.48	\$0.00
LED Refrigerated Case Lighting	\$312,487.16	\$312,487.16	\$0.00
Fluorescent T8 to T8 Low Wattage	\$293,340.00	\$5,866.80	\$287,473.20
ECM Fan Coil	\$290,850.00	\$290,850.00	\$0.00
Package Units: VRF	\$268,819.40	\$134,409.70	\$134,409.70
LED	\$235,620.00	\$188,496.00	\$47,124.00
Fluorescent T12 to T8 Low Wattage	\$202,993.00	\$164,302.60	\$38,690.40
VFD - AHU	\$197,808.00	\$49,452.00	\$148,356.00
Window Film	\$195,658.48	\$48,914.62	\$146,743.86
Heat Pump Water Heater	\$194,400.00	\$194,400.00	\$0.00
Residential A/C	\$185,700.00	\$185,700.00	\$0.00
Window AC w/ Trade In	\$173,920.00	\$42,520.00	\$131,400.00
Advance Power Strips	\$154,871.09	\$154,871.09	\$0.00
VFD Pool Pumps	\$139,650.00	\$112,800.00	\$26,850.00
Reach-In Refrigerator Solid Door	\$107,000.00	\$47,152.50	\$59,847.50
Ice Machine	\$105,000.00	\$10,839.25	\$94,160.75
Water Cooler Timers	\$88,950.00	\$88,950.00	\$0.00
Showerhead	\$77,321.52	\$77,321.52	\$0.00
LED Specialty	\$68,736.59	\$58,716.59	\$10,020.00
Transformer (Three-Phase)	\$66,171.00	\$66,171.00	\$0.00
Cool Roof	\$62,000.00	\$15,500.00	\$46,500.00
LED Exit Signs	\$61,665.00	\$61,665.00	\$0.00
Faucet Aerator	\$59,952.04	\$59,952.04	\$0.00
Accounting-Custom Energy Kits	\$58,381.00	\$0.00	\$58,381.00
Anti-Sweat Heater Controls	\$56,700.00	\$56,700.00	\$0.00
Custom - Submetering	\$51,000.00	\$51,000.00	\$0.00
Whole House Fan	\$49,800.00	\$49,800.00	\$0.00
CFL Omni-Directional	\$43,859.31	\$43,859.31	\$0.00
Reach-In Freezer Solid Door	\$39,500.00	\$14,212.25	\$25,287.75
Fluorescent T12 to T8 Standard	\$31,440.00	\$31,440.00	\$0.00
Solar Attic Fan	\$30,150.00	\$30,150.00	\$0.00
Accounting-Freight	\$27,756.00	\$0.00	\$27,756.00
Rid-A-Fridge (Refrigerator)	\$20,065.00	\$20,065.00	\$0.00

Table A14 (cont'd) Total vs. Incremental Measure Cost			
Measure	Measure Total Cost (\$)	Measure Incremental Cost (\$)	Difference (\$)
Room Occupancy Sensors	\$18,600.00	\$18,600.00	\$0.00
CFL Specialty	\$17,092.46	\$17,092.46	\$0.00
Fluorescent Delamping with Reflectors	\$16,960.00	\$16,960.00	\$0.00
Hot Food Holding Cabinet	\$14,000.00	\$9,343.60	\$4,656.40
Steam Cooker	\$11,154.00	\$5,786.25	\$5,367.75
Fluorescent Delamping	\$9,472.00	\$9,472.00	\$0.00
Electric Griddle	\$9,000.00	\$7,740.00	\$1,260.00
Ladder Charge	\$8,911.00	\$8,911.00	\$0.00
Refrigerator	\$8,000.00	\$1,600.00	\$6,400.00
Ceiling Fans	\$6,345.00	\$1,269.00	\$5,076.00
CFL Exchange	\$3,825.95	\$3,825.95	\$0.00
Reach-In Refrigerator Glass Door	\$3,500.00	\$1,549.10	\$1,950.90
Rid-A-Fridge (Freezer)	\$3,175.00	\$3,175.00	\$0.00
Reach-In Freezer Glass Door	\$1,500.00	\$124.05	\$1,375.95
Transformer (Single-Phase)	\$345.00	\$345.00	\$0.00
No Catalog Entry	\$0.00	\$0.00	\$0.00
Soundbar	\$0.00	\$45,855.00	(\$45,855.00)
Non-Qualifying Equipment	\$0.00	\$0.00	\$0.00
Kitchen Ventilation	\$9,000.00	\$9,000.00	\$0.00
Totals	\$147,583,751	\$116,326,107	\$31,257,644

Note: Incomplete and/or unavailable data have resulted in negative Differences, however portfolio impact is negligible.

APPENDIX B - BUSINESS PROGRAM

Expenditures

BEEM

Table B1 BEEM Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
BEEM Operations	\$875,900.39	\$876,000.00	99.99%	\$99.61	0.01%
BEEM Incentives	\$5,887,495.89	\$5,893,475.00	99.90%	\$5,979.11	0.10%
Total BEEM	\$6,763,396.28	6,769,475.00	99.91%	\$6,078.72	0.09%

CBEEM

Table B2 CBEEM Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
CBEEM Operations	\$600,455.93	\$601,000.00	99.91%	\$544.07	0.09%
CBEEM Incentives	\$4,354,447.44	\$4,363,075.00	99.80%	\$8,627.56	0.20%
Total CBEEM	\$4,954,903.37	4,964,075.00	99.82%	\$9,171.63	0.18%

BESM

Table B3 BESM Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
BESM Operations	\$32,632.28	\$40,000.00	81.58%	\$7,367.72	18.42%
BESM Incentives	\$0.00	\$0.00	0.00%	\$0.00	0.00%
Total BESM	\$32,632.28	40,000.00	81.58%	\$7,367.72	18.42%

BHTR

Table B4 BHTR Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
BHTR Operations	\$369,588.19	\$375,000.00	98.56%	\$5,411.81	1.44%
BHTR Incentives	\$2,882,167.56	\$2,892,288.00	99.65%	\$10,120.44	0.35%
Total BHTR	\$3,251,755.75	3,267,288.00	99.52%	\$15,532.25	0.48%

APPENDIX C - RESIDENTIAL PROGRAM

Expenditures

REEM

Table C1 REEM Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
REEM Operations	\$1,313,316.15	\$1,313,317.00	100.00%	\$0.85	0.00%
REEM Incentives	\$6,444,202.43	\$6,486,580.00	99.35%	\$42,377.57	0.65%
Total REEM	\$7,757,518.58	7,799,897.00	99.46%	\$42,378.42	0.54%

CREEM

Table C2 CREEM Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
CREEM Operations	\$162.50	\$163.00	99.69%	\$0.50	0.31%
CREEM Incentives	\$0.00	\$0.00	0.00%	\$0.00	0.00%
Total CREEM	\$162.50	163.00	99.69%	\$0.50	0.31%

RESM

Table C3 RESM Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
RESM Operations	\$15,535.15	\$15,536.00	99.99%	\$0.85	0.01%
RESM Incentives	\$262,675.00	\$264,500.00	99.31%	\$1,825.00	0.69%
Total RESM	\$278,210.15	280,036.00	99.35%	\$1,825.85	0.65%

RHTR

Table C4 RHTR Program Expenditures					
	Total Expenditures	PY16 Budget (R9)	Percent Spent	Unspent	Percent Unspent
RHTR Operations	\$197,385.92	\$197,386.00	100.00%	\$0.08	0.00%
RHTR Incentives	\$474,276.05	\$583,780.00	81.24%	\$109,503.95	18.76%
Total RHTR	\$671,661.97	781,166.00	85.98%	\$109,504.03	14.02%

APPENDIX D - 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. Upon the end of each program year, a formal evaluation is conducted by the Program Evaluator whereby recommendations are provided to the Program. Updates and improvements are implemented for the subsequent program year in collaboration with the Contract Manager.

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 describes how the Program estimates energy savings from each measure at the Customer Level. In PY16, the TRM was re-organized by program and then alphabetically by measure. The traditional TRM Microsoft Word document was also complimented in PY16 by a companion Microsoft Excel Workbook showing step-by-step calculations for a majority of the measures. This document will be expanded upon to be comprehensive for the PY17 TRM. The PY16 TRM Word document is available as a pdf 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). Measures are calculated at the Customer Level in the TRM. By applying county-level system loss factors, shown in **Table D1**, System Level savings are calculated. Applying a net-to-gross ratio, listed in **Table D2**, to System Level savings provides Program Level savings.

Application of System Loss Factors

The amount of energy saved at a customer site is not equal to the amount saved at the electric utility plant supplying the energy to that site. There are system losses in generation, transmission and 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 D1**.

Table D1 System Loss Factors		
County System to Customer Energy Loss Factors		
Oahu	Maui	Hawaii
11.17%	9.96%	9.00%

The system loss factors were applied to the estimated Customer Level savings for each measure to calculate the impact 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.hawaiienergy.com/information-reports. Hawai'i Energy utilizes the combined Program total NTG ratio of 78%. The values used in PY16 are provided in **Table D2**.

Table D2 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. **Table D3** shows the 20 year utility avoided cost.

Proxy Avoided Cost Developed

The Program's avoided cost is calculated based on the PY2015 PBFA Contract Renewal 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 D4**. The capacity avoided cost for the Program takes into account a prorated demand value based on O'ahu demand achievements of 76% in PY13, as shown in **Table D5**. No capacity savings was used for Maui County for PY16. **Table D4** provides capacity values through year 2033, after which the Program assumes a linear relationship, based on years 2029-2033, to extrapolate the avoided cost for a total of 20 years.

Table D3 20 Year Utility Avoided Cost					
			Discount Rate		
			6%	Utility Avoided Cost	
PY	Year	Measure Life	NPV Multiplier	\$/kW/yr.	\$/kWh/yr.
PY16	2016	1	1.00		\$ 0.166
PY17	2017	2	0.94		\$ 0.171
PY18	2018	3	0.89		\$ 0.176
PY19	2019	4	0.84		\$ 0.181
PY20	2020	5	0.79	\$ 904	\$ 0.187
PY21	2021	6	0.75	\$ 986	\$ 0.192
PY22	2022	7	0.70	\$ 856	\$ 0.198
PY23	2023	8	0.67	\$ 750	\$ 0.204
PY24	2024	9	0.63	\$ 663	\$ 0.210
PY25	2025	10	0.59	\$ 590	\$ 0.216
PY26	2026	11	0.56	\$ 527	\$ 0.223
PY27	2027	12	0.53	\$ 474	\$ 0.230
PY28	2028	13	0.50	\$ 1,020	\$ 0.236
PY29	2029	14	0.47	\$ 1,066	\$ 0.244
PY30	2030	15	0.44	\$ 964	\$ 0.251
PY31	2031	16	0.42	\$ 875	\$ 0.258
PY32	2032	17	0.39	\$ 795	\$ 0.266
PY33	2033	18	0.37	\$ 724	\$ 0.274
PY34	2034	19	0.35	\$ 629	\$ 0.282
PY35	2035	20	0.33	\$ 544	\$ 0.291

Table D4
Avoided Costs Attachment A From Waiver Docket 2013-0056
EEPS (2013-0056) Avoided Capacity Cost

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

HECO

P2_100vs110

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

HELCO

H2_100vs110

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

MECO

M2_100vs110

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

Table D5

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%

APPENDIX E – OUTLINE OF TABLE NUMBERING CHANGES (PY15 TO PY16)

PY16 Tables with corresponding PY15 References	
PY 16 List of Tables	PY15 Table Reference
Table 1	1
Table 2	1a
Table 3	1b
Table 4	2
Table 5	3
Table 6	3a
Table 7	4
Table 8	5
Table 9	8
Table 10	9
Table 11	10
Table 12	11a
Table 13	12
Table 14	13
Table 15	14
Table 16	15
Table 17	17
Table 18	25
Table 19	26
Table 20	33
Table 21	33a
Table 22	34
Table 23	35
Table 24	38

PY16 Tables with corresponding PY15 References	
PY 16 List of Tables	PY15 Table Reference
Table 25	39
Table 26	40
Table 27	41
Table 28	42
Table 29	43
Table 30	44
Table 31	45
Table 32	47
Table 33	51
Table 34	52
Table 35	54
Table 36	55
Table 37	56
Table 38	57
Table 39	59
Table 40	60
Table 41	61
Table 42	62
Table 43	63
Table 44	64
Table 45	65
Table 46	68
Table 47	70
Table 48	72

PY16 Tables with corresponding PY15 References	
PY 16 List of Tables	PY15 Table Reference
Table A1	18
Table A2	19
Table A3	20
Table A4	21
Table A5	22
Table A6	23
Table A7	27
Table A8	28
Table A9	29
Table A10	30
Table A11	31
Table A12	32
Table A13	36
Table A14	37
Table B1	46
Table B2	48
Table B3	50
Table B4	53

PY16 Tables with corresponding PY15 References	
PY 16 List of Tables	PY15 Table Reference
Table C1	58
Table C2	67
Table C3	69
Table C4	71
Table D1	75
Table D2	76
Table D3	77
Table D4	77b
Table D5	77c
Included in Table 4	6
Included in Table 4	7
Included in Table 4	11
Removed in PY17	16
Removed in PY17	24
Removed in PY17	49
Removed in PY17	66
Removed in PY17	77a

ATTACHMENTS

Attachment A: Acronym List

A list of the commonly used Hawai'i Energy acronyms

Attachment B: PY16 Program Participation List

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

Attachment C: PY16 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 D: PY16 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 E: PY16 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, Customer and System Benefits Chart

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